

FLYING ON THE WINGS OF TRUST:
THE STORY OF THE DELTA FARMLAND AND WILDLIFE TRUST
AN EXAMPLE OF COLLABORATIVE COMMUNITY BASED RESOURCE
MANAGEMENT

by
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Abstract

Competition over resources is threatening both agricultural viability and wildlife habitat around the world. One of the ways this problem can be addressed is through agri-environmental non-government organizations (NGOs) that practice community based collaborative resource management. However, there is a lack of academic research on both the formation and development of agri-environmental NGOs in First World industrialized nations and the role that policy plays in their formation and development. It is important to understand how policy affects the formation and development of such organizations in order to address any policy gaps that may exist. My research examines how a community in conflict acknowledged the potential loss of both agricultural and wildlife resources and came together to identify ways to share resources more equitably. Since 1993, the Delta Farmland and Wildlife Trust (DFWT) has been working with farmers and environmentalists to balance the needs of wildlife with the needs of farmers. The DFWT shares the cost of specific management practices that benefit agriculture and wildlife. My research involved face-to-face interviews with 28 individuals who had been involved in the formation and/or development of the DFWT. Content analysis was used to identify common themes in the interviews. Secondary sources of information were reviewed to triangulate the results. The formation of the DFWT came about due to a number of conflicts occurring in Delta at the time. The conflicts were having a negative impact on both agricultural and wildlife habitat viability. The key driving force in the formation of the DFWT appeared to be the willingness of agricultural and conservation interests to work together. Government policy appears to have enabled the formation of the DFWT. However, policy may be impeding the development of the DFWT by limiting the ability of the DFWT to provide agri-environmental stewardship programs in an optimal manner. Agri-environmental policies from three countries were reviewed and a variety of policies that could be used to encourage agri-environmental stewardship in Canada were identified. This research will be of value to individuals and organizations interested in collaborative community based resource management as well as to those interested in developing supportive agri-environmental policy.

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CHAPTER 1

Introduction

1.0 Introduction

This chapter provides a brief introduction to my research. I begin with an overview of some of the agricultural and wildlife habitat conservation challenges faced at the global and local level. I also provide a brief description of the Delta Farmland and Wildlife Trust (DFWT), the organization I used as my case study. I then provide an explanation as to why I became interested in studying the DFWT, the four research questions I developed to guide my study, and how my research will contribute to knowledge.

1.1 Context

Over the past century there has been a fourfold increase in the world human population. The global population is expected to increase to nine billion by 2050 (UN, 2000). Agricultural land is being lost to development and farmers are under intense pressure to produce more food on less land. The industrialization of agriculture has resulted in environmental problems such as soil loss, water pollution, and destruction of wildlife habitat (Stauber et al., 1995). Industrialization of agriculture has also resulted in an increased dependency on fossil fuels and excessive resource consumption. Fossil fuels are typically used as a source of energy for machinery and as a key ingredient in synthetic fertilizers. The pollution caused by burning fossil fuels is one of the factors that contributes to climate change, along with methane from manure and N_2O from fertilizers (IPCC, 2007). These greenhouse gases can reduce the productivity of agricultural land and contribute to biodiversity loss (IPCC, 2007; Costanza et al., 1997).

Biodiversity is declining around the world in both wild and domestic plant and animal populations (Millennium Ecosystem Assessment, 2005). Decreased genetic diversity results in increased vulnerability to disease. In wild populations this can result in reduced species viability. In domestic populations this can result in a greater need for antibiotics in animals and pesticides in crops. Eliminating native plants and animals from farmland either intentionally or unintentionally through clearing or through the use of toxic substances negatively impacts natural ecosystems (Altieri, 2000). In addition, wildlife are being forced onto farmland as a result of urban development where they compete with farmers for limited resources and reduce agricultural productivity (e.g. consuming crops and livestock) (Neave et al., 2000).

Competition for resources is a growing issue around the world. The municipality of Delta (British Columbia, Canada) has faced, and continues to face, competition for resources in its agricultural area. Delta has some of the most productive farmland in Canada (Temple, 1994; Klohn Leonoff Ltd. et al., 1992) and also provides vital habitat for millions of migratory birds (DUC, 2000).

Unfortunately, waterfowl feed on farmers' crops and damage soil. This creates an added expense for farmers. It has also created a great deal of conflict between farmers and conservationists. However, in 1993 the DFWT was founded by local farmers and conservationists interested in conserving agricultural and wildlife resources. The mission of the DFWT is to promote preservation of farmland and associated wildlife habitat on the Fraser River delta through sustainable farming and land stewardship. The DFWT supports both wildlife habitat conservation and agriculture by sharing the cost of specific management practices contributing to soil and/or wildlife habitat conservation and enhancement. These practices include:

- Grassland set-asides
 - Cover crops
 - Field margins
 - Hedgerows
- (DFWT, 2006)

I chose to study the DFWT because I was interested in finding out how opposing interests worked together to solve a local problem that is global in nature. In the next section I provide a brief explanation of why I was inspired to pursue this research.

1.2 Personal Motivation

I grew up in the City of Toronto (Ontario, Canada) within a heavily modified human landscape of roads and buildings. Every week my parents would drive me into the countryside to take horseback riding lessons. Every year the journey became more and more depressing. Farms and forests were disappearing as the city sprawled further and further out into the country. The scenes haunted me. I wondered what would happen to all the farms and wildlife habitat in the future if this kept happening. I realized, upon travelling to different cities around the world, that agricultural land and wildlife habitat were being consumed by cities all over the world. This series of events led me to eventually pursue a degree in sustainable agriculture. I thought that if

I knew more about sustainable agriculture I could save farms and wildlife habitat. However, I soon realized that it was not enough to know about the benefits of sustainable agriculture. I needed to understand how to put the theory of sustainable agriculture into practice. I needed to learn about how to develop policies that would stop this from happening. I decided to study community planning. I felt that by becoming immersed in the 'culture' of planning that I would see development through the eyes of the people who worked in that discipline and could then help prevent agricultural land and wildlife habitat from being lost to development.

I became an Environmental Planner in the Township of Langley, an agricultural community about 90 kms from the City of Vancouver, BC. I learned that my desire to protect agricultural land and wildlife habitat was extremely difficult within the existing policy framework. I discovered that agricultural land, although protected to some extent by the Agricultural Land Commission Act, was being converted to non-agricultural uses (e.g. rural estates) and the remaining agricultural land was being used more and more for intensive industrial agriculture, due to the pressures on farmers to produce inexpensive food in an increasingly competitive environment. As a result, wildlife habitat was being lost and the long term sustainability of the land for farming and/or wildlife appeared to be threatened.

Frustrated by the constraints of municipal government, I decided to start a sustainable agriculture network in Langley, to try to bring people together to focus on more sustainable forms of agriculture. I joined forces with the Langley Environmental Partners Society, a well respected non-government organization that works primarily on watershed stewardship but was also interested in agricultural stewardship. I discovered that it was extremely difficult to secure funding for ambitious long-term solutions such as the network I envisioned. After many years of applying for funding we received a small grant to fund one aspect of our network. This project was intended to match people with unused agricultural land with people looking to farm in a sustainable manner. We discovered that although about 50% of the land in the Agricultural Land Reserve in Langley is not being farmed (BCMAFF, 2001), few people were interested in leasing out their unused land for farming.

As a result of these experiences, I decided that I wanted to examine the current policy framework to determine whether it was acting as an impediment to the concurrent optimization of both agricultural productivity and wildlife habitat on agricultural land. I chose to focus on

the Delta Farmland and Wildlife Trust for a number of reasons. As a resident of Delta at the time the DFWT was formed, I was intrigued by the progress that the DFWT appeared to have made in agri-environmental stewardship. Driving through Delta I would often see signs in farmers' fields announcing that they were part of a DFWT program. Agriculture seemed to be thriving despite having to share resources with millions of birds. I was also familiar with the DFWT through my academic and professional life. Colleagues from both the agricultural community and environmental community often spoke about the DFWT, praising its agri-environmental stewardship programs. Thinking back to my days in Toronto, where the countryside disappeared under rows of identical brick houses, this harmonious scene of man and nature was like a painting from my youth. It filled me with wonder and motivated me to begin my research into the DFWT.

I thought it would be interesting to find out how the organization formed, and whether policy had enabled or impeded the formation and development of the DFWT. I also wanted to explore whether policy reform might facilitate the work they were doing. I developed four research questions to guide my study:

1. What led to the formation of the DFWT?
2. Did government policy enable or impede the formation of the DFWT?
3. Did government policy enable or impede the development of the DFWT?
4. What sorts of government policies could be used to encourage agri-environmental stewardship in Canada?

1.3 Methods

I used a qualitative approach in my research because I felt that it was the most appropriate method of capturing and understanding the perspectives of those involved in the formation and/or development of the DFWT. Qualitative research focuses on specific people or situations emphasizing words rather than numbers (Maxwell, 2005). I conducted face-to-face interviews with people who had been involved in the formation and/or development of the DFWT because I wanted to make a personal connection with each individual. I felt that this would be a better way to interact with people and collect meaningful data about the DFWT than using a self-administered questionnaire. I used content analysis to analyse each interview. I also reviewed secondary sources of information to help triangulate my results and provide additional context.

1.4 Contribution to Knowledge

There is a lack of academic research on both the formation and development of agri-environmental NGOs in First World industrialized nations and the role that policy plays in their formation and development. By documenting how the DFWT formed, I hope to contribute to a better understanding of how competing interests can work together to conserve wildlife habitat and agricultural viability. Two similar community based organizations, the Malpai Borderlands Group and the Cameron County Agricultural Coexistence Committee, were also formed to address competing interests over agricultural and wildlife habitat resources. These case studies are reviewed in Chapter 6 and compared to the DFWT in Chapter 14.

By documenting the accomplishments and challenges of the DFWT I will provide individuals and organizations around the world with the opportunity to learn from the DFWT's experiences. By identifying how policies have affected the formation and development of the DFWT, and examining agri-environmental policies from other countries, I will provide decision-makers and community members with alternative approaches to support agri-environmental stewardship. This research may assist communities around the world to adopt or adapt similar programs that support both the conservation of wildlife habitat and agricultural production. If communities around the world adopt a community based collaborative approach to resource management and governments support such efforts, the global matrix upon which sustainability initiatives are anchored will expand, perhaps leading to more equitable distribution and conservation of resources around the world.

CHAPTER 2

Global Context

2.0 Introduction

This chapter summarizes the global context in which my research is situated by providing an overview of the factors impacting agriculture and wildlife habitat around the world. The effects of population growth, agricultural intensification, climate change, resource depletion, biofuels, and loss of biodiversity on agro-ecosystem sustainability are discussed in the context of human behaviour, the global economy, and government policy.

2.1 Population Growth

During the twentieth century the global population increased dramatically from 1.65 billion to six billion (United Nations Secretariat, 1999). The global population is expected to increase to nine billion by 2050 (United Nations Secretariat, 2008). The Food and Agriculture Organization of the United Nations recently announced that world food stocks are rapidly dwindling. Thirty seven countries are facing food crises as a result of civil strife and disasters. Food security is threatened by rising food prices, historically low food stocks, floods and droughts associated with climate change, high fuel prices, and increasing demand for bio-fuels. Food riots have occurred in some countries as a result of high international cereal prices (FAO, 2007).

2.2 Agricultural Intensification

Population growth, wealth disparities, and uneven distribution of food are driving increased demand for food and urban encroachment into agricultural areas. Farmers are under intense pressure to produce more food on less land. Agricultural intensification has resulted in an increased dependency on external inputs such as pesticides, fertilizers, water, and fossil fuel. Dependency on external inputs increases the vulnerability of farmers to rising prices, reduced input availability, and other market changes. Agricultural intensification has also resulted in environmental problems such as soil loss, water pollution, and destruction of wildlife habitat (McNeely and Scherr, 2003; Pretty, 2002; Gliessman, 2000; Altieri, M.A., 1999).

2.3 Resource Depletion

Modern agriculture has resulted in soil degradation around the world. It is estimated that about 562 million hectares of agricultural land across the globe are degraded (World Bank, 2008). Soil degradation includes salinization, compaction, contamination, loss of fertility, and soil

erosion. Soil is created at about 1 ton per hectare per year, so the losses that are occurring are, in effect, permanent losses, often of an order of magnitude greater. Typical agricultural techniques such as intensive tillage, short crop rotations, use of monocultures, and leaving soil exposed after harvest have contributed to the decline in soil quality and quantity (Gliessman, 2000).

Modern agriculture has also had a significant impact on communities around the world. There has been a global trend towards fewer farms and consolidation of small farms into large farms (Pretty et al., 2001; Gliessman, 2000). This has left agricultural production in the hands of relatively few people. In addition, children from farming families are leaving the farm for jobs in cities. Local knowledge about farming and the ecosystems in which farms operate is being lost as farming communities dissolve (Gliessman, 2000).

Farm conglomeration to produce commodities for export has forced local farmers in developing countries to farm marginal lands. Farming of marginal lands can result in deforestation, soil erosion, and ecological damage (Gliessman, 2000). The decline in non-renewable resources, such as fossil fuels, is of great concern to the agriculture industry. Fossil fuels are typically used as a source of energy for machinery and as a key ingredient in synthetic fertilizers. The pollution caused by burning fossil fuels contributes to climate change, which can reduce productivity of agricultural land and contribute to biodiversity loss (Gliessman, 2000; Costanza et al., 1997).

2.4 Climate Change

Climate change poses a serious threat to communities around the world (Solomon et al., 2007; Pretty, 2002). Impacts of climate change include rising sea levels, increased frequency and magnitude of storm events, greater fluctuations in temperature, droughts, and floods. The impact of climate change on agricultural production will vary. Some areas may see increased productivity as a result of greater precipitation or warmer weather while other areas may be unable to continue food production (e.g. low lying coastal areas inundated by rising sea level) (Solomon et al., 2007). Ongoing effects of climate change are likely to increase the vulnerability of the global food supply. For example, a significant change in climate in an area of high production could cause a significant drop in food supply, resulting in a reduction of local and global food security (Rosenthal, 2007).

2.5 Biofuels

The dwindling supply of fossil fuel, combined with concern over the contribution that burning fossil fuel makes to climate change, has resulted in an increase in the production of crops, such as corn and sugar cane, used for biofuel. Unlike fossil fuels, biofuels are considered to be a renewable resource. Production of biofuels has created new opportunities as well as new problems for both agriculture and wildlife habitat (FAO, 2008).

There are a number of concerns over the production of crops for use as biofuels. These include potential for competition between food security and energy security, competition for water resources, impact on agricultural markets and food prices, as well as effects on the environment and biodiversity. In addition, there is concern that there may be no net energy gain from the production of biofuel. The fossil fuel inputs that are needed to grow, harvest, and process the crops may exceed the amount of biofuel that is produced. In the end, the production of biofuels may not be any more sustainable than the use of fossil fuels (FAO, 2008).

Increasing the production of cash crops and biofuel crops is likely to put enormous pressure on the environment. The use of inputs such as water, fertilizers, fossil fuels, and pesticides to grow the crops may contribute to groundwater pollution, land degradation, and loss of biodiversity. In addition, there is concern that marginal lands will be put into production in order to meet food and biofuel demands. Loss of fragile ecosystems is of particular concern as the loss of these areas is likely to result in a loss of wildlife habitat and biodiversity (FAO, 2008).

2.6 Biodiversity

Biodiversity can be defined as:

...the diversity among living organisms in terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part. It includes diversity within and between species and the diversity of ecosystems. (Mace et al., 2005, p. 80)

Biodiversity is a prerequisite for sustainability. Biodiversity should be thought of as an environmental condition because it is "...the *source* of all the other values that we derive from natural environments and that future generations will depend upon (Wood, 1997; Norton 2001, 2003)" (Wood and Flahr, 2004, p. 384-385). It is important to conserve wildlife habitat because it contains a wide array of biodiversity. If wildlife habitat is not conserved, this will lead to a loss of biodiversity and will undermine attempts at sustainability.

Unfortunately, biodiversity is declining around the world. In 2001, the Millenium Ecosystem Assessment (MA) project was launched by the United Nations. The MA found that ecosystems have changed more quickly and expansively than in any other comparable period of time in human history and that this has resulted in a sizeable and largely irreversible loss of diversity on Earth (MA, 2008). Loss and fragmentation of natural habitat are key factors in the decline of biodiversity (Mace et al., 2005).

Biodiversity has been significantly impacted by agricultural development. Agricultural production contributes to biodiversity loss through the over-exploitation of wild resources, nutrient loading, and changes in land use (Wood and Ehui, 2005). Wildlife habitat is destroyed or fragmented when landscapes are modified to accommodate agricultural fields, barns, and roads. This results in the displacement, or loss, of species and alteration of the natural ecosystem (Wood and Ehui, 2005; Neave et al., 2000). In addition, wildlife are being forced onto farmland as a result of urban development where they compete with farmers for limited resources and reduce agricultural productivity (e.g. consuming crops) (Neave et al., 2000).

Wildlife may also be intentionally destroyed because they threaten agricultural productivity. For example, rodents and other animals, such as birds, will feed on crops growing in fields and also after the crops have been harvested and stored (McNeely and Scherr, 2003). Eliminating native plants and animals from farmland, either intentionally or unintentionally through land clearing or through the use of toxic substances, negatively impacts natural ecosystems (Altieri, 2000). Despite these negative influences, agricultural land offers more benefits to wildlife than residential, commercial, or industrial areas. Agricultural land can provide shelter, food, connectivity to natural landscapes, and less human intervention than urbanized areas (Neave et al., 2000).

Genetic diversity within agriculture is also declining. Crop uniformity improves productive efficiency because it allows for the standardization of management practices. However, the use of genetically homogenous crops in agricultural production increases the susceptibility of crops to pests, and this has resulted in increasing pesticide dependency (Gliessman, 2000). Pesticides can contribute to water pollution, reduce natural biodiversity (by killing non-target insects), and pose risks to human health (Pretty et al., 2001).

The cumulative effect of a growing global population, agricultural intensification, declining amount of farmland, climate change, dwindling supplies of fossil fuels, production of biofuels, use of synthetic fertilizers and pesticides, declining biodiversity and loss of wildlife habitat have the potential to negatively affect the sustainability of agro-ecosystems around the world.

2.7 Human Behaviour

In this section, I focus on how human behaviour can affect the sustainability of societies. Tainter (1988) reviewed eighteen societies to determine what factors led to their collapse. He found that these societies increased in complexity over time. He defined societal collapse as a "...a process of decline in complexity" (Tainter, 1988, p. 31). Tainter (1988) concluded that the collapse of complex societies results from diminishing marginal returns. He explains that: "as the marginal return on complexity declines, complexity as a strategy yields comparatively lower benefits at higher and higher costs" (Tainter, 1988, p. 127). In other words, as societies become more complex, continued investment in complexity yields smaller returns. Consequently, a society must allocate more and more resources to maintaining the population. However, after a certain point, increased investment yields smaller increments of return. One of the ways in which this can be alleviated is to restrict population growth, thereby reducing the amount of resources needed to sustain the society.

Diamond (2005) reviewed six culturally complex past societies and found that intensification of agriculture was a precursor to societal collapse. He found that, in most cases, population growth forced people to farm the land more intensively and to expand farming from prime agricultural land onto marginal lands in order to feed the growing population. The marginal lands were damaged by the intensive agriculture and eventually abandoned. The remaining agricultural land deteriorated in quality, resulting in food shortages and starvation. Competition for limited resources then ensued, with wars over control of remaining resources. Eventually the combination of starvation, disease, and war rendered the society unsustainable and the civilization perished (Diamond, 2005).

Diamond (2005) explains that we are facing the same environmental problems today as those that he identified in the downfall of previous societies, plus four additional problems: "...human-caused climate change, buildup of toxic chemicals in the environment, energy shortages, and full human utilization of the Earth's photosynthetic capacity" (Diamond, 2005,

p. 7). Many of these destructive processes were discussed in the previous section. If Diamond is correct in his analysis of the downfall of previous societies, it appears as though modern society is on a trajectory to collapse. Diamond predicts that such a collapse could be triggered by a scarcity of environmental resources and may appear in a variety of forms including global pandemics and worldwide wars (Diamond, 2005).

Diamond developed a five-point framework of contributing factors that have led to the collapse of past societies. He explains that four of those factors: environmental damage, climate change, hostile neighbors, and decreased support by friendly trade partners may or may not be significant enough on their own to cause the collapse of a society. However, he says the fifth factor, society's response to its environmental problems, is always significant. Diamond explains that a society's response depends on its social, political, and economic institutions, as well as its cultural values. The institutions and values of a society will affect whether or not it solves, or attempts to solve, its problems (Diamond, 2005).

Unfortunately, despite the ability of humans to anticipate and respond to such dire warnings, humans may actually be unsustainable themselves. In a study to measure whether humans fall within the natural variation observed among species for a variety of ecological measures, Fowler and Hobbs (2003) found that humans generally do not fall "...within statistical confidence limits that envelop the central tendencies in variation among other species" (Fowler and Hobbs, 2003, p. 2579). They found that human CO₂ production, energy use, biomass consumption, population size, and geographical range differ from other species by orders of magnitude. They found that the human species is often an outlier compared to other species and concluded that the evidence appeared to indicate that humanity is not currently sustainable (Fowler and Hobbs, 2003).

Rees (2004) has described humans (*H. sapiens*) as a "patch disturbance species" (Rees, 2004, p. 5) whose [unsustainable] actions are rooted in biology. The argument is based on two key behaviours typical of patch disturbance species. Human beings are large animals with correspondingly large energy and material requirements. They are also social beings that tend to live in large groups. The result of these two biologically entrenched behaviours is that when humans occupy a territory, they do so with large energy requirements, resulting in changes in

the ecosystem, specifically in terms of the allocation of energy and resources. Some species will benefit from this reallocation of resources, while others will not (Rees, 2004).

Ultimately, there appears to be a biological foundation for the tendency of humans to ‘soil their own nest’ and destroy the life systems upon which they depend. Rees (2004) provides a number of examples of how human behavior is leading us away from sustainability:

- *H. sapiens*, like all other species, has a biological imperative to expand into any available habitat
- Our ability to communicate and use technology to further our advances has made us the most successful large vertebrate on the planet
- While we depend on biodiversity to survive, human evolution has left us with few qualms about destroying the habitats of other species (and our own habitats)
- The prevailing economic paradigm is predicated on economic growth which has resulted in the exploitation of natural resources and further dissipation of energy
- The ‘value’ of biodiversity is not included in our current market structure, so markets do not indicate impending ecological scarcity, resulting in ongoing and unimpeded biodiversity loss

(Rees, 2004)

The combination of these factors puts the integrity of the ecosphere, and all those human and non-human species that depend on it for survival, at risk of collapse. The scale of human exploitation of material and energy resources is compromising the ability of the earth’s life support systems to continue to support human society (Manno, 2000). While resource depletion may ultimately cause the downfall of society, it is human behaviour that has led to this predicament.

However, as Diamond (2005) points out, his research shows that the manner in which humans behave in the face of environmental crises can affect whether or not a society is sustainable. He describes a number of societies that have been sustainable over thousands of years. For example, he explains how the Pacific Islands, Tikopia and Tonga, have each survived for over 3,000 years. Diamond (2005) explains how Tikopia used a bottom-up approach to achieve sustainability while Tonga used a top-down approach, two contrasting approaches to solving environmental problems. Diamond (2005) hypothesizes that small societies occupying a small

homeland area or island, such as Tikopia (1.8 square miles), can adopt a bottom-up approach to environmental management:

...because the homeland is small, all of its inhabitants are familiar with the entire island, know that they are affected by developments through the island, and share a sense of identity and common interests with other inhabitants. (Diamond, 2005, p. 277)

Bottom-up management involves people working together to solve their own problems. Because the society is small, everybody realizes that they will benefit from managing the environment properly (Diamond, 2005).

The top-down approach is suited to a large society with a centralized government such as Tonga (288 square miles). In a large society it is impossible for all members of the society to know what is going on in different parts of the island. A centralized government has the ability to oversee what is going on across the island, and create rules and regulations to ensure that the environment is protected over the whole island (Diamond, 2005). These approaches are not mutually exclusive. For example, in a country such as Canada, senior governments use a top-down approach to establish environmental management policies (e.g. Canadian Environmental Protection Act) intended to benefit all Canadians, while local groups (e.g. NGOs) use a bottom-up approach to engage community members in resource stewardship.

Over time humans have proven to be capable of incredibly destructive behaviour towards other humans as well as towards the environment. However, humans have also shown that they are capable of solving resource management issues and some societies have avoided collapse, remaining sustainable for thousands of years. Whether a society uses a top-down or bottom-up approach, or a combination of the two, the key factor appears to be the willingness of people to behave in such a way that their actions support sustainable resource management.

2.8 Economics and Policy

A major barrier to sustainable agriculture has been government policies that encourage the use of external inputs and technologies. A lack of government support for sustainable agriculture has meant that farmers who want to switch from high-input to more resource conserving practices cannot do so without incurring some additional costs. This acts as a disincentive to farmers who want to change to more sustainable methods of farming (Pretty, 1998).

In addition, governments have traditionally separated agricultural policy from environmental policy. This disconnection of food from nature has resulted in agricultural production systems that negatively impact environmental systems (Pretty, 2002). Trade policies have also tended to focus on the economic development of agriculture without taking into consideration the impact on, or the importance of, biodiversity in the maintenance of sustainable agro-ecosystems (CBD, 2008). Pretty explains that, “Policy integration is vital; yet most policies seeking to link agriculture with more environmentally sensitive management are still highly fragmented” (Pretty, 2002).

Agricultural production can produce both positive (e.g. wildlife habitat) and negative externalities (e.g. loss of biodiversity). These externalities are not captured in the marketplace, so without government intervention farmers have little incentive to change their practices (to decrease negative externalities or increase positive externalities). Policy reforms are needed to internalize some of these costs and benefits (Pretty, 2002).

2.9 Summary

Agro-ecosystem sustainability is in a precarious position around the world. Population growth, agricultural intensification, climate change, loss of biodiversity, and resource depletion, driven by the elusive specter of human behaviour, are coalescing and setting the stage for a global food crisis and ecological collapse. The market-driven global economy combined with government policies that support high-input agriculture at the expense of the environment contribute to the challenges faced in sustaining agro-ecosystems. While this may appear to be an intractable problem, it is apparent that some societies have managed to remain sustainable for thousands of years. The manner in which societies manage their resources and how they behave when confronted with environmental problems appear to be important factors in sustainability. My research will explore how agricultural and environmental interests changed their behaviour, switching from antagonists to collaborators, to address an agri-environmental crisis that was affecting wildlife and agriculture in their community.

CHAPTER 3

Federal and Provincial Context

3.1 Introduction

This chapter provides an overview of the status of agriculture and wildlife habitat in Canada and British Columbia. It describes the federal and provincial agricultural and environmental context for my research. Statistics related to land area, population, agriculture, biodiversity, and wildlife habitat are summarized. Federal and provincial policies related to my research are discussed in Chapter 13.

3.2 Area and Population

Canada is the second largest country in the world (Environment Canada, 2008a). It covers an area of 9,017,698.92 square kms (Statistics Canada, 2006a) and has a population of about 33 million (33,143,610) (Statistics Canada, 2008a). Eighty five percent of the population is located along Canada's southern border with the United States (Environment Canada, 2008a). Canada's population is forecast to grow to between 36 million and 42 million people by 2031 (Statistics Canada, 2006b).

British Columbia (BC) is situated on the west coast of Canada adjacent to the Pacific Ocean. It has a land area of 924,815.43 square kms and population of 4,113,487 (Statistics Canada, 2006a). BC's population is expected to increase by 36% between 2001 and 2031 (BC Stats, 2004). More than half (52%) of the people in BC live in the Vancouver area (BC Stats, 2007a).

3.3 Agriculture

3.3.1 Canada

In 2006, Canada had 229,373 census farms, averaging 728 acres in size (Statistics Canada, 2008b). The number of farms in Canada dropped by 7.1% between 2001 and 2006 (Statistics Canada, 2006c). Based on the most recent available statistics (2005), the agricultural industry provided one in eight jobs in Canada and accounted for eight percent of total GDP. The agriculture and agri-food system contributed \$86 billion (constant 1997 dollars) or 8% to the Canadian economy and employed 2.1 million Canadians in 2005. The agriculture and agri-food system has been growing at an average rate of 2.4% per year over the past decade with most of the growth occurring in Food, Beverage and Tobacco processing, food retail/wholesale and

foodservice. Growth has been driven partly by export, particularly exports of consumer oriented products (AAFC, 2007).

Canada has increased its share of world agriculture and agrifood trade over the past 15 years in response to trade liberalization and changing market conditions. The North American Free Trade Agreement (NAFTA), in particular, has resulted in increased trade within the North American market. There has been a nine-fold increase in exports to Mexico and a quadrupling of exports to the United States since 1991. The rising Canadian dollar slowed exports in 2008. Recent growth in biofuel production has created an increased demand for feedgrains and oilseeds resulting in higher prices for livestock feed (AAFC, 2007).

Field crops are the most common commodity grown in Canada (39.8% of all Canadian farms). The second most common commodity is beef (26.6% of all Canadian farms). The average size of the Canadian farm increased from 274 ha to 295 ha between 2001 and 2006, although the total agricultural land area remained the same at 67 million ha. Vegetable production decreased by 6.9% across Canada between 2001 and 2006. Vegetable processors across Canada have closed or become less competitive because of the rising Canadian dollar, competition with imported vegetables, and greenhouse grown vegetables (Statistics Canada, 2008b).

3.3.2 British Columbia

Less than five percent of BC has land that is considered to be arable or potentially arable. Nonetheless, agriculture is BC's third largest primary industry, behind forestry and mining (BCMAL, 2006). Approximately 5% of the province's land base is contained within the Agricultural Land Reserve (ALR). The ALR was established between 1974 and 1976 to address the rapid loss of agricultural land to development. Agriculture is intended to be the primary use of land in the ALR, although there is an application procedure to allow other uses in the ALR (ALC, 2008).

According to the 2006 Census of Agriculture there were 19,844 census farms in BC. The number of farms in BC has dropped by 2.2% since 2001. However, the total number of census farms in BC in 1971 was 18,400, indicating a 7.9% increase in farms between 1971 and 2006 (BCMAFF, 2002). BC also accounts for 8.7% of Canada's farms, which is slightly higher than its share in 2001. The total number of farms in BC is the fifth highest in Canada. BC's total

gross farm receipts were \$2.7 billion in 2005, while operating expenses were \$2.4 billion (Statistics Canada, 2006c).

Farms in BC are getting larger. In 2001 the average farm size was 128 ha. In 2006 the average farm size rose to 143 ha (Statistics Canada, 2006c). Unlike some other provinces that experienced decreases in total farm area, BC's total farm area increased by 9.6% between 2001 and 2006 (Statistics Canada, 2008b). BC accounts for about 1.6% of all cropland area in Canada (Statistics Canada, 2006c). Cropland is defined by Statistics Canada as: "...the total area in field crops, fruits, vegetables, sod and nursery" (Statistics Canada, 2006c, p. 1).

The area under greenhouses grew 14.7% between 2001 and 2006 to 57.3 million square feet. BC has 24% of the total greenhouse area in Canada. BC ranks third (behind Ontario and Quebec) in terms of total acres of vegetables. However, there has been a drop of 4.4% in vegetable production in BC in that time (Statistics Canada, 2006c). Blueberries have become a popular crop across Canada and have been a driving factor in the fruit sector. BC experienced a dramatic increase in blueberry area of 61.5% between 2001 and 2006 (Statistics Canada, 2008b).

Farm operators are ageing across the country. The average age of farm operators increased from 49.9 years of age to 52.0 years of age between 2001 and 2006. The average age of farm operators in BC was the highest in Canada at 53.6 years of age (Statistics Canada, 2008b).

This section identified the current trends in agriculture in BC and Canada. This information provides valuable context for my research because it illustrates that many of the global trends in agriculture (e.g. fewer farmers, larger farms) are also being seen at the national and provincial levels. The impact of these trends on agri-environmental stewardship is discussed in greater detail in Chapter 14.

3.4 Biodiversity and Wildlife Habitat

There are more than 70,000 plant and animal species in Canada (CESCC, 2001). More than 400 of these species are at risk of extinction. Most of the threatened or endangered species live in areas heavily impacted by humans (Environment Canada, 2008b). British Columbia is the most biologically diverse province or territory in Canada (BCMELP and BCMOF, 1988). This biological diversity is linked to BC's climatic and geographic diversity. Three out of the four

broad continental climatic regions are found in BC. These climatic regions are polar, humid temperate, and dry. The interaction of these climatic regions with BC's land systems creates fourteen distinct climates. The diversity of wildlife in BC results from this interrelationship between climate and land (BCMOE, 2008a).

The following table (Table 3.1) provides estimates on some of the plant and animal species found around the world and in Canada and BC (where estimates are available). It illustrates the high biodiversity found in BC compared to the rest of Canada.

Table 3.1 Plant and animal species estimates

Description	Estimated number of species in the world	Estimated number of species in Canada	Estimated number in BC
Ferns	11,000	122	BC has 78 species of ferns (second highest in Canada)
Butterflies	20,000	284	BC has higher species richness (182 species) than any other region in Canada
Birds	No data	462 resident species	BC has the most bird species in Canada (362)
Mammals	4,629	209 resident species	BC has the most terrestrial mammal species in Canada (118); the Pacific Ocean region has the most marine mammal species in Canada (26)

Source: Adapted from (CESCC, 2001, p. 16-33)

There was a 5% decline in wildlife habitat capacity on Canada's agricultural land between 1981 and 2001 due to an expansion in cropland and decline in pasture (Javorek et al., 2007). Habitat capacity in BC decreased by less than 2% during the same time period, mostly due to a decline in the relative share of pasture on farmland (Javorek et al., 2007). Between 1981 and 1996 cropland grew by 28% in the Lower Mainland (the area in and around Vancouver). This is considered to be a negative trend for wildlife because much of this expansion came from the conversion of tame or seeded pasture (which is more favourable for wildlife habitat) to cropland (Neave et al., 2000).

3.5 Summary

Population growth will continue to put pressure on agricultural lands and wildlife habitat across BC and Canada. Farms are decreasing in number but increasing in size. The average age of farmers is increasing, indicating that fewer young people are becoming farmers. There has been an increase in the area under greenhouses and a drop in vegetable production. Growth in the biofuel sector has resulted in higher prices for livestock feeds. These changes in agriculture are likely to have an impact on farmers across Canada and BC. Wildlife habitat is decreasing on farmland in BC and the Lower Mainland. This is likely to have a negative impact on farmers who do provide wildlife habitat, because as the area of farmland available for wildlife decreases the concentration of wildlife on farms that do provide wildlife habitat will increase. It will also have a negative impact on wildlife because they will have fewer areas in which to feed, breed, and rest. This information provides some of the context that is necessary to help develop my research questions, which are discussed in Chapter 7. The next chapter discusses the state of agriculture and the environment at the regional and local level.

CHAPTER 4

Regional and Local Context

4.1 Introduction

This chapter provides statistics on area, population, and agricultural production in the GVRD and Delta. It also provides an overview of agricultural operations in Delta, farming challenges, wildlife habitat, and wildlife-farming conflicts. This information is provided in order to establish the regional and local context in which my research is situated and to contribute to the rationale I used to develop my research questions (discussed in Chapter 7). The chapter also introduces the Delta Farmland and Wildlife Trust in order to provide some background on the organization I have chosen as my case study (discussed in greater detail in Chapter 9).

4.2 Greater Vancouver Region

The Greater Vancouver Regional District (GVRD) is part of a larger corporate entity called Metro Vancouver, which also includes the Greater Vancouver Water District, the Greater Vancouver Sewerage and Drainage District, and the Greater Vancouver Housing Corporation. The GVRD is comprised of 22 member municipalities and one electoral area (MV, 2008). For the purposes of this research I refer only to the GVRD (as opposed to Metro Vancouver) because the GVRD encompasses the geo-political aspect of the Greater Vancouver region whereas the other responsibilities under the Metro Vancouver umbrella relate to the services that Metro Vancouver provides to municipalities in the region.

The GVRD's estimated population (as of July 2007) was 2,249,725 (BC Stats, 2007b). The population of Greater Vancouver is expected to grow to 3,142,500 by 2036 (BC Stats, 2008). Agriculture is an important industry in the GVRD. According to Statistics Canada data for 2006 (the most recent census year), total gross farm receipts for the GVRD equalled \$728,604,105. There are 2,618 farms with 3,850 farm operators in the GVRD. The average age of a farm operator in the GVRD is 54.6 years. The GVRD has a land area of about 287,700 ha. The total area of farms in the GVRD is 41,035 ha with an average farm size of 16 ha. Fifty-nine percent of the total area of farmland in the GVRD is planted in crops (24,086 ha) (Statistics Canada, 2006d).

This information provides additional context for my research because it illustrates that global trends in population growth are also occurring regionally. It also shows that the trend toward

older farmers that is occurring nationally and provincially is also occurring at the regional level. The implications of these trends on agriculture and the environment are discussed in greater detail in Chapter 14.

4.3 Delta

The municipality of Delta is part of the Greater Vancouver Regional District (GVRD). Delta has an area of approximately 183.70 square kilometers (Statistics Canada, 2008c). Delta's estimated population, as of July 2007, was 101,668 (BC Stats, 2007b). Delta is situated about 20 kilometers from the City of Vancouver. It is bounded by the Fraser River to the north, Boundary Bay to the south, the Strait of Georgia to the west, and the City of Surrey to the east.

The land area we now know as Delta began forming about 8,000 years ago as a result of the accumulation of sediment from the Fraser River, as it fanned out into the Strait of Georgia. Much of the low lying areas in and around Delta flooded during the spring freshet of the Fraser River, but most of the area is now dyked eliminating the regular inundation of sediments and fresh water across the low lying areas of Delta (Butler and Campbell, 1987).

Vegetation in Delta has been modified by humans for thousands of years. The dominant environmental influence in the establishment of vegetation in the lowlands of Delta was the incidence of regular flooding. As a result, the native vegetation consisted of grasses and shrubs that could tolerate regular flooding. Deciduous and coniferous trees became established on the higher river banks, beach ridges, and other drier areas. Only remnants of the original vegetation remain in a relatively natural state today. The lowland vegetation has been almost entirely replaced by agricultural, residential, or commercial land use (North et al., 1979).

4.3.1 Agriculture

Delta has some of the most productive farmland in Canada. It receives about 1000 mm of precipitation annually and has the longest period of frost free days in Canada (April 15 – October 21). Much of the agricultural land in Delta has prime agricultural capabilities (Class 1-3) allowing a wide variety of crops to be grown (Saddlemyer et al., 2001; DFWT, 1994; Klohn Leonoff Ltd. et al., 1992). Soils in the lowlands of Delta are comprised of fertile silt clays or silt. They have good water storage capacity and the potential to sustain crop production year-round (Temple, 1994; Klohn Leonoff Ltd. et al., 1992). The lowlands of Delta (where agricultural operations are located) are at, or below, sea level.

Delta has a very resilient and historic farming community (Saddlemeyer et al., 2001). The Delta Farmers' Institute (DFI) was one of the first farming institutes to be formed in BC in 1898 (BCMAFF 1996) and is still very active today. According to the 2006 Census of Agriculture, there were 180 census farms and 260 farm operators operating on 7520 ha of farmland in Delta. Since 2001, the number of farms in Delta decreased by 16, the number of farm operators decreased by 20, and the area being farmed decreased by 320 ha. As of 2006, the average age of farm operators in Delta was 54.6 years and the average farm size was 42 ha. In 2006, Delta farms generated \$190,315,672 in total gross farm receipts (26% of the total farm receipts for the GVRD) (Statistics Canada, 2006e).

According to the 2006 Census of Agriculture, the top three farm types in Delta by industry were: vegetable farms (22%), animal production (mainly dairy cattle and horses) (19%), and greenhouse, nursery and floriculture production (18%). The total land area in crops in Delta in 2006 was 6,303 ha (Statistics Canada, 2006e). The top five crops produced in Delta in 2006 are shown in Table 4.1.

Table 4.1 Top five crops produced in Delta (2006)

Top 5 crops	2006 Area (hectares)
1. Potatoes	1660
2. All other tame hay and fodder crops	1445
3. Green or wax beans	769
4. Blueberries	360
5. Sweet corn	341

Source: (Statistics Canada, 2006e)

4.3.1.1 Farming Challenges

Delta has a long history of conflict and competing interests over agricultural land (Saddlemeyer et al., 2001). In the late 1960s, 1641.4 hectares (4056 acres) of farmland was expropriated by the province of BC for port-related industrial development (Norecol et al., 1994). The farmland, known as the 'Back-up Lands' (Klohn Leonoff Ltd. et al., 1992), was not immediately developed, but the land was leased back to farmers on short-term year-to-year-leases which included a clause that the lease could be revoked with 90 days notice (Fraser, 2004). As a result of these short-term leases, farmers were reluctant to make capital investments to keep the land productive over the long-term (Fraser, 2004; Klohn Leonoff Ltd.

et al., 1992). In a survey conducted in 1991, farmers expressed concern and frustration that they were being forced to mine the soil as a result of the short-term leases. They also suggested that incentives for soil management should be provided (Klohn Leonoff Ltd. et al., 1992). Eventually in 1999, the Province of BC offered to sell the Back-up Lands that had been expropriated to the original farmers or their families (Delta Optimist, 2007).

Agricultural productivity has been sub-optimal because of numerous soil issues including inadequate sub-surface drainage and declining soil organic matter levels (Klohn Leonoff Ltd. et al., 1992). The soil also tends to be acidic which reduces agricultural productivity (DFWT, 2006). Wildlife, particularly waterfowl, can have a devastating effect on farmers' fields. Both resident and migratory birds consume crops and compact soil. Since Delta is part of the Pacific Flyway, migratory birds rely on farmers' fields to rest and feed (DFWT, 2006; Saddlemyer et al., 2001; Klohn Leonoff Ltd. et al., 1992).

Fragmentation of agricultural land is a serious issue in Delta. Utility and transportation corridors (e.g. roads, rail) impact individual farms by reducing the amount of farmable land, creating barriers to the movement of farm equipment, and cutting neighbouring farms off from each other (Klohn Leonoff Ltd. et al., 1992). The use of farmland or land adjacent to farmland for recreation has also been an issue for some farmers, particularly those living near the dyke. Visitors using the dyke will sometimes park on farmland or block access to the dyke with their cars. Farmers use the dyke to move their farm equipment and the presence of people and their vehicles can delay farming operations. Vandalism and loose dogs also create issues for some farmers (Klohn Leonoff Ltd. et al., 1992).

In 1988, the provincial government made a significant change to policy related to golf courses in the Agricultural Land Reserve (ALR). The policy change, Order-in-Council 1141/88, allowed golf courses as an outright use in the ALR with municipal government having the final say over golf course applications. Prior to this policy change, golf courses were not permitted in the ALR unless approved by the provincial Agricultural Land Commission (Saddlemyer et al., 2001; Klohn Leonoff Ltd. et al., 1992). This policy change led to a flood of golf course development applications in Delta from farmers wishing to convert their farmland to golf courses. Environmentalists vehemently and vocally opposed the golf course applications. They felt that agricultural land was important not only for producing food, but also for providing

wildlife habitat (BBCC, 1992). In 1991, a moratorium was put on the development of golf courses in the ALR. The Golf Course Development Moratorium Act was passed in 1992, effectively halting the flood of golf course applications (Norecol et al., 1994).

In the 1990s the number and size of greenhouses in Delta began to increase. This worried environmentalists who were concerned that the greenhouses would negatively impact migratory birds, raptors, and shorebirds in Delta. The Municipality of Delta attempted to pass a series of bylaws intended to restrict or prohibit certain agricultural activities, including the development and operation of greenhouses. Greenhouse operators responded by launching legal action against the municipality. The Province of BC became involved and issued an Order-in-Council (#568) in June 2001. This Order-in-Council stipulated that the municipality could not pass any zoning bylaws restricting farming in the ALR without first receiving approval of the Minister of Agriculture (Saddlemyer et al., 2001).

The price of agricultural land, although ostensibly protected from urban development by the ALR, has risen along with the price of developable land due to speculation that the land could be developed in the future. This has resulted in land prices that are out of reach for many farmers, leading them to lease land rather than own it (Norecol et al., 1994; Klohn Leonoff Ltd. et al., 1992). Just over half (52%) of Delta's farmland is owned by the farmer. The remainder is rented, leased, or crop shared (Statistics Canada, 2006e). Much of this leased land is owned by speculators hoping that one day they will be able to subdivide and develop the land (Smith 1998). This drives up the price of agricultural land, making it more difficult for farmers to make a profit and increasing the risk of investment for farmers. This also puts the farming community itself at risk as farmers weigh the costs and benefits of farming. As costs increase, the risk that farmers will leave Delta also increases, which could lead to the loss of the critical mass of farmers needed to maintain a viable agricultural industry in Delta (Norecol et al., 1994; Klohn Leonoff Ltd. et al., 1992).

Adding to the economic pressures of farming in the urban shadow of Vancouver, are the pressures of international trade. After the Canada-US Free Trade Agreement was signed in 1989 several vegetable processors that bought produce from local farmers moved out of the area or closed down. The loss of the processors meant that local farmers had to diversify their agricultural operations in order to stay in business (Saddlemyer et al., 2001). Delta's

agricultural viability is linked, not only to local issues such as land speculation and soil degradation, but also to international policies such as free trade and competition with imported food produced without the same economic, social, and environmental challenges facing Delta farmers.

In 2003, the Province of BC launched the Gateway Program, which was aimed at reducing traffic congestion and improving movement of people and goods in the region. Part of the Gateway Program includes the construction of the four-lane South Fraser Perimeter Road, which will pass through Delta (Gateway, 2008). This road will result in the loss and further fragmentation of agricultural land in Delta.

In 2004, the Vancouver Port Authority initiated the Deltaport Third Berth Project at the existing Roberts Bank Port facility in Delta. The project includes the creation of new land with 50 ha of fill to accommodate a container operations and storage area as well as a wharf to accommodate a third berth (Deltaport, 2004). The project is part of the Port's overall strategy to expand container capacity to accommodate increased trade with Pacific Rim nations – particularly China. The BC Rail Company will be installing seven kilometers of additional track on the Roberts Bank causeway to accommodate increased container traffic. The Port of Vancouver acknowledges that the construction of the Deltaport Third Berth will result in an increase in vehicular and rail traffic in Delta (Port of Vancouver, 2008). This will add to the challenges farmers already face in moving farm equipment. The increase in rail traffic at level crossings will exacerbate farm fragmentation by segmenting farms while trains pass through.

Unfortunately, the port is being expanded to facilitate importation of products (including food) from other countries, while the ability of Delta farmers to produce food for local consumption is being reduced as a result of the expansion. In addition, the port expansion combined with the Gateway Program will result in increased fossil fuel use and a corresponding increase in greenhouse gases which will contribute to climate change.

Recently, 207 ha of agricultural land was removed from the ALR in Delta as part of the Tsawwassen First Nations (TFN) treaty settlement (Tsawwassen Lands, 2008). This loss of agricultural land, combined with the port development, Gateway Program, and expansion of BC Rail will further erode the agricultural industry in Delta.

4.3.2 Wildlife

Since 1868, development of the lower Fraser River delta has resulted in the loss of 70% of the original wetland habitat through dyking and drainage. Farmland, as well as wildlife habitat, is severely threatened by urban encroachment and industrial development (DFWT, 2006). The municipality of Delta provides vital wildlife habitat. Most of this habitat is on or adjacent to agricultural land. As noted above, the municipality of Delta is part of the Fraser River delta. The Fraser River delta is one of the largest estuaries on the north Pacific Coast and is essential to the functional integrity of the Pacific Flyway. It also supports the highest densities of wintering waterfowl in Canada (Butler and Campbell, 1987). One million migrating and wintering waterfowl and five million shorebirds from Asia, Alaska, and Western Canada use the Fraser River delta for feeding and roosting (DUC, 2000). It is ranked as one of the world's top ten internationally significant areas for birds and other wildlife (Saddlemeyer et al., 2001).

Delta is also home to a wide variety of resident wildlife including non-migratory birds, mammals, reptiles, amphibians, and fish. Wildlife habitat in Delta, including oldfield grasslands, intertidal flats, and bogs, provide critical habitat for numerous species at risk including short-eared owls (*Asio flammeus*), barn owls (*Tyto alba*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), sandhill cranes (*Grus Canadensis tabida*), and great blue herons (*Ardea Herodias*) (Saddlemeyer et al., 2001). Other types of habitat in Delta that are important for both migratory and resident wildlife include open fields, hedgerows, woodlands, marshes, and riparian areas (Norecol et al., 1994; BBCC, 1992).

Delta provides essential habitat for the Townsend's vole (*Microtus townsendii*) which uses old field habitat to feed and breed (Norecol et al., 1994; BBCC, 1992). Although old field habitat is declining in area in Delta (Sullivan, 1992), grassland set-asides also provide habitat for Townsend's voles in Delta (Merkens, 2005). The Townsend's vole is a key food source for local raptors (Merkens, 2005), some of which are of special concern in BC because they are particularly sensitive to human activities (BCMOE, 2008b). Studies have shown that high densities of raptors occur where there are high densities of prey (Sullivan, 1992). Research conducted in Delta showed that the relative density of Townsend's voles in 2-4 year old grassland set-asides was greater than or equal to old-field habitat (Merkens, 2005).

4.3.3 Agriculture-Wildlife Conflicts

As previously explained, Delta provides vitally important habitat for migratory birds and resident wildlife. It has been estimated that the Fraser River delta's ecosystems provides habitat for migratory birds from over 20 countries and three continents. There are no comparable sites along the Pacific coast between Alaska and California (Butler and Campbell, 1987). Simply stated, the Fraser River delta is unique and irreplaceable. However, wildlife, particularly migratory waterfowl, cause problems for farmers because ducks and geese feed on overwintering vegetable crops and forage crops (Norecol et al., 1994; Klohn Leonoff Ltd. et al., 1992). The birds of most concern to farmers are widgeon, mallards, pintails, Canada geese, trumpeter swans, and snow geese (Klohn Leonoff Ltd. et al., 1992).

Waterfowl also have a negative impact on soils. Waterfowl congregating and feeding in vegetable fields over the winter compact soil resulting in poor drainage, water accumulation, and delayed planting of crops in the spring. Farmers are unable to plant some crops, such as sugar beet seed, turnip seed, and winter cauliflower, due to waterfowl predation. Most damage occurs from August to March, resulting in soil compaction and, in some cases, loss of entire crops (Klohn Leonoff Ltd. et al., 1992).

While there is a pilot project aimed at mitigating, compensating, and monitoring waterfowl damage to forage crops in Delta (the Delta Forage Compensation Program), there is no long-term government policy or program that compensates farmers for wildlife damage. In order to recover costs, farmers sometimes switch to higher value commodities such as blueberries. Crops such as hay and field vegetables provide wildlife habitat, but do not provide farmers with sufficient income. Without compensation for losses due to wildlife, farmers are understandably reluctant to continue farming low value agricultural products for the benefit of wildlife or society at large.

4.3.4 Summary

The numerous government development projects and loss of agricultural land described above will have a negative impact on both agriculture and wildlife in Delta. Soil based agriculture provides important habitat for a variety of wildlife. As the area of farmland shrinks and becomes more fragmented, wildlife will be forced to congregate on the remaining farmland. Increased concentrations of wildlife on farmland are likely to cause more damage to farmers'

fields, putting additional stress on the agricultural industry in Delta. Ultimately, both farmers and wildlife will suffer as a result of increased development in Delta.

4.4 Delta Farmland and Wildlife Trust

This section provides a brief overview of the DFWT because it is the organization I chose as my case study. Since 1993, the Delta Farmland and Wildlife Trust (DFWT) has been working with farmers and environmentalists to balance the needs of wildlife with the needs of farmers. In this thesis I frequently use the term ‘wildlife’ and ‘wildlife habitat’. Wildlife is an anthropocentric term describing those life forms that have not yet been domesticated by humans. Wildlife habitat is a complex mix of essential attributes that contribute to ecological and agroecological function. The DFWT focuses on protecting habitat for vertebrates (e.g. waterfowl, raptors). However, in doing so, the DFWT also provides habitat for a wide variety of taxa. While the focus of the DFWT may be on conservation of wild vertebrates, the DFWT stewardship programs contribute to overall ecosystem health. The DFWT was chosen as a case study because it illustrates a community based response to issues that are global in nature. The DFWT uses on-the-ground programs based on an agroecological approach to promote sustainable agriculture. I provide additional details on why I chose the DFWT as my case study in Chapter 9. Additional insight into the formation and development of the DFWT, based on the results of interviews I conducted with 28 people who were involved in the formation and/or development of the DFWT, is provided in Chapter 11 where I discuss my interview results.

4.4.1 Pre-DFWT

Prior to the formation of the DFWT, a project called Greenfields was launched in 1990 (Temple, 1997). The goal of the Greenfields project was to develop a strategy that would allow agriculture and wildlife to coexist on farmland in Delta. The project was a cooperative venture between farmers and wildlife agencies. The main component of the project was a cost sharing program that supported winter cover crops, an important soil conservation practice that also provides habitat for waterfowl. Greenfields paid for the seed and farmers planted the seed in the fall to establish cover crops. Crops were monitored for growth and locations where birds consumed crops were documented (Duynstee, 1993).

In the late 1980s the federal government embarked on a plan to build a third runway at Vancouver International Airport (YVR). The new runway would affect approximately 350

hectares of wildlife habitat close to the municipality of Delta in an area of international significance for migratory and wintering birds. As a condition of development, Transport Canada (the federal government agency responsible for airports) was required to establish a compensation package to mitigate the loss of wildlife habitat (Temple and Smith, 1995; DFWT, 1994).

4.4.2 Formation of the DFWT

The DFWT was founded in 1993 by local farmers and conservationists (DFWT, 1994). The DFWT supports both wildlife habitat conservation and agriculture by sharing the cost of specific management practices contributing to soil and/or wildlife habitat conservation and enhancement (DFWT, 2006). In March 1995, the DFWT was awarded \$2.25 million from the YVR compensation fund for a farmland stewardship program in the lower Fraser River delta. The money was provided by the Government of Canada as a grant. The money was placed in an endowment fund with the Vancouver Foundation so that the interest could be used for stewardship programs on farmland to benefit both wildlife and agriculture in perpetuity (Temple, 1997; Temple and Smith, 1995).

4.4.3 DFWT Programs

This section describes some of the programs offered by the DFWT. The most recent data available is from the 2005-2006 Annual Report. During this period, a total of 50 farming operations across Delta participated in one or more of the DFWT programs. Approximately 17% of land within the ALR in Delta was affected by DFWT programs in 2005-06 (DFWT, 2006).

4.4.3.1 Winter Cover Crops (aka Greenfields)

Winter cover cropping is the most common technique used by the DFWT. Cover crops are typically a cereal or leguminous crop which are planted after a cash crop has been harvested, usually in late summer or early fall. Cover cropping is an agroecological technique that contributes to soil productivity, enhances wildlife habitat (DFWT, 2006; Gliessman, 2000), and may contribute to carbon sequestration (DFWT, 2006). Cover crops are sometimes planted in order to provide alternative foraging areas for waterfowl that over-winter on the Fraser River delta. An average of about 1214 hectares (ha) has been planted annually (DFWT, 2006).

4.4.3.2 Grassland Set-asides

Grassland set-asides are grassland rotations that are integrated into farm management plans. Degraded soils can be vastly improved through the inclusion of grassland in crop rotations. The grassland set-asides provide habitat that is similar to old field habitat. The grasslands provide important habitat for wildlife, such as the Townsend's vole which is the main food source for a variety of grassland hawks and owls. For greatest benefit, it appears as though grassland set-asides must be in place for at least two years because Townsend's voles will not colonize the set-asides until at least the second winter (Merkens, 2005). Many raptor species use old field habitat for hunting, particularly in the winter months (Butler and Campbell, 1987; Sullivan, 1992; Merkens, 2005). As of 2005, there were 29 fields (231 ha) in Delta in the grassland set-aside program. Some farmers have subscribed to the grassland set-aside program in order to make the transition to organic crop production. A three-year set-aside qualifies fields for organic certification, provided no restricted chemicals or management practices are used during that time. Switching to organic production provides extra benefits to wildlife over the long term because pesticide use is decreased. Farmers have indicated that they are willing to set aside an additional 81-121 ha, but the DFWT does not have sufficient funding to support these additional set-asides (DFWT, 2006).

4.4.3.3 Hedgerows and Grass Margins

Hedgerows are linear barriers of trees, shrubs, perennial forbs and/or grasses usually associated with field boundaries. Grass margins are linear patches of grassland habitat around cultivated fields. They both benefit wildlife by providing habitat for small mammals, songbirds, raptors, and insects. Hedgerows can act as windbreaks, living fences, and also provide additional income to farmers if they include marketable products such as fruit (DFWT, 2006; Gliessman, 2000). Both grass margins and hedgerows can act as buffers between land uses, providing a transition zone between different habitats. They can benefit agriculture by choking out agricultural weeds and providing refuges for beneficial insects. They improve filtration of field run-off reducing the amount of soil, silt and excess nutrients that may leach from the field (DFWT, 2006; Gliessman, 2000). Hedgerow agreements span ten years and can be extended for another ten years (DFWT, 2006).

4.4.3.4 Laser Levelling

Medium to fine textured soil and a high water table are common characteristics of the agricultural land in Delta. Laser levelling evens out the topography of the land. This allows farmers to reduce ponding on their fields, improving the establishment and longevity of winter crops and grass fields that are subject to grazing by waterfowl. Laser levelled fields tend to dry out more quickly in the spring. Earlier access gives farmers more options on what to plant in their fields and it also improves the likelihood that a cover crop can be planted on the field once the cash crop is harvested (DFWT, 2006).

4.4.3.5 Field Liming

The soils in Delta have a tendency to acidify relatively quickly. This affects the availability of nutrients for plants. Soil pH can be adjusted by applying lime to the fields. Improving the pH of soil helps to maximize yield potential, particularly for vegetables. It may take up to six months before the pH is affected by the application of lime. However, the long-term effects of lime application may be up to ten years (DFWT, 2006). Increasing the productivity of fields is likely to benefit both farmers and wildlife.

4.4.3.6 Communications

The DFWT provides advice and shares data with other organizations or companies involved in land management in Delta. The DFWT is also involved in public education and communication, co-operating with various government and non-government organizations to promote the benefits of farm stewardship and wildlife habitat conservation. The DFWT has a website (www.deltafarmland.ca), produces a regular newsletter, program fact sheets, information pamphlet, and has a static display for events. DFWT representatives also present lectures and slide shows to local and regional organizations (DFWT, 2006). The DFWT recognizes that “the environmental services, cultural identity and wildlife habitat associated with farms are attributes that are important to society” (DFWT, 2004, p. 2).

4.5 Summary

Agriculture is an important industry in the GVRD and Delta. Soil-based agriculture provides vital habitat for many species of wildlife in Delta, particularly migratory birds and raptors.

However, farmers are faced with significant challenges associated with expropriation of farmland, development, competition with imported agricultural products, and financial losses due to wildlife predation. Despite these challenges, farmers continue to find innovative ways to

work the land in harmony with nature. Over the past sixteen years, the DFWT has worked with farmers and conservationists to improve agricultural viability and wildlife habitat. They have shown that agriculture and wildlife can coexist.

My research takes place on a terrain of investigation (a microcosm) that has strategic significance beyond Delta because many of the global trends in agriculture and biodiversity are found in Delta. For example, population growth, increased development pressure, and competition for resources are affecting the viability of agriculture and wildlife habitat in Delta. There are also some factors affecting Delta that are not typical in the global context. For example, the ALR helps to protect farmland in Delta. The ALR acts as an urban growth boundary, helping to discourage urban sprawl into agricultural areas. In addition, while other communities also struggle with wildlife-agriculture conflicts, Delta is unusual in that it provides vital habitat for migratory and over-wintering birds. Consequently, while some of the findings from my research may be applicable at a broader scale, other findings may be specific to Delta (or similar communities). These findings are discussed in greater detail in Chapter 14. The next chapter discusses the theoretical context of my research.

CHAPTER 5

Theoretical Frameworks

5.1 Introduction

This chapter provides an overview of my rationale for choosing an interdisciplinary approach as well as descriptions of the theoretical frameworks I use in my research. There are five theoretical frameworks that I use in an integrated manner to bring different streams of knowledge into my research. They are: sustainable agriculture, agroecology, agricultural extension, ecological economics, and adaptive policy. I discuss each framework below and explain how they relate to my research.

5.2 Interdisciplinary Rationale

The Cartesian paradigm, also known as positivism, reductionism, or rationalism, has dominated scientific thought since the early seventeenth century (Pretty, 2002). This paradigm asserts that there is an objective external reality which is driven by immutable laws (Woodhill and Röling, 1998). Through the process of reductionism, the complex world can be broken down into discrete parts. These parts can then be studied separate from their surroundings in order to establish universal generalizations that have no reference to time or context (Costanza et al., 1997; Pretty, 1995). Positivist science has traditionally been viewed as the source of truth (Woodhill and Röling, 1998). This section explains why I have taken an interdisciplinary approach to my research by examining the shortcomings of the Cartesian paradigm and the benefits of a holistic approach.

The reductionist approach has provided some good insight into how different pieces of a system function, but it has done so at the expense of understanding the whole system, particularly the relationships between humans and nature. This separation of nature and society emanated from modernist thinking and is known as Cartesian dualism (Pretty, 2002). This perspective has affected the manner in which agriculture and the natural environment have been viewed (Pretty 2002; Ashby, 2001; Woodhill and Röling, 1998).

Pretty explains that this has led to 'enclave thinking' where nature is seen as having boundaries. This is manifested in our society by the creation of parks or protected areas. However, at the landscape level this creates problems because the whole is more important than each part. Enclave thinking further entrenches our separation of people and nature. It suggests that nature

can be located in one place while agricultural production is situated in another place. Pretty notes that these enclaves will always be threatened at the borders and may be too small to be socially or ecologically viable. In addition, protection of enclaves may actually perpetuate an ideology that justifies destruction over the wider landscape based on the premise that we have protected some areas (Pretty, 2002).

Within the Cartesian paradigm, environmental concerns are valued merely as externalities to the system where infinite growth within the economic system is viewed as both desirable and possible. It posits that economies and societies can succeed without regard to the preeminence of environmental (Manno, 2000) and agricultural systems (Pretty, 2002). Our knowledge about certain parts of agricultural systems is very high (e.g. maximizing yield) but we need to increase our understanding about how society and the environment affect, and are affected by, agricultural systems (Ashby, 2001). The reductionist approach has focused on how components of the system operate, but not on how the system operates as a whole or how social systems interact with ecological systems (Pretty, 2002).

Rather than reducing Delta's complex agroecological system into its component parts and studying these in isolation, I am examining agri-environmental stewardship as a holistic system involving social, institutional, environmental, and economic elements. I draw on the theories and practices of various disciplines to help identify the threads that link public policy and community action to agri-environmental stewardship.

5.3 Sustainable Agriculture

The term 'sustainability' is being used with increased frequency throughout the world due to a growing awareness of the negative environmental and social impacts of population growth and economic development. More and more people are beginning to realize that without better management of our resources, the planet will be unable to sustain humanity's present living standards. Sustainable agriculture is one very important component of overall sustainability because humans rely on food for basic survival. First, I discuss the mounting interest in sustainable agriculture that came about as a response to the environmental and social damage caused by industrialization of agriculture. Then, I explain why I chose sustainable agriculture as one of my theoretical frameworks.

Over the last sixty years, interest in sustainable agriculture has risen in response to various environmental crises, rural socio-economic decay, and food safety concerns (Schaller, 1993). Gold and Gates (2007) traced the evolution of organic/sustainable agriculture back to 1580 to a book by Thomas Tusser called Five Hundred Points of Good Husbandry. The book includes advice on crop rotation and observations of human behaviour in farming. Many books related to various aspects of agricultural productivity and resource conservation were written through the following centuries, but it was an essay written by economist Thomas Malthus in 1798 that propelled the concept of sustainability to new heights. This landmark work predicted that the planet would be unable to support an ever-increasing human population (Malthus, 1798). This prediction may have both hindered and helped the concept of sustainable agriculture. It helped the cause by identifying the finite ability of the planet's resources to sustain life, but it may have also hindered the path to sustainability by providing a rationale for increasing agricultural productivity at any cost.

Malthus' work is important because it initiated discussion over the finite resources and carrying capacity of our planet. However, Malthus' ideas also prompted a heated debate over population control. Critics pointed out that it is not population growth that is the problem, but inequitable distribution of resources (including food) and a lack of understanding of the role of social organization in resource use that are at the root of environmental degradation (Taylor and Garcia-Barrios, 1999; Feeny et al., 1990). These are important factors to consider when discussing the impact of population growth on natural resources. The key Malthusian concept I draw on in my research is that our planetary resources are finite, so there will be increased pressure to convert agricultural land and wildlife habitat to other uses as the population grows (notwithstanding issues related to inequitable distribution of resources). As a society, we need to learn how to share our resources equitably and use our resources as efficiently as possible so that future generations (in all parts of the world) will continue to thrive.

Agriculture changed dramatically after World War II. The production of food and fiber surged due to increased specialization and technology. The Green Revolution appeared to repudiate Malthus' predictions by dramatically increasing crop yields. The Green Revolution began in the 1940s when University of Minnesota researcher Norman Borlaug developed a high-yielding wheat plant at a plant-breeding station in Mexico. Wheat production increased significantly as a result of the new wheat variety combined with controlled irrigation and addition of

petrochemical fertilizers (Rosset et al., 2000). This sudden boost in productivity appeared to hold promise of feeding the world, and farmers were encouraged to switch from labour-intensive, knowledge-based farming to chemical-intensive mechanized industry (Lyson, 2002; Pretty, 1997; Grove and Edwards, 1993; Ikerd, 1993). Although the increase in production was impressive, there were an alarming number of negative impacts associated with the industrialization of agriculture. Industrial farming practices led to a number of serious environmental problems including ground and surface water contamination, declining water tables, soil erosion, and loss of wildlife habitat (Stauber et al. 1995; Grove and Edwards, 1993). High yields have been achieved primarily through increased agricultural inputs (Gliessman, 2000). Inputs such as inorganic fertilizers, pesticides, and machinery are substituted for natural processes (Röling and Pretty, 1997). Inputs derived from nonrenewable resources (e.g. fossil fuels) are not sustainable because the supply of the resources is finite. Purchased inputs also leave farmers vulnerable to supply shortages and price increases (Gliessman, 2000). Reducing the use of external inputs and regenerating internal resources are important components of sustainable agriculture (Gliessman, 2000; Röling and Pretty, 1997).

Industrial agricultural practices have resulted in soil degradation issues including waterlogging, loss of fertility, erosion, contamination, and decline in soil structure. Protection and regeneration of soil is another crucial aspect of sustainable agriculture (Gliessman, 2000). The use of in-organic fertilizers has led to the eutrophication of water bodies. This reduces the amount of oxygen available for organisms living in the water and can lead to the death of some or all of those organisms (e.g. fish) (Gliessman, 2000).

Pest control poisons were developed as part of the war effort during World War II. The intent of the poisons was to completely annihilate pests. Unfortunately, this form of pest control had a number of negative effects on the environment including the destruction of non-target species, pest resurgence, and secondary pest outbreaks. Farmers responded to pest resurgence, resistance, and secondary pest outbreaks by increasing the amount of pesticide applied. This came to be known as the “pesticide treadmill” (Vandermeer, 1995, p. 179).

