

AN ALTERNATIVE PARADIGM FOR CONSERVATION EDUCATION:
INNOVATIONS IN THE PUBLIC PRESENTATION OF KILLER WHALES
AT THE VANCOUVER AQUARIUM

by

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Abstract

Conservation is the number one goal of modern zoos and aquaria. Public education is the primary means through which zoos and aquaria attempt to fulfill their conservation goal. Yet, nearly two decades after its initial adoption, conservation education fails to be effectively translated into practice. This thesis argues that the entertainment paradigm in which zoos and aquaria have traditionally operated is at odds with their contemporary goal of conservation education, thus continued adherence to this entertainment paradigm prevents zoos and aquaria from effectively implementing conservation education. The thesis proposes an alternative paradigm in which conservation education may be successfully achieved. Killer whales present an ideal case example through which to explore the impact of the entertainment paradigm on conservation education. Since they were first displayed in 1964, these animals have been consistently presented in a show format. Today, the Vancouver Aquarium is the only institution in the world to present killer whales outside the context of a show. This thesis uses examples from the Vancouver Aquarium to describe how innovations within an alternative paradigm resulted in the Aquarium's unique approach to killer whale interpretation and animal care, and how these innovations have been successfully implemented into the practice of conservation education in the Vancouver Aquarium's public galleries.

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Introduction

I remember clearly the way I prepared my "talks" the first season I worked as an Interpreter at the Calgary Zoo. The venture started with an exploration through the Zoo's library, hot and stuffy on a prairie summer's day. Here I'd search out fabulous facts - wonderful details about animal size, reproduction habits or physical capabilities that would show my audience how truly amazing animals were. Weighted down with arm loads of books, I'd cycle home. The night would be devoted to consolidating the facts into an inspiring presentation which I would then commit to memory, eventually incorporating it into dreams of precise presentation. The morning found me up early, eager to mount my bike and cycle to the place where the bicycle path widened into a park and I could practice my prose out loud without fear of being discovered. How many mornings I serenaded the magpies with tales of Siberian tigers and lowland gorillas I cannot say. But what I do remember was the pride I felt in performing my talks for my supervisor in the backyard of the Education building and the excitement that always followed, when finally, after all my reading, we went as a group to recite in front of the animals themselves.

What strikes me now, as I look back upon these fond memories of 1983, is how little time I spent watching the animals. They were certainly left out of my preparation stage and by the time I was presenting talks in public, I was so caught up with catching the attention of my hot dog eating audiences and getting to my next "talk," I had little time left to look. In retrospect, it seems surprising that the visitors let me get away with it! Didn't they wonder why a certain animal was doing a certain thing? As I recall, they too were caught up in the race of getting from scheduled program to scheduled program, eager not to miss out on an animal feeding. Between visiting with family and finding the next "show", there wasn't much time to see the animals.

That summer, I gave talks about twelve different species of animals. Because I was particularly keen, I changed my talks three times over the course of the summer to prevent getting stale. Anecdotal stories that I picked up from the keepers were added as my confidence and integration into the zoo world increased. By the time my mid-season evaluation arrived, I had become a rather accomplished showperson, able to captivate the crowd with my words and excite them with my enthusiasm. I received high marks for "eye contact," "posture" and "smiles." It did not seem important to my colleagues or me that I knew virtually nothing about (and

spent even less time watching) the hundreds of other animals that lived at the zoo.

What was the purpose of these presentations? According to my training manual it was: "Wildlife Conservation - to instill a sense of wonder that would lead someone to conserve wildlife." How best to accomplish this noble goal was a constant source of inspiration, angst and debate for the Interpreters at the Calgary Zoo that summer. We struggled over the placement of our "conservation components" - statements of demise regarding the rate of rainforest depletion or troubling photographs of dolphins entangled in driftnets.

If we put these at the beginning of our talks, people would walk away. If we put them at the end, people would walk away. Most of us ended up sneaking them into the middle, hurrying on to a fun topic quickly enough to minimize their negative impact upon the "success" of our presentations. No matter how we packaged them, these messages of doom never really fit. Eventually, for all of us, the frequency of their inclusion became more dependent on the sight of our supervisor in the audience than our personal commitment to feature them.

There appeared to be an inherent contradiction between conservation education messages and our visitors' agenda for an enjoyable family visit in the safe, entertaining company of exotic animals. As it turns out, we were not alone in this dilemma.

Since their early beginnings in the 1700's, the primary goal of zoos and aquaria has been entertainment. Zoos, like circuses, offered strange animals to be ogled, not understood (Russow, 1989). This focus on entertainment proved popular. Zoos have evolved to become one of society's most favoured institutions. Current estimates suggest some 600 zoos exist world wide visited by more than 350 million people annually. (Kellert and Dunlap, 1989). In North America alone, annual visitorship at the 158 AAZPA zoos and aquariums is nearly 105 million." (Hotchkiss, 1993).

Since World War II, however, "a remarkable growth in the knowledge of animal behavior and ecology, and the mounting crisis of wildlife extinction, has motivated many of the best zoos to become increasingly concerned with scientific study, captive propagation, conservation of imperiled wildlife, and public education.(Kellert and Dunlap, 1989, pg.2). The call for zoos and aquaria to use their popularity to direct public attention toward wildlife conservation has been echoed in the international conservation community (IUCN, 1980; UNESCO-UNEP, 1990). Today, conservation is the number one goal of modern zoos and aquaria (Hotchkiss, 1993).

Public education is the primary means through which zoos and aquaria attempt to fulfill their conservation goal (Resenbrink and Jacobi, 1966; Conway,1974; Robinson, 1986; Jackson-Gould, 1993). Yet, nearly two decades after its initial adoption, conservation education fails to be effectively translated into practice (Kellert and Dunlap, 1989; Birney, 1987, 1990; Lieberman, 1993).

This thesis argues that the entertainment paradigm in which zoos and aquaria have traditionally operated is at odds with their contemporary goal of conservation education, thus continued adherence to this entertainment paradigm prevents zoos and aquaria from successfully implementing conservation education. The thesis proposes an alternative paradigm in which conservation education may be successfully achieved. Support for these claims is drawn from the fields of

environmental education, informal education, and zoo and aquarium education. Killer whales present an ideal case example through which to explore the impact of the entertainment paradigm on conservation education. Since they were first displayed in 1964, these animals have been consistently presented in a show format. Today, the Vancouver Aquarium is the only institution in the world to present killer whales outside the context of a show. This thesis uses examples from the Vancouver Aquarium to describe how innovations within an alternative paradigm resulted in the Aquarium's unique approach to killer whale interpretation and animal care and how these innovations have been successfully implemented into the practice of conservation education in the Aquarium's public galleries.

Chapter 1: The Ineffectiveness of the Entertainment Paradigm for Conservation Education

At the 1990 annual conference of the International Marine Animal Trainers Association, a lip-synching sea lion and two trainers in zoot suits received a standing ovation and recognition for excellence in conservation education for their performance of a rap song about ecology. The sea lion wore sunglasses, danced on his hind flippers and appeared to deliver "cool" remarks through the use of a prerecorded sound track. Although the dialogue was factually accurate, the anthropomorphic portrayal of this sea lion and the overall delivery of the information struck me as the antithesis of the true meaning of ecology. My view of ecology is based on valuing and understanding animals as they actually are: interconnected species within a biological system. Because the theme of the conference was conservation education, I had expected the conference participants to challenge the presenters regarding the contradiction between the message of conservation and the mode of delivery. Instead, they judged the success of the presentation in terms of its entertainment value and responded with thunderous applause.

As I attended sessions throughout the week, I became convinced that there was a serious flaw in the way conservation education was being defined and practiced in animal shows. By inserting conservation statements into entertaining shows, the content of the message appeared to be in direct contradiction to the context in which it was delivered. Yet, my suggestions that zoos and aquaria look outside the context of an entertaining show for educational strategies that better reflected the goals of conservation education while meeting the diverse needs of visitors fell on deaf ears.

Since their inception, the primary purpose of zoos and aquaria has been entertainment. They began at a time when according to Hubbell (1991) "there was not much information available about the natural history of these strange looking animals and therefore not much to pass on to the public" (p. 540). As time passed, knowledge increased, yet zoos and aquaria remained primarily focused upon entertainment. Hundreds of years of entertainment history continues to perpetuate

this public expectation. As an approach, entertainment has proven tremendously popular. Each year, more people visit zoos than attend all professional football, baseball and basketball games combined (Cohen, 1992).

The entertainment focus of zoos and aquaria remained virtually unchanged until the early 1960's when an alarming increase in global habitat destruction and species extinctions stimulated zoos and aquaria worldwide to re-evaluate their purpose (Kellert & Dunlap, 1989). In addition to conservation issues, zoos and aquaria shared a growing concern regarding the public's knowledge and value for animals:

Generations are growing up without any natural contact with wild creatures; unstable public opinions concerning wildlife and wild environments blow hither and yon unguided by fact or experience....The opportunity to observe and learn directly from a living collection of wild animals is a zoo's unique educational offering. (Conway, 1968, p. 317)

The call for zoological institutions to use their popularity to direct public attention toward wildlife conservation also came from external sources. According to the "World Conservation Strategy" (International Union for the Conservation of Nature, 1980), "public concern for popular animals (such as whales) should be used to foster better understanding of the ecosystems of which those animals are part, and of how people both affect those ecosystems and benefit from them (sec. 13-12). This sentiment is reiterated in the "International Strategy for Action in the Field of Environmental Education" (United Nations Educational, Scientific, and Cultural Organization - the United Nations Environment Programme, 1990).

A new commitment to wildlife conservation emerged. In 1980, the American Association of Zoological Parks and Aquariums designated conservation as their highest priority (Hutchins et al., 1992). Today, conservation is firmly established within the zoo and aquarium community as their primary goal and public education is recognized as the principle means through which conservation is achieved. Zoos and aquaria "must create an interest in biology, dispel attitudes to animals and plants that are ecologically dangerous and advocate humane attitudes to life... the (zoo) is the ultimate weapon in defending the biological world through environmental education" (Robinson, 1987, pp.10-11).

The shift from entertainment to conservation, through public education, represents a fundamental change in purpose. Yet, this change in purpose has not been reflected in practice. Despite the adoption of conservation education as their primary goal, zoos and aquaria have treated conservation as a change in subject matter and continued to operate within their existing entertainment paradigm. In his survey of conservation education programs in North American aquaria, Lieberman (1993) found that the rate of implementation of conservation related activities has been relatively slow:

This situation derives from the fact that marine conservation and education are not the institutional priorities at the aquariums. Even though conservation may have become one of the key objectives of many of the aquariums, it is clear, and understandable, that their primary focus remains on the visitor, providing a good experience for the visitor, and husbandry of the animals in the facility. " (pp. 4-5)

Adherence to the entertainment paradigm is understandable given the lengthy history in which zoos and aquaria have operated within it, the vast amount of expertise that has been invested in it, and the public's perception of zoos and aquaria as places of entertainment. Indeed there exists a pervasive belief within the zoo and aquaria community that providing entertainment is essential to the success of their institutions. According to Hubbell (1991): "In order to attract the multitudes of visitors that we will need to bring in revenue and make an impact with our conservation education efforts, we have to be entertainment centres " (p. 543).

The ever-increasing number of animal shows about conservation, currently operating in North American zoos and aquaria, provides a clear example of this phenomenon in practice (Yerke and Burns, 1991). It is entertainment, rather than educational theory, that dictates the format of these presentations. Because the format in turn, dictates where, when and how much information can be presented, it is the placement of information rather than increased understanding that dictates the content. In this context, conservation education has come to mean simply the selection and organization of facts about environmental problems (and in some cases) solutions that are inserted into entertainment-oriented formats. The stated goal is education but the driver is entertainment.

Fitting conservation education into entertaining shows has a profound influence on the way in which animals are portrayed. Brookfield Zoo show presenters, Sevenich and Gifford (1989) explain how they fit conservation into their dolphin show by "keeping the animals from distracting the audience from the conservation message by giving the animals acting parts in the skit " (p. 24). They describe their conservation show as follows:

Bermuda shorts and a flowered shirt enter stage left. A "tourist" strolls past the pool, drinking soda pop and tossing plastic litter into the dolphin's pool. When all of the garbage is in the pool, the dolphins are cued by a trainer to throw the garbage out of the pool, directly at the tourist. The tourist seems surprised and confused about what to do with the plastic garbage. The trainer on stage motions to the garbage can labelled, "Please don't pollute, save our oceans and lakes." The tourist deposits the garbage in the can and the dolphins thank the tourist by doing tail slaps and presenting the tourist with a fish as a sign of appreciation. During the skit, a recorded message explains how plastics can kill wildlife, how much of it is dumped into the oceans, and what individuals can do to help the situation. The entire skit lasts about two minutes before the rest of the dolphin show begins. " (pp. 24-25)

The littering tourist who gets his trash back courtesy of the dolphin and the environmentally conscious, singing sea lion are clear examples of what Lockwood (1989) describes as personification. Personification is a form of anthropomorphism in which animals are seen to act, think, feel, dress or communicate like humans. Anthropomorphic portrayals of animals are standard practice in animal shows. According to Challinor (1989), the extent to which the new emphasis on naturalism or ecology is at odds with older, anthropomorphic traditions represents a dilemma with which the zoo and aquarium community is clearly still grappling:

On the one hand, modern zoos, with their emphasis on research, education, and conservation, are increasingly attempting to promote what Kellert (1989) calls the ecologicistic perspective.... At the same time, some zoos have had a tradition of being more like stationary circuses in which animals are given names, have tea parties and provide rides to children. " (pp. 2-3)

Challinor (1989) cites an interesting example of the contrasting elements of this debate in a promotional videotape issued by the American Association of Zoological Parks and Aquariums (AAZPA) in 1983 to increase public interest in zoos. In the tape, all of the animals are presented in naturalistic environments. The enclosures are large and spacious and the animals are separated from people by moats or glass panels - not old-fashioned prison-like bars. The group sizes are very natural and seem to reflect what might be seen in the wild. All these characteristics are among the best features of modern zoos: "But at the same time, through the use of clever editing and dubbing, the animals appeared to be talking, joking, singing, and generally acting like human characters" (p. 3).

Proponents of anthropomorphism argue that it is an effective technique for inspiring positive attitudes toward animals. However, anthropomorphism is based upon an inaccurate biological portrayal of the animal which according to Kellert (1987a) "can cause more, rather than less, difficulties for wildlife and natural habitats" (p. 227). He cites a number of examples in which undue public affection or aesthetic attraction for particular species which has resulted in inordinate concern for animals that are not endangered at the cost of those that are.

In addition to their reliance upon anthropomorphism, shows also foster utilitarian and dominionistic attitudes toward animals. Shows feature animals who perform under human control for the entertainment pleasure of people. This encourages values for animals based upon their usefulness to people or for the things that people can make them do. These human-centred values conflict with attitudes that promote an ecological view in which animal have an inherent value within the natural ecosystem. Effective conservation relies upon ecological attitudes and values rather than solely, human-centred attitudes and values (Wilson, 1984; Kellert, 1987a).

The entertainment paradigm also dictates a particular view of science. Grobman (1992) argues that by packaging science as "fun", zoos misrepresent the true nature of scientific endeavours. According to Grobman few would describe the practices of analyzing field and experimental data and reviewing research reports as fun:

In the lives of our students, there are roles for both entertainment and education. The former however, is not a substitute for the latter. Science is a great intellectual adventure. Let us not entice students to study science with promises that amusement and pleasure are its hallmarks. " (p. 31)

Zoos and aquaria are not alone in packaging education, or science, as entertainment. It is the common practice of the world's largest mass communication vehicle - television. Postman (1985) claims that television has become the template for our conception of public information. Redefining education to fit within an

entertainment format has become so familiar that its appropriateness is rarely questioned by the public. "In presenting news as vaudeville, television induces other media to do the same, so that the total information environment begins to mirror television" (p.111). Postman's predictions are supported by the zoo and aquarium literature. The belief that "the best education is entertaining" is mentioned time and time again throughout the annual conference proceedings of the American Association of Zoological Parks and Aquariums. Television may have created a public that has come to accept entertainment as education but according to critics, this perception is incorrect:

Televisions' principal contribution to educational philosophy is the idea that teaching and entertainment are inseparable. This entirely original conception is to be found nowhere in educational discourses, from Confucius to Plato to Cicero to Locke to John Dewey...no one has ever said or implied that significant learning is effectively, durably and truthfully achieved when education is entertainment. " (Postman, 1985, p. 146)

Perhaps most importantly in terms of conservation, the entertainment paradigm negates the seriousness of the very conservation messages it hopes to instill. Animal presentations are based on principles that maximize their entertainment value ahead of their conservation education value. As the narrator leaps from the two minute skit about ocean pollution and dolphin survival, to the entertaining performance of the Brookfield Zoo's regular dolphin show, there is no continuity of message, no context, no consequences of the dire environmental threat that was just presented. The sense of seriousness is lost. This presentation style mimics the format of television news in which war, murder, earthquakes, and pie eating

contests are presented as discrete events, separated in content, context and emotional texture from what precedes and follows it. Like television news programs, animal shows operate in seconds and minutes, in images far more than words, to an audience that is free to come and go as they please:

The idea is to keep everything brief, not to strain the attention of anyone but instead to provide constant stimulation through variety, novelty, action, and movement. You are required...to pay attention to no concept, no character, and no problem for more than a few seconds at a time. (MacNeil, 1983, p. 2)

Postman cautions his readers not to mistake popularity for educational effectiveness. A review of the zoo and aquaria literature illustrates a widespread tendency for zoos and aquaria to do exactly that. Animal show developers claim that their shows are "entertaining and popular with zoo visitors, they are a means to deliver educational messages, attract increased attendance, and prolong visitor staytime" (Yerke & Burns, 1991, p. 532). In her 1990 study, "The Status of AAZPA's Marine Mammal Conservation Education and Research Programs", Birney (1990a) concluded that: "Few institutions engage in systematic evaluation of the informal learning opportunities they provide to the public " (p.17). According to Birney, educators may be using a number of non-related criteria such as popularity of animal shows, to judge the success of their conservation programming. The same is said to be true of museum directors who "pleased with rising attendance, rarely acknowledge that the museum's popularity may be a

measure of the museum's entertainment value, rather than its educational value"
(Grobman, 1992, p. 30).

Are zoos and aquaria effectively achieving their conservation education goals while operating within the entertainment paradigm? Those studies that have been conducted indicate that they are not (Birney, 1987; Kellert & Dunlap, 1989; Lieberman, 1993). In their 1989 study, "Informal Learning at the Zoo: A Study of Attitude and Knowledge Impacts", Kellert and Dunlap (1989) refer to the modern zoo as the "sleeping giant" of the wildlife education and conservation field:

No one could doubt the sincerity of their ambitions, yet the absence of persuasive corroboration is also evident... empirical evidence of a more informed and appreciative public following the zoo visit is neither impressive nor reassuring.... The meager ecological understanding of visitors following the zoo visit was among the disappointing results of the study. " (pp. 100-101)

Lieberman's (1993) findings are equally critical of the conservation education success of aquaria: "With few exceptions, aquariums are not providing the general public with the message of marine conservation, helping them to understand these issues or asking them to get involved in resolving the associated public policy and other problems" (p. 23).

These studies (Kellert & Dunlap, 1989; Lieberman, 1993) also found that zoos and aquaria had not supported their conservation education goals with staff resources. Conservation education programs are typically created by staff who lack

professional training in education. In his study of marine conservation in aquaria, Lieberman (1993) surveyed ten of the leading North American aquaria. Only 28 % of the education department staff had degrees in education while another 11% had degrees in marine sciences. As a result: "The staff may not thoroughly understand either the scientific perspectives on marine conservation issues or how to most effectively integrate conservation into their programs" (p. 13). As well, most zoos and aquaria rely on volunteers to teach their education programs (Birney, 1990b). Thus much of the conservation education programming that visitors encounter is developed and presented by individuals who are relying upon their own intuitions to determine what is appropriate to include. Newhouse (1990) cautions against relying on intuition alone when developing conservation education programs. She cites examples of research, such as that conducted by Kostka (1976) which illustrate that some forms of environmental education can actually have a negative effect on people's attitudes toward the environment.