Persistent organic pollutants (POPs) such as DDT posed particular problems for animals higher up in the food chain because pesticides accumulate in prey species. Predators eventually ingest so many contaminated prey that they succumb to the poison. These chemicals also disrupt

endocrine systems leading to reproductive problems in wildlife and in humans. Top carnivores, such as hawks and eagles, can have up to 10 million times more POPs than herbivorous species further down the food chain (Vandermeer, 1995). Pesticides also pose a hazard to farmworkers who may inadvertently ingest the pesticide during application (Gliessman, 2000).

In 1962, Rachel Carson's book Silent Spring sounded an alarm about the environmental hazards of chemicals, particularly DDT. While early environmental movements initially focused on wilderness preservation and pollution control, it became apparent that agricultural activity was having a significant environmental impact on both land and water, and attention expanded to include the agriculture industry (Buttel, 1993; Schaller, 1993). Social impacts were also being felt in agricultural communities. Farm industrialization led to an increase in corporate-owned farms, a corresponding decrease in family farming, and deterioration of the social fabric of rural communities (Ashby, 2001; Pretty et al., 2001; Gliessman, 2000; Stauber et al., 1995).

Concern about the sustainability of agriculture heightened in the mid-1980s as a series of crises hit the agricultural sector. These crises included heavy debt loads, high interest rates, overproduction of grain, and collapse of the North American export market (Stauber et al. 1995; Buttel, 1993; Schaller, 1993). Family farms fell into bankruptcy across North America. The promise of the Green Revolution appeared to be faltering. Crop yields began to fall off, and it became apparent that the industrialization of agriculture threatened to compromise future productivity. The development of high-yield crops increased dependency on energy-intensive fertilizers and pesticides, and resulted in rapid degradation of soil (Gliessman, 2000). Mainstream farmers and agricultural researchers began to look more seriously at alternatives to conventional agriculture. In the 1970s, grassroots sustainable agriculture organizations emerged. Farmers began experimenting on their farms by reducing the amount of chemical pesticides and fertilizers they were using. They began to explore strategies that worked with nature instead of against nature (Stauber et al., 1995). Sustainable agriculture appeared to hold promise for a better way to grow crops and a better way of life (Buttel, 1993; Grove and Edwards, 1993; Ikerd, 1993).

Another milestone for sustainable agriculture was reached in 1987 when the Brundtland Commission investigated the concept of sustainable development, defining it as: "development that meets the needs of the present without compromising the ability of future generations to

meet their own needs” (WCED, 1987). Three fundamental components of sustainable development were identified: environmental protection, economic growth, and social equity (WCED, 1987). These three components have come to be the cornerstones on which many definitions of sustainable agriculture are built.

Edwards et al. (1993) explain that while there are hundreds of definitions of sustainable agriculture in the literature, virtually all definitions of sustainable agriculture “...promote environmental, ecological, economic, and social stability and sustainability” (Edwards et al., 1993, p. 100). As such, sustainable agriculture provides a useful overarching integrative framework for examining agroecosystem sustainability.

Sustainable agriculture integrates natural processes, such as nitrogen fixation, natural pest control, nutrient cycling, and soil regeneration into food production processes (Pretty, 2002; Gliessman, 2000). The amount of non-renewable inputs is minimized and farmer knowledge and skill are utilized to help make “...productive use of people’s capacities to work together in order to solve common management problems” (Pretty, 2002, p. 56). Sustainable agriculture should also have minimal negative impacts on the environment, use water prudently, conserve wild and domestic biodiversity, and provide equality of access to agricultural practices, knowledge, and technology to enable local control of agricultural resources (Gliessman, 2000).

Röling and Wagemakers (1998) explain that the transformation to sustainable farming has the following interlocking dimensions:

1. Changing agricultural practices at both the farm and higher system levels
2. Learning the practices
3. Facilitating the learning
4. Supportive institutional frameworks
5. Supportive policy frameworks
6. Managing change from conventional agriculture to sustainable agriculture across each of these dimensions (Röling and Wagemakers, 1998, p. 7)

Röling and Wagemakers’ insights on the transformation to sustainable farming are particularly relevant to my research because they illustrate the practical challenges associated with converting to more sustainable agricultural practices. These challenges cannot be met by

farmers alone, but require a supportive institutional framework, including supportive policies and effective transfer of knowledge. Pretty points out that:

Most policies still actively encourage farming that is dependent on external inputs and technologies. It is these policy frameworks that are one of the principal barriers to a more sustainable agriculture. (Pretty, 1998, p. 28)

Pretty also explains that many policy measures that are meant to support agriculture actually act as “...powerful disincentives against sustainability” (Pretty, 1998, p. 35). Without appropriate policy support sustainable agriculture is likely to remain localized and sustainable agriculture may not spread beyond these local successes (Pretty, 2002; Pretty, 1998). The crux of my research revolves around these challenges because it examines sustainable agriculture in the context of policy. The broad theory of sustainable agriculture also allows for the integration of other theoretical frameworks such as agroecology, ecological economics, agricultural extension, and adaptive policy. These frameworks are discussed in the following sections.

5.4 Agroecology

Agroecology is an approach to agricultural production that incorporates ecological principles into the study, design, and management of agroecosystems (Gliessman 2000; Altieri 1995). Interest in applying ecological principles to agriculture began in the 1960s and 1970s with heightened environmental awareness, the growing influence of systems-level approaches, and increased research into community and population ecology. Agroecology emerged as a distinct methodology and conceptual framework for the study of agroecosystems by the 1980s (Gliessman, 2000).

Gliessman (2000) describes an agroecosystem as a site of agricultural production, such as a farm, although he explains that it could also include a collection of farms (Gliessman, 2000). Vandermeer explains that a persistent idea in agroecology is that an agroecosystem should mimic the functioning of non-managed ecosystems, including features such as tight nutrient cycling, vertical structure, and the preservation of biodiversity (Vandermeer, 1995).

Gliessman defines an agroecosystem as “an agricultural system understood as an ecosystem” (Gliessman, 2000, p. 339). Ecosystems are constantly changing due to birth and death within the system, but maintain an internal dynamism that provides stability to ecosystem structure and function. Ecosystem complexity and species diversity contribute to this overall stability.

Natural ecosystems evolve toward the most biologically complex structure in order to optimize resources and nutrient cycling within that system. This leads to an environment that is comprised of dynamic populations of organisms that demonstrate stability over time (Gliessman 2000).

Gliessman (2000) compares natural ecosystems and agroecosystems by identifying the following distinguishing characteristics:

Energy flow: Agroecosystems tend to be open systems. They lose a great deal of energy as a result of biomass loss due to harvesting, and rely on energy inputs by humans.

Nutrient Cycling: Nutrients are lost from agroecosystems as a result of leaching or erosion due to biomass removal and exposure of bare soil which results in nutrient leaks.

Population Regulating Mechanisms: Trophic interactions are reduced as a result of simplification of the system. Humans determine population size and composition by planting seeds and applying control agents. Pest outbreaks are likely to occur because of a lack of natural predators.

Stability: Agroecosystems are less resilient than natural ecosystems because of reduced functional and structural diversity. Stability is compromised due to harvest and can only be sustained with human inputs.

An agroecosystem should mimic the function of non-managed ecosystems (Vandermeer 1995).

A sustainable agroecosystem is:

...one that maintains the resource base upon which it depends, relies on a minimum of artificial inputs from outside the farm system, manages pests and diseases through internal regulating mechanisms, and is able to recover from the disturbances caused by cultivation and harvest (Gliessman, 2000, p. 299).

Gliessman explains that an agroecological approach focuses on specific aspects of a cropping system within the context of alternative ecological management strategies. At a broader level, an agroecological approach identifies and incorporates knowledge about historical ecological systems into current farming management approaches (Gliessman 2000).

The theory of agroecology provides a direct link between agriculture, society, and ecology: "A web of connections spreads out from every agroecosystem into human society and natural ecosystems" (Gliessman, 2000, p. 26). Our current dominant industrial model of agriculture is not sustainable because it is eroding natural resources (e.g. soil, water, air, biodiversity) and

requires high inputs that come from non-renewable resources (e.g. fossil fuels). If we destroy our ecosystems we will undermine the sustainability of our existence. One step towards sustainability is to model agricultural systems on ecosystems. The theory of agroecology, therefore, provides an important foundation for my research because it provides a framework for understanding how agricultural production can be successful while enhancing, rather than degrading, natural ecosystems.

5.5 Agricultural Extension

Agricultural extension is a useful theoretical framework in which to situate my research and examine the information exchange system that is needed to put the theories of sustainable agriculture and agroecology into practice. Agricultural extension is a system that includes public, private, and semi-public institutions that fund and provide agricultural information services (Alex et al., 2004).

Although agricultural extension has been around for centuries, its history is largely unrecorded (Jones and Garforth, 1997). There is evidence that the concept of exchanging information about agriculture goes as far back as 1800 B.C. in Mesopotamia where clay tablets have been found with advice about watering crops and controlling rats (Jones and Garforth, 1997).

Approaches to agricultural extension differ. Rölíng and Wagemakers (1998) explain that: “Within the realist-positivist epistemology, extension is looked upon as a necessary delivery mechanism of the results of scientific research” (Rölíng and Wagemakers, 1998, p. 15). On the other hand:

Within the constructionist epistemology, extension is a means for socially (re)constructing agrarian reality through communication and information sharing activities. More generously and truly constructionally, extension can be seen as a societal mechanism for facilitating social learning of appropriate responses to changing circumstance. (Rölíng and Wagemakers, 1998, p. 15)

The latter interpretation is consistent with the approach I have taken in my research. There are a number of themes in agricultural extension that directly relate to my research. In terms of sustainable agriculture and agroecology, agricultural extension provides a conduit through which theories can be put into practice. Rölíng and Pretty, (1997) identify three major lessons to help achieve sustainable agriculture through agricultural extension. The first lesson is that extension can be used to help explain environmental issues and to show farmers how present farming practices are unsustainable. Extension also offers the opportunity to test the feasibility

of sustainable practices. Extension can provide farmers with the tools to observe and monitor the sustainability of their own farms. The second lesson is that extension must make use of farmers' knowledge. They explain that: "The location- specific nature of sustainable agriculture implies that extension must make use of farmers' knowledge and work together with farmers" (Röling and Pretty, 1997, p. 186). The third lesson emphasizes facilitated learning. Rather than transferring knowledge to farmers, extension should seek to facilitate the learning process, drawing on expert advice when needed. The creation of learning groups to help farmers adapt to sustainable practices is an important part of this process. They explain that the success of sustainable agriculture "...depends not just on the motivations, skills, and knowledge of individual farmers, but on action taken by groups or communities as a whole" (Röling and Pretty, 1997, p. 181-182).

Agricultural extension is in a state of transition. There has been a move away from public extension towards decentralization of extension, cost recovery, participation by stakeholders, privatization, and delivery of extension through a pluralistic approach to financing and delivery (Alex et al., 2004). Rivera and Cary (1997) explain that:

The primary issue may not be whether a certain function would be entrusted to public or private organizations, but, rather, what configuration of organizations, both public and private, is needed and what arrangements between them provide the most effective outcomes...(Rivera and Cary, 1997, p. 208).

This is an important consideration in my research as it touches on the role that non-government organizations do play (or could play) in agricultural extension. Rivera et al. (2000) characterize agricultural extension systems based on the entities that carry out three major functions: financing, purchasing of services, and provision of services (Rivera et al., 2000). They explain that each of these functions can be split between public (national, regional, or local government) and private sectors (farmers, agribusiness, NGOs, and for-profit firms) (Rivera et al., 2000). Demand driven extension is increasingly being driven through central government which provides financing for local government or through farmer groups to contract services from the private sector (Rivera et al., 2000).

Non-government organizations are playing an increasingly important role in agricultural extension (Alex et al., 2004; Röling, 1988). Alex et al. (2004) point out that NGOs are useful partners in agricultural extension because they adapt to local situations, are often quite flexible,

and are able to provide assistance to grass roots community organizations (Alex et al., 2004). However, NGOs also face some barriers in providing agricultural extension services. They must be careful to maintain good relationships with governments to maintain government funding and support. In addition, local NGOs usually focus on the efficacy of their work at the local level and are generally not capable of expanding their operations to a national scale. Their ability to deliver projects is constrained by the size of the organization and the funding they receive (Röling, 1988).

Agricultural extension provides a valuable theoretical framework in which to conduct my research because it is one of the tools that can be used to put the theories of sustainable agriculture and agroecology into practice. The transition to sustainable agriculture will require investment in, among other things, strategies to exchange information with farmers about the techniques and benefits of sustainable agriculture, incentives for farmers to experiment and initiate transitions to sustainability, as well as strategies to include NGOs in delivery of extension services.

5.6 Ecological Economics

Ecological economics began in the 1980s with a group of scholars who realized that improvements needed to be made in environmental policy and management in order to protect the well-being of future generations. Throughout most of the 20th century there has been an increasing separation and reductionism within and between the disciplines of economy and ecology (Costanza et al., 1997). This gap between economy and ecology was (and is) driven by the dominant economic paradigm which does not accept that the economic system is embedded within the ecological system. Ecological economics acknowledges that humans and economies are embedded within natural ecosystems and that energy flows within and between economies and ecosystems (Röpke, 2004).

This dominant economic paradigm began in the 1700s with Adam Smith's seminal work The Wealth of Nations (Smith, 1776). Adam Smith proposed that individual decision making benefits society at large. He suggested that each individual is guided by an 'invisible hand' that will make them act in a way that benefits society, although their intention is to maximize their own gain (Smith, 1776). Smith's theory contributed to a dominant paradigm in economics that is based on the premise that the sum total of individual decisions will provide the greatest benefit to society. This perspective has provided the rationale for our current market driven

economy and has resulted in an individualistic society motivated by materialism and personal greed (Costanza et al., 1997).

Around the same time that Smith wrote The Wealth of Nations, Thomas Malthus wrote his provocative essay on population growth (as noted in Section 5.3). He predicted that if the population continued to grow geometrically there would not be enough food for everyone, because agricultural production could only increase arithmetically (Malthus 1798). In other words, the population would grow faster than food production. Unfortunately, Malthus' predictions were largely dismissed as a result of the technological advances made by the Green Revolution. Human ingenuity and the success of the market economy appeared to support Smith's theory and discredit Malthus' theory.

However, the collective impact of individual decision-making had a serious impact on the sustainability of natural resources. Hardin described this impact as the "tragedy of the commons" (Hardin, 1968, p. 1244) whereby each individual seeks to maximize their own personal benefit without regard for the cumulative impact on the resource being exploited. Each individual looks at their gain in the context of a limitless world without consideration of how their decision will affect others. Hardin uses a metaphor to illustrate this theory. He describes a hypothetical scenario where many herdsmen graze their animals on a common pasture. Based on the rationale that an individual should seek to maximize their own gain, a herdsman would add another animal in order to earn more income. He would not consider how adding one more cow would affect the ability of the pasture to feed 31 animals (for example) instead of 30. The herdsman would gain by one (+1), and all the other herdsmen would share the loss (-1) of the resource equally. Each herdsman would attempt to maximize their own gain by adding one more animal, eventually rendering the pasture barren from overgrazing (Hardin, 1968).

Hardin explains that the same scenario could play out in the global commons if every individual was to act as a rational being who sought to maximize his/her own gain (Hardin, 1968). Critics have argued that Hardin did not consider the possibility of excluding individuals from communal property and that the evidence suggests that exclusion under such communal property regimes is the rule rather than the exception (Feeny et al., 1990). Ostrom et al. (1999) explain that the farmer-managed irrigation systems in Nepal are good examples of communal resources that have been well managed using locally crafted rules and evolved norms (Ostrom

et al., 1990). They also say that: “The empirical and theoretical research stimulated over the past 30 years by Garrett Hardin’s article has shown that tragedies of the commons are real, but not inevitable” (Ostrom et al., 1999, p. 281). Pretty (2003) explains that successes in communal property management have been largely at the regional to local level where institutional conditions and market pressures are supportive and access to resources can be controlled. However, a greater challenge exists in applying these principles to large scale (i.e. global) open-access commons where appropriate conditions must be created so that social capital can work (Pretty, 2003).

The main criticisms of Hardin’s theory appear to revolve around a literal translation of Hardin’s metaphor. However, I have drawn on Hardin’s metaphor here to illustrate Smith’s (1776) free market economy theory. According to Smith (1776), if each person acts in a manner that optimizes their own gain, they are acting in a way that ultimately benefits the public interest. Hardin illustrates the flaw in this theory using the commons metaphor by describing what would happen if everyone in a commons pasture did operate in a manner that optimized their own gain (as opposed to the collective gain). Research has shown that people do not always act in this way, illustrating that both Hardin’s and Smith’s theories are overly-simplistic, ignoring the social (and behavioural) component of managing public goods such as natural resources. This ties in to my discussion in Chapter 2 which postulated that humans (individuals and societies) can choose to behave in a manner that helps to sustain natural resources or they can choose to behave in a manner that degrades natural resources.

In Limits to Growth, Meadows et al. (1972) (aka The Club of Rome), modeled the consequences of a growing world population and predicted that economic growth could not continue indefinitely because of the limited availability of natural resources, particularly oil. The Club of Rome brought the issues of population growth and finite natural resources to the forefront renewing debate about whether technology was really capable of overriding the Earth’s finite resources.

Simon (1981) argued that the conclusions drawn by the Club of Rome were incorrect and that human ingenuity could overcome any resource limitations we may face now or in the future. He claimed that society will be better off by increasing wealth and technology and that resources can be viewed as infinite because they will be either recycled or new alternatives will

be found. He also argued that population growth is desirable because it will contribute to our ability to solve problems and will contribute to the overall wealth of society (Simon 1981).

Despite the fact that human society depends on natural ecosystems and agro-ecosystems for sustainability, these systems are typically undervalued in the current market economy. Costanza et al. (1997) explain that a standard assumption in neoclassical economics is that factors of production are highly substitutable. A shortage of one factor does not significantly impact the productivity of the other factor, if the factors are good substitutes. However, Costanza et al. (1997) argue that human capital and natural capital should be seen as complementary because human-made capital is dependent on natural capital (Costanza et al. 1997). They point out that as human-made capital increases, the demand on natural capital also increases due to the complementarity of the two factors. Productivity of the scarcest (limiting) factor should be maximized and supply increased. Costanza et al. (1997) provide an example of the complementary nature of natural and human-made capital by asking: "...what good is a sawmill without a forest?" (Costanza et al. 1997, p. 85).

Costanza et al. (1997) explain that the traditional indicators of economic success, such as GDP, GNP, and other national income accounting measures, typically overemphasize market transactions because they undervalue resource depletion, ignore the damage caused by pollution, and do not accurately measure changes in well-being (Costanza et al., 1997). This approach does not adequately value environmental or social costs in the economy. However, Daly and Cobb (1989) developed an Index of Sustainable Economic Welfare (ISEW) which combines income inequalities, social factors, and environmental deterioration. The ISEW includes, among numerous other factors, cost estimates for the loss of farmlands and wetlands, long-term environmental damage, and depletion of non-renewable resources (Costanza et al., 1997; Max-Neef, 1995). When the ISEW was compared to the GNP of various countries, researchers found that the GNP and ISEW ran parallel to each other until a threshold was reached, at which point the ISEW began to decline while the GNP continued to rise (Costanza et al., 1997; Max-Neef, 1995). This threshold was reached in the early 1970s in the US and the mid-1970s in the UK (Costanza et al., 1997; Max-Neef, 1995). The ISEW indicates that economic welfare per capita has been declining despite continued growth of the GNP (Max-Neef, 1995). In other words, the costs of additional growth outweigh the benefits (Costanza et al., 1997). The ISEW is not a perfect measure of total welfare. Like the GNP, it also measures

what is being produced and consumed. However, it does adjust for the sustainability of consumption, its negative impact on natural resources, and its distribution across different income classes (Costanza et al., 1997). The ISEW illustrates that traditional measures of economic success (e.g. GNP) do not capture the social and environmental costs that come as a result of a growing free-market economy.

Brown (2005) explains that throughout history humans have lived on the sustainable yield of the planet, in other words, the interest from nature's endowment. However, we are now consuming the endowment instead of just the yield. In economic terms we are drawing down the principal as well as the interest. This situation is not sustainable over the long term. Eventually the resources will run out entirely and we will be left bankrupt (Brown, 2005). In order to get off this path that is leading towards ecological collapse, the emphasis needs to shift from using technologies that increase productivity of labour and human-made capital to those that increase the productivity of natural capital. This could occur if market forces captured the value of natural capital. But natural capital is not usually owned and therefore it is not marketed. As a result, there is no explicit price for natural capital, so it is exploited as if its price was zero. In cases where natural capital is priced, it tends to be undervalued by the market because the market excessively discounts the value of future scarcity (Costanza et al., 1997).

Discounting takes future dollar benefits and costs to determine their present value. Discounting is used to estimate the stream of benefits and costs over the life of a public project or policy to determine if the present value of the benefits is worth the present value of the costs (Loomis and Helfand, 2001). High discount rates favour the present over the future. Low discount rates favor the future and conservation of resources (Costanza et al., 1997).

Costanza et al. (1997) use the exploitation of biological resources to illustrate the impact that a high discount rate can have on biological conservation. They explain that by economic logic, if biological resources are not increasing in value as quickly as the interest rate, then those resources should be exploited and the revenues invested in industrial capital markets. A lower interest rate would result in less discounting and make the conservation of biological resources economically rational (Costanza et al., 1997).

Ecosystems, agroecosystems, and agri-environmental stewardship are undervalued by society in the current economic paradigm because they lack the characteristics of a good or service that

can be sold as a commodity. Manno (2000) refers to this concept as commoditization. A commodity is an object outside of oneself that satisfies human wants. The easier it is to package, transport, standardize, and assign property rights to the object, the easier it is to sell as a commodity (Manno, 2000).

Commoditization does not work well with unique, knowledge based, cooperative, process-oriented systems (Manno, 2000). These characteristics describe some of the key elements of ecosystems, agroecosystems, and agri-environmental stewardship. Commoditization focuses on detaching things from their cultural and ecological contexts rather than focusing on the systems of which they are a part (Manno, 2000).

The agricultural industry has taken advantage of commoditization by creating inputs such as fertilizers and pesticides. These products can be developed and owned by chemical companies, mass produced in factories, then packaged and transported to farms around the world. More knowledge based, system oriented, natural forms of pest control, such as integrated pest management, are more difficult to commoditize and lose out in the competitive market economy (Manno, 2000). Manno (2000) explains that commoditization acts like a selection pressure where certain types of goods and services are chosen over others. This process occurs as a result of the laws, institutions, and cultural practices in place to support a growth economy (Manno, 2000).

Ecological economics acknowledges that non-market goods, such as natural capital, are undervalued in our current economic framework. Sagoff provides an interesting perspective on valuing non-market goods:

The things we cherish, admire, or respect are not always the things we are willing to pay for. Indeed, they may be cheapened by being associated with money. It is fair to say that the worth of things we love is better measured by our unwillingness to pay for them (Sagoff, 2005, p. 158).

Therein lies a conundrum. Should we attempt to value nature and all the 'services' she offers or should we simply nurture non-human entities and protect them out of a sense of moral obligation? Protecting nature because it provides a 'service' to humanity illustrates a utilitarian view of nature. In other words, we are protecting nature for our own benefit (Rees, 2004). Unfortunately, the current state of the environment seems to indicate that society does not feel a moral obligation to protect nature for 'nature's sake'. I explore this question in further detail in

Chapter 14. Ecological economics provides a holistic theoretical framework in which to conduct my research, linking economy, society, environment, agriculture, and policy.

5.7 Adaptive Policy

I am using adaptive policy as one of my theoretical frameworks because it is a method of policy making and implementation that embraces learning as a key concept of reform. It also acknowledges that we often do not know enough about systems to make policies that are effective across a range of conditions so we need to monitor and adapt policies over time to ensure they are achieving their desired outcomes. Adaptive policy is an important component of my research because it provides a framework to understand policy issues, identify policy objectives, and design policies that address those issues.

Adaptive policy evolved out of the theory of adaptive management. The concept of adaptive management was defined in the mid-1970s by an interdisciplinary team of biologists and systems analysts led by Canadian ecologist C.S. Holling (Lee, 1993). Their work identified the need to understand how natural systems respond to human disturbance and to learn to adapt to the unexpected (Lee, 1993). Adaptive management involves learning while doing. The approach acknowledges that action should not be postponed until all is known about a system (Lee, 2005). Lee explains that: “Adaptive management is grounded in the admission that humans do not know enough to manage ecosystems” (Lee, 2005, p. 105).

Lee appears to have been one of the first to use the term ‘adaptive policy’ (Swanson et al., 2006). Adaptive policy is based on the same premise as adaptive management. We simply do not know enough about the complex interactions between society, economy, and ecology to develop policies that remain stagnant over time. In the context of adaptive management, Lee (1993) states: “Adaptive management is an approach to natural resource policy that embodies a simple imperative: policies are experiments; learn from them...” (Lee, 1993, p. 9).

Röling and Wagemakers (1998) explain that developing and using knowledge are our main mechanisms for surviving rapidly changing conditions. An adaptive response requires creativity and the capacity for collective learning and innovation (Röling and Wagemakers, 1998). Adaptive policies should encourage and enable positive action through participation and information exchange with multiple actors (Swanson et al., 2006). Agroecologically guided

agricultural extension could play an important role in adaptive policy by facilitating participation and information exchange.

In terms of typical policy approaches, Swanson et al. (2006) note that: “Policies intended to enable local responses to national issues often do not recognize the diversity of contexts and conditions in which they will be applied” (Swanson et al., 2006, p. 24). The distance between decision-making and service delivery may be very large (both organizationally and geographically) when policies are developed at the federal or provincial level of government but applied at the local level. It may be difficult for those dealing directly with policy at the individual or community level to provide feedback to decision-makers. One way to make a policy more adaptive is to decentralize decision-making as much as possible to allow policies to respond to local circumstances (Swanson et al., 2006). These are important concepts in my research, as I explore the vertical and horizontal integration of policy between governments and the impact on agri-environmental stewardship. In Chapter 9, I use the theory of adaptive policy to develop a process to review existing policy and identify policy options.

5.8 Summary

I draw on a variety of theoretical frameworks in my research in order to provide the depth and breadth needed to interpret my topic in a holistic and interdisciplinary manner. By incorporating these frameworks into the conceptualization of my research I will be able to better understand the inter-relationships between agriculture, environment, society, economy, and policy. The next chapter summarizes the literature I reviewed for my research.

CHAPTER 6

Literature Review

6.1 Introduction

This chapter provides a summary of the literature I found that relates to my research. The interdisciplinary nature of my research meant that it was necessary to cast a wide net in my literature review in order to capture useful studies and reports. I have attempted to keep this chapter as succinct as possible by summarizing a relatively small (but representative) number of recent studies and reports that are most relevant to my research. I have divided the chapter into six key sections: agri-environmental collaborations, ecosystem goods and services, wildlife habitat availability on farmland, research conducted by the DFWT, research involving the DFWT, and competing interests in Delta.

6.2 Agri-environmental Collaborations

A review of the literature revealed that there are few studies that have investigated the formation and development of agri-environmental NGOs and I could find no studies that examined the role of policy in the formation and development of agri-environmental NGOs. There have been numerous studies examining community involvement in agroecology, particularly in Latin America and developing countries (see www.agroecology.org). However, the focus tends to be on specific agroecological issues such as improving the productivity of agroecosystems, demonstrating that agroecology is effective, ensuring that local people are involved, and that local knowledge is integrated into agroecosystem management. While these are important aspects of agroecology, they are not the focus of my research, so I have not included such studies in my literature review.

As part of my literature review, I searched for case studies written in English that met the following criteria:

- Community based NGO in a First World industrialized nation
- Formed as a result of ongoing conflict between farmers and environmentalists
- Identified enhancement of both wildlife habitat and agriculture as a goal of the NGO
- Discussed the role of policy in the formation and development of the NGO

While I could not find any studies that met all of my criteria, I did find two studies that examined conflict and collaboration in ecosystem management and the NGOs that formed as a result. These studies are discussed below.

6.2.1 Malpai Borderlands Group

Keough and Blahna (2006) reviewed ecosystem management and collaboration literature in an attempt to identify how social and ecological factors are integrated in collaborative management and why they are effective. They identified eight factors important for integrative, collaborative ecosystem management: integrated and balanced goals, inclusive public involvement, stakeholder influence, consensus group approach, collaborative stewardship, monitoring and adaptive management, multidisciplinary data, and economic incentives. They then examined four successful ecosystem management cases from western United States to show how the principles were incorporated and to explain the role these principles played in each success. They conducted interviews with key informants and reviewed secondary data (e.g. planning and decision documents, published media and academic accounts). The four case studies ranged in scale from site-specific to eco-regional. All of the cases involved controversial issues and agreement between stakeholders emerged over time.

They discovered that successful collaborative efforts resulted from meaningful stakeholder participation, development of plans that were economically feasible, and involvement of stakeholders in monitoring key social, ecological, and economic issues as they emerged. They also found that stakeholders were willing to trade off some of the value of economic incentives for recreational and environmental benefits. Although all the case studies examined collaborative management, one case study seemed most relevant to my research, because it involved an organization that formed due to agri-environmental issues. This study is summarized below.

The Malpai Borderlands Group is a nonprofit organization led by ranchers in New Mexico, USA. It was formed to address ongoing conflicts between ranchers and government personnel in favour of livestock grazing and environmental groups who were opposed to the grazing. Both sides were locked in a cycle of conflict that impeded management actions. Eventually two local ranchers realized that a common goal was needed to protect the grasslands so they organized meetings between environmentalists and ranchers. Over a period of five years the

group engaged other stakeholders including state and federal government personnel, academic organizations, as well as local and national environmental groups. The leaders of the group created a forum for open discussion where participants were asked to set aside their immediate concerns and focus on what they wanted the landscape to look like in the future. Stakeholder groups shared in the decision making process and a formal power-sharing system including a board of directors, planning teams, and advisory groups was established. This led to a shared vision for preserved unfragmented open spaces and improved rangeland conditions.

While the research conducted by Keough and Blahna (2006) does not examine the role of policy in the formation and development of any of the cases, it does provide some useful insights for my research. The methods used are similar to mine (i.e. interviews, review of secondary data), the formation of the Malpai Borderlands Group came as a response to agri-environmental conflicts, and the findings of Keough and Blahna (2006) provide a useful comparison to my research findings.

6.2.2 Cameron County Agricultural Coexistence Committee

Drawing on nearly ten years of research, Wondolleck and Yaffee (2000) discuss the benefits of collaboration in resolving natural resource conflicts. They explain how people have worked together to resolve conflicts, solve problems, and build partnerships. They studied nearly 200 cases of collaboration in natural resource and environmental management and identified eight themes they found to be critical to successful collaboration:

- Build on common ground established by a sense of place or community, mutual goals or fears, or a shared vision
- Create new opportunities for interaction among diverse groups
- Employ meaningful, effective, and enduring collaborative processes
- Focus on the problem in a new and different way by fostering a more open, flexible, and holistic mind-set
- Foster a sense of responsibility, ownership, and commitment
- Recognize that partnerships are made up of people not institutions
- Move forward through proactive and entrepreneurial behavior; and
- Mobilize support and resources from numerous sources (Wondolleck and Yaffee 2000, p. 20-21)

The most similar case study to my research that is cited in this book is the Cameron County Agricultural Coexistence Committee in South Texas, USA. Formation of the group came as a response to a proposal in the late 1980s by the United States Environmental Protection Agency

(EPA) to significantly restrict pesticide use on agricultural crops surrounding a wildlife refuge. This action was being taken in order to protect the endangered Aplomado falcon (*Falco femoralis septentrionalis*). At first farmers were angry and frightened by the EPA's proposal, so they formed an ad hoc group to discuss the issue. They decided that they needed a broader coalition to generate ideas. The group grew into the Cameron County Agricultural Coexistence Committee with farmers, environmentalists, and government personnel involved in the committee.

Wondolleck and Yaffee (2000) explain that a critical part of the group's development was a joint learning process in which everyone contributed their own expertise to the problem. For example, the group discussed alternative means of controlling pests that would not harm the falcons. Granular pesticides were poisoning the birds, but the same pesticide could be injected into the ground. A technique which, the group agreed, would not harm the birds. They worked through a process of mutual learning focusing on the problem rather than on historic or predetermined positions. The group adopted a holistic perspective linking economic and environmental issues across the landscape and used scientific information to help in their decision making. Government representatives also contributed by expanding their traditional roles defined by their agency to contribute to a process of joint problem solving. Wondolleck and Yaffee (2000) explain that a critical component of the success of the Cameron County committee was the willingness of the members to try a different approach.

While Wondolleck and Yaffee (2000) do not delve into the role of policy in the formation and development of the committee, they do point out that differences in the goals and missions of organizations can hinder cooperative efforts. They also explain that a lack of administrative flexibility among agencies in implementing agreements can result in frustration for individuals involved in collaborative efforts (Wondolleck and Yaffee, 2000). These findings provide valuable insight into some of the issues non-government organizations face in formation and development.

6.3 Ecosystem Goods and Services

This section discusses two reports that examined ecosystem goods and services on farmland in and around Delta. They provide insight into the value people place on wildlife habitat on farmland as well as an indication of the difficulty of attempting to estimate or capture that value.

6.3.1 Fraser Valley Natural Capital

Olewiler (2004) conducted four case studies to demonstrate how the preservation or restoration of natural areas in settled areas of Canada would generate considerable net benefits to society. The case studies demonstrate how inefficient allocation of land use by governments may be destroying or degrading natural capital. One of these cases studies focuses on the Lower Fraser Valley. Olewiler (2004) says that:

Valuing the natural capital from the Fraser Valley could help improve land use planning and save British Columbians millions of dollars in avoiding the construction of costly substitutes for the services of natural capital and the loss of these valuable goods and services. (Olewiler, 2004, p. 9)

However, Olewiler (2004) does not estimate the actual value of the ecosystem services provided by agricultural land (including wildlife habitat) due to a lack of data. She explains that a lack of data on the amount of natural capital in Canada is a serious and pervasive issue that is hindering our ability to make informed land use policies that reflect the value of natural capital.

Olewiler (2004) suggests four roles for government:

- Provide data reflecting the amount and attributes of natural capital and how it has changed over time
- Coordinate and fund efforts to measure and value natural capital in order to improve decision making
- Recognize and capture the benefits of natural capital when valuing Crown land
- Design policies that provide incentives for landowners to conserve their land when the natural capital from that land equals or exceeds its value for other uses

Olewiler's (2004) study is useful in the context of my research because it illustrates how agricultural land is undervalued in our current market driven economy. Non-market goods, such as the provision of wildlife habitat, are simply not documented or valued. As a result, the provision of ecosystem services (including wildlife habitat) by farmers is generally uncompensated. Olewiler (2004) explains that:

...because farmers typically receive no payment for the ecosystem benefits generated by their lands and farming techniques, they have little incentive or ability to protect nature. (Olewiler, 2004, p. 17)

6.3.2 Public Amenity Benefits and Ecological Services of Farmland

A recent study conducted by the BC Ministry of Agriculture and Lands (2007) examined the public amenity benefits and ecological services provided by farmland in Abbotsford. Abbotsford is located in the Fraser Valley approximately 55 kilometers from Delta. The study used intercept interviews, a postal survey, and a focal group to identify the public benefits individuals placed on farmland in Abbotsford. The interviews were conducted outside a mall in Abbotsford. Individuals were asked: “Is it a benefit to have farmland in the community?” Ninety-eight percent of the respondents answered yes. They were then asked: “What would you say are some positive associations you have with farmland in your community?” The responses are indicated below:

Table 6.1 Positive associations with farmland

Theme	Responses
Access to local food	75%
Greenspace/Nature	4%
Lifestyle	4%
Cheaper food	4%
Others	13%

Source: (BCMAL, 2007, p. 3)

A postal survey was created based on these initial responses and sent to 2500 random addresses in Abbotsford. Addresses in the Agricultural Land Reserve were excluded from the postal survey. The survey was intended to identify residents’ willingness to pay for specific attributes of farmland and general farmland preservation. 377 surveys were returned (15% response rate). One of the questions asked respondents to indicate the three most important attributes of farmland from a list of potential attributes. The responses are shown in the following table.

Table 6.2 Most important attributes of farmland

Theme	Responses
Access to local food	84%
Greenspace	62%
Rural lifestyle	38%
Job opportunities	34%
Wildlife habitat	28%
Scenic value	19%
Farm animals	18%
Cultural heritage	14%
Other	2.8%

Source: (BCMAL, 2007, p. 4)

A focus group drawn from the postal survey was used to confirm how respondents interpreted the questions in the postal survey. Since my research focuses on the provision of wildlife habitat on agricultural land, I will only discuss the findings related to wildlife habitat. The postal survey results showed that 111 (31.4%) of the respondents would contribute annually to a non-profit trust to protect wildlife habitat on 1000 acres of farmland (BCMAL, 2007). It is important to note that this is 31.4% of the self-selected minority that chose to answer the questionnaire, so their responses may not be representative of the broader population.

The study notes that the postal survey question related to wildlife habitat may have been confusing for respondents, so this figure may not be accurate. The author(s) explain that respondents may have had difficulty “unbundling the farmland attributes” (BCMAL, 2007, p. 50) from those that contribute to wildlife habitat and therefore contributed a similar amount to wildlife habitat as they did to farmland preservation as a whole.

The author(s) then go on to explain that: “Using aerial photos and the Land Use Inventory it appears the amount of farmland that could be used as wildlife habitat in Abbotsford is in the 10 percent range” (BCMAL, 2007, p. 50). This statement is disconcerting because it appears to separate farmland from wildlife habitat when, in fact, farmland itself provides wildlife habitat. The author(s) do note that the individuals who took part in the focus group had a difficult time separating specific benefits of farmland (e.g. wildlife habitat) from the overall value of farmland and that most postal survey respondents appeared to take a holistic view of the benefits of farmland (rather than focusing on specific attributes).

While this study does shed some light on the value respondents place on the non-market goods and services provided by farmland, the confusion over whether all farmland or only a small percentage (the area that is presumably unfarmed) should be considered as potential wildlife habitat is problematic. However, the study does illustrate the difficulty in measuring the ‘value’ of wildlife habitat on farmland.

The mere fact that people acknowledge the non-market goods and services that farmland provides indicates that there is potential to capture the value that people place on farmland and its provision of wildlife habitat. The challenge is in determining: a) what wildlife habitat is ‘worth’ (and if it is even possible to assign a value to wildlife habitat); and b) if wildlife habitat can be valued, how can that value be captured from the public and transferred to the farmers who are providing the wildlife habitat. While there are methods to estimate the value of wildlife habitat (e.g. contingent valuation), these methods are controversial because they may not capture the full value of wildlife habitat (i.e. both intrinsic and economic) (Farber et al., 2006). There are also methods to transfer the value of wildlife habitat to farmers who provide wildlife habitat (e.g. direct payments), but the challenge lies in developing a system that is equitable and affordable over the long term (Swinton et al., 2007).

6.4 Wildlife Habitat Availability on Farmland

Neave et al., (2000) developed an ‘Availability of Wildlife Habitat on Farmland’ indicator for Agriculture and Agri-Food Canada for the seven main ecozones in which agricultural production occurs in Canada. The indicator was developed to track changes in agricultural habitat types between 1981 and 1996. Between 1981 and 1996 cropland grew by 28% in the Lower Mainland (Neave et al., 2000). This is considered to be a negative trend for wildlife because much of this expansion came from the conversion of tame or seeded pasture (which is more favourable for wildlife habitat) to cropland (Neave et al., 2000). This provides a good example of how a gain in agricultural production can result in a loss of wildlife habitat.

The report acknowledges that, in the Lower Mainland of British Columbia, “urbanization, agriculture, and wildlife habitat are often conflicting land uses...” (Neave et al., 2000, p. 151). The DFWT is cited by Neave et al. (2000) as an excellent example of how agricultural productivity does not have to come at the expense of wildlife habitat:

All of the programs promoted by the Delta Farmland and Wildlife Trust provide benefits to both the exceptional wildlife resource in the Fraser Valley and the agricultural community. (Neave et al., 2000, p. 152)

This information is useful for my research because it shows that wildlife habitat on farmland in the Lower Mainland is declining and specifically identifies the DFWT as an organization that has been successful at providing programs that benefit both wildlife habitat and agriculture. This helps to validate my decision to use the DFWT as a case study.

Javorek et al. (2007) examined changes to wildlife habitat on agricultural land in Canada. They derived land use patterns from Statistics Canada's Census of Agriculture and applied these at the soil polygon level. They found that there was a 5% decline in habitat capacity on Canada's agricultural land between 1981 and 2001. This decline was associated with an expansion in cropland and decline in pasture. In British Columbia they found a decrease in habitat capacity of less than 2%. They explain that this negative trend is mostly due to a decline in the relative share of farmland in pasture.

They recommend that information should be collected locally and regionally where planners can work with landowners to set habitat goals and objectives for a variety of species. They explain that the use of extension and incentive programs can help farmers to understand how they can implement land management practices that benefit wildlife. They conclude by saying that a holistic approach is needed in policy development to address environmental and economic sustainability in agriculture. They state that:

Policies and programs designed to sustain biodiversity should not be developed independently of socioeconomic factors of policies favouring agricultural intensification. (Javorek et al., 2007, p. 225)

This study links the provision of wildlife habitat on farmland to policy, incentive programs, and agricultural extension. These are all important components of my research.

6.5 DFWT Research

This section describes some of the research carried out by the DFWT in 2005-06. The DFWT conducts an ongoing research program to study the impacts of their agri-environmental stewardship programs to ensure that objectives are being met and to adjust programs as needed to meet those objectives (DFWT, 2006). Since I chose the DFWT as my case study, the results

are included here to give a sense of the type of research carried out by the DFWT and to show how their programs benefit both agriculture and wildlife over the long term.

6.5.1 Cover Crops

Grazing surveys were conducted three times on all cover crops registered in the program over the winter of 2005-06. Field surveys were conducted by an observer who walked through each field to visually estimate the proportion of field that had been grazed by waterfowl as well as the intensity of the grazing. Weather conditions were particularly bad during this season. Bad weather, combined with extremely high tides and high waterfowl population densities resulted in heavy waterfowl use in the upland areas on the Fraser River delta. By the end of March 2006, 82% of 1034 ha of cover crops showed evidence of grazing and 51% of those crops were either extremely grazed (only cover crop stubble remained) or completely grazed (no evidence of cover crop) (DFWT, 2006).

The field surveys revealed that late planted wheat crops were particularly vulnerable to waterfowl grazing with 98% of the total area planted with wheat showing evidence of grazing. Timothy fields were also grazed off early in the season, although only 22 ha were planted this season. In many cases there was little wheat or timothy crop to plough down at the end of the season. Waterfowl appeared to use barley fields less, with only 8 out of 64 fields extremely grazed. The biomass in barley fields tended to be high at the end of winter allowing for significant incorporation of organic carbon after ploughing (DFWT, 2006).

In many cases, cover crops were grazed before they could provide full soil cover. These cover crops usually do not survive early grazing. The young plants provide excellent nutritional value for waterfowl, but do not provide enough forage through the winter for waterfowl or enough residual crop for plough down. Cover crops will continue to be monitored and evaluated to determine if planting guidelines need to be adjusted (DFWT, 2006).

6.5.2 Trumpeter Swan Habitat Use Study

The trumpeter swan (*Cygnus buccinator*) was nearly driven to extinction in the early 1930s. In 1970 the winter population of swans on southern Vancouver Island and the Fraser River delta was estimated at 947. This population grew to 7,570 by 2005. As populations grow, it is

expected that medium to large estuaries associated with agricultural lands will continue to provide important habitat for wintering swans (DFWT, 2006).

These large grazers can be difficult to accommodate on agricultural lands because they can cause significant damage to economically important fields. Cover crops can be used as lure areas to draw swans away from economically important crops such as perennial forage. Over the 2005-06 winter season a pilot study was conducted to determine habitat preferences of Trumpeter swans across three regional areas containing mixed field cover. The goal of the study was to better understand the relative importance of cover crops in sustaining wintering swans (DFWT, 2006).

Surveys were conducted between mid-November and the end of March. Swan flocks were observed in all three areas. The crop type, swan numbers, and the fields in which they fed were recorded. This information was compared to the availability of different field types to determine if swans demonstrated any habitat preference. The results revealed that swans only used winter cover crops, corn stubble fields, and potato residue fields within the surveyed areas. The results indicate that crop residue and cover crops provide important foraging areas for Trumpeter swans while economically important perennial forage fields do not appear to provide significant habitat for swans (DFWT, 2006).

6.5.3 Grassland Set-asides

The DFWT documents patterns of habitat use at the landscape level to help identify habitat types that are important to different species. Winter landscape level use by raptors was studied in 2005-06 to identify critical areas and habitat types. Censuses of diurnal birds of prey were conducted along six transects covering an area of 2800 ha. Biweekly surveys were conducted between mid-November and early March. The location and behaviour of the raptors as well as the field type were recorded on each 1.6 km (1 mile) wide transect (DFWT, 2006).

There were sufficient numbers of red-tailed hawk and northern harrier detections made over the survey season to estimate habitat preferences. Both showed highest preference for tall grass habitat (grassland set-asides, old fields, and some tall forage fields). A number of owl species also used grassland set-asides in the winter. Some owl species used grassland set-asides year-round (DFWT, 2006).

Tall grass habitats made up 9.7% of the upland areas included in the surveys. Seventy percent of the area covered by these tall grass habitats was part of the DFWT funded grassland set-aside program. The results of the research indicate that tall grass habitat is important for grassland raptors wintering on the delta. Set-asides provide dense populations of their preferred food (Townsend's vole) as well as thermal and hiding cover (DFWT, 2006).

6.5.4 Raptor and Small Mammal Densities in Selected Grassland Types

Small mammal and raptor surveys were conducted in the winter within selected grassland set-asides and forage fields. The objectives were to identify relative densities of small mammals within these field types and to measure the relative use of selected grass field types by wintering raptors. Twenty live traps spaced at 10 m intervals (index lines) were used to monitor small mammal relative density at three replicates of perennial forage fields and three set-aside age classes. Three two-day trapping sessions were conducted over the 2005-06 winter season. Five trapping sessions had been planned, but heavy rain and excessive field flooding prevented this from occurring (DFWT, 2006).

The results showed similar trends in Townsend vole (*Microtus townsendii*) relative density in relation to age of set-asides as data collected from previous years. Older set-asides have higher vole densities relative to first year set-asides and perennial forage fields. Grass cover and height was greater in second and fourth year grassland set-asides relative to the other field types studied. Raptor use was also assessed within the same fields using four 60 minute field surveys over the 2005-06 winter season. More surveys had been planned, but poor weather interfered with many of the planned surveys (DFWT, 2006).

The data collected from the grassland surveys indicate that these habitats are populated by Townsend's voles and are used by many raptors, most notably the northern harrier. Ninety-five percent of all observations were northern harriers (*Circus cyaneus*). Other raptor species observed included red-tailed hawks (*Buteo jamaicensis*), bald eagles (*Haliaeetus leucocephalus*), merlin (*Falco columbarius*), rough-legged hawks (*Buteo lagopus*), American kestrel (*Falco sparverius*), and short-eared owls (*Asio flammeus*). The DFWT grassland set-aside program has contributed to the winter raptor habitat capacity in the Fraser River delta. The program provides between 50 to 60% of tall grass habitats on farmland in the delta.

Without the financial incentives provided by the DFWT grassland set-aside program these fields may have been left bare during the winter or remained in crop production (DFWT, 2006).

6.5.5 Hedgerow Songbird Surveys

The hedgerows installed as part of the DFWT Farmscape program are all under ten years old so they have not yet developed into the complex structures that some of the older hedgerows in Delta display. Some of the DFWT's older hedgerows (5-8 years old) are beginning to show some vegetative complexity. Spring breeding bird surveys were conducted in 2006 to assess the development of the hedgerows particularly with respect to bird species richness (DFWT, 2006).

Bird surveys took place along 21 field margins throughout Delta. These field margins were stratified into four groups: those with no hedgerows (control), those with 1-4 year old hedgerows established under the DFWT Farmscape Program (new), those with 4-8 year old hedgerows established under the DFWT Farmscape Program (old), and those with hedgerows of approximately 20 years or older (mature). A combined total of 37 songbird species were identified along surveyed field margins. Mature hedgerows appeared to demonstrate the highest species richness (number of species) as well as overall relative abundance (total number of bird detections/100 m). The 'old' DFWT hedgerows appear to be increasing in species richness and density compared to the 'new' and 'control' field margins. DFWT hedgerows have been designed to develop relatively quickly into structurally complex hedgerows with a well developed shrub layer and intermittent tall tree canopy. Structurally complex hedgerows have been shown to increase the density and diversity of songbirds in hedgerows compared to less complex hedgerows (DFWT, 2006).

6.6 Other Research Involving the DFWT

This section summarizes two studies involving the DFWT. I have included these studies because they identify some of the cultural and economic benefits that come as an indirect result of the DFWT programs. They are useful for my research because they illustrate that the DFWT programs have a broad impact on the community that extends beyond the direct benefit to agriculture and wildlife habitat.

6.6.1 Hedgerows

Oreszczyn and Lane (2001) compared cultural perspectives of hedgerows in Canada (specifically Delta) and England. The authors found that people in Delta and England shared many similar perceptions of hedgerows. However, they also found some differences in cultural perceptions. The authors point out that these differences have implications for the planning and management of hedgerows in Delta and have affected the manner in which the DFWT has managed its hedgerow program. This is discussed in greater detail below.

In order to gather data about people's perceptions of hedgerows in England, the authors conducted 45 interviews (using open-ended questions) with farmers, members of the public, and professionals. They used a questionnaire to survey 70 people and also used secondary data sources. Less data was collected for the Delta portion of the study due to time and financial constraints. They collected information from the DFWT, the local museum, and the University of BC library. They also spoke with some Delta farmers and members of the DFWT. A small sample of BC residents completed the same questionnaire provided to participants in the English study. The data was analysed using a computer program (QSR NUD*IST (1997)) which sorted the qualitative data into categories so that relationships within the data could be identified through a grounded theory process (Oreszczyn and Lane, 2001).

The researchers found that farmers in England and in Delta shared similar concerns about providing "free board" for wildlife on their farms (Oreszczyn and Lane, 2001, p. 4). Farm economics was identified as the main barrier to conservation by farmers in both countries. Farmers from both countries also felt that their contribution to wildlife conservation was not adequately recognized by the broader community. Trust and relationships were identified as being important to farmers in both countries (Oreszczyn and Lane, 2001).

One of the key findings of the English study was that farmers did not trust the experts and members of the public did not trust the farmers. English farmers were also very critical of the bureaucracy involved in government-led agri-environmental programs such as the Countryside Stewardship Scheme administered by the Department of Environment and Rural Affairs. Within these schemes farmers receive grants for adopting more environmental friendly farm practices including hedge laying and planting. Their key criticisms related to the amount of time and commitment required by the farmer, lack of program flexibility, inadequate funding,

and a lack of appreciation of the farmer's knowledge of their own farm. The researchers found that "...whereas the English schemes appeared to act against trusting relationships concerning hedgerows, the scheme run by the DFWT specifically aimed to build trust" (Oreszczyn and Lane, 2001, p. 6).

The researchers found that people viewed hedgerows in England as a historical part of the landscape. However, in Delta, hedgerows are a relatively new feature on the landscape and do not generate the same feelings of heritage or sense of place as those in England. Hedgerows have been in place in England since prehistoric times, whereas the oldest hedgerow in Delta is thought to be about 100 years old. However, Canadian respondents did indicate that hedgerows were important for their aesthetic, visual, and wildlife aspects (Oreszczyn and Lane, 2001).

The researchers note that these cultural differences create a different climate for hedgerow establishment and management. In England, some farmers care for hedgerows with no financial assistance or recognition while others take advantage of partial incentives to encourage hedgerow planning and maintenance. There is also legislation in place to protect the most important hedgerows in England. However, the DFWT has taken a different approach, using word-of-mouth and curiosity in the farming community to build trust in order to encourage farmers to take part in their hedgerow program. In addition, the DFWT assumes responsibility for establishing and caring for hedgerows for the first five years (Oreszczyn and Lane, 2001).

This research illustrates how important it is to understand, and work with, the local community when designing and implementing agri-environmental stewardship programs. In some cases financial incentives may be needed to encourage agri-environmental stewardship. In other cases, farmers may practice agri-environmental stewardship out of a sense of moral obligation (e.g. tending ancient hedgerows). This research provides a useful cultural perspective on the value of agri-environmental stewardship.

6.6.2 Land Tenure

Fraser (2004) examined whether farmers need to own their land to conserve it or if long-term leases are adequate. Fraser (2004) used crop management and land tenure data from Delta to identify whether farmers who own their land plant more crops that promote long-term conservation than farmers who rent their land. The research also examined whether farmers

with long-term leases plant more crops that promote long-term soil conservation than farmers with short-term leases.

The research revealed that farmers who do not own their land plant more crops that provide short-term returns (e.g. annuals) while farmers who own their land manage their farms over a long-term time frame and plant crops (e.g. perennials) that help maximize soil conservation. Fraser (2004) also found that long term leases do not appear to provide the same incentives as land ownership and long-term leases do not necessarily result in farmers adopting a long-term farm management approach.

Interestingly, Fraser (2004) found that the DFWT grassland set-aside program counteracted the negative impact that land tenure (i.e. leased land) had on long-term farm management and soil conservation. Fraser explains that this occurs because the grassland set-aside program provides incentives for farmers to invest in long-term management practices (i.e. grassland set-asides) that improve soil conservation even though the farmers may not receive any long-term benefit beyond the financial incentives provided. Fraser identifies three accomplishments of the DFWT grassland set aside program:

1. It provides an immediate return on what would otherwise be a long-term investment and would not normally be justified on leased land
2. It creates a monetary value for wildlife habitat
3. It provides farmers with the opportunity to provide wildlife habitat while also improving soil quality

Fraser notes that "...this sort of program should be of considerable interest to policy makers as a method of promoting sound environmental management and soil conservation practices" (Fraser, 2004, p. 78). These findings are of value to my research because they show how the DFWT programs can counteract the effects of leased land which might otherwise be poorly managed for soil and wildlife habitat. The study also shows how payment for ecological services can act as an incentive for agri-environmental stewardship.

6.7 Competing Interests

This section summarizes some of the other studies that are related to my research that have been conducted in Delta. Since many of the reports are quite lengthy, I only discuss those points that directly relate to my topic.

6.7.1 Conflicts in Delta

Saddlemeyer et al. (2001) examined the past and present conflicts in Delta and provided a number of recommendations on how to resolve these conflicts. This is a lengthy report, so I will only identify a few salient points made by the authors that are relevant to my research. The authors discuss the plethora of conflicts that have occurred in Delta since the 1960s including expropriation of farmland (Back-up Lands) by the provincial government in the late 1960s; construction of roads, hydro, gas, sewer, and water lines; residential subdivision; establishment of the ALR in the 1970s; increased concern in the 1980s and 90s over environmental and wildlife habitat degradation; impact of free trade on local agricultural viability; and initiation of the Tsawwassen First Nations band land claim. The authors sum up the past 50 years in Delta by saying :

...Delta appears to be a classic example of a community which has experienced multi-issue, multi-party, multi-incident conflict. Conflict has remained a near-constant feature of the landscape... (Saddlemeyer et al., 2001, p. 20)

At the time the report was written Delta was also battling the provincial government over the right to pass bylaws which would place restrictions on greenhouses. As discussed in Chapter 4, the provincial government passed an Order-in-Council (#568) on June 11, 2001 which required Delta to receive Ministerial approval for any zoning bylaws restricting farming in the ALR. The authors explain that the conflict over greenhouses is complex because it involves four layers of government: federal, provincial, regional, and municipal. The authors discovered that the crux of the conflict is centered on competing interests between the provincial and municipal governments with each government attempting to enact laws that will allow them to achieve their own goals (Saddlemeyer et al., 2001).

The authors solicited comments from community members and found that farmers and environmentalists had similar concerns and interests. They shared a similar vision of the type of community they wanted in the future. The DFWT was identified by provincial representatives as a good partnership model and recommended that similar partnerships be formed modeled after the DFWT (Saddlemeyer et al., 2001).

The authors found that community members:

- Care passionately about their community and its future
- Believe it is important to protect farmland

- Understand the need for farmers to earn sufficient income to enjoy a decent standard of living
- Believe it is important to protect waterfowl, wildlife and their habitat
- Believe the rest of society has a vested interest in the preservation of the Fraser River delta ecosystem
- Want to be understood, appreciated and treated respectfully by other community members
- Want predictability, security and a decent quality of life for themselves, their families and future generations
- Want to be able to chart their own future, free from outside interference (Saddlemeyer et al., 2001, p. 22)

This report provides useful historical information on the range of conflicts and policy issues in Delta both before and after the formation of the DFWT. The information in this report is valuable because I can compare these results to my interview results to determine whether conflicts and policy issues have changed since the report was written. It is also useful for determining whether the recollections of those interviewed are consistent with the information provided in the report.

6.7.2 Land Use Management in Delta

Norecol et al. (1994) undertook a study to develop a set of environmental and land use management strategies for rural lands around Boundary Bay. The main themes of the study were agricultural viability and environmental management. The authors point out that there is a wide range of competing interests in Delta ranging from those who want to maintain the land as farmland, environmental agencies and groups interested in maintaining wildlife habitat, and other groups interested in using the land for recreational purposes. They point out that these interests should be dealt with as a whole rather than in isolation of each other. They explain that the maintenance of soil-bound agriculture is essential for agricultural viability, wildlife habitat conservation, and for recreational opportunities.

This is a lengthy report with many recommended strategies and actions aimed at building and strengthening existing cooperative relationships. I have only identified some of the actions that are directly related to my research and the DFWT. The authors recommend that the DFWT should be endorsed and encouraged as a working partnership between wildlife conservationists and farmers. Some of the actions recommended by the authors include:

- Encourage the Delta Farmland and Wildlife Trust as a working partnership between farmers and wildlife conservationists through initial financial support, ongoing liaison, and the provision of appropriate information (Norecol et al., 1994, p. 5-3)
- Encourage agricultural enhancement measures, where appropriate, which offer concurrent benefits to wildlife (e.g. set aside and winter cover crop programs) and also encourage habitat enhancement that provides agricultural benefits (Norecol et al., 1994, p. 5-4)
- Support government, non-government, and landowner initiatives to manage farmlands in order to maintain and enhance their agricultural and wildlife values (Norecol et al., 1994, p. 5-4)

This report provides useful historical information on strategies aimed at enhancing both agricultural viability and wildlife habitat conservation. The report was written about the same time the DFWT formed (in 1993), so it gives a good indication of the atmosphere in the community at that time. The results and recommendations provide information that I can use to triangulate my interview results.

6.7.3 Agriculture in Delta

Klohn Leonoff Ltd. et al. (1992) produced a report on agriculture in Delta jointly funded by the federal department of agriculture (Agriculture Canada) and the provincial ministry of agriculture (BC Ministry of Agriculture, Fisheries, and Food). The purpose of the report was to provide an integrated framework for guiding and promoting farmland protection, land use, and agri-business development in Delta. They divided agricultural problems in Delta into five categories: agricultural land, crop markets and economic viability, transportation, drainage and irrigation, and wildlife and other competing uses. They provided ten recommendations to address these problems. Since this is a lengthy and dated report, I will only discuss some of their findings directly related to my research.

The authors conducted personal interviews with 85 out of 105 producers in Delta. This was aggregated to 68 agricultural operations (due to people farming in association with others). The interview results indicated that many farmers were incurring considerable costs as a result of wildlife damage (primarily migratory waterfowl, resident geese and other birds) to crops and soil. Most of the farmers surveyed (87.5%) felt the damage would be easier to accept if they received adequate compensation. Many farmers said they would be willing to produce crops strictly for waterfowl if they were adequately compensated. Farmers also noted that they thought the number of overwintering ducks and geese had increased in recent years.

The report suggests an integrated cooperative approach to resolve issues associated with waterfowl and agriculture. It also recommends the establishment of a Steering Committee to “...ensure habitat enhancement is not detrimental to farming activities” (Klohn Leonoff Ltd. et al., 1992, p. 122). Such a committee would advise municipal and provincial governments and have strong representation from the farming community.

This report provides useful information about agricultural and environmental issues in Delta prior to the formation of the DFWT. The report mentions the idea of a Steering Committee which is also mentioned in the next section. The information in this report provides a useful comparison to my research results.

6.7.4 Ecosystem Protection in Delta

The Boundary Bay Conservation Committee (BBCC) (1992) produced a report which identified the issues associated with wildlife habitat protection in Boundary Bay and proposed a framework for ecosystem protection. The report summarizes the importance of Boundary Bay for its agricultural, wildlife, and heritage values. It outlines the threats to the Boundary Bay ecosystem and the challenges in addressing both habitat conservation and farmland preservation. Land use issues are examined and goals to help protect the Boundary Bay ecosystem are identified. The report culminates with a proposal to create a Boundary Bay Biosphere Reserve as a way of cooperatively addressing the issues and goals identified.

The report notes that: “The large number of jurisdictions owning the land base makes integrated resource planning particularly complex” (BBCC, 1992, p. 16). The biosphere reserve concept is presented as a method of coordinating various land use interests. The report explains that a biosphere reserve would provide a framework for achieving the following goals:

- Conservation of wildlife habitat
- Preservation of the farming industry
- Public education on the importance of living and working in the ecosystem
- Improved land use planning
- Research initiatives

Nine recommendations summarizing the steps that need to be taken to implement the goals of the biosphere reserve are provided. I will only discuss the third recommendation because it is

the one that is most relevant to my research. This recommendation is to: “Cooperate with agricultural land owners to ensure a supply of upland wildlife habitat” (BBCC, 1992, p. 36). One of the actions associated with this recommendation is to establish a Steering Committee of wildlife interests and local farmers to explore cooperative schemes to encourage and fund wildlife habitat conservation. Another action is to implement a rotational leasing scheme to ensure a supply of old-field habitat based on similar schemes used in North America and Europe in which farmers are paid to leave fields uncultivated. The report also suggests that the retention of hedgerows should be promoted and funded.

This report was completed in the same year and contains much of the same information as the Klohn Leonoff Ltd. et al. (1992) report, although there is a greater focus on the issues associated with wildlife habitat conservation and the concept of developing a Biosphere Reserve in the BBCC report. As noted above, both reports identify the need for agricultural and environmental interests to work cooperatively to solve agri-environmental issues. Both reports also identify the need for a Steering Committee to guide this process. This report is beneficial to my research because it provides an environmental perspective on the issues in Delta around the time the DFWT formed. It also provides me with an opportunity to compare my interview results with the information provided in this report.

6.8 Summary

The information from the Malpai Borderlands Group (Keough and Blahna, 2006) and Cameron County Agricultural Coexistence Committee (Wondolleck and Yaffee, 2000) provides insight into some of the opportunities and challenges faced by these organizations in their formation and development. This information will be useful to compare to my research findings regarding the formation and development of the DFWT. The studies conducted on ecological goods and services demonstrate the challenges associated with capturing the economic value of non-market goods such as wildlife habitat on agricultural land. The study on hedgerows in England and Delta shows that the value people place on landscape features can differ across cultures. The research conducted by the DFWT demonstrates the benefits of their programs to agriculture and wildlife habitat. This information helps to validate the choice of the DFWT as a case study because their ongoing research shows that their programs are effective and that the DFWT is a successful agri-environmental organization worthy of further study.

The various studies examining the competing interests in Delta reveal a socio-political landscape that has been riddled with conflict for years. The historical information provided in these reports provides insights into the prevailing issues between agricultural and environmental interests over the years. This information will help me to triangulate my interview results and provide insight into whether the DFWT has helped to ease any of the conflicts that were identified. The next chapter takes the information that has been provided by me up to this point to describe the research problem and identify the research questions I used to guide my research.

CHAPTER 7

Research Problem Statement

7.1 Introduction

This chapter describes the research problems I identified based on the information provided in the preceding chapters. It also describes the research questions I developed to guide my thesis and provide insight into the research problems. A research problem can be defined as something that is not fully understood, or it is something we don't know how to deal with, so we need to find additional information (Maxwell, 2005). The research problem helps to justify my study and show the importance of my research. A research question explains specifically what the research will attempt to understand (Maxwell, 2005).

7.2 Overarching Problem

In Chapter 2, I summarized some of the global threats to agricultural viability and wildlife habitat, including population growth, resource depletion, and loss of biodiversity. As prime agricultural land is lost to development, marginal lands are brought into production. These marginal lands are less productive and more susceptible to erosion. The loss of marginal lands to agriculture also often means a loss of wildlife habitat forcing wildlife onto remaining soil-based agricultural land where they can cause damage to crops and injure or kill livestock. Without compensation for these damages, farmers are understandably reluctant to voluntarily provide wildlife habitat on their farms.

The threats to agricultural viability and wildlife habitat conservation combined with the challenges associated with providing wildlife habitat on agricultural land have considerable consequences for the sustainability of society globally and locally. This is the overarching research problem that is guiding my research. The overarching research question that I have derived from this problem is: How can we reconcile the challenges of producing food for a growing population on a diminishing agricultural land base, while still providing wildlife habitat on or around farmland? One of the ways in which this problem can be addressed is through community based collaborative resource management. This leads to the second part of this overarching research question: How can community-based collaborative efforts address this problem and how do policies affect these efforts?

7.3 Broad Research Problems

In this section I identify a number of broad research problems that help me define four broad research questions. In the following section I refine these broad research questions into four specific research questions. These specific research questions are the questions I try to answer through my research.

When I reviewed the literature related to my study I discovered three broad research problems. There were very few studies that profiled how a community in conflict in a First World industrialized nation worked together to form a NGO that specifically set out to provide wildlife habitat and enhance agricultural viability. The two organizations I reviewed appeared to have similar reasons for forming. In both cases there was a conflict in the community between agricultural and environmental interests that was not being resolved by government or any other means, so a NGO was formed to deal with the issues. Conflict and a willingness to work together to resolve the conflict were common driving forces between the two case studies. These case studies provide some insight into the reasons why agri-environmental NGOs form.

It is important to document why agri-environmental NGOs form so that individuals or organizations interested in providing wildlife habitat while enhancing agricultural viability can learn from the experiences of these NGOs. This information may help farmers and environmentalists to work together to address agri-environmental conflicts. It may also lead to the formation of additional agri-environmental NGOs and/or more effective agri-environmental NGOs.

There also appears to be a lack of research into the role of policy in the formation and development of agri-environmental NGOs. Pretty (1998) explains that agricultural policy often acts as a disincentive to sustainability. While there may be localized successes in sustainable agriculture, Pretty (2002; 1998) points out that without a supportive policy framework these successes may not spread far. If this is the case, then it is important to examine the role of policy in the formation and development of agri-environmental NGOs to determine whether policy is enabling or impeding their ability to promote agri-environmental stewardship. It is also important to understand what sorts of policies encourage agri-environmental stewardship so that policy makers are aware of the policy options that are available to support agri-environmental stewardship.

These research problems led me to the following broad research questions:

1. What leads to the formation of agri-environmental NGOs?
2. What role do government policies play in agri-environmental NGO formation?
3. What role do government policies play in agri-environmental NGO development?
4. What sorts of government policies encourage agri-environmental stewardship?