Unfortunately, more comprehensive knowledge of the effectiveness of zoo and aquarium conservation education is burdened by an overall lack of data, problems of reliable and valid research methodology, and the absence of replicated studies conducted over a period of time and in diverse geographical locations. Lack of information is particularly pronounced with regards to the study of "informal" (ie. non-structured and nonobligatory) learning impacts of the zoo, which is the typical educational experience encountered by most zoo visitors (Kellert & Dunlap, 1989).

These research findings are reinforced by an uncomfortable feeling, both inside and outside the zoo and aquarium community, that conservation education goals are not being achieved:

I see a tremendous opportunity to raise the scientific literacy of our (zoo) visitors and to help them understand their place in the natural world. Unfortunately, we don't do a very good job of doing this. The surveys we have conducted...show that the overwhelming majority of our visitors leave us without increasing either their knowledge of the natural world or their empathy for it. There are even times when I wonder if we don't make things worse by reinforcing the idea that man is only an observer of nature and not part of it. (Donaldson, 1987, p. 3)

Despite the poor record of conservation education success, zoos and aquaria continue to operate within the entertainment paradigm. There is chronic concern that if zoos and aquariums put too much conservation education into their exhibits and programs, they may turn-off their visitors. They are very concerned about the balance between their 'entertainment value', their education value and their role in getting out the conservation message (Kellert & Dunlap, 1989; Lieberman, 1993). According to Cohen (1992):

As they have become important conservation and education centers, zoos have had to deal with difficult questions, resolve new problems, and make tough choices regarding the animals they keep and how they manage them. To a large extent, the choices zoos make in addressing these issues requires tradeoffs. In some cases, the right course for conservation programs may run counter to what zoogoers want and expect to see in their local zoo. " (p. 654)

The struggle to achieve conservation education while continuing to deliver popular entertainment is among the most important factors driving the evolution of the modern zoo. "The North American zoological community is at a pivotal stage in its evolution. The world is changing and zoological institutions must also redefine their purposes and goals (Hutchins et. al., 1992, p. iii). Kellert and Dunlap (1989) site the contradictory tradition of zoos as sources of mass entertainment versus centers of learning, science and conservation as the most difficult problem stemming from the historic popularity of these institutions. Zoos and aquaria are not alone in this dilemma. When the Canadian Museum of Civilization opened in 1989, the Globe and Mail described it as "a new target in the battle over the role of museums in Canada: to preserve or to entertain....You have to prove you're an entertainment centre to get the money" (Drane, 1992, p. C2).

Fidelity to the entertainment paradigm is justified by the zoo and aquarium community by the belief that: "It is entertainment rather than education, for which the public are willing to spend money" (Harrison, 1992, p. 8). Yet, recent polls suggest that this belief is not currently supported by public opinion. National polls conducted in Canada and the United States indicate that the public rates education far higher than entertainment as essential functions of the "zoo" (Department of Fisheries and Oceans, 1992; Roper, 1992). More than half of the respondents in the US poll (Roper) rated educating people about environmental conservation as an

essential function of zoos and aquariums. Only twenty percent believe that "entertaining people while they are learning about animals" is essential " (p. 20).

Not only is education in zoos and aquaria viewed as more important than entertainment by the public, but in certain cases, an entertainment format may actually be perceived as negative. In a surprising turn of events, the Canadian poll (Department of Fisheries and Oceans, 1992) revealed "a remarkable discrimination by the public as to what was an acceptable purpose for keeping an animal in captivity. Support for entertainment presentation was very low, about 39% " (p. 25). In his study of "Canadian Perceptions of Marine Mammal Conservation and Management in the Northwest Atlantic" Kellert (1991) found that Canadians strongly opposed: "...the taking of marine mammals for captive display in the absence of strong positive educational benefits " (p. 63). Kellert also discovered that "...respondents residing in cities of more than 500,000 population, indicated the greatest concern for the ethical treatment of marine mammals and were substantially less likely to endorse human mastery over and practical exploitation of these animals " (p. 59). This information is particularly relevant to the zoo and aquaria community. Because zoos and aquaria depend upon a large population base to sustain their operations, aquaria housing whales, dolphins and other marine mammals are located in major cities of the size described by Kellert.

According to a US poll (Roper, 1992): "The strongest feeling among the public is that (zoos and aquaria) are important places for teaching people of all ages " (p. 22). Similarly, Kellert and Dunlap (1989) found a high level of interest and strong public support for conservation education in their study of Informal Learning at the Zoo. A large majority of the zoo visitors surveyed favored increasing the amount of conservation information. Several argued that zoos are the best places to teach people about conservation because visitors are already interested. Lieberman (1993) cites a study at the Monterey Bay Aquarium on the impact of the "Jellies" exhibit which indicated that 66% of the viewers saw a strong conservation message and 76% said that the message made them want to do something to help. These studies and other anecdotal evidence indicate that the proportion of visitors coming to aquaria for conservation purposes and conservation information is increasing (Lieberman, 1993).

These studies reflect the fact that societal attitudes toward, and values placed on, wildlife are changing (Steinhoff et al., 1987; Edgell and Nowell, 1989; Loew, 1993): "Our attitudes towards animals have changed significantly, and it strikes me that if we are not conscious of the changing sensibilities - what I call the elevated moral status of most vertebrate animals - then we will not be responsive to our fellow citizens" (Loew, 1993, p. 17). Attitudes toward wildlife are important to an understanding of wildlife values because they reflect a broader set of beliefs, feelings, and social norms (Shaw & Zube, 1980). Kellert (1980; 1984; 1987a;

1989; 1991) has developed a "typology of thought" which consists of categories which he and his colleagues have developed to identify types of attitudes people hold towards animals (See Appendix 1). Kellert's data indicate an increase over time in humanistic attitudes and a decrease in utilitarian and dominionistic attitudes toward animals amongst North Americans (Loew, 1993).

Russow (1989) attributes changes in attitudes towards animals to changes in historical circumstances, emotional orientation and intellectual climate. From a historical viewpoint, urbanization during the past one hundred and fifty years forced a general change in the way "animals" and "the wild" were perceived by North Americans (Kellert, 1983; Kellert, 1994; Russow, 1989; Loew, 1993).

The vast majority of Canadians are urban dwellers. In fact, a larger percentage of Canadians than Americans live in cities. Therefore, our immediate concerns and daily realities, even our assumptions about what constitutes progress, are primarily generated by and contained by the ethos and patterns of the metropolis. (Littlejohn, 1989, p. 12)

As people became concentrated into cities, animals were no longer perceived as familiar tools or usable things, but rather as unfamiliar, exotic individuals. People began to romanticize and glorify the "wild" as a pristine, idyllic environment. At the same time, animals became the subject of sentimental concern:

Most of the emotional factors which have shaped our perception of animals support an increased concern for animal welfare and animal rights. However, this orientation is a two-edged sword, in that the concern is often misinformed by a mythic picture of animals rather than an accurate understanding of them on their own terms. (Russow, 1989, p. 34)

In terms of emotional orientation and intellectual climate, the American public as a whole is characterized by an extremely limited knowledge of animals (Kellert, 1980; Kellert, 1989). Those who visited zoos were among the least knowledgeable groups of people. According to Whittal (1992): "...the majority of zoo visitors are novice biologists, and also respond primarily at an emotional level to the exhibits" (p. 339). Zoo visitors rank high on scales of affection and concern for individual animals, but lower on ecology and knowledge scales than other people affiliated with wildlife clubs of various kinds (Kellert, 1979).

The reasons why many people misunderstand animals are complex indeed. Among them is a widespread tendency for humans to make the world of animals a simple reflection or replica of his or her own world. The tendency to interpret animals in human terms is widespread. According to Challinor (1989) anthropomorphism is the most common way of perceiving animals in America. Robinson (1988) states that many zoos and aquaria encourage a misguidedly anthropomorphic view of animals that can warp profoundly our judgement about human-animal interactions. The tendency to anthropomorphize is a quality that Kellert (1989) used to categorize people who possess a "humanistic" attitude towards animals:

This attitude primarily emphasizes feelings of strong affection and attachment to individual animals, typically pets. The animal is the recipient of feelings and emotional projections somewhat analogous to those expressed toward other people. No amount of affection for animals, however, can compensate for intrinsic biological differences, and thus the animal is rendered something of a subhuman. Nevertheless, the humanistic attitude values animals primarily as basic sources of affection and

companionship and, for some people, even as surrogate human beings. Considerable empathy for animal emotion and thought typically accompanies this perspective; consequently, anthropomorphic distortions can result. The attributes and capacities of animals may be idealized, leading to somewhat romanticized notions of animal innocence and virtue. The humanistic attitude toward wildlife usually involves strong affection for animals phylogenetically close to human beings, as well as those animals that are large and aesthetically attractive. (p. 7)

Whales, especially, tend to be viewed in an anthropomorphic manner (Edgell and Nowell, 1989; Kellert, 1991). "Certain attributes of cetaceans and their habitat places them in a special position in the affections and concerns of some people beyond those for most other mammals frequently held in zoos and aquaria (DFO, 1992, p. 23). These feelings appear to apply to marine mammals in general. According to Kellert (1991): "The Canadian public consistently expressed strong concern and affection for marine mammals, particularly seals and whales, and an interest in their protection and conservation " (p. 63). Yet, as with other surveys, Kellert discovered an overall lack of biological knowledge of marine mammals: "Even an animal category as popular as marine mammals reflects the prevailing lack of public understanding of the ocean environment and its biotic resources " (p 64).

The aforementioned surveys indicate strong public need and support for the conservation education goal zoos and aquaria define as their primary purpose. Yet, abandoning the entertainment paradigm in favour of an alternative paradigm more conducive to conservation education would require zoos and aquaria to break with hundreds of years of tradition. Such a break is necessary in order to see things in

new ways or to discover new possibilities (Covey, 1989). According to Kuhn (1970), almost every significant breakthrough in the field of scientific endeavor is first a break with tradition, with old ways of thinking, with old paradigms.

Shifting paradigms can be difficult and frightening. Lieberman (1993) suggests that executive staff in zoos and aquaria will probably continue to be reticent about implementing conservation education until they can be certain that it won't have a negative influence on visitation rates, and therefore, institutional survival. He cautions that this reticence will also keep them unaware of the general public's actual level of interest in learning more about marine conservation through their local aquarium: "...As long as the impact of conservation messages on visitation numbers and visitor response remains an unknown, executive staff and exhibit designers will probably continue to be reticent about fully integrating these messages into their exhibits" (Lieberman, 1993, p. 26).

Killer whales in aquaria present an ideal case example through which to explore the impact of the entertainment paradigm on conservation education and the public's perception of animals. Since they were first displayed in 1964, killer whales have always been presented in show formats which reflect utilitarian, dominionistic attitudes and humanistic values toward animals. These values conflict with the ecologicistic attitudes toward animals upon which conservation is dependent. Due to their historical popularity, killer whale shows provide a dramatic test by which to

gage the public's acceptance of an alternative method of presentation. In 1991, the Vancouver Aquarium became the first, and as yet, the only facility in the world to interpret killer whales outside of the context of a show.

Chapter 2: The Impact of the Entertainment Paradigm on Public Perceptions of Animals: Killer Whales as a Case Example

In June, 1991, I attended a public meeting of the Johnstone Strait Killer Whale Committee. The meeting was held to seek public input into the management of Johnstone Strait, British Columbia: the best place in the world to see wild killer whales. Each summer, nearly 300 killer whales return to the area to feed on the seasonal salmon runs and to socialize with one another. For nearly twenty five years, scientists have followed the summer activities of these whales, making them the best studied population of whales in the world. Because of its internationally significant ecological value, Johnstone Strait has been nominated as a World Heritage Site. Currently a portion of the Strait has been designated within the British Columbian provincial system as an ecological reserve.

Given its international stature and uniqueness, and the public's affection for killer whales, one might assume that Johnstone Strait would be free of conservation concerns. Instead, competing interests over commercial and recreational salmon fishing, coastal logging, fish farming and whale watching continue to exert pressure on the waters and the whales of Johnstone Strait. The realization that even an area as important as this must compete with human activities such as logging and fishing came as a total surprise to me. Like many other people who live in British Columbia, I had simply assumed that given the enormous popularity of killer whales and the fact that the area is a world famous whale watching site, that it would naturally be protected.

I remember scanning the newspapers the day after the public meeting, expecting to find full coverage of the debate regarding the future habitat of one of the world's most popular animals. Since I began working at the Vancouver Aquarium I had become very aware of the great amount of media attention that is devoted to the individual killer whales who live at the Aquarium and I anticipated that an issue affecting the livelihood of the wild population of British Columbian whales would receive similar, high profile coverage. Though an article eventually came out in the weekend science section of the Vancouver Sun, to my utter surprise, media coverage was almost nonexistent.

Killer whales are frequently covered by the media. Yet most of the reports take the form of human interest stories about specific animals in aquarium

settings. In recent years, the majority of media coverage has focused on the issue of whales in captivity. Front page stories in the Globe and Mail, for example, question whether or not whales should be released to the wild. These concerns are echoed by many of the people I meet. Thus, while human activities in local British Columbian waters threaten the well-being of the world's best known population of killer whales, public attention and concern is firmly focused on the issue of individual whales in aquaria.

Only forty nine killer whales live in aquaria world wide (See Appendix 2). The influence of this small number of animals on public perception is staggering. In North America alone, more than 15 million people will watch killer whales in aquaria this year. And, for the vast majority, the killer whales they see will be performing shows. Since their aquarium debut in 1964, killer whales have been presented as show performers. With the recent exception of the Vancouver Aquarium, whether you visit an aquarium in the United States, Mexico, Spain, France, Argentina, Hong Kong, Japan or Canada, you'll see killer whales performing shows. Because killer whales have consistently been presented in a show format, they provide a unique opportunity through which to examine the effects of the entertainment paradigm on the public's perception of a particular species.

Ask someone to name his or her favourite aquatic animal and chances are very good the answer will be "a killer whale". Indeed killer whales are so popular that killer whale toys, posters, magazines, television programs, feature films and other assorted paraphernalia can be found virtually anywhere in the world. The international scope of the public's love affair with killer whales is, in itself

noteworthy. What makes it even more fascinating, is the fact that the popular image of killer whales so widely held today is completely different from the image held just thirty years ago.

Public perception of killer whales

Published accounts of killer whales may be traced back to the first century, to Pliny the Elder, who stated: "A killer whale cannot be properly depicted or described except as an enormous mass of flesh armed with savage teeth (Rackham, 1947, p. 171). The portrayal of killer whales as savage killers remained constant throughout the 2,000 years since Pliny's first writings (Hoyt, 1984). Tales of the whales' ferocity, of their ability to tear the lips and tongues from whales several times their size, earned them names such as "devil fish", "sea monsters" and "bloodthirsty wolves of the sea." Hoyt hypothesizes that this early animosity toward killer whales may be due to the fact that some killer whales eat dolphins. To the early Greeks, including Aristotle, dolphins were omens of good fortune. They were immortalized for their intelligence and altruistic natures. The Greeks, and to a lesser extent, the Romans, did not take kindly to these dolphin-killing whales. During the 19th and the early 20th centuries, the predatory behaviour of killer whales was further exaggerated by whalers who considered these black and white mammals to be a threat to their whale-fishery: "In whatever quarter of the world the orcas (killer whales) are found, they seem always intent upon seeking something to destroy or devour" (Scammon, 1874, p. 88).

Throughout this century, killer whales in British Columbia were feared, hated and shot on sight by fishermen who viewed them as unfair competitors to the Pacific fishing industry. In 1960 the Canadian Department of Fisheries mounted a campaign to reduce the number of killer whales off the north-east coast of Vancouver Island: "It is recommended that one .50 calibre machine gun with tripod mounting be used (at Seymour Narrows) with ball ammunition only...If the whales approach from the westward, method of attack would be to open fire when they approach" (Johnstone Strait Killer Whale Committee,1991, pg.i). Although the government's gun was never fired, shooting at killer whales from fishing boats was an acceptable practice. One-quarter of the killer whales caught for aquariums in the 1960s and 1970s had bullet wounds (Obee, 1993).

In 1964, sculptor Samuel Burich was commissioned by the Vancouver Aquarium to kill a killer whale and fashion a life-sized model from it for display in the Aquarium's public gallery. After a two month vigil on Saturna Island, Burich harpooned and shot a young whale, but it failed to die. "Moby Doll" as the whale came to be called, was subsequently towed from Saturna Island to a temporary pen in Vancouver's Harbour.

The live display of Moby Doll allowed people an intimate view of a species that spends 95% of its life hidden beneath the sea. To the surprise of scientists and the

public alike, Moby Doll did not turn out to be a vicious man-eater. He was gentle and capable of learning tricks (Hewlett & Newman, 1968). Moby Doll became the darling of the international press. "Readers Digest", "Life", and many other magazines published articles. When Moby Doll died, approximately four months after capture, "The Times of London" gave his obituary a two-column heading, the same size given to the outbreak of World War II (Hoyt, 1984, p. 16).

Today, killer whales are described as peaceful, kind, civilized, caring, and intelligent; terms lovingly reserved for friends, not foe. It is somewhat ironic that this dramatic change in attitude was the result of a failed harpoon attack. The unintentional capture of Moby Doll and his unexpected demeanor were the catalyst for an international publicity blitz that marked the beginning of a dramatic change in public attitude toward killer whales. The most important result of the captive killer whale era, according to Hoyt (1984) was "the almost overnight change in public opinion. People today no longer fear and hate (killer whales), they have fallen in love with them " (p.19).

Rarely does one find such a clear example of a change in public perception resulting from captive display. It is interesting to note that although books and film now play a role in fostering positive public attitudes toward killer whales, they were not the catalyst. The first filming of killer whales in their natural habitat did not occur until 1973.

Early aquarium shows emphasized the killer whales' size, beauty and intelligence; the three most important factors effecting public preference for a species (Kellert, 1980). As in the classic tale of beauty and the beast, the relationship between between the human trainer and the gentle (but predatory!) whale became the main focus of attention. The sight of trainers riding on whales' backs and placing their heads into their enormous mouths, appealed to the audiences' sense of fear, awe and superiority toward wild animals. Graeme Ellis " (personal communication, July 1992) a biologist with the Pacific Biological Station in Nanaimo, BC and one of the first killer whale trainers suggests that the early emphasis on trained behaviours probably resulted from the audiences' fascination with watching staff feeding the whales. In an effort to get Namu, a newly captured whale at the Seattle Aquarium to eat, staff began swimming with it and turning over boat loads of fish. The audience loved it. According to Ellis, sea lion shows were already popular when killer whales first came into captivity. People enjoyed seeing what the trainers could make the animals do. Tricks were one way of showing the audience that whales were intelligent. Thirty years later, the way in which whales interact with humans remains a major area of public interest (Schaedlich,1987).

Aquaria were not alone in playing up close-contact, action-packed relationships between "man" and "beast". In a review of television nature shows, Siebert (1993) describes the style of nature program popular in the 1960s:

Its an episode of Mutual of Omaha's Wild Kingdom. There's Marlin Perkins...thrashing about in a South American river with an anaconda around his neck, his face going red as he tries to get the snake into a burlap bag for some zoo in Europe...There's his sidekick, Jim Fowler jumping out of a helicopter onto the back of a swimming moose, then falling into a lake " (p. 47). According to Siebert, 1960s television nature shows featured "cowboy naturalists, riding the natural frontier,...rustling up the animals and fencing them off on the ranch we call the wild." (p. 47)

The content and format of the first killer whale shows established a presentation style which has remained remarkably consistent over time and across location. According to Hoyt (1992) "for most of the shows, no matter the park, the actual acrobatic routines remain the same (64). Birney (1990a) discovered the same consistency in her review of marine mammal shows: "...there is little variation between shows... trainers or docents give an oral presentation using a sound amplifier while animals are rewarded for demonstrating a variety of behaviours " (p. 12).