In order to keep these questions manageable, I confined the scope of my research to First World industrialized countries with supportive agri-environmental policies, specifically Australia, Switzerland, and England. I explain why these countries were chosen and provide an overview of their agri-environmental policies in Chapter 13.

7.4 Specific Research Questions

This section builds on the previous section by taking the broad research questions identified above and honing them down to create succinct research questions that I can explore in this thesis. Based on my experience, I found that the DFWT was well respected in the agricultural and environmental communities for its agri-environmental stewardship programs. A number of reports that I reviewed also identified the DFWT as a good model and/or praised its agri-environmental stewardship programs (e.g. Saddlemyer et al., 2001; Neave et al., 2000; Norecol et al., 1994).

Despite the apparent success of the DFWT, the formation and development of the DFWT has never been documented in an academic manner. The DFWT has been in operation for sixteen years, and many of the founders are getting on in age, so now appears to be a good time to examine what led to the formation of the DFWT. Also, because it appears to have established itself as a successful agri-environmental NGO, it seems to be an appropriate time to examine where its successes lie, whether it faces (or has faced) any challenges in its development, and whether policy has played any role in these successes and/or challenges.

Based on the broad research questions identified above, and using the DFWT as a case study, I developed four specific research questions. The fourth research question is based on the results of research questions two and three. If no impeding policies were identified through the primary or secondary research, this research question would not be addressed. However, assuming that there are impeding policies identified, this research question is intended to determine whether there are policies from other countries that appear to support agri-

environmental stewardship. The intent is to use these policies to develop policy options that support agri-environmental stewardship. The four specific research questions I developed based on the broad research questions are:

1. What led to the formation of the DFWT?
2. Did government policy enable or impede the formation of the DFWT?
3. Did government policy enable or impede the development of the DFWT?
4. What sorts of government policies could be used to encourage agri-environmental stewardship in Canada?

Answering these questions may help address the overarching research problem by identifying some of the opportunities that are available to communities to deal with agri-environmental conflicts at the local level. The lessons learned by the DFWT may serve as guidelines for those interested in establishing similar organizations. The policy review may provide policy-makers with some insight into the effect of policies on agri-environmental stewardship. The identification of supportive agri-environmental stewardship policies from other countries may help policy-makers in Canada and BC to amend policies that are currently impeding agri-environmental stewardship. In sum, these research questions will help to address the overarching research question by illustrating how communities can work together to produce food for a growing population on a diminishing land base, while still providing wildlife habitat on or around farmland.

7.5 Summary

There is a lack of academic research on both the formation and development of agri-environmental NGOs in First World industrialized nations and the role that policy plays in their formation and development. The research questions I have identified are based on the premise that the sustainability of society is at risk because of a shrinking agricultural land base, growing population, competition for resources, and loss of wildlife habitat. There is a need for innovative approaches to voluntary cooperative resource management. My research will examine how a community in conflict acknowledged the potential loss of both agricultural and wildlife resources and came together to identify ways to share resources more equitably. This will provide an original contribution to knowledge by documenting how a relatively small community, faced with a long history of conflict, worked through their differences to manage agricultural and wildlife resources cooperatively. As these resources diminish around the world, case studies, such as this one, will provide both a beacon of hope and a blueprint for

success that others around the world can use to etch their own mark of sustainability on the world.

CHAPTER 8

Methodology

8.1 Introduction

In this chapter, I describe the theory behind my methodological framework, data sources, interview process and design, validity, reliability, interview analysis, and policy review process. The next chapter describes the specific methods I used to collect and analyse data.

8.2 Framework

I decided to take a qualitative, rather than a quantitative, approach in my research because it appeared to be the most appropriate method of capturing and understanding the perspectives of the people who have been involved in the formation and/or development of the DFWT. Qualitative research focuses on specific people or situations emphasizing words rather than numbers (Maxwell, 2005). Qualitative research includes the "...description of an observed situation...historical enumeration of events, and account of the different opinions people have about an issue..." (Kumar, 2005, p. 12). In contrast to quantitative research, which emphasizes large sample sizes that can be statistically analyzed, qualitative research tends to involve in-depth investigation with fewer subjects (Kumar, 2005).

Qualitative results are not intended to be generalized as they are in quantitative research. Instead, data is collected from a relatively small number of people and interpreted in the context in which the events being documented occurred (Maxwell, 2005). It is often used in exploratory studies and can lead to the formation of robust testable hypotheses where quantitative or combined qualitative and quantitative methods may be appropriate. My research is well suited to a qualitative approach because I explore the history of the DFWT through interviews with people who have been involved in the formation and/or development of the DFWT. I use their opinions, based on their personal experience, to develop a general sense of why the DFWT formed and whether they feel policy has enabled or impeded the formation and/or development of the DFWT.

In terms of research typology, this research is 'applied research' because the findings are "...being designed either for use in understanding a phenomenon/issue or to bring change in a program/situation" (Kumar, 2005, p. 14). Specifically, the findings from my research will be used to identify whether policy enabled or impeded the formation and/or development of the

DFWT and to identify policy gaps and options to address those gaps. My study design includes both a retrospective and case study approach. A retrospective approach investigates "...a phenomenon, situation, problem or issue that has happened in the past" (Kumar, 2005, p. 99). Retrospective studies are "...usually conducted either on the basis of the data available for that period or on the basis of respondents' recall of the situation" (Kumar, 2005, p. 99). A case study approach involves the in-depth analysis of a person, group, process, community, episode, or any other aspect of society. It is a valuable method to use because it provides an opportunity to intensively analyze many specific details about the case (Kumar, 2005).

I chose to use a case study approach because it allows for: "...a comprehensive description and explanation of the many components of a given social situation" (Babbie, 1990, p. 32). For example, how relationships between community members changed after the formation of the DFWT, how individual personalities hindered or helped the formation of the DFWT, and how those involved learned from each other. A case study approach is an important aspect of my research because of the interdisciplinary nature of my topic. A case study approach allows me to delve into the complex interactions between people, agriculture, wildlife habitat, and policy in the context of the DFWT. The key limitation to the case study approach is that it assumes that the case being studied is typical of cases of a similar type so that intensive analysis of the chosen case will yield results that can be generalized to cases of the same type (Babbie, 2008; Kumar, 2005; Bryman, 2001). However, the data collected from a single case study may be anomalous. In other words, the data may be unique to that example, making it difficult (or impossible) to extrapolate that data to other cases. This limitation can be offset by comparing the findings to other research and/or case studies (Babbie, 2008).

8.3 Data Sources

I used primary and secondary sources of data in this research. Sproull (1995) describes primary sources as being "...present during the event, experience or time" (Sproull 1995, p. 155). Data from primary sources are not necessarily accurate even though they come from first hand sources. Primary sources are subject to distortion because of factors such as selective recall, selective perceptions, and intentional or unintentional omission or addition of data (Sproull, 1995). Prerequisites for primary data collection include: motivation to share the required information, clear understanding of the questions, and possession of the required information (Kumar, 2005).

Secondary sources are “...sources of information who were not present at the time of the event and whose information about events or physical artifacts was gathered from other sources” (Sproull, 1995, p. 156). Secondary sources also differ from primary sources in that there is the introduction of a second person between the event and the recording of that event. The person recording the event brings a second set of selective perceptions and recollections creating the potential for additional distortion (Sproull, 1995).

8.3.1 Primary Data Collection

Face-to-face structured interviews were used to collect primary data from individuals having past and/or present involvement in the DFWT. This was done in order to capture as many different perspectives as possible. Pretty points out that:

Who gets to tell the stories matters greatly. Every piece of land or landscape contains as many meanings and constructions as the people who have interacted with it. (Pretty, 2002, p. 23)

I chose to conduct face-to-face interviews rather than use a self-completed questionnaire because I wanted to have personal contact with each person. I felt that this would be a better way to interact with people and collect meaningful data about the DFWT than using a self-administered questionnaire. Interviews also allow for the collection of in-depth information and are more appropriate for complex situations where explanation or probing may be required (Kumar, 2005; Sproull, 1995; Gray and Guppy, 1999).

In a structured interview the researcher uses an interview schedule to ask a predetermined set of questions using the same wording and same order in each interview. The interview schedule is a written list of open-ended or closed-ended questions prepared in advance by the researcher (Kumar, 2005). When closed-ended questions are asked, the respondent is provided with a list of acceptable responses. Open-ended questions, on the other hand, allow for the respondent to provide the answers themselves (Fowler, 2002). While closed-ended questions are easier to analyse because the responses are already categorized (Kumar, 2005), open-ended questions allow people to express their answers freely in their own words (Kumar, 2005; Fowler, 2002).

Open-ended questions usually require the researcher to go through another process called content analysis in order to classify the data (Kumar, 2005). Content analysis is discussed in greater detail in Section 8.4. An interview schedule with both open-ended and closed-ended

questions was prepared by me for this research (Appendix IV). The interview schedule is discussed in greater detail in Chapter 9. One of the key advantages of structured (vs. unstructured) interviews is that they provide "...uniform information, which assures the comparability of data" (Kumar 2005, p. 126).

Interviews do have some disadvantages. For example, the quality of the interaction, the time, the location, and the specific circumstances may affect the quality of information obtained. Also, since each interaction is unique (despite using the same interview schedule each time) the quality of responses may vary from one interview to another. The interviewer may also introduce his or her own bias into the framing of interview questions and in the recording or interpretation of responses (Kumar, 2005; Sproull, 1995).

8.3.2 Interview Sample Design

I used a non-random judgemental or purposive sample design. The key consideration in this type of design is that the researcher judges who can provide the best information to achieve the objectives of the study. The researcher only goes to those people who, in the researcher's opinion, are likely to have the desired information and will be willing to share it (Kumar, 2005). This approach is particularly useful when the researcher wants to "...construct a historical reality, describe a phenomenon or develop something about which only a little is known" (Kumar, 2005, p. 179). Non-random sample designs "...do not follow the theory of probability in the choice of elements from the sampling population" (Kumar, 2005, p. 178).

The population was defined by the number of people who had been involved in the formation and/or development of the DFWT. The criteria I use to define involvement in the DFWT are described in Chapter 9. The entire population that met the criteria of involvement in the formation and/or development of the DFWT was surveyed, rather than a sample, so hypothesis testing was not used. Hypothesis testing, by definition, is used to make inferences about populations from samples (Sproull, 1995, p. 44).

8.3.3 Response Rates

The response rate is determined by dividing the number of people interviewed by the number of people sampled. In theory, a higher response rate will yield better and less biased results. However, there is no universally accepted standard for a minimum response rate (Fowler,

2002). In this survey, the response rate was affected by the number of people in the population who volunteered to be interviewed. In other words, people could not be forced to consent to an interview, so the number of responses was dependent upon the willingness of individuals to be interviewed. This, along with the actual response rates for this research, is discussed in Chapter 10.

8.3.4 Validity

Validity is the “...extent to which an empirical measure adequately reflects the real meaning of the concept under consideration” (Babbie, 1990, p. 133). In other words, validity is a measure of how accurately an instrument measures what it is supposed to measure (Kumar, 2005). Validity is that quality of research that leads us to accept the results as being true (Krippendorff, 2004). There are three common types of validity (although the terms sometimes vary): face and content validity, concurrent and predictive validity, and construct validity (Kumar, 2005; Babbie, 1990). Fowler (2002) explains that there has been little research conducted on how well questions measure what they are intended to measure. However, Fowler (2002) says that most surveys assume face validity, where the answers to the questions mean what the designer of the question thought they would mean (Fowler, 2002). Krippendorff (2004) explains that we appeal to face validity when the findings are plausible and believable ‘on their face’. In other words, the findings make sense and we don’t need detailed reasons to accept their accuracy (Krippendorff, 2004).

However, one of the problems with accepting the face value of the interview responses is that the respondents may intentionally, or unintentionally, provide erroneous responses. Fowler (2002) explains that there are four basic reasons why people do not provide accurate information to survey questions:

- They do not understand the question
- They do not know the answer
- They cannot recall it, although they do know it
- They do not want to report the answer in the interview context (Fowler, 2002, p. 95-96)

Consequently, I used triangulation to try to confirm the validity of my interview results. Triangulation uses different methods, sources, (Maxwell, 2005), or perspectives (Starrin et al., 1997) to study a phenomenon. This helps to reduce systemic biases or limitations in the

methods used. Findings arrived at through different methods, sources, and perspectives can be compared allowing for a broader understanding of the issues being studied (Maxwell, 2005).

8.3.5 Reliability

Reliability refers to whether a particular technique, if applied repeatedly to the same object, would yield the same results each time (Babbie, 1990). The greater the degree of stability and consistency in a research instrument, the greater is its reliability (Kumar, 2005). Some of the ways that reliability is enhanced in interviews is by only asking people questions they are likely to know the answers to, asking questions about things that are relevant to them, and by being clear about the questions you are asking (Babbie, 1990) and by rephrasing questions to see if different wording of questions elicits the same answer. In theory, the people I interviewed knew enough about most of the questions I was asking to be able to answer them accurately (because all of the people I interviewed had been involved in the formation and/or development of the DFWT).

Some aspects of the interview process are impossible to control and may affect reliability. For example, the respondent's mood, the nature of the interaction, the physical environment, and the regression effect of an instrument (e.g. if a person was given the same interview twice, they may change their answers if they were unhappy with their answers to the first interview) (Kumar, 2005). Although it is difficult to test the reliability of my research instrument (i.e. interview schedule), I think that the triangulation process I used to check the validity of my research also acted as a test of reliability.

8.4 Content Analysis

I used content analysis to analyse my interview results. Content analysis involves the identification of themes emerging from the responses given by the respondents (Kumar, 2005). Content analysis is a set of methods used to analyse communications. It is not a statistical analysis. Content analysis is the most appropriate method to use for analysing open-ended questions. It can be used with existing data (i.e. secondary sources) or primary data (Sproull, 1995).

Kumar (2005) suggests four key steps to take in the content analysis process:

1. Identify the main themes

2. Assign codes to the main themes (the codes can be numbers or keywords)
3. Classify responses under the main themes
4. Integrate themes and responses into the text of your report

I used this relatively simple approach with a few minor modifications:

1. Identify key concepts for each question in each interview response
2. Group key concepts together into themes
3. Display responses in tables identifying theme, number of responses, percent of respondents, brief description of theme
4. Discuss themes and responses in the text of my report

I return to these steps in Chapter 9 where I describe how I applied each step to analyse my interview results.

8.4.1 Interview Analysis

Interview responses were analysed using a nominal scale of measurement. A nominal scale allows for the classification of responses based on a common property or characteristic (Kumar, 2005; Fowler, 2002; Babbie, 1990). Responses are placed into mutually exclusive and exhaustive categories (Kumar, 2005; Sproull, 1995).

Drawing on Kumar's (2005) suggestions for analysis, I developed themes (i.e. categories) that met the following criteria:

1. Themes were mutually exclusive (i.e. a key concept could fit into only one theme)
2. Themes were exhaustive (i.e. every key concept fit into a theme)
3. Use of 'other' themes was kept to a minimum as this reflects a failure of the classification system (Kumar, 2005, p. 231)

Similar responses were grouped into themes and each theme was given a name that was descriptive of the responses in that category (Kumar, 2005).

8.5 Policy Review

In this section I discuss the methodology I use to review enabling and impeding policies identified in the interviews. Since most of the information that was needed to do the policy review was derived from the interview analysis, the policy review was conducted after the interview analysis. The results of the policy review are discussed in Chapter 13.

Bobrow and Dryzek (1987) explain that policy analysis is a field that has not been adequately defined and that there are biases inherent in policy analysis. These biases are related to the manner in which policy is examined and the research tradition in which the analysis is rooted (e.g. welfare economics) (Bobrow and Dryzek, 1987). I reviewed a variety of policy analysis techniques, but found none that embraced the holistic nature of my research. As a result, I decided to draw on the theory of adaptive policy (Chapter 5) to develop a policy review process that would suit my research requirements and help to answer my final research question.

I draw on Swanson et al.'s (2006) idealized policy cycle for my policy review. The idealized policy cycle is based on a summary of "policy design and implementation insights from the complex adaptive systems literature" (Swanson et al., 2006, p. 18). The idealized policy cycle described by Swanson et al. (2006) is:

1. Understanding the issue
 2. Policy objective setting
 3. Policy design and implementation
 4. Policy monitoring and evaluation
 5. Policy learning and adaptation
- (Swanson et al., 2006, p. 18)

The theory behind the idealized policy cycle approach is consistent with the interdisciplinary and holistic approach I have taken in my research. Bobrow and Dryzek (1987) note that: "Policy problems do not respect entrenched disciplinary boundaries..." (Bobrow and Dryzek, 1987, p. 6). In Chapter 9, I explain how I use this policy cycle to examine enabling and impeding policies and identify policy options.

8.6 Summary

The methodology outlined above draws on a number of different sources and perspectives in order to help answer my research questions. A qualitative approach was chosen because I wanted to explore the history of the DFWT through the recollections of a relatively small

number of people and also because there was no baseline data available that I could use for a more quantitative approach. Face-to-face interviews appeared to be the most appropriate method of gathering data from those involved and allowed me to make personal contact with each of those contributing to my research. The interview schedule provided consistency to the interview process allowing me to collect and analyse data in a systematic manner without losing the unique perspectives of those involved.

Content analysis was used because it is a useful method for extracting themes from different forms of communications, including interviews. It allowed for a deep analysis of each interview, taking not only the words and phrases into consideration but also the context in which the comments were made. While the subtleties of the English language may stifle flawless interpretation, content analysis provided me with the opportunity to examine the responses from each interview thoroughly. The results of the content analysis were used as part of the idealized policy cycle to identify policy gaps and policy options. The next chapter describes the research methods I used based on the methodology described in this chapter.

CHAPTER 9

Research Methods

9.1 Introduction

This chapter explains the methods I used to collect and process my interview data. It is grounded in the methodology discussed in Chapter 8. It includes information on the ethics review process I completed prior to the interviews and a description of the interview schedule. It also includes information on why I chose the DFWT as a case study, how I chose my sample, how I recruited subjects, and how I processed the interview data. The interview results are provided in Chapter 10.

9.2 Ethics Review

An ethics review is required by the University of British Columbia (UBC) for any research involving human subjects. As a result, an ethics review application was submitted by me and approved by the UBC Behavioural Research Ethics Board (BREB) prior to initiating the interview portion of this research. The Certificate of Approval is attached in Appendix I. The supporting documents required for the approval are also attached in Appendix II (Main Study Consent Form), Appendix III (Invitation letter), Appendix IV (Interview Schedule), and Appendix V (Letter of Contact).

9.3 Case Study

In Chapter 4, I described how farmers in Delta face numerous challenges including high land prices, road and rail construction, and land expropriation. Wildlife add to these challenges, by consuming crops and trampling fields. I also explained that Delta provides vitally important wildlife habitat. It is part of the Pacific Flyway, providing a crucial stopover for migrating birds. The combination of these challenges affects the sustainability of agriculture in Delta.

In Chapter 2, I described how agricultural intensification is increasing as the population increases and world food stocks decline. This is resulting in many global issues including resource depletion and loss of biodiversity. The scale of these issues appears to create an intractable problem. However, for the past sixteen years, the DFWT has been addressing some of these issues through its on-the-ground agri-environmental stewardship programs.

As mentioned in Chapter 7, the DFWT has been cited in several reports (e.g. Saddlemyer et al., 2001; Neave et al., 2000; Norecol et al., 1994) as being an organization that has successfully

worked with farmers to provide wildlife habitat on agricultural land. The DFWT appears to have been successful at mediating the interests of farmers and environmentalists, finding common ground between the two groups. It has also been identified as a potential model (e.g. Saddlemeyer et al., 2001) for the establishment of similar organizations.

The DFWT appears to be a good choice for a case study because it is an example of a conflict-ridden community that has worked together to address some of these issues at the local level. The DFWT illustrates a community based response to issues that are global in nature. The DFWT uses on-the-ground programs based on an agroecological approach to promote sustainable agriculture. The constitution of the DFWT states that one purpose of the DFWT is: “to undertake projects and research which promote sustainable agriculture and stewardship practices which conserve and enhance wildlife habitat” (DFWT, 1993, Certificate of Incorporation, Part 2 (ii)).

The DFWT uses financial incentives to encourage agri-environmental stewardship. In effect, farmers are paid for providing ecological goods and services. The DFWT also maintains and updates a variety of extension materials including (but not limited to) a regular newsletter, program fact sheets, a static display, and an information pamphlet (DFWT, 2006). The approach of the DFWT, therefore, is consistent with the theoretical frameworks in which I am conducting my research. It is important to document the formation and development of this organization in the context of policy so that communities and policy makers around the world can learn from the experiences of the DFWT.

9.4 Interview Schedule

An interview schedule (Appendix IV) was created (in Microsoft Word) to ensure the same questions were asked of each individual and to record responses from each interview. The interview questions were created by examining my specific research questions to determine what sort of information I needed to collect to answer these research questions.

The interview questions were a combination of closed-ended and open-ended questions. Prior to an open-ended question being asked, a closed-ended question would be asked. For example, the respondent would be asked “Do you know why the DFWT formed?” If the individual answered yes to this question, the follow-up question would be asked: “What or who do you think were the driving forces in its formation?” If the individual answered no, then the follow-

up question would not be asked. This method was used for two key reasons. The closed-ended questions allowed me to determine whether I should ask the next follow up open-ended question or skip to the next question. This technique also facilitated analysis because it allowed me to quickly sum up responses to the closed-ended questions, whereas the open-ended questions required more time to identify key concepts and themes through content analysis (discussed below).

9.5 Population/Sample

I identified the population for this study as including all those people who had been involved in the DFWT, past or present, and who met one or more of the following criteria:

- Farmers who have participated, or are currently participating, in a DFWT program
- Non-government organization representatives who have worked, or are working, in collaboration with the DFWT
- Government organization representatives who have worked, or are working, in collaboration with the DFWT
- Individuals who have been directly involved in the formation or operation (past or present) of the DFWT as a staff member or director
- Other individuals who have been involved in the formation or development of DFWT, but are not identified above

These criteria were used in order to gather different perspectives from people who have had direct involvement with the DFWT. The population of people meeting these criteria was 111. I decided to use the entire population as my sample because it was a relatively small number of people. In addition, it was not possible for me to identify a representative sample from the population since I was not permitted access to the identities of those who were involved (past or present) in the DFWT due to the BREB ethical review guidelines. This is explained in greater detail in the next section. The study population included farmers, conservationists, university researchers, DFWT staff and board members, agricultural business people, non-government representatives, government representatives, and elected officials.

9.6 Interview Recruitment

The ethical review guidelines provided to me by BREB indicated that I could not approach people directly and ask them to participate in the study. Instead, the Letter of Invitation (Appendix III) was to be used as the first point of contact with potential subjects. As a result, I

did not approach people directly. Initially I had hoped to gain access to the list of potential subjects from the DFWT so that I could send the invitation letters out myself. However, the ethical review guidelines stipulated that this was not permitted. Fortunately, the DFWT agreed to send out letters on my behalf to all those individuals who fit the criteria identified above.

Two batches of letters were sent out. One batch was sent out in April, 2007 and the second batch was sent out in September, 2007. Unfortunately, a misunderstanding between me and the DFWT resulted in the first batch of letters being sent to only 70 out of the 111 potential subjects. I asked the DFWT to send out a second batch of letters in September, 2007. All those people who did not receive the first Letter of Invitation received it in the second mail-out. Consequently, all 111 people who fit the criteria identified above received a Letter of Invitation to participate in an interview.

Due to the low number of responses from farmers (discussed in Chapter 10), I contacted the administrator for the Delta Farmers' Institute (DFI) in November, 2007 and asked him if he would send the invitation letters to ten farmers who had been specifically identified by other interview subjects as being people I should try to interview because they had been involved in the formation and/or development of the DFWT. The letters were sent out to the ten farmers by the administrator.

I also made presentations at the DFWT Board of Directors meeting in October, 2007 and at the DFI General Meeting in November, 2007. At both these meetings I described my research, the process for recruiting subjects, and requested that if there were any people who met the study criteria, and were interested in participating in the research, to contact me.

9.7 Interview Process

Those individuals who were interested in participating in an interview contacted me directly via email or phone. I asked them where they would like to be interviewed. An interview location, date, and time of their choosing was then arranged. Before beginning the interview I explained the purpose of my research by reading a scripted preamble describing the purpose of my research (see Appendix IV). All interview subjects were asked the same questions in the same order. Interview responses were typed directly into an interview schedule on a laptop computer. Each interview schedule was identified with the date of the interview and a unique alphanumeric code. Interviews generally took between 60 and 90 minutes.

9.8 Stakeholder Consultation

As mentioned in Section 9.6, I made presentations at a DFWT meeting in October, 2007 and a DFI meeting in November, 2007. At these presentations I invited questions and feedback on my research. In addition to these meetings, I presented at a DFWT Board of Directors meeting and a DFI General Meeting (both in March, 2008). At these meetings, I provided an overview of my preliminary interview results and the policy gaps I had identified through the analysis. I asked the audience whether they thought the data accurately represented the formation of the DFWT and whether they thought I had identified the right policy gaps. No concerns were expressed about either the interview results or the policy gaps I identified.

A few general questions about my research were asked at each meeting. People also provided suggestions on who I should talk to, documents I should read, and countries I should examine for supportive agri-environmental policy. Overall my research was well received and people seemed interested in the topic. At the meetings in March I asked people to contact me if they were interested in reviewing the policy options I was developing or in reviewing any other aspect of my results. Nobody contacted me to review the policy options or research results.

9.9 Data Processing

This section explains the procedures I used to process the interview data. Examples are provided in order to illustrate these procedures. The data used in the examples represent typical responses, but are not derived directly from any of the responses since I stated in my BREB application that the identity of all of those interviewed would be kept confidential. The results of the data analysis are provided in Chapter 10 and Appendix VI.

The data from the completed interviews was transferred from the interview schedules (Microsoft Word) to a Microsoft Excel workbook. A series of Excel worksheets was created in the workbook. A worksheet was created for each main question from the interview schedule. The manner in which specific questions were processed is discussed below. Questions that were processed in a similar manner have been grouped together to facilitate discussion.

9.9.1 Closed-ended Questions

This section describes how I processed the closed-ended questions. Most of the closed-ended questions were processed in the manner described under 'Type 1' below. Some closed-ended questions were not processed in this manner because they differed slightly from the majority of

the closed-ended questions. The manner in which I processed the remaining closed-ended questions is discussed below under ‘Type 2’ and ‘Type 3’.

Generally, the possible responses to each closed-ended question were: yes, no, don’t know. In one question (“Do you know why the DFWT formed?”), ‘don’t know’ was not an option. The only possible responses to this question were ‘yes’ or ‘no’. In my data processing, I also discovered that I had not asked some of the questions. As a result, I included a column called ‘not asked’ in my data processing. I describe which questions were not asked and why they were not asked in Chapter 10.

9.9.1.1 Type 1 – Majority of Closed-ended Questions

Responses for each question were recorded in separate columns in separate Excel worksheets. Responses were coded with a 1 or 0, where 1 indicated the response given and 0 indicated the responses that were not given. This approach was used in order to take advantage of Excel’s sum function to add up all of the responses in each column and row.

Table 9.1 Type 1: Majority of closed-ended questions

Code	Yes	No	Don’t know	Not asked	Sum 2
ea_123	1	0	0	0	1
bc_456	0	1	0	0	1
Sum 1	1	1	0	0	2

In this case the total number of subjects who responded ‘yes’ is 1 and the total number of subjects who responded ‘no’ is 1 (Sum 1). The total number of subjects who responded to this question is 2 (Sum 2).

9.9.1.2 Type 2 – Categorization of Interview Subjects

As in Type 1, responses were assigned a value of 1 or 0, (where 1 indicated the responses given and 0 indicated the responses that were not given). These responses were recorded in a table as illustrated below (Table 9.3). Sum 1 provides the total number of subjects in a particular category, while Sum 2 provides the total number of categories into which each subject fits. Table 9.2 shows how the letters (A – E) relate to the categories of DFWT involvement.

Table 9.2 Categories of DFWT involvement

A	You are a farmer who has participated in a DFWT program
B	You are a non-government organization representative who has worked, or is working, in collaboration with the DFWT
C	You are a government organization representative who has worked, or is working, in collaboration with the DFWT
D	You have been directly involved in the formation or operation (past or present) of the DFWT as a staff or board member
E	Other (describe)

Table 9.3 Type 2: Categorization of interview subjects

Code	A	B	C	D	E	Sum 2
ea_123	0	1	0	1	0	2
bc_456	1	0	0	0	0	1
Sum 1	1	1	0	1	0	3

The Sum 2 column provides the total number of responses. Since individuals may fit into more than one category, the total number of responses in the Sum 2 column adds up to more than the total number of interview subjects. The Sum 1 column gives the total number of responses for each category.

9.9.1.3 Type 3 - Degree of Conflict

As in Types 1 and 2, responses were assigned a value of 1 or 0, (where 1 indicated the responses given and 0 indicated the responses that were not given). These responses were recorded in a table as illustrated below (Table 9.4).

Table 9.4 Type 3: Degree of conflict

Code	Conflict	Degree of conflict					Sum 2
		High	Medium	Low	Don't know	Not asked	
ea_123	Waterfowl damage	1	0	0	0	0	1
bc_456	Tension between farmers and conservationists	1	0	0	0	0	1
Sum 1		2	0	0	0	0	2

In this case the total number of subjects who said the degree of conflict was high is 2 (Sum 1). The total number of subjects who responded to this question is 2 (Sum 2).

9.9.1.4 Data Summary

After I finished coding the closed-ended responses I created summary tables in order to display the results. An example of one of these tables is shown below (Table 9.5). The summary tables are discussed in Chapter 10.

Table 9.5 Are you aware of any conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	25	0	3	0	28
% of responses	89%	0%	11%	0%	100%

9.9.2 Open-ended Questions

This section describes the manner in which the open-ended questions were processed. The next section describes how content analysis was used to group the data into themes. All open-ended questions were processed in the same manner. Responses were pasted directly from the interview schedule into an Excel worksheet. For example, a 'PreDFWT Conflicts' worksheet was created and all responses to that question were pasted into rows in the worksheet. Table 9.6 illustrates this example. A separate worksheet was used for each question and all responses for that question from all the interviews were pasted in the worksheet.

Table 9.6 PreDFWT Conflicts

Code	PreDFWT Conflicts
ea_123	The farmers and conservationists were constantly arguing. The ducks were eating the crops and there was no compensation for the wildlife damage.
bc_456	There was a great deal of mistrust between agricultural and environmental interests.
de_789	Waterfowl were coming in over the winter and causing a lot of damage to farmers' crops.

9.9.2.1 Content Analysis

Content analysis was used to analyse the open-ended questions. Content analysis involves the identification of themes emerging from the responses given by the respondents (Kumar, 2005). In Chapter 8 I identified the following steps I took to process the data from the open-ended questions:

1. Identify key concepts for each question in each interview response
2. Group key concepts together into themes

3. Display responses in tables identifying theme, number of responses, percent of respondents, brief description of theme
 4. Discuss themes and responses in the text of my report
- (Adapted from Kumar, 2005)

Categorization serves at least two purposes. It makes the responses more manageable for analysis, and provides more generalized data (i.e. not specific to Delta) that can then be used, for example, for comparison with other studies. In this section I describe how I carried out steps 1, 2, and 3 of the content analysis process. Step 4 is covered in Chapter 11.

Step 1: Identify key concepts for each question in each interview response

Key concepts (words or phrases) were identified by reviewing the narrative for each response for each question. Table 9.7 illustrates how the narrative was broken down into key concepts. The narrative shown in this table is representative of the type of response I received, but is not derived from an actual interview. A column was added to the Excel worksheet to record the key concept. The response was pasted in the same row as the narrative. Extra rows were added for each key concept identified. The alphanumeric code from each interview was pasted into the row in order to keep track of interview responses. This technique allowed me to retrace my steps to the raw interview results at any point during the data processing and analysis (e.g. to clarify data).

Table 9.7 Identification of key concepts from preDFWT conflicts

Code	Narrative	Key concept
ea_123	The farmers and conservationists were constantly arguing. The ducks were eating the crops and there was no compensation for the wildlife damage.	
ea_123		Farmers and conservationists arguing
ea_123		Ducks eating crops
ea_123		No compensation for wildlife damage

Step 2: Group key concepts together into themes

As discussed in Chapter 8, I developed themes that met the following criteria:

1. Themes were mutually exclusive (i.e. a key concept could fit into only one theme)
2. Themes were exhaustive (i.e. every key concept fit into a theme)

3. Use of ‘other’ themes was kept to a minimum as this reflects a failure of the classification system

(Adapted from Kumar, 2005)

After each response was analysed for key concepts, a copy of this worksheet was created and a new column called ‘themes’ was added to this worksheet. The key concepts were reviewed and similar concepts from different respondents were grouped together (by cutting and pasting rows in Excel). As noted above, the alphanumeric identifier was retained through this process. Once the data was sorted into groups I reviewed the responses in each group and gave the theme a name that was descriptive of the responses in that category. Table 9.8 illustrates how the results were tabulated.

Table 9.8 Identification of themes (preDFWT conflicts)

Code	Theme	Key concept
ea_123	Tension between farmers and conservationists	Farmers and environmentalists arguing
bc_456		Mistrust between agricultural and environmental interests
ea_123	Waterfowl damage	Ducks eating crops
de_789		Crop damage by overwintering waterfowl

Step 3: Display responses in tables identifying theme, number of responses, percent of respondents, brief description of theme

Once all the data was sorted into themes, a series of summary tables displaying key data was created in Microsoft Word for each question. The alphanumeric codes were removed at this point because they were not relevant to the data summary. However, all of the alphanumeric codes were retained in the raw data (in Excel) for future reference. The summary tables included the following information:

- Themes sorted into descending order of frequency (based on the number of subjects whose responses fit into a particular theme)
- Number of responses that fit into each theme
- Percentage of respondents who provided that response (out of the total number of people who provided a response for that question)
- A brief description of each theme

A partial summary table is shown below (Table 9.9). All of the summary tables are shown in Appendix VI.

Table 9.9 Conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B)	Description
Tension between farmers and conservationists	11	44%	Mistrust; Lack of communication; No forum for communication; Disagreement over winter waterfowl use of the land vs. protection of crops for agricultural production
Competing interests in the ALR	11	44%	Land speculation; Golf courses; Greenhouses; Loss of agricultural land; Wildlife habitat on agricultural land; Loss of soil-based agriculture
Waterfowl damage	10	40%	Farmers unable to grow certain crops; Crop damage by waterfowl; Soil compaction; Loss of forage crops

9.10 Policy Questions

Policies and policy descriptions were initially processed using the same content analysis methods described in Section 9.9.2. Like the other open-ended questions, policies and policy descriptions were sorted according to key concepts, grouped into themes, and summarized in tables. Once this process was complete, I used Swanson's idealized policy cycle (described in Chapter 8) to develop a process to understand the issues, set policy objectives, and design policy options. The idealized policy cycle described by Swanson et al. (2006) is outlined below:

1. Understanding the issue
2. Policy objective setting
3. Policy design and implementation
4. Policy monitoring and evaluation
5. Policy learning and adaptation

(Swanson et al., 2006, p. 18)

I used this framework to develop more specific procedural steps. These steps are outlined below and discussed in more detail in the following section.

Step I: Understanding the issue

1. Identify enabling and impeding policy themes
2. Identify policy gaps

Step II: Policy objective setting

1. Identify policy objectives

Step III Policy Design

1. Identify policy options
2. Describe policy options

This approach allowed me to identify policy options in an effective and expeditious manner. I used the first three steps in this cycle to review the policies and policy descriptions that were identified in the interviews, identify policy objectives, and describe policy options. Ideally all steps outlined by Swanson et al. (2006) would be followed in an adaptive policy cycle. However, it was not within the scope of my research to implement the policies, nor to carry out the monitoring, evaluation, learning, or adaptation stages.

9.11 Policy Review

This section describes how I defined policy, as well as the steps I took to review the policies and policy descriptions, identify policy objectives, and develop policy options. In a review of the policy literature, I discovered that very few authors explicitly defined policy. The definitions that I did find were very broad and all encompassing. For example, John (1998) defines it as “a process of public decision-making leading to (or appearing to lead to) actions outside the political system” (John, 1998, p. 204). The Canadian Environmental Protection Act (1999) says: “Policies are not law, but may form the basis for laws and regulations. Policies provide a framework which forms the basis for attaining of key management objectives” (CEPA, 1999, http://www.ec.gc.ca/CEPARRegistry/the_act/Introduction.cfm). The Merriam-Webster dictionary defines policy as “a definite course or method of action selected to guide and determine present and future decisions” (Merriam-Webster, 1997, p. 567). Brewer and deLeon (1983) sum up the vagaries of the term by saying that: “Policy is a word with many interpretations and many interpreters. But if a word represents everything, it risks meaning nothing” (Brewer, G. D. and P. deLeon, 1983, p. 6). This description illustrates the breadth of interpretations available and the risk of defining policy so broadly that the term is meaningless.

For the purposes of my interviews I felt that I needed to provide respondents with some idea as to what I meant by policy, so that they would be able to identify specific policies. During each interview I explained to respondents that policy could include any one of the following:

- An act of legislation (e.g. Federal Fisheries Act)
- A government program (e.g. Canadian Agricultural Income Stabilization Program)
- A government guideline (e.g. Environmental Best Management Practices)

However, despite providing this definition, interview respondents had a difficult time identifying specific policies, choosing instead to describe policy themes, which I incorporated into my content analysis. Based on my experience in municipal government, policy refers to any written or unwritten guideline that government staff are supposed to follow. This is a very broad interpretation of policy, but one which seemed to encompass my own experience with policy. It also seemed to capture much of what the respondents alluded to in their policy descriptions. Consequently, this is the definition I used when conducting my policy review.

9.11.1 Step I: Understanding the Issue

1. Identify enabling and impeding policy themes

Enabling and impeding policies and policy descriptions derived from the interviews were grouped into themes using the content analysis process described above. Some policies were explicitly identified, so these theme names simply reflected the name of the policy (e.g. Migratory Birds Convention Act). Other policies were described, rather than explicitly identified, so these policy descriptions were grouped together and assigned a representative policy theme name (e.g. federal government staff involvement). Enabling policy themes and impeding policy themes were separated into two tables to facilitate analysis. The tables are shown in Chapter 12.

2. Identify policy gaps

I examined the enabling and impeding policy themes as a whole in order to get a sense of any dominant or overlapping issues. I focused on the policy themes that appeared to impede the formation and/or development of the DFWT in order to identify policy gaps. These are areas where policy appears to be lacking altogether or has acted as an impediment to agri-environmental stewardship.

9.11.2 Step II: Policy Objective Setting

1. Identify policy objectives

I used the policy gaps to develop policy objectives. Swanson et al. (2006) do not provide a definition of policy objective, so for the purposes of this research, I have defined a policy objective as an action oriented statement that addresses the policy gap I identified through the policy review. The policy objectives help me to focus my search for policy options.

9.11.3 Step III: Policy Design

1. Identify policy options

Based on the policy objectives identified in Part II, I reviewed policies that met the policy objectives from three countries (Australia, England, Switzerland). The countries were chosen based on references from the literature, word of mouth, and availability of information about their policies written in English. A cursory review of the policies was conducted using the policy objectives as the focus of the review. It was not within the scope of this research to do an in-depth analysis of each policy or each country.

2. Describe policy options

Based on the policies I reviewed from the four countries, I selected those policies that I thought best addressed each of the policy gaps identified. This was done in order to highlight those policies that addressed the key issues that were raised in the interview and policy analysis. This information helped to answer my final research question.

9.12 Secondary Data

A literature review was conducted in order to gather information related to this research. The key findings from the literature review were discussed in Chapter 6. The research questions were used to help identify information that related specifically to my research. Correspondence from various organizations and individuals written prior to the formation of the DFWT was reviewed. Archival information such as annual reports, funding reports, and newsletters from the DFWT were also reviewed to gather some of the historical context of the DFWT and to help triangulate the interview results. The internet was used to gather other information such as statistics and information about policies from other countries.

9.13 Summary

This chapter explained how I applied the methodology described in Chapter 8 to process the interview results. The DFWT was chosen as a case study because it represents a community-based response to issues that are global in nature. All of the people who have been involved in the formation and/or development of the DFWT were invited to participate in an interview. An ethics review was conducted prior to the interviews. An interview schedule was created to standardize the questions that were asked of each individual. Closed-ended questions and open-ended questions were used to make the interview process and analysis straightforward yet comprehensive. Content analysis was used to analyse the open-ended questions, including questions related to policy. Policy themes were then examined in more detail using a process I adapted from Swanson et al.'s (2006) idealized policy cycle. The following chapters describe the results of the interview and policy analysis.

CHAPTER 10

Interview Results

10.1 Introduction

This chapter summarizes the data limitations and interview results. In order to keep the data manageable and to facilitate discussion, I only summarize those themes that included $\geq 20\%$ of the responses. I discuss these results in Chapter 11 and explain how they help to answer my research questions. The remaining data ($< 20\%$ of responses) is provided in Appendix VI.

10.2 Data Limitations

There are some limitations to the data I collected. In this section I discuss some of the generic limitations that affect the results. I discuss data limitations that are specific to certain questions in the sections in which the results are presented.

10.2.1 Response Rate

As I explained in Chapter 9, 111 letters were sent out to those people who were involved in the formation and/or development of the DFWT (and who also met one or more of the criteria listed in Chapter 9). Twenty-eight people meeting one or more of the criteria of the study volunteered to participate in an interview. All 28 people were interviewed. This represents a response rate of 25%. It is difficult to determine whether a response rate of 25% will generate a representative range of responses. While a larger response rate would have been desirable, "...there is no agreed-upon standard for a minimum acceptable response rate" (Fowler, 2002, p. 42). As noted in Chapter 9, I was bound by the ethical review guidelines, so additional recruitment of individuals was challenging. In addition, I could not expand my sample to include more people from the population because the entire population was sampled.

However, I did find that after about the 20th interview I appeared to reach a saturation point. A saturation point is a subjective judgement made by the researcher. It is the point at which the researcher finds that he/she is "...not obtaining any new data or the new information is negligible..." (Kumar, 2005, p. 165). Once I reached this saturation point, I found that responses were very similar to other responses and little new information was being generated by the interviews. I decided to continue on interviewing people, because at that point I had only interviewed three farmers. While I would have preferred to have had a higher response rate, I feel as if I did everything I could to recruit volunteers without breaching the ethical review

guidelines. While additional interviews may have provided additional insight into my research questions, I feel that I did reach the saturation point in my interviews. Consequently, I think that the responses summarized here are likely to be reasonably representative of those who were involved in the formation and/or development of the DFWT, notwithstanding the self-selection bias that may have occurred (see Section 10.2.2). In Chapter 11, I use secondary sources of information to triangulate these results, which provides an added degree of validity and reliability to my research.

10.2.2 Self-selection

Since individuals were not forced to participate in the research, the results may be skewed by a self-selection bias. For example, it is possible that only those individuals who had positive experiences with DFWT responded. As a result, the data may not fully represent the perspectives of the broader community. However, I did notice that interview subjects identified issues that did not necessarily affect them, but did affect others. For example, non-farmers expressed concern for farmers over the damage that waterfowl were causing and the lack of compensation for farmers.

10.2.3 Policy Questions

Most of the questions I asked in the interview had follow-up questions related to policy. Some policies were described in fairly general terms (e.g. allowing government staff to participate in the formation of the DFWT). Other policies were specifically identified (e.g. Migratory Birds Convention Act). Originally I had hoped to identify the specific policies that were alluded to in the general policy responses. However, upon review of the data I realized that this was neither necessary nor feasible. It was unnecessary because the description of the policy is sufficient for the purposes of this research which is to identify whether policy enabled or impeded the formation and/or development of the DFWT (i.e. to identify the *role* of policy). It was also not feasible for me to identify all of the policies because it would have required me to correctly interpret the policy descriptions made by the interview respondents and link the policy descriptions to a particular policy or policies. Apart from being prohibitively time-consuming, the policy, or combination of policies, identified through this process may or may not have been the one(s) alluded to in the interview.

I had also hoped to link the policies to the issues or topics identified in each question. However, upon review of the data I realized I could not do this because the process of content analysis broke the responses down into themes. Once the responses were broken down into themes, it was not possible to determine whether the policy that was identified by the respondent applied to the theme I identified. In many cases, numerous themes were extracted from one statement. For example: “The conservationists and farmers worked together to get on-the-ground programs going, which were very successful” has two key concepts which fall into two separate themes: ‘Conservationists and farmers working together’ and ‘on-the-ground programs which were very successful’. If a respondent answered ‘yes’ policy played a role in this accomplishment, it was not possible for me to determine whether they felt that policy played a role in one or both themes I identified.

Policy responses were sorted according to whether the respondent answered ‘yes’, policy played a role in *at least one* of the issues (e.g. conflicts) or topics (e.g. accomplishments) they identified. The data was sorted in this manner to illustrate the number of respondents who felt that policy did play some role in the issue or topic. For example, if a respondent indicated that policy did play a role in one of the conflicts prior to the formation of the DFWT, but not all conflicts, then I counted this as ‘yes’ policy played a role in conflicts. I did not assign the policy to the conflict, but simply summed up the number of individuals who thought policy played a role in at least one of the conflicts they identified. Each individual was only counted once. So, for example if a respondent said yes, policy played a role in three of the conflicts, their response was only counted once, for a maximum possible total of responses of 28 (i.e. the number of people interviewed). All questions related to policy were dealt with in this manner.

This approach provided me with a sense of whether or not people thought policy played a role in the issue or topic being discussed. It also provided me with insight into the policies that may have enabled or impeded the formation and/or development of the DFWT. Although this approach did not link specific policies with specific issues, it became apparent upon examining the issues and the policies that there were some policies that were problematic and the issues they were causing were fairly evident. I discuss these connections in Chapter 11.

10.3 Results

This section summarizes the interview results in a series of tables. As noted in Chapter 9, key concepts and themes were identified using content analysis. In this section, I provide a brief

narrative summarizing those themes that included $\geq 20\%$ of the responses. The number of responses indicated for each theme is the number of individuals who provided a response that fit within that theme. Although an individual may have provided more than one response that fit in a theme, the individual was only counted once. In other words, if an individual gave an answer where three of their statements fit into one theme, all of the statements were included in the description, but the response was only counted once. The percentage of respondents is the number of individuals who provided a response that fit within that theme divided by the total number of individuals who were asked that question. The percent of responses sometimes exceeds 100% because of rounding-off errors.

This approach was used in order to demonstrate the key themes that arose from the questions. It was not feasible to discuss every theme because of the number of themes that are present in the responses. Eighty percent (i.e. $\geq 20\%$ of the responses) was used as the cut off point because this appeared to capture the most dominant themes in the majority of the questions. It also kept the number of themes covered in the discussion to a manageable level. The remaining themes for each question are shown in Appendix VI.

10.3.1 Categorization of Interview Respondents

Subjects were asked to identify which category (or categories) best described their involvement with the DFWT. Table 10.2 shows that the responses were fairly evenly distributed across categories except for 'other' and 'farmers'. The 'other' category included university researchers, elected representatives, and business people. Unfortunately, relatively few farmers volunteered to take part in an interview despite numerous attempts to recruit them (see Section 10.2.1).

Table 10.1 Categories of DFWT involvement

A	You are a farmer who has participated in a DFWT program
B	You are a non-government organization representative who has worked, or is working, in collaboration with the DFWT
C	You are a government organization representative who has worked, or is working, in collaboration with the DFWT
D	You have been directly involved in the formation or operation (past or present) of the DFWT as a staff or board member
E	Other

Table 10.2 Which category or categories best describe your involvement with the DFWT?

	A Farmer	B NGO rep	C Govt rep	D Staff/Board	E Other	*SUM
Number	5	12	10	14	7	48
*% of responses (number/48)	10%	25%	21%	29%	15%	100%

*Subjects may belong to more than one category.

The total number of interviews = 28

The number of total responses = 48

Eighty-one farmers received the invitation letter and five consented to an interview. In terms of farmers, the response rate was only 6% (5/81). Consequently the data may not accurately reflect the opinions of all the farmers involved in the formation and/or development of the DFWT. However, I noticed that the farmers' responses did not differ dramatically from non-farmers' responses. The response rates for the other categories were not possible to calculate because in some cases the number of subjects identifying with a particular category exceeded the number of subjects in that category according to the DFWT (see Table 10.3). This may have occurred because individuals categorized themselves differently than the DFWT categorized them. However, since there were 111 letters sent out and 81 of these were farmers, this leaves 30 individuals who fit into the remaining categories. The cumulative response rate for the remaining categories, therefore, was 27% (30/111). Since some individuals belonged to more than one category, the sum in Table 10.3 exceeds 111.

Table 10.3 Categories of involvement

Category	Number	Response rate
Farmers	81	6%
NGO representative	8	27%
Government representative	9	
DFWT staff or Director	23	
Other	8	
Total	129	N/A

Source: DFWT

10.3.2 DFWT Involvement

For this question, I asked people how long they had been involved in the DFWT and in what way(s). This question provided me with some background information on those being interviewed. It also seemed to help put people at ease as they had the chance to tell me about themselves. Most of the interview subjects seemed to really enjoy having the chance to tell me about their involvement in the DFWT. I did not conduct a formal content analysis on this question because I could not group the results into themes without the risk of revealing the identities of some or all of the interview subjects.

10.3.3 Conflicts pre-DFWT

This question was meant to determine whether there were any conflicts between agricultural and environmental interests prior to the formation of the DFWT and, if so, whether government policies contributed to these conflicts. This was a multi-part question where each open-ended question was preceded by a closed-ended question. If interview respondents answered ‘yes’ to the closed-ended question, they were asked the corresponding open-ended question. If they provided any answer other than yes, they were not asked the next corresponding open-ended question. Instead, they were asked the next closed-ended question, and so on. The questions that were asked are contained in the interview schedule (Appendix IV). The results of these questions are presented in a series of tables below in the order in which the questions were asked.

10.3.3.1 Identification of Conflicts

Interview subjects were asked whether they were aware of any conflicts that existed between agricultural and environmental interests prior to the formation of the DFWT, and if so, to describe these conflicts. Eighty-nine percent of those interviewed said that conflicts did exist between agricultural and environmental interests prior to the formation of the DFWT. Only those respondents who answered yes to this question were asked the following questions described in this section (Section 10.3.3). Table 10.4 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each conflict. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.4 Are you aware of any conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	25	0	3	0	28
% of responses	89%	0%	11%	0%	100%

Table 10.5 Conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B)	Description
Tension between farmers and conservationists	11	44%	Mistrust; Lack of communication; No forum for communication; Disagreement over winter waterfowl use of the land vs. protection of crops for agricultural production
Competing interests in the ALR	11	44%	Land speculation; Golf courses; Greenhouses; Loss of agricultural land; Wildlife habitat on agricultural land
Waterfowl damage	10	40%	Farmers unable to grow certain crops; Crop damage by waterfowl; Soil compaction; Loss of forage crops
Alaksen National Wildlife Area	8	32%	Government employees managing farmland; Alaksen not managed or farmed properly; Waterfowl spilling onto farmland from wildlife reserves; Created hot spots of waterfowl damage
Lack of compensation	5	20%	Farmers sustaining wildlife without compensation; Crop loss; Financial loss
Pesticides	5	20%	Wildlife poisoning (ducks, eagles)

10.3.3.2 Degree of Conflict

Interview subjects who answered yes to the previous question were asked to indicate the degree of conflict they felt existed for each conflict prior to the formation of the DFWT. Unfortunately, during the analysis of the results I discovered that I could not assign a degree of conflict to each of the conflicts identified because the content analysis process resulted in their answers being broken down into themes. Sometimes a single answer would generate numerous themes (as discussed with respect to policy in Section 10.2.3). Consequently, I could not determine absolutely whether the degree of conflict indicated by the respondent actually

corresponded with the theme I had identified, since multiple themes were sometimes extracted from one response. As a result, I analysed the data for this question in the following manner.

Each response to this question was examined for the highest level of conflict indicated by an individual. So, for example, if the highest level of conflict that a person noted (across all conflicts) was 'medium' then this was recorded as their overall response to the question. My assumption was that the highest degree of conflict they identified was the most severe level of conflict they thought existed prior to the formation of the DFWT. I felt that this was the most accurate method to use to show the overall level of conflict between farmers and environmental interests prior to the formation of the DFWT.

Based on this method of analysis, 76% of the respondents thought the degree of conflict between agricultural and environmental interests was high before the formation of the DFWT (Table 10.6). One individual was not asked this question because he/she did not answer the previous question. In this case, the previous question was asked, but the respondent did not actually identify any conflicts in his/her response, so I did not ask this question or the subsequent parts of this question to that individual.

Table 10.6 Degree of conflict between agricultural and environmental interests prior to the formation of the DFWT

	High	Medium	Low	Don't know	Not asked	SUM
Number of responses	19	4	0	1	1	25
% of responses	76%	16%	0%	4%	4%	100%

10.3.3.3 Impact on Agricultural Viability

Subjects who answered yes to the first part of this question were asked to indicate whether they thought the conflicts between agricultural and environmental interests had a negative impact on agricultural viability. Seventy-six percent of those asked thought that the conflicts did have a negative impact on agricultural viability (Table 10.7). These individuals were then asked to indicate how they thought these conflicts had negatively impacted agricultural viability. Table 10.8 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each theme. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.7 Did the conflicts have a negative impact on agricultural viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	4	1	1	25
% of responses	76%	16%	4%	4%	100%

Table 10.8 Negative impact on agricultural viability due to conflicts

Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Loss of forage crops	6	32%	Difficult to grow forage crops due to waterfowl grazing; Resulted in yield reductions; Biggest effect on first cut; Trampling can seal the surface and reduce drainage; Farmers had to bring forage in from other areas; Economic loss to farmers, particularly dairy; Contributed to an environment where there was a low tolerance for wildlife
Reduced range of crops	4	21%	Waterfowl predation made it impossible to grow overwintering vegetables; Changed the range of crops that farmers grew because the birds would eat the crops; Early crops were better for the processors; These crops were lost due to waterfowl
Lack of community support	4	21%	Lack of public recognition for the role farmers played in providing wildlife habitat; Trespassing and vandalism on agricultural land

10.3.3.4 Impact on Wildlife Habitat Viability

Subjects who answered yes to the first part of this question were asked to indicate whether they thought the conflicts between agricultural and environmental interests had a negative impact on wildlife habitat viability. Sixty-four percent of those asked thought that the conflicts did have a negative impact on wildlife habitat viability (Table 10.9). These individuals were then asked to indicate how they thought these conflicts had negatively impacted wildlife habitat viability. Table 10.10 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each theme. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.9 Did any of the conflicts have a negative impact on wildlife habitat viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	16	6	2	1	25
% of responses	64%	24%	8%	4%	100%

Table 10.10 Negative impact on wildlife habitat viability due to conflicts

Theme	# of responses (A)	% of respondents (A/B) B=16	Description
Loss of wildlife habitat	7	44%	Conversion of wildlife habitat to agriculture; Conversion of agricultural land to urban development; Loss of land in ALR
Pesticide poisoning	5	31%	Pesticide used to kill wireworms in potato fields was consumed by waterfowl; Waterfowl died; Eagles consumed waterfowl and died; Use of pesticides diminished wildlife habitat quality
Insufficient wildlife forage available	4	25%	Lack of cover crops meant that there was little forage available for waterfowl
Lack of community support	4	25%	Lack of cooperation between farmers and environmentalists; Farmers were less inclined to encourage waterfowl grazing because of lack of acknowledgement; Lost opportunity to enhance farmland for wildlife

10.3.3.5 Government and Non-government Organizations Involved in the Conflicts

This question was meant to ascertain which government or non-government organizations (NGOs) were part of the conflicts. Unfortunately, this was a vague question, because it did not clearly specify whether these organizations contributed to the conflicts or were attempting to solve these conflicts. People also had a difficult time recalling which organizations were involved, so the question may or may not identify all the organizations involved at the time. The question also does not answer the degree to which the organizations were involved or the manner in which they were involved. Consequently, the results of this question are ambiguous. However, I have included them because they do give some sense of the organizations that came to mind when people were asked this question. In some cases, the comments provided in Table 10.12 also give some indication of the role that each organization played. Responses to

subsequent questions provide greater clarity on the role that different organizations played in the formation and development of the DFWT.

Seventy-six percent of the respondents indicated that they could name some of the government or non-government organizations involved in the conflicts. Table 10.12 lists the organizations that were identified by $\geq 20\%$ of the respondents and provides some of the comments about those agencies that were provided by the interview subjects. A table listing all of the organizations identified for this question is provided in Appendix VI.

Table 10.11 Can you name any government or non-government organizations involved in any of the conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	1	4	1	25
% of responses	76%	4%	16%	4%	100%

Table 10.12 Government or non-government organizations involved in conflicts

Agency	# of responses (A)	% of respondents (A/B) B=19	Comments
Environment Canada – Canadian Wildlife Service (CWS)	15	79%	They have the legislative mandate for migratory waterfowl
Boundary Bay Conservation Committee (BBCC)	10	53%	A consortium of many groups; BBCC formed over this issue and other threats to habitat
BC Ministry of Environment (MOE)	10	53%	Representatives were on the Steering Committee because they had a responsibility for some of the species
Delta Farmers' Institute	9	47%	Representatives would speak at public meetings
Ducks Unlimited	9	47%	Ducks Unlimited have always been involved re: hunting; They know the farmers
UBC researchers	6	32%	
BC Ministry of Agriculture	5	26%	
Corporation of Delta	5	26%	Local government involved in resolving conflict
Agricultural Land Commission	4	21%	

Agency	# of responses (A)	% of respondents (A/B) B=19	Comments
Provincial government	4	21%	Province didn't provide compensation for wildlife damage

10.3.3.6 Role of Government Policies

Seventy-six percent of the interview subjects said they thought that government policies contributed to the conflicts (Table 10.13). Since many respondents described policies rather than identified specific policies, I grouped similar policy descriptions together and identified the theme by the dominant concept in that theme. In some cases, respondents knew the name of the policy, so I have included that information as well. Table 10.14 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each policy theme. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.13 Do you think government policies contributed to any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	0	5	1	25
% of total interviews	76%	0%	20%	4%	100%

Table 10.14 Description of policies that contributed to the conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Lack of compensation for waterfowl damage	7	37%	Government has always been reluctant to get involved in wildlife damage; Lack of compensation for crop losses due to wildlife was the number one issue; BC's decision not to include wildlife compensation in their business risk management agreement with Agriculture Canada; Environment Canada took position that it was not their responsibility and Agriculture Canada said it was not their responsibility

Policy Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Canada Wildlife Act - Federal acquisition of land for National Wildlife Area	6	32%	Acquisition and management of Alaksen National Wildlife Area; CWS had little experience managing waterfowl in areas like Delta; Created hot spots for waterfowl; Concern that CWS is not accountable to anybody; Environment Canada has limited power in protecting migratory bird habitat on private land, so acquisition of land is necessary
Lack of policy coordination	4	21%	Contradictory policies; Different agencies representing different groups with different objectives; e.g. CWS to protect and sustain migratory bird populations; Policies of other agencies; e.g. BCMAL to protect the agricultural industry as a whole; Government departments with separate mandates create a gap and the landowners fall in the gap; Same problems all over the province (re: conflicts between farmers and environmentalists)
Migratory Birds Convention Act (MBCA)	4	21%	MBCA protects migratory birds in Canada; Policy tools for protecting migratory birds are very limited; General policy of increasing waterfowl numbers adds to the conflict and reduces agricultural viability

10.3.4 Why the DFWT Formed

Interview subjects were asked whether they knew why the DFWT formed and, if so, to describe the driving forces in its formation. Those who responded yes to the first part of the question were also asked whether they thought government policies enabled or impeded the formation of the DFWT and, if so, to describe these policies. The complete list of questions for this section is in the interview schedule (Appendix IV).

10.3.4.1 Identification of Driving Forces

Eighty-six percent of those interviewed said they thought they knew why the DFWT formed (Table 10.15). Only those respondents who answered yes to this question were asked the following questions described in this section (Section 10.3.4). Table 10.16 lists those themes

that captured $\geq 20\%$ of the responses to this question and provides a brief description of each driving force. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.15 Do you know why the DFWT formed?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	24	4	0	0	28
% of responses	86%	14%	0%	0%	100%

Table 10.16 Driving forces in DFWT formation

Theme	# of responses (A)	% of respondents (A/B) B=24	Description
Agricultural and conservation interests willingness to cooperate	13	54%	Farmers and conservationists wanting to address wildlife and agricultural issues; Farmers and conservationists saw potential benefits for both wildlife habitat and agriculture
Agricultural organizations and individuals	11	46%	Delta Agricultural Society; Core group of farmers who already worked together; Delta Farmers Soil Conservation group; Delta Farmers' Institute
Availability of money	11	46%	Availability of YVR habitat mitigation money helped to get the DFWT going; Government and NGO money also helped
Municipal representatives	9	38%	Facilitated communication between farmers and conservationists; Provided neutral ground
UBC researchers	7	29%	Independent science based critical thinkers; Conducting soil research in Delta; Provided some of the technical knowledge
Conservationist organizations and individuals	5	21%	BBCC; Nature Trust; Birders; Naturalists; Ducks Unlimited; Conservation community

10.3.4.2 Enabling Government Policies

Respondents were asked whether they thought government policies helped in the formation of the DFWT and, if so, to describe these policies. Seventy-one percent of the interview subjects said they thought government policies helped in the formation of the DFWT (Table 10.17). Table 10.18 lists the enabling policies that were identified or described by $\geq 20\%$ of the respondents and provides a brief description of each. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.17 Did government policies help in the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	17	3	4	0	24
% of responses	71%	13%	17%	0%	*101%

*Sum exceeds 100% because of rounding-off errors

Table 10.18 Government policies that helped in the formation of the DFWT

Policy Theme	# of responses (A)	% of respondents (A/B) B=17	Description
Environmental Assessment Act – YVR Wildlife Stewardship Fund	8	47%	Habitat mitigation funds available because of the federal environmental review process for the third runway; A large part of this money went to the DFWT
Federal government staff involvement	5	29%	Environment Canada-CWS was at table during formation of the DFWT; Their mandate allowed staff to be part of the process and contribute in a generally positive way; Transport Canada was also involved
Provincial government staff involvement	5	29%	Ministry of Agriculture, Ministry of Environment, and ALC staff were at the table during formation of the DFWT; They were given the latitude to help in the formation of the DFWT

Policy Theme	# of responses (A)	% of respondents (A/B) B=17	Description
Non-Government Organization (NGO) capacity	5	29%	Government realized that environmental and agricultural interests had to work together; To do that they needed a locally run legal entity to take ownership and management of the project; A NGO would be able to do more than a government organization; The YVR Wildlife Stewardship Fund was seen as seed funding that could be used to leverage other grants and donations
Municipal Council support	4	24%	Strong support by local government politicians; Provided legal advice on how to set up the DFWT; Provided meeting rooms; Municipal Councillor provided mediation; Councillor was respected by the community; Provided some legitimacy to the process

10.3.4.3 Impeding Government Policies

Respondents were asked whether they thought government policies impeded the formation of the DFWT and, if so, to describe these policies. Twenty-five percent said they thought government policies did impede the formation of the DFWT (Table 10.19). Forty-two percent of the respondents said that government policies did not impede the formation of the DFWT and thirty-three percent said they didn't know. Those who answered yes to this question were asked to describe the policies they thought impeded the formation of the DFWT. There was only one theme identified that captured $\geq 20\%$ of the responses (Table 10.20). The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.19 Did government policies impede the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	6	10	8	0	24
% of responses	25%	42%	33%	0%	100%

Table 10.20 Government policies that impeded the formation of the DFWT

Policy Theme	# of responses (A)	% of respondents (A/B) B=6	Description
Allocation of YVR Wildlife Stewardship Fund	4	67%	CWS threw up a lot of obstacles; A lot of mistrust; CWS wanted to control the money; They wanted to get the YVR money for wildlife refuges; Farmers were saying they could do a much better job; There was no policy to direct this money; There was confusion over how they were going to divide up the money; The process wasn't really clear as to who would get money or how the competition would take place; DFWT supporters had to talk to Treasury Board to explain the objectives of the DFWT

10.3.5 DFWT Accomplishments and Challenges

Interview subjects were asked whether they thought the DFWT had any major accomplishments or challenges and, if so, to describe these accomplishments and challenges. Those who said they thought the DFWT had some major accomplishments or challenges were also asked whether they thought government policies had played a role in either the accomplishments or the challenges, and, if so, to describe these policies.

10.3.5.1 DFWT Accomplishments

Ninety-six percent of those interviewed thought the DFWT had some major accomplishments (Table 10.21). Only those respondents who answered yes to this question were asked questions related to DFWT accomplishments. Table 10.22 lists the themes that captured $\geq 20\%$ of the responses and provides a brief description of each. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.21 Do you think the DFWT has any major accomplishments?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	1	0	28
% of responses	96%	0%	4%	0%	100%

Table 10.22 DFWT accomplishments

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
On-the-ground programs	22	82%	On-the-ground programs increase productivity and decrease soil and crop damage by waterfowl; Poor farms have been brought into production because of laser levelling; Hedgerows and set asides are great for raptors and songbirds; Winter cover crops are great for waterfowl; Set aside program assists organic certification; Helped to restore the quality of the land
Community relations	13	48%	Maintaining the good relationship between the farming and wildlife community; Show farming industry is sympathetic to wildlife needs; More of the general public is aware of the importance of agriculture and wildlife; Newsletters; Events
Conservationists and farmers working together	11	41%	Diffusing conflict between the conservationists and the farming community; Benefits both agricultural and wildlife resources on the delta; They are taking a positive approach rather than a negative approach
Survival of the organization	9	33%	Kept a functioning organization with a Board that has both environmental and agricultural interests; Have established themselves as an important farming conservation agency in the region
Financial management	9	33%	Have effectively administered the YVR stewardship fund; Money and organization have been well managed; Accomplishments have far exceeded what could have been achieved if a piece of land had been purchased; Fundraising efforts have been good
Research	7	26%	Effectiveness of their programs has been demonstrated through their monitoring and evaluation; Brought science to programs
Funding ecosystem goods and services	7	26%	Farmers providing habitat that benefits all but not having to pay for it themselves; Putting money into farms

10.3.5.2 Role of Government Policies in DFWT Accomplishments

Interview subjects were asked whether they thought government policies contributed to any of the DFWT accomplishments. Sixty-seven percent said they thought that government policies did contribute to the DFWT accomplishments (Table 10.23). Table 10.24 lists the policy themes that captured $\geq 20\%$ of the responses and provides a brief description of each. The results are discussed in Chapter 11. A table listing all of the themes identified/results for this question is provided in Appendix VI.