Studies have shown that the way in which animals are presented effects how people perceive them (Rhoads and Goldsworthy, 1979; Shettel-Neuber, 1988). Our perceptions and attitudes about animals affect our interactions with nature and thus our impact on the natural world. The messages about killer whales conveyed through killer whale shows take on added significance when one considers that most people will only ever see killer whales when they are performing shows. Killer whales are rarely sighted in the wild and unlike other zoo or aquarium displays, where people may view animals in their exhibits any time throughout the

day, killer whales are displayed in show stadiums where in some cases, people are prohibited from viewing the killer whales except during the show. Even at facilities where the whales are always on public view, visitors spend little time watching them except during the scheduled shows. Visitors associate killer whales with performance. As a result, the only killer whales most visitors "see", are performing animals.

Since 1988, I have had the opportunity to watch killer whale shows either live or on video tape, from; SeaWorld facilities in San Diego and Florida; Marineland in Ontario, and the Vancouver Aquarium in British Columbia. I have also reviewed historical show scripts and viewed archival film and video tape footage from killer whale shows performed at the Vancouver Aquarium between 1968 and 1990. From these experiences, I have compiled a list of elements typically present in a killer whale show. These elements are supported by the findings of Hoyt (1992) in his review of mid-1980s transcripts of killer whale shows from Marineland of the Pacific (California), SeaWorld (California) and the Vancouver Aquarium (Canada). Interestingly, a 1988 review of dolphin shows in England indicates that the same criteria are also present in dolphin shows (Milburn, 1988).

A typical killer whale show

Killer whale shows consist of killer whales and trainers performing a scheduled routine of trained behaviours in a sequence designed to compliment a particular

theme. The show is punctuated throughout by visitor applause. Depending on the facility and the budget, the routines may be choreographed to music and/or large screen video projections. The core behaviours included in a show have changed very little since the late 1960s. These include: dolphin leap, spy hop, breach, pectoral flipper slap, vocalization, mouth open, tail lob, blow hole, slide out. It is the choreography, music, style and individual athleticism that gives each routine its own unique feel. The behaviours are presented in a condensed time frame. A days worth of diverse behaviours may be condensed into a single 20 minute show. Shows are typically scheduled seven days a week and are performed four to eight times a day (Hoyt, 1992).

The relationship between the trainers and the whales is positively portrayed. It is emphasized by physically positioning trainers in high profile locations and through the narrators frequent reference to the "special bond" which exists between the trainers and the whales. In most facilities, killer whale shows include segments in which the trainers ride and swim with the whales in the water. The dialogue which accompanies these behaviours emphasizes the "trust" which exists between whale and trainer. Training is further emphasized through demonstrations or explanations which describe how the whales are trained.

Killer whale shows include segments where the whales "splash" the audience with water. Visitors are advised that there will be splashes through pre-show

announcements and "splash zone" signs. The timing of the initial splash is a surprise. Narration and/or music, is used to build suspense before each subsequent splash. The splash is a standard component of a killer whale show.

The narrative dialogue which occurs during the show is scripted. In some facilities it is pre-recorded. Scripting insures that the spoken information relates to the specific whale behaviour being performed and that the length of the statements is synchronized with the duration of each behaviour. The script contains generalized facts about killer whale biology and natural history such as; size, diet, scientific classification, echolocation, family groupings. The amount of biological content varies between facilities and shows. The style of the narration is authoritative and entertaining. Reference to the whales' natural environment is rarely emphasized. when it is, the lives of killer whales in "the wild" are typically romanticized. The relationships between the wild whales are described as harmonious and the "wild" is portrayed as a pristine place.

Information about killer whales is frequently explained in terms of their similarity to humans. The term "just like us" is commonly used to express commonalities. Visitors are told, for example, that whales live in close knit family groups and are mammals just like us. The script also typically includes statements which attribute human emotions to the whales. Visitors may be told that a whale "loves" to perform or that the whales "want" to show the audience a behaviour. The whales

are referred to by individual names. The degree of anthropomorphism is often more overt. In some shows, whales are trained to perform behaviours that mimic human body language. The whale may nod "yes" or "no" on cue, or shake flippers when a hand is extended. Trainers may "pretend" to be carrying on a dialogue with the whales, or the whales may be trained to perform a sequence which creates the impression that the animals are playing a trick on a trainer. A member of the audience may be treated to a killer whale "kiss" or a chance to sit on a whale during the show (See Appendix 3).

The show has a distinct introduction in which the animals and the trainers are introduced by name. It also has a distinct ending. Shows end with an invitation for visitors to join the trainers and commentators after the show to have their questions answered. In more recent years, shows have tended to conclude with a conservation component which takes the form of short, simplified statement which describes an environmental problem and urges the audience to "help" preserve these animals (See Appendix 4).

Implications of portraying killer whales as gentle, benevolent, "people".

Much has been made of the "special bond" between killer whales and humans. A Vancouver Aquarium flyer from the late-1960s advertising one of the first live

displays of killer whales states: "(killer whales) are surprisingly gentle and responsive to man. Despite their predatory reputation, they have never been known to harm anyone." Another flyer, this one from the mid-1980s, attempts to illicit volunteers for wild killer whale research. In this flyer, potential volunteers are told that: "orcas don't attack people - not even in self-defence"; and "the orca is one step above God". The brochure features pictures of smiling people hugging killer whales.

Audiences enjoy the vicarious experience of watching trainers touch and "communicate" with killer whales. In most killer shows, a member of the audience is chosen to touch, feed, kiss or train one of the whales. The 1994 Sea World show: *New Visions*, includes a segment where a preschooler is chosen from the audience to have her picture taken sitting on the back of one of the whales. The "gentle giant" portrayal extends to descriptions of the interactions between whales. Frequent references are made to the tight-knit family structure of killer whales. A script from a mid-1970s Vancouver Aquarium killer whale show is typical of this sentiment: "Just like your Mom or Dad or friends take care of you when you are sick, killer whales help one another if they are sick or injured. The other whales would support the sick animal at the surface, keeping its blowhole above water so it could breathe."

These claims fail to reflect an accurate image of killer whales. Jenkins (1991) claims that by emphasizing the altruistic care-giving behaviour of wild whales and not mentioning the rake-marks and rostrum-sized contusions present on some beached carcasses aquaria have romanticized the lives of cetacea. By emphasizing the similarities we share with whales without mentioning the differences, aquaria have contributed significantly, to the highly popularized, but incorrect mystique surrounding killer whales: "We need to accept the fact that the public didn't hear us when we told them dolphins and whales are mammals. What they heard is that "they're just like us " (p. 8). Spotte " (personal communication, October, 1991) concurs: "You can safely assume that the public at large - the " silent majority", if you will - is no better informed about marine mammals than it was 10 years ago. If anything, even more people now believe cetaceans to be humans disguised cleverly in wetsuits."

According to Russow (1989), one of the most interesting forms of anthropomorphism is the tendency to neotenize animals; to see them as children. The 1993 movie, "Free Willy", contains excellent examples of neotenization. The main character is a real killer whale yet, some of his physical features and behaviours have been changed to make him appear more human. For example, Willy opens his mouth and makes human crying sounds despite the fact that whales do not open their mouths to vocalize. Close-up shots reveal eyes that look more

human than whale. And, he is completely dependent upon people. This movie fits the criteria that foster neoteny as described by Russow:

Suppose one entertains a romantic vision of the wild as unspoiled innocence, of animals as the proper subject of sentimental concern, yet still holds that adult humans have some sort of responsibility toward them, tied to our more developed rationality. Combining all of these feelings creates a picture of animals as innocent children; cute and unspoiled, but in need of protection by more rational beings - us. " (p. 33)

Anthropomorphism fosters humanistic values toward animals (Kellert, 1989). The danger of anthropomorphism is that it makes no attempt to understand the animal in its own world. There is no recognition of the true biological needs or adaptations of the animals involved (Lockwood, 1989). According to Kellert (1987a), most humans have remained aloof from the biological matrix of the earth. In order for people to develop more sophisticated ecological and philosophical concerns for wildlife they must "move beyond feelings of compassion and kindness for selected animals to a conviction that the health and well-being of wildlife and natural habitats are ultimately linked to human well-being and even survival (228).

Difficulties arise when the biological behaviours of whales fails to live up to this imaginary image. In 1991, Keltie Byrne a trainer at Sealand of the Pacific died after

falling into the killer whale pool and being dragged beneath the surface by the whales:

The widely-reported death shocked people throughout North America. It was difficult for a whale-loving public to accept that Sealand's three killer whales had actually drowned their trainer. Were these the same gentle giants that allow trainers to stick hands inside their mouths or tickle them without harm? (Gallagher, 1991, p. 43)

Klinghammer (1989) discovered the same type of surprised response in wolf sympathizers who hold a romantic notion of wolf behaviour. "They are actually offended when a tame wolf ignores them, or even snaps or growls at them " (p. 87).

The whales at Sealand had not been socialized to swim with people. To the Sealand whales, a person falling into the pool would be an unusual event.

Biologists at the inquiry into Ms. Byrne's death, interpreted the whales' behaviour as the natural response of predatory animals to an exciting stimuli. This interpretation did not fit the commonly held stereotype of the "special bond" between human and whale. Rather than forwarding the biologically-based explanation, the press played up the animal rights explanation; an explanation that attributed the whales' behaviour to an external factor, captivity, and thus preserved the popular image of benevolent whales. "The whales 'bizarre and abnormal behaviour' was undoubtedly due to their confinement in a condition of extreme sensory deprivation" (Obee, 1993, p. 43).

Lockwood (1989) describes a form of anthropomorphism which explains animal behaviour in terms of human codes of behaviour as explanatory anthropomorphism. He uses the example of dog owners who assume that their pets have torn their house apart when left alone out of spite or revenge. This form of anthropomorphism is evidenced in the following quote taken from a magazine article about Ms. Byrne's death: "were the huge, swimming mammals exacting some sort of revenge for their captive and perhaps unhappy life at the aquarium?" (Gallagher, 1991) As this example illustrates, the unrealistic image of killer whale behaviour and "personality" portrayed in killer whale shows conflicts with the development of an accurate biological understanding of the animal.

Implications of portraying killer whales as performers.

For three decades, killer whales have consistently been portrayed as show performers. Images of leaping killer whales performing shows are featured prominently in advertising campaigns, print and television news and feature reports, books, brochures, and souvenirs. If, according to Hoyt (1992), the lasting impression of most shows is mainly visual, then the images that persist are those of the trainers commanding, riding, and patting killer whales as trained animals are put through their paces. This portrayal has resulted in a world-wide expectation on the part of aquarium visitors for whales to perform.