Table 10.23 Did government policy contribute to any of these accomplishments?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	18	5	4	0	27
% of responses	67%	19%	15%	0%	*101%

*Sum exceeds 100% because of rounding-off errors

Table 10.24 Government policies that contributed to accomplishments

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Environmental Assessment Act – YVR Wildlife Stewardship Fund	5	28%	The environmental assessment for the third runway was required by legislation; This meant that there was money available to mitigate lost habitat; YVR Wildlife Stewardship Fund provided seed money so the DFWT had funds every year
AEPI: Delta Forage Compensation Program (DFCP) Pilot Project	4	22%	Symbiotic relationship between DFWT and DFCEP; Annual and perennial forage crops covered; Programs like this acknowledge the work that the DFWT is doing
Federal government staff involvement	4	22%	Government gives federal staff the latitude to work with the DFWT; Environment Canada staff provide technical support
Greenfields funding	4	22%	Government funding of Greenfields was a major step in breaking the ice; Greenfields was seen as a collaborative approach that would not generate conflict

10.3.5.3 DFWT Challenges

Interview subjects were asked whether they thought the DFWT had any major challenges. Ninety-six percent of those interviewed thought the DFWT had some major challenges (Table 10.25). Only those respondents who answered yes to this question were asked the following questions related to challenges. Table 10.26 lists the challenges that were identified in the responses of $\geq 20\%$ of respondents and provides a brief description of each challenge. The results are discussed in Chapter 11. A table listing all of the themes identified/results for this question is provided in Appendix VI.

Table 10.25 Do you think the DFWT has any major challenges?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	1	0	28
% of responses	96%	0%	4%	0%	100%

Table 10.26 DFWT challenges

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Insufficient funding	14	52%	Programs oversubscribed; Not enough money for all programs; Only able to access endowment interest; Interest rates have gone down; Resulted in reduction in money for programs because only the interest can be drawn from the Trust fund; Shrinking land base, more waterfowl impacts in winter, so need more cover crop and relay cropping, but not enough funding to pay for this
Competing interests in the ALR	9	33%	Development pressures; Land base is shrinking; More pressure on existing soil based farmers; Concentrating wildlife in the area; Farmland is becoming more and more important component of their habitat because of loss of habitat elsewhere; The land base is coming under so much stress now that farming could come to an end in Delta and this would mean an end to the DFWT

Table 10.26 DFWT challenges

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Funding stability	8	30%	Need a healthy fund for ongoing operations, so you can hire good staff and keep them; Difficult to get long term funding for programs; Farmers want to feel that if they participate in a program that it will be there for the long term
Funding administration	8	30%	Takes time and effort to keep applying for money; Less time to spend on programs; Need to involve more businesses
Changes in agriculture	8	30%	Kids aren't staying on the farm and new farmers aren't coming in; Conversions to blueberries and cranberries; Blueberries not compatible with wildlife habitat; Threats to soil based agriculture; Global competition; Trying to reconcile non-soil based farming with wildlife issues
Internal operation of organization	7	26%	DFWT Board of Directors: both a strength and weakness that everyone has to come together to agree, can also stalemate some things; Not sure BBCC represents the range of interests in the environmental community; Could have stronger linkages to UBC researchers and government; DFWT needs protocols; Need to get more people interested in the DFWT

10.3.5.4 Role of Government Policies in DFWT Challenges

Interview subjects were asked if they could identify or describe any government policies that contributed to the challenges faced by the DFWT. Sixty-seven percent said they could identify or describe some government policies that contributed to the challenges faced by the DFWT (Table 10.27). Two people were not asked this question because their responses to the previous question (to identify challenges faced by the DFWT) were related to the way in which the DFWT operates and were not related to government policy.

Since many respondents described policies rather than identified specific policies, I grouped similar policy descriptions together and identified the theme by the dominant concept in that theme. In some cases, respondents knew the name of the policy, so I have included that information as well. Table 10.28 lists those policy themes that captured $\geq 20\%$ of the responses

to this question and provides a brief description of each. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.27 Do you think government policies contributed to any of these challenges?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	18	3	4	2	27
% of responses	67%	11%	15%	7%	100%

Table 10.28 Government policies that contributed to DFWT challenges

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Inaccessible government funds	12	67%	Competition for money; Federal government fiscal years may not coincide with funding needs; AEPI - very specific to mitigate impact of agriculture on environment, don't look at the ability of agriculture to enhance wildlife habitat, so DFWT can't get funding; Investment Agriculture foundation - built around generating a revenue stream but DFWT is not a revenue generating operation; Can't access some of the money that is available because they need a study or matching funds; Some organizations won't apply for government funding anymore because of the red tape and onerous reporting requirements; Investment Agriculture has funded DFWT, but there is a payback requirement before they are able to access Investment Agriculture funds; EFP provides funding for short-term projects, but not long-term projects that benefit soil fertility and wildlife habitat
Lack of government funding	7	39%	Loss of funding; Federal government not interested in core capacity of NGOs; Spending freezes; In some cases funding has been promised then withdrawn at the last minute due to government expenditure reviews; Misuse of government funds in past has led to heightened accountability for funding in government; Difficult to get long term funding for programs; Appears to be a reluctance in government to give too much money to one organization

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Lack of policy coordination	7	39%	Conflicts among governments; Delta can't write agricultural bylaws without getting the Minister of Agriculture to approve them; Province doesn't want to get involved in the conflicts over waterfowl because waterfowl are under federal jurisdiction; Federal and provincial government won't work together to develop a compensation program; Provincial government allows non-soil based farming activities on prime agricultural land (e.g. greenhouses); These operations should be put elsewhere; The Ministry of Agriculture has been a huge advocate of the agricultural industry; They haven't looked at whether or not farming practices should be improved
Economic policy	7	39%	Government policy related to growth and economy; Economic imperative often overrides everything else, both within and outside government; e.g. blueberries are a high value crop (economically valuable), but may not be environmentally sustainable because of sawdust that they are grown in; Changing crop pattern (e.g. expansion of blueberry acreage) is reducing wildlife habitat; Business decision by farmers based on economic return, but provides little or no wildlife habitat; Rising dollar may force closure of greenhouses; Farmers can't make money on soil-based vegetables, so they are growing more intensive crops; Related to trade between Canada and U.S.
ALC Act	4	22%	Relaxing of ALR guidelines; The ALC has allowed some loss of farmland to urbanization; Fragmentation of farmland coupled with rural estates impacts the types of crops that can be grown; Concern that land will be expropriated for First Nations treaty settlement; Government infrastructure projects have taken land out of the ALR

10.3.6 Conflicts

Interview subjects were asked whether they thought conflicts between agricultural and environmental interests in Delta had increased or decreased since the formation of the DFWT and, if so, to describe these conflicts. Those who answered yes to these questions were asked if they thought government policies had played a role in either the increase or decrease of conflicts and, if so, to describe these policies. These questions were intended to give a sense of the role that the DFWT played in increasing or decreasing conflicts in Delta. Unfortunately, they were not worded in that manner, so the role of the DFWT in increasing or decreasing conflicts can only be loosely inferred from the responses.

10.3.6.1 Decrease in Conflicts

Interview subjects were asked whether they thought conflicts between agricultural and environmental interests in Delta had decreased since the formation of the DFWT. Seventy-five percent of those interviewed thought conflicts had decreased since the formation of the DFWT (Table 10.29). Only those respondents who answered yes to this question were asked the following questions related to decreased conflicts. There were only two themes that captured $\geq 20\%$ of the responses (Table 10.30). The results from this question are discussed in Chapter 11. A table listing all of the themes identified/results for this question is provided in Appendix VI.

Table 10.29 Do you think conflicts between agricultural and environmental interests have decreased since the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	21	4	3	0	28
% of responses	75%	14%	11%	0%	100%

Table 10.30 Conflicts that have decreased since the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=21	Description
Tension between conservationists and farmers	15	71%	Level of understanding in both groups has improved; At one time the conservationists and the farmers were very mistrusting of each other, this has diminished a great deal
Farm practices negatively affecting wildlife	5	24%	Conflicts related to the timing of harvesting have decreased (e.g. harvesting at certain times of the year can destroy nests); DFWT has been able to convince farmers that the programs are good for the land as well as for wildlife

10.3.6.2 Role of Government Policies in Helping to Decrease Conflicts

Interview subjects were asked if they thought government policies had played a role in decreasing conflicts between agricultural and environmental interests in Delta since the formation of the DFWT and, if so, if they could identify or describe any of those government policies. Forty-three percent responded yes (Table 10.31). Three people were not asked this question. In two cases the respondent's answers to the previous question were not policy related. In the third case the respondent could not think of any specific examples of decreases in conflicts although he/she felt that conflicts had decreased since the formation of the DFWT. There was one theme identified through the data analysis related to the role of government policy in decreasing conflicts. The responses in this theme were provided by $\geq 20\%$ of the respondents (Table 10.32). The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.31 Have government policies helped to decrease any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	9	3	6	3	21
% of responses	43%	14%	29%	14%	100%

Table 10.32 Government policies that have helped to decrease these conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=9	Description
AEPI: Delta Forage Compensation Program	2	22%	Providing compensation for waterfowl damage to forage crops is a big step forward; Government recognition of a problem

10.3.6.3 Increase in Conflicts

Interview subjects were asked whether they thought conflicts between agricultural and environmental interests in Delta had increased since the formation of the DFWT. Thirty-two percent of those interviewed thought conflicts had increased since the formation of the DFWT (Table 10.33). One person was not asked this part of the question because he/she began to provide information that fit under questions that came later in the interview, even though those questions had not yet been asked. As a result, this question was inadvertently skipped as I tried to record the information under the other questions. Only those respondents who answered yes to this question were asked the following questions related to increased conflicts. Table 10.34 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each conflict. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.33 Have conflicts in Delta increased since the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	9	11	7	1	28
% of responses	32%	39%	25%	4%	100%

Table 10.34 Conflicts that have increased since the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=9	Description
Changes in agriculture	6	67%	The next conflict will be the evolution of crops on the delta; Not convinced that traditional mixed farming is sustainable for Delta; Mixed farming commodity crops are lower value, so they are moving to higher value crops; Using higher intensity forms of farming (e.g. greenhouses), does not provide habitat; Price of corn has gone up because of biofuel demand; Increases costs of feeding cattle, but cattle prices are dropping; Farmers are getting out of cattle because they can't make money off of cattle
Competing interests in the ALR	4	44%	Port development; Use of the land for recreational purposes; Removal of ALR lands for political reasons (e.g. roads, TFN); Undermines the purpose of the ALR
Waterfowl damage	3	33%	Increased waterfowl populations have had an escalating impact on agriculture; Damage on perennial crop; Snow geese are having a strong impact

10.3.6.4 Role of Government Policies in Increased Conflicts

Interview subjects were asked if they thought government policies had played a role in increasing conflicts between agricultural and environmental interests in Delta since the formation of the DFWT and, if so, if they could identify or describe any of those government policies. Sixty-seven percent responded yes (Table 10.35). There was only one theme that I identified that captured $\geq 20\%$ of the responses to this question (Table 10.36). The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.35 Did government policies contributed to an increase in any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	6	0	3	0	9
% of responses	67%	0%	33%	0%	100%

Table 10.36 Government policies that contributed to an increase in conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=6	Description
Farm Practices Protection (Right to Farm) Act (FPPA)	3	50%	Delta wanted the FPPA amended so that they could restrict greenhouse operations; This irritated the agricultural community; Conflict between municipal and provincial policies re: greenhouses; Extreme positions based on emotions (for both farmers and conservationists)

10.3.7 Other Issues

Interview subjects were asked whether they thought there were any other issues besides environmental conflicts that were threatening the viability of agriculture in Delta. Those who answered yes to this question were then asked if they thought government policies contributed to any of these issues and, if so, to describe these policies.

Ninety-six percent of those interviewed thought there were other issues that were threatening the viability of agriculture in Delta (Table 10.37). One person was not asked this question because it was added after the first interview. I added this question because the first interview subject identified some other issues (besides environmental issues) that were threatening the viability of agriculture in Delta. I realized that this was an important question to help me understand the overall context in which agriculture operates in Delta, so I added it to the interview schedule after the first interview. Only those respondents who answered yes to this question were asked to identify whether government policies played a role and, if so, to describe those policies.

Table 10.38 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.37 Are there other issues besides environmental conflicts that are threatening the viability of agriculture in Delta?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	0	1	28
% of responses	96%	0%	0%	4%	100%

Table 10.38 Other issues or conflicts that are threatening agricultural viability in Delta

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Competing interests in the ALR	23	85%	Pressure on the land from speculators; Land values are increasing, so farmers have to generate more income from that land to keep it in agricultural production; Agricultural land is the cheapest land to buy, so when expropriation occurs, it makes 'financial sense' to buy it; Less farmland so less area for wildlife and more pressure on remaining soil based farmers; Land claims are contributing to the fragmentation and deterioration of farmland in Delta; If TFN are not interested in using their land for agriculture it will affect agriculture and wildlife habitat across Delta; There will be less land available for stewardship; Non-farmers buying land and taking land out of production (has effect on agriculture and wildlife habitat); Proliferation of rural estates; Constant erosion of ALR; Critical mass of farms needed; Need a certain size of operation for processors to come in

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Changes in agriculture	16	59%	Labour shortage is a big issue; Aging farm community; Costs of farming, the margins are getting very narrow for a lot of commodities; Land prices, fuel prices are heavily impacting agriculture; Water will become more of an issue adding to the cost of production; Greenhouses; Lack of revenue generating crops; The potential for the collapse of the greenhouse industry; Conversion to blueberry production; Uncertainty of what will happen next in Delta is affecting farmers' ability to make a living; Processors have gotten smaller and moved out of area
Transportation and utility infrastructure	14	52%	Major industrial corridor expansion affecting agriculture and wildlife habitat; Fragmentation of farmland e.g. South Fraser perimeter road; Gateway project; Expansion of the railway system; Direct conversion of farmland to container storage; Encroachment of power lines
Global economy	7	26%	Farmers are operating in a global environment; Competition is a big challenge for them; Remaining competitive and sustainable

10.3.7.1 Government Policies that have Contributed to Other Issues

Interview subjects were asked if they thought government policies had contributed to the other issues that were threatening the viability of agriculture in Delta and, if so, to identify or describe these policies. Ninety-three percent of the respondents thought policies did contribute to the other issues (Table 10.39). Table 10.40 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each theme. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.39 Did government policies contribute to any of these other issues?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	25	0	2	0	27
% of responses	93%	0%	7%	0%	100%

Table 10.40 Government policies that contributed to these other issues

Policy Theme	# of responses (A)	% of respondents (A/B) B=25	Description
ALC Act	8	32%	The ALR is weakening; You can see it in the price of the land; The value of ALR land goes along with urban prices; As the ALR weakens there are more speculators; Proliferation of rural estates and hobby farms; ALR exclusions have a negative effect on agriculture and wildlife
International trade agreements	6	24%	Foreign food policy; Policies related to trade; Industrial expansion is driven by government policy and global economy; Federal and provincial policies that are driving agricultural industrialization are supported by global economics; Much of what affects farmers is driven by the market; Foreign food imports; Food safety requirements; Labelling laws
Lack of policy coordination	6	24%	Different departments with different interests; Lack of an inter-government model to make effective land use decisions; Lots of working committees that integrate government but don't do anything; Government agencies, other than the federal and provincial agricultural departments, have a limited understanding of agriculture and the impact of their decisions on farmland; Need to take a regional approach to agriculture

10.3.8 What Else Could Government Do?

This question was intended to cast a broad net to capture ideas that people had about what the government could do to help individual farmers or organizations like the DFWT to provide wildlife habitat while maintaining or enhancing agricultural viability. It was hoped that this

question would help to generate some solutions to some of the issues that had been previously identified and contribute to the identification of alternative policy options.

Interview subjects were asked whether they could think of anything that government could do to support DFWT programs and/or individual farmers who wanted to provide wildlife habitat while maintaining or enhancing agricultural viability. All of those interviewed answered yes to this question (Table 10.41). They were then asked to describe what they thought government could do to support DFWT programs and/or individual farmers who wanted to provide wildlife habitat while maintaining or enhancing agricultural viability. There were only two themes that captured $\geq 20\%$ of the responses (Table 10.42). The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.41 Is there anything that government could do to support DFWT programs and/or individual farmers who want to provide wildlife habitat while maintaining or enhancing agricultural viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	28	0	0	0	28
% of responses	100%	0%	0%	0%	100%

Table 10.42 What government could do to support DFWT programs and/or individual farmers who want to provide wildlife habitat while maintaining or enhancing agricultural viability

Theme	# of responses (A)	% of respondents (A/B) B=28	Description
Additional government funding	11	39%	The DFWT has demonstrated that the will is there, but they need more money; Stewardship programs are the best thing that we have; Having more programs would be good if there was more consistency in funding of stewardship
Compensation for ecosystem goods and services	9	32%	Everyone benefits from wildlife habitat and agriculture, so everyone should pay; The money should come via taxes; If the government wants farmers to do work for the environment then farmers need to be paid a reasonable amount; The money needs to come from government not from the marketplace; Implement the DFCP on a permanent basis

10.3.9 Lessons Learned

This question was intended to capture the overall experience that people have had with the DFWT to help other organizations (and the DFWT) to learn from these experiences. Interview subjects were asked to describe any lessons they had learned from their experience with the DFWT that might help other organizations to develop similar agri-environmental programs. Ninety-six percent said they could think of some lessons learned (Table 10.43). I have divided the lessons learned into two tables. Table 10.44 shows ‘what has worked for the DFWT’ and Table 10.45 shows ‘what could be improved’.

Table 10.43 lists those themes that captured $\geq 20\%$ of the responses related to ‘what has worked for the DFWT’. Table 10.44 lists those themes that captured $\geq 20\%$ of the responses related to ‘what could be improved’. Lessons learned are discussed in Chapter 11. Tables listing all of the themes identified for this question are provided in Appendix VI.

Table 10.43 Can you think of any lessons learned from the DFWT experience that might help other organizations to develop similar agri-environmental programs?

	Yes	No	Don't know	Not asked	SUM
Number of responses	27	1	0	0	28
% of responses	96%	4%	0%	0%	100%

Table 10.44 Lessons learned: what has worked for the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Equal representation on Board of Directors	7	39%	Need a committee of reps from both sides; Must make decisions by consensus, otherwise you will always have conflict; Don't lobby except for funds; There should be women on the board
Bring opposing sides together	5	28%	Formation of the DFWT has brought understanding from both sides; Formed from the two core communities who really care about the issues; Find your advocates early on; Talk about what you can agree on to start with at first, then build on that

Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Operation of the organization	5	28%	Need staff and the advisors who have appropriate expertise; Use a business model; Don't emphasize one or the other (farmland or wildlife); Agricultural and environmental interests should share responsibility for running the organization

Table 10.45 Lessons learned: what could be improved

Theme	# of responses (A)	% of respondents (A/C) C=18	Description
Fundraising	5	28%	Need to build up credibility with the farmers; The directors should be doing the fundraising; Fundraising needs to be done by those involved; Need some businesses and philanthropists to help set up some trusts
Operation of the organization	4	22%	Need a certain set of skills to found an organization and another set of skills to implement programs; Make sure that the people who work for the DFWT have a neutral perception of the agencies that are working with them; A director should not become an employee

10.3.10 Other Comments about the DFWT

This question was intended to provide people with an opportunity to tell me anything else they wanted to about the DFWT. I included this question because I wanted to make sure I hadn't missed any key points about the DFWT. It also gave people an opportunity to express their general opinions about the DFWT without the constraints of a specific question. I found that this question was very valuable in getting an overall sense of how people felt about the DFWT.

Seventy-one percent of the respondents said that they had more to say about the DFWT (Table 10.46). Table 10.47 lists those themes that captured $\geq 20\%$ of the responses to this question and provides a brief description of each theme. The results are discussed in Chapter 11. A table listing all of the themes identified for this question is provided in Appendix VI.

Table 10.46 Is there anything else you would like to say about the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	20	8	0	0	28
% of responses	71%	29%	0%	0%	100%

Table 10.47 Other comments about the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
DFWT is a good model	8	40%	The DFWT works as an agri-environmental stewardship model; It is a really unusual organization in Canada; Would be great to have similar organizations in other areas; Having a local non-government organization really helps get things done on-the-ground; When funding comes up there is a place for the money to go; Solutions need to be developed by people who live there and earn their money there; The key is that the DFWT was created by community members with government playing peripheral roles; Programs designed and implemented by the community; The fact that it has been working for 14 years shows that it is a success; They are a good model; A lot of decision makers share an interest in protecting farmland and want to steward the environment, but they don't necessarily know how to do it, DFWT is doing it
On-the-ground programs	6	30%	Pros: Program funding attracted farmers; On-the-ground results have been good; Farmers are losing money year to year due to wildlife, but continue to sit at the table and agree to participate in DFWT programs Cons: The focus is on the environment; Most of the work is done for the benefit of the abandoned fields; Almost nothing done for farming; There are programs that could be expanded but not enough funding available

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
Operation of the organization	6	30%	<p>Pros: Great organization; Employees are extremely dedicated; The DFWT does great work in a difficult environment; Haven't heard anything bad about the DFWT</p> <p>Cons: Government of Canada put a lot of money into the DFWT; The government was hoping the DFWT would bring in more money; The DFWT could play a really important and strong role to fight for both wildlife and soil based farming; Real opportunity for DFWT to try to affect policy; They need to create new partnerships, new alliances, and reach new people in the community</p>

10.4 Summary

In this chapter I explained the limitations of my data and provided a summary of the top themes identified through the interview analysis. Letters were sent to 111 people who had been involved in the formation and/or development of the DFWT inviting them to participate in an interview. Twenty-eight people consented to an interview. The majority of respondents (89%) thought that there were conflicts between agricultural and environmental interests prior to the formation of the DFWT. The top two conflicts identified were tension between farmers and conservationists (44%) and competing interests in the ALR (44%). Seventy-six percent of respondents thought there was a high degree of conflict between agricultural and environmental interests prior to the formation of the DFWT.

Seventy-six percent of respondents thought that the conflicts had a negative impact on agricultural viability. Sixty-four percent of respondents thought that the conflicts had a negative impact on wildlife habitat viability. Seventy-six percent of respondents thought government policies contributed to the conflicts (prior to the formation of the DFWT). Lack of compensation for waterfowl damage was the most commonly cited policy theme that contributed to the conflicts (37%).

Eighty-six percent of respondents said they thought they knew why the DFWT formed. The willingness of agricultural and conservation interests to cooperate was the most commonly cited driving force in the formation of the DFWT (54%). Seventy-one percent of respondents thought government policies helped in the formation of the DFWT. The Environmental Assessment Act – YVR Wildlife Stewardship Fund was the most commonly cited policy theme identified as having helped in the formation of the DFWT (47%).

Ninety-six percent of respondents thought that the DFWT had some major accomplishments. The most commonly cited accomplishment was on-the-ground programs (82%). Sixty-seven percent of respondents thought government policy contributed to the DFWT accomplishments. The Environmental Assessment Act – YVR Wildlife Stewardship Fund was the most commonly cited policy theme that contributed to the accomplishments (28%). Most of the respondents (96%) thought the DFWT had some major challenges. Insufficient funding was the most commonly cited challenge (52%). Sixty-seven percent of respondents thought government policies contributed to these challenges. Inaccessible government funds was the most commonly cited policy theme (67%).

Seventy-five percent of respondents thought conflicts between agricultural and environmental interests had decreased since the formation of the DFWT. Tension between conservationists and farmers was the most commonly cited conflict that had decreased (71%). Forty-three percent of respondents thought government policies had helped to decrease these conflicts. The AEPI: Delta Forage Compensation Program was the most commonly cited policy theme that helped to decrease the conflicts (22%). Thirty-nine percent of respondents thought conflicts had not increased since the formation of the DFWT while 32% thought conflicts had increased. Changes in agriculture was the most commonly cited theme contributing to an increase in conflicts (67%). Sixty-seven percent of respondents thought government policies contributed to the conflicts. The Farm Practices Protection (Right to Farm) Act (FPPA) was the most commonly cited policy theme that contributed to the conflicts (50%).

The majority of respondents (96%) thought there were other issues that were threatening the viability of agriculture in Delta. Competing interests in the ALR was the most commonly cited issue (85%). Ninety-three percent thought that government policies contributed to other issues.

The ALC Act was the most commonly cited policy theme that contributed to other issues (32%). All of the respondents thought that government could do something to support DFWT programs and/or individual farmers who wanted to provide wildlife habitat while maintaining or enhancing agricultural viability. Additional government funding was the most commonly cited action (theme) identified by respondents (39%).

Ninety-six percent of respondents said they could think of lessons learned from the DFWT experience that might help other organizations to develop similar agri-environmental programs. Equal representation on the Board of Directors (by conservationists and farmers) was the most commonly cited lesson learned for what has worked for the DFWT (39%). Fundraising was the most commonly cited lesson learned for what could be improved (28%). Seventy-one percent of respondents had other comments about the DFWT with forty percent of them saying that the DFWT was a good model. In the following chapters, I discuss the top themes and explain how they help to answer my research questions.

CHAPTER 11

Interview Results Discussion

11.1 Introduction

This chapter is based on the results presented in Chapter 10 and draws on those themes that captured at least 80% of the responses. The main focus of this chapter is to ‘tell the story’ of the DFWT and to answer my first three research questions. I answer the fourth research question in Chapter 13. In order to tell the story of the DFWT in an interesting and cohesive manner, I have drawn the results together and discuss them as a whole in the context of each research question. All of the results cited here are from the interviews I conducted unless otherwise noted.

11.2 Formation of the DFWT

In the following two sections I draw on the interview results from interview questions 3 and 4 (Sections 10.3.3 – 10.3.4) to help describe the scenario in Delta prior to the formation of the DFWT and to identify the driving forces in the formation of the DFWT. I then use secondary sources to help triangulate my findings and answer my first two research questions.

11.2.1 Situation in Delta Leading up to the Formation of the DFWT

This section draws on the responses from interview question 3 (Chapter 10 – Section 10.3.3) (interview results) to describe the situation in Delta leading up to the formation of the DFWT. Eighty-nine percent of those interviewed said they thought that conflicts existed between agricultural and environmental interests prior to the formation of the DFWT and seventy-six percent of those people said they thought that government policies contributed to the conflicts. Seventy-six percent of the respondents thought the degree of conflict between agricultural and environmental interests in Delta was high before the formation of the DFWT.

Tension between farmers and conservationists was the most commonly cited conflict identified by interview respondents (44%). The two sides were highly polarized at the time (prior to the formation of the DFWT). This polarization was magnified by a lack of trust between the two sides as well as a lack of communication. A contributing factor (to the lack of communication and mistrust) was that there was no forum for the farmers and conservationists to talk.

Competing interests in the ALR was another key conflict that was identified through the interview analysis. This conflict, identified by 44% of respondents, is tied to the tension

between farmers and conservationists because it includes loss of agricultural land and soil based agriculture which put additional waterfowl pressure on remaining soil based farms. It also includes land speculation which was driving up the cost of agricultural land, making the economic losses due to waterfowl difficult for farmers to absorb. An increase in the number of golf courses and greenhouses also meant a loss of soil-based agriculture. In addition, the presence of wildlife habitat on agricultural land resulted in competition between farmers and wildlife.

Forty percent of respondents cited waterfowl damage and twenty percent cited lack of compensation as conflicts that existed prior to the formation of the DFWT. These conflicts appeared to help drive the tension between farmers and environmentalists. Seventy-six percent of those asked thought that the conflicts prior to the formation of the DFWT had a negative impact on agricultural viability. Loss of forage crops was the main impact identified by respondents (32%) followed by a reduced range of crops due to waterfowl (21%). These impacts are discussed in greater detail below.

Respondents said that waterfowl were causing problems for farmers because ducks and geese were feeding on over-wintering vegetable crops and forage crops. Crop yields were reduced as a result of waterfowl foraging. The financial impact was greatest for dairy farmers because of damage to their forage crops. In some instances, newly seeded forage fields were consumed by ducks in a single night. Some dairy farmers were forced to import forage from other areas to make up for the losses due to waterfowl. This created an added expense for those farmers.

The range of crops that farmers could grow was limited by waterfowl predation. Some farmers could no longer grow overwintering vegetables. Early crops were better for the processors, but these crops were lost due to waterfowl. Waterfowl predation reduced crop diversity and economic opportunities for farmers. Waterfowl also had a negative impact on soils. Waterfowl congregating and feeding in vegetable fields over the winter compacted soil resulting in poor drainage, water accumulation, and delayed planting of crops in the spring. Farmers were not compensated for wildlife damage, nor did they receive any public recognition for the habitat they were providing for wildlife.

Seventy-six percent of the respondents thought government policies contributed to the conflicts. The main policy issue was related to a lack of compensation for waterfowl damage.

Thirty-seven percent of respondents felt the government was to blame for the lack of compensation for waterfowl damage. Twenty-one percent of respondents specifically identified the federal Migratory Birds Convention Act (MBCA) as a policy that contributed to the conflicts in Delta.

The Migratory Birds Convention Act protects migratory birds, their eggs, and nests. The Act regulates hunting, prevents trafficking and commercialization, and controls the use of migratory birds through permits. The Act applies to public and private lands. Under this Act, the federal government can designate an area of importance to migratory birds as a Migratory Bird Refuge, to limit hunting and physical disturbance (MBCA, 1994).

The second most commonly cited policy issue (identified by 32% of respondents) was the federal acquisition of land for a National Wildlife Area through the Canada Wildlife Act. The Canada Wildlife Act was created to help protect habitat for those birds protected under the Migratory Birds Convention Act. Under this Act the Minister of Environment has the authority to acquire and manage habitats for birds and, with the approval of the provinces, other wildlife (Canada Wildlife Act, 1985). Some respondents pointed out that the policy tools to protect migratory birds on private land are actually very limited, so acquisition of land is necessary. However, the key issue appeared to be that some of the bird species were increasing in number and causing more damage each year.

The acquisition of the 299 ha Alaksen National Wildlife Area (NWA) on Westham Island in Delta appeared to exacerbate the waterfowl predation problem. Alaksen NWA was established in 1976 by the federal government and overlaps with the George C. Reifel Migratory Bird Sanctuary (MBS) (CWS, 2008a). The George C. Reifel MBS was established in 1967 and has an area of 648 ha (CWS, 2008b). Both Reifel MBS and Alaksen were specifically mentioned by respondents as causing problems for farmers, however Alaksen was identified more frequently as being problematic. Respondents noted that waterfowl appeared to spill over from these protected areas to feed in farmers' fields, resulting in substantial damage to crops. Thirty-two percent of the interview respondents felt that the Alaksen NWA was not being properly managed for wildlife. Alaksen was also used for farming, and some farmers felt that it was not being farmed properly. Some interview respondents felt that Alaksen should not be farmed at all.

Twenty-one percent of the respondents cited lack of policy coordination as contributing to the conflicts. Different agencies represented different groups with different objectives. For example, the objective of the Ministry of Agriculture is to protect the agricultural industry, while the objective of the Canadian Wildlife Service (Environment Canada) is to protect and sustain migratory bird populations. Neither the federal or provincial government was willing to compensate farmers for losses due to waterfowl predation. Federal and provincial governments were not taking a holistic approach to agricultural and environmental management. Each government appeared to be focused on its own particular mandate creating a gap in policy, with farmers falling in this gap. This policy gap is discussed in Chapter 12.

The conflicts also affected wildlife habitat viability in Delta. Sixty-four percent of those asked thought that the conflicts had a negative impact on wildlife habitat viability. The main negative impact identified by respondents was loss of wildlife habitat (44%). Respondents indicated that the conversion of wildlife habitat to agriculture as well as the conversion of agricultural land to urban development were resulting in a net loss of wildlife habitat. Insufficient wildlife forage was cited by 25% of respondents as being one of the negative impacts on wildlife habitat viability. Lack of cover crops meant that there was little forage available for waterfowl. This forced waterfowl onto those fields that did have crops, particularly forage fields on dairy farms.

Twenty percent of respondents identified pesticides as contributing to the conflicts prior to the formation of the DFWT. Pesticide poisoning was also cited by 31% of respondents as having a negative impact on wildlife habitat viability. Farmers were using granular pesticides to control wireworm in potatoes. Unfortunately, the granular pesticide looked like grit to the ducks that were foraging in the fields. This resulted in high duck mortality. To make matters worse, eagles were feeding on the duck carcasses, and subsequently dying from bioaccumulation of the pesticide in their bodies. The eagle and duck deaths added to the friction between farmers and environmentalists.

A lack of support from the community (from both a financial perspective and a public recognition perspective) meant that farmers were less inclined to provide wildlife habitat on their farms. Respondents indicated that a lack of community support affected both agricultural viability (21%) and wildlife habitat viability (25%). Respondents commented that nobody

appeared to be doing anything to try to solve the conflicts between agricultural and conservationist interests.

11.2.1.1 Summary

The conflicts identified above provide an indication of the tension that existed in Delta prior to the formation of the DFWT. These conflicts and policies appeared to create an intolerable situation for both farmers and conservationists. This situation could have continued and escalated for many more years, but something happened to change the trajectory of conflict. A series of events occurred that resulted in the formation of the DFWT. These events, and the people involved, are described in the next section. The following table (Table 11.1) summarizes the policies that contributed to the conflicts prior to the formation of the DFWT. I draw on this table, as well as subsequent policy summary tables, in Chapter 12 to help identify policy gaps.

Table 11.1 Summary of policies that contributed to the conflicts prior to the formation of the DFWT

	Pre-DFWT conflicts
Lack of compensation for waterfowl damage	X
Canada Wildlife Act - Federal acquisition of land for National Wildlife Area	X
Lack of policy coordination	X
Migratory Birds Convention Act (MBCA)	X

11.2.2 Driving Forces in the Formation of the DFWT

This section draws on the responses from interview question 4 (Section 10.3.4). It describes the driving forces that led to the formation of the DFWT and the role that policies played in its formation. Eighty-six percent of those interviewed said they thought they knew why the DFWT formed. Seventy-one percent of these respondents thought policy enabled the formation of the DFWT, while 25% thought government policy impeded the formation of the DFWT.

The tension between environmentalists and farmers, identified in the previous section as being the most frequently cited conflict prior to the formation of the DFWT, eased as the two groups

were brought together to discuss conflicts related to agriculture and wildlife. The top driving force identified by respondents was the willingness of agricultural and conservation interests to cooperate (54%). Farmers and conservationists saw potential benefits for both wildlife habitat and agriculture.

Although only identified by two respondents, a change in the ALC Act may have acted as a driving force in the formation of the DFWT. I have included this theme (despite the low number of responses) because it appears to have had a dramatic effect on the tension in Delta prior to the formation of the DFWT and also appears to have acted as a driving force in the formation of the DFWT. I was told that this was what drove the municipality to organize meetings between farmers and conservationists. It is possible that other respondents did not identify this policy as a driving force because they were not aware of the role it played in bringing the conservationists and farmers together.

As explained in Chapter 4, the provincial government made a significant change to policy related to golf courses in the Agricultural Land Reserve (ALR) in 1988. The policy change, Order-in-Council 1141-88, allowed golf courses as an outright use in the ALR with municipal government having the final say over golf course applications. Prior to this policy change, golf courses were not permitted in the ALR unless approved by the provincial Agricultural Land Commission. This policy change led to a flood of golf course development applications in Delta from landowners wishing to convert farmland to golf courses.

Respondents explained that conservationists fervently opposed the golf course applications. Conservationists felt that agricultural land was important not only for producing food, but also for providing wildlife habitat. Respondents said that this infuriated farmers who felt that they should be able to do what they wanted with their land. This, combined with the economic losses due to waterfowl predation and the desire of conservationists to see farmers provide more habitat for wildlife, created a fiery rift between the farmers and conservationists.

Some respondents said that Delta Municipal Council was getting frustrated at hearing the two sides arguing at public meetings and the council was concerned about the divide the feud was causing in the community. Council was also concerned about the loss of farmland to golf courses. At the same time, there was a core group of farmers who were already working together and were interested in addressing the issues related to agriculture and wildlife.

Agricultural organizations and individuals were identified by 46% of respondents as being key driving forces in the formation of the DFWT. Organizations included the Delta Farmers' Institute, Delta Agricultural Society, and Delta Farmers' Soil Conservation Group.

Delta municipal council decided to intervene in the feud by bringing the two sides together to talk. The first meeting organized by the municipality was held in September, 1991. Thirty-eight percent of respondents indicated that municipal representatives were a driving force in the formation of the DFWT. Respondents noted that municipal representatives helped to facilitate communication between the two groups and the Councillor who was involved was well respected by the community. The municipality also provided meeting rooms which helped to establish neutral ground for the two sides to talk. Municipal Council support was also cited by 24% of respondents as a policy that helped in the formation of the DFWT. In November, 1991, Order in Council 1141-88 was rescinded after a change in provincial government.

Availability of money was identified by 46% of respondents as being a driving force in the formation of the DFWT. While the allocation of the money came after the formation of the DFWT, the environmental review of the airport expansion indicated that money would be available for habitat acquisition and mitigation. Respondents noted that the availability of money from the YVR habitat mitigation fund helped to motivate those involved to incorporate the DFWT as a legal entity under the Society Act so that they could make a formal application for the funds. Contributions from government agencies and non-government agencies also assisted in the formation of the DFWT. The Environmental Assessment Act – YVR Wildlife Stewardship Fund was identified by 47% of respondents as a policy that enabled the formation of the DFWT.

While the DFWT did eventually (in March 1995) receive a \$2.25 million trust fund for a farmland stewardship program in the lower Fraser River delta, 67% of the respondents thought that the policy associated with the allocation of the YVR Wildlife Stewardship Fund money impeded the formation of the DFWT. There appeared to be confusion over how the money would be allocated and complaints that there was no policy to direct the money. Some respondents felt they couldn't trust the Canadian Wildlife Service (CWS) and that the CWS wanted to control the money. Farmers were concerned that the money would be used to expand wildlife refuges in the area, adding to the waterfowl predation problems on their farms. Farmers thought they could do a better job of providing habitat with the money that was available. The

Treasury Board appeared reluctant to release the funds to a NGO, so some of the DFWT supporters spoke with Treasury Board to explain the objectives of the DFWT.

Respondents said that UBC researchers (29%) and conservationist organizations and individuals (21%) were also important driving forces in the formation of the DFWT. Respondents noted that the UBC researchers brought an objective perspective to the conflicts and were well respected by both sides. They also brought technical knowledge and a science based approach to the table. Various conservation organizations and interests contributed to the discussions (either directly or indirectly) including the Boundary Bay Conservation Committee, Nature Trust, Ducks Unlimited, as well as bird-watchers and naturalists.

Government agencies were also involved in the discussions. Twenty-nine percent of respondents indicated that the policy allowing federal government staff to be involved in the discussions helped in the formation of the DFWT. Respondents noted that Environment Canada (Canadian Wildlife Service) and Transport Canada representatives contributed to the process in a generally positive manner. Similarly, twenty-nine percent of respondents indicated that the policy allowing provincial staff to be involved helped in the formation of the DFWT. Representatives from the Ministry of Agriculture, Ministry of Environment, and the Agricultural Land Commission were given the latitude to help in the formation of the DFWT.

Initially, sessions between the farmers and conservationists were very tense. Eventually, the hostility between farmers and conservationists dissipated as the idea of a farmland and wildlife trust came to fruition. Some of those involved in the discussions had heard of agri-environmental programs elsewhere (e.g. England, California) and thought a similar program might work well in Delta. The availability of money from the YVR Wildlife Stewardship Fund helped drive the idea of forming a Trust. Once the idea of forming a Trust was established, Council gave permission to the municipal lawyer to draft the documents needed to form the DFWT.

Although only mentioned by two respondents (8%), the Greenfields project may have contributed to the idea that agriculture and wildlife habitat could be successfully combined. The goal of the Greenfields project, which started in 1990, was to develop a strategy that would allow agriculture and wildlife to coexist on farmland in Delta. The project was a cooperative venture between farmers, wildlife agencies, and the University of British Columbia. It received

financial support from various government and non-government agencies (Temple, 1997). The main component of the project was a cost sharing program that supported winter cover crops, an important soil conservation practice that also provides habitat for waterfowl. Greenfields paid for the seed and farmers planted the seed in the fall to establish cover crops. Crops were monitored for growth and locations where birds consumed crops were documented (Duynstee, 1993).

While the capacity of a non-government organization (NGO) to administer the YVR Wildlife Stewardship Fund is not really a government policy, it was identified by 29% of respondents as a policy that helped in the formation of the DFWT. It is *linked* to policy because government could not (or didn't want to) administer the YVR Wildlife Stewardship Fund. It is also linked to policy in that the DFWT could not have become a legal entity without the Society Act. Respondents indicated that a locally run NGO was needed to manage and take ownership of the project. Respondents also noted that a NGO could do more with the money than government. For example, a NGO could use the YVR Wildlife Stewardship Fund as seed funding to leverage other grants and donations.

The Delta Farmland and Wildlife Trust was formed on February 26, 1993 through the Society Act of British Columbia. The eight founding directors represented a partnership of wildlife and agricultural interests with equal representation from the conservation and agricultural communities. The Constitution stipulates that three directors shall be appointed by the Delta Farmers' Institute (DFI) and three directors appointed by the Boundary Bay Conservation Committee (BBCC). The two remaining positions (At Large directors) are elected by the DFI and BBCC directors. The DFWT was established as a non-profit, non-political, charitable society to, among other things, "promote sustainable agriculture and stewardship practices which conserve and enhance wildlife habitat" (DFWT, 1993, Certificate of Incorporation, Part 2 (ii)). The DFWT took over administration of the Greenfields project from Ducks Unlimited Canada in 1995.

11.2.2.1 Summary

This section described the driving forces that led to the formation of the DFWT based on the interview responses. Policies that appeared to enable or impede the formation of the DFWT were also identified. This information, combined with the information from Section 11.2.1 and triangulation with secondary sources allows me to answer my first two research questions:

1. What led to the formation of the DFWT?
2. Did government policy enable or impede the formation of the DFWT?

Most of the conflicts that existed prior to the formation of the DFWT were also identified in reports by Klohn Leonoff Ltd. et al. (1992), BBCC (1992), and Norecol et al. (1994). These reports are particularly valuable because they were all written around the time the DFWT formed. Collectively, they provide a snapshot of the issues that were present in Delta in the years leading up to, and just after, the formation of the DFWT.

Competing interests in the ALR were identified by Klohn Leonoff Ltd. et al. (1992), BBCC (1992), and Norecol et al. (1994) although not all reports identified the same competing interests. For example, Klohn Leonoff Ltd. et al (1992) identified the following competing interests: land speculation, loss of agricultural land, and wildlife habitat on agricultural land. However, golf courses, greenhouses, and loss of soil-based agriculture were not concerns expressed by farmers at that time. In fact, these were supported by farmers. Farmers supported more non-soil based agriculture to improve economic viability (Klohn Leonoff Ltd. et al, 1992). The report produced by the BBCC (1992) identified land speculation, golf courses, and greenhouses as competing interests in the ALR. Similarly, Norecol et al. (1994) identified land speculation, erosion of the ALR, wildlife habitat on farmland, and greenhouses as competing interests in the ALR.

Tension between conservationists and farmers was alluded to by Klohn Leonoff Ltd. et al. (1992) and Norecol et al. (1994). Neither of these reports explicitly say that there this is a conflict, but they do explain that farmers are irritated by waterfowl predation. In addition, the Norecol et al. (1994) report focuses on the need for agricultural and environmental interests to work together to solve the agri-environmental conflicts in Delta, which implies that there was tension between agricultural and environmental interests at that time.

Waterfowl damage was identified as an issue by Klohn Leonoff Ltd. et al. (1992), BBCC (1992), and Norecol et al. (1994). Klohn Leonoff Ltd. et al. (1992) found that farmers were unable to grow certain crops (i.e. reduced range of crops), there was a loss of forage crops, and that soil compaction resulted from waterfowl predation. Norecol et al. (1994) found that there was a loss of forage crops and increased soil compaction due to waterfowl predation. The BBCC (1992) report identified loss of wildlife habitat due to greenhouses, golf courses, and development in the ALR, as an issue that existed prior to the formation of the DFWT. Norecol et al. (1994) also identified greenhouses as contributing to a loss of wildlife habitat in Delta.

Klohn Leonoff Ltd. et al. (1992), BBCC (1992), and Norecol et al. (1994) all identified a lack of community support as an issue that had a negative impact on agricultural and/or wildlife habitat viability. In the Klohn Leonoff Ltd. et al. (1992) study, farmers explained that they felt there was a lack of understanding of agriculture in the broader community. The BBCC (1992) recommended that the public should be made more aware of the role of local farmers in growing food and providing wildlife habitat. Norecol et al. (1994) suggested that the public be made more aware of the wildlife resources in Delta.

Policy appeared to contribute to these conflicts because there was no federal or provincial policy to compensate farmers for losses due to wildlife. The MBCA contributed to the conflicts because it protects migratory birds on public and private lands but does not compensate farmers for bird damage. The Canada Wildlife Act (federal acquisition of land for National Wildlife Area) also contributed to this conflict because the acquisition of Alaksen National Wildlife Area (NWA) resulted in the congregation of waterfowl in and around Alaksen NWA, negatively impacting surrounding farmland. Lack of policy coordination appeared to exacerbate all of these conflicts because environmental agencies and agricultural agencies were focusing on their own mandates, rather than on solving the conflicts. These conflicts appeared to help drive the formation of the DFWT. However, it does not appear as though these policies enabled or impeded the formation of the DFWT.

None of the reports I reviewed explicitly identified the Alaksen NWA or the Canada Wildlife Act - federal acquisition of land for National Wildlife Areas as issues. However, Norecol et al. (1994) did find that farmers were concerned about spillover from protected areas and that protected areas take farmland out of production. In contrast, the BBCC (1992) report

recommends that additional land be purchased and protected by (municipal, regional, provincial, or federal) government for wildlife habitat.

Klohn Leonoff Ltd. et al. (1992) identified lack of compensation for waterfowl damage as an issue prior to the formation of the DFWT. The BBCC (1992) report does not specifically identify lack of compensation for waterfowl damage as an issue, but the report does recommend that farmers be paid for various agri-environmental stewardship activities. While Norecol et al. (1994) do not identify lack of compensation as an issue for farmers, they do explain that farmers are suffering financial losses due to waterfowl predation and that farmers have indicated that they would be willing to provide wildlife habitat if they were compensated.

Lack of policy coordination is alluded to by both BBCC (1992) and Norecol et al. (1994). For example, the BBCC identifies the challenges of coordinating land use management in Delta due to the number of jurisdictions owning land in Boundary Bay (e.g. federal, provincial, regional, municipal). The BBCC (1992) also recommends that an interagency ecosystem approach be taken (by government) to coordinate land use planning in Delta. None of the reports I reviewed explicitly identified the Migratory Birds Convention Act (MBCA) as a policy that contributed to the conflicts in Delta prior to the formation of the DFWT. However, since migratory birds are protected under this Act, and waterfowl predation was identified as an issue in all of these reports, it seems reasonable to assume that the MBCA played some role in the conflict(s).

Based on the interview responses, the willingness of agricultural and conservation interests to work together appears to be a key driving force that led to the formation of the DFWT. The involvement of municipal representatives and UBC researchers in negotiations between conservationists and farmers as well as the availability of money also appeared to contribute to the formation of the DFWT.

Triangulating the driving forces in the formation of the DFWT is somewhat more difficult because these are the subjective opinions of interview respondents. In other words, the people or circumstances they identify as playing a key role in the formation of the DFWT may or may not be the true driving forces. For example, an individual may feel that he/she was a driving force, whereas others may feel differently.

However, it is possible to use secondary sources to lend some support to the driving forces that were identified by respondents. For example, Klohn Leonoff Ltd. et al. (1992) and BBCC (1992) identify the need for agricultural and conservation interests to cooperate to help solve the agri-environmental conflicts. Both reports recommend the establishment of a Steering Committee made up of conservationists and farmers. Correspondence from the DFI and Delta Soil and Water Conservation Group (DSWCG) to government representatives encouraging the government to allocate some of the YVR habitat mitigation money for agri-environmental stewardship adds credence to the role of agricultural organizations as a driving force in the formation of the DFWT (DFI/DSWCG, 1992). The DSWCG was a collaborative group made up of UBC researchers and members of the DFI. Its formation was made possible by federal provincial soil conservation funding under the Canada-British Columbia Soil Conservation Agreement. The DSWCG enabled UBC and Delta farmers to conduct research and demonstrate some of the practices that eventually became part of the DFWT programs. For example, the DSWCG on-farm work began the process of identifying soil degradation issues and remediation measures such as cover cropping, laser levelling, drainage, and the first grassland set-aside.

The minutes of the preDFWT meetings confirm that municipal representatives, UBC researchers, and conservation organizations/individuals were present (Farmland Conservation Trust, 1992). Correspondence between agricultural organizations and government representatives indicates that the formation of the DFWT appeared to come about (at least partially, if not completely) as a result of the availability of the YVR habitat compensation fund (DFI/DSWCG, 1992; Farmland Conservation Trust, 1992). However, the DFWT had already formed by the time the funds were actually allocated (DFWT, 1994). Respondents told me that the preDFWT meeting group was aware that the funds were available, and the availability of these funds acted as a catalyst in the formation of the DFWT.

There are a number of policies identified in the interview responses that appear to have enabled the formation of the DFWT. These include the involvement of all levels of government in negotiations between conservationists and farmers, the Environmental Assessment Act – YVR Wildlife Stewardship Fund, NGO capacity, and (perhaps) the rescinding of Order in Council 1141-88.

The only policy that was identified as impeding the formation of the DFWT was the allocation of the YVR Wildlife Stewardship Fund. Based on these results, government policy both enabled and impeded the formation of the DFWT. However, it appears as though government policy played a stronger role in enabling the formation of the DFWT than it did in impeding the formation of the DFWT.

Secondary sources confirm that an Environmental Assessment was conducted and a habitat mitigation fund was established (DFWT, n.d.). In addition, preDFWT meeting minutes confirm that federal government staff, provincial government staff, and municipal council representatives were involved in the preDFWT meetings (Farmland & Wildlife Trust Founding Committee, 1992).

There is some correspondence from Environment Canada that corroborates the contention that there was confusion over how the YVR habitat mitigation money would be allocated with Environment Canada promising in one letter to cooperate in the formation of a farmland wildlife trust (Martel, 1992) and another letter from Environment Canada stating that the mandate of CWS was to conserve wildlife habitat (Charest, 1992). This letter implies that conservation of wildlife habitat and conservation of farmland are mutually exclusive goals, and since the latter does not fall within the mandate of Environment Canada, it will not be considered in the allocation of the YVR habitat mitigation fund. Correspondence from agricultural organizations also confirms that farmers felt they could do a better job with the money, conserving both farmland and wildlife habitat (DFI/DSWCG, 1992).

The following two tables (Table 11.2 and Table 11.3) summarize the policies that appear to have enabled and impeded the formation of the DFWT. I draw on these tables in Chapter 12 to help identify policy gaps.

Table 11.2 Summary of policies that have enabled the formation of the DFWT

	Driving forces
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X
Federal government staff involvement	X
Provincial government staff involvement	X
Non-Government Organization (NGO) capacity	X
Municipal Council support	X
Rescinding of Order in Council 1141-88	X

Table 11.3 Summary of policies that have impeded the formation of the DFWT

	Driving forces
Allocation of YVR Wildlife Stewardship Fund	X

11.3 DFWT Development

In the following sections I draw on the interview results from interview questions 5 – 9 (Sections 10.3.5 – 10.3.7) to help describe the development of the DFWT and the role that policy has played in its development. I also use secondary sources to help triangulate my findings and answer my third research question: Did government policy enable or impede the development of the DFWT? I developed a series of interview questions related to accomplishments, challenges, and changes in conflicts in an attempt to identify whether policies had enabled or impeded the development of the DFWT. I used these interview questions to lead me to the policies that have affected the development of the DFWT.

11.3.2 DFWT Accomplishments and Challenges

This section draws on the responses to interview questions 5 and 6 (Section 10.3.5). These questions were intended to identify the accomplishments and challenges of the DFWT in order to determine whether policy had played a role in these accomplishments or challenges, thereby giving me a sense of whether or not policy had enabled or impeded the development of the DFWT. Ninety-six percent of those interviewed thought the DFWT had some major accomplishments and ninety-six percent thought that the DFWT had some major challenges.

11.3.2.1 On-the-ground Programs

The DFWT's on-the-ground programs were the most commonly cited accomplishment (82%). Respondents noted that these programs improved both agricultural productivity and wildlife habitat. Some poor farms had been brought into production because of laser levelling. The grassland set-aside program also assists in the transition to organic production and organic certification. A three year set-aside allows for organic certification, provided no restricted chemicals or management practices are used during that time (DFWT, 2006). The hedgerows and set-asides provide excellent habitat for raptors and songbirds, while the winter cover crops provide habitat for waterfowl. Overall, the DFWT on-the-ground programs have helped to restore the quality of the land.

Twenty-six percent of respondents identified on-going (DFWT) research as an accomplishment. The effectiveness of their programs has been demonstrated through monitoring and evaluation (e.g. hedgerow songbird surveys, trumpeter swan habitat use) as discussed in Chapter 6. In addition, the research has brought science to their programs, providing additional credibility to their work. Funding of ecosystem goods and services was also identified by 26% of respondents as another DFWT accomplishment. The DFWT was praised for putting money into farms and compensating farmers for providing wildlife habitat (e.g. cover crops, grassland set-asides). The wildlife habitat benefits all people, but now farmers do not have to absorb the entire cost of providing this service.

Sixty-seven percent of the respondents said they thought that government policies did contribute to the DFWT accomplishments. The most commonly cited policy that contributed to these accomplishments was the Environmental Assessment Act – YVR Wildlife Stewardship Fund with 28% of responses. As discussed above, the environmental assessment for the third

runway was required by legislation. This meant that there was money available to mitigate lost habitat through on-the-ground programs. The YVR Wildlife Stewardship Fund provided seed money so the DFWT had some funding available every year. This policy appears to have enabled the development of the DFWT.

Greenfields funding was cited by 22% of respondents as a policy that contributed to the DFWT accomplishments. Greenfields was identified as a major step in breaking the cycle of conflict between conservationists and farmers. Greenfields was seen as a collaborative approach that would not generate conflict. Government policy that provided funds to support this program appears to have enabled the development of the DFWT (see Chapter 4 for more information on the Greenfields project).

The Delta Forage Compensation Program (DFCP) was identified by 22% of respondents as a program that has contributed to the accomplishments of the DFWT. While the DFCEP is not itself a policy, respondents indicated that they thought that the DFCEP was established as a result of supportive policy, namely the Agriculture Environment Partnership Initiative (AEPI). The AEPI was created by the federal and provincial departments of agriculture. Program funds are held in trust by the Investment Agriculture Foundation of BC (BCAC, 2008a). The AEPI is similar to the previously mentioned Canada-British Columbia Soil Conservation Agreement (which is now defunct) because both involve(d) federal-provincial funding agreements and both are/were aimed at agri-environmental initiatives.

After many years of complaints from forage producers in the Delta area over waterfowl damage to their crops, the DFCEP was initiated as a pilot project in 2001 by the DFI with assistance from BC Ministry of Agriculture, Food and Fisheries staff (now known as BC Ministry of Agriculture and Lands) (Farmwest, n.d.). The DFCEP is managed by the Delta Farmers' Institute (DFI) not the DFWT, but the DFWT is part of the Steering Committee. The objective of the DFCEP is to address the impact of migratory waterfowl on forage fields within the municipality of Delta and the Mud Bay region of the municipality of Surrey through monitoring, mitigation, and compensation (DFI, 2006). The program includes a variety of farms. Some farms only produce forage, some produce forage and dairy, while other farms are very diverse, producing forage, blueberries, potatoes, etc. The only criterion for the program is that the participants must be full-time farmers (Farmwest, n.d.). Although the DFWT does not administer this

program, respondents felt that programs like this acknowledge the work that the DFWT is doing and that there is a symbiotic relationship between the DFCP and DFWT. The AEPI policy to fund projects such as the DFCP appears to have contributed to the development of the DFWT.

11.3.2.2 Funding

Fifty-two percent of respondents identified insufficient funding as a challenge that has impeded the development of the DFWT. While the YVR Wildlife Stewardship Fund provides some annual funding, the DFWT is only able to access the interest generated from the fund. As interest rates have gone down, so has the amount of money available from the fund. There is not enough money generated from this fund to pay for all of the on-the-ground programs and some programs have more demand than the DFWT is able to accommodate (e.g. grassland set-aside program). In addition, the area covered by soil-based agriculture in Delta is shrinking (as discussed in Chapter 4), which results in an increase in waterfowl damage and puts more pressure on remaining soil-based farms to provide wildlife habitat. Additional cover crop and relay cropping is needed, but there is not enough funding to pay farmers to plant these crops.

Funding stability was cited by 30% of respondents as another challenge the DFWT faces. The DFWT has found it difficult to get long term funding for programs. Funding programs are often set up to encourage new projects and if a project has been funded once it is unlikely that it will be funded again. Funding stability is important in order to maintain ongoing operations. This includes keeping on-the-ground programs going and retaining qualified staff. It is also important to have funding stability because farmers want to know that if they participate in a program that it will be there for the long term. Another challenge associated with funding that was identified by 30% of respondents was related to funding administration. It takes time and effort to keep applying for money which means there is less time to spend on programs.

Interview respondents also identified policies that contributed to these funding challenges. Sixty-seven percent said that inaccessibility of government funds presents a challenge to the DFWT. For example, it was noted that it is difficult to get funding from the AEPI program because the AEPI focuses on mitigating the impact of agriculture on the environment, but appears reluctant to fund programs that provide benefits to both agriculture and wildlife habitat. Consequently, the DFWT has had difficulty securing funding from the AEPI program.

The Investment Agriculture Foundation (IAF) is a not-for-profit, industry-led organization established in 1996 to manage and distribute federal and provincial funding programs (IAF, 2008). Respondents explained that IAF funding is aimed at projects that generate a revenue stream, but DFWT is not a revenue generating operation so it has had difficulty getting funding from the IAF. A few years ago, the IAF provided the DFWT with funding to hire an individual to raise funds. However, there were some strings attached to the money. The DFWT was expected to pay back the money it received from the IAF. Unfortunately, the position did not raise as much money as had been hoped and the DFWT has not been able to pay off the IAF. Consequently, the DFWT has been unable to access additional IAF funding.

The Environmental Farm Plan (EFP) program was also criticized for focusing on short-term projects rather than long-term projects. The EFP was launched in 2003. It is a bilateral agreement between the federal and provincial governments aimed at developing a sustainable agriculture industry in BC. Funds are delivered through the IAF (BCAC, 2008b).

While the EFP does provide funding for some long-term projects (e.g. riparian fencing, manure storage, drip irrigation), respondents complained that it does not explicitly provide funding for projects that contribute to soil fertility or wildlife habitat. Respondents criticized the program because farmers must share the costs of any improvements through the EFP program. It was noted that farmers are often land-rich and cash-poor, so they do not have the cash that is needed to cost-share EFP projects. Respondents explained that the program is not particularly useful for the DFWT or for individual farmers in Delta who want to provide wildlife habitat and enhance soil fertility (as the DFWT programs do).

In addition to these funding issues, the DFWT cannot access some of the other government funding available to NGOs because of some of the requirements that the government sets, such as having a study done first or finding matching funds. Respondents noted that misuse of government funds in the past (not related to the DFWT) has led to heightened accountability for funding in government. I was told that some organizations won't apply for federal funding anymore because of the red tape associated with funding applications and the onerous reporting requirements. Government policies that lead to programs with overly restrictive funding criteria (making funds inaccessible to the DFWT) appear to be impeding the development of the DFWT.

Lack of government funding was cited by 39% of respondents as a policy that contributes to the challenges faced by the DFWT. This theme differs from the previous theme in that the former theme focused on funds that were available, but inaccessible to the DFWT for various reasons. In contrast, this theme focuses on an overall lack of government funding for NGOs. Respondents explained that federal funding has been cut back and there have been regular spending freezes. In one case money was promised to the DFWT and programs were planned based on that money, but a sudden spending freeze meant the money was not available as promised. In addition, the federal government does not appear to be interested in the core capacity of NGOs and it is difficult for the DFWT to get long term funding for programs. There also appears to be a reluctance in government to give too much money to one organization. Lack of government funding appears to have impeded the development of the DFWT.

11.3.2.3 The DFWT as an Organization

Forty-eight percent of respondents identified community relations as a DFWT accomplishment. Respondents noted that the DFWT did a good job of maintaining the relationship between the farming and wildlife community. They have helped to show that the farming industry is sympathetic to wildlife needs. They have also raised awareness in the general public about the importance of agriculture and wildlife through various outreach activities including newsletters and special events.

Thirty-three percent of respondents said that the survival of the organization was an accomplishment and 41% felt that getting conservationists and farmers to work together was an accomplishment. The fact that the DFWT has kept a functioning organization with a Board that has both environmental and agricultural interests was cited as a significant accomplishment, particularly in light of the conflict between the two groups prior to the formation of the DFWT. The DFWT has helped to diffuse the conflicts between conservationists and the farming community. This proactive approach has benefitted both agricultural and wildlife resources on the delta. The DFWT has also established itself as an important farming conservation agency in the region.

Twenty-six percent of the respondents identified the internal operation of the organization as a challenge. Having a Board of Directors with equal representation from the agricultural and environmental community where both sides must unanimously agree is beneficial because it

means that the decisions that are made reflect the interests of both groups. On the other hand, if the two sides do not agree it can create a stalemate, which can be very frustrating if one side wants to move along on something. Respondents indicated that the DFWT could have stronger linkages to UBC researchers and government. There was also concern expressed that the BBCC may not represent the range of interests in the environmental community. In addition, it was noted that there was a need for protocols in the organization so that staff and directors were aware of, and followed, correct procedures in all matters. It was also mentioned that the DFWT needed to get new people on the Board in order to provide some new perspectives to the DFWT programs.

Good financial management was cited by 33% of respondents as a DFWT accomplishment. Respondents noted that the DFWT has done an excellent job of managing the YVR Wildlife Stewardship Fund. Respondents indicated that the accomplishments that have resulted from good financial management and on-the-ground programs have exceeded the benefits that would have been realized if the YVR Wildlife Stewardship Fund had been used to purchase land for wildlife habitat mitigation. The DFWT was also commended for their fundraising efforts.

There are no clear policy connections for these last three accomplishments, although the fact that the DFWT is partially funded by the YVR Wildlife Stewardship Fund, as well as other government funds, has probably helped the organization to survive and work effectively with conservationists and farmers.

11.3.2.4 Land Use

Competing interests in the ALR was cited by 33% of respondents as a challenge faced by the DFWT. Development pressures and a shrinking agricultural land base are causing wildlife to become more concentrated on remaining soil-based farmland, putting more pressure on existing soil-based farmers. Farmland is becoming a more and more important component of wildlife habitat because habitat is being lost elsewhere to development. Concern was expressed that the land base is under so much stress now that farming could come to an end in Delta, and this would also mean an end to the DFWT. Competing interests in the ALR was also identified as a conflict that existed prior to the formation of the DFWT.

Twenty-two percent of the respondents thought the ALC Act was a policy that contributed to the challenges faced by the DFWT. Respondents explained that relaxing of ALR guidelines,

removal of land from the ALR for First Nations treaty settlement, urban development, and government infrastructure projects have had a significant impact on the agricultural land base in Delta. Fragmentation of farmland coupled with rural estates has also had an impact on the types of crops that can be grown. This government policy appears to be linked to the challenge associated with competing interests in the ALR. While the ALC Act does not appear to have a direct connection to the development of the DFWT, it may have impeded the ability of the DFWT to develop because of the loss of agricultural land which may negatively impact the implementation of their on-the-ground programs (i.e. less area for programs).

Thirty-nine percent of respondents indicated that a lack of policy coordination contributed to the challenges faced by the DFWT. There are conflicts between all levels of government. A particularly tense conflict exists between the provincial government and municipal government. As previously explained, Delta is one of three municipalities that is under an Order-in-Council from the provincial government. Delta can't adopt zoning bylaws that restrict agriculture without getting the Minister of Agriculture and Lands to approve them. There is some sense of irritation and inequity amongst municipal staff and Council about having the Order-in-Council imposed on Delta. There was concern expressed that this conflict could affect the DFWT somehow because the conflict is related to jurisdiction over agricultural land. Respondents also pointed out that the Ministry of Agriculture is a strong advocate for the agricultural industry, but the Ministry doesn't appear to have looked at whether or not farming practices should be improved to benefit the environment. The provincial government was also criticized for allowing non-soil based farming on prime agricultural land (e.g. greenhouses).

Respondents said there was conflict between federal and provincial government policy. They explained that the provincial government doesn't want to get involved in the conflicts over migratory waterfowl because the birds are under federal jurisdiction. The federal government doesn't want to compensate farmers because it is not part of its mandate. The two levels of government have been at loggerheads for some time, refusing to work together to develop a compensation program. Fortunately the two governments have recently agreed to provide some compensation. This is discussed in Chapter 13.

Lack of policy coordination appears to have impeded the development of the DFWT because agri-environmental policy is not integrated across governments or government agencies. The

DFWT must expend additional time and effort ensuring that their programs meet both agricultural and environmental interests, with little or no policy to support their efforts. On the other hand, policy allowing federal staff to work with the DFWT was cited by 22% of respondents as contributing to the accomplishments of the DFWT. Federal staff have been given the latitude to work with the DFWT and Environment Canada staff provide technical support to the DFWT. This policy appears to have enabled the development of the DFWT.

11.3.2.5 Global Forces

Thirty percent of respondents identified changes in agriculture as a challenge. Children are not staying on the farm to take over from their parents and few new farmers are coming to Delta. Loss of farm families in Delta could result in a drastic change in agriculture. Land prices are so high in Delta, that any new farmers that do come into Delta will have to produce high value crops to stay in business. Thirty-nine percent of respondents indicated that economic policy contributed to the challenges faced by the DFWT. They explained that farmers must make business decisions that may be economically sustainable but may not be environmentally sustainable. For example, some farmers are switching to non-soil based crops such as greenhouses and blueberries. These types of agricultural operation provide higher returns for farmers, but provide little or no wildlife habitat (and create a host of other problems to the sustainability of agriculture). Although blueberries are grown in the soil, interview respondents explained that they felt that blueberries were not soil-based because they are grown in a layer of sawdust. While blueberry fields may provide limited habitat for some wildlife (e.g. rodents, raptors), they do not provide the type of habitat preferred by many of the other migratory and native species in the area (e.g. waterfowl).

Respondents noted that governments are also driven by the economy and policies related to growth can have a negative effect on both wildlife habitat and soil-based agriculture. Based on the respondents' comments, it appears as though economic policy has impeded the development of the DFWT because farmers are switching to higher value non-soil-based commodities in order to remain economically competitive. This has meant a reduction in the amount of land (soil-based agriculture) available for DFWT's on-the-ground programs.

11.3.2.6 Summary

It is more difficult to triangulate the themes I identified after the formation of the DFWT because nobody else has studied the DFWT in the manner in which I studied it and much of the data I collected was specific to the DFWT so it is difficult to triangulate with more general documents. However, it is possible to triangulate some of the themes I identified through reports written after the formation of the DFWT. It is also possible to compare the findings from the reports completed prior to the formation of the DFWT. For example, the identification of an accomplishment by the DFWT can be triangulated with reports written before the formation of the DFWT by showing that the conflict existed before the formation, and since the DFWT formed, the conflict has decreased.

The on-the-ground programs offered by the DFWT address many of the issues that were identified by Klohn Leonoff Ltd. et al. (1992), BBCC (1992), and Norecol et al. (1994). For example, the BBCC (1992) suggested that farmers be paid to implement a rotational leasing scheme to ensure a supply of oldfield habitat. This is now addressed through the DFWT grassland set-aside program. In addition, Klohn Leonoff Ltd. et al. (1992) identified low soil pH as an issue. This is now addressed through the DFWT field liming program.

The Norecol et al. (1994) report focuses on bringing conservationists and farmers together to solve land use issues collectively. The report directly addresses the need for conservationists and farmers to work together. Saddlemyer et al. (2001) also say that the DFWT brought farmers and conservationists together. This theme was identified as an accomplishment of the DFWT.

In terms of financial management, the DFWT annual report indicates that in the 2005/2006 fiscal year 68.7% of the expenses went toward stewardship programs and research. The remaining 31.3% was spent on fundraising (4.8%), communication and extension (4.2%), office and administrative expenses (5.3%), and staff (16.9%) (DFWT, 2006). In addition, the annual revenue for 2005/2006 exceeds the annual expenses. This seems to indicate good financial management by the DFWT.

Research was identified by respondents as an accomplishment. The DFWT has been involved in numerous research and monitoring projects since its inception. Some of these were described in Chapter 6, confirming that the DFWT does do ongoing monitoring and research.

Klohn Leonoff Ltd. et al. (1992), BBCC (1992), Norecol et al. (1994), and Saddlemeyer et al. (2001) all talk about the need to compensate farmers for ecosystem goods and services. Norecol et al. (1994) commend the success of the DFWT and the incentives it provides to farmers. They encourage the continuation of the DFWT agri-environmental stewardship programs and compensation for farmers.

I was not able to find any secondary sources of information that triangulated the policies that were identified as enabling or impeding the development of the DFWT. However, I did find that the Klohn Leonoff Ltd. et al. (1992) and Norecol et al. (1994) reports both recommended that the Greenfields program continue to help encourage agri-environmental stewardship. Greenfields funding was identified as one of the policies that contributed to the accomplishments of the DFWT.

In terms of the key challenges that I identified, Saddlemeyer et al. (2001) and Norecol et al. (1994) lend support to my findings, identifying competing interests in the ALR and changes in agriculture as ongoing issues in Delta. Saddlemeyer et al. (2001) explain that farmers are worried about their ability to remain competitive in the global economy and want the freedom to adapt their agricultural operations in order to meet changing demands. Norecol et al. (1994) explain that land speculation, non-agricultural land uses, and land prices based on urban use constrain agricultural viability. They note that greenhouses are threatening soil-based agriculture and resulting in a loss of wildlife habitat. They also explain that farmers are operating in an increasingly competitive environment and that international trade agreements create an added dimension of uncertainty for farmers.

In my interview analysis I identified a number of challenges related to funding. These themes are also difficult to triangulate. However, the DFWT annual report (2005-2006) does mention that the grassland set-aside program is consistently oversubscribed and that the DFWT lacks the funds to enroll additional set-asides in the program.

I identified the ALC Act as one of the policies that contributes to the DFWT challenges. Klohn Leonoff Ltd. et al. (1992), BBCC (1992), Norecol et al. (1994), and Saddlemeyer et al. (2001) all identify competing interests in the ALR as an issue but do not specifically identify the ALC Act as a policy that is impeding agri-environmental stewardship in Delta.

I also identified inaccessible government funds and lack of government funding as policy themes that contribute to the DFWT challenges. Both of these themes are difficult to triangulate. However, I did review the AEPI funding program, which was specifically identified by interview respondents, to see whether they have recently funded any agri-environmental stewardship programs. Most of the current AEPI projects focus on improving agricultural viability, reducing the negative impact of agriculture on the environment, and compensating farmers for losses due to wildlife. However, one of the projects is aimed at rewarding farmers for providing wildlife (ungulate) habitat on their farms (BCAC, 2008c). This illustrates that there is money available for such projects, but it represents a small percentage of the projects that were recently funded. I also reviewed the projects highlighted by the Investment Agriculture Foundation, but could find none that benefitted both wildlife habitat and agricultural viability.

I identified lack of policy coordination as a policy theme that contributes to the DFWT challenges. This theme was also identified as contributing to the conflicts prior to the formation of the DFWT. As noted earlier, lack of policy coordination is alluded to by both BBCC (1992) and Norecol et al. (1994) (prior to the formation of the DFWT). Lack of policy coordination continues to be an issue in Delta. For example, Saddlemyer et al. (2001) identify a lack of policy coordination between the municipal and provincial government over greenhouse development in Delta. The Order-in-Council that was passed in 2001 restricting Delta's ability to pass zoning bylaws affecting agricultural activities in the ALR without Ministerial approval is still in place today. It is difficult to tie this policy issue directly to the challenges faced by the DFWT, because the DFWT is not directly involved in these conflicts. However, some interview respondents did say that they thought that the hostile political climate in Delta could have a negative effect on the ability of the DFWT to function optimally.

I also identified economic policy as a policy theme that contributed to the challenges faced by the DFWT. Although the Klohn Leonoff Ltd. (1992) report was completed prior to the formation of the DFWT, they explain that farmers face greater competition due to the North American Free Trade Act. They also say that farmers should switch to higher value crops and that there should be stronger economic policy to support farmers. Some interview respondents, on the other hand, were concerned that economic policy acted as an impediment to agri-

environmental stewardship and that policy should be reformed to support agri-environmental stewardship initiatives. Consequently, the findings of Klohn Leonoff Ltd. (1992) are not completely consistent with my findings. However, this could be due to the fact that I only interviewed five farmers, while they interviewed 85 farmers. Farmers may have a very different perspective on economic policy than the other stakeholders I interviewed.

The accomplishments described in this section give a good sense of the progress that the DFWT has made in diffusing some of the conflicts that were present prior to the formation of the DFWT and in promoting agri-environmental stewardship in Delta. The challenges that were identified by respondents give some insight into the ongoing struggles the DFWT faces to optimize their operations. These results indicate that government policies appear to have both enabled and impeded the development of the DFWT. These policies are summarized below (Table 11.4 and Table 11.5). I return to these tables in Chapter 12 to help identify policy gaps.

Table 11.4 Summary of policies that have enabled the development of the DFWT

	Accomplishments	Challenges
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X	
AEPI: Delta Forage Compensation Program (DFCP)	X	
Federal government staff involvement	X	
Greenfields funding	X	

Table 11.5 Summary of policies that have impeded the development of the DFWT

	Accomplishments	Challenges
Inaccessible government funds		X
Lack of government funding		X
Lack of policy coordination		X
Economic policy		X
ALC Act		X

11.3.3 Conflicts

In the previous section, I described the DFWT accomplishments and challenges, as well as the policies that appear to have contributed to these accomplishments and challenges, in an attempt to identify whether policies had enabled or impeded the development of the DFWT. This section builds on the previous section by examining whether conflicts have increased or decreased since the formation of the DFWT. I draw on the responses to interview questions 7 and 8 (Section 10.3.6) to help answer the research question: Did government policy enable or impede the development of the DFWT?

As noted in Chapter 10, these interview questions (#7 and #8) were somewhat ambiguous in that they didn't ask whether respondents thought the conflicts had increased or decreased as a direct result of the DFWT. Consequently, the role of the DFWT in increasing or decreasing conflicts can only be loosely inferred from the responses.

Seventy-five percent of those interviewed thought conflicts had decreased since the formation of the DFWT while 32% thought conflicts had increased. Interestingly, the top conflict that respondents felt had decreased since the formation of the DFWT was the tension between conservationists and farmers (71%). This was also the top conflict (44% of respondents) that was identified prior to the formation of the DFWT. Respondents indicated that the level of understanding in both groups has improved since the formation of the DFWT. There used to be a lot of mistrust between the conservationists and farmers, but this has now diminished. These results seem to indicate that the DFWT has played a role in helping to decrease the main

conflict that existed between agricultural and environmental interests prior to the formation of the DFWT.

Forty-three percent of respondents thought that government policies helped to decrease the conflicts that were identified. The main policy that was identified as helping to decrease conflicts between agricultural and environmental interests in Delta since the formation of the DFWT was the policy that enabled the AEPI funding of the Delta Forage Compensation Program (DFCP) (22%). As noted earlier, this program is not administered by the DFWT, but the DFWT is part of the Steering Committee. Respondents explained that the DFCP illustrated government recognition of a problem by providing compensation for waterfowl damage to forage crops. Government policy that established these funding programs, leading to the creation of the DFCP, may have helped ease tension between conservationists and farmers and thereby helped in the development of the DFWT.

Twenty-four percent of the respondents said that the conflict associated with farm practices negatively impacting wildlife had also decreased since the formation of the DFWT. For example, conflicts related to the timing of harvesting have decreased (e.g. harvesting at certain times of the year can destroy nests). The DFWT was commended for its ability to convince farmers that their on-the-ground programs were good for the land as well as for wildlife. This conflict was not specifically identified prior to the formation of the DFWT. Policy does not appear to have played a role in helping to decrease this conflict.

Sixty-seven percent of respondents identified changes in agriculture as a major conflict that has increased since the formation of the DFWT. Respondents noted that mixed farming may not be sustainable in Delta because the crops produced are lower in value. It was also noted that the price of corn has gone up as a result of the demand for biofuels. This has resulted in an increase in the cost of feed for livestock. At the same time, cattle prices have been falling, so farmers are getting out of cattle production. As a result, farmers are moving to higher value crops and more intense forms of agriculture. This has a direct impact on wildlife because the higher value crops (e.g. blueberries) and more intense agricultural operations (e.g. greenhouses) do not provide appropriate habitat for waterfowl and raptors. This conflict was not identified by respondents as one of the conflicts that existed prior to the formation of the DFWT. This conflict may have affected the development of the DFWT because as the area of soil-based agriculture decreases

due increased agricultural intensification, the area available to provide on-the-ground programs also decreases. While not explicitly identified by respondents, the FPPA may have contributed to this conflict because it is focused on enabling agricultural operations in the ALR, regardless of the impact on wildlife habitat.

The provincial FPPA, which came into effect in 1996, protects the rights of farmers to use normal farm practices to farm lands in the ALR and other lands zoned for agriculture. It provides a mechanism for farmers to protect themselves against nuisance lawsuits and bylaws as well as a means of defending themselves against unwarranted complaints regarding their farm practices (Saddlemeyer et al., 2001). While the Act does protect a farmer's right to use normal farm practices, it also limits the ability of local governments to create bylaws in the ALR. Local government bylaws must be consistent with the FPPA (BCMAL, 2008a).

The Farm Practices Protection (Right to Farm) Act (FPPA) was identified as a policy that contributed to an increase in conflicts. Respondents explained that this policy contributed to an increase in conflicts because Delta wanted to restrict greenhouse operations. This irritated the agricultural community because it implied that the municipality did not support agriculture. It also created tension between the municipality and the provincial government because the FPPA is a provincial Act. This policy continues to cause strife between the provincial and municipal governments. This indicates a lack of policy coordination between the provincial and municipal governments.

While some respondents did feel that the FPPA contributed to an increase in conflicts, it is difficult to determine whether the net effect of the FPPA has been to enable or impede the development of the DFWT. On the one hand it protects the right to farm, but on the other hand the Act focuses on agriculture and does not explicitly support the integration of wildlife habitat into farming operations. This implies that agriculture is more important than wildlife habitat. As such, it may have impeded the development of the DFWT by creating a chasm between conservation interests and agricultural interests. Ultimately, I think this policy illustrates a lack of agri-environmental policy coordination. This, combined with a lack of policy coordination between (federal), provincial and municipal governments, may impede the development of the DFWT because it creates layers of bureaucracy through which the DFWT must maneuver.

Forty-four percent of respondents identified competing interests in the ALR as a conflict that had increased since the formation of the DFWT. The competing interests that were specifically identified were port development, use of the land for recreational purposes, exclusion of lands in the ALR for political reasons (e.g. roads) and for the Tsawwassen First Nations land claim. Respondents explained that the ALR was being undermined by allowing these uses. Competing interests in the ALR was also identified by 44% of respondents as a conflict that existed prior to the formation of the DFWT.

Although not explicitly identified by at least 80% of respondents in this question, the ALC Act appears to play a key role in this conflict. On the one hand, the fact that the ALR exists means that agricultural land in Delta has, for the most part, been protected from urban development. However, conflicts arise because of competing interests in the ALR. The issues appear to revolve around loss of ALR land and use of ALR land for unauthorized non-farm purposes. If the ALC Act was enforced more strictly, these issues may not surface. These issues are having a negative effect on agriculture and wildlife habitat in Delta. As a result, it appears as though the ALC Act has not sufficiently upheld the agricultural land base in Delta and, therefore, may have impeded the development of the DFWT. Loss of agricultural land (whether through exclusion or non-farm use) means loss of land for on-the-ground programs.

Thirty-three percent of respondents indicated that waterfowl damage has increased since the formation of the DFWT. Respondents noted that the impact of wildlife on agriculture has increased, especially to perennial crops. Snow geese appear to be having a particularly strong impact on agriculture. Waterfowl damage was cited by 40% of respondents as a conflict that existed prior to the formation of the DFWT. Despite the work done by the DFWT, waterfowl continue to cause damage. While only mentioned by one respondent, the Migratory Birds Convention Act appears to be at the root of the ongoing waterfowl damage. Like the FPPA, the MBCA is a single purpose Act aimed at protecting and sustaining migratory bird populations. It does not take into consideration the impact of waterfowl on agriculture. This indicates a lack of agri-environmental policy coordination and, as a result, may impede the development of the DFWT.

11.3.3.1 Summary

Although I cannot conclude that a decrease in any of the conflicts was due to the DFWT, the main conflict that was identified as decreasing since the formation of the DFWT was the tension between farmers and conservationists. This was the top conflict prior to the formation of the DFWT. It does appear as though the DFWT has played a role in easing this tension because the DFWT has provided a forum for farmers and conservationists to communicate. The DFWT has also been proactive in delivering programs that benefit both agriculture and wildlife habitat. This theme is corroborated by Saddlemeyer et al. (2001) and Norecol et al. (1994) who identify the DFWT as an organization that has helped farmers and conservationists to work together cooperatively.

The DFWT may also have assisted in reducing the conflict associated with farm practices negatively impacting wildlife. Although respondents did not identify this as a conflict that existed prior to the formation of the DFWT, it may have been a conflict that was overshadowed by the other conflicts at the time (but in retrospect perhaps respondents realized that this was a conflict that had decreased). The fact that the DFWT provided a forum for discussion may have helped decrease this conflict.

Norecol et al. (1994) allude to farm practices negatively affecting wildlife in their report. They explain that wildlife are dependent on agriculture but wildlife can have a negative impact on agriculture and vice versa. They also say that there are ways of minimizing these impacts and accommodating multiple land uses so that both wildlife and agriculture benefit. They specifically identify the DFWT as being an organization that has facilitated activities that benefit both wildlife and agriculture.

The top policy that was identified as helping to decrease the conflicts was the AEPI funding of the Delta Forage Compensation Program (DFCP). This does not appear to have a direct connection to the DFWT, although respondents did say that they thought the work done by the DFWT may have helped the DFCEP to get funding. I could not find any secondary sources of information that explicitly stated that conflicts between agricultural and environmental interests in Delta had decreased as a result of this program.

The top conflict that increased since the formation of the DFWT was changes in agriculture. This theme was not identified as a conflict prior to the formation of the DFWT. Despite the

work of the DFWT, it appears as though the pressures on agriculture to remain economically competitive will create challenges for farmers, conservationists, and the DFWT. The other conflicts that respondents felt had increased since the formation of the DFWT (competing interests in the ALR and waterfowl damage) were both identified as conflicts prior to the formation of the DFWT.

The FPPA was identified as a policy that has contributed to an increase in conflicts in Delta. Although none of the secondary sources I reviewed specifically identified the FPPA as contributing to the conflicts between agricultural and environmental interests, the Saddlemeyer et al. (2001) report alludes to this. The report says:

Since provincial legislation supersedes municipal laws and bylaws, the conflict in Delta must be considered in the context of the provinces's long-standing policy of protecting farmland and the legislation that has been enacted to achieve that end. (Saddlemeyer et al., 2001, p. 3)

Saddlemeyer et al. (2001) acknowledge that the greenhouse controversy created conflict between agricultural and environmental interests. Based on Saddlemeyer et al.'s (2001) report, one can infer that the FPPA contributed to the conflict between agricultural and environmental interests.

The conflicts that I identified as having increased since the formation of the DFWT (changes in agriculture, competing interests in the ALR, waterfowl damage) are all themes that I have already identified in secondary sources, so I will not repeat them here. Although many of the reports that triangulate this information were conducted prior to the formation of the DFWT, and cannot be used to support my findings related to the conflicts that have increased since the formation of the DFWT, they do help to illustrate that some conflicts in Delta have continued despite the work of the DFWT. It is worth noting that all of these conflicts are related to policy in some way. The changes in agriculture theme is linked to the economic policy and international trade agreements themes. The competing interests in the ALR theme is linked to the ALC Act. The waterfowl damage theme is linked to the MBCA. These policies are discussed further in Chapter 12.

The DFWT does appear to have assisted in decreasing conflicts that are not driven by policy. For example, the tension between farmers and conservationists was addressed by bringing the two sides together and providing on-the-ground programs that benefitted both agriculture and

wildlife habitat. The conflicts that have increased, however, appear to be rooted in policy and may be beyond the scope of the DFWT to effect change.

The following two tables (Table 11.6 and Table 11.7) are a combination of the enabling and impeding policies from this section and Section 11.3.2. I build on these tables in the next two sections to help me answer my third research question.

Table 11.6 Summary of policies that have enabled the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X			
AEPI: Delta Forage Compensation Program (DFCP)	X		X	
Federal government staff involvement	X			
Greenfields funding	X			

Table 11.7 Summary of policies that have impeded the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts
Inaccessible government funds		X		
Lack of government funding		X		
Lack of policy coordination		X		X
Economic policy		X		
ALC Act		X		X
FPPA				X
MBCA				X

11.4 Other Issues

This section builds on the previous sections by attempting to identify whether policy has enabled or impeded the development of the DFWT. Interview subjects were asked whether they thought there were any other issues besides environmental conflicts that were threatening the viability of agriculture in Delta. Those who answered yes to this question were then asked if

they thought government policies contributed to any of these issues and, if so, to describe these policies.

I asked this question because I wanted to examine the broader context in which the DFWT operates. I wanted to find out if there were other issues affecting agriculture besides environmental conflicts that might also affect the development of the DFWT. Many of the responses indicate that the issues that affect agricultural viability will also affect wildlife habitat. This question helps to link the local context to the global context because it allowed people to identify issues outside of Delta and the DFWT.

Ninety-six percent of those interviewed thought there were other issues that were threatening the viability of agriculture in Delta. Ninety-three percent of the respondents thought policies contributed to the other issues. Eighty-five percent of respondents indicated that competing interests in the ALR is an issue that is threatening the viability of agriculture in Delta. These competing interests have resulted in loss and fragmentation of farmland. A critical mass of farms is needed to keep the agriculture industry in Delta viable. For example, there must be enough farms in the area for processors to invest in building a processing plant.

As noted in Section 11.3.2.4, the issue of competing interests in the ALR appears to be linked to the ALC Act. In fact, the Agricultural Land Commission (ALC) Act was identified by 32% of respondents as a policy that contributed to the 'other' issues. While respondents generally supported the concept of an Agricultural Land Reserve (ALR), they felt that the ALR is weakening. The price of land is increasing in the ALR because the ALC Act is not adequately protecting the ALR. The value of land in the ALR is increasing along with urban prices. As the ALR weakens there are more speculators purchasing land in the hopes that one day they will be able to develop the land. In addition, unauthorized non-farm use is increasing. The ALC Act requires that any non-farm use must be approved by the ALC. However, there has been a proliferation of properties being used for non-farm purposes (e.g. rural estates) and these unauthorized non-farm uses are not being enforced by the ALC. Respondents felt that the ALC Act needed to be strengthened or enforced. As such, the ALC Act appears to have impeded the development of the DFWT because it has not protected soil-based agriculture in Delta, which has resulted in less area available for the DFWT's on-the-ground programs.

Also contributing to loss of farmland is development pressure. Pressure from land speculation and expropriation continues. Expropriation of land in the ALR makes financial sense because it is cheaper than land outside of the ALR. Respondents noted that land claims are also contributing to the fragmentation and deterioration of farmland in Delta. Lands taken out of the ALR to settle Tsawwassen First Nations (TFN) land claims may mean that there is less land available for agri-environmental stewardship if the TFN are not interested in using their land for agriculture. This will have a negative impact on agriculture and wildlife habitat across Delta.

Fifty-two percent of respondents said that the construction of transportation and utility infrastructure is an issue that is threatening the viability of agriculture in Delta. The Gateway project, expansion of the railway system, encroachment of power lines, and conversion of farmland to container storage at the port were all identified as contributing to the fragmentation of farmland. Loss of farmland will negatively affect the agriculture industry in Delta and will result in a loss of wildlife habitat.

Lack of policy coordination was cited by 24% of respondents as a policy (or lack of policy) that contributed to the issues that were identified. Respondents noted that government departments were not working together to solve land use issues. Respondents explained that government agencies, other than the federal and provincial departments of agriculture, have a limited understanding of agriculture and the impact of their decisions on farmland. Although there are inter-government committees, they were described as being ineffective. It was suggested that there is a need for an inter-government model to make more effective land use decisions. A lack of policy coordination may be impeding the development of the DFWT because it may take a greater amount of effort by the DFWT to develop and provide on-the-ground programs if government policies are not supportive of agri-environmental stewardship.

Fifty-nine percent of respondents identified changes in agriculture as being an issue that is threatening the viability of agriculture in Delta. Respondents noted that the farm community is aging and labour shortage is a big issue. The costs of farming are increasing and the profit margins are getting narrower for a lot of commodities. There is also a lack of revenue generating crops. Processors have gotten smaller and moved out of the area. Land prices and fuel prices are heavily impacting agriculture. Water is becoming more of an issue and this is

expected to add to the costs of production. Increased regulation and red tape are making it more difficult to farm. Pesticide regulations have limited the ability of farmers to effectively deal with wireworm. Altogether, there is uncertainty about what will happen next in Delta that will affect farmers' ability to make a living.

Twenty-six percent of respondents indicated that the global economy is threatening the viability of agriculture in Delta. Respondents noted that farmers are operating in a global environment and competition from other countries is a big challenge for them. It is difficult for farmers to remain competitive and sustainable in the global economy. Lower production costs in other countries (due to lower labour costs, for example) means that food produced elsewhere is cheaper to purchase here than locally grown foods. Because of the influx of foreign foods, it is also difficult for consumers to know where their food was grown. If consumers are unaware of where their food is produced they may simply buy the cheapest food available. Without the support of the local consumer, farmers may have difficulty selling their products locally. As a result, they may shift their production to export commodities in order to open up a broader market for themselves and generate more profit. This is likely to require additional consumption of fossil fuels (e.g. transportation), which will make a greater contribution to climate change.

Policy related to the negative impact of international trade agreements on agricultural viability in Delta was indicated in 24% of the responses. This is linked to the global economy issue discussed above. Policies related to trade, foreign food imports, food safety requirements, labelling laws, and industrial expansion were all cited as issues associated with international trade. Respondents noted that industrial expansion is driven by government policy and the global economy. Much of what affects farmers is driven by the global market. For example, policies affecting the Canadian dollar affect the ability of farmers to remain competitive in the global economy. Respondents did not indicate whether they thought international trade agreements should be changed. In fact, despite some of the negative impacts of international trade agreements, some respondents thought that international trade was good for agriculture. The key issue appeared to revolve around the unlevel playing field between farmers in Delta and farmers in other countries. This issue is linked to the cost of land in Delta, cost of inputs, lack of labour, and losses due to waterfowl predation. There appears to be a lack of policy coordination between economic policy and agri-environmental policy. This is discussed in

greater detail in Chapter 12. Policy related to international trade agreements appears to have impeded the development of the DFWT because it has led to increased agricultural intensification in Delta, resulting in less soil-based agriculture and less land for on-the-ground programs that benefit both agriculture and wildlife.

11.4.1 Summary

The top two issues (competing interests in the ALR and changes in agriculture) identified by respondents were the same top two conflicts that were identified in the previous section. The difference between these two interview questions is that this question asked respondents to identify any other issues they thought were threatening the viability of agriculture in Delta. Respondents were not constrained by the need to identify issues that were related to the DFWT or the environment. It is interesting that the same issues rose to the surface in this question. This leads me to believe that these issues are ‘top-of-mind’ for the respondents and are the dominant threats to agriculture in Delta.

Two additional issues were identified by respondents, transportation and utility infrastructure and global economy. In previous questions I combined responses related to transportation and utility infrastructure under the competing interests in the ALR theme, however, in this case I decided to keep them separate because the number of respondents who specifically identified transportation and utility infrastructure as an issue was much higher in this question than in previous questions. By creating a separate theme for this issue, it is possible to see how important this issue is to many respondents.

Klohn Leonoff Ltd. et al (1992), BBCC (1992), and Norecol et al. (1994) all identify issues associated with transportation and utilities. While these reports were produced prior to, or just after, the formation of the DFWT they help to show that these are long-standing issues. The recent Gateway Program (Gateway, 2008) and Deltaport Third Berth Project (Deltaport, 2004) illustrate that these issues continue today.

This was the first time the global economy was identified as a dominant issue. This issue is also identified by Klohn Leonoff Ltd. et al (1992), Norecol et al. (1994), and Saddlemeyer et al. (2001). Saddlemeyer et al. (2001) explain that, after the signing of the Canada-US Free Trade Agreement in 1989, several vegetable processing firms that Delta farmers had sold their produce to, moved out of BC, mainly to the United States, or closed down altogether. This

forced farmers to diversify their operations in order to stay in business. The impact of the global economy on farmers is also supported by data from Statistics Canada, which shows that the area of blueberry production, a crop that is a valuable commodity in the global market, increased by 61.5% between 2001 and 2006 in BC (Statistics Canada, 2008b). There is no corresponding data available for Delta.

The global economy issue appears to be captured in the international trade agreements policy theme. The interview responses indicate that the work of the DFWT will probably always be overshadowed by global forces. While the DFWT appears to have been successful at agri-environmental stewardship at the local level, international policy will continue to exert pressure on farmers to convert to more intensive, higher value, forms of agriculture. This is discussed in greater detail in Chapter 14.

Lack of policy coordination and the ALC Act were identified by respondents in this question as policies that were having a negative impact on the viability of agriculture in Delta. These themes have also appeared in previous questions. Since I have already discussed these themes previously and identified sources of triangulation I will not discuss them further here. Based on the results of my interview analysis and triangulation from secondary sources it appears as though international trade agreements, lack of policy coordination and the ALC Act are impeding the development of the DFWT.

Table 11.9 (impeding policies) summarizes the impeding policies that have been identified in this section and the previous sections. Table 11.8 summarizes the enabling policies that have been identified up to this point. However, no enabling policies were identified in this question.

Table 11.8 Summary of policies that have enabled the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X				
AEPI: Delta Forage Compensation Program (DFCP)	X		X		
Federal government staff involvement	X				
Greenfields funding	X				

Table 11.9 Summary of policies that have impeded the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues
Inaccessible government funds		X			
Lack of government funding		X			
Lack of policy coordination		X		X	X
Economic policy		X			
ALC Act		X		X	X
FPPA				X	
MBCA				X	
International trade agreements					X

11.5 What Else Could Government Do?

This section builds on the previous sections by attempting to identify policies that have enabled or impeded the development of the DFWT. Respondents were asked whether they could think of anything else government could do to support DFWT programs and/or individual farmers who wanted to provide wildlife habitat while maintaining or enhancing agricultural viability. All of those interviewed responded yes to this question and all respondents provided one or more suggestions about what government could do to support the DFWT or individual farmers.

Thirty-nine percent of respondents said the government should give the DFWT additional funding. Respondents said that the DFWT has demonstrated that farmers are willing to undertake agri-environmental stewardship programs, but more money is needed to fund the

programs. They explained that stewardship is the best approach to enhancing both agricultural viability and wildlife habitat, and the DFWT could have more programs if they had consistency in funding. This policy issue was also mentioned in Section 11.3.2.2. A lack of (consistent and sufficient) government funding appears to be impeding the development of the DFWT.

Thirty-two percent of respondents thought that farmers should be compensated for the ecosystem services they provide. Respondents explained that everyone benefits from wildlife habitat and agriculture, so everyone should pay farmers to provide these services. It was suggested that the DFCP be implemented on a permanent basis. Respondents said that farmers need to be paid a reasonable amount of money for ecosystem goods and services if the government wants farmers to provide these services. It was emphasized that this money should come from the government not from the marketplace. It was suggested that the money could be collected through taxes.

The lack of compensation for ecosystem goods and services appears to be impeding the development of the DFWT because farmers are not being adequately compensated for the public benefits they provide by supplying wildlife habitat on their farms. If compensation was provided, farmers may be more willing to provide wildlife habitat on their farms. This would facilitate the work that the DFWT is doing to maintain wildlife habitat and agricultural viability.

11.5.1 Summary

The top two suggestions made by respondents were related to issues that had been raised in earlier interview questions. These themes were discussed previously and sources of triangulation provided. Interestingly, both of these themes relate to financial compensation. However, in the first case (lack of government funding) the aim of the policy would be to fund NGOs such as the DFWT. In the second case, the aim of the policy would be to compensate farmers directly for the ecosystem goods and services they provide. Funding the DFWT directly would probably enable the development of the DFWT, while funding farmers directly for ecosystem goods and services may impede DFWT development. However, it is possible that funding farmers for providing ecosystem goods and services could help the DFWT to develop if they were allowed to act as an agent for the farmers. This sort of system is used in England and is discussed in further detail in Chapter 13.

Table 11.11 summarizes all of the impeding policies that have been identified. Table 11.10 summarizes all of the enabling policies that have been identified in this chapter. No enabling policies were identified in this question.

Table 11.10 Summary of policies that have enabled the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues	What else could government do?
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X					
AEPI: Delta Forage Compensation Program (DFCP)	X		X			
Federal government staff involvement	X					
Greenfields funding	X					

Table 11.11 Summary of policies that have impeded the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues	What else could government do?
Inaccessible government funds		X				
Lack of government funding		X				X
Lack of policy coordination		X		X	X	
Economic policy		X				
ALC Act		X		X	X	
FPPA				X		
MBCA				X		
International trade agreements					X	
Lack of compensation for ecosystem goods and services						X

11.6 Lessons Learned

This section combines the top themes from Section 10.3.9 and Section 10.3.10. I have combined the themes from these two final interview questions because the top responses from both questions overlap. I did not attempt to triangulate these responses since they are based on individual insights, reflecting the experiences of individuals, rather than events or issues that can be proven or disproven through secondary sources.

In interview question 11 (Appendix IV), interview subjects were asked to describe any lessons they had learned from their experience with the DFWT that might help other organizations to develop similar agri-environmental programs. The question was intended to capture the overall experience that people have had with the DFWT to help other organizations (and the DFWT) to learn from these experiences. Ninety-six percent said they could think of some lessons learned (Table 10.43). In interview question 13 (Appendix IV), interview subjects were asked whether they had anything else they wanted to say about the DFWT. Seventy-one percent responded that they had more to say about the DFWT (Table 10.46).

11.6.1 Model Guidelines

I examined the themes from both questions and determined that the themes could be categorized into three key areas: people, partnerships, and programs. I provide a description of each category below. The identification of these ‘model guidelines’ serves two purposes. The first is to illustrate the actions taken by the DFWT that have helped it to succeed and to identify areas where the DFWT may need some improvement. The second is to provide other organizations, or individuals wishing to start an agri-environmental organization, with some suggestions that may help in the formation and/or development of a similar agri-environmental organization.

When asked if they had anything else to say about the DFWT, forty percent of respondents said that the DFWT works as an agri-environmental stewardship model. Respondents noted that the DFWT is a very unusual organization in Canada, that it is a good model for agri-environmental stewardship, and that it would be great to have similar models in other areas. They explained that having a local non-government organization like the DFWT helps to get things done on-the-ground and when there is money available there is a place for it to go. The DFWT has been a success because it was created by community members with government playing peripheral

roles. In addition, DFWT programs are designed and implemented by the community. The fact that the DFWT has been working for 14 years shows that it is a success. One respondent commented that a lot of decision makers want to protect farmland and steward the environment, but they don't necessarily know how to do it; the DFWT is doing it.

11.6.1.1 People

Board of Directors: Thirty-nine percent of respondents identified equal representation on the Board of Directors as a strategy that has worked for the DFWT. Respondents explained that the Board should be made up of representatives from both sides (i.e. farmers and conservationists). Representatives should be appointed democratically and represent the broad interests of the community they are representing. While most respondents felt that decisions should be made by consensus, some others thought that this sometimes created stalemates between the two groups resulting in a high level of frustration. It was noted that women should be on the Board because they bring a moderating influence to discussions. It was also noted that Board members should not lobby for anything except funding.

Operation of the organization: Twenty-eight percent of respondents said the operation of the organization has been successful. They explained that it is important to use a business model and find the right people to run the organization. For example, staff and advisors must have the appropriate expertise. In addition, agricultural and environmental interests should share responsibility for running the organization and there should be equal attention paid to farmland and wildlife (i.e. don't emphasize one or the other).

When asked if they had anything else to say about the DFWT, thirty percent of the respondents commented on the operation of the organization. The majority of these respondents (83%) made positive comments about the operation of the DFWT. They explained that the employees are extremely dedicated and do an excellent job. They said that the DFWT works in a difficult environment trying to balance the interests of conservationists and farmers, but they have made it work. However, the DFWT was criticized for not reaching out to new people in the community to create new partnerships and alliances. It was also suggested that the DFWT could play a stronger role in advocating for both soil-based farming and wildlife habitat conservation. It was felt that this would provide the opportunity for the DFWT to affect policy.

Twenty-two percent of respondents said there are some aspects of the operation that need to be improved. It was pointed out that there are a certain set of skills that are needed to form an organization and another set of skills needed to carry out the mandate of the organization and implement programs. It was also noted that the people who work for the organization should have a neutral perception of the agencies that are working with them. In other words, they should not have biases towards or against any of the agencies with which they work. In addition, the DFWT should ensure that there is no conflict of interest in their operations. For example, it was pointed out that former directors should not become employees as this constitutes a conflict of interest.

11.6.1.2 Partnerships

Bring opposing sides together: Twenty-eight percent of respondents indicated that bringing conservationists and farmers together helped both sides to understand each other better. It was recommended that talks should begin with topics that both sides can agree on and more difficult topics should follow once some trust has been established. It was also suggested that advocates (e.g. government representatives) should be identified early on in the process in order to help advance the cause.

11.6.1.1 Programs

On-the-ground programs: Thirty percent of respondents identified on-the-ground programs as contributing to the success of the DFWT. Respondents explained that farmers have been attracted to the on-the-ground programs because of the funding that is available and the on-the-ground results have been good. Despite losing money year to year due to wildlife, farmers continue to sit at the table and agree to participate in DFWT programs. However, it was noted that the focus of the programs appears to be more on the environment than on improving farms.

Fundraising: Twenty-eight percent of respondents indicated that fundraising could be improved. There is a need to build up credibility with farmers, and consistent funding is needed in order to do this. Respondents explained that fundraising should be done by those who are involved (e.g. directors) and that there was a need to approach businesses and philanthropists to help set up trust funds for the DFWT.

11.6.2 Model Summary

These guidelines may provide the DFWT with some insight into its operations. There are many successes of which the DFWT should be proud, but there are also some areas where there may be some room for improvement. Individuals and organizations may also find these guidelines useful in establishing or evaluating their own agri-environmental organization. I have summarized the key points below.

People

1. Have equal representation on the Board of Directors and use consensus based decision making.
2. Ensure that staff and advisors have the appropriate expertise and the organization balances the interests of both sides (e.g. farmers and conservationists).

Partnerships

1. Bring opposing sides together and look for advocates to assist in advancing the cause.

Programs

1. Establish effective on-the-ground programs that benefit both wildlife habitat and agriculture.
2. Engage directors in fundraising. Aim for consistent and sufficient funding.

11.6.3 Summary

In this chapter, I used the results from my interview analysis to ‘tell the story’ of the DFWT and answer my first three research questions. I also used secondary sources wherever possible to triangulate my findings. I summarize the answers to my first three research questions below.

What led to the formation of the DFWT?

Based on the interview responses and triangulation through secondary sources I found that there were a number of conflicts in Delta that were creating tension between conservationists and farmers prior to the formation of the DFWT. The degree of conflict was high and the conflicts negatively affected both agricultural and wildlife habitat viability. Ultimately, the formation of the DFWT appeared to come about due to the willingness of agricultural and conservation interests to work together to find a solution. Agricultural organizations, municipal representatives, UBC researchers, conservation organizations and individuals as well as the availability of money also appeared to contribute to the formation of the DFWT.

Did government policy enable or impede the formation of the DFWT?

For the most part, policy appeared to enable the formation of the DFWT. The key enabling policy appeared to be the Environmental Assessment Act – YVR Wildlife Stewardship Fund. Policies allowing federal and provincial government staff to be involved in the process to establish the DFWT also appeared to have enabled its formation. The legal capacity of a NGO to administer the YVR Wildlife Stewardship Fund and develop agri-environmental stewardship programs also appeared to contribute to the formation of the DFWT. The main policy that was identified as impeding the formation of the DFWT was the manner in which the YVR habitat mitigation fund was allocated. The process appeared to be overly convoluted and frustrating for those trying to secure some of the money for the DFWT.

Did government policy enable or impede the development of the DFWT?

It appears as though policy has both enabled and impeded the development of the DFWT. Policies that were identified as enabling the development of the DFWT include the YVR Wildlife Stewardship Fund, AEPI: Delta Forage Compensation Program (DFCP) Pilot Project, Federal government staff involvement, and Greenfields funding. Policies that were identified as impeding the development of the DFWT include inaccessible government funds, lack of government funding, lack of policy coordination, economic policy, ALC Act, FPPA, MBCA, international trade agreements, and lack of compensation for ecosystem goods and services. Policy does appear to have impeded the development of the DFWT to some degree, primarily because it seems to be limiting the ability of the DFWT to deliver agri-environmental stewardship programs in an optimal manner.

In the next chapter, I use the enabling and impeding policy summary tables developed in this chapter to identify policy gaps. I discuss the relevance of my findings from this chapter and the following two chapters in Chapter 14.

CHAPTER 12

Policy Gaps

12.1 Introduction

In this chapter I identify policy gaps by examining the enabling and impeding policies that were identified in the previous chapter. The information in this chapter also helps me to answer my final research question: What sorts of government policies could be used to encourage agri-environmental stewardship in Canada?

In order to answer this research question, I draw on the policy review process I described in Chapter 9. In that chapter I explained that I had adapted the ‘idealized policy cycle’ described by Swanson et al. (2006) to fit the scope (and intent) of my research. I used the first three steps in Swanson et al.’s policy cycle to develop a process to review the policies that were identified by interview respondents, identify policy gaps, and develop policy options. The three steps are:

Step I: Understanding the issue

1. Identify enabling and impeding policy themes
2. Identify policy gaps

Step II: Policy objective setting

1. Identify policy objectives

Step III Policy Design

1. Identify policy options
2. Describe policy options

In this chapter, I summarize the enabling and impeding policy themes that were identified in Chapter 11. I then discuss the enabling and impeding policy themes in a holistic manner in order to understand the issues and identify overarching policy gaps. I use these gaps to identify general policy objectives in order to facilitate identification of alternative policy options.

12.2 Enabling and Impeding Policies

This section addresses the first part of Step I of the policy review process, specifically identification of enabling and impeding policy themes. The following tables (Table 12.1 and 12.2) summarize the policy themes that were identified as enabling the formation and development of the DFWT in Chapter 11.

The enabling policy themes from these two tables are combined in Table 12.3 in order to facilitate analysis (by showing which policies enabled *both* the formation and development of the DFWT). This table helps me to understand the role these policy themes have played in the formation and/or development of the DFWT and contributes to my understanding, and identification, of policy gaps. Policy gaps are discussed in further detail in Section 12.3.

Table 12.1 Summary of policy themes that have enabled the formation of the DFWT

	Driving forces
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X
Federal government staff involvement	X
Provincial government staff involvement	X
Non-Government Organization (NGO) capacity	X
Municipal Council support	X
Rescinding of Order in Council 1141-88	X

Table 12.2 Summary of policy themes that have enabled the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues	What else could government do?
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X					
AEPI: Delta Forage Compensation Program (DFCP)	X		X			
Federal government staff involvement	X					
Greenfields funding	X					

Table 12.3 Summary of enabling policy themes

	Enabled DFWT formation	Enabled DFWT development
Environmental Assessment Act – YVR Wildlife Stewardship Fund	X	X
Federal government staff involvement	X	X
Provincial government staff involvement	X	
Non-Government Organization (NGO) capacity	X	
Municipal Council support	X	
Rescinding of Order in Council 1141-88	X	
AEPI: Delta Forage Compensation Program (DFCP)		X
Greenfields funding		X

The next three tables (Table 12.4, Table 12.5, and Table 12.6) are also from Chapter 11. The first table (Table 12.4) summarizes the policy themes that contributed to the conflicts prior to the formation of the DFWT. The next two tables (Table 12.5 and Table 12.6) summarize the policy themes that were identified as impeding the formation of the DFWT. I use these three tables to develop a summary table (Table 12.7) which synthesizes the policy themes that

contributed to the conflicts in Delta prior to the formation of the DFWT as well as those policy themes that appear to have impeded the formation and/or development of the DFWT. The impeding policy themes are discussed in the next section and are used to help identify policy gaps.

Table 12.4 Summary of policy themes that contributed to the conflicts prior to the formation of the DFWT

	Pre-DFWT conflicts
Lack of compensation for waterfowl damage	X
Canada Wildlife Act - Federal acquisition of land for National Wildlife Area	X
Lack of policy coordination	X
Migratory Birds Convention Act (MBCA)	X

Table 12.5 Summary of policy themes that have impeded the formation of the DFWT

	Driving forces
Allocation of YVR Wildlife Stewardship Fund	X

Table 12.6 Summary of policy themes that have impeded the development of the DFWT

	Accomplishments	Challenges	Decrease in conflicts	Increase in conflicts	Other issues	What else could government do?
Inaccessible government funds		X				
Lack of government funding		X				X
Lack of policy coordination		X		X	X	
Economic policy		X				
ALC Act		X		X	X	
FPPA				X		
MBCA				X		
International trade agreements					X	
Lack of compensation for ecosystem goods and services						X

Table 12.7 Summary of impeding policy themes

	Contributed to preDFWT conflicts	Impeded DFWT formation	Impeded DFWT development
Allocation of YVR Wildlife Stewardship Fund		X	
Inaccessible government funds			X
Lack of government funding			X
Lack of policy coordination	X		X
Economic policy			X
ALC Act			X
FPPA			X
MBCA	X		X
International trade agreements			X
Lack of compensation for ecosystem goods and services			X
Canada Wildlife Act - Federal acquisition of land for National Wildlife Area	X		
Lack of compensation for waterfowl damage	X		

12.2.1 Summary

This section showed how I consolidated the enabling and impeding tables from Chapter 11 into two tables summarizing policy themes that enabled the formation and/or development of the DFWT (Table 12.3) and policy themes that impeded the formation and/or development of the DFWT (Table 12.7). In the next section, I draw on these two tables to describe how these policy themes affected the formation and development of the DFWT. I also draw on the policy themes that were identified as contributing to the conflicts prior to the formation of the DFWT (Table 12.4) to illustrate how some of the policy themes that were causing conflicts over fifteen years ago continue to cause problems for the DFWT today. I use the information from this discussion to identify policy gaps which are used to identify policy objectives and policy options.

12.3 Policy Discussion and Identification of Policy Gaps

In this section I briefly reiterate the role of policy in the formation and development of the DFWT in order to identify policy gaps. I examine the policy themes (as a whole) in order to get a sense of any dominant or overlapping issues. I focus on those policies that appear to impede the formation and/or development of the DFWT in order to identify policy gaps. These are areas where policy appears to be lacking altogether or has acted as an impediment to agri-environmental stewardship. The gaps are identified based on the effect these policy themes have had on the formation and/or development of the DFWT. I use this information to develop policy objectives in order to identify policy options. The following discussion is based on the interview responses unless otherwise noted.

12.3.1 DFWT Formation

As noted in Table 12.3, policies allowing for the involvement of federal and provincial government staff appeared to enable the formation and development of the DFWT. In addition, policies that were adopted by municipal council to support discussions between environmentalists and farmers (e.g. providing meeting rooms and staff support) and providing the services of the municipal lawyer to draft the documents required for the formation of the DFWT appeared to enable the formation of the DFWT. There do not appear to be any policy gaps associated with these policy themes.

The Environmental Assessment Act – YVR Wildlife Stewardship Fund was identified by respondents as enabling the formation and development of the DFWT. As discussed in Chapter 11, this Act required that an environmental assessment be conducted prior to the development of the third runway at Vancouver International Airport. The assessment showed that migratory bird and raptor habitat would be destroyed if a third runway was constructed. As a result of this assessment, Transport Canada was required to provide financial compensation for habitat mitigation. Respondents identified the availability of money for stewardship as being a driving force in the formation and development of the DFWT. There does appear to be a gap associated with this policy theme. It is discussed below.

The ability of the DFWT to become a legal entity under the Society Act meant that the DFWT would be able to apply for a portion of the habitat mitigation funds. Respondents indicated that the capacity of a NGO to administer the YVR Wildlife Stewardship Fund and develop agri-environmental programs was a ‘policy’ that enabled the formation of the DFWT. The availability of the stewardship money and the ability of the DFWT to attain legal status through the Society Act enabled the formation of the DFWT. There does not appear to be a gap associated with this policy theme.

12.3.2 Funding

While the Environmental Assessment Act – YVR Wildlife Stewardship Fund appeared to enable the formation of the DFWT, respondents noted that the manner in which the mitigation fund was allocated made the formation of the DFWT more difficult. There was confusion about the process for applying for the money and how the money would be allocated. There were fears, particularly amongst farmers, that the money would be used to expand the Alaksen or Reifel refuge. The Treasury Board also appeared hesitant to give the money to a NGO. There appears to be a policy gap related to the allocation of the stewardship funds.

Policies associated with government funding, specifically inaccessibility of government funds and lack of government funding were also identified as impeding the development of the DFWT. Respondents explained that government does not provide consistent funding to the DFWT, even though, respondents noted, NGO driven conservation programs can be very cost effective. Some organizations won’t apply for government funding anymore because of the red tape and onerous reporting requirements. It is also difficult to get long term funding for

programs. Respondents lamented that there is money available but it is difficult to access this money for various reasons. For example, some programs require matching funds (e.g. EFP) and others require that the project generates revenue (e.g. Investment Agriculture).

Overall, the DFWT has been frustrated by the regulations attached to government funding. While government policy does provide some funding for NGOs such as the DFWT, the limitations of the funding programs (as discussed above) restrict the ability of the DFWT to plan for, and provide, agri-environmental stewardship programs over the long term. There appears to be a policy gap associated with this issue. There appears to be a lack of long term government funding for agri-environmental NGOs.

Respondents indicated that funding for the Greenfields project assisted in the development of the DFWT. Funding was provided by both government and non-government agencies. Government policy to fund such a program assisted in the development of the DFWT. Greenfields was seen as a collaborative approach that would not generate conflict. The success of the project prior to the formation of the DFWT illustrated that such a program could be used to promote agri-environmental stewardship. There does not appear to be a policy gap associated with this project.

Government policy led to the creation of the AEPI which provided funds for the Delta Forage Compensation Program (DFCP). While the Delta Forage Compensation Program (DFCP) is not operated by the DFWT, respondents indicated that the DFCP reflected the success of the DFWT because both programs provide compensation for the provision of wildlife habitat. Lack of compensation for waterfowl damage was identified as one of the conflicts that existed prior to the formation of the DFWT. The DFCP along with the programs offered by the DFWT appear to have reduced the conflicts associated with this issue. However, the success of these programs also illustrates a policy gap. There has been a lack of government policy related to compensation for the provision of ecosystem goods and services.

Federal acquisition of land for a National Wildlife Area (NWA), specifically the Alaksen NWA, through the Canada Wildlife Act contributed to the conflicts in Delta prior to the formation of the DFWT. Some respondents expressed concern that the acquisition and management of this NWA resulted in a high concentration of birds in a relatively small area. Not recognizing the boundaries of the NWA, the birds used neighbouring farms for feeding

causing damage to crops and soil. Farmers were not compensated for providing wildlife habitat or for the damages that were incurred as a result of the birds feeding. This is linked to the ecosystem goods and services policy gap mentioned above.

When asked what else government could do to support DFWT programs and/or individual farmers who wanted to provide wildlife habitat while maintaining or enhancing agricultural viability, thirty-two percent of respondents indicated that they thought that farmers should be compensated for the ecosystem services they provide. Respondents explained that everyone benefits from the ecosystem goods and services that farmers provide, and everyone should contribute to paying farmers for providing these public goods. It was noted that if compensation was provided, more farmers may be willing to provide wildlife habitat on their farms.

Lack of compensation for ecosystem goods and services appears to be a policy gap that is acting as an impediment to agri-environmental stewardship and may be impeding the development of the DFWT. This policy gap has been partially addressed recently by a federal-provincial agreement to provide compensation to farmers for wildlife damage. However, the new policy does not appear to provide compensation for the provision of wildlife habitat on farmland. This is discussed in greater detail in Chapter 13.

12.3.3 Policy Coordination

Respondents indicated that a lack of policy coordination between government agencies contributed to the conflicts in Delta prior to the formation of the DFWT. This policy gap was also identified as impeding the development of the DFWT. Respondents noted that different agencies represent different interests. For example, the Canadian Wildlife Service protects and sustains migratory bird populations while the BC Ministry of Agriculture and Lands focuses on supporting the agricultural industry. There is also conflict between municipal and provincial policies. As already explained, Delta is under an Order-in-Council (#568), so the municipality cannot pass any zoning bylaws that restrict agricultural operations without approval from the Minister of Agriculture and Lands. A previous Order-in-Council (1141-88), that allowed golf courses as an outright use in the ALR, also appeared to contribute to conflicts prior to the formation of the DFWT. Interestingly, the *rescinding* of this Order-in-Council (1141-88) appeared to reduce the conflicts in Delta.

Lack of policy coordination exists at a number of different levels of government. For example, a gap in policy exists because federal and provincial government departments have separate mandates that address either agriculture or the environment, but not both simultaneously (or holistically). Lack of policy coordination also occurs between federal departments. For example, respondents pointed out that neither Environment Canada nor Agriculture and Agri-Food Canada were willing to take responsibility for waterfowl damage. The BC government was also criticized for not including wildlife compensation in their business risk management agreement with Agriculture Canada. In addition, municipal policy is superseded by both provincial and federal policy, so any attempt at the municipal level to address agri-environmental issues can be over-ridden by higher levels of government. This lack of policy coordination illustrates a broad policy gap occurring vertically and horizontally across government agencies.

In addition, specific policies were identified by respondents as being problematic. These included the federal Migratory Birds Convention Act (MBCA), the provincial Farm Practices Protection (Right to Farm) Act (FPPA), and the provincial Agricultural Land Commission Act (ALC Act). The effects of these policies on agri-environmental stewardship are summarized below.

The federal Migratory Birds Convention Act (MBCA) was identified as contributing to the conflicts in Delta prior to the formation of the DFWT and also acted as an impediment to the development of the DFWT. The MBCA, in conjunction with the acquisition of National Wildlife Areas for migratory birds through the Canada Wildlife Act, has resulted in a concentration of migratory waterfowl in Delta. The waterfowl have had a negative impact on agricultural operations. Neither of these federal acts addresses the issue of wildlife damage to agriculture. This creates the impression that the protection of waterfowl is more important than agricultural viability. Ultimately, this could result in less agri-environmental stewardship because farmers may feel their concerns are not being addressed in these acts.

The provincial Farm Practices Protection (Right to Farm) Act (FPPA) was identified as impeding the development of the DFWT. Delta's attempt to restrict greenhouse development upset farmers and the province's response (i.e. the Order-in-Council) upset conservationists, which created additional conflict between the two groups. While the FPPA is useful in that it

supports agricultural operations, it doesn't address the importance of farmland for wildlife habitat. This creates the impression that agriculture is more important than wildlife habitat.

The provincial ALC Act was identified by respondents as impeding the development of the DFWT. Respondents noted that there appears to have been a relaxing of ALR guidelines which has allowed some loss of farmland to urbanization. ALR exclusions have a negative impact on agriculture and wildlife. For example, removal of land from the ALR for the Tsawwassen First Nations treaty settlement and government infrastructure projects has resulted in loss and fragmentation of agricultural land. Although respondents generally supported the ALC Act, they felt that it has not completely protected agricultural land from development, fragmentation, and escalating land prices. This has contributed to increased farming costs resulting in a move towards higher value products (to improve economic margins). This has resulted in a decrease in soil-based agriculture, which in turn decreases the area available for on-the-ground agri-environmental stewardship programs.

While both the ALC Act and FPPA Act benefit agriculture, they focus on agriculture without considering the impact of agricultural operations on wildlife and wildlife habitat. Similarly, the MBCA and Canada Wildlife Act focus on protecting migratory birds but do not consider the impact of the birds on neighbouring farms. There is no recognition of the inter-relationships between agriculture and the environment in these policies. There appears to be a conflict between governments over control of agricultural and environmental resources. This has a potentially negative impact on agri-environmental stewardship by creating layers of bureaucracy and an 'us against them' attitude which is not conducive to a cooperative approach to agri-environmental stewardship. These policies further illustrate that there is a lack of policy coordination across different levels of government. This chasm is partly due to the division of powers set out in the British North America Act, 1867 (now the Constitution Act, 1982) whereby responsibilities for agriculture and wildlife (among others) were divided between federal and provincial or territorial governments. This is discussed in greater detail in the following chapter.

Respondents indicated that economic policy has impeded the development of the DFWT. Respondents explained that farmers make decisions that are best for their business. These decisions, however, are not always best for wildlife habitat. Wildlife habitat is a non-market

good and its value is not adequately recognized or valued in economic policy. In addition, respondents pointed out that government decision-making is also driven by the economy. As a result, economic policy is biased towards those ventures that are most likely to yield short-term financial returns. If agri-environmental stewardship does not yield any returns, or worse, creates costs, then this is likely to act as an impediment to agri-environmental stewardship. This is also linked to a lack of policy coordination in government because economic policy is not tied to agri-environmental policy.

International trade agreements were identified as impeding the development of the DFWT. Respondents had difficulty identifying specific policies, although they expressed concern that international policies related to trade, foreign food imports, food safety requirements, labelling laws, and industrial expansion were all issues connected to international trade agreements. Respondents noted that farmers are affected by the global economy. For example, as the Canadian dollar increases in value against the American dollar it becomes more difficult for farmers to sell their products abroad. However, farmers have also benefitted from international trade because it has opened up markets for them in other countries. The key issue appears to be linked to the uneven playing field between farmers in Delta and farmers in other countries. The cost of farming in Delta is high due to high land prices, loss of crops due to waterfowl, input costs, and lack of affordable labour. This policy theme is linked to the economic policy theme described above. Policies that are rooted in economic growth without consideration of their impact on agri-environmental stewardship illustrate a lack of policy coordination in government.

As with federal and provincial policies, international trade agreements and economic policies create challenges for agri-environmental stewardship. They focus on enhancing and facilitating economic opportunities, without consideration of the impact of such policies on local agroecological systems.

12.3.4 Summary

This section explored the various policy themes that were identified as having enabled or impeded the formation and/or development of the DFWT. Policy gaps were identified based on the effect these policy themes have had on the formation and/or development of the DFWT. Policy gaps are areas where policy appears to be lacking altogether or has acted as an impediment to agri-environmental stewardship.

The policy gaps that were identified through this discussion are:

- Lack of policy coordination
- Lack of long term government funding for agri-environmental NGOs
- Lack of compensation for ecosystem goods and services

The next section summarizes these gaps and identifies policy objectives. These objectives are then used to identify policy options in Chapter 13.

12.4 Policy Objectives

This section addresses Step II of the policy review process, specifically identification of policy objectives. For the purposes of this research, I define a policy objective as an action oriented statement that addresses the policy gap I identified through the policy review. The policy gaps I identified in the previous section are summarized below. I developed a policy objective for each policy gap that I identified. In the next chapter I describe how I use these policy objectives to identify policy options. I use this information to help answer my last research question: What sorts of government policies could be used to encourage agri-environmental stewardship in Canada?

12.4.1 Policy Gaps

1. Lack of policy coordination

Interview responses indicate that policies from different areas of government undermine agri-environmental stewardship at the local level. Government policies do not appear to address agri-environmental issues in a coordinated manner. This lack of policy coordination may create impediments for NGOs, such as the DFWT, to provide agri-environmental stewardship programs that benefit both wildlife habitat and agricultural viability.

Policy objective: To identify policies that illustrate a holistic approach to agri-environmental stewardship.

2. Lack of long term government funding for agri-environmental NGOs

The interview responses indicate that the DFWT has done a good job of mediating environmental and agricultural issues through community relations and on-the-ground programs. However, the responses also indicate that the DFWT is not operating at an optimal level (in terms of being able to provide programs that benefit both agriculture and wildlife habitat to all farmers who wish to participate) due to policy related to the accessibility of long term, stable, funding.

Policy objective: To identify options for sufficient, accessible, long term, and stable funding for NGOs to provide agri-environmental stewardship programs to farmers.

3. Lack of compensation for ecosystem goods and services

The interview responses indicate that the financial effects of wildlife predation on farmers are not adequately met through existing policy. In this case, a lack of policy is impeding the ability of farmers to provide wildlife habitat without incurring financial losses. There are two components to this gap. One relates to compensation for the provision of wildlife habitat on farmland (e.g. hedgerows), while the other relates to compensation for losses due to wildlife predation (e.g. loss of marketable crops). The federal and provincial governments have recently agreed to provide compensation for wildlife damage, so this policy gap appears to have been filled (this is discussed in further detail in Chapter 13). The focus of my policy review, therefore, will be on identifying policies that address compensation for the provision of wildlife habitat (ecological goods and services) on farmland.

Policy objective: To identify policy options that compensate farmers for the provision of ecological goods and services (particularly wildlife habitat) on farmland.

12.5 Summary

In this chapter I consolidated all of the enabling policies and all of the impeding policies into two tables. I then summarized these policy themes and discussed how these policy themes led me to identify three key policy gaps:

- Lack of policy coordination
- Lack of long term government funding for agri-environmental NGOs
- Lack of compensation for ecosystem goods and services

I identified policy objectives based on these gaps to help me identify policy options from other countries. The next chapter provides an overview of the Canada/BC policy framework in the context of the policies and policy themes that have been discussed in this chapter. I then discuss policy options from three countries with supportive agri-environmental policies.

CHAPTER 13

Policy Options

13.1 Introduction

This chapter identifies policy options based on a review of three countries with supportive agri-environmental policies. I begin by providing an overview of the policy framework in Canada and British Columbia as it relates to my research. I then use the three policy objectives defined in Chapter 12 to help me identify policies from other countries that address the corresponding policy gaps.

13.2 Canada/BC Policy Framework

The purpose of this section is to provide a brief overview of the guiding policies of the federal and provincial departments of agriculture and environment since these organizations are most relevant to my research. I examine the mandate and guiding principles of each department in the context of the policy gaps I identified.

13.2.1 Overview

Canada is a federated country made up of ten provinces and three territories. Responsibility for environmental and agricultural resources in Canada is divided at both the federal and provincial levels of government. Under the British North America (BNA) Act, 1867 (now the Constitution Act, 1982) legislative powers in Canada were divided into federal and provincial jurisdictions. The provinces were given "...exclusive legislative jurisdiction over the general regulation and control of land use within their boundaries" (Environment Canada, 1980, p. 41). Agricultural responsibilities were split between the provinces and the federal government. The federal government took control of agricultural research, policy and inter-provincial and international trade. Provinces were given control over agricultural education including extension, agricultural colleges and universities (Young, 2004).

Management of wildlife in Canada is shared by federal, provincial, and territorial governments. Federal responsibility for wildlife includes migratory bird protection, designation of nationally significant wildlife habitat, control of international trade in endangered species, and research on wildlife issues deemed to have national importance. Provincial and territorial governments are responsible for other wildlife issues such as conservation of wildlife populations and their

habitat within jurisdictional boundaries (BCMOE, 2007). I discuss the guiding policies of the federal and provincial departments of agriculture and environment in the following sections.

13.2.2 Agriculture and Agri-Food Canada

The mandate of Agriculture and Agri-Food Canada (the national department responsible for agriculture in Canada) is to provide:

...information, research and technology, and policies and programs to achieve security of the food system, health of the environment and innovation for growth. (AAFC, 2008a)

The Agricultural Policy Framework (APF) was a five-year federal-provincial-territorial agreement on agriculture that came into effect in 2003. The APF was created in order to provide a national approach to agriculture. In 2008, the 'Growing Forward' policy framework was announced. This new policy framework will replace the APF. The APF will officially expire on March 31, 2009, however APF programs will continue until Growing Forward programs are developed and implemented (AAFC, 2008b).

The APF was the guiding policy framework for Agriculture and Agri-Food Canada from 2003 to 2008. Since the APF was in effect during the time I conducted most of my research and interviews (2004 – 2008), I focus on the APF rather than 'Growing Forward' because this was the policy context in which my research was conducted. However, I also provide a brief review of 'Growing Forward' in order to determine whether any of the policy gaps that were identified through my research have been addressed in this new policy framework.

APF programs were grouped into five key areas: business risk management, food safety and quality, science and innovation, environment, and renewal (AAFC, 2008b). The environment program area is most relevant to my research, so I focus on describing the key elements of this program as they relate to my research. All of the environment programs under the APF are continuing during the transition year (2008 – 2009) or until the Growing Forward programs are implemented (AAFC, 2008c).

Under the APF environmental program area there were programs that were intended to:

- Improve soil, water, and air quality and reduce the industry's impact on biodiversity
- Support research and development of on-farm beneficial management practices

- Improve land use planning and management by making environmental information available (AAFC, 2008c)

Under the APF, the National Farm Stewardship Program provided technical and financial assistance to farmers and land managers to adopt beneficial management practices (BMPs). BMPs included maintaining or improving the quality of soil, water, air, and biodiversity as well as ensuring the sustainability of natural resources used for agricultural production (AAFC, 2008d).

As part of the National Farm Stewardship Program, BC developed an Environmental Farm Plan Program. Under this program an environmental assessment is conducted on the farm by an EFP Planning Advisor outlining the risks and benefits of the agricultural operation to the environment. An action plan is developed to mitigate the risks. Producers are then eligible to apply for financial assistance to implement the BMPs identified in their action plan (AAFC, 2008e).

However, funding is only available for some projects and is on a cost share basis. Interview respondents explained that farmers are land rich, but cash poor, so many are unable to access the funds available through the EFP Program. This echoes the policy gap I identified in Chapter 12 related to the inaccessibility of funding for NGOs. In addition, funding is not provided for ecosystem goods and services. This is consistent with the third policy gap I identified (lack of funding for ecosystem goods and services). However, the BC EFP Program does aim to foster partnerships with other agencies and reduce conflicts between agricultural and environmental interests (BCAC, 2008d). In addition, a new aspect of the program encourages farmers to develop biodiversity management plans for their farms. However, there does not appear to be any funding available for enhancing on-farm biodiversity (BCAC, 2008e). Promoting on-farm biodiversity and partnerships between agencies partially address policy gap 1 (lack of policy coordination) by combining policies that benefit both agriculture and the environment.

13.2.2.1 Growing Forward

The new Growing Forward policy framework is intended to deliver programs that are more simple, effective, and tailored to local needs (AAFC, 2008f). The Growing Forward vision focuses mainly on economic development. There is nothing in the vision that explicitly promotes agri-environmental stewardship. The vision is:

...for a profitable and innovative agriculture, agri-food and agri-based products industry that seizes opportunities in responding to market demands and contributes to the health and well-being of Canadians. (AAFC, 2008g)

There are three strategic outcomes identified in the Growing Forward policy framework:

1. a competitive and innovative sector
2. a sector that contributes to society's priorities
3. a sector that is proactive in managing risk (AAFC, 2008g)

I discuss the degree to which the Growing Forward policy framework addresses the policy gaps below.

Policy gap 1: Lack of policy coordination

Growing Forward does address policy coordination to some degree. It establishes a framework for coordination between the federal, provincial, and territorial governments to help the agricultural sector to "...become more prosperous, competitive, and innovative" (AAFC, 2008g, p. 1). However, the APF provided a similar framework, so it is unclear whether Growing Forward will provide a greater level of policy coordination than the APF. In addition, the framework only addresses coordination among agricultural departments (in terms of prosperity, competitiveness, and innovation), and does not address the need to coordinate agri-environmental initiatives with federal, provincial, and territorial environmental departments.

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

The Growing Forward policy framework does identify funding opportunities for providing technical assistance to support on-farm sustainable agriculture practices. However, it is unclear whether this funding will be available to organizations such as the DFWT. Funding will be provided to extension specialists and producers to improve awareness and adoption of beneficial management practices (AAFC, 2008g). While the DFWT does provide an extension type of service, it is not clear whether the organization would be considered extension specialists. Other agri-environmental NGOs may provide similar services, but may not be

considered extension specialists. As a result, these organizations may be unable to access this funding.

Growing Forward also describes funding that will be available to producers and producer groups to implement on-farm actions that will benefit the environment and provide public benefits (AAFC, 2008g). However, the DFWT is not considered to be a producer group, so they would not be eligible for this funding. These two initiatives provide some insight into the difficulty the DFWT has in accessing funds. Often government funding programs have very specific criteria, targeted at particular groups, but because of the uniqueness of the DFWT, the organization may not be able to access such funding programs.

Policy gap 3: Lack of compensation for ecosystem goods and services

Growing Forward acknowledges the importance of ecological goods and services (AAFC, 2008g). However, it does not provide any indication of funding for these services except that there will be "...an increased focus on promoting public benefit practices" (AAFC, 2008g, p. 29). Growing Forward does address the issue of wildlife damage compensation. It states that the federal government will cost share compensation for wildlife damage with provincial and territorial governments (AAFC, 2008g). However, the province (or territory) must have a program in place for mitigation and damage prevention. BC has recently undertaken such a program. This is discussed further in Section 13.2.4.1.

13.2.2.2 Summary

Under the APF and Growing Forward policy frameworks, there are policies related to agri-environmental stewardship as well as cooperation and cost-sharing between federal and provincial governments. However, despite having an environmental component, neither of these policy frameworks identifies any attempt to harmonize agricultural policy with federal or provincial environmental policy. In addition, while their agri-environmental programs sound good on the surface (e.g. National Farm Stewardship Program and EFP Program), the evidence from my research indicates that the programs are not working effectively for agri-environmental NGOs such as the DFWT. For example, while funds may be available for agri-environmental stewardship, funding criteria may make these funds inaccessible to farmers or agri-environmental NGOs, such as the DFWT.

13.2.3 Environment Canada

Federal, provincial, and territorial governments share the management of wildlife in Canada. Wildlife matters that are the responsibility of the federal government, including protection and management of migratory birds and nationally significant wildlife habitat, are managed by the Canadian Wildlife Service (CWS). Provincial and territorial governments are responsible for other wildlife matters such as conservation and management of wildlife populations and habitat (CWS, 2008c). Environment Canada has a broad mandate, ranging from weather forecasting, enforcement of regulations related to boundary waters, protection of water resources, and preservation of the natural environment (Environment Canada, 2008c). In this section, I focus on the CWS because it is responsible for migratory birds and nationally significant wildlife habitat, which are directly related to my research. The mission of the CWS is to: “conserve wildlife and the ecosystems of which they are a part, with a particular focus on migratory birds and species at risk” (CWS, 2000, p. 12).