The image of killer whales as show performers has a number of implications on public attitudes toward killer whales. Primarily, it fosters a value for whales which is essentially utilitarian; the whales are valued because they do things which entertain people. Utilitarian values are context dependent. The value is based on what the animal can do for a person, rather than on the inherent value of the animal itself (Kellert, 1991). The utilitarian attitude is reflected in the following comment written by a Vancouver Aquarium visitor: "I came here (the Vancouver Aquarium) to see the whales do what they are supposed to do (tricks) " (personal communication, September 1, 1991).

Obee (1993) describes the experience of Graeme Ellis, one of the first whale trainers, who became "disillusioned by tourists who got angry when whales failed to perform as expected. There were huge profits to be made, and whales were forced to do the same tricks hour after hour, day after day " (p. 52). Decades later, this utilitarian attitude toward captive whales is still commonly expressed by aquarium visitors: 'I'd like to see the whales perform where they put them through their paces, make them jump in the air and you know, put on shows for the kids and that' (CBC TV, 1991).

Shows can also reinforce the concept of human dominance (Birney, 1990b). Children frequently ask aquarium staff to "make the whales jump". The 1992 Sea World show, caters to this desire by including a segment in which children from the

audience are given the opportunity to train the whales to nod "yes" and "no". The dominionistic attitude fosters a value based on what a person can make a whale do, rather than a value for the whale itself (Kellert, 1991).

These utilitarian and dominionistic attitudes toward killer whales conflict with the humanistic attitudes which many other aquarium visitors hold: "Any animal that has to perform for human entertainment is ...cheated (Streicher, 1992, p. 111).

Perhaps in an effort to diminish the concerns that the animals are being made to do something against their will, show narrations have stated, for the past thirty years, that killer whales love to perform. "Concern has been expressed about the indignity that dolphins allegedly suffer giving 'performances' for the public. Fortunately, these are generally extroverted animals that respond to applause of public enthusiasm" (Manton, 1988, p. 202).

This anthropomorphic portrayal has led to yet another unanticipated public concern. Some visitors, who have come to believe that the whales love to perform, worry that non-performing whales are missing something of value:

It was odd not to see the whales performing - we've come to associate the aquarium with whale shows. I'm curious if the whales get bored? Do they feel lost or without a purpose? I feel that they don't have a purpose here now and feel sad seeing them swim back& forth aimlessly. I want to clap, to let them know people are out there thinking of them..." " (personal communication, May 14, 1992)

Implications of the time-condensed view of killer whale activity patterns.

Killer whale shows present a time-condensed view of whale behaviour. Siebert (1993) that distilling nature into a series of spectacular, rapid, focused, and framed events, fosters an audience of viewers that does not know how to "see" and may therefore be disappointed by their experiences viewing real life. Killer whales shows, like televised nature shows, offer a guaranteed view of spectacular animal events. The disparity between the way nature is represented in shows and the way it actually is leads to unrealistic expectations which can not be fulfilled by the actual living animal or environment. According to Siebert, people in natural environments, "trek and look dutifully about in hopes of spotting something in the wild, our minds mired somewhere in that disappointment between 'Disneyfied' nature and the actual place... " (p. 51).

Jim Borrowman, co-owner of Stubbs Island Charters in Telegraph Cove, one of the premier killer whale-watching outfits in the world says that "children become easily bored watching the dorsal fins of wild whales from a distance. They prefer aquariums, where they can see the whales at close range (Obee, 1993, p. 53).

Whale watchers frequently describe their wild whale watching experiences in entertainment terms; remarking that the whales are putting on quite a show for us! Ironically, Borrowman occasionally carries a stack of Aquarium passes to hand out to disappointed whale watchers.

Whittal (1992) discovered that many zoo visitors do not have an accurate idea of animals' natural activity patterns. People do not realize that "animals in nature may sleep for many hours or appear still for long periods of time " (p. 339). Because very few visitors spend a significant amount of time watching whales, there is a tendency for people to assume whatever they see the whales do in the few moments they are watching, to be what the animals do all day long. An inaccurate perception of animal activity patterns can lead to disillusionment with the activities of the actual animal. This phenomena is illustrated in this quote from a Vancouver Aquarium visitor who watched the interpretation of actual killer whale behaviour rather than a killer whale show:

I supported the end of whale shows until I took my children to the aquarium this summer. After "viewing" the whales the children had about as much awe for them as they do for pot-bellied pigs. If it takes entertainment to enlighten, then that is a small price to pay for education. " (personal communication, September 2, 1991)

Interestingly, the innovative program that the Vancouver Aquarium adopted in place of shows resulted in a quantifiable increase in both the amount of time and the variety of activities in which the whales were engaged, on a daily basis. Because training sessions within the new format are non-scheduled, visitors began watching the whales randomly throughout the day. For many it was the first time they had seen whales resting, socializing and engaging in low energy activities. The whales at the Vancouver Aquarium had always engaged in resting and low energy activities in full public view. The difference was that visitors were now seeing these

activities. This would lead some to assume that the animals were doing "nothing" all day long because they were resting for the few moments that they watched them.

For thirty years, killer whale shows have condensed real animal behaviour into an artificial series of rapid, spectacular, predictable events in order to capture public interest. Although these shows have succeeded in capturing public interest, it is somewhat ironic that the unrealistic image of killer whales they present may actually contribute to disappointment with the real animal. The issue of unrealistic expectations is critical to the conservation goals of aquaria whose primary purpose is to encourage public interest in wildlife and ecology.

Implications of a schedule and structured format

Schedules imply that there is a "best" or "correct" time to do something. A scheduled killer whale show therefore implies that the best time to watch killer whales is when they are performing trained behaviours. Evidence that people have adopted this belief is reflected in the daily behaviour of visitors at the Vancouver Aquarium's admission desk. Three years after the Vancouver Aquarium ceased advertising killer whale shows and became the first, and as yet, only facility to display killer whales without a show, "When's the next killer whale show?" continues to be the most frequently asked question by the facility's 800,000 annual visitors.

By telling the public (whether it be directly or inferred through a schedule) that the best time to watch killer whales is when their actions are dictated by their human trainers, value for the animals own, inherent behaviours is diminished. Not only does a schedule carry the message that human-dictated whale activities are more interesting than the natural behaviour of whales, it also imposes a human-centred schedule on the activities of the animals; no matter what behaviour the whales may be currently engaged in, it is superseded by the show schedule.

In killer whale shows, the whales perform trained behaviours which are choreographed and synchronized with the narration and often, music. Because of the level of synchronization, only trained whale behaviours are included. Thus, the whale becomes an "actor" playing the role of a whale as fashioned by people. By limiting shows to the display of predetermined sequences of trained behaviours, the visitor experience is limited to a single, repeating product. The spontaneity, surprise and excitement of real, truly unexpected animal-initiated behaviour, is lost. Oppenheimer (1972) compares such pre-determined experiences to sightseeing on a train that is unstoppable, irreversible and dominated more by the smell, sounds and motions of the train than by the landscape. The best kind of sightseeing, and hence, the best educational experiences, involve personal exploration and the freedom to decide what not to investigate and where to linger. They encourage visitors to use their own skills and beliefs and to discover the inconsistencies in this knowledge through participation in new experiences (Screven, 1987).

Romantic portrayal of the wild

Websters defines the "wild" as 1. a sparsely inhabited or uncultivated region or tract: wilderness 2: a wild, free, or natural state or existence. Killer whale shows perpetuate a romanticized view of natural environments through narrative references to "the wild". Use of this general term rather than a specific description of a location with actual problems creates an idyllic image of killer whales living in a pristine wilderness. In some cases, the shows reinforce a stereotyped picture of a location. In SeaWorld's 1994 killer whale show entitled: New Visions, a large format video screen projects pristine views of Alaska while the commentator describes "god's country" in glowing terms.

Interestingly, a romanticized view of the wild is also implicit within the philosophy of a group to which zoos and aquaria frequently find themselves at odds - animal rights. One goal of animal rights is the liberation of individual animals from captivity. By focusing on the need to return animals to freedom, animal rights perpetuates a view of natural environments as "free". Animal rights proponents have argued that the best policy toward wild animals is simply to 'let them be' (Singer, 1990, Munro, 1991; Shinnick, 1991; Hutchins, 1992). Conservationists argue that the "let them be statement" lacks validity given the enormously destructive human-driven forces at work on the globe (Geist, 1992; Maple, 1992, Hutchins, 1992). The number one problem facing wildlife today is loss or

degradation of habitat due to human encroachment: "And if we let things go, it is not letting nature go, rather it is letting the forces that we have let loose continue their destructive work" (Geist, 1992, p. 17). Marine mammal conservation issues are becoming increasingly abstract and complex. Today, indirect, habitat-related competitive relationships between marine mammals and human development activities pose the greatest threat to species survival (Kellert, 1991)

New threats have emerged, however, that are more subtle in their expression but perhaps no less significant. These include: incidental take during fishing operations; entanglement in lost and discarded fishing gear; disturbance by boats engaged in whale-watching and other activities; and habitat degradation and destruction due to fishery development, dumping, dredging, offshore oil and gas development and other human activities." Indirect impacts are frequently subtle, and difficult to detect, as well as to monitor and control. (Hofman & Bonner, 1985, p. 116)

Implications of focusing on individual animals rather than populations

Marine mammal conservation is exceedingly complicated and contentious (Kellert, 1991). It is difficult to engage learners in the complex, controversial, abstract issues inherent to conservation of species within ecosystems. It is far easier to evoke public interest and concern for individual animals; especially if those animals are on display and are presented in anthropomorphic terms. In presenting an unrealistic, anthropomorphic view of individual killer whales and a romantic view of "the wild", killer whale shows appeal to the emotional orientation of aquarium visitors. This emotional orientation fosters a humanistic attitude toward marine mammals. Since the humanistic concern is for individual animals, species

considerations typically are disregarded (Kellert, 1989). Killer whale shows lead to an increased interest in the individual animals on display.

The distinction between a focus on individuals versus species is of paramount importance to the goal of conservation education. The primary goal of wildlife conservation is the maintenance of natural populations in native habitats (Geist, 1992). Conservationists, therefore, focus their attentions on species and populations within ecosystems (Jamieson, 1992). Animal rights proponents on the other hand, focus on the welfare of individual animal. Animal rights is concerned "exclusively with the welfare of individual animals, so much so that should the welfare of individuals conflict with that of a population of them...animal liberation unhesitatingly gives uncompromising priority to the welfare of individuals, more holistic considerations be damned" (Callicott, 1987, p. 217).

Berryman (1987) warns that the protectionist line of animal rights has greater popular appeal with citizens than the scientific statements of wildlife managers. This is critical because it is the responses of citizens to policy makers and legislators which influence the future course of conservation. So real is the threat of non-scientifically based decisions to the goal of conservation that the International Association of Fish and Wildlife Agencies suggest that loss of habitat and the animal rights movement are two of the most ominous threats facing wildlife conservation.

Over emphasis of the similarities between whales and humans has also led to a public whose primary affection, and subsequent concern centres on the whales they see in aquaria. Notice the striking similarities of (1) a quote from a 1988 Vancouver Aquarium show outline, (2) a 1992 quote from an animal rights brochure and (3) a 1992 letter to the editor of Canadian Geographic from a past Aquarium visitor:

(1) The most important point to get across in the introduction is the unique social structure of the whales - that is, they live in permanent family groups. No other mammal does this. The life of the individual whale is inseparable from that of its pod. " (personal communication, 1988)

(2) From field studies, we now know that orcas live and travel in family groups or pods for their entire lives. Since they have no den or home-base, their families fulfill their need for comfort, security and survival. When one is captured, virtually always a youngster, the whole family tries to protect her/him and are traumatized by the loss. (Citizens for the Ethical Treatment of Animals, 1992)

(3) I remember visiting the Vancouver Aquarium and watching in awe as the orcas swam in the pool. Now I think aquariums are cruel entertainment at the expense of the killer whales. I agree with the author that whales as mammals are part of a family; what gives us the right, as fellow mammals, to tear a family apart?...Today, I would much rather observe whales, and other mammals, in their natural habitat. (Cahan, 1992, p. 111)

The Aquarium show attempted to engender public support for killer whales through their strong emphasis on killer whale families; an aspect of killer whale life that is attractive to people. The importance of families is picked up in the animal rights brochure; this time in a more overtly anthropomorphic fashion. The visitor reflects

this anthropomorphic view of killer whales in her letter. Comparing the killer whales to human families led her to reject the display of killer whales which she once found inspirational.

Magdoff and Barnett (1989) found that "Americans tend to believe that animals, especially mammals, have families similar to human families " (p. 94). Russow (1989) warns that when animals are not perceived in a realistic fashion, people's perceptions of them are continuously subject to the flux of emotional orientation and intellectual climate. Today, animal rights is one of the fastest growing movements in America (Regan, 1992, Finegood, 1992). The unrealistic view of killer whales portrayed through shows leads to public concern for individual killer whales in aquaria rather than conservation of killer whales in their natural environment. As aquaria continue to foster a mythic, emotional orientation towards whales through their killer whale shows, the public's receptiveness to animal rights claims grows: "Certain attributes of cetaceans and their habitat places them in a special position in the affections and concerns of some people beyond those for most of the mammals frequently held in zoos and aquaria (DFO, 1992, p. 23). The end result is that aquaria now spend increasing amounts of their time and resources justifying why whales should be captivity (Loew, 1993).

While there has been a rise in the animal rights movement in North America, the levels of animal-related biological knowledge North America have not increased

significantly in this century and the American public remains only moderately familiar with wildlife issues. "The public appeared to be far more aware of relatively emotional issues involving specific, attractive and typically large 'higher' animals, compared to issues of a more abstract nature, involving indirect impacts on wildlife due to habitat loss..." (Kellert ,1980, p. 98). Rowan (1992) argues that to the general public the popular meaning of animal rights simply means that "humans have some obligation to treat animals humanely and respect their needs when these do not become too inconvenient " (p. 13). The crux of marine mammal conservation - the reason that it is so controversial and difficult to achieve- however, is that habitat degradation does not respect the needs of animals and that the solutions to these issues are most often not convenient to people.

Aquarium professions claim that killer whale shows generate public enthusiasm for killer whales which in turn leads to killer whale conservation. Hewlett (1983) captures this view: "There is absolutely no question that the enthusiasm and appreciation felt by the public who see these magnificent animals is transferred to a very real concern for the conservation of whales in the wild " (p. 9). While there is no doubt that killer whale shows have led to killer whale popularity, evidence supporting a link between popularity and conservation, is lacking.

Chapter 3: Constructing a Theoretical Framework for Conservation Education

It was late in the afternoon, when word of the oil spill reached my office. The news was bad. The oil had reached the intricate bays and rocky shoreline off Pacific Rim National Park on Vancouver Island and winter storms were making the already rugged terrain virtually impossible to work in. John Ford, the Aquarium's marine mammal scientist was racing around making arrangements for a helicopter to fly him to the site; the oil was headed north toward the only population of sea otters in Canada. If it reached the Bunsby's, a Canadian endangered species could be lost.

The oil spill became the focus of the Vancouver Aquarium's attention for the next few weeks. We mounted a volunteer team of staff who travelled to the west side of Vancouver Island and spent 16 hour days rescuing wildlife and mopping up oil from the rocks and beaches. The work was cold, hard, messy and discouraging. For most, the oil spill represented the first time they had personally been involved in an environmental disaster. They returned to the Aquarium with oil stained rain gear, personal accounts of injured wildlife, and graphic videotape and photographic images of rich marine habitats covered with sludge.

The Aquarium's North Pacific Gallery became the centre for current public information about the spill. Staff who had actually been involved in the clean-up, manned a touch table complete with oil spill equipment, video footage of the clean-up effort and real objects from the site. Given the recent occurrence of the spill, the personal experience of the staff in the clean-up and the popularity and importance of the setting (a Canadian National Park) I was certain that this would be one of our most successful, public gallery conservation education efforts. I was wrong.

The spill had occurred in the winter; the time of year when the Aquarium is primarily visited by elementary school groups and local families consisting of mothers or fathers with pre-school aged children. Although an oil spill off the coast of Vancouver Island seemed real, current and relevant to the staff, it held little interest to a four year old child busily engaged in watching an octopus tearing apart a crab in the next exhibit. The same was true for adult visitors. We had made the fundamental error of ignoring the real life experiences that our visitors were engaged in and of assuming that something that we valued was also valued by others. To us, the oil spill was an enormous tragedy because we "knew" the sites and "valued" the incredibly rich invertebrate, fish and marine mammal life of the area.

Because Aquarium educators, aquarists and scientists regularly went to Pacific Rim, to us, it felt close to home. Our visitors helped us to realize that to many Vancouver residents, the events on the west coast of Vancouver Island seemed far away. The spill did not appear to have much relevance to their lives. It was simply one of many events that was carried in the newspaper for a day or two. When the press stopped covering it, they simply assumed that it had been dealt with.

This experience was invaluable. When we looked at our oil spill touch table from this perspective, we saw an isolated island of oil covered objects that appeared to have little in common with the interesting and unusual looking animals that filled the rest of the gallery. The connections between the Aquarium, our visitors, the animals on display and the oil spill had been made in our heads, but had not been shared. And, most importantly, the underlying question of "who cares" had not been addressed. Losing something matters little unless the thing that is being lost is of personal value.

THE CURRENT PRACTICE OF CONSERVATION EDUCATION IN ZOOS AND AQUARIA: CONSERVATION-BY-FORMULA

Conservation education is the major goal of modern zoos and aquaria. Yet what these institutions mean by "conservation education" is difficult to determine. To date, much of what has been written about conservation education in zoos and aquaria focuses upon rationales for its inclusion. A second body of literature consists of practical suggestions for program components. There are large gaps between the broad, philosophical goals of the first set of papers and the narrow, mechanistic goals of the second. The literature is indicative of gaps which currently exist in the understandings of what is meant by conservation education, how it should be taught and what it should achieve.

A review of the zoo and aquarium education literature indicates that the practice of conservation education has evolved over time. Traditionally, conservation education was simply the presentation of biological facts and concepts designed to improve public knowledge of animals (Rensenbrink, 1981). Next, conservation education broadened to include relationships between animals and their environments (Blakely, 1981). In its third phase, conservation education shifted its focus from the interpretation of animals to presentation of environmental problems caused by people. This perspective is epitomized by Hatley (1988) who advocates the use of what she terms "hot interpretation". Here shocking pictures of slaughtered rhino with blood dripping out of their heads are used to ram home the message of human threats to the environment. In recent years, the meaning of conservation education has expanded to include not only the presentation of environmental problems, but also, calls for environmental action:

More recently, the education function of zoos and aquarium also changed from passive to active. No longer do we present only the depressing facts about the health of our environment and the direction that it is headed. In many cases we frighten people and turn them off with these negative accounts. We now discuss solutions and encourage people to do specific things to protect and improve our environment...We actively go out into the community to spread the "gospel" of conservation. (Hubbell, 1991, p. 541)

The evolution of conservation education from its traditional emphasis on biological facts to its current emphasis on the alteration of human behaviour mirrors the evolution of the topic itself. Nearly forty years ago, Dansereau (1957) described

the movement of "conservation" through four distinct phases: legislative, biological, ecological and sociological. Conservationists, trained in the natural sciences, traditionally concentrated their efforts on technological or biological solutions to environmental crises (Newhouse, 1990). Despite these advances, there is a growing recognition that technology alone cannot solve environmental problems. Human behaviour is now recognized as the root of environmental problems. Today, conservation is essentially a matter of managing people (Kellert, 1986; Berryman, 1987; Edgell and Nowell, 1989): "The solution to the environmental crisis...rests neither with scientists nor with government officials but with a citizenry educated in environmental problem solving" (Hawkins & Vinton, 1973, p. 7).

Because it involves differing values, attitudes, beliefs and perceptions regarding the "right use" of animals and environments, conservation, by its very nature, involves the exploration of controversial, complex, value-laden issues: "Learning about environmental issues, their complexity, urgency and importance is overwhelming (Bardwell, 1992, p. 9). The complexity of the subject matter and the process of real behavioural change is seldom addressed in conservation education practice in zoos and aquaria. There is a tendency to approach conservation education as if it were a clear-cut matter of presenting environmental problems and solutions. The learner is told that something important is being lost and that it is their responsibility to "save" it. This over-simplified "conservation-

by-formula" approach fits neatly within the time constraints of an entertaining show format yet, the complex, controversial issues inherent to the subject of conservation and behavioural change are lost. This has a number of negative consequences.