The ‘Wildlife Policy for Canada’ provides the framework for policies and programs that affect wildlife in Canada (CWS, 1990). Under this policy framework, the Habitat Conservation Program (HCP) strategy helps guide the CWS wildlife conservation programs. The mission of the HCP is to “conserve, protect and rehabilitate habitats of significance to migratory birds and species-at-risk in Canada” (CWS, 2008d, p. 2). The program is supported in legislation by the Canada Wildlife Act, the Migratory Birds Convention Act, the Species at Risk Act, and the Canadian Environmental Assessment Act (CWS, 2008d). Under the HCP, CWS activities are directed towards two key objectives for habitat conservation:

- To conserve, protect and rehabilitate habitats for migratory birds and species at risk
- To use an ecosystem approach when making resource management decisions

(CWS, 2008d)

The HCP purports to take an ecosystem approach to wildlife conservation by considering “...birds and all wildlife as components of ecosystems, rather than as single species” (CWS, 2008d, p. 2). However, the HCP does not appear to include humans or human activities in its definition of an ecosystem approach. There is no mention of the habitat that agricultural land provides or of the negative impact wildlife could have on agricultural land.

One of the tools the HCP uses to protect migratory birds and species at risk is to acquire land for protected areas (CWS, 2008d). However, the interview responses indicated that the acquisition of the Alaksen National Wildlife Area (through the Canada Wildlife Act) added to the conflicts in Delta prior to the formation of the DFWT. Alaksen was acquired in 1976, yet there does not seem to have been any attempt made to revise policy based on the conflicts that came about as a result of the acquisition of the Alaksen NWA. This illustrates a tremendous lag in policy reform as well as a lack of policy coordination between agricultural and environmental interests. Based on my cursory review of the policy framework for Environment Canada – CWS, none of the policy gaps I identified seem to be addressed.

13.2.3.1 Summary

While the Habitat Conservation Program appears to be of great benefit to wildlife and wildlife habitat, it does not identify how other land uses, such as agriculture, might be impacted. In addition, there is no mention of any mitigation measures that may need to be taken as a result of wildlife or wildlife habitat protection (e.g. impact on agricultural operations as a result of increased in wildlife predation). There is no apparent recognition of the habitat that farmland provides, nor of the negative impact that wildlife can have on agricultural operations.

13.2.4 Ministry of Agriculture and Lands

The mandate of the BC Ministry of Agriculture and Lands (MAL) is to:

...promote economic development and environmental sustainability for the agriculture, aquaculture and food sectors, supporting them in delivering safe, healthy and high-quality food, and to manage Crown land in a manner that contributes to the economic, societal and environmental goals of government. (BCMAL, 2008b, p. 33)

The Ministry is guided by a Service Plan which is updated approximately every five years. In this section, I focus on the Ministry of Agriculture, Food and Fisheries Service Plan (2005-2008) because this was the Plan that was in place while my research was conducted. I also comment briefly on the new Service Plan in the context of my research. I also review the newly released BC Agricultural Plan and discuss how it relates to my research.

The Service Plan identifies the need to work with other government ministries to ensure development and investment in agriculture is not constrained. As an example, the Plan explains that the Ministry is working on provincial wildlife management policies to find a better balance

between agricultural development objectives and wildlife management objectives (BCMAFF, 2005). This initiative partially addresses Policy Gap 1 (lack of policy coordination). This is an important initiative because it acknowledges that agricultural and environmental interests must work together to achieve mutually beneficial outcomes. However, there is no direct reference to (or support for) agri-environmental stewardship.

The Service Plan also explains that staff members will work with municipal governments to ensure local government bylaws support farm operations (BCMAFF, 2005). While this may help to address Policy Gap 1 (lack of policy coordination), the focus of this initiative is on supporting farm operations, not agri-environmental stewardship. The interview results indicate that provincial legislation which overrides municipal legislation (e.g. FPPA, ALC Act) has contributed to the conflicts in Delta and have impeded the development of the DFWT.

The mission described in the most recent MAL Service plan (2008-2011) is to: "...promote sustainable land use and the production of agriculture and aquaculture products in an environmentally sound manner for the benefit of all British Columbians" (BCMAL, 2008b, p. 3). This Service Plan outlines strategic priorities and key initiatives for the Ministry between 2008-2011. I reviewed the strategic priorities and key initiatives in the context of the policy gaps I had identified in order to determine whether the new Service Plan addressed any of these gaps.

The Service Plan does address Policy Gap 1 (lack of policy coordination) to some extent because it explains that the Ministry works in partnership with all levels of government, First Nations, and industry to fund and implement Ministry strategies (BCMAL, 2008b). The Service Plan does not address Policy Gap 2 (lack of long term government funding for agri-environmental NGOs). The Service Plan does partially address policy 3 (Lack of compensation for ecosystem goods and services) because it identifies "Environmentally Sound Farming Practices" as an opportunity to conserve and create habitat for plants, animals, and fish (BCMAL, 2008b, p. 36). However, it does not indicate any compensation for the provision of these ecosystem goods and services (Policy Gap 3).

13.2.4.1 BC Agriculture Plan

The BC Agriculture Plan was released in 2008 after I had finished conducting my interviews, interview analysis, and identification of policy gaps. Consequently, I reviewed this Plan in the context of the policy gaps I identified to determine whether this new Plan addressed those gaps. The BC Agriculture Plan is a "...long-term plan for the future of agriculture in B.C." (BCMAL, 2008c, p. 1). There are 23 strategies aimed at sustaining the agriculture industry. These strategies are linked to five themes:

1. Producing local food in a changing world
2. Meeting environmental and climate challenges
3. Building innovative and profitable family farm businesses
4. Building First Nations agriculture capacity
5. Bridging the urban/agriculture divide

(BCMAL, 2008d)

Policy gap 1: Lack of policy coordination

The BC Agriculture Plan does address this policy gap to some extent. Under Strategy 23 (Local Government Agricultural Planning) the plan states that the MAL will encourage local governments to establish agriculture advisory committees and prepare agricultural plans as part of their Official Community Plans (BCMAL, 2008d). This indicates a willingness to work with local governments on agricultural issues, but does not address the need to work on agri-environmental issues together. The strategy appears to be focused primarily on agriculture, because it emphasizes agricultural needs, but not environmental or other local government needs. This strategy focuses on developing a local government regulatory structure that "...promotes the growth of farming in B.C." (BCMAL, 2008d, p. 40).

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

Similar to Growing Forward, the BC Agriculture Plan identifies the need to provide technical assistance and extension to promote farm practices "...that ensure measurable results in minimizing the agriculture industry's impact on climate change, greenhouse gas emissions (GHG), water and air quality and the environment generally" (BCMAL, 2008d, p. 14), but does not state explicitly whether there will be any funding available for NGOs to help deliver these programs.

The BC Agriculture Plan outlines a number of opportunities in the agricultural sector for reducing GHG (e.g. providing benefits to farmers for supplying ecological goods and services). The Province of BC has recently released a number of pieces of legislation aimed at reducing GHG. Since agri-environmental stewardship can help to reduce GHG (e.g. carbon sequestration in grassland set-asides), this new legislation aimed at reducing GHG may eventually provide long-term funding for agri-environmental NGOs. However, at this point in time there does not appear to be any commitment in the Province's GHG legislation or the BC Agriculture Plan to provide long-term funding to combat greenhouse gases through agri-environmental stewardship.

The BC Agriculture Plan also identifies the need to increase extension services to the agricultural sector. While this would be a perfect opportunity for organizations such as the DFWT, there is no funding specifically allocated to NGOs. The Plan does however, identify the need for MAL staff to work with post-secondary institutions, federal research institutions, and the private sector to improve extension services (BCMAL, 2008d). This is a step in the right direction, but excluding NGOs from the group of extension providers indicates the lack of recognition the DFWT (and similar organizations) receive for the services they provide.

Policy gap 3: Lack of compensation for ecosystem goods and services

The BC Agriculture Plan partially addresses this policy gap under Strategy 6 (Ecological Goods and Services) by acknowledging that agricultural land provides benefits to the public beyond food production including wildlife habitat and biodiversity conservation (BCMAL, 2008d). However, the Plan does not actually offer funding for *providing* ecological goods and services above and beyond normal farm practices. Instead, it offers compensation for agricultural losses due to wildlife damage. The difference between the two is that, by their own definition, providing ecological goods and services means providing benefits to the public beyond food production. Growing specific crops (e.g. cover crops) or setting aside areas of their farm (e.g. hedgerows) would provide benefits to wildlife as well as to the general public (e.g. wildlife viewing opportunities). However, the Plan doesn't encourage the provision of wildlife habitat in conjunction with agricultural production, but rather aims at developing a "...wildlife damage reduction plan..." (BCMAL, 2008d, p. 15).

A new Provincial Agriculture Zone Wildlife Program will be implemented which will “...integrate prevention, mitigation and compensation strategies” (BCMAL, 2008d, p. 37). This zone appears to be an area where wildlife are managed so that agricultural damages are minimized. This appears reasonable on the surface, because it should help farmers to manage wildlife on their farms. However, it does not sound like this zone will promote agri-environmental stewardship.

13.2.4.2 Summary

The Ministry of Agriculture and Lands does appear to be making some steps towards agri-environmental stewardship. The Service Plan does identify the need to work with environmental agencies to find a balance between agricultural and environmental interests. This is a step towards resolving the lack of policy coordination between government departments. The BC Agriculture Plan also takes some steps towards agri-environmental stewardship by providing funding for technical assistance and extension to promote farm practices that benefit the environment and by acknowledging that agricultural land provides ecosystem goods and services that benefit all people. While compensating farmers for wildlife damage is an important component of this, the Plan should also reward farmers for providing wildlife habitat on their farms.

13.2.5 Ministry of Environment

Like the Ministry of Agriculture and Lands, the Ministry of Environment (MOE) is guided by a Service Plan which is updated every one to three years. In this section, I provide an overview of the MOE using the 2006-2008 Service Plan as it relates to my research (since this covers the period in which I conducted my interviews). The 2006-2008 and 2008-2011 Service Plans are very similar, particularly in the area of environmental stewardship. As a result, I do not discuss these plans separately. However, I do draw on the 2008-2011 Service Plan when I discuss whether this plan addresses any of the policy gaps I identified through my research.

The mandate of the MOE is to “...protect human health and safety, and maintain and restore the diversity of native species, ecosystems and habitat” (BCMOE, 2006, p. 5). The ministry’s programs and services are delivered through six core business areas: Environmental Stewardship, Water Stewardship, Oceans and Marine Fisheries, Environmental Protection, Compliance, Executive and Support Services (BCMOE, 2006). The core business area that is

most relevant to my research is Environmental Stewardship. This area focuses on working with other ministries, industry, First Nations, governments, and communities to establish standards for the protection and use of wildlife species and their habitats. This area also establishes policies, procedures, and legislation that assist in the conservation and protection of the natural environment (BCMOE, 2006). Despite the fact that environmental stewardship is one of the core business areas in the Service Plan, there is no mention of agri-environmental stewardship or the importance of agricultural land for wildlife.

The goals and objectives from the 2006-2008 Service Plan are essentially the same goals and objectives as the 2008-2011 Service Plan apart from some minor wording differences between the two plans. I reviewed all of the goals and objectives in the 2008-2011 Service Plan to determine whether they addressed any of the policy gaps I identified through my research. Under Goal 3 (British Columbians share responsibility for the environment), the plan states that in order to develop a successful shared stewardship model there is a need to:

...integrate cooperative and collaborative partnerships with First Nations, industry, associations, academia, communities, environmental groups and other government bodies across all sectors and geographic jurisdictions. (BCMOE, 2008c, p. 24)

This addresses Policy Gap 1 (lack of policy coordination) to some degree because it identifies the need to work with other government bodies. This was the only gap that was addressed in the Service Plan.

13.2.5.1 Summary

The MOE appears to play a minor role in agri-environmental stewardship. The Service Plan does identify the need to develop partnerships with a wide variety of agencies and organizations across the province. This may contribute to agri-environmental stewardship, however agriculture is not specifically mentioned in the list of potential partners. There do not appear to be any other MOE policies that contribute, either positively or negatively, to agri-environmental stewardship.

13.2.6 Canada/BC Policy Summary

There is some vertical integration between federal agriculture policy and provincial agriculture policy (e.g. APF, Growing Forward). The federal and provincial agricultural departments have also made some attempt to incorporate environmental initiatives into their policies (e.g. Environmental Farm Plan Program). However, there does not appear to be much attempt at horizontally integrating federal or provincial environmental policies into agricultural policies or vice versa (e.g. integration of MOE policy with MAL policy). Neither Canada nor BC appears to have policies that adequately facilitate or encourage agri-environmental stewardship. In the following sections, I describe supportive agri-environmental policies from three countries and then identify some policy options that may facilitate agri-environmental stewardship in Canada.

13.3 Policy Options

In this section, I draw on Step III – 1 to identify policy options and to answer my final research question: What sorts of government policies could be used to encourage agri-environmental stewardship in Canada? I provide an overview of agri-environmental policies from three countries: Australia, England, and Switzerland. The countries were chosen based on references from the literature, word of mouth, and availability of information about their policies written in English.

Policy is a very complex topic. From my experience working with, and for, government, there is policy that is written but never followed, and policy that is followed but never written, making it difficult to pinpoint which policies are guiding decision-making. In addition, policies can interact both synergistically and antagonistically. It is difficult to analyse a policy on its own without looking at all of the policies with which it interacts. However, it was not within the scope of my research to conduct an in-depth policy analysis. Instead I took a broad brush approach, using the policy objectives I identified to guide my review. The review is intended to provide an overview of some of the methods that other countries are using to deal with these policy gaps. It does not address all policies, nor does it address potential problems with these policies. I do not discuss the role of international trade agreements because this is outside the scope of my research.

The intent of the policy review is to illustrate what is being done at the national level for a variety of countries to get a sense of what Canada could do to address the policy gaps. The policies I have identified are not necessarily flawless. However, it was neither feasible, nor

necessary for the purposes of my research, to examine the pros and cons of each policy. The intent of the policy review is to provide a sense of what other countries are doing in order to illustrate that some countries have addressed these policy gaps and that there are different methods of doing so. In that respect, they are ‘theoretical’ or ‘idealized’ policies taken out of their true context and put into a different context (i.e. Canada) without considering all of the constraints that may exist. The policy review is meant to open eyes to the possibilities that exist, unfettered by such constraints.

13.3.1 Australia

In Australia, soil and water degradation combined with increased concern over environmental conservation led to the Australian Government announcing the ‘Decade of Landcare’ initiative in 1989. Two important events appear to have provided the impetus for this initiative. In 1988, Bradsen (1988) completed a report on soil and land conservation and policy in Australia. Bradsen found that the existing soil conservation legislation (Soil and Land Conservation Act 1945) was ineffective and that land degradation was increasing across the country (Bradsen, 1988, cited in Allison and Hobbs, 2006).

The other important event that occurred prior to the Decade of Landcare also occurred in 1988. The Australian Conservation Foundation and the National Farmers Federation formed a cooperative agreement to tackle nation-wide land degradation issues together at the national policy level. Previously, these two groups had taken opposing positions on land conservation policy. Their cooperation combined with collaboration with the Australian Government led to the release of the 1989 National Soil Conservation Strategy aimed at mitigating land degradation. (Allison and Hobbs, 2006).

The Decade of Landcare heightened awareness amongst Australian people and the Australian government about the scale of natural resource degradation across the country. Non-government organizations pressured governments to respond to the social and environmental problems caused by natural resource issues. Government responded by developing statutory Environmental Protection Policies, strategic regional approaches, and an integrated land management approach (Allison and Hobbs, 2006).

Community involvement is a key feature of Landcare. It is a participatory form of voluntary natural resource management focused on productive agricultural landscapes. Community Landcare groups form the fundamental units underpinning the Landcare movement. There are approximately 4,000 groups across the nation. Landcare operates mainly in rural Australia, involving approximately 40% of Australia's farmers who manage 70% of the nation's diverted water and 60% of the land (DAFF, 2008a).

Farmers combat soil salinity and erosion through sustainable production and land management practices. Landcare volunteers have planted millions of native trees, shrubs, and grasses to help improve soil, water, and air quality. They have worked to restore bushlands and sensitive environmental areas on public and private lands. Their actions have helped to protect thousands of native species, including threatened and endangered fauna and flora (Landcare Australia, 2008).

Landcare groups offer the opportunity for farmers to learn from each other. There has been a move away from individual agricultural extension focused on production and industry towards group extension focused on the provision of public goods. The Landcare groups provide a means of sharing knowledge. They are an important method of building social support for the adoption of more sustainable farming practices and for "...encouraging social norms more conducive to conservation among Landcare's rural constituency" (Webb et al., 2000, p. 5). The partnership between the community and government is an integral component of Landcare. This partnership encourages on-the-ground natural resource management at the farm, catchment, and regional level (DAFF, 2008b).

Policy gap 1: Lack of policy coordination

Policy objective: To identify policies that illustrate a holistic approach to agri-environmental stewardship.

Like Canada, there are separate departments for agriculture and the environment at the national level in Australia. However, the new 'Caring for Our Country' program (described below) which is administered by the Department of Environment, Water, Heritage and the Arts, integrates Landcare and environmental stewardship, so there does appear to be some policy coordination between agriculture and environment (DAFF, 2008c).

On July 1, 2008, the Australian government launched a new initiative called ‘Caring for Our Country’. This program integrates various existing natural resource management programs, including Landcare, into one consolidated program. The integration of natural resource programs is intended to streamline natural resource management and environmental protection, reduce bureaucracy, and decrease the amount of administrative work required by those undertaking resource management activities. These were issues that were raised from national reviews and audits of various Australian natural resource programs including the Landcare program. The Australian government is providing \$2.25 billion in funding over five years for the Caring for Our Country initiative (Australian Government, 2008a). Through this program, and more specifically through Landcare, it appears as though Australia is taking a holistic view of agriculture and the environment with harmonized policy that supports agri-environmental stewardship.

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

Policy objective: To identify options for sufficient, accessible, long term, and stable funding for NGOs to provide agri-environmental programs to farmers.

The Australian government does appear to be addressing this policy gap through the Caring for Our Country initiative. As part of this initiative, the Australian government is committing \$636 million as secure base level funding for regional natural resource management organizations to invest in actions that complement and contribute to the government’s national resource management priorities. The initiative will provide the opportunity for government and non-government organizations and regional bodies to access program funding (Australian Government, 2008a). The Landcare program will be strengthened under the Caring for Our Country initiative. There will be \$189.2 million available to deliver Landcare initiatives over the first five years of Caring for Our Country (Australian Government, 2008b). Although it is not clear whether the funds will be accessible and sufficient over the long-term for all agri-environmental NGOs, it does appear as though the government has recognized the value of NGOs in delivering agri-environmental stewardship programs and has allocated money to assist NGOs in fulfilling the goals of the Landcare program.

Policy gap 3: Lack of compensation for ecosystem goods and services

Policy objective: To identify policy options that compensate farmers for the provision of ecological goods and services (particularly wildlife habitat) on farmland.

Australia provides compensation for the provision of environmental services. The Environmental Stewardship Programme, part of the Caring for Our Country initiative, takes a market-based approach to environmental management. It is jointly administered by the Minister for the Environment and Water Resources and the Minister for Agriculture, Fisheries and Forestry. The program addresses "...a policy gap in the provision of payments for longterm protection of high value environmental assets" (Australian Government, 2007, p. 1). The program offers contracts to landowners who provide cost-effective environmental services. The contracts provide financial incentives to selected farmers and other private land managers to accomplish long-term environmental goals on their properties. In order to allow time for ecological processes to produce the desired conservation outcome, contract lengths may be up to 15 years in duration. Participants are selected through tender, auction, and other market-based mechanisms (Australian Government, 2007).

There are numerous programs that provide incentives for environmental conservation on private land. Various organizations are involved in the delivery of the incentive programs including government and non-government organizations, indigenous groups, natural resource management regional bodies, and industry groups (Australian Government, 2007). Australia appears to have an inclusive agri-environmental stewardship program that provides a variety of opportunities for farmers to receive compensation for ecosystem goods and services.

13.3.2 England

After the Second World War, an important policy goal for England was to increase food production. However, this focus on production had a negative impact on long term industry and countryside sustainability (DEFRA, 2002). Over the past twenty years, there has been a shift from production-based subsidies to agri-environmental stewardship incentives (FWAG, 2008). In 1987 England introduced its first agri-environmental program, the Environmentally Sensitive Areas (ESA) scheme which paid farmers to adopt measures to conserve and enhance the landscape for historic and/or wildlife values. Options included payments for buffer strips, species rich hay meadows, and unimproved pasture and land (University of Reading, 2008).

This scheme now covers 22 areas in England that have been designated as ESAs because of their unique environmental features (DEFRA, 2008a).

Additional agri-environmental schemes have been introduced over the years. These schemes provide payments for the adoption of agricultural practices that conserve wildlife habitat, protect historic, archaeological and landscape features and improve opportunities for countryside enjoyment (DEFRA, 2008a). Agri-environmental schemes are part of the New Rural Development Programme for England (RDPE) and are administered by the Department for Environment, Food and Rural Affairs (discussed in greater detail below).

Policy gap 1: Lack of policy coordination

Policy objective: To identify policies that illustrate a holistic approach to agri-environmental stewardship.

Unlike Canada, England takes a more holistic approach to agriculture and the environment. Rather than having separate national departments to address these intertwined elements, England has created the Department for Environment, Food and Rural Affairs (DEFRA). In addition to having this institutional arrangement that supports a more integrated policy environment (i.e. removing the departmental ‘silos’ of agriculture and environment), England also has a national program that pays farmers for agri-environmental stewardship.

DEFRA administers the New Rural Development Programme for England (RDPE), which replaced the England Rural Development Programme (ERDP) in 2007. There are numerous schemes under this program that provide funding to farmers manage the land more sustainably for agriculture and the environment (DEFRA, 2008b). This is discussed in greater detail below (policy gap 3).

The agri-environmental schemes are part of the ‘Single Payment Scheme’ (SPS) which is the principal agricultural subsidy scheme in the European Union. Subsidies are no longer linked to production, allowing farmers greater freedom to farm to the demands of the market and to receive payments for environmentally friendly farming practices (known as cross compliance). Payments are made through one agency, the Rural Payments Agency, which is an Executive Agency of DEFRA (described below) (DEFRA, 2007). The approach taken by DEFRA appears to address Policy Gap 1 by harmonizing agricultural and environmental policy which may facilitate agri-environmental stewardship.

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

Policy objective: To identify options for sufficient, accessible, long term, and stable funding for NGOs to provide agri-environmental programs to farmers.

There were no explicit references to long-term funding of non-government organizations in any of the policies I reviewed. However, the Farming & Wildlife Advisory Group (FWAG), which is the United Kingdom's only independent provider of environmental and conservation advice for farmers, crofters, and landowners, does appear to receive some money from the government to assist in promoting agri-environmental stewardship. The organization is funded through its members, corporate contributions, and various authorities and agencies. Much of FWAG's work is project based. Due to the funding requirements of various agencies, such as Trusts or government agencies, FWAG develops working partnerships with several organizations to optimize funding opportunities and create synergistic working relationships (FWAG, 2008).

FWAG was formed in 1969 as an independent Registered Charity. It has a network of Farm Conservation Advisers across the United Kingdom. FWAG provides advice to farmers to help them integrate conservation practices into their farming operations. They take a 'whole farm approach' (which considers the entire farm area and the farm business) providing farmers with specific advice on how to improve wildlife habitat conservation, how to make the most of agri-environmental schemes, and how to meet resource management and pollution regulations. FWAG also represents the needs of farmers, wildlife, and the environment at both local and national levels when in consultation with government, farming and environmental organizations. FWAG helps to interpret regulations into practical advice to help farmers manage their land and businesses cost-effectively to achieve environmental gains. They have no enforcement powers or duties so they often act as a link between government agents and FWAG members to help mediate any conflicts that may arise (FWAG, 2008).

In summary, while England does not appear to explicitly address this policy gap, FWAG does receive some funding from the government to help farmers provide wildlife habitat and take advantage of government funding opportunities for agri-environmental stewardship. FWAG, in essence, offers an agricultural extension service to promote sustainable farming, but does not appear to receive direct long-term, consistent, funding to offer this service. Interestingly, some interview respondents told me that the DFWT was modeled on FWAG. The services they

provide are quite similar, but unfortunately they both seem to lack full government support for their services.

Policy gap 3: Lack of compensation for ecosystem goods and services

Policy objective: To identify policy options that compensate farmers for the provision of ecological goods and services (particularly wildlife habitat) on farmland.

England does address this policy gap by providing compensation to farmers for agri-environmental stewardship initiatives that benefit the public good. As noted above, England launched the New Rural Development Programme for England (RDPE) in 2007. The new Environmental Stewardship (ES) scheme falls under this program. This ES scheme provides payments for agri-environmental stewardship. It has three elements: Entry Level Stewardship, Organic Entry Level Stewardship, and Higher Level Stewardship. These programs are summarized below (DEFRA, 2008c).

Entry Level Stewardship (ELS) is open to all farmers and land managers. Acceptance is guaranteed providing the scheme requirements are met. Organic Entry Level Stewardship (OELS) is similar to ELS. It is open to farmers who manage all or part of their land organically. Higher Level Stewardship (HLS) aims to deliver significant environmental benefits in high priority situations and areas. HLS concentrates on more complex management types where land managers need advice and support. Agreements are tailored to local circumstances (DEFRA, 2008d). As its name implies, ELS is the most basic agri-environmental stewardship scheme in England. ELS is intended to encourage a large number of farmers and land managers across England to deliver simple effective environmental management. It is hoped that if ELS is adopted across the country it will: improve water quality and reduce soil erosion, improve conditions for farmland wildlife, maintain and enhance landscape character, and protect the historic environment (DEFRA, 2008d).

Farmers are assigned a 'points target' that is related to farm size. There is no minimum farm size for ELS. A wide-range of agri-environmental stewardship options are available including hedgerow management, low input grassland, buffer strips, and management plans to protect soils. Each option earns points. Participants must achieve 30 points per hectare for all land except that which is considered to be a 'Less Favoured Area' (LFA) in parcels of 15 ha or more where 8 points per hectare must be achieved (DEFRA, 2008d).

Participants choose how much of each option to have and where to put them until they reach their 'points target'. If they agree to deliver enough ELS options to meet their points target they are guaranteed entry into the scheme. The agreement with DEFRA is legally binding and runs for five years. There are penalties for withdrawing from the scheme early or if the terms of the agreement are breached (DEFRA, 2008d).

The Environmental Stewardship Scheme provides compensation for a variety of ecosystem goods and services. It appears as though virtually any farmer could participate in the scheme. As such, this scheme has the potential to provide agroecosystem benefits across England to a wide array of interests including farmers, wildlife, and the general public.

13.3.3 Switzerland

Since the beginning of the nineties, agricultural policy in Switzerland has been dramatically reformed (Swiss Confederation, 2007). Swiss agriculture is now much more oriented towards market demands and ecological principles than it was ten years ago (Swiss Federal Office for Agriculture, 2004). In 1992, the Swiss Federal Agricultural Law was reframed to target subsidies towards ecological practices. The policy was changed after a national referendum in 1996 in which a majority of the Swiss electorate voted in favour of a new constitutional mandate for agriculture (Botsch, 2005; Pretty, 2002). The reform's main feature was a shift from market support instruments linked to production towards direct payments linked to ecological requirements (eco-conditionality) (Botsch, 2005).

At the beginning of the reform process almost two thirds of funds earmarked for agriculture were spent on market support. This dropped to 20% by 2005 and is expected to drop further in coming years (Botsch, 2005). Opinion polls showed that agricultural lands were valued not just for producing food, but also for other services desired by society such as landscape conservation and maintenance of the basic natural elements of life. Swiss agricultural policy is now less focused on safeguarding supply and more focused on preserving natural resources and conserving cultivated landscapes (Swiss Confederation, 2007).

Farmers receive direct payments only if they meet specific requirements. They must prove ecological performance through a variety of measures including: an appropriate proportion of ecological compensation areas, crop rotation, soil protection, rational use of fertilizers, animal

welfare considerations, and acceptable use of plant treatment products. By linking payments to these conditions, almost all farmland in Switzerland is being used in a more environmentally sensitive manner (Swiss Federal Office for Agriculture, 2004).

Policy gap 1: Lack of policy coordination

Policy objective: To identify policies that illustrate a holistic approach to agri-environmental stewardship.

Switzerland does not have a combined agricultural and environmental federal department. The Federal Office of Agriculture (FOAG) falls under the Federal Department of Economic Affairs while the Federal Office of Environment (FOEN) falls under the Federal Department of the Environment, Transport, Energy and Communications. Swiss agricultural policy is administered by the FOAG. While the two departments are separate, the FOAG does promote sustainable multifunctional agriculture. It also plays a role in formulating agricultural policy (Swiss Federal Office for Agriculture, 2008).

On the basis of Article 104 of the Federal Constitution (under the Federal Law on Agriculture) Switzerland has committed to a sustainable market-oriented agriculture that contributes to the secure provision of food for the country, maintains the natural basic elements of life, conserves the cultivated landscape, and contributes to the decentralization of settlement (i.e. maintains rural communities). In addition to these objectives, as part of its agricultural policy Switzerland is also conducting scientific research, providing training and information services (gaining and passing on knowledge), and managing agricultural research stations (Swiss Confederation, 2007).

The agricultural research stations support sustainable, competitive agriculture which conserves natural resources, soil, water, air, and biodiversity. They develop the scientific and technical knowledge for agricultural practitioners as well as training and information services. They provide insight into new directions in agriculture and carry out enforcement tasks. They also help to develop and evaluate agricultural policy measures related to ecological compensation, integrated production, organic farming, animal welfare, and animal nutrition (Swiss Confederation, 2007).

Changes in agricultural policy have resulted in a shift in the responsibilities of the agricultural research stations towards a more holistic research agenda. Their main activity has traditionally

been to develop and improve production systems in agriculture. While research continues in this area, there is more focus on the cross-disciplinary areas of agriculture and the environment, decision making for business management, animal health and animal welfare, and product quality and safety and their effects on human health (Swiss Confederation, 2007).

Agricultural research, extension, and education play a pivotal role in the reform process because “knowledge and awareness are key conditions for success” (Botsch, 2005, p. 2). The focus of the research, training, and extension is to promote sustainable agriculture. Training and extension services are subsidised by public funds and delivered through cantonal authorities (Swiss Federal Office for Agriculture, 2004).

Switzerland appears to be addressing this policy gap to some extent through its shift towards a more holistic and integrated research agenda combined with a federal policy that explicitly links agriculture to the environment. It is particularly interesting that Swiss policy explicitly identifies the need to pursue sustainable multifunctional agriculture, identifies the importance of conserving natural resources (including soil and biodiversity), and identifies the importance of agricultural extension in helping to make the transition to sustainable agriculture.

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

Policy objective: To identify options for sufficient, accessible, long term, and stable funding for NGOs to provide agri-environmental programs to farmers.

None of the Swiss policies that I reviewed indicated any explicit financial support for (agri-environmental) non-government organizations. However, there is reference to a project taking place in Lucerne that is supported by government funds. This project, initiated by the Swiss Ornithological Institute in 1995, focuses on improving birdlife in the intensively farmed Wauwil valley north of Lucerne. There were already a number of protected areas in the Wauwil valley when the project began, so organizers focused on linking protected areas together using ecological compensation areas (which are part of Swiss agricultural policy). Now that these habitats are linked up, there is greater habitat continuity for plants and animals (Swiss Federal Office for Agriculture, 2004).

Approximately 40 farmers are participating in the project, along with local nature conservation organizations, and all the boroughs in the area. Open discussions between those involved in the project are cited as being an important factor in the success of the project (Swiss Federal Office

for Agriculture, 2004). While Swiss policy does not appear to directly address this policy gap, this case study illustrates that there is money available for such initiatives. Unfortunately, neither the duration of the project nor the duration of the funding were indicated.

Policy gap 3: Lack of compensation for ecosystem goods and services

Policy objective: To identify policy options that compensate farmers for the provision of ecological goods and services (particularly wildlife habitat) on farmland.

Switzerland provides direct payments to farmers for various agri-environmental stewardship practices that compensate farmers for the ecosystem goods and services they provide (Botsch, 2005). Direct payments were introduced in 1993 (Swiss Federal Office for Agriculture, 2004). General direct payments are compensation for basic tasks that are set out in the Swiss Constitution. These include ensuring food supplies, maintaining the landscape, and contributing to the preservation of rural communities. Since food production based purely on market demands cannot ensure this variety of services, direct payments are necessary. Farm area and number of grazing animals are used to calculate the payments. The payments are available for the entire Swiss agricultural area. Additional amounts are paid to farmers in upland mountain areas because of the more difficult farming conditions. The general direct payments ensure that the basic requirements of the agricultural policy are met across the country (Swiss Federal Office for Agriculture, 2004).

Ecological direct payments are paid separately. The payments compensate farmers for participating in voluntary schemes such as organic farming, animal welfare programs, and ecological compensation areas (Botsch, 2005). One of the goals of this program is to create valuable habitats for animals and plants. Some of the agri-environmental practices that farmers receive additional ecological payments for include extensive meadows, reed-beds, permanent flower meadows and rotated fallow fields, natural field margins, wooded river banks, and hedges (Swiss Federal Office for Agriculture, 2004).

After the ecological direct payment program was launched in 1993 a survey was conducted which revealed that, although the area of land reserved for ecological compensation had increased, the quality and locations of the ecological compensation areas were not satisfactory. This led to a revision of the policy and establishment of an ordinance on eco-quality in 2001. Financial incentives were introduced with the specific goal of improving the quality of certain

ecological areas and linking them up to form a network. These network subsidies are paid only if a regional network plan exists. In consultation with farmers, it was agreed that measures to improve biodiversity should be achieved within six years (Swiss Federal Office for Agriculture, 2004). This illustrates that the Swiss policy is not ‘etched in stone’ but is flexible to change to achieve desired outcomes.

Farmers also receive payments for organic farming. Between 1993 and 2002, the number of organic farms in Switzerland increased fivefold to approximately 6,000. Regular outdoor exercise and particularly animal-friendly stabling are part of the organic farming payment program. The animal welfare requirements for this program far exceed the legislation on animal protection. In 2002, 61% of all farm animals had regular outdoor exercise and 30% of all animals were kept in particularly animal-friendly conditions. Every summer over 100,000 cows, 350,000 calves, 220,000 sheep, and 20,000 goats spend three months in the Alpine pastures. Farmers receive payments on the condition that they farm the Alpine pastures in an environmentally sound manner (Swiss Federal Office for Agriculture, 2004).

Switzerland appears to address this policy gap by paying farmers for a variety of ecosystem goods and services. Similar to England, Switzerland has developed programs to address different types of farming and different ecosystem goods and services. It appears as though any farmer could take advantage of one or more of the programs offered. The Swiss programs are particularly interesting because they don’t just preserve bits and pieces of wildlife habitat, but they seek to provide contiguous areas for wildlife. As noted in Chapter 2, fragmentation of wildlife habitat poses a serious threat to wildlife populations. In other words, the Swiss policy appears to provide tangible benefits to both farmers and wildlife. In doing so, it also provides ecosystem goods and services for the general public.

13.4 Key Policies

In this section I draw on Step III – Part 2 of the policy review process described in Chapter 9 to describe some policy options for Canada. While any of the policies from the countries I reviewed help to answer my final research question, I have selected what appears to be the best policy to fill each policy gap.

Policy gap 1: Lack of policy coordination

The best example of policy coordination appears to come from Australia. They have a long track record of success with the Landcare program. Through their Caring for Our Country initiative, they have integrated the Landcare program with other natural resource management programs. They have responded to flaws in these programs by combining them to improve program efficiency and efficacy. Australia has also illustrated that they are willing to revisit their policies if they are not achieving the expected results. This reflects an adaptive policy approach.

Perhaps most importantly, they have an overarching policy framework guiding land stewardship across Australia, including agri-environmental stewardship. The framework includes horizontal policy integration between agricultural and environmental departments and vertical integration with state governments, regional bodies, and non-government organizations. Lack of integration between government departments in Canada and BC was identified through the interview analysis as impeding the development of the DFWT. In theory, Caring for Our Country provides the common vision necessary to encourage enhanced cooperation between departments.

Policy gap 2: Lack of long term government funding for agri-environmental NGOs

The best example of consistent, long term funding for NGOs also appears to come from Australia. As part of the national policy framework (Caring for Our Country), funding is provided to organizations (including NGOs) to coordinate on-the-ground programs at the local level. DFWT's on-the-ground programs were identified as its greatest accomplishment. The Australian approach appears to recognize the importance of NGOs and the extension services they can provide.

Policy gap 3: Lack of compensation for ecosystem goods and services

All of the countries reviewed provide compensation for ecosystem goods and services to some extent. However, England appears to have the most comprehensive program for farmers. All farmers are eligible to participate in one or more of the schemes. The amount of compensation is tied to the scheme chosen by the farmers. There are many management options to choose from (e.g. hedgerows, buffer strips, grasslands). These options generally provide some benefit to both agriculture and wildlife.

Interestingly, FWAG acts as a liaison between government and farmers, helping farmers to make the most of the programs. FWAG charges a fee to provide this service, so the program indirectly funds FWAG. If such an agri-environmental stewardship program was launched in Canada, perhaps the DFWT, and other agri-environmental NGOs, could provide this liaison service for a fee. This may provide a more secure funding base for agri-environmental NGOs such as the DFWT.

13.5 Summary

This chapter provided an overview of the policy framework in Canada and BC in the context of my research. The overview illustrated how federal and provincial agricultural and environmental departments operate apart from each other. Each department has its own mandate focused on either agriculture or environment. However, both the federal and provincial departments of agriculture do address agri-environmental stewardship to some degree. The environmental departments, on the other hand, do not appear to address agri-environmental stewardship at all.

I provided a summary of agri-environmental policies from Australia, England, and Switzerland in order to illustrate what these countries are doing to encourage agri-environmental stewardship and to answer my final research question. I then selected those policies that I thought best met the policy objectives in order to highlight those policies that appear to best address the issues that were raised in the interview and policy analysis. In theory, any of the agri-environmental stewardship policies I identified could be used by Canada to encourage agri-environmental stewardship. There would be financial and political implications for all of these policies, but it was not within the scope of my research to delve into the issues associated with implementation of each policy. In the next chapter I provide a general discussion of my research results, drawing together theory, policy, and practice.

CHAPTER 14

General Discussion

14.1 Introduction

In this chapter I compare my research findings to previous research and discuss my findings in the context of the theoretical frameworks in which my research is framed. I also explain how my research links to global issues and provide some insight into the overarching research problem I identified in Chapter 7 by explaining how the DFWT has managed to reconcile some of the challenges associated with producing food for a growing population on a diminishing agricultural land base, while still providing wildlife habitat on or around farmland.

14.2 Linking Global Issues to Local Action

In Chapter 2, I explained how human behaviour is contributing to societal demise. For example, Fowler and Hobbs (2003) found that human CO₂ production, energy use, biomass consumption, population size, and geographical range differ from other species by orders of magnitude, and concluded that humanity is not currently sustainable (Fowler and Hobbs, 2003). Diamond (2005) identified intensification of agriculture as a precursor to societal collapse. In his review of six culturally complex societies, Diamond (2005) found that, in most cases, population growth pushed people to farm land more intensively and to expand farming from prime agricultural land onto marginal lands. These marginal lands were eventually abandoned because of the damaging effects of intensive agriculture and prime agricultural land deteriorated in quality to the point where there was not enough food being produced to support the population. This resulted in competition for remaining resources, culminating in wars, starvation, and disease which led to the downfall of the civilization (Diamond, 2005).

Diamond (2005) developed a five-point framework of contributing factors that led to societal collapse: environmental damage, climate change, hostile neighbors, decreased support by friendly trade partners, and society's response to environmental problems. He found that, while all of these factors may or may not contribute to the collapse of a civilization on their own, society's response to environmental problems is always significant. Whether or not a society solves, or attempts to solve, its environmental problems depends on its social, political, and economic institutions, as well as its cultural values (Diamond, 2005).

While Delta may not have been on the brink of collapse prior to the formation of the DFWT, I found some similarities between Diamond's descriptions of the issues that led to societal downfall and the conflicts that were occurring in Delta prior to the formation of the DFWT. For example, population growth has led to development pressure and competition for resources in the ALR. Land speculation is driving up the price of farmland, making it difficult for farmers to expand their operations. As the cost of farming increases, farmers are forced to make decisions based primarily on economics, such as switching to blueberries, to remain competitive. These business decisions may bolster the farming community (in the short term), but they also remove valuable wildlife habitat. Some interview respondents said they felt that traditional soil-based farming (e.g. annual crops) was simply not economically viable.

As discussed in Chapter 4, only 52% of Delta's farmland is owned by farmers. The remainder is rented, leased, or crop shared (Statistics Canada, 2006e). Klohn Leonoff Ltd. et al (1992) found that short term leases often lead to poor soil management because farmers are reluctant to invest in long term soil management practices since they don't know if they will be farming that land in the future. However, based on the research conducted by Fraser (2004), the DFWT grassland set-aside program seems to counteract the negative impact that short-term leases have on land management. Fraser (2004) found that the payments offered by the DFWT for grassland set-asides are enough of an incentive for farmers to take part in the program, even though they may not farm the land long enough to receive any long-term agricultural benefits. The DFWT is providing a service to the community that is helping to offset deterioration of agricultural land, thereby addressing one of the issues Diamond found to be a precursor to societal collapse.

My research found that competition over resources prior to the formation of the DFWT was not limited to humans competing for agricultural land, but also involved wildlife, particularly migratory waterfowl, competing for resources. The economic losses were borne by the farmers alone because there was no compensation for damage. Some farms were converted to more intensive forms of agriculture (e.g. greenhouses) to increase revenues. Meanwhile, conservationists were angry that farmers were not doing more to provide habitat for wildlife and were particularly frustrated that greenhouses were being built on prime agricultural land. Conservationists were also upset when the Agricultural Land Commission changed its policy to allow golf courses as an outright use on agricultural land (Order-in-Council 1141/88). This led

to a flood of applications from landowners who were interested in improving their financial situation by converting some or all of their farmland to a golf course. The combination of these contentious issues created a 'war' between conservationists and farmers. Fortunately, the two sides responded to the problems and decided to work together to try to solve them, illustrating that human behaviour can also contribute to sustainability. In this case, society's response to the environmental problem was a positive one, and helped to resolve some of the issues.

Based on my research results, the formation of the DFWT has helped to reduce the tension between conservationists and farmers in Delta. However, there are other issues that threaten agriculture and wildlife habitat locally and globally. In Chapter 2, I explained that resource depletion is threatening agriculture and wildlife habitat around the world (World Bank, 2008). Modern agricultural practices contribute to resource depletion and alter natural ecosystems. For example, intensive tillage, monocultures, short crop rotations, and leaving soil exposed after harvest contribute to soil loss and degradation (Gliessman, 2000). The DFWT has addressed some of these issues through its on-the-ground programs that improve soil and provide wildlife habitat (e.g. cover crops, grassland set-asides). Interview respondents identified the DFWT on-the-ground programs as its top accomplishment, explaining that these programs had helped to restore the quality of the land and provided important habitat for a wide variety of wildlife. The agroecological approach used by the DFWT helps to restore natural ecosystems.

Another threat to agriculture (and society in general) is the consolidation of small farms into large farms (Pretty et al., 2001; Gliessman, 2000), leaving the growing of food in the hands of fewer and fewer people. Local knowledge about farms and ecosystems is being lost as family farms disappear and as children of farmers leave the farm for higher paying jobs in the city (Gliessman, 2000). In Canada, the number of farms dropped by 7.1% between 2001 and 2006 (Statistics Canada, 2006c). The average farm size grew from 274 ha to 295 ha during the same time period, although the total area of agricultural land in Canada remained the same at 68 million ha (Statistics Canada, 2008b). In BC, the number of farms dropped by 2.2% between 2001 and 2006 but average farm size increased from 128 ha to 143 ha (Statistics Canada, 2006c). In Delta, between 2001 and 2006, the number of farms decreased from 196 to 180 and the number of farm operators decreased from 280 to 260 (Statistics Canada, 2006e). It is clear that these global trends are also manifested at the local level.

However, unlike some communities, Delta has managed to retain much of the local knowledge needed to farm the land sustainably. As noted in Chapter 4, Delta has a historic and resilient farming community (Saddlemyer et al., 2001). The Delta Farmers' Institute (DFI) has been in operation since 1898 (BCMAFF, 1996). The DFI played a key role in the formation of the DFWT. The DFI continues to play an important role in the development of the DFWT because three board members on the DFWT Board of Directors are appointed by the DFI (DFWT, 1993).

Unfortunately, the ageing population appears to be affecting both the DFI and DFWT. In my research, some interview respondents said that they were concerned that both the DFI and DFWT needed new members because many members were getting old and 'new blood' was needed to invigorate both organizations. As noted in previous chapters, farmers are ageing across the country. Between 2001 and 2006 the average age of farmers increased from 49.9 years of age to 52.0 years of age. In BC, the average age of farmers was the highest at 53.6 years of age (Statistics Canada, 2008b). Delta is no exception to this trend. In 2006, the average age of farmers was 54.6 years of age, exceeding both the national and provincial average (Statistics Canada, 2006e).

The ageing farm community may have a negative effect on the DFWT. For example, the cost of agricultural land in Delta could deter new farmers. Additional costs, such as labour, combined with narrow profit margins for most agricultural commodities, add to the financial burden. New farmers are more likely to start intensive farming operations in order to generate sufficient returns to pay their debts. Some of the farmers I interviewed thought that soil-based farming was not profitable enough to continue in Delta, and may eventually come to an end. This could also mean an end to the DFWT and much of the wildlife habitat in Delta.

While the DFWT has been successful at addressing many issues that are global in nature, this is one issue that the DFWT may not be able to affect. Changes in agriculture, driven in large part by the global economy, could change the agricultural landscape, which in turn, would change the habitat mosaic currently available to wildlife in Delta.

Another global issue that is threatening the diversity of habitat available for wildlife is the increased demand for biofuels. This has led to an increase in the cost of corn (which is used as a biofuel), making it more expensive to feed livestock such as cattle. This, along with falling

cattle prices, may deter farmers from raising cattle in the future. This issue was brought up by a farmer who raises beef cattle in Delta. This farmer explained that the increased cost of corn combined with the low prices paid for beef cattle was making it uneconomical to raise beef cattle.

While cattle production can also contribute to climate change (e.g. methane production), switching from extensive forms of cattle production (i.e. pasture based) to more intensive forms of agriculture may not only contribute to climate change, but could also result in a loss of wildlife habitat (i.e. pasture). It would also mean a loss of manure which can be used to improve soil. However, there is not much the DFWT can do to deter biofuel production and encourage cattle production apart from offering incentives for agri-environmental stewardship.

Climate change poses a more serious threat to the DFWT (and humanity in general). Since most of the agricultural land in Delta is at, or below, sea level, it is highly susceptible to rising sea levels. There is very little that the DFWT can do to stop this from happening. However, the DFWT programs could assist in changing farming practices by encouraging the retention of vegetation (e.g. grassland set-asides, cover crops) which can help to sequester carbon. Soil-based farming is also likely to make a lesser contribution to climate change than intensive agriculture because the latter generally requires greater fossil fuel inputs.

In other words, society's response at the local level may not be enough to counteract global market forces. There needs to be broad policy support for agri-environmental stewardship. Pretty explains that some countries have seen progress on agricultural sustainability, but oftentimes "...progress occurs in spite of, rather than because of, explicit policy support" (Pretty, 2002, p. 73).

Policy appeared to enable the formation of the DFWT (i.e. YVR Wildlife Stewardship Fund), but policy also appears to have impeded its development. Policy could undermine the work of the DFWT, and similar organizations, over the long term unless policy is changed to encourage agri-environmental stewardship. The DFWT could just be a localized success as described by Pretty:

Sustainable agricultural systems can be economically, environmentally and socially viable, and can contribute positively to local livelihoods. But without

appropriate policy support, they are likely to remain, at best, localized in extent and, at worst, may simply wither away. (Pretty, 2002, p. 73)

In BC, policy protects agricultural land to some extent through the ALC Act. However, the interview responses indicate that the ALR is not being adequately protected from fragmentation, which is compromising the ability of the agricultural community to function optimally. Fragmentation occurs when land is removed from the ALR and also when land in the ALR is used for purposes other than agriculture. According to a 2002 agricultural land use inventory conducted by the BC Ministry of Agriculture, Food and Fisheries (now the BC Ministry of Agriculture and Lands), only 55% of the ALR in Delta has agriculture as its primary use (BCMAFF, 2004). Some respondents felt that the ALC should take measures to ensure that land in the ALR is being used primarily for farming. The ALC appears to be aware of this concern because it has recently established its first ever compliance and enforcement team to “...ensure land in the Agricultural Land Reserve is not used inappropriately” (ALC, 2009, <http://www.alc.gov.bc.ca/>). This new team may help to address some of the issues raised by respondents.

Interestingly, the major developments in Delta (e.g. Deltaport, Gateway) that have resulted in the fragmentation of agricultural land are government projects. It may be that the ALC Act is not the culprit in this case, but government agencies usurping the powers of the ALC in order to achieve their own development goals. This illustrates, at best, a lack of policy coordination between government agencies and, at worst, a systemic ignorance about the true value of agricultural land to farmers, wildlife, and society as a whole. It demonstrates that governments view farmland as an inferior investment compared to industrial development and international trade.

This is linked to our current market driven economy which underestimates the long-term value of agricultural land. As discussed in Chapter 5, neoclassical economics posits that human capital and natural capital are highly substitutable. However, within the ecological economics paradigm, human capital and natural capital are viewed as complementary. Natural capital and human capital may have been good substitutes when there were plenty of resources, but now, as our resources are drawn down, human capital has become dependent upon natural capital. However, economic policy and economic decisions are still largely driven by the neoclassical perspective that the two forms of capital are good substitutes. This perspective, combined with

high discount rates that favour development of agricultural land to achieve higher returns over the short-term, results in a loss of agricultural land to uses that are deemed to be the highest and best use of the land based on conventional economic rationale.

Discounting is used to estimate the present value of a project or policy by examining future dollar benefits and costs. This is done to determine whether the present value of benefits is worth the present value of the costs (Loomis and Helfand, 2001). A low discount rate favours the conservation of resources, while a high discount rate favours present value over future value (Costanza et al., 1997). For example, the future benefits of expanding the port and road system in Delta may appear to exceed the present value of benefits provided through agriculture. However, Olewiler's (2004) study found that non-market goods, such as the provision of wildlife habitat, are not adequately documented or valued in our current market driven economy, so it may not even be possible to calculate the true value of the land for both food production and wildlife habitat (over the long term) (Olewiler, 2004). Society's inability, or unwillingness, to adequately value agricultural land and non-market goods has resulted in an overexploitation of resources. This is not sustainable over the long term and eventually we will run out of resources altogether (Brown, 2005).

14.3 Linking Theory to Practice

In Chapter 5, I explained that I was taking an interdisciplinary approach to my research because I wanted to explore the connections within and between different theoretical frameworks in order to identify the threads that link public policy and community action to agri-environmental stewardship. I described how modernist thinking had resulted in a separation of nature and society known as Cartesian dualism (Pretty, 2002). I explained how Pretty describes this as "enclave thinking" (Pretty, 2002, p. 13) where nature is seen as having distinct boundaries. This leads to the creation of parks or protected areas resulting in a further separation of people and nature. Pretty explains that these enclaves may be too small to be socially or ecologically viable. Protected areas may contribute to a mindset in which destruction of the surrounding landscape may occur based on the notion that there are protected areas for nature (Pretty, 2002).

This is particularly relevant to my research because one of the top conflicts prior to the formation of the DFWT identified by respondents was the acquisition and management of the Alaksen National Wildlife Area by the federal government. Prior to the formation of the

DFWT, the DFI and Delta Soil and Water Conservation Group (DSWCG) sent letters to various government officials explaining that government acquisition of farmland for wildlife was of no benefit to the agricultural community, that the long term viability of the agricultural community was an essential component of maintaining wildlife habitat, and that financial resources (i.e. YVR mitigation fund) should be put into a trust fund to be used to enhance agricultural productivity and sustainability of farmland in Delta (DFI/DSWCG, 1992).

This approach contributes to agricultural sustainability and provides wildlife habitat without creating a 'protected enclave'. While parts of Alaksen NWA are farmed, some interview respondents said that farmers did not want to farm Alaksen anymore because farmers found it too frustrating trying to farm the land under Environment Canada's direction. It was also pointed out by a number of respondents that farmers knew the land the best, and they should be given the freedom to farm using incentives for land stewardship rather than regulations. One respondent noted that farmers are very entrepreneurial, and if you give them the opportunity to earn more money through land stewardship they will do whatever they can to optimize their returns. On the other hand, if you create regulations that they must follow, they will do the minimum amount of work required to meet the regulations. In other words, give farmers the freedom to be creative and they will flourish, but give farmers constraints and they will grudgingly oblige. This is why the work that the DFWT does is so important. They work with farmers to come up with creative solutions that benefit both agriculture and wildlife habitat. This is also consistent with Pretty's suggestion that nature needs to be protected at a landscape level, rather than in isolated enclaves (e.g. protected areas) (Pretty, 2002). Some respondents pointed out that it would not be possible for the government to own all the land needed to provide wildlife habitat, particularly for the millions of birds visiting Delta each year. By working with farmers across Delta, the DFWT creates a tapestry of habitat across the landscape, meeting the needs of different wildlife species while helping to sustain the farming community.

It is this connection with the community that helps to define the DFWT. In Chapter 5, I discussed how agricultural extension is an information exchange system that can be used to share knowledge about the theories and practices of sustainable agriculture and agroecology. Röling and Wagemakers (1998) explain that agricultural extension can be seen as a mechanism for assisting social learning through communication and information sharing in order to

develop appropriate responses to changing conditions. The DFWT appears to be taking this approach in its operations. I discuss this in more detail below.

Röling and Pretty (1997) explain that agricultural extension plays an important role in sustainable agriculture and identified three major lessons to help achieve sustainable agriculture through agricultural extension. My research showed that the DFWT provides a variety of agricultural extension services that are consistent with these three lessons. The first lesson, that extension can be used to help explain environmental issues and to test the feasibility of sustainable practices, is addressed by the DFWT through their various on-the-ground programs. The second lesson, that extension(ists) must make use of farmers' local knowledge and work together with farmers, is fulfilled by the DFWT through the composition of the Board of Directors (i.e. three farmers, three conservationists, two at-large directors) and the consensus-based decision making approach used by the Board. This ensures that farmers are given an opportunity to share their knowledge with others. It also gives farmers input into the types of on-the-ground programs that are developed by the DFWT. The third lesson, that extension should emphasize facilitated learning and draw on expert advice when needed, is addressed by the DFWT through ongoing research and liaison with post-secondary institutions and government agencies. The DFWT clearly provides a variety of extension services that promote sustainable agriculture and agroecology. While some of the funding for this comes via the YVR Wildlife Stewardship Fund, it does not appear as though the significance of their role in putting the theory of sustainable agriculture and agroecology into practice through agricultural extension is recognized at a broader government level. If it were, then funding (for these services) should not be an issue. However, funding was identified as the key challenge facing the DFWT.

Around the world, NGOs are playing an increasingly important role in agricultural extension (Alex et al., 2004; Röling, 1988). Alex et al. (2004) point out that agricultural extension is in a state of transition, with a move away from public extension towards decentralization of extension, cost recovery, participation by stakeholders, privatization, and delivery of extension through a pluralistic approach to financing and delivery. NGOs are useful partners in agricultural extension because they are more familiar with local situations and are able to adapt to local needs (Alex et al., 2004).

Röling (1988) says that local NGOs usually focus their work on the local community and are often not capable of expanding their operations to a national scale. The size of the organization and the funding they receive can constrain their ability to deliver projects over a wider area. Some interview respondents noted that the DFWT has intentionally stayed small and the organization may not work at a broader level because its success is based on the fact that it is part of the community and aware of specific community needs. Instead, some respondents suggested that the DFWT could be used as a model for similar organizations and perhaps a consortium of trusts could be set up around the province.

14.4 DFWT as a Model

In Chapter 5, I reviewed the research conducted by Keough and Blahna (2006). They examined ecosystem management and collaboration literature in an attempt to identify how social and ecological factors are integrated in collaborative management and why they are effective. They found that successful collaborative efforts resulted from meaningful stakeholder participation, development of plans that were economically feasible, and involvement of stakeholders in key social, ecological, and economic issues (Keough and Blahna, 2006).

Keough and Blahna (2006) identified eight factors that were important for integrative collaborative ecosystem management:

1. integrated and balanced goals
2. inclusive public involvement
3. stakeholder influence
4. consensus group approach
5. collaborative stewardship
6. monitoring and adaptive management
7. multidisciplinary data
8. economic incentives

In my research I found that the formation and development of the DFWT has involved many of these factors. Although there was a great deal of tension between farmers and conservationists prior to the formation of the DFWT, interview respondents indicated that the two sides tried to work through their differences by identifying common goals. While there was not inclusive public involvement in terms of the entire community, the preDFWT meetings did involve a wide range of stakeholders including farmers, conservationists, post-secondary researchers, and

government representatives. Stakeholders certainly appeared to have an influence in the formation of the DFWT. For example, some stakeholders wrote letters to government officials requesting that the YVR mitigation fund be put into a trust so that farmers could enhance agricultural sustainability and wildlife habitat (e.g. DFI/DSWCG, 1992).

Key stakeholders (i.e. farmers and conservationists) continue to influence the DFWT through equal representation on the Board of Directors. Collaborative stewardship is the cornerstone of the DFWT. Interview respondents explained that farmers own the land on which the wildlife depend, and without the farmers' cooperation, there would be no DFWT agri-environmental stewardship programs. The DFWT regularly monitors the efficacy of their programs and adapts them as necessary (DFWT, 2006). Multidisciplinary data is collected by the DFWT or on behalf of the DFWT. For example, at this point in time, there is a study that is examining which winter wheat grows best in Delta when exposed to waterfowl grazing (DFWT, 2008), another study analysing stewardship programs at the landscape level through GIS mapping (DFWT, 2008) and my study which links many disciplines together and will be available to the DFWT and other organizations for future use. Economic incentives are also at the heart of the DFWT agri-environmental stewardship programs. In summary, the DFWT appears to be a good example of an organization that has used integrative collaborative ecosystem management to succeed.

After studying nearly 200 cases of collaboration in natural resource and environmental management, Wondolleck and Yaffee (2000) identified eight themes they found to be critical to successful collaboration:

1. Build on common ground established by a sense of place or community, mutual goals or fears, or a shared vision
2. Create new opportunities for interaction among diverse groups
3. Employ meaningful, effective, and enduring collaborative processes
4. Focus on the problem in a new and different way by fostering a more open, flexible, and holistic mind-set
5. Foster a sense of responsibility, ownership, and commitment
6. Recognize that partnerships are made up of people not institutions
7. Move forward through proactive and entrepreneurial behavior; and

8. Mobilize support and resources from numerous sources (Wondolleck and Yaffee, 2000, p. 20-21).

My research revealed many similar themes in the formation and development of the DFWT. As noted above, there was a great deal of tension between farmers and conservationists prior to the formation of the DFWT. However, interview respondents explained that, although the two sides were highly polarized and opinionated, they made progress by identifying goals they had in common. Municipal representatives helped to facilitate the discussion. They helped to identify common ground between the two groups, focusing on mutual interests rather than conflicts.

The preDFWT meetings offered an opportunity for the two sides to meet face to face, creating new opportunities for interaction among these diverse groups. These meetings appear to have been meaningful, effective, and enduring because they resulted in the formation of the DFWT which ultimately (according to my results) helped to reduce the conflict between farmers and conservationists, improve agricultural viability, and improve wildlife habitat in Delta. It appears as though the preDFWT group did focus on the problem in a new and different way by examining the conflicts within a holistic agri-environmental context. In other words, the group didn't just focus on agriculture or on wildlife habitat, it looked at the two as being intertwined. Through this open-minded process came ideas about creating a farmland wildlife trust. My results indicated that the idea of a farmland wildlife trust was being pondered by both sides and by municipal representatives. One respondent said that lots of people were thinking about the idea of a trust and everyone wants to take credit for thinking up the idea of the DFWT, which, the respondent noted, is probably a good thing because it means that everybody played a role in, and took ownership of, the solution.

My interview results seem to indicate that the long-standing institutional divides at the federal, provincial, and municipal levels of government that led to some of the conflicts in Delta were set aside so that partnerships could develop between participants. However, interview respondents also noted that while some government representatives were very helpful, others seemed to impede discussions and hamper progress.

The preDFWT group moved forward in an entrepreneurial and proactive manner in attempting to secure monies from the YVR habitat mitigation fund to finance agri-environmental

stewardship programs. My interview results showed that there were many people who took credit for securing the YVR fund. However, like the idea of the DFWT, it is less important to identify who secured the money, and more important that those involved felt they played a role in securing the money. The Environmental Assessment Act – YVR Wildlife Stewardship Fund was identified as a policy that enabled the formation of the DFWT.

The DFWT continues to move forward by monitoring and adapting its programs. It has mobilized support and resources from numerous sources in the start-up of the organization and in its ongoing operations. Over the years, the DFWT has received funding from a variety of government and non-government agencies as well as a large endowment from the Delta Agricultural Society. Farmers continue to support the DFWT by taking part in the DFWT on-the-ground programs. The DFWT also publishes a regular newsletter and holds a large fund-raising BBQ every two years. In summary, the actions taken in the formation and development of the DFWT appear to be consistent with the themes for successful collaboration identified by (Wondolleck and Yaffee, 2000).

Rojas et al. (2009) identified eight principles of adaptive resolution to environmental conflicts. They found that when these principles were put into practice they helped to create broadly accepted and mutually accepted solutions. They also found that these principles can reduce the vulnerability of affected communities while improving the adaptive capacity of the communities and of the institutions involved in environmental governance (Rojas et al., 2009).

The eight principles Rojas et al. (2009) identified are:

1. Open, transparent, convenient, and equitable access to information
2. Symmetry of power relations during negotiations
3. Recognition and respect for different sets of values and perspectives
4. Preserving the integrity of the ecosystem and restoring biodiversity
5. Strengthening the social networks of involved communities
6. Strengthening the technological capacities of businesses and institutions to assist in their adaptation to climate change.
7. Improvement of negotiation skills and creation of social organizations
8. Strengthening the democratic, moral and technical authority of the state (Rojas et al., 2009, p. 30-31)

Many of these principles are reflected in the experiences of the DFWT. In terms of the first principle, there did not seem to be completely open, transparent, convenient, and equitable access to information. Respondents indicated that the allocation of the YVR Wildlife

Stewardship Fund acted as an impeding policy in the formation of the DFWT. They complained that the process wasn't clear as to who would get the money or how the competition would take place. Some respondents felt that the government wanted to control the money so that they could use it to buy additional wildlife refuges. This created mistrust between the community and the government. Respondents did not indicate any other issues related to the sharing of information.

Respondents explained that municipal government representatives acted as facilitators in the preDFWT meetings. They managed to calm the tempers of the two sides and searched for common ground that the two sides could share. In doing so, they helped to create a symmetry of power relations during the negotiations. Each side had the opportunity to express the key issues that concerned them. In doing so, the group came to realize that their problems were intertwined and they needed to work together to protect both wildlife habitat and agricultural viability.

Initially it does not appear as though there was recognition and respect for different sets of values and perspectives. However, as noted above, the municipal representatives helped the two sides to find mutual respect. Without question, the DFWT addressed the fourth principle of preserving the integrity of the ecosystem and restoring biodiversity. In fact, this is a key element of the DFWT.

The social networks of the involved communities (farmers and conservationists) did improve as a result of the formation and development of the DFWT. The top conflict identified by respondents prior to the formation of the DFWT was the tension between conservationists and farmers. The top driving force in the formation of the DFWT was the willingness of agricultural and conservation interests to cooperate. This helped to create an internal solidarity within the group with both sides working collaboratively to conserve wildlife habitat and improve agricultural viability.

While the technological capacities of businesses and institutions to assist in their adaptation to climate change was not specifically addressed in my research, it does appear as though the

DFWT has helped farmers (who are private businesses) to pursue activities that may help to mitigate climate change (e.g. grassland set-asides sequester carbon).

Negotiation skills do appear to have improved through the formation of the DFWT. Initially the meetings were very tense, but once the two sides realized they needed each other to succeed, they worked together to negotiate the best outcome. In other words, neither side backed down from their goals, they simply worked together to find a way for both sides to win.

It is difficult to say whether the democratic, moral, and technical authority of the state was strengthened as a result of the formation and development of the DFWT. I do think that those government representatives who were involved in the preDFWT meetings were very proud that they were part of such a successful community based collaborative process. In that sense, I think the democratic and moral authority of the state was strengthened because the process empowered government representatives to be part of the solution. It also showed that community members and government representatives can collaborate on a level playing field, where government representatives are seen as equals, not authoritative figures. This reduces the likelihood of coercion and fear-based decision making.

14.5 Linking Theory, Policy, and Practice

The majority of interview respondents said that the formation of the DFWT helped to reduce tension between farmers and conservationists by, among other things, providing a forum for communication to help solve agri-environmental conflicts. This forum also provides for the exchange of knowledge between farmers, conservationists, and DFWT staff so that programs can be developed that reflect the needs of farmers and wildlife. As local knowledge about farming and ecosystems is lost around the world, Delta is in the enviable position of having an organization that helps to retain and build that knowledge.

As noted in Chapter 5, Röling and Wagemakers (1998) explain that the transformation to sustainable farming involves six interlocking dimensions.

1. Changing agricultural practices at both the farm and higher system level
2. Learning the practices
3. Facilitating the learning
4. Supportive institutional frameworks

5. Supportive policy frameworks
6. Managing change from conventional agriculture to sustainable agriculture across each of these dimensions (Röling and Wagemakers, 1998, p. 7)

My research indicates that the first three dimensions are being addressed by the DFWT through its on-the-ground programs and organizational structure (i.e. Board of Directors). However the last three dimensions are outside the scope of the DFWT. My research indicates that there is a need for stronger institutional support, more supportive policy frameworks, and the change from conventional to sustainable agriculture is not yet occurring over each of these five dimensions. I discuss these below.

In Chapter 6, I explained how Olewiler (2004) conducted four case studies to demonstrate how preservation of natural areas in Canada would generate benefits to society. However, Olewiler (2004) was unable to calculate the value of ecological services provided by agricultural land due to a lack of data (Olewiler, 2004). This is a pervasive issue and an example of poor institutional support. It leads to uniformed land use policies and inefficient allocation of resources (Olewiler, 2004). Javorek et al. (2007) suggest that information should be collected locally and regionally so that planners can work with landowners to set habitat goals and objectives for a variety of species.

Policy support is also lacking. Oreszczyn and Lane (2001), in their comparison of cultural perspectives of hedgerows in England and Canada (Delta), found that farmers shared similar concerns about providing 'free board' for wildlife. Farm economics was identified as the main barrier to conservation by farmers in both countries. My research also found that farmers were reluctant to provide wildlife habitat if it meant additional costs for them. Olewiler (2004) suggests that policies should be designed to provide incentives for landowners to conserve their land to protect nature. She explains that farmers usually do not receive payment for the ecosystem goods and services that are provided through their land and farming techniques, so they lack the incentive, and perhaps the ability, to protect nature (Olewiler, 2004).

In my research, interview respondents indicated that farmers should be paid for providing wildlife habitat (ecological goods and services). However, the value of the agri-environmental stewardship programs offered by the DFWT is not easily captured because they lack the characteristics of a good or service that can be sold as a commodity. Manno (2000) points out

that the easier a good or service is to package, transport, standardize, and assign property rights to an object, the easier it is to sell as a commodity. Manno (2000) explains that commoditization does not work well with unique, knowledge based, cooperative, process-oriented systems (Manno 2000). This description accurately describes the services offered by the DFWT.

In addition, knowledge-based goods and services that can't be packaged and sold around the world do not contribute to the global economy. International trade agreements also perpetuate the production of commodities over place-based goods and services that benefit local communities. Trade policies have tended to focus on the economic development of agriculture without considering the impact on, or the importance of, biodiversity in maintaining sustainable agro-ecosystems (CBD, 2008). Javorek et al. (2007) say that a holistic approach is needed in policy development to address environmental and economic sustainability in agriculture.

My research indicates that farmers will provide wildlife habitat (ecosystem goods and services) if they are adequately compensated. My research also shows that government is not paying for these goods and services and that organizations such as the DFWT, despite their best efforts, may be unable to provide agri-environmental stewardship programs at an optimal level due to a lack of consistent long term government funding. Government should be paying for these goods and services since they are non-market goods that benefit all of society. In fact, the Swiss government has acknowledged this, explaining that: "As long as negative and positive externalities of economic activities are not internalized and public goods are demanded, public intervention will be needed" (Botsch, 2005, p. 3).

The Canada and BC governments have been slow to respond to the need to pay for ecosystem goods and services. The BC Agriculture Plan does recognize the damage caused by wildlife and has introduced a program to compensate farmers for wildlife damage. However, this does not go far enough, because the program does not pay farmers for the non-market goods they provide on their farms (e.g. wildlife habitat).

In Chapter 5, I pondered whether we should even attempt to value nature and the services she provides or whether we should protect nature out of a sense of moral obligation. Interestingly, some interview respondents said that part of the conflict between farmers and conservationists prior to the formation of the DFWT was a real or perceived belief that farmers *ought to be*

providing wildlife habitat on their farms, presumably out of some moral obligation. Oreszczyn and Lane (2001) found that farmers from Canada (Delta) and England felt that their contribution to wildlife habitat conservation was not recognized by the general public. Similar comments were made by interview respondents in my research.

Some farmers told me that they felt pressure from the conservation community to provide additional wildlife habitat, but they were not being compensated for the damage that was occurring so were reluctant to voluntarily provide any wildlife habitat. Some conservationists told me that they thought farmers should be providing wildlife habitat, but once they met with the farmers they realized that the farmers were incurring real financial losses and came to realize that farmers should be compensated for this service.

It was this realization, I think, that helped to break the ice between the conservationists and farmers and resulted in them (eventually) working toward a common goal of paying farmers to provide wildlife habitat while also enhancing agricultural viability. While we may indeed have a moral obligation to protect nature, the financial cost of doing so may exceed a personal desire to act in the best interests of nature. Unfortunately, government has been slow to adapt policy to compensate farmers for providing ecosystem goods and services.

In Chapter 5, I explained that I was using the theory of adaptive policy to help frame my research. Lee (1993) explains that policies are experiments and that we should learn from them. My research showed that policies have been slow to adapt. For example, the MBCA was one of the policies that was identified as contributing to the conflicts prior to the formation of the DFWT. This policy was also identified as impeding the development of the DFWT. Based on these findings, the MBCA does not appear to have adapted to the concerns of farmers over the past sixteen years.

One policy that did change was the Order-in-Council (1141/88) that allowed golf courses as an outright use in the ALR. This policy was rescinded in 1991 prior to the formation of the DFWT. Some respondents indicated that conflicts between conservationists and farmers decreased once this policy was rescinded. However, another Order-in-Council (#568) was passed in 2001, which restricted the ability of the municipality of Delta to pass zoning bylaws in the ALR unless they received Ministerial approval. This contributed to the conflict between

conservationists and farmers in Delta because it meant that Delta could not enact the bylaws it had hoped to in order to restrict greenhouse development.

Some respondents felt the FPPA contributed to conflicts in Delta because it is focused on agriculture, and does not consider the negative impacts that agriculture can have on wildlife habitat. The FPPA was enacted by the provincial government in 1996. As long as farmers use 'normal farm practices' and comply with other provincial legislation they are protected by the FPPA. The FPPA defines a normal farm practice as:

- ...a practice that is conducted by a farm business in a manner that is consistent with
 - (a) proper and accepted customs and standards as established and followed by similar farm businesses under similar circumstances, and
 - (b) any standards prescribed by the Lieutenant Governor in Council,
- and includes a practice that makes use of innovative technology in a manner consistent with proper advanced farm management practices and with any standards prescribed under paragraph (b). (FPPA, 1995)

Although not explicitly stated, normal farm practices are based on an industrial model of agriculture because these are considered to be normal farm practices today. As noted previously, today's approach to agriculture (i.e. the industrial approach) has resulted in loss of biodiversity, resource depletion, soil degradation, and an increase in GHG emissions around the world. In addition, small farms may be penalized by the FPPA if they are not be able to meet provincial regulations related to public health and international trade (Campbell, 2006). Ideally, the FPPA should *promote* an agroecological approach to agriculture, rather than focus on those practices that are considered to be the norm today. This would benefit agriculture, the environment, and society over the long term.

Although the majority of policies I reviewed that were identified as impeding the formation and/or development of the DFWT have not shown evidence of adaptation, the BC Agriculture Plan does identify a new policy that will address wildlife damage. Lack of compensation for wildlife damage was identified as a conflict prior to the formation of the DFWT and also identified as an ongoing challenge. The establishment of this policy illustrates that both the federal and provincial governments are aware of the problem and are making efforts to address it. However, as mentioned in Chapter 13, the policy only identifies compensation for wildlife damage and does not include compensation for *providing* wildlife habitat.

Some of the policies I reviewed from other countries did show evidence of adaptation. For example, Swiss policy was revised in 2001 because the quality and location of the areas reserved for ecological compensation were not satisfactory. Financial incentives were introduced to improve the quality of the ecological areas and to link these areas up to form a network (Swiss Federal Office for Agriculture, 2004). Habitat fragmentation limits the ability of wildlife to feed, breed, and disperse, and can pose a serious threat to species survival (ELI, 2003; Fleury and Brown, 1997). By linking up high quality ecological areas, the Swiss government acknowledged that it is not enough to simply set land aside for wildlife, but this land must provide benefits to wildlife. Also, in Australia, policy related to the Landcare program, along with other natural resource programs, was revised in 2008 to streamline natural resource management and reduce bureaucracy (Australian Government, 2008a). These changes reflect a willingness to revisit and adapt policy if it is not achieving the desired outcomes.

14.6 Putting Policy into Practice

In Chapter 13, I explained that, of the agri-environmental policies that I reviewed from other countries, the overarching policy framework from Australia appeared to best address the ‘lack of policy coordination’ gap and ‘lack of long term government funding for agri-environmental NGOs’ gap I identified. I also identified the agri-environmental stewardship programs offered in England as the best option, from the three countries I reviewed, for addressing the ‘lack of compensation for ecosystem goods and services’ policy gap that I identified.

If the Canadian government established a policy framework similar to Australia, based on the principles of sustainable agriculture, it could help to facilitate agri-environmental stewardship in Canada. Such an overarching framework is needed in order to allocate funds specifically for long-term agri-environmental stewardship programs. My research indicated that funding is often targeted for short-term projects and that there is a lack of sufficient long-term funding for on-going programs, such as the agri-environmental programs offered by the DFWT. This creates hardship for the organization and makes it more difficult to recruit farmers because they cannot be certain that the program will be funded in the future. In other words, it makes the organization and its programs less sustainable. Policy reform must include an evaluation of the funding programs that are available in order to facilitate agri-environmental stewardship.

In addition, such a national policy framework could facilitate the establishment of an agri-environmental stewardship program that compensated farmers for providing ecological goods

and services. While the policy framework would provide the overarching guidelines for such a program, there should be flexibility at the local level to adapt agri-environmental stewardship programs to meet the needs of the community. For example, some of the challenges faced by farmers in Delta are relatively unique because of the number of migratory birds that visit the area each year. Local agricultural and environmental knowledge is needed in order to tailor programs to meet the needs of the agricultural community and wildlife in the area. Local NGOs, such as the DFWT, could play a role in administering programs that paid farmers for providing ecological goods and services. This may reduce the administrative burden noted by farmers in the Oreszczyn and Lane (2001) study. This study also found that farmers felt the programs were not flexible enough, as described below.

Oreszczyn and Lane (2001) found that English farmers were critical of the bureaucracy involved in government-led agri-environmental programs such as the Countryside Stewardship Scheme administered by the Department of Environment and Rural Affairs. Farmers criticized the amount of time and commitment required by the farmer, lack of program flexibility, inadequate funding, and a lack of appreciation of the farmer's knowledge of their own farm.

By having a NGO, such as the DFWT, to adapt and administer the programs, local knowledge could be integrated into programs. This may help to reduce the bureaucracy, lack of program flexibility, etc., that farmers face in England. In other words, the strengths of the DFWT appear to be that it works directly with the community, it draws on local knowledge (both agricultural and ecological), and it develops programs that are appealing and effective for the local community, adapting programs to fit individual farms as needed.

If the Canadian government developed a similar policy framework, grounded in the principles of sustainable agriculture, collected data on the value of ecological goods and services provided by agricultural land, and committed to funding agri-environmental NGOs to deliver programs similar to the English programs, then agri-environmental stewardship may become more widespread in Canada. The combination of these approaches would address the final dimension in Röling and Wagemakers (1998) transformation to sustainable farming (i.e. managing change from conventional agriculture to sustainable agriculture across the five dimensions).

14.7 Summary

The formation of the DFWT is an interesting example of how society's response to environmental problems led to an improvement in relations between competing interests (i.e. conservationists and farmers). It also helped farmers become better stewards of the land, improving soil quality, agricultural productivity, and wildlife habitat. These actions address some of the issues Diamond (2005) identified as being precursors to societal collapse.

My results illustrate that the formation and development of the DFWT were consistent with the findings from the ecosystem management and collaboration literature that I reviewed in Chapter 6. My findings also illustrate that the DFWT plays a valuable role in agricultural extension, by facilitating sustainable agriculture and demonstrating agroecological approaches to farming in Delta. However, the DFWT is stymied by the current economic paradigm, which places greater value on developing agricultural land for non-farm purposes than conserving it for food production. This has led to ongoing issues such as land speculation which drives up the price of land for agriculture, government infrastructure projects that facilitate international trade, and non-soil based agricultural intensification.

While it is clear that policy can play a positive role in agri-environmental stewardship (e.g. Environmental Assessment Act – YVR Wildlife Stewardship Fund), government has been slow to react to policy issues, resulting in a lack of policy coordination, lack of funding for NGOs, and lack of compensation for ecosystem goods and services. The government also does not seem to recognize the important role the DFWT plays in putting the theories of sustainable agriculture and agroecology into practice through its agri-environmental stewardship programs. The transition to a more sustainable agriculture will require investment in programs that facilitate learning.

My research has shown that competing interests can work together to address some of the challenges associated with producing food for a growing population on a diminishing agricultural land base, while still providing wildlife habitat on or around farmland (the overarching research problem I identified in Chapter 7). The insights found through this research could help other communities around the world to address agri-environmental issues in a proactive manner. However, the fate of the DFWT is uncertain, as the current policy framework does not appear to encourage agri-environmental stewardship. Government must

acknowledge the contribution that the DFWT has made to sustainability and develop policies that facilitate the work that the DFWT has done.

Government needs to regularly review policies to ensure they are achieving the desired outcomes and are not creating issues such as agri-environmental conflicts. Policies that explicitly support and encourage agri-environmental stewardship need to be developed. Changing conditions such as population growth, climate change, and resource depletion need to be considered when developing such policies. Without such policies, the DFWT may simply fade away beneath policies that promote economic development over environmental sustainability.

CHAPTER 15

Conclusions and Recommendations

15.1 Conclusions

The municipality of Delta has some of the most productive farmland in Canada. It is also situated on the Pacific Flyway, an annual stopover for one million migrating birds. Over the years, conservationists have struggled to ensure that wildlife habitat remains intact for migratory and resident wildlife. Unfortunately wildlife habitat has been disappearing in the Fraser River delta due to agricultural and urban development. This has forced wildlife onto agricultural fields where they consume crops and damage soil. Farmers in Delta have struggled with the impact of waterfowl predation for years.

After many years of conflict between farmers and conservationists, the DFWT was formed in an attempt to address these issues in a proactive manner. This series of events intrigued me. As a resident of Delta at the time, I was aware of the ongoing conflicts between farmers and conservationists. Over the years since the DFWT formed I watched with interest as the organization seemed to flourish and bring calm to the agricultural and conservation communities. Driving through Delta I would see signs in farmers' fields announcing that they were participating in DFWT programs. I would see flocks of swans feeding in fields, bald eagles swooping through the sky, and farmers ploughing the fields. This harmonious scene of agriculture and nature coexisting always struck me as awe-inspiring. This, along with accolades from colleagues and others, led me to choose the DFWT as my case study. I wanted to find out how a relatively small community such as Delta could come together and create this portrait of cooperation.

Consequently, I embarked on a journey to study the DFWT. I was interested, not only in what led to the formation of the DFWT, but also whether policy had played a role in its formation and/or development. Working for local government as an Environmental Planner and for a local environmental NGO, I had found policy to be quite confounding. I was not able to put some of the theories I had learned at university into practice because either there was no policy to enable these theories, or the policy that existed acted as a barrier to implementation. I became very frustrated with policy and wondered whether the DFWT had faced any challenges (or opportunities) related to policy. As a result, I decided to examine how the DFWT formed

and whether policy enabled or impeded the formation and/or development of the DFWT. I developed four research questions to guide me:

1. What led to the formation of the DFWT?
2. Did government policy enable or impede the formation of the DFWT?
3. Did government policy enable or impede the development of the DFWT?
4. What sorts of government policies could be used to encourage agri-environmental stewardship in Canada?

In order to answer these research questions I conducted interviews with 28 individuals who had been involved in the formation and/or development of the DFWT. I also reviewed secondary sources of information to triangulate as many of my results as possible. I identified three key policy gaps and then reviewed agri-environmental policies from three countries and identified a variety of policy options to address these gaps. The answers to my four research questions are summarized below.

15.1.1 Formation of the DFWT

The formation of the DFWT appears to have come about due to a number of conflicts occurring in Delta at the time. These conflicts included: tension between farmers and conservationists over the use of farmland by migratory waterfowl, waterfowl damage to crops and soil, competing interests in the ALR such as land speculation, management of the Alaksen National Wildlife Area, lack of compensation for waterfowl damage, and pesticides which were killing waterfowl and raptors. The degree of conflict was high and the conflicts were having a negative impact on both agricultural and wildlife habitat viability. The key driving force in the formation of the DFWT appeared to be the willingness of agricultural and conservation interests to work together. The involvement of agricultural organizations, municipal representatives, UBC researchers, conservation organizations and individuals, and the availability of money also appeared to help drive the formation of the DFWT.

15.1.2 Role of Policy in the Formation of the DFWT

Overall, government policy appears to have enabled the formation of the DFWT. The availability of the YVR habitat mitigation money helped to kick-start the DFWT. Government policies that allowed federal and provincial government staff to be involved in the process to establish the DFWT also helped in the formation of the DFWT. The legal capacity of a NGO to administer the YVR fund and develop agri-environmental stewardship programs was also a

policy that contributed to the formation of the DFWT. The only policy that was identified as impeding the formation of the DFWT was the manner in which the YVR fund was allocated. The process appeared overly convoluted and frustrated those trying to secure the money for the DFWT.

15.1.3 Role of Policy in the Development of the DFWT

Based on a review of the accomplishments, challenges, conflicts, and other issues facing the DFWT, I determined that government policy appears to have both enabled and impeded the development of the DFWT. The YVR Wildlife Stewardship Fund, AEPI: Delta Forage Compensation Program (DFCP) Pilot Project, Federal government staff involvement, and Greenfields funding have all contributed to the development of the DFWT. However, inaccessible government funds, lack of government funding, lack of policy coordination, economic policy, ALC Act, FPPA, MBCA, international trade agreements, and lack of compensation for ecosystem goods and services appear to have acted as impediments to the development of the DFWT. Policy appears to be limiting the ability of the DFWT to provide agri-environmental stewardship programs in an optimal manner.

15.1.4 Government Policies that Could be Used to Encourage Agri-environmental Stewardship in Canada

I reviewed agri-environmental policies from three countries and found a variety of policies that could be used to encourage agri-environmental stewardship in Canada. In Australia, an overarching policy framework has been developed to guide natural resource management including agri-environmental stewardship. As part of this initiative Australia has committed funding to government and non-government organizations to deliver agri-environmental stewardship programs. This acknowledges the role that NGOs can play in providing extension services. Australia also provides compensation for ecosystem goods and services to farmers and other land managers to accomplish long-term environmental goals on their properties. In England, agriculture and environment are combined under one government agency: the Department for Environment, Food and Rural Affairs (DEFRA). This arrangement supports a more integrated policy environment than currently exists in Canada. DEFRA administers a national program that pays farmers for a wide variety of agri-environmental stewardship initiatives. In Switzerland, agricultural policy has become more holistic. There has been a shift from market support instruments linked to production towards direct payments linked to

ecological requirements. Swiss farmers are paid for various activities that benefit agriculture, the environment, and society. General direct payments compensate farmers for basic tasks such as ensuring food supplies, maintaining the landscape, and contributing to the preservation of rural communities. Farmers may also receive direct payments for participating in voluntary schemes including organic farming, animal welfare programs, and setting aside of ecological compensation areas.

15.1.5 Principles of Collaboration

In Chapter 11, I grouped the lessons learned by the DFWT into three key themes:

People

1. Have equal representation on the Board of Directors and use consensus based decision making.
2. Ensure that staff and advisors have the appropriate expertise and the organization balances the interests of both sides (e.g. farmers and conservationists).

Partnerships

1. Bring opposing sides together and look for advocates to assist in advancing the cause.

Programs

1. Establish effective on-the-ground programs that benefit both wildlife habitat and agriculture.
2. Engage directors in fundraising. Aim for consistent and sufficient funding.

These lessons learned provide a useful basis for the development of some general principles for collaboration and conflict resolution. I have identified four principles based on my research.

1. Discussion

Those involved in the conflict must be willing to meet and discuss their differences. Meetings should take place on neutral ground and should include a wide range of stakeholders (and/or advocates) who can each bring their own expertise and/or concerns to the table. One or more facilitators should be involved to assist in identifying issues and opportunities.

2. Respect

All stakeholders must be treated with the same level of respect. This appeared to be an important turning point in the evolution of the DFWT. Initially there was a lack of respect between conservationists and farmers. However, over time they developed respect for each other. The two sides are no longer polarized. In fact, one respondent told me that now farmers

speak up publically in favour of wildlife habitat protection, whereas prior to the formation of the DFWT they would not because of the stigma attached to supporting the 'other side'.

3. Action

The group must be able to move from discussion to action. For example, the top accomplishment identified by respondents was the DFWT on-the-ground programs. Numerous respondents explained that they would not have continued their involvement with the DFWT if the on-the-ground programs did not exist.

4. Iteration

Collaborative resource management is an ongoing process. Initial conflicts may be resolved, but new conflicts may arise over time. It is important to monitor the efficacy of the actions that result from the collaborative process and to address any deficiencies. If conflicts surface, those involved should return to Step 1 (Discussion) and repeat the process outlined above. While the DFWT does not appear to engage in a formal iterative conflict resolution process, they do have equal representation on their Board of Directors (3 farmers, 3 conservationists, 2 members at large) and use a consensus based approach to make decisions. Respondents explained that this approach meant that both sides were equally represented and the Board provided a forum for discussion between conservationists and farmers. In essence, this approach appears to emulate the principles I have identified.

15.1.6 Summary

My research has contributed to a broader understanding of how competition over agricultural and environmental resources can be resolved. I have shown that community based collaborative resource management can be effective at enhancing agricultural and wildlife habitat viability. Success appears to depend on a combination of bottom-up and top-down approaches. The community must be willing to take ownership of the problem and government(s) must be willing to provide policies that are holistic, supportive, and adaptive.

The DFWT is an example of an organization built by a community that acknowledged and attempted to solve its agri-environmental problems. While the DFWT has demonstrated a great deal of success over the past sixteen years, it continues to face challenges. Many of these challenges are related to policy. Lack of funding (for NGOs) is a policy issue that could probably be addressed in a relatively simple manner. The government already provides funds for various agricultural and environmental programs, illustrating that funds are available. For

example, the Investment Agriculture Foundation has over \$50 million in funds available (IAF, 2007). However, my research indicates that the money from this and other funding programs is difficult for organizations such as the DFWT to access. The government needs to review its funding programs and identify how to make it easier for organizations such as the DFWT to access adequate sustainable funding for projects that have proven to be successful (as well as for new projects).

Compensation for ecosystem goods and services is a somewhat more complicated policy gap to address. The programs offered in Australia, England, and Switzerland illustrate that it is possible to develop national policies that encourage agri-environmental stewardship and pay farmers for providing ecosystem goods and services. However, there are at least two challenges that the Canadian government would have to address in developing such programs. The first is whether such a program would be allowed under existing international trade agreements. The second is how the government would finance the program. These are two areas that I did not examine, but are worthy of further research.

The most insidious threat to wildlife habitat, farming, and the DFWT appears to be related to lack of policy coordination. Agricultural and environmental departments operate in isolation of each other developing policies that meet their departmental mandate but potentially conflict with the mandate of other departments. This departmental differentiation of agriculture and environment reflects a reductionist approach to governance and results in a type of zero-sum game mentality where either agriculture wins or the environment wins, but rarely do both win simultaneously. The impact of these policy decisions is felt at the local level and can create heated conflicts, as they have in Delta.

Policies that focus on economic development over agricultural or environmental sustainability also illustrate a lack of policy coordination. Port, rail, and road development in Delta have been initiated by government to facilitate international trade. Unfortunately, the long-term negative impacts on agriculture and wildlife habitat appear to be less important than the short-term economic gains that these developments promise to bring. The Canadian government could address this lack of policy coordination by either integrating agricultural and environmental departments as England has done (although this would not address the economic component) and/or developing an overarching policy framework to guide integrated natural resource

management as Australia has done. If Canada did this, it would be a bold step towards a more sustainable agriculture and would provide Canadians with the security of knowing that farmers could continue to produce food and provide wildlife habitat over the long term.

The findings from my research will be useful for those interested in community based collaborative resource management. The lessons learned by the DFWT will help people interested in forming an agri-environmental NGO to understand some of the factors that contribute to success. The policy recommendations will be useful for decision-makers and community members who are interested in alternative policy approaches to agri-environmental stewardship. While the actions of one community may not be enough to ensure global sustainability, community based collaborative resource management combined with supportive policies in communities around the world may help to provide the momentum needed for a broad paradigm shift towards sustainable resource management.

15.2 Recommendations

This section identifies some of the recommendations I have for future research. Although my research was interdisciplinary and covered a number of areas, I was not able to explore in detail all of the questions my research raised. Based on my findings, and the urgency of addressing agri-environmental conflicts, I recommend that research be carried out as soon as possible in the following areas:

1. Examine a representative sample of agri-environmental NGOs across Canada to determine how they formed and whether policy has enabled or impeded their formation and/or development. By doing so, we will get a better sense of whether my findings are typical or atypical. In other words, whether the policy gaps I identified affect other agri-environmental NGOs across Canada, or whether they are specific to the DFWT. If the results are similar, impeding policies should be reviewed by federal, provincial, and territorial governments to determine how the policies can be reformed to enable the formation and/or development of agri-environmental NGOs across Canada.
2. Conduct a review of existing government funding programs to determine whether the funds could be better allocated for long-term agri-environmental stewardship programs. This research should be conducted in partnership with agri-environmental NGOs and all levels of government in order to identify where funding is needed, how much funding is needed, and how the funds should be distributed.

3. Investigate the policy implications of a Canadian ecosystem goods and services compensation program based on the programs from Australia, England, and/or Switzerland. This research needs to be conducted within the context of Canada's international trade agreements and should be conducted in conjunction with representatives from each of the three countries so that both the strengths and weaknesses of the programs can be considered. The results of this review should be used to generate options that the Government of Canada can use, in partnership with the provinces and territories, to develop pilot programs that compensate farmers for providing ecosystem goods and services.
4. Conduct an in-depth examination of agricultural and environmental policy in Canada to determine whether it could be better harmonized to encourage agri-environmental stewardship. This research should include representatives from countries with harmonized agri-environmental policies, along with representatives from all levels of government in Canada, in order to identify feasible options for Canada. The research must also examine the steps that need to be taken to harmonize agri-environmental policy in Canada. For example, the Constitution Act, 1982, may need to be amended to update the sections on the division of powers (which were established in 1867 before sustainability became a concern) to reflect a more holistic approach to natural resource management.

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Agricultural Land Commission (ALC) (2009). Home page. Agricultural Land Commission, May 15, 2009 <<http://www.alc.gov.bc.ca/>>

Agricultural Land Commission (ALC) (2008). Home page. Agricultural Land Commission, June 18, 2008 <<http://www.alc.gov.bc.ca/index.htm>>

Agriculture and Agri-Food Canada (AAFC) (2008a). Mandate. Agriculture and Agri-Food Canada, September 17, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1173965157543&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008b). Agricultural Policy Framework. Agriculture and Agri-Food Canada, September 17, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/displayafficher.do?id=1173969168670&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008c). APF: Environment. Agriculture and Agri-Food Canada, September 17, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1182434256046&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008d). National Farm Stewardship Program. Agriculture and Agri-Food Canada, September 17, 2008.
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1181580600540&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008e). Advancing the development and implementation of environmental farm plans across Canada: British Columbia. Agriculture and Agri-Food Canada, September 17, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1182169725677&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008f). Growing Forward: The new agricultural policy framework. Agriculture and Agri-Food Canada, September 17, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1200339470715&lang=e>>

Agriculture and Agri-Food Canada (AAFC) (2008g). Growing Forward: A Federal – Provincial – Territorial Framework Agreement on Agriculture, Agri-food and Agri-Based Products Policy. Agriculture and Agri-Food Canada, September 17, 2008
<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1217941012105&lang=e>

Agriculture and Agri-Food Canada (AAFC) (2007). An Overview of the Canadian Agriculture and Agri-Food System: 2007. Agriculture and Agri-Food Canada, May 16, 2008
<<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1201291159395&lang=e>>

Alex, G., D. Byerlee, M. Helene-Collion, W. Rivera (2004). Extension and Rural Development: Converging Views on Institutional Approaches. The World Bank, Agriculture and Rural Development Department, Washington, DC: USA.

Allison, H. and R. Hobbs (2006). Science and Policy in Natural Resource Management: Understanding System Complexity. Cambridge University Press, Cambridge: UK.

Altieri, M.A. (2000). Ecological Impacts of Industrial Agriculture and the Possibilities for Truly Sustainable Farming. In F. Magdoff, J. Bellamy Foster, and F.H. Buttel (eds.), Hungry for Profit (p. 77-92). Monthly Review Press, New York, NY: USA.

Altieri, M.A. (1999). The Ecological Role of Biodiversity in Agroecosystems. Agriculture, Ecosystems and Environment 74: 19-31.

Altieri, M.A. (1995). Agroecology: The Science of Sustainable Agriculture. Westview Press, Boulder, CO: USA.

Ashby, J. A. 2001. Integrating Research on Food and the Environment: An Exit Strategy from the Rational Fool Syndrome in Agricultural Science. Conservation Ecology 5(2): 20.

Australian Government (2008a). Caring for our Country: Funding. Australian Government, March 22, 2008 <<http://www.nrm.gov.au/funding/future.html>>

Australian Government (2008b). Caring for our Country: Questions and Answers. Australian Government, March 22, 2008
<<http://www.nrm.gov.au/funding/cfoc-faq.html>>

Australian Government (2007). Environmental Stewardship Programme: Strategic Framework 2007. Australian Government, Department of Agriculture, Fisheries and Forestry and Department of the Environment and Water Resources: Australia.

Babbie, E. (2008). The Basics of Social Research (4th Edition). Thomson Higher Education, Belmont, CA: USA.

Babbie, E. (1990). Survey Research Methods. Wadsworth Publishing Company. Belmont, CA: USA.

BC Stats (2008). Quarterly Regional Statistics, First Quarter. BC Stats, June 30, 2008
<<http://www.bcstats.gov.bc.ca/pubs/qrs/rd15.pdf>>

BC Stats (2007a). British Columbia Census Metropolitan Area and Census Agglomerations Population Estimates, 2001-2006, July 2007. BC Stats, June 29, 2008
<<http://www.bcstats.gov.bc.ca/data/pop/pop/rd/cma0106.asp>>

BC Stats (2007b). Regional and Municipal Population Estimates, 2007/2008. BC Stats, May 17, 2008 <<http://www.bcstats.gov.bc.ca/data/pop/pop/mun/Mun2007e.asp>>

BC Stats (2004). British Columbia Population Projections. BC Stats, Ministry of Management Services, Victoria, BC: Canada.

Bobrow, D. B. and J. S. Dryzek (1987). Policy Analysis by Design. University of Pittsburgh Press, Pittsburgh, PA: USA.

Botsch, M. (2005). Modern Swiss Agricultural Policy. The New Role of Agriculture. Director, Swiss Federal Office for Agriculture, International Federation of Agricultural Journalists, Congress Switzerland 31.08 – 04.09.2005: Switzerland.

Boundary Bay Conservation Committee (BBCC) (1992). Ours to Preserve: Boundary Bay Biosphere Reserve. Boundary Bay Conservation Committee, Delta, BC: Canada.

Bradsen, J..R. (1988). Soil Conservation Legislation in Australia. Report for the National Soil Conservation Program. Faculty of Law, University of Adelaide, Adelaide: Australia.

Brewer, G. D. and P. deLeon (1983). The Foundations of Policy Analysis. The Dorsey Press, Homewood, Illinois: USA.

British Columbia Agriculture Council (BCAC) (2008a). BCAC Agriculture Environment Initiatives. British Columbia Agriculture Council, November 25, 2008. <http://www.bcac.bc.ca/agriculture_enviro_programs.htm>

British Columbia Agriculture Council (BCAC) (2008b). EFP Program: About Us. British Columbia Agriculture Council, November 29, 2008 <http://www.bcac.bc.ca/EFP_pages/about_us/index.html>

British Columbia Agriculture Council (BCAC) (2008c). Agriculture Environment Funds Current Projects: August 25, 2008. British Columbia Agriculture Council, Kelowna, BC: Canada.

British Columbia Agriculture Council (BCAC) (2008d). EFP Programs. British Columbia Agriculture Council, September 17, 2008 <http://www.bcac.bc.ca/efp_programs.htm>

British Columbia Agriculture Council (BCAC) (2008e). Planning for Biodiversity: A Guide for BC Farmers and Ranchers. British Columbia Agriculture Council, Kelowna, BC: Canada.

British Columbia Ministry of Agriculture, Food and Fisheries (BCMAFF) (2005). Service Plan: 2005/6-2007/8. British Columbia. Government of BC, BC Ministry of Agriculture, Food and Fisheries, Victoria, BC: Canada.

British Columbia Ministry of Agriculture, Food and Fisheries (BCMAFF) (2004). Corporation of Delta Agricultural Land Use Inventory, 2002. BC Ministry of Agriculture, Food and Fisheries, Abbotsford, BC: Canada.

British Columbia Ministry of Agriculture, Food and Fisheries (BCMAFF) (2002). Census of Agriculture 2001 and Historical Comparisons, BC Summary, May 2002. BC

Ministry of Agriculture, Food and Fisheries, Statistical Services Unit, Policy and Economics Branch, Victoria, BC: Canada.

British Columbia Ministry of Agriculture, Food and Fisheries (BCMAFF) (2001). Township of Langley Agricultural Land Use Inventory. British Columbia Ministry of Agriculture, Food and Fisheries, Abbotsford, BC: Canada.

British Columbia Ministry of Agriculture, Fisheries and Food (BCMAFF) (1996). A Century of Achievement. British Columbia Government Publications, Victoria, BC: Canada.

British Columbia Ministry of Agriculture and Lands (BCMAL) (2008a). Farm Practices Protection. British Columbia Ministry of Agriculture and Lands, Strengthening Farming, January 7, 2009 <<http://www.agf.gov.bc.ca/resmgmt/sf/farmpp/index.htm>>

British Columbia Ministry of Agriculture and Lands (BCMAL) (2008b). Service Plan: 2008-2011. Government of British Columbia, British Columbia Ministry of Agriculture and Lands, Victoria, BC.

British Columbia Ministry of Agriculture and Lands (BCMAL) (2008c). The BC Agriculture Plan: Growing a Healthy Future for B.C. Families. British Columbia Ministry of Agriculture and Lands, September 17, 2008
< http://www.al.gov.bc.ca/Agriculture_Plan/>

British Columbia Ministry of Agriculture and Lands (BCMAL) (2008d). The British Columbia Agriculture Plan: Growing a healthy future for BC families. British Columbia Ministry of Agriculture and Lands, Victoria, BC: Canada.

British Columbia Ministry of Agriculture and Lands (BCMAL) (2007). Public Amenity Benefits and Ecological Services Provided by Farmland to Local Communities in the Fraser Valley. British Columbia Ministry of Agriculture and Lands, Abbotsford, BC: Canada.

British Columbia Ministry of Agriculture and Lands (BCMAL) (2006). About the Agriculture Industry, 2006. Ministry of Agriculture and Lands, May 29, 2008
< <http://www.agf.gov.bc.ca/aboutind/profile.htm>>

British Columbia Ministry of Environment (BCMOE) (2008a). Biodiversity in BC. British Columbia Ministry of Environment, Environmental Stewardship Division, June 29, 2008 <<http://www.env.gov.bc.ca/wld/bio.htm>>

British Columbia Ministry of Environment (BCMOE) (2008b). Endangered Species and Ecosystems. British Columbia Ministry of Environment, August 28, 2008
< <http://www.env.gov.bc.ca/atrisk/red-blue.htm>>

British Columbia Ministry of Environment (BCMOE) (2008c). Service Plan: 2008/2009-2010-2011. Government of British Columbia, British Columbia Ministry of Environment. Victoria, BC: Canada.

British Columbia Ministry of Environment (BCMOE) (2007). The Wildlife Act: Managing for Sustainability in the 21st Century. Government of British Columbia, British Columbia Ministry of Environment, Fish and Wildlife Branch, Victoria, BC: Canada.

British Columbia Ministry of Environment (BCMOE) (2006). Service Plan: 2006/07-2008/09. Government of British Columbia, British Columbia Ministry of Environment, Victoria, BC: Canada.

British Columbia Ministry of Environment, Land, and Parks (BCMELP) and British Columbia Ministry of Forests (BCMOF) (1988). Biodiversity in British Columbia. British Columbia Ministry of Environment, Land, and Parks and British Columbia Ministry of Forests, Victoria, BC: Canada.

Brown, Lester (2005). A Planet Under Stress. In J. S. Dryzek and D. Schlosberg (eds.), Debating the Earth: The environmental politics reader. Oxford University Press, Oxford: Great Britain.

Bryman, Alan (2001). Social Research Methods. Oxford University Press, New York: USA.

Butler, R.W. and R.W. Campbell (1987). The Birds of the Fraser River Delta: Populations, Ecology and International Significance. Canadian Wildlife Service, Environment Canada, Ottawa: Canada.

Buttel, F.H. (1993). The Sociology of Agricultural Sustainability: Some Observations on the Future of Sustainable Agriculture. Agriculture, Ecosystems and Environment 46 (175-186).

Campbell, C. (2006). Forever Farmland: Reshaping the Agricultural Land Reserve for the 21st Century. David Suzuki Foundation. Vancouver, BC: Canada.

Canada Wildlife Act (1985). Canada Wildlife Act (R.S., 1985, c. W-9). Department of Justice Canada, November 26, 2008
<<http://laws.justice.gc.ca/en/showdoc/cs/W-9///en?page=1>>

Canadian Endangered Species Conservation Council (CESCC) (2001). Wild Species 2000: The General Status of Species in Canada. Minister of Public Works and Government Services of Canada, Ottawa: Canada.

Canadian Environmental Protection Act (CEPA) (1999). Policies. Environment Canada, CEPA Environmental Registry, April 28, 2009 <<http://www.ec.gc.ca/CEPARegistry/policies/>>

Canadian Wildlife Service (CWS) (2008a). Habitat Conservation, National Wildlife Areas, British Columbia. Environment Canada, Canadian Wildlife Service, November 26, 2008
<<http://www.cws-scf.ec.gc.ca/habitat/default.asp?lang=en&n=213D568A>>

Canadian Wildlife Service (CWS) (2008b). Habitat Conservation, Migratory Bird Sanctuaries, British Columbia. Environment Canada, Canadian Wildlife Service, November 26, 2008 <<http://www.cws-scf.ec.gc.ca/habitat/default.asp?lang=en&n=04AEF3A2>>

Canadian Wildlife Service (CWS) (2008c). FAQ: Who Does What. Environment Canada, Canadian Wildlife Service, September 25, 2008 <http://www.cws-scf.ec.gc.ca/questions_e.cfm>

Canadian Wildlife Service (CWS) (2008d). Habitat Conservation Program Strategy. Environment Canada, Canadian Wildlife Service, September 17, 2008 <<http://www.cws-scf.ec.gc.ca/habitat/default.asp?lang=En&n=C951239D-1>>

Canadian Wildlife Service (2000). Strategic Plan 2000: The Path Forward for Environment Canada's Wildlife Conservation Program. Minister of the Environment, Canadian Wildlife Service, Minister of Public Works and Government Services Canada, Ottawa, ON: Canada.

Canadian Wildlife Service (1990). A Wildlife Policy for Canada. Minister of Environment, Canadian Wildlife Service, Wildlife Ministers' Council of Canada, Ottawa, ON: Canada.

Charest, J. (1992). Letter to Delta Farmers' Institute and Delta Soil and Water Conservation Group, June 30, 1992. Minister of Environment, Environment Canada, Ottawa, ON: Canada.

Convention on Biological Diversity (CBD) (2008). Communication, Education, and Public Awareness. Convention on Biological Diversity, July 27, 2007 <<http://www.cbd.int/cepa/messages.shtml>>

Costanza, R., J. Cumberland, H. Daly, R. Goodland, and R. Norgaard (1997). An Introduction to Ecological Economics. International Society for Ecological Economics. St. Lucie Press, Boca Raton, Florida: USA.

Daly, H.E. and J. Cobb (1989). For the Common Good: Redirecting the Economy Towards Community, the Environment, and a Sustainable Future. Beacon Press, Boston: USA.

Delta Farmers' Institute (DFI) (2006). Delta Forage Compensation Program: Year 5 Annual Report (September 1, 2005 – August 31, 2006). Prepared by Delta Farmers' Institute and the Project Steering Committee, Delta, BC: Canada.

Delta Farmers' Institute and Delta Soil and Water Conservation Group (DFI/DSWCG) (1992). Letter from DFI/DSWCG to Transport Canada, March 3, 1992. Delta Farmers Institute and Delta Soil and Water Conservation Group, Delta, BC: Canada.

Delta Farmland and Wildlife Trust (DFWT) (2008). Farmland and Wildlife: The Delta Farmland and Wildlife Trust Newsletter. Delta Farmland and Wildlife Trust. December, 2008, Vol. 14, No. 2.

Delta Farmland and Wildlife Trust (DFWT) (2006). Delta Farmland and Wildlife Trust Annual Report (2005-2006). Delta, BC: Canada.

Delta Farmland and Wildlife Trust (DFWT) (2004). DFWT Annual Report (2003-2004). Delta Farmland and Wildlife Trust, Delta, BC: Canada.

Delta Farmland and Wildlife Trust (DFWT) (1994). Farm Stewardship Proposal for Parallel Runway Habitat Compensation Strategy. Submitted to Wildlife Habitat Advisory Committee on Compensation. Prepared by Delta Farmland and Wildlife Trust, Delta, BC: Canada.

Delta Farmland and Wildlife Trust (DFWT) (1993). Certificate of Incorporation, Delta Farmland and Wildlife Trust, Number S-30194 (February 26, 1993). Society Act, Victoria, BC: Canada.

Delta Farmland and Wildlife Trust (DFWT) (no date). Partners in Stewardship, YVR Wildlife Stewardship Fund, Five Year Plan, 2000-2005. Delta Farmland and Wildlife Trust, Delta, BC: Canada.

Delta Optimist (2007). Fifth Generation Farmers Have Been Tending the Land for Almost 130 Years. Delta Optimist, October 10, 2007. Delta, BC: Canada.

Deltaport Third Berth Project (2004). Scoping document, July 23, 2004. Deltaport Third Berth Project, June 30, 2008 <www.ceaa-acee.gc.ca/050/documents/2700/2700E.pdf>

Department for Environment, Food and Rural Affairs (DEFRA) (2008a). e-Digest Statistics: Land Use and Land Cover. Department for Environment, Food and Rural Affairs, March 16, 2008 <<http://www.defra.gov.uk/environment/statistics/land/ldagricultural.htm>>

Department for Environment, Food and Rural Affairs (DEFRA) (2008b). Rural Affairs. Department for Environment, Food and Rural Affairs, September 16, 2008 <<http://www.defra.gov.uk/rural/default.htm>>

Department for Environment, Food and Rural Affairs (DEFRA) (2008c). The England Rural Development Programme 2000-2006. Department for Environment, Food and Rural Affairs, March 15, 2008 <<http://www.defra.gov.uk/erdp/default.htm>>

Department for Environment, Food and Rural Affairs (DEFRA) (2008d). Entry Level Stewardship Handbook. Department for Environment, Food and Rural Affairs, March 16, 2008 <<http://www.defra.gov.uk/erdp/schemes/els/handbook/chapter1.htm>>

Department for Environment, Food and Rural Affairs (DEFRA) (2007). Single Payment Scheme: Information for Farmers and Growers in England. Department for Environment, Food and Rural Affairs. Defra Publications, London: U.K..

Department for Environment, Food and Rural Affairs (DEFRA) (2002): The Strategy for Sustainable Farming and Food: Facing the Future. Department for Environment, Food and Rural Affairs, London: U.K..

Department of Agriculture, Fisheries, and Forestry (DAFF) (2008a). Landcare. Department of Agriculture, Fisheries, and Forestry, March 22, 2008
<<http://www.daff.gov.au/natural-resources/landcare>>

Department of Agriculture, Fisheries, and Forestry (DAFF) (2008b). National Landcare Program. Department of Agriculture, Fisheries, and Forestry, March 22, 2008
<<http://www.daff.gov.au/natural-resources/landcare/national-landcare-programme>>

Department of Agriculture, Fisheries, and Forestry (DAFF) (2008c). Caring for our Country - Better Land Management, Less Red Tape. Joint Media Release, March 14, 2008.

Department of Agriculture, Fisheries, and Forestry and Ministry of Environment, Heritage and the Arts, September 16, 2008
<http://www.daff.gov.au/maff/media/media_releases/2008/march_2008/caring_for_our_country_-_better_land_management_less_red_tape>

Diamond, J. (2005). Collapse: How Societies Choose to Fail or Succeed. Penguin Books Ltd., London, England.

Ducks Unlimited Canada (DUC) (2000). A Proposal for Habitat Conservation in the Fraser River Delta. Presented to the Board of Directors of Ducks Unlimited Canada.

Duynstee, T. (1993). The Greenfields Project 1991-92 Interim Report. Presented to the Canadian Wildlife Service from Ducks Unlimited Canada.

Edwards, C.A., Grove, T.L., Harwood, R.R., Pierce Colfer, C.J. (1993). The Role of Agroecology and Integrated Farming Systems in Agricultural Sustainability. Agriculture, Ecosystems and Environment 46 (99-121).

Environment Canada (2008a). Nature. Environment Canada, May 16, 2008
<<http://www.ec.gc.ca/default.asp?lang=En&n=9E3DC4EA-1>>

Environment Canada (2008b). Wildlife. Environment Canada, May 16, 2008
<<http://www.ec.gc.ca/default.asp?lang=En&n=A730B631-1>>

Environment Canada (2008c). About Us. Environment Canada, September 17, 2008
<<http://www.ec.gc.ca/default.asp?lang=En&n=ECBC00D9-1>>

Environment Canada (1980). Land Use in Canada: The Report of the Interdepartmental Task Force on Land-use Policy. Lands Directorate, Ottawa, Ontario: Canada.

Environmental Law Institute (ELI) (2003). Conservation Thresholds for Land Use Planners. Environmental Law Institute. Washington, DC: USA.

Farber, S., R. Costanza, D.L. Childers, J. Erickson, K. Gross, M. Grove, C.S. Hopkinson, J. Kahn, S. Pincetl, A. Troy, P. Warren, and M. Wilson (2006). Linking Ecology and Economics for Ecosystem Management. BioScience Vol. 56, No. 2 (121-133).

Farm Practices Protection (Right to Farm) Act (FPPA) (1995). Farm Practices Protection Act. Queen's Printer, Victoria, BC: Canada.

Farming and Wildlife Advisory Group (FWAG) (2008). Home page. Farming and Wildlife Advisory Group, March 16, 2008 < www.fwag.org.uk>

Farmland Conservation Trust (1992). Meeting Minutes, September 8, 1992. Farmland & Wildlife Trust Founding Committee, Delta, BC: Canada.

Farmland & Wildlife Trust Founding Committee (1992). Meeting Minutes, November 23, 1992. Farmland & Wildlife Trust Founding Committee, Delta, BC: Canada.

Farmwest (n.d.). Robert Butler – Waterfowl damage to forage crops. Interviews. May 12, 2007 <<http://www.farmwest.com/index.cfm?method=pages.showPage&pageid=254>>

Feeny, D., F. Berkes, B.J. McKay, and J.M. Acheson (1990). The Tragedy of the Commons: Twenty-Two Years Later. Human Ecology Vol. 18, No. 1 (1-19).

Fleury, A. M. and R. D. Brown (1997). A Framework for the Design of Wildlife Conservation Corridors with Specific Application to Southwestern Ontario. Landscape and Urban Planning 37 (163-186).

Food and Agriculture Organization of the United Nations (FAO) (2008). The State of Food and Agriculture. Biofuels: Prospects, Risks and Opportunities. Food and Agriculture Organization of the United Nations, Rome: Italy.

Food and Agriculture Organization of the United Nations (FAO) (2007). FAO Calls for Urgent Steps to Protect the Poor from Soaring Food Prices. FAO Newsroom (December 17, 2007). Food and Agriculture Organization of the United Nations, May 14, 2008 <<http://www.fao.org/newsroom/en/news/2007/1000733/index.html>>

Fowler, C.W. and L. Hobbs (2003). Is Humanity Sustainable? Proc. R. Soc. Lond. B (2003) 270, 2579-2583.

Fowler, F. J. Jr. (2002). Survey Research Methods – 3rd Edition. Sage Publications Inc., Thousand Oaks, California: USA.

Fraser, E.D.G. (2004). Land Tenure and Agricultural Management: Soil Conservation on Rented and Owned Fields in Southwest British Columbia. Agriculture and Human Values 21:73-79, 2004.

Gateway Program (2008). Gateway Program. Government of BC, June 30, 2008 <<http://www.th.gov.bc.ca/gateway/>>

Gliessman, S.R. (2000). Agroecology: Ecological Processes in Sustainable Agriculture. Lewis Publishers, Boca Raton, Florida: USA.

Gold, M.V. and J.P. Gates (2007). Tracing the Evolution of Organic/Sustainable Agriculture: A Selected and Annotated Bibliography. United States Department of Agriculture, National Agricultural Library, Beltsville, MD: USA.

Gray, G. and N. Guppy (1999). Successful Surveys: Research Methods and Practice. Toronto, Ontario: Harcourt Canada.

Grove, T.L. and C.A. Edwards (1993). Do We Need a New Developmental Paradigm? Agriculture, Ecosystems and Environment 46 (135-145).

Hardin, Garrett (1968). The Tragedy of the Commons. Science, New Series 162:3859 (1243-1248).

Ikerd, J.E. (1993). The Need for a Systems Approach to Sustainable Agriculture. Agriculture, Ecosystems, and Environment, 46 (147-160).

Intergovernmental Panel on Climate Change (IPCC) (2007). Climate Change 2007: Synthesis Report. An Assessment of the Intergovernmental Panel on Climate Change, IPCC Plenary XXVII, November 12-17, Valencia: Spain.

Investment Agriculture Foundation (IAF) (2008). IAF Mandate. Investment Agriculture Foundation, November 29, 2008 <http://www.iafbc.ca/about_us/mandate.htm>

Investment Agriculture Foundation (IAF) (2007). Annual Report, 2007. Investment Agriculture Foundation, January 14, 2009 <http://www.iafbc.ca/publications_and_resources/annual_reports.htm>

Javorek, S.K., R. Anonowitsch, C. Callaghan, M. Grant, and T. Weins (2007). Changes to Wildlife Habitat on Agricultural Land in Canada, 1981-2001. Can. J. Soil Sci. 87:225-233.

John, P. (1998). Analysing Public Policy. Pinter, London, UK.

Jones, G.E. and C. Garforth (1997). The History, Development, and Future of Agricultural Extension. In B.E. Swanson, R.P. Bentz, and A.J. Sofranko (eds.). Improving agricultural extension: a reference manual (p. 3-12). Food and Agriculture Organization of the United Nations, Rome: Italy.

Keough, H.L. and D.J. Blahna (2006). Achieving Integrative, Collaborative Ecosystem Management. Conservation Biology Vol. 20, No. 5 (1373-1382).

Klohn Leonoff Ltd., W.R. Holm and Associates, and G.G. Runka Land Sense Ltd. (1992). Delta Agricultural Study. BC Ministry of Agriculture, Fisheries and Food, Agriculture Canada, BC Agricultural Land Commission, Delta Farmers' Institute, and the Corporation of Delta, BC: Canada.

Krippendorff, K. (2004). Content Analysis: An Introduction to its Methodology. Sage Publications, Thousand Oaks, California: USA.

Kumar, Ranjit (2005). Research methodology: A Step-by-Step Guide for Beginners (Second Edition). Sage Publications Ltd., London: U.K..

Landcare Australia (2008). Landcare Online. Landcare Australia, March 22, 2008 < www.landcareonline.com >

Lee, K.N. (2005). Appraising Adaptive Management. In John S. Dryzek, and David Schlosberg (eds.). Debating the Earth: The environmental politics reader. Oxford University Press: Great Britain.

Lee, K.N. (1993). Compass and Gyroscope: Integrating Science and Politics for the Environment. Island Press, Washington, DC: USA.

Loomis, John and Gloria Helfand (eds.) (2001). Environmental Policy Analysis for Decision Making. Kluwer Academic Publishers: The Netherlands.

Lyson, T.A. (2002). Advanced Agricultural Biotechnologies and Sustainable Agriculture. Trends in Biotechnology 20(5) (193-196).

Mace, G., H. Masundire, and J. Baillie (2005). Millenium Ecosystem Assessment: Biodiversity. In R. Hassan, R. Scholes, N. Ash (eds.), Ecosystems and Human Well-being: Current State and Trends, Volume 1. Island Press, Washington, DC: USA.

Malthus, Thomas (1798). An Essay on the Principle of Population. Penguin Books, London: England.

Manno, Jack (2000). Privileged Goods: Commoditization and its Impact On Environment And Society. Lewis Publishers, New York, NY: USA.

Max-Neef, M. (1995). Economic Growth and Quality of Life: a Threshold Hypothesis. Ecological Economics 15: 115-118.

Martel, A., 1992; Letter to Wayne Temple (August 6, 1992). Environment Canada, CWS, Regional Director, Delta, BC: Canada.

Maxwell, Joseph A. (2005). Qualitative Research Design: An Interactive Approach. Second Edition. Sage Publications, California, USA.

McNeely, J.A. and S.J. Scherr (2003). Ecoagriculture. Strategies to Feed the World and Save Wild Biodiversity. Island Press, Washington, DC: USA.

Meadows, D.H., D.L. Meadows, J. Randers, and W.W. Behrens III (1972). The Limits to Growth. Universe Books, New York, NY: USA.

Merkens, Markus (2005). Value of Grassland Set-asides in Increasing Farmland Habitat Capacity for Wintering Raptors in the Lower Fraser River Delta. In T.D. Hooper (ed.) Proceedings of the Species at Risk 2004 Pathways to Recovery Conference. March 2-6, Victoria, BC: Canada.

Merriam-Webster Incorporated (1997). The Merriam-Webster Dictionary. Springfield Massachusetts: USA.

Metro Vancouver (2008). About Metro Vancouver. Metro Vancouver, June 18, 2008
<<http://www.metrovancouver.org/about/Pages/default.aspx> >

Migratory Birds Convention Act (1994). Migratory Birds Convention Act 1994 (c. 22). Department of Justice Canada, November 26, 2008
<<http://laws.justice.gc.ca/en/showtdm/cs/M-7.01>>

Millenium Ecosystem Assessment (2008). Overview of the Millenium Ecosystem Assessment. Millenium Ecosystem Assessment, June 28, 2008
< <http://www.millenniumassessment.org/en/About.aspx#2>>

Millennium Ecosystem Assessment (2005). Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC: USA.

Neave, P., E. Neave, T. Wiens, and T. Riche (2000). Availability of Wildlife Habitat on Farmland. In McRae, T. C. Smith, L. Greogrich (eds.), Environmental Sustainability of Canadian Agriculture: Report of the Agri-Environmental Indicator Project. Research Branch, Policy Branch, Prairie Farm Rehabilitation Administration. Agriculture and Agri-Food Canada, Ottawa, ON: Canada.

Norecol, Dames & Moore, Inc. (1994). Our Legacy for Future Generations. Delta Rural Land Use Study. Corporation of Delta, BC: Canada.

North, M.E.A., M.W. Dunn, and J.M. Teversham (1979). Vegetation of the Southwestern Fraser Lowland 1858-1880. Ministry of Supply and Services, Environment Canada, Ottawa: Canada.

Norton, B.G. (2003). Defining Biodiversity: Do We Know What We are Trying to Save? The Namkoong Family Lecture Series. Faculty of Forestry, University of British Columbia, Vancouver, BC: Canada.

Norton, B.G. (2001). What Do We Owe the Future? How Should We Decide? In V.A. Sharpe, B. Norton and S.D. Donnely (eds.), Wolves and Human Communities. Island Press, Covelo, CA: USA.

Olewiler, N. (2004). The Value of Natural Capital in Settled Areas of Canada. Published by Ducks Unlimited and the Nature Conservancy of Canada.

Oreszczyn, S.M. and A.B. Lane (2001). Hedgerows of Different Cultures: Implications from a Canadian and English Cross-cultural Study. In C. Barr and S. Petit (eds.) Hedgerows of the World: Their Ecological Functions in Different Landscapes. Proceedings of the 2001 Annual IALE (UKL) Conference, University of Birmingham 5th – 8th September 2001. IALE: UK.

Ostrom, E., J. Burger, C.B. Field, R.B. Norgaard, and D. Policansky (1999). Revisiting the Commons: Local Lessons, Global Challenges. Science April 9, 1999, Vol. 284 (279-282).

Port of Vancouver (2008). Deltaport Third Berth Project: FAQ. Port of Vancouver, June 30, 2008 <http://www.portvancouver.com/the_port/faq.html>

Pretty, J. (2003). Social Capital and the Collective Management of Resources. Science Vol. 302, December 12, 2003, (1912-1914).

Pretty, J.N. (2002). Agri-Culture: Reconnecting People, Land and Nature. Earthscan Publications Ltd., London: U.K.

Pretty, J.N., C. Brett, D. Gee, R. Hine, C. Mason, J. Morison, M. Rayment, G. Van Der Bijl, and T. Dobbs (2001). Policy Challenges and Priorities for Internalizing the Externalities of Modern Agriculture. Journal of Environmental Planning and Management, March 2001, Vol. 44, Issue 2, p. 263.

Pretty, J. N. (1998). Supportive Policies and Practice for Scaling up Sustainable Agriculture. In N.G. Röling and M.A.E. Wagemakers (eds.), Facilitating Sustainable Agriculture (p. 23 - 40). Cambridge University Press, Cambridge: UK.

Pretty, J.N. (1997). The Sustainable Intensification of Agriculture. Natural Resources Forum 21(4) (247-256).

Pretty, J.N. (1995). Regenerating Agriculture: Policies and Practice for Sustainability and Self-Reliance. Earthscan Publications Ltd., London: U.K.

Rees, W.E. (2004). Why Conventional Economic Logic won't Protect Biodiversity. In David Lavigne (ed.), Gaining Ground: Pursuit of Ecological Sustainability (Chapter 14). International Fund for Animal Welfare, Guelph, Canada and the University of Limerick, Ireland.

Rivera, W.M., W. Zijp, and G. Alex (2000). Contracting for Extension: Review of emerging practices. The World Bank Rural Development Family, Agricultural Knowledge and Information Systems (AKIS). World Bank Group, March 6, 2005 <<http://lnweb18.worldbank.org>>

Rivera, W.M., and J.W. Cary (1997). Privatizing Agricultural Extension. In B.E. Swanson, R.P. Bentz, and A.J. Sofranko (eds.), Improving Agricultural Extension: A Reference Manual (p. 203-211). Food and Agriculture Organization of the United Nations, Rome: Italy.

Rojas, A., B. Reyes, L. Magzul, Enrique Schwartz, R. Borquez, and D. Jara (2009). Waters of Life: What Commitment is Needed from Institutions in an Era of Climate Change? Support Manual for an Adaptive Resolution to Environmental Conflicts. [In Press]

Röling, N.G. and M.A.E. Wagemakers (1998). A New Practice: Facilitating Sustainable Agriculture. In N.G. Röling and M.A.E. Wagemakers (Eds) (1998). Facilitating Sustainable Agriculture (p. 3-22). Cambridge University Press, Cambridge: UK.

Röling, N. and J. N. Pretty (1997). Extension's Role in Sustainable Agricultural Development. In B.E. Swanson, R.P. Bentz, and A.J. Sofranko (eds.), Improving Agricultural Extension: A Reference Manual (p. 181 - 191). Food and Agriculture Organization of the United Nations, Rome: Italy.

Röling, N. (1988). Extension science - Information systems in agricultural development. Cambridge University Press, Cambridge: UK.

Røpke, I. (2004). The Early History of Modern Ecological Economics. Ecological Economics 50 (293-314).

Rosenthal, E. (2007). World Food Stocks Dwindling Rapidly, UN Warns. International Herald Tribune, Europe (December 17, 2007), May 14, 2008
<<http://www.iht.com/articles/2007/12/17/europe/food.php?page=2>>

Saddlemeyer, K., R. Hobson, and S. Veit (2001). Report and Recommendations of the Delta Mediation Team. Submitted to Honourable John van Dongen, Minister of Agriculture, Food, and Fisheries, Victoria, BC: Canada.

Sagoff, M. (2005). The Allocation and Distribution of Resources. In J.S. Dryzek, and D. Schlosberg (eds.) Debating the Earth: The Environmental Politics Reader. Oxford University Press: Great Britain.

Schaller, N. (1993). The Concept of Agricultural Sustainability. Agriculture, Ecosystems and Environment 46 (89-97).

Secretariat of the Convention on Biological Diversity (UN) (2000). Sustaining Life on Earth: How the Convention on Biological Diversity Promotes Nature and Human Well-being. Secretariat of the Convention on Biological Diversity, United Nations Environment Program, Nairobi: Kenya.

Simon, J. (1981) The Ultimate Resource. Princeton University Press, New Jersey: USA.

Solomon, S., D. Qin, M. Manning, M. Marquis, K. Averyt, M. Tignor, H. Miller, and Z. Chen (eds.) (2007). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, NY: USA.

Smith, A. (1776). The Wealth of Nations. Random House Inc., New York, NY: USA.

Smith, B.E. (1998). Planning for Agriculture - Resource Materials. Provincial Agricultural Land Commission, Burnaby, BC: Canada.

Sproull, Natalie L. (1995). Handbook of Research Methods: A Guide for Practitioners and Students in the Social Sciences (Second Edition). The Scarecrow Press Inc., London: U.K..

Starrin, B., L. Dahlgren, G. Larsson, and S. Styrborn (1997). Along the Path of Discovery: Qualitative Methods and Grounded Theory. Studentlitteratur, Stockholm University: Sweden.

Statistics Canada, 2008a. Home Page. Statistics Canada, May 16, 2008
<<http://www.statcan.ca/menu-en.htm>>

Statistics Canada (2008b). Snapshot of Canadian Agriculture, 2008. Statistics Canada, May 16, 2008 <<http://www.statcan.ca/english/agcensus2006/articles/snapshot.htm>>

Statistics Canada, (2008c). Population and Dwelling Counts, for Canada, Provinces and Territories, and Census Subdivisions (Municipalities), 2006 and 2001 Censuses; Delta, 2006/2008. Statistics Canada, May 16, 2008
<<http://www12.statcan.ca/english/census06/data/popdwell/Table.cfm?T=302&SR=201&S=1&O=A&RPP=25&PR=59&CMA=0>>

Statistics Canada (2006a). Population and Dwelling counts, for Canada, Provinces and Territories; 2006 and 2001 Censuses. Statistics Canada, May 16, 2008
<<http://www12.statcan.ca/english/census06/data/popdwell/Table.cfm?T=101>>

Statistics Canada (2006b). Projected Population, 2008. Projected Population by Age Group According to Three Projection Scenarios for 2006, 2011, 2016, 2021, 2026 and 2031, at July 1. Statistics Canada, May 16, 2008
<<http://www40.statcan.ca/l01/cst01/demo08c.htm>>

Statistics Canada (2006c). Census of Agriculture, 2006. Statistics Canada, May 16, 2008 <http://www.statcan.ca/english/agcensus2006/media_release/bc.htm>

Statistics Canada (2006d). Census of Agriculture, Quick Agriculture Profile for: Greater Vancouver C, Table 1. Statistics Canada, June 29, 2008
<http://www26.statcan.ca:8080/AgrProfiles/cp06/Table1.action;jsessionid=B913FDF7EC648472F529EFA9B9DFB2F4?letter=G&prov=59&tab_id=1&geog_id=590215020&geog_id_amal=590215020&loccode=39575&placename=Greater+Vancouver+C>

Statistics Canada (2006e). Census of Agriculture, Community profiles. Statistics Canada, June 30, 2008
<http://www26.statcan.ca:8080/AgrProfiles/cp06/Table1.action;jsessionid=A483F00F2FFAFA4158B183B19AC2B986?prov=59&geog_id_amal=590215011&tab_id=1&letter=D&loccode=35147&placename=delta&geog_id=590215011>

Stauber, K., C. Hassebrook, E. Bird, G. Bultena, E. Hoiberg, H. MacCormack, and D. Menanteau-Horta (1995). The Promise of Sustainable Agriculture. In E. Bird, G. Bultena, and J. Gardner (eds.), Planting the Future: Developing an Agriculture that Sustains Land and Community (p. 3-16). Iowa State University Press/Ames, Center for Rural Affairs, Walthill, Nebraska: USA.

Sullivan, Terrance M. (1992). Populations, Distribution and Habitat Requirements of Birds of Prey. In R.W. Butler (Ed.), Abundance, Distribution and Conservation of Birds in the Vicinity of Boundary Bay, British Columbia. Technical Report Series No. 155. Canadian Wildlife Service, Pacific and Yukon Region, BC: Canada.

Swanson, D., H.D. Venema, S. Barg, S. Tyler, J. Drexhage, P. Bhandari, and U. Kelkar (2006). Initial Conceptual Framework and Literature Review for Understanding Adaptive Policies. In Designing Policies in a World of Uncertainty, Change, and Surprise. Phase 1 Research Report. International Institute for Sustainable Development, Winnipeg, MB: Canada.

Swinton, S.M., F. Lupi, G.P. Robertson, and S.K. Hamilton (2007). Ecosystem Services and Agriculture: Cultivating Agricultural Ecosystems for Diverse Benefits. Ecological Economics 64: 245-252.

Swiss Confederation (2007). Agroscope Research Master Plan. Federal Office for Agriculture, Bern: Switzerland.

Swiss Federal Office for Agriculture (2008). The FOAG: Task. Swiss Federal Office for Agriculture, September 16, 2008
< <http://www.blw.admin.ch/org/00022/index.html?lang=en>>

Swiss Federal Office for Agriculture (2004). Swiss Agricultural Policy: Objectives, Tools, prospects. Swiss Federal Office for Agriculture, Berne: Switzerland.

Tainter, Joseph A. (1988). The Collapse of Complex Societies. Cambridge University Press, New York: USA.

Taylor, P.J. and R. Garcia-Barrios (1999). The Dynamics of Socio-environmental Change and the Limits of Neo-Malthusian Environmentalism. In T. Mount, H. Shue and M. Dore (eds). Global Environmental Economics: Equity and the Limits to Markets (p. 139-167). Oxford: Blackwell: UK.

Temple, W.D. (1997). Conservation and Farm Stewardship Practices for Delta. Final Report for Canada – British Columbia Green Plan for Agriculture.

Temple, W.D. and S. Smith (1995). Farmland & Wildlife: Newsletter of the Delta Farmland & Wildlife Trust. Vol. 1, No. 1, July 1995.

Temple, W.D. (1994). Delta Farmers' Soil Conservation Group Project #S1202 Final Report. Funded by the Canada-British Columbia Soil Conservation Agreement.

Tsawwassen Lands (2008). Tsawwassen Final Agreement. Canada Indian and Northern Affairs Canada, Tsawwassen First Nations, BC Ministry of Aboriginal Relations, June 30, 2008
<www.gov.bc.ca/arr/firstnation/tsawwassen/down/factsheet/lands.pdf>

United Nations Secretariat (2008). World population Prospects: The 2006 Revision. Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, New York, NY: USA.

United Nations Secretariat (1999). The World at Six Billion. United Nations Secretariat, Population Division, Department of Economic and Social Affairs, New York, NY: USA.

University of Reading (2008). England Rural Development Programme. University of Reading, December 15, 2008 <http://www.ecifm.rdg.ac.uk/compensatory_schemes.htm>

Vandermeer, John (1995). The Ecological Basis of Alternative Agriculture. Annu. Rev. Ecol. Syst. 26:201-24.

Webb, T., J. Cary, and A. Campbell (2000). Contracting to Prevent Land Degradation: Landcare, an Australian Success Story. The World Bank, March 6, 2005 <<http://lnweb18.worldbank.org/>>

Wood S. and S. Ehui (2005). Millenium Ecosystem Assessment: Food. In R. Hassan, R. Scholes, N. Ash (eds.), Ecosystems and Human Well-being: Current State and Trends, Volume 1. Island Press, Washington, DC: USA.

Wood, Paul M. and Laurie Flahr (2004). Taking Endangered Species Seriously? British Columbia's Species-At-Risk Policies. Canadian Public Policy Vol. XXX (No. 4): 381-400.