Often a very specific problem is followed by a very general solution. The problem of sea turtle entanglement for example, is often followed by the simple message "don't litter". Or the reverse, when a global problem such as the destruction of tropical rainforests, is followed by a specific solution - recycle pop cans. Rarely is there enough space, time or interest to explain the connection between bauxite mining in the Amazon and the production of aluminum which is used in the manufacture of pop cans, or, the connection between ocean currents, plastics pollution and the poorly understood ranges of sea turtle populations. The result of such disjointed problems and solutions is a set of rules that lack meaning. Without clear understanding, there is little motivation to comply. For example, in a 1990 survey, 60% of Canadians indicated that they had changed their buying habits because of the environment. When asked why they weren't doing more, 22% said it was too confusing to know what to do (Miller, 1990).

Unfortunately, further clarification is rarely provided. Instead, programs or individuals employing the conservation-by-formula approach tend to attribute the resultant lack of action to a failure on the part of the learner to understand the significance of the environmental problem. Typically, they respond to this

deficiency by turning up the external motivators. Learners are thus, presented with even larger doses of impending doom. With the initial problem of understanding connections still unresolved, the gloom messages merely serve to increase anxiety. According to one learner: "This is the kind of stuff that makes me feel so helpless. It shows me a crisis but doesn't give me a solution" (Bardwell, 1992, p. 1). Little wonder that so many people exposed to this form of conservation education respond to the anxiety it produces by either closing down and refusing to listen to any environmental information or, by worrying (Rensenbrink, 1981; Gregg & Posner, 1990; Bardwell, 1992).

Bardwell (1992) describes a well-educated man with a bright future and healthy family who refuses to listen to reports on the environment. Although he has the resources and the contacts to make a difference, he has turned his back on most environmental issues because they seem so overwhelmingly inevitable and impossible to rectify. Bardwell believes that efforts to motivate people through emphasizing environmental problems often misses the mark. People need only hear about crises and the failed or feeble attempts at addressing them to feel helpless.

An educational model that leaves its learners lost, worried or disinterested does a disservice to its purpose and its participants. Conservation-by-formula is additionally troubling with respect to its impact on children.

Poore (1993) describes these children as "eco-freaked kids". The result, she states, of environmental education programs that employ an apocalyptic tone:

Words like menace, catastrophe, collapse, shortage, disaster, breakdown, alarm, degradation, and deadly are ubiquitous. And unlike the singular apocalyptic vision of baby boomers' school days - nuclear annihilation - the sheer number of possible catastrophes terrorizes today's students with a host of disaster-bringing boogeymen: If acid rain doesn't get us, global warming will. Well-meaning people tell me they hope this urgency will propel kids toward positive action. (Poore, 1993, pp. 29, 30)

Traditionally, zoos and aquaria have based their public gallery interpretive experiences on a transmission or transfer model of learning. In this model, the role of education is to acquire facts and skills (Pratt, 1987). The main task is transmitting and assimilating data, or passing on as much information as possible to the learner (Csikszentmihalyi, 1987). Transmission is most appropriate to those areas in which the objective is to master a body of knowledge or learn a skill which can be taught in a step-by-step manner. These procedures apply to the teaching of facts (Rosenshine & Stevens, 1986). In this theory, the emphasis is on the selection and organization of content - fixed scientific facts and concepts - which, when presented in logical sequences, provide the audience with scientific knowledge. The teacher's role is to transmit information which the audience will passively absorb. The learner is analogous to an empty vessel into which information is poured. The transmission model operates within the cognitive domain. Learning depends on the organization and delivery of content. The feelings, attitudes and emotions of the learner are not considered relevant to the success of this model.

Programme outlines may resemble a recipe book format with the implication that if certain steps are followed, a predictable learning outcome will result.

Learning in informal settings depends on intrinsically motivated individuals. Yet, rather than designing programs based on intrinsic motivation, conservation-by-formula programs attempt to externally motivate learners through scare tactics or emotional ploys. As in the case of our oil spill exhibit, learners are bombarded with depressing statistics about environmental destruction or sickening images of fur seals entangled in driftnets, to convince them of the urgent need for conservation action.

A transmission-based program can provide a fast, efficient method of disseminating information to a large audience. Though the transmissive approach is among the most widely recognized and practiced, its effectiveness, like that of any educational methodology, depends on specific factors. The transmission view is best suited to a controlled learning environment, a uniform audience, learners who are extrinsically motivated by tests or rewards and a well-structured subject (Fenstermacher & Stolis, 1992). These factors are often present in schools and other formal learning environments. They are not, however, present in the public galleries of zoos and aquaria. According to Kellert and Dunlap (1989) most learning in zoos and aquaria: "is informal, unfocused and encountered in relatively unstructured and undemanding ways " (p. 4).

DEVELOPING A NEW MODEL FOR CONSERVATION EDUCATION IN ZOOS AND AQUARIA

Attempts to teach conservation education to zoo and aquarium visitors through the development of structured, transmission-based educational shows is not effective. The transmission model is inappropriate for the subject matter, for the audience and for the setting. This approach fails to address the complex, controversial nature of conservation education, the diverse values and motivations of the visitors and the informal learning setting in which zoos and aquaria operate.

The Setting: Zoos and Aquaria as Informal Learning Environments

The field of informal learning explores the context in which zoo and aquarium learning occurs. It also provides critical insights regarding the type of subject matter that may effectively be taught in these settings. The importance of the informal learning setting on the practice of conservation education in zoos and aquaria should not be underestimated.

Informal learning settings are unstructured

Birney (1988) describes learning in public galleries as nonlinear, self-paced, voluntary and exploratory:

...the school lecturer faces a homogeneous audience, seated behind closed doors with an attention span of approximately 30 minutes", while a zoo or aquarium "must first capture and then hold the interest of a heterogeneous freely-moving audience with a proved attention span of 30 seconds...(Conway, 1974).

Informal learning depends upon intrinsic motivation

Motivation is a critical factor in the success of educational experiences in the public galleries of zoos and aquaria. Most visits are not compulsory; no discipline is imposed upon those who fail to learn at zoos and few rewards are offered to those who do (Conway, 1974). Informal learning environments "have to rely on intrinsic motivation to stimulate learning" According to Csikszentmihalyi (1987):

There has to be something about the activity itself, about the interaction, about the encounter, which is so intriguing that the person will want to focus attention on it. That may then provide the involvement necessary for learning to take place. " (p. 82)

Learning occurs in social, family groups:

Demographic profiles collected from zoos and aquariums throughout North America (Greene, 1988) suggest that most people come to visit in family groups. Visitors use the zoo experience as an opportunity to interact with one another and strengthen family ties (Swenson, 1983; Kellert & Dunlap, 1989). The significance of the family group in visitor learning should not be underestimated. Diamond

(1986) concluded that "learning...does not occur only or even primarily as a result of the interaction between individual visitors and the exhibits " (p. 152). The sharing and social circumstances that comprise the experience form an essential part of the learning process. Learning and sociability are inextricably related (Chase, 1975).

Although surrounded by people, families in zoos and aquaria tend to function as isolated groups. Family roles have a bearing on the way in which the facility is experienced. Parents read graphics more and try to explain concepts to their children through both telling and showing. Children participate more actively and transmit information about the activity to their parents (Diamond, 1986).

Experiences that promote active observation or participation and explanations of what is actually being observed will encourage the mutual exchange of information that is essential to family learning. Koran et al. (1988) suggest that modelling is an effective way to direct visitor attention and prompt behaviours that will increase the visitors interest, participation and comfort when confronted with novel situations.

For the typical visitor, the zoo experience is usually more context than content-oriented, with the emphasis on the social benefits derived from visiting a park-like setting rather than obtaining increased knowledge about exhibited animals (Rosenfeld, 1980): Motivation is driven by social desires rather than information acquisition. The majority of visitors tend to be primarily interested in the zoo as a

relatively safe, attractive and entertaining social experience. The motivation to learn is often of secondary importance and largely directed at the presumed benefits to children (Kellert and Dunlap, 1989).

Biological knowledge is lacking

Kellert (1979, 1984), Cheek et. al (1976) and others, have determined that the majority of adult zoo visitors are young (18-36 years), well-educated urban families. They are better off financially and better educated than the rest of the population. However, this study found that although visitors may be well-educated in general, most of the visitors were not well-educated in biology (3/4 of the sample had taken biology only to high school level or less).

The majority of zoo visitors are novice biologists who respond primarily at an emotional level to the exhibit animals (Whittal, 1992). Kellert (1979) determined that zoo visitors were ranked higher on scales of affection and concern for animals, but lower on ecology and knowledge scales than other people who were affiliated with wildlife clubs of various kinds.

Time is a critical element in informal settings

One of the greatest challenges to education in zoo and aquarium galleries is the factor of time. The average length of stay for a visitor to the Vancouver Aquarium

is 1 1/2 to 2 hours. There are more than 8,000 individual animals for people to observe during their visit. The resultant visitor behaviour has been compared to window shopping. In this metaphor, visitors browse through the galleries, often engaged in conversation, stopping only for a few seconds when a particular exhibit catches their attention.

Visitor learning is influenced by prior conceptions

According to Screven (1987) what viewers understand from what they see is influenced as much by their entering knowledge and preconceptions about an exhibit topic as by the exhibit itself. Individual attitudes and preconceptions have a direct bearing on the way in which zoo and aquarium visitors learn. According to Carey (1986) it is common to find visitors using exhibits to reinforce their existing incorrect interpretations. Through interviews, Snively (1988) determined that the way in which children perceive animals and the metaphors that they use to describe them influence both their understandings and the value that they place upon them. These preconceptions, many of which are incorrect or are oversimplifications, influence how visitors interpret what they "see".

According to Miles (1987) it is often assumed that visitors are homogeneous in their behaviour. Traditionally program developers have paid little attention to "who" they were designing their programs for, focusing far greater energy on "what" the message would contain. He laments this naive