Wood, P.M. (1997). Biodiversity as the Source of Biological Resources: A New Look at Biodiversity Values. Environmental Values 6 (3): 251-68.

Woodhill J. and N. G. Röling (1998). The Second Wing of the Eagle: The Human Dimension in Learning our way to More Sustainable Futures. In N.G. Röling and M.A.E. Wagemakers (eds). Facilitating Sustainable Agriculture (p. 46-72). Cambridge University Press, Cambridge: U.K..

Wondolleck, J.M. and S. L. Yaffee (2000). Making Collaboration Work. Island press, Washington, DC: USA.

The World Bank (2008). Soil degradation. The World Bank, June 28, 2008 <<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTARD/0,,contentMDK:20452551~pagePK:148956~piPK:216618~theSitePK:336682,00.html>>

World Commission on Environment and Development (WCED) (1987). Our Common Future: The Report of the World Commission on Environment and Development. Oxford University Press, Oxford: U.K..

Young, D. (2004). Agricultural Extension in Canada. Canadian Society of Extension Newsletter, University of Saskatchewan, SK: Canada



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CERTIFICATE OF APPROVAL - MINIMAL RISK

PRINCIPAL INVESTIGATOR: Arthur A Bomke	INSTITUTION / DEPARTMENT: UBC/Land and Food Systems	UBC BREB NUMBER: H06-03632
INSTITUTION(S) WHERE RESEARCH WILL BE CARRIED OUT:		
<small>Institution</small>	<small>Site</small>	
N/A Other locations where the research will be conducted: Government office Non-government office Farm		
CO-INVESTIGATOR(S): William E. Rees Alejandro Rojas		
SPONSORING AGENCIES: N/A		
PROJECT TITLE: Linking theory, policy, and practice: An examination of the Delta Farmland and Wildlife Trust (DFWT) and analysis of the policy framework in which it operates		

CERTIFICATE EXPIRY DATE: April 20, 2008

Appendix I**Behavioural Research Ethics Board Certificate
of Approval (p. 2 of 2)**

DOCUMENTS INCLUDED IN THIS APPROVAL:		DATE APPROVED: April 20, 2007	
Document Name	Version	Date	
<u>Consent Forms:</u>			
Main study consent	Version 5	April 4, 2007	
<u>Advertisements:</u>			
Invitation Letter	Version 6	April 15, 2007	
<u>Questionnaire, Questionnaire Cover Letter, Tests:</u>			
Interview schedule	Version 6	April 4, 2007	
<u>Letter of Initial Contact:</u>			
Letter of Contact	Version 6	April 15, 2007	
<p>The application for ethical review and the document(s) listed above have been reviewed and the procedures were found to be acceptable on ethical grounds for research involving human subjects.</p>			
<p><i>Approval is issued on behalf of the Behavioural Research Ethics Board and signed electronically by one of the following:</i></p> <hr/> <p>Dr. Peter Suedfeld, Chair Dr. Jim Rupert, Associate Chair Dr. Arminee Kazanjian, Associate Chair Dr. M. Judith Lynam, Associate Chair Dr. Laurie Ford, Associate Chair</p>			

Appendix II Behavioural Research Ethics Board Supporting Documents: Main Study Consent Form (p. 1 of 3)

Faculty of Land and Food Systems
248-2357 Main Mall
Vancouver, BC Canada V6T 1Z4
www.landfood.ubc.ca
Phone: (604) 822-4593
Fax: (604) 822-4400

CONSENT FORM

Linking theory, policy, and practice: An examination of the Delta Farmland and Wildlife Trust and analysis of the policy framework in which it operates

Principal Investigator: Dr. Arthur Bomke
Associate Professor
Faculty of Land and Food Systems



Co-Investigator: Elaine Anderson
PhD Candidate
Faculty of Land and Food Systems



Purpose

Elaine is conducting research into the history and development of the Delta Farmland and Wildlife Trust (DFWT) as part of her doctoral thesis. This research is being done in order to identify whether government policies have enabled or impeded the work of the DFWT.

You have been asked to participate in this research because you have been involved in the DFWT in one or more of the following ways:

- You have been directly involved in the formation or operation (past or present) of the DFWT as a staff member or director
- You are a farmer who has participated in a DFWT program
- You are a government or non-government organization representative who has worked, or is working, in collaboration with the DFWT

Appendix II Behavioural Research Ethics Board Supporting Documents: Main Study Consent Form (p. 2 of 3)

Study procedures

If you agree to participate in this research, you will be asked a series of questions about the DFWT in two hour interview with Elaine. Specifically she will ask for your perspective on the history and development of the DFWT and whether you can identify any government policies that have affected the ability of DFWT to provide programs that support wildlife habitat and agricultural viability.

The interviews will be conducted between April 2007 and September 2007 at a location that is convenient for you. During the interview, your responses will be typed directly onto a laptop computer.

Confidentiality

In order to ensure your confidentiality, the results from all of the interviews will be combined and grouped into similar theme areas or categories. No individual statements will be quoted. You will also be assigned a code number that will be used on all data related to you. Data will be stored in a password protected electronic file at UBC. The research team will have access to this information, but the raw data that you provide will not be included in the final reports of the research, nor will anyone other than the research team be given access to the data you provide.

Final Results

Participants will be provided with a copy of Elaine's doctoral thesis upon request.

Remuneration/Compensation

No remuneration or compensation will be provided for participation, since this project is unfunded. Please notify the researcher if this causes undue hardship for the participant.

Contact for information about the study

If you have any questions or desire further information with respect to this study, you may contact Ms. Elaine Anderson, Co-investigator and key contact person, at [REDACTED] or Dr. Art Bomke, Principal Investigator, at [REDACTED]

Contact for concerns about the rights of research subjects

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598.

Appendix II Behavioural Research Ethics Board Supporting Documents: Main Study Consent Form (p. 3 of 3)

Consent

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your employment or professional standing.

Your signature below indicates that you have received a copy of this consent form for your own records.

Your signature indicates that you consent to participate in this study.

Subject Signature_____Date_____

Appendix III Behavioural Research Ethics Board Supporting Documents: Invitation Letter (p. 1 of 3)

INVITATION TO PARTICIPATE IN RESEARCH

Linking theory, policy, and practice: An examination of the Delta Farmland and Wildlife Trust and analysis of the policy framework in which it operates

Principal Investigator: Dr. Arthur Bomke
Associate Professor
Faculty of Land and Food Systems



Co-Investigator: Elaine Anderson
PhD Candidate
Faculty of Land and Food Systems



This is an invitation for you to participate in a research project about the history and development of the Delta Farmland and Wildlife Trust (DFWT) and the government policies that have influenced the DFWT since its inception. Participants will be asked questions related to the DFWT during a 2 hour interview. Additional information about this research is provided below.

Purpose

Elaine is conducting research into the history and development of the Delta Farmland and Wildlife Trust (DFWT) as part of her doctoral thesis. This research is being done in order to identify whether government policies have enabled or impeded the work of the DFWT.

You have been asked to participate in this research because you have been involved in the DFWT in one or more of the following ways:

- You have been directly involved in the formation or operation (past or present) of the DFWT as a staff member or director
- You are a farmer who has participated in a DFWT program
- You are a government or non-government organization representative who has worked, or is working, in collaboration with the DFWT

Appendix III Behavioural Research Ethics Board Supporting Documents: Invitation Letter (p. 2 of 3)

Study procedures

If you agree to participate in this research, you will be asked a series of questions about the DFWT in a two hour interview with Elaine. Specifically she will ask for your perspective on the history and development of the DFWT and whether you can identify any government policies that have affected the ability of DFWT to provide programs that support wildlife habitat and agricultural viability.

The interviews will be conducted between April 2007 and December 2007 at a location that is convenient for you. During the interview, your responses will be typed directly onto a laptop computer.

Confidentiality

In order to ensure your confidentiality, the results from all of the interviews will be combined and grouped into similar theme areas or categories. No individual statements will be quoted. You will also be assigned a code number that will be used on all data related to you. Data will be stored in a password protected electronic file at UBC. The research team will have access to this information, but the raw data that you provide will not be included in the final reports of the research, nor will anyone other than the research team be given access to the data you provide.

Final Results

Participants will be provided with a copy of Elaine's doctoral thesis upon request.

Remuneration/Compensation

No remuneration or compensation will be provided for participation, since this project is unfunded. Please notify the researcher if this causes undue hardship for the participant.

Contact for information about the study

If you have any questions or desire further information with respect to this study, you may contact Ms. Elaine Anderson, Co-investigator and key contact person, at [REDACTED] or Dr. Art Bomke, Principal Investigator, [REDACTED]
[REDACTED]

Contact for concerns about the rights of research subjects

If you have any concerns about your treatment or rights as a research subject, you may contact the Research Subject Information Line in the UBC Office of Research Services at 604-822-8598.

Appendix III Behavioural Research Ethics Board Supporting Documents: Invitation Letter (p. 3 of 3)

Consent

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your employment or professional standing.

If you are interested in participating in this research please contact:
Elaine Anderson



Thank you

Appendix IV Behavioural Research Ethics Board Supporting Documents: Interview Schedule (p. 1 of 4)

INTRODUCTION

I am conducting research into the formation and development of the Delta Farmland and Wildlife Trust (DFWT) as part of my doctoral thesis. This research is being done in order to identify whether government policies have enabled or impeded the work of the DFWT and to 'tell the story' of the DFWT.

PURPOSE

The purpose of this interview is to find out your perspective on the formation and development of the Delta Farmland Wildlife Trust through documentation of:

- 1. Conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT and whether government policies contributed to these conflicts.*
- 2. Why the DFWT formed and the role that government policies (if any) played in its formation.*
- 3. The accomplishments and challenges faced by DFWT since its inception and the role that government policies (if any) have played in these accomplishments and challenges.*

DEFINITIONS

Policy: for the purposes of this research, a policy includes the following:

- act of legislation (e.g. Federal Fisheries Act)*
- government programs (e.g. CAIS (Canadian Agricultural Income Stabilization Program))*
- government guidelines (e.g. Environmental Best Management Practices)*

If you have any questions or don't understand the questions I ask you, please feel free to ask me to clarify what I am asking. There is no right or wrong answer to any of these questions. If you feel that you have more to add, the last question in the survey will allow you to express anything you would like to say that I haven't asked.

1. Which category or categories best describe your involvement with the DFWT?
 - A. You are a farmer who has participated in a DFWT program
 - B. You are a non-government organization representative who has worked, or is working, in collaboration with the DFWT
 - C. You are a government organization representative who has worked, or is working, in collaboration with the DFWT
 - D. You have been directly involved in the formation or operation (past or present) of the DFWT as a staff or board member
 - E. Other (describe):
2. How long have you been involved with the DFWT and in what way?

Appendix IV Behavioural Research Ethics Board Supporting Documents: Interview Schedule (p. 2 of 4)

3a) Are you aware of any conflicts between agricultural and environmental interests that existed prior to the formation of DFWT? (yes; no; don't know)

If no or don't know, go to question 4a.

3b) Please describe each of the conflicts.

3c) What was the degree of conflict? (high; medium; low; don't know)

3d) Do you think this conflict had a negative impact on agricultural viability. If so, how?

3e) Do you think this conflict had a negative impact on wildlife habitat viability. If so, how?

3f) Can you name any government or non-government organizations involved in any of the conflicts you have identified?

3g) Do you think government policies contributed to any of these conflicts? If so, please name or describe these policies.

4a) Do you know why the DFWT formed? (yes; no)

If no, go to question 5a.

4b) If yes, what or who do you think were the driving forces in its formation?

4c) Do you think that government policies helped in the formation of the DFWT? (Yes; No; Don't know)

4d) If so, can you describe these policies?

4e) Do you think that government policies acted as an impediment to the formation of the DFWT? (Yes; No; Don't know)

4f) If so, can you describe these policies?

5a) Do you think the DFWT has any major accomplishments? (yes; no; don't know)

If no or don't know, go to question 6a.

5b) If yes, can you please describe these accomplishments?

5c) Do you think government policies contributed to any of these accomplishments? (Yes; No; Don't know)

5d) If so, which government policies do you think contributed to these accomplishments?

Appendix IV Behavioural Research Ethics Board Supporting Documents: Interview Schedule (p. 3 of 4)

6a) Do you think DFWT has any major challenges? (yes; no; don't know)

If no or don't know, go to question 7a.

6b) If yes, can you please describe these challenges?

6c) Do you think government policies contributed to any of these challenges? (Yes; No; Don't know)

6d) If so, which government policies do you think contributed to these challenges?

7a) Do you think conflicts between agricultural and environmental interests in Delta have decreased since the formation of the DFWT? (yes; no; don't know)

If no or don't know, go to question 8a.

7b) If yes, please describe the conflicts that have decreased.

7c) Do you think government policies helped to decrease these conflicts?
(yes; no; don't know)

If no or don't know, go to question 8a.

7d) If so, which government policies do you think have helped to decrease these conflicts?

8a) Do you think conflicts between agricultural and environmental interests in Delta have increased since the formation of the DFWT? (yes, no, don't know)

If no or don't know, go to question 9a.

8b) If yes, please describe the conflicts that have increased.

8c) Do you think government policies have contributed to an increase in any of these conflicts? (yes; no; don't know)

If no or don't know, go to question 9a.

8d) If yes, which government policies do you think have contributed to an increase these conflicts?

Appendix IV Behavioural Research Ethics Board Supporting Documents: Interview Schedule (p. 4 of 4)

9a) Do you think there are other issues besides environmental conflicts that are threatening the viability of agriculture in Delta? (yes; no; don't know)

If no or don't know, go to question 10.

9b) If yes, please describe these issues.

9c) Do you think government policies contributed to any of these issues?

(yes; no; don't know)

If no or don't know, go to question 10.

9d) If yes, please describe how government policies contributed to these issues.

10. What do you think government could do to support DFWT programs and/or individual farmers who want to provide wildlife habitat while maintaining or enhancing agricultural viability?

11. Please describe any lessons learned from the DFWT experience that might help other organizations to develop similar agri-environmental programs.

12. Are there any questions that you would like to go back to and change or add to your answers?

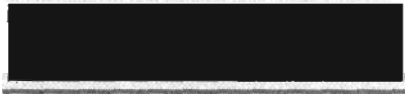
13. Is there anything else you would like to say about the DFWT?

Appendix V Behavioural Research Ethics Board Supporting Documents: Letter of Contact (p. 1 of 3)

INVITATION TO PARTICIPATE IN RESEARCH

Linking theory, policy, and practice: An examination of the Delta Farmland and Wildlife Trust and analysis of the policy framework in which it operates

Principal Investigator: Dr. Arthur Bomke
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Elaine is conducting research into the history and development of the Delta Farmland and Wildlife Trust (DFWT) as part of her doctoral thesis. This research is being done in order to identify whether government policies have enabled or impeded the work of the DFWT.

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Appendix V Behavioural Research Ethics Board Supporting Documents: Letter of Contact (p. 2 of 3)

Study procedures

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Appendix V Behavioural Research Ethics Board Supporting Documents: Letter of Contact (p. 3 of 3)

Consent

Your participation in this study is entirely voluntary and you may refuse to participate or withdraw from the study at any time without jeopardy to your employment or professional standing.

If you are interested in participating in this research please contact:
Elaine Anderson



Thank you
Elaine Anderson, MCIP, P.Ag.
M.Sc. (Planning), B.Sc. (Agriculture), B.A.

Appendix VI Interview Results Summary Tables

Table A.1 Are you aware of any conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	25	0	3	0	28
% of responses	89%	0%	11%	0%	100%

Table A.2 Conflicts between agricultural and environmental interests that existed prior to the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B)	Description
Tension between farmers and conservationists	11	44%	Mistrust; Lack of communication; No forum for communication; Disagreement over winter waterfowl use of the land vs. protection of crops for agricultural production
Competing interests in the ALR	11	44%	Land speculation; Golf courses; Greenhouses; Loss of agricultural land; Wildlife habitat on agricultural land
Waterfowl damage	10	40%	Farmers unable to grow certain crops; Crop damage by waterfowl; Soil compaction; Loss of forage crops
Alaksen National Wildlife Area	8	32%	Government employees managing farmland; Alaksen not managed or farmed properly; Waterfowl spilling onto farmland from wildlife reserves; Created hot spots of waterfowl damage
Lack of compensation	5	20%	Farmers sustaining wildlife without compensation; Crop loss; Financial loss
Pesticides	5	20%	Wildlife poisoning (ducks, eagles)
International treaties	3	12%	RAMSAR; Loss of processors; NAFTA; Free Trade
Policies to protect birds	3	12%	Lack of consideration of impact of bird protection policies on farmers; Management of the delta for waterfowl; Damage to agricultural resources; Federal jurisdiction over migratory birds; Provincial jurisdiction over other birds

Theme	# of responses (A)	% of respondents (A/B)	Description
Anthropogenic changes to the Fraser River System	3	12%	Dyking; Dredging; Negative impact on wetlands and shorebirds; Poor surface drainage and silt compaction of soil
Lack of community support	3	12%	Public perception that agricultural land is greenspace and public should have access; Difficulty moving equipment; Trespassing; Complaints from residents on edge of ALR; Farmers had no public recognition for the wildlife habitat they were providing
Ditch maintenance	2	8%	Fisheries preventing farmers from cleaning out ditches
Hunting restrictions	2	8%	Very difficult to get a hunting permit; Restrictions on when you could hunt
Provincially owned land	1	4%	Back up lands; Short term leases; Land management policies
Lack of raptor habitat	1	4%	No hedgerows; Lack of cover crops; Farmers didn't want to plant crops for voles to live in; Wanted to use land to grow crops
Lack of confidence in government	1	4%	No help by farming community from government; Government and farmers didn't trust each other
Greenfields	1	4%	Greenfields; Farmers already did that; We grew summer vegetables harvested before PNE and then grew cover crops; Lost processors, went to potatoes; Harvested in late September; The land was healthier before DFWT; Since we changed crops the land is not as good

Table A.3 Did the conflicts have a negative impact on agricultural viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	4	1	1	25
% of responses	76%	16%	4%	4%	100%

Table A.4 Negative impact on agricultural viability due to conflicts

Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Loss of forage crops	6	32%	Difficult to grow forage crops due to waterfowl grazing; Resulted in yield reductions; Biggest effect on first cut; Trampling can seal the surface and reduce drainage; Farmers had to bring forage in from other areas; Economic loss to farmers, particularly dairy; Contributed to an environment where there was a low tolerance for wildlife
Reduced range of crops	4	21%	Waterfowl predation made it impossible to grow overwintering vegetables; Changed the range of crops that farmers grew because the birds would eat the crops; Early crops were better for the processors; These crops were lost due to waterfowl
Lack of community support	4	21%	Lack of public recognition for the role farmers played in providing wildlife habitat; Trespassing and vandalism on agricultural land
Loss of markets	3	16%	Difficult for farmers to find markets for their products; Globalization; Reduced economic viability
Reduced soil quality	2	11%	Due to short term leases, some farmers were farming on a year to year basis; They were unable to invest in subsurface drainage and other practices for sustainable management; Resulted in degraded soil and reduced productivity
Lack of compensation	2	11%	Farmers weren't being compensated for set-asides; Lack of compensation for waterfowl damage
Pest control regulations	2	11%	Conflicts over pesticide use; Lack of recognition that farmers needed to control pests in order to be productive; Reduced the availability of certain pesticides, leading to lack of pest control

Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Ditch maintenance regulations	2	11%	Fisheries officers were preventing farmers from cleaning out their ditches; Reduced agricultural viability
Loss of farmland	2	11%	Federal government purchased farmland for wildlife; Created competition between farmers and government; Managed for wildlife and agriculture, but with restrictions on agriculture; Reduced opportunities for farm diversification; Heightened overall speculative interest in farmland

Table A.5 Did any of the conflicts have a negative impact on wildlife habitat viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	16	6	2	1	25
% of responses	64%	24%	8%	4%	100%

Table A.6 Negative impact on wildlife habitat viability due to conflicts

Theme	# of responses (A)	% of respondents (A/B) B=16	Description
Loss of wildlife habitat	7	44%	Conversion of wildlife habitat to agriculture; Conversion of agricultural land to urban development; Loss of land in ALR
Pesticide poisoning	5	31%	Pesticide used to kill wireworms in potato fields was consumed by waterfowl; Waterfowl died; Eagles consumed waterfowl and died; Use of pesticides diminished wildlife habitat quality
Insufficient wildlife forage available	4	25%	Lack of cover crops meant that there was little forage available for waterfowl
Lack of community support	4	25%	Lack of cooperation between farmers and environmentalists; Farmers were less inclined to encourage waterfowl grazing because of lack of acknowledgement; Lost opportunity to enhance farmland for wildlife
Waterfowl scaring	2	13%	Farmers were trying to scare waterfowl away (e.g. low level helicopter flying); More intense attempts at scaring than normal

Table A.7 Can you name any government or non-government organizations involved in any of the conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	1	4	1	25
% of responses	76%	4%	16%	4%	100%

Table A.8 Government or non-government organizations involved in conflicts

Agency	# of responses (A)	% of respondents (A/B) B=19	Comments
Environment Canada – Canadian Wildlife Service (CWS)	15	79%	They have the legislative mandate for migratory waterfowl
Boundary Bay Conservation Committee (BBCC)	10	53%	A consortium of many groups; BBCC formed over this issue and other threats to habitat
BC Ministry of Environment (MOE)	10	53%	Representatives were on the Steering Committee because they had a responsibility for some of the species
Delta Farmers' Institute	9	47%	Representatives would speak at public meetings
Ducks Unlimited	9	47%	Ducks Unlimited have always been involved re: hunting; They know the farmers
UBC researchers	6	32%	
BC Ministry of Agriculture	5	26%	
Corporation of Delta	5	26%	Local government involved in resolving conflict
Agricultural Land Commission	4	21%	
Provincial government	4	21%	Province didn't provide compensation for wildlife damage
BC Waterfowl Society	3	16%	
Non-Government Organizations	3	16%	Some local conservation groups (e.g. Friends of Boundary Bay); Representatives from these groups would speak at public hearings
Agriculture Canada	2	11%	
Environment Canada	2	11%	Environment Canada - Environmental Protection branch
Department of Fisheries and Oceans	2	11%	
Farmers	2	11%	

Agency	# of responses (A)	% of respondents (A/B) B=19	Comments
Federal government	2	11%	Federal government had responsibility for managing wildlife populations; Federal government said they weren't responsible for the waterfowl damage
Agricultural industry	1	5%	Different orders of agricultural industry
BC Institute of Agrologists	1	5%	Representatives would speak at public meetings
Delta Agricultural Society	1	5%	
Government	1	5%	Different orders of government
Habitat Conservation Trust fund	1	5%	
Health Canada	1	5%	
Media	1	5%	
Nature Trust of BC	1	5%	
Public	1	5%	The general public - both organized and disorganized
Tsawwassen Home Owners Association	1	5%	Representatives would speak at public meetings
Wildlife Habitat Canada	1	5%	
Committee that regulates use of pesticides	1	5%	

Table A.9 Do you think government policies contributed to any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	19	0	5	1	25
% of total interviews	76%	0%	20%	4%	100%

Table A.10 Description of policies that contributed to the conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Lack of government compensation for waterfowl damage	7	37%	Government has always been reluctant to get involved in wildlife damage; Lack of compensation for crop losses due to wildlife was the number one issue; BC's decision not to include wildlife compensation in their business risk management agreement with Agriculture Canada; Environment Canada took position that it was not their responsibility and Agriculture Canada said it was not their responsibility
Canada Wildlife Act - Federal acquisition of land for National Wildlife Area	6	32%	Acquisition and management of Alaksen National Wildlife Area; CWS had little experience managing waterfowl in areas like Delta; Created hot spots for waterfowl; Concern that CWS is not accountable to anybody; Environment Canada has limited power in protecting migratory bird habitat on private land, so acquisition of land is necessary
Lack of policy coordination	4	21%	Contradictory policies; Different agencies representing different groups with different objectives; e.g. CWS to protect and sustain migratory bird populations; Policies of other agencies; e.g. BCMAL to protect the agricultural industry as a whole; Government departments with separate mandates create a gap and the landowners fall in the gap; Same problems all over the province (re: conflicts between farmers and environmentalists)

Policy Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Migratory Birds Convention Act (MBCA)	4	21%	MBCA protects migratory birds in Canada; Policy tools for protecting migratory birds are very limited; General policy of increasing waterfowl numbers adds to the conflict and reduces agricultural viability
Agricultural Land Commission (ALC) Act	3	16%	ALC decision to allow golf courses as an outright use on farmland (Order in Council 1141-88); Farmers not able to sell their land for non-farming purposes to make up for losses incurred by waterfowl
Hunting regulations	3	16%	How and to who they issue kill permits; Can be a positive tool or a negative tool (if it is withheld); Government under pressure from public to restrict hunting; Farming community felt that there should be changes in rules to help reduce damage by waterfowl
Competing interests in the ALR	3	16%	Amount of development that has been permitted on the Fraser river delta that has displaced birds and concentrated their effect on remaining farmland; Policies that allowed non-farm use and subdivision in ALR; Erosion of ALR
Fisheries Act	2	11%	Farmers couldn't clean their ditches; Contributed to tension between farmers and conservationists
International trade agreements	2	11%	Global market forces made farm viability more difficult; Free Trade agreement resulted in a loss of processors
Pesticide legislation	2	11%	Pesticides had a negative impact on wildlife; They were taken off the market to address human and animal health concerns; This reduced the options available for farmers to protect their crops from pests
Stewardship funding	2	11%	Federal government said they don't support Trusts but the Greenfields program showed that farmers would provide wildlife habitat if given the right incentives

Policy Theme	# of responses (A)	% of respondents (A/B) B=19	Description
Land expropriation	2	11%	Government expropriation of agricultural land; Contributed to loss of farmland; Affected wildlife habitat and agriculture
RAMSAR	1	5%	Lack of consideration of the impact of RAMSAR on farmers
Golf course applications	1	5%	Municipal council decision to allow golf course applications to proceed heightened the conflict

Table A.11 Do you know why the DFWT formed?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	24	4	0	0	28
% of responses	86%	14%	0%	0%	100%

Table A.12 Driving forces in DFWT formation

Theme	# of responses (A)	% of respondents (A/B) B=24	Description
Agricultural and conservation interests willingness to cooperate	13	54%	Farmers and conservationists wanting to address wildlife and agricultural issues; Farmers and conservationists saw potential benefits for both wildlife habitat and agriculture
Agricultural organizations and individuals	11	46%	Delta Agricultural Society; Core group of farmers who already worked together; Delta Farmers Soil Conservation group; Delta Farmers' Institute
Availability of money	11	46%	Availability of YVR habitat mitigation money helped to get the DFWT going; Government and NGO money also helped
Municipal representatives	9	38%	Facilitated communication between farmers and conservationists; Provided neutral ground

Theme	# of responses (A)	% of respondents (A/B) B=24	Description
UBC researchers	7	29%	Independent science based critical thinkers; Conducting soil research in Delta; Provided some of the technical knowledge
Conservationist organizations and individuals	5	21%	BBCC; Nature Trust; Birders; Naturalists; Ducks Unlimited; Conservation community
Federal representatives	4	17%	Environment Canada - CWS; Transport Canada
Provincial representatives	4	17%	Ministry of Agriculture; Ministry of Environment; Agricultural Land Commission
Lack of existing farmland wildlife organization	3	13%	Need for an entity to represent wildlife and agricultural interests
Research	3	13%	BBCC, Corporation of Delta, and UBC conducting environmental and agricultural research in Delta
Loss of farmland	3	13%	Farmers concerned YVR compensation fund would be used to buy farms for wildlife; Conservationists willing to put money toward stewardship instead of just buying land
Existing farmland wildlife organizations/models	2	8%	Similar farmland wildlife programs in Britain and California
Lack of effective government policy	2	8%	Lack of government policies to deal with conflicts between agricultural and environmental interests; Key people plus lack of effective policy helped drive the formation of the DFWT
Greenfields program	2	8%	Success of existing farmland wildlife program
Deteriorating land	1	4%	Deteriorating habitat and agricultural resources on the delta due to land tenure issues

Table A.13 Did government policies help in the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	17	3	4	0	24
% of responses	71%	13%	17%	0%	*101%

*Sum exceeds 100% because of rounding-off

Table A.14 Policies that helped in the formation of the DFWT

Policy Theme	# of responses (A)	% of respondents (A/B) B=17	Description
Environmental Assessment Act – YVR Wildlife Stewardship Fund	8	47%	Habitat mitigation funds available because of the federal environmental review process for the third runway; A large part of this money went to the DFWT
Federal government staff involvement	5	29%	Environment Canada-CWS was at table during formation of the DFWT; Their mandate allowed staff to be part of the process and contribute in a generally positive way; Transport Canada was also involved
Provincial government staff involvement	5	29%	Ministry of Agriculture, Ministry of Environment, and ALC staff were at the table during formation of the DFWT; They were given the latitude to help in the formation of the DFWT
Non-Government Organization (NGO) capacity	5	29%	Government realized that environmental and agricultural interests had to work together; To do that they needed a locally run legal entity to take ownership and management of the project; A NGO would be able to do more than a government organization; The YVR Wildlife Stewardship Fund was seen as seed funding that could be used to leverage other grants and donations
Municipal Council support	4	24%	Strong support by local government politicians; Provided legal advice on how to set up the DFWT; Provided meeting rooms; Municipal Councillor provided mediation; Councillor was respected by the community; Provided some legitimacy to the process

Policy Theme	# of responses (A)	% of respondents (A/B) B=17	Description
General government support	2	12%	All of the government agencies were supportive philosophically
Order in Council 1141-88 rescinded	2	12%	Change in provincial government; New Democratic Party repealed the legislation that allowed golf courses as a permitted use; This helped to reduce the level of conflict and reduced land speculation; Helped those involved in trying to resolve the conflicts to move ahead and form the DFWT
Municipal staff involvement	2	12%	Staff representatives provided practical support, assisted with facilitation, and assisted in generating ideas
Society Act	1	6%	The Society Act allowed the DFWT to form and have charitable status
Intergovernmental cooperation	1	6%	Helped give credibility to the idea of the DFWT; Partnership committee (agriculture-wildlife committee) helped; Some of the programs that we had like Greenfields and Pacific Coast Venture where the agricultural ministry and federal and provincial governments were already working together helped

Table A.15 Did government policies impede the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	6	10	8	0	24
% of responses	25%	42%	33%	0%	100%

Table A.16 Government policies that impeded the formation of the DFWT

Policy Theme	# of responses (A)	% of respondents (A/B) B=6	Description
Allocation of YVR Wildlife Stewardship Fund	4	67%	CWS threw up a lot of obstacles; A lot of mistrust; CWS wanted to control the money; They wanted to get the YVR money for wildlife refuges; Farmers were saying they could do a much better job; There was no policy to direct this money; There was confusion over how they were going to divide up the money; The process wasn't really clear as to who would get money or how the competition would take place DFWT supporters had to talk to Treasury Board to explain the objectives of the DFWT
Society Act	1	17%	General bureaucracy related to creating a non-profit society
Gaming Laws	1	17%	Gaming laws changes made it a little more difficult to raise funds
Lack of compensation for ecosystem goods and services	1	17%	Lack of compensation for the provision of ecosystem goods and services; All levels of government didn't consider the environmental goods and services that farms provide; Farmers were providing ecosystem goods and services such as soil productivity, wildlife habitat, and carbon sequestration for free
Land expropriation	1	17%	Land expropriation
Lack of NGO funding	1	17%	Lack of funding; If the money didn't come from the YVR fund at the time that it did, the DFWT probably wouldn't exist; Common failing of government; Say they support something but don't allocate any money

Table A.17 Do you think the DFWT has any major accomplishments?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	1	0	28
% of responses	96%	0%	4%	0%	100%

Table A.18 DFWT accomplishments

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
On-the-ground programs	22	82%	On-the-ground programs increase productivity and decrease soil and crop damage by waterfowl; Poor farms have been brought into production because of laser levelling; Hedgerows and set asides are great for raptors and songbirds; Winter cover crops are great for waterfowl; Set aside program assists organic certification; Helped to restore the quality of the land
Community relations	13	48%	Maintaining the good relationship between the farming and wildlife community; Show farming industry is sympathetic to wildlife needs; More of the general public is aware of the importance of agriculture and wildlife; Newsletters; Events
Conservationists and farmers working together	11	41%	Diffusing conflict between the conservationists and the farming community; Benefits both agricultural and wildlife resources on the delta; They are taking a positive approach rather than a negative approach
Survival of the organization	9	33%	Kept a functioning organization with a Board that has both environmental and agricultural interests; Have established themselves as an important farming conservation agency in the region
Financial management	9	33%	Have effectively administered the YVR stewardship fund; Money and organization have been well managed; Accomplishments have far exceeded what could have been achieved if a piece of land had been purchased; Fundraising efforts have been good

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Research	7	26%	Effectiveness of their programs has been demonstrated through their monitoring and evaluation; Brought science to programs
Funding ecosystem goods and services	7	26%	Farmers providing habitat that benefits all but not having to pay for it themselves; Putting money into farms
DFWT Staff	5	19%	Very good staff; Science and relationships are both important; Staff play a role in communicating how to integrate wildlife habitat and agriculture

Table A.19 Did government policy contribute to any of these accomplishments?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	18	5	4	0	27
% of responses	67%	19%	15%	0%	*101%

*Sum exceeds 100% because of rounding-off

Table A.20 Government policies that contributed to the accomplishments

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Environmental Assessment Act – YVR Wildlife Stewardship Fund	5	28%	The environmental assessment for the third runway was required by legislation; This meant that there was money available to mitigate lost habitat; YVR Wildlife Stewardship Fund provided seed money so the DFWT had funds every year
AEPI: Delta Forage Compensation Program (DFCP) Pilot Project	4	22%	Symbiotic relationship between DFWT and DFCEP; Annual and perennial forage crops covered; Programs like this acknowledge the work that the DFWT is doing

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Federal government staff involvement	4	22%	Government gives federal staff the latitude to work with the DFWT; Environment Canada staff provide technical support
Greenfields funding	4	22%	Government funding of Greenfields was a major step in breaking the ice; Greenfields was seen as a collaborative approach that would not generate conflict
Conditions of YVR Wildlife Stewardship Fund	3	17%	Government has played a role in overseeing the administration of the YVR Wildlife Stewardship Fund; The DFWT has to be accountable to government and to the people of Canada
Federal funding	3	17%	Environment Canada provides financial support; The government couldn't give money directly to farmers for agri-environmental incentives, but they could give it to the DFWT
Other funding	3	17%	Policies and programs that provide funding to the DFWT
Environmental Farm Plan (EFP) program	2	11%	EFP program may have helped with awareness of environmental issues
Provincial government staff involvement	2	11%	Ministry of Agriculture staff helped move DFWT forward; Government gives provincial staff the latitude to work with the DFWT; Provincial staff provide technical support to the DFWT
Federal research	2	11%	CWS research program helped to quantify waterfowl damage
Municipal government staff involvement	2	11%	Giving municipal government staff the latitude to work with DFWT; Municipal government support
Science based approach	2	11%	Government policy supports science based approach
European Common Agricultural Policy (CAP)	1	6%	The CAP was offering incentives for agri-environmental stewardship; It was used as an example of what could be done in Delta

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Government staff involvement on steering committees	1	6%	Participation of government representatives on steering committees
Agri-environmental stewardship	1	6%	Government acknowledgement that they will never own enough land to sustain the birds; Private stewardship is necessary
Official Community Plan (OCP)	1	6%	Local government policies that promote agriculture and environment; The Delta OCP has a section on agriculture and the environment; The OCP encourages on-farm stewardship
Organic certification	1	6%	Set-aside program helps with organic certification
Outreach programs	1	6%	Provincial programs that encourage people to support BC agriculture (e.g. Buy BC)
Partnership Committee on Agriculture and Environment	1	6%	Has eased overall tension; Federal and provincial representatives examine the impact of environmental regulations on agriculture and vice versa
Program off-loading	1	6%	Government policies related to off-loading some of the activities that were formerly done by government have probably enabled organizations such as the DFWT to play a larger role in agri-environmental stewardship
Provincial research	1	6%	Active provincial government research programs
Municipal research funding	1	6%	Delta provides some funds for research
Society Act	1	6%	DFWT is a registered society which allows them to get funds and issue charitable receipts; These types of policies help the DFWT to function
Soil conservation	1	6%	Soil conservation program

Table A.21**Do you think the DFWT has any major challenges?**

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	1	0	28
% of responses	96%	0%	4%	0%	100%

Table A.22**DFWT challenges**

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Insufficient funding	14	52%	Programs oversubscribed; Not enough money for all programs; Only able to access endowment interest; Interest rates have gone down; Resulted in reduction in money for programs because only the interest can be drawn from the Trust fund; Shrinking land base, more waterfowl impacts in winter, so need more cover crop and relay cropping, but not enough funding to pay for this
Competing interests in the ALR	9	33%	Development pressures; Land base is shrinking; More pressure on existing soil based farmers; Concentrating wildlife in the area; Farmland is becoming more and more important component of their habitat because of loss of habitat elsewhere; The land base is coming under so much stress now that farming could come to an end in Delta and this would mean an end to the DFWT
Funding stability	8	30%	Need a healthy fund for ongoing operations, so you can hire good staff and keep them; Difficult to get long term funding for programs; Farmers want to feel that if they participate in a program that it will be there for the long term
Funding administration	8	30%	Takes time and effort to keep applying for money; Less time to spend on programs; Need to involve more businesses

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Changes in agriculture	8	30%	Kids aren't staying on the farm and new farmers aren't coming in; Conversions to blueberries and cranberries; Blueberries not compatible with wildlife habitat; Threats to soil based agriculture; Global competition; Trying to reconcile non-soil based farming with wildlife issues
Internal operation of organization	7	26%	DFWT Board of Directors: both a strength and weakness that everyone has to come together to agree, can also stalemate some things; Not sure BBCC represents the range of interests in the environmental community; Could have stronger linkages to UBC researchers and government; DFWT needs protocols; Need to get more people interested in the DFWT
Compensation for ecosystem goods and services	4	15%	The amount of money the DFWT has for compensating farmers for the ecosystem goods and services they provide is insufficient; Should be public funds that support community efforts at conservation initiatives; Costs farmers a lot of money to look after the wildlife
Community relations	4	15%	Doing good job, but preaching to the converted; Need to try to reach others; Would like to see people offering more money for support of both wildlife habitat and agriculture
Program management	3	11%	DFWT needs to determine which programs are most efficient and which aren't; Risk that programs are created just for the funding, then you have a program that you have to keep going; Need to find new farmers or create new programs
Influence of other organizations	1	4%	Ducks Unlimited needs to be more transparent in their work
Science based approach	1	4%	Need to maintain an objective science based attitude
Developing trust	1	4%	Finding ways to trust each other

Table A.23 Do you think government policies contributed to any of these challenges?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	18	3	4	2	27
% of responses	67%	11%	15%	7%	100%

Table A.24 Government policies that contributed to DFWT challenges

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Inaccessible government funds	12	67%	Competition for money; Federal government fiscal years may not coincide with funding needs; AEPI - very specific to mitigate impact of agriculture on environment, don't look at the ability of agriculture to enhance wildlife habitat, so DFWT can't get funding; Investment Agriculture foundation - built around generating a revenue stream but DFWT is not a revenue generating operation; Can't access some of the money that is available because they need a study or matching funds; Some organizations won't apply for government funding anymore because of the red tape and onerous reporting requirements; Investment Agriculture has funded DFWT, but there is a payback requirement before they are able to access Investment Agriculture funds; EFP provides funding for short-term projects, but not long-term projects that benefit soil fertility and wildlife habitat
Lack of government funding	7	39%	Loss of funding; Federal government not interested in core capacity of NGOs; Spending freezes; In some cases funding has been promised then withdrawn at the last minute due to government expenditure reviews; Misuse of government funds in past has led to heightened accountability for funding in government; Difficult to get long term funding for programs; Appears to be a reluctance in government to give too much money to one organization

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Lack of policy coordination	7	39%	Conflicts between governments; Delta can't write agricultural bylaws without getting the Minister of Agriculture to approve them; Province doesn't want to get involved in the conflicts over waterfowl because waterfowl are under federal jurisdiction; Federal and provincial government won't work together to develop a compensation program; Provincial government allows non-soil based farming activities on prime agricultural land (e.g. greenhouses); These operations should be put elsewhere; The Ministry of Agriculture has been a huge advocate of the agricultural industry; They haven't looked at whether or not farming practices should be improved
Economic policy	7	39%	Government policy related to growth and economy; Economic imperative often overrides everything else, both within and outside government; e.g. blueberries are a high value crop (economically valuable), but may not be environmentally sustainable because of sawdust that they are grown in; Changing crop pattern (e.g. expansion of blueberry acreage) is reducing wildlife habitat; Business decision by farmers based on economic return, but provides little or no wildlife habitat; Rising dollar may force closure of greenhouses; Farmers can't make money on soil-based vegetables, so they are growing more intensive crops; Related to trade between Canada and U.S.
ALC Act	4	22%	Relaxing of ALR guidelines; The ALC has allowed some loss of farmland to urbanization; Fragmentation of farmland coupled with rural estates impacts the types of crops that can be grown; Land expropriation for First Nations treaty settlement and government infrastructure projects has taken land out of the ALR

Policy Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Tsawwassen First Nations (TFN) treaty settlement	3	17%	Policy to take land out of ALR as part of TFN treaty settlement
Port development	3	17%	Expansion of the port impinges on the ability of the DFWT to sustain the farm community and wildlife habitat; Port development is taking land out of the ALR; There will be less land for soil based agriculture and wildlife habitat
Municipal land use and zoning	3	17%	Municipal land use and zoning policies that affect agriculture; Municipalities can create a very hostile environment for farmers; Municipality allowed an increase in population and population density
Lack of compensation for ecosystem goods and services	3	17%	Farmers want compensation for losses that they are suffering over wildlife use; Neither federal or provincial government will provide compensation; Amazing what the DFWT has accomplished with such thin resources; Partly due to a willing farm community that doesn't profit much from the programs
Gateway Program	2	11%	Gateway Program has taken land out of the ALR; There will be less land for soil based agriculture; Will negatively affect the ability of the DFWT to sustain the farm community and wildlife habitat
Lack of municipal agricultural department	1	6%	Delta doesn't have an agricultural department or staff to deal with agricultural issues; No capital budget to deal with agricultural matters
Federal policy priorities	1	6%	Priorities in federal policy seem to change from month to month
Soil Conservation Act	1	6%	Government changes to Soil Conservation Act; Allowed removal of topsoil in greenhouse development
Gaming laws	1	6%	Change in gaming rules affected ability to fund raise

Table A.25 Do you think conflicts between agricultural and environmental interests have decreased since the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	21	4	3	0	28
% of responses	75%	14%	11%	0%	100%

Table A.26 Conflicts that have decreased since the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=21	Description
Tension between conservationists and farmers	15	71%	Level of understanding in both groups has improved; At one time the conservationists and the farmers were very mistrusting of each other, this has diminished a great deal
Farm practices negatively affecting wildlife	5	24%	Conflicts related to the timing of harvesting have decreased (e.g. harvesting at certain times of the year can destroy nests); DFWT has been able to convince farmers that the programs are good for the land as well as for wildlife
Compensation for ecosystem goods and services	4	19%	Some of the programs have recognized the wildlife impacts and compensated farmers for some of their losses
Land degradation	4	19%	DFWT programs have helped to improve the land for agriculture and wildlife habitat
Research	1	5%	Better research information than before; Need hard data so they can monitor, because every year is different
Change in hunting regulations	1	5%	Increase in snow goose hunting limit
Parking next to dyke	1	5%	GVRD purchased some land for parking next to dyke; Done specifically to decrease conflicts with farmers, so people had somewhere to park when they went to the dyke

Table A.27 Have government policies helped to decrease any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	9	3	6	3	21
% of responses	43%	14%	29%	14%	100%

Table A.28 Government policies that have helped to decrease these conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=9	Description
AEPI: Delta Forage Compensation Program	2	22%	Providing compensation for waterfowl damage to forage crops is a big step forward; Government recognition of a problem
Farm Practices Protection (Right to Farm) Act (FPPA)	1	11%	FPPA has helped reduce conflicts
Federal staff involvement	1	11%	CWS staff have helped reduce conflicts
GVRD land purchase	1	11%	The GVRD purchased some land for parking areas near the dyke; Done specifically to decrease conflicts with farmers, because people had been parking in areas that blocked access for farmers
Change in hunting regulations	1	11%	Increased snow goose hunting limit
Ministry of Agriculture and Lands (MAL) staff involvement	1	11%	MAL provides staff to deal with farm issues
Municipal pro-agriculture policies	1	11%	Previous Council developed pro-agriculture policies
Release of back-up lands	1	11%	Release of back-up lands to private ownership
Municipal wildlife damage compensation fund	1	11%	The municipality has a fund that supports crop damage assessment

Table A.29 Have conflicts in Delta increased since the formation of the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	9	11	7	1	28
% of responses	32%	39%	25%	4%	100%

Table A.30 Conflicts that have increased since the formation of the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=9	Description
Changes in agriculture	6	67%	The next conflict will be the evolution of crops on the delta; Not convinced that traditional mixed farming is sustainable for Delta; Mixed farming commodity crops are lower value, so they are moving to higher value crops; Using higher intensity forms of farming (e.g. greenhouses), does not provide habitat; Price of corn has gone up because of biofuel demand; Increases costs of feeding cattle, but cattle prices are dropping; Farmers are getting out of cattle because they can't make money off of cattle
Competing interests in the ALR	4	44%	Port development; Use of the land for recreational purposes; Removal of ALR lands for political reasons (e.g. roads, TFN); Undermines the purpose of the ALR
Waterfowl damage	3	33%	Increased waterfowl populations have had an escalating impact on agriculture; Damage on perennial crop; Snow geese are having a strong impact

Table A.31 Did government policies contributed to an increase in any of these conflicts?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	6	0	3	0	9
% of responses	67%	0%	33%	0%	100%

Table A.32 Government policies that contributed to an increase in conflicts

Policy Theme	# of responses (A)	% of respondents (A/B) B=6	Description
Farm Practices Protection (Right to Farm) Act (FPPA)	3	50%	Delta wanted the FPPA amended so that they could restrict greenhouse operations; This irritated the agricultural community; Conflict between municipal and provincial policies re: greenhouses; Extreme positions based on emotions (for both farmers and conservationists)
ALC Act	1	17%	Decisions to take land out of ALR are affecting both agriculture and wildlife
Crown use of land	1	17%	Crown use of land is affecting both agriculture and wildlife (e.g. Gateway Program)
Municipal use of land	1	17%	Municipality providing parking lots so people can access dyke for recreational purposes; The dikes are all adjacent to farms and sometimes people are not respectful of farmers property
Migratory Birds Convention Act	1	17%	Not setting population goals for migratory birds
First Nations treaty settlements	1	17%	Treaty settlements are negatively affecting agricultural land base
Economic policy	1	17%	Policy related to the rising dollar

Table A.33 Are there other issues besides environmental conflicts that are threatening the viability of agriculture in Delta?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	27	0	0	1	28
% of responses	96%	0%	0%	4%	100%

Table A.34 Other issues or conflicts that are threatening agricultural viability in Delta

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Competing interests in the ALR	23	85%	Pressure on the land from speculators; Land values are increasing, so farmers have to generate more income from that land to keep it in agricultural production; Agricultural land is the cheapest land to buy, so when expropriation occurs, it makes 'financial sense' to buy it; Less farmland so less area for wildlife and more pressure on remaining soil based farmers; Land claims are contributing to the fragmentation and deterioration of farmland in Delta; If TFN are not interested in using their land for agriculture it will affect agriculture and wildlife habitat across Delta; There will be less land available for stewardship; Non-farmers buying land and taking land out of production (has effect on agriculture and wildlife habitat); Proliferation of rural estates; Constant erosion of ALR; Critical mass of farms needed; Need a certain size of operation for processors to come in

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Changes in agriculture	16	59%	Labour shortage is a big issue; Aging farm community; Costs of farming, the margins are getting very narrow for a lot of commodities; Land prices, fuel prices are heavily impacting agriculture; Water will become more of an issue adding to the cost of production; Greenhouses; Lack of revenue generating crops; The potential for the collapse of the greenhouse industry; Conversion to blueberry production; Uncertainty of what will happen next in Delta is affecting farmers' ability to make a living; Processors have gotten smaller and moved out of area
Transportation and utility infrastructure	14	52%	Major industrial corridor expansion affecting agriculture and wildlife habitat; Fragmentation of farmland e.g. South Fraser perimeter road; Gateway project; Expansion of the railway system; Direct conversion of farmland to container storage; Encroachment of power lines
Global economy	7	26%	Farmers are operating in a global environment; Competition is a big challenge for them; Remaining competitive and sustainable
Environmental conditions	5	19%	Climate change; air pollution; Land settling; more salt intrusion into irrigation water; Climate change will have a significant effect on farmers and wildlife
Traffic	2	7%	Highways are a real issue for farmers; Land based farming spread out around Delta, so have to travel in tractors on highways to get to different fields
Conflict between farmers and municipal council	2	7%	Ongoing conflict between Delta government and farmers; Present municipal council is not pro-agriculture

Theme	# of responses (A)	% of respondents (A/B) B=27	Description
Dredging of Fraser River	2	7%	Dredging of Fraser River means that soils are washing away; New agricultural land could be formed from these soils; Loss of soil diversity in Delta
Public role in agri-environmental stewardship	2	7%	Loss of general conservation environmental ethic in the larger population; Lack of avenues to support farming (e.g. ability to buy local produce); Public participation in DFWT
Population	1	4%	Population growth puts pressure on agricultural land
Mitigation for loss of farmland	1	4%	Need to mitigate the impact of industrial developments
Internal operation of DFWT	1	4%	Board of Directors should consist of local people; e.g. Surrey issues are not necessarily the same as Delta; At Large Directors don't need to be from Delta, but need to be familiar with Delta

Table A.35 Did government policies contribute to any of these other issues?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	25	0	2	0	27
% of responses	93%	0%	7%	0%	100%

Table A.36 Government policies that contributed to these other issues

Policy Theme	# of responses (A)	% of respondents (A/B) B=25	Description
ALC Act	8	32%	The ALR is weakening; You can see it in the price of the land; The value of ALR land goes along with urban prices; As the ALR weakens there are more speculators; Proliferation of rural estates and hobby farms; ALR exclusions have a negative effect on agriculture and wildlife
International trade agreements	6	24%	Foreign food policy; Policies related to trade; Industrial expansion is driven by government policy and global economy; Federal and provincial policies that are driving agricultural industrialization are supported by global economics; Much of what affects farmers is driven by the market; Foreign food imports; Food safety requirements; Labelling laws
Lack of policy coordination	6	24%	Different departments with different interests; Lack of an inter-government model to make effective land use decisions; Lots of working committees that integrate government but don't do anything; Government agencies, other than the federal and provincial agricultural departments, have a limited understanding of agriculture and the impact of their decisions on farmland; Need to take a regional approach to agriculture

Policy Theme	# of responses (A)	% of respondents (A/B) B=25	Description
Municipal zoning and land use	4	16%	Restrictions on housing for farm workers; Huge issue right now; Labour shortages; Zoning prohibits additional farmhouses; If you have three sons who want their own home they can't live on the farm
Farming regulations	3	12%	Regulations related to farming make it difficult to farm; Environmental regulations that are far too stringent for the reality of farming e.g. buffer zones to protect water habitat; Access to pesticide products influenced by environmental interests; This can create a lot of road blocks for farmers who need pesticide products to remain viable
First Nations treaty settlement	3	12%	Government departments responsible for TFN; Policy of land in the ALR going to TFN is not right, even though the TFN deserve better treatment
Labelling laws	2	8%	Labelling laws in Canada are flawed; Government has lower standards for imported food than for food produced by Canadian farmers; There isn't a level playing field
Reactive policy-making	2	8%	The problem in government is that policy is reactive; For example, when complaints came in over blueberry cannons a policy was created; Need to plan over a 100 year time frame for farmland
Farm tax rates	2	8%	Tax system is a big problem; Land taxes are in excess of 50%; The income required to qualify for farm status is too low
Port development	2	8%	Government departments responsible for port expansion
Dyking	1	4%	Dyking eliminates the ability of the land to regenerate with sands and silts
Gateway Program	1	4%	Perimeter road will result in a loss of agricultural land and wildlife habitat

Policy Theme	# of responses (A)	% of respondents (A/B) B=25	Description
Fraser River dredging	1	4%	Dredging results in the loss of soils and potential creation of new agricultural land; Loss of soil diversity in Delta; Also affects wildlife habitat
Official Community Plan (OCP)	1	4%	OCP policies encourage retention of large lots and discourage subdivision; Although that is useful, some farmers have said that it is not viable because they can't afford 100 acres; They want smaller properties; Mostly a positive policy, but can work against new farmers

Table A.37 Is there anything that government could do to support DFWT programs and/or individual farmers who want to provide wildlife habitat while maintaining or enhancing agricultural viability?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	28	0	0	0	28
% of responses	100%	0%	0%	0%	100%

Table A.38 What government could do to support DFWT programs and/or individual farmers who want to provide wildlife habitat while maintaining or enhancing agricultural viability

Theme	# of responses (A)	% of respondents (A/B) B=28	Description
Additional government funding	11	39%	The DFWT has demonstrated that the will is there, but they need more money; Stewardship programs are the best thing that we have; Having more programs would be good if there was more consistency in funding of stewardship
Compensation for ecosystem goods and services	9	32%	Everyone benefits from wildlife habitat and agriculture, so everyone should pay; The money should come via taxes; If the government wants farmers to do work for the environment then farmers need to be paid a reasonable amount; The money needs to come from government not from the marketplace; Implement the DFCP on a permanent basis
Environmental Farm Plan Program funding	4	14%	Lots of good ideas, but no money; EFP subsidizes improvements, but this is not enough; Could offer farmers more opportunities to apply for funding for wildlife habitat and/or riparian restoration/enhancement; EFP needs to provide longer term support; Need to provide resources, funding, and expertise on a longer time scale e.g. soil fertility, water management

Theme	# of responses (A)	% of respondents (A/B) B=28	Description
Supportive agricultural policy	4	14%	All the federal and provincial programs have disappeared e.g. ARDSA, they were instrumental in getting programs going, pretty much nonexistent now; Inspect imported food; Change packaging laws; Hard for small slaughter houses to operate under new regulations; Don't download ALR regulations to municipal governments (province should control what happens in ALR); Government could contribute through policy by putting in irrigation and drainage to maximize productivity of remaining agricultural land
Tax incentives	3	11%	Tax breaks; Tax incentives; Give income tax break for providing wildlife habitat; Reduce GST and give 1% to farmers for wildlife habitat; Tax reduction for hedgerows
Agri-environmental incentives	2	7%	Voluntary program based on incentives is the success of DFWT; Government can provide support by providing incentives; Mandated regulations tend to create bureaucracy and reduce cooperation; Government could encourage farmers to produce winter cover crops wherever possible and plant relay crops
Public involvement	2	7%	Shouldn't just come from government, should also come from society because this will drive policy and programs; Consumers need to embrace on-farm environmental practices
Strengthen government decision making	1	4%	Government needs to come together to strengthen the ALR and support farming practices
Resolve native land claims	1	4%	Native land claims should be resolved
International trade agreements	1	4%	The programs have to be set up so they are not trade distorting; Provide the right incentives for farmers to steward the land and produce food

Theme	# of responses (A)	% of respondents (A/B) B=28	Description
Enabling policies for local government	1	4%	Perhaps need policies at senior level of government to assist local governments in protecting wildlife habitat and agriculture; Senior government should be more proactive in supporting local government
Enforce Migratory Birds Convention Act (MBCA)	1	4%	Federal government needs to enforce MBCA by protecting habitat from development
Farmland acquisition	1	4%	If a farmer wants to sell, he/she should be able to sell to the government and have someone else farm the land
Government consultation	1	4%	Government needs to do more consultation re: provincial infrastructure programs (e.g. Gateway)
Protect farming community	1	4%	Government needs to stand up and protect the farming community in Delta
Collaboration between wildlife and agricultural interests	1	4%	Government could be more open to seeing the benefits of a collaborative relationship between wildlife and agriculture
Mitigation	1	4%	Mitigation fund is the main thing that is needed; Have groups on ground to deliver and have coordinating bodies to provide long term funding to the appropriate areas
Development guidelines	1	4%	Municipal and regional government could bring in development guidelines that also maintains wildlife habitat so it is not a burden to farmers
More farmland wildlife trusts	1	4%	Government could fund future farmland wildlife trusts through endowments; It is not money lost, because it is kept in trust; The government could always go back and take out the money if it isn't working; Very cost effective way of bringing stability to programs that provide a common good
Promotion	1	4%	The government could help promote the work of DFWT and identify similar work that could be done in other areas

Theme	# of responses (A)	% of respondents (A/B) B=28	Description
Education	1	4%	The Corporation of Delta needs to be more aware of what DFWT is doing; Integrate into education system, so people grow up with appreciation of soil, farmland and farming, and how valuable it is in Canada
Research	1	4%	Government could support the DFWT more actively than they do, e.g. provide money for research; Government should provide research, incentives, etc and let farmers work with that within a reasonable regulatory framework
Changes in agriculture	1	4%	Farmers are aging and their offspring are not going into farming; Farm succession needs to be managed
Do nothing	1	4%	Not convinced that government can or should do a whole lot to support the financial viability of the DFWT

Table A.39 Can you think of any lessons learned from the DFWT experience that might help other organizations to develop similar agri-environmental programs?

	Yes	No	Don't know	Not asked	SUM
Number of responses	27	1	0	0	28
% of responses	96%	4%	0%	0%	100%

Table A.40 Lessons learned: what has worked for the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Equal representation on Board of Directors	7	39%	Need a committee of reps from both sides; Must make decisions by consensus, otherwise you will always have conflict; Don't lobby except for funds; There should be women on the board
Bring opposing sides together	5	28%	Formation of the DFWT has brought understanding from both sides; Formed from the two core communities who really care about the issues; Find your advocates early on; Talk about what you can agree on to start with at first, then build on that
Operation of the organization	5	28%	Need staff and the advisors who have appropriate expertise; Use a business model; Don't emphasize one or the other (farmland or wildlife); Agricultural and environmental interests should share responsibility for running the organization
Include a facilitator	3	17%	Need someone who can mediate the conflict and facilitate the discussion
Wildlife and agriculture can coexist	3	17%	Wildlife and soil based farming can coexist and people can work together
University support	3	17%	UBC researchers have supported the DFWT; Provides credibility when academics speak in favour of it; They brought science to the table; UBC researchers were respected by both farmers and conservationists
Community relations	3	17%	The DFWT has done a good job of publicizing what it does; Make sure you get the word out about what you are doing

Theme	# of responses (A)	% of respondents (A/B) B=18	Description
Partnerships	2	11%	Develop strong partnerships with funders; Find out what expertise each organization brings (e.g. technical expertise)
Commitment	2	11%	Need people who are 100 percent committed; Everyone at the table had passion, everyone knew that there was something that could be lost
Open minded people	2	11%	People who have more of a world view and are open to ideas to try something new
Provincial government support	2	11%	Key provincial government people helped; Getting the right parties on board behind you
Community involvement	2	11%	Enlist the community in conservation programs; On-the-ground programs done by farmers are a lot cheaper than if government had contracted the work out to a private contractor or public sector agency
On-the-ground programs	2	11%	The focus of the DFWT has remained on delivery of field level programs; Need to demonstrate success
Model applicability at a larger scale	2	11%	Operation as a small model is probably a good one; Could have a consortium of trusts across the province
Municipal government support	1	6%	The formation of the DFWT came during a window of opportunity with a municipal government that was friendly with agriculture and wanted to balance agricultural and wildlife habitat concerns

Table A.41**Lessons learned: what could be improved**

Theme	# of responses (A)	% of respondents (A/C) C=18	Description
Fundraising	5	28%	Need to build up credibility with the farmers; The directors should be doing the fundraising; Fundraising needs to be done by those involved; Need some businesses and philanthropists to help set up some trusts
Operation of the organization	4	22%	Need a certain set of skills to found an organization and another set of skills to implement programs; Make sure that the people who work for the DFWT have a neutral perception of the agencies that are working with them; A director should not become an employee
Board of Directors	3	17%	Need to keep representation on the Board of Directors fresh; Directors need to commit to their role; Need protocols; Should be public input into the selection of the Board
Cost sharing	3	17%	There should be a compensation program; More damage more payment; We all benefit, so we should all share in the cost of protecting
Government support	3	17%	Government should support rather than direct or regulate; Government policy needs to support both agriculture and environment
Adaptive management	2	11%	Need to know what to do if wildlife numbers increase; Changes in agriculture (e.g. blueberries) may require a change in approach
Community relations	2	11%	The DFWT should give Council a quarterly presentation to tell them what they are doing (other organizations do this); Need to promote DFWT; Don't assume that everyone knows what you are doing
Program promotion	1	6%	Need a handbook of programs for farmers in other areas who don't have an organization like the DFWT
Product branding	1	6%	They might be able to brand their product and generate a bit more income and product loyalty

Theme	# of responses (A)	% of respondents (A/C) C=18	Description
Partnerships	1	6%	Can't be too tied to other organizations, or you lose your identity

Table A.42 Is there anything else you would like to say about the DFWT?

	Yes (B)	No	Don't know	Not asked	SUM
Number of responses	20	8	0	0	28
% of responses	71%	29%	0%	0%	100%

Table A.43 Other comments about the DFWT

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
DFWT is a good model	8	40%	The DFWT works as an agri-environmental stewardship model; It is a really unusual organization in Canada; Would be great to have similar organizations in other areas; Having a local non-government organization really helps get things done on-the-ground; When funding comes up there is a place for the money to go; Solutions need to be developed by people who live there and earn their money there; The key is that the DFWT was created by community members with government playing peripheral roles; Programs designed and implemented by the community; The fact that it has been working for 14 years shows that it is a success; They are a good model; A lot of decision makers share an interest in protecting farmland and want to steward the environment, but they don't necessarily know how to do it, DFWT is doing it

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
On-the-ground programs	6	30%	<p>Pros: Program funding attracted farmers; On-the-ground results have been good; Farmers are losing money year to year due to wildlife, but continue to sit at the table and agree to participate in DFWT programs</p> <p>Cons: The focus is on the environment; Most of the work is done for the benefit of the abandoned fields; Almost nothing done for farming; There are programs that could be expanded but not enough funding available</p>
Operation of the organization	6	30%	<p>Pros: Great organization; Employees are extremely dedicated; The DFWT does great work in a difficult environment; Haven't heard anything bad about the DFWT</p> <p>Cons: Government of Canada put a lot of money into the DFWT; The government was hoping the DFWT would bring in more money; The DFWT could play a really important and strong role to fight for both wildlife and soil based farming; Real opportunity for DFWT to try to affect policy; They need to create new partnerships, new alliances, and reach new people in the community</p>
Competing interests	3	15%	Access to water will be a huge issue in the future; The ALR is not protecting farmland from the development of roads, hydro lines etc.; This affects agriculture and wildlife
Formation of the organization	3	15%	A lot of conflict at beginning; Eventually the people who were causing the conflict left and better relationships developed; Farmers wanted to be independent of government; Non-government, non-profit, non-political was important; A lot of people were skeptical that the DFWT would succeed; The fact that the farmers stuck it out was what made it succeed; The farmers have the land for the on-the-ground programs

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
Insufficient funding	3	15%	As the costs go up they need more money; They are not keeping up with inflation; The things that the DFWT does (e.g. tours, BBQ) help publicize their work; A lot of Vancouver people now know what they are doing; This has led to some funds coming in, but not as much as if they could follow up more on fundraising; There should be a fund that is not a government compensation fund, but is paid out to farmers for losses due to wildlife; A separate fund that deals with issues on a year to year basis; Society as a whole should pay for it; It should be a cross Canada fund supplemented by provinces
Improved agricultural viability	2	10%	The amount of money that the DFWT has put into agriculture has improved agricultural viability in Delta and may have kept some farmers in business; Anything you do to put income into these farms on the urban fringe is worthwhile because the farms will provide fresh food to Vancouver for a long time

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
Alaksen National Wildlife Area	2	10%	Issues with farming practices in the Alaksen National Wildlife Area; Some crops are harvested too late to establish a cover crop; Some farmers have given up trying to farm on Alaksen because it is too frustrating; Environment Canada's attitude was that they need farmers to farm the land to keep it going; Environment Canada tried to accommodate farmer's interests but within their mandate; This created some conflicts (e.g. flooding land for waterfowl was not well received by farmers); Farmers wanted to laser level the land but this would have eliminated the ponds; Planting hedgerows around Alaksen made adjacent farmers annoyed because the hedgerows were seen as having pests; Attitudes appear to have changed; Some farmers were being impacted quite a bit by being next to a wildlife refuge; Some other farmers were saying that you just need to farm within the context of wildlife, but then it can get difficult when the wildlife numbers get too large
Revitalize Board of Directors	2	10%	Hard to get other farmers on the Board of Directors; Younger generation say they are too busy; Wildlife people seem to have the same problem; Would like to see new faces on the Board
Lack of compensation	2	10%	More compensation needed; There is no standardized crop insurance program for wildlife damage, but there are in other provinces
Changing global conditions	1	5%	Climate change will affect agriculture and wildlife

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
Create land	1	5%	More land could be created by moving the dyke farther out; Could create land that would benefit agriculture and wildlife (i.e. soil based agriculture); Would be a good strategy to offset the loss of agricultural land in Delta due to the TFN land settlement, port development, and new roads; Would require supportive policy; Society would have to pay some of the costs
YVR Wildlife Stewardship Fund	1	5%	It was difficult to get the stewardship fund for the DFWT; Having the DFWT as a partnership to solve conflicts was a very important factor; Farmers were very concerned that the money would be used to expand the Alaksen National Wildlife Area
Environmental Farm Plan funding	1	5%	If the farmers were making money off of the EFP, then more farmers would participate
Farm succession	1	5%	The whole way of farming is disappearing; New generation not interested in carrying on farming
Federal government regulations	1	5%	The Department of Fisheries and Oceans won't let them clean out ditches even though farmers have expanded fish habitat by creating ditches for drainage and irrigation
Strife affects funding	1	5%	There was some difficulty getting renewal money for Greenfields because some people were complaining to the Minister about the agri-environmental conflicts in Delta
Municipal government	1	5%	Corporation of Delta needs to consider entire community, not just farmers; There is a perception from farmers that farming is over-regulated in Delta
Partnerships	1	5%	The DFWT has got more people and organizations involved (e.g. Ducks Unlimited)

Theme	# of responses (A)	% of respondents (A/B) B=20	Description
Provincial government	1	5%	Provincial control over local agriculture limits environmental stewardship opportunities; Delta can only regulate what the Ministry of Agriculture and Lands will let them regulate; Irritation that the Ministry is overriding local government
Public role	1	5%	Society should offer more financial support to the DFWT
Species at Risk	1	5%	A lot of species at risk will end up in the ALR, because no habitat in residential areas; Urban development pushing more wildlife into ALR; Potential issue in the future if farmers can't farm the land due to the presence of species at risk
University researchers	1	5%	UBC researchers have been a tremendous help; UBC has been very supportive
Delta Forage Compensation Program	1	5%	DFWT helped to do some research for the Delta Forage Compensation Program; Did some in-kind work; DFI is the contractor on the Delta Forage Compensation Program through AEPI; Had to be a farm organization; DFWT is not a pure farm organization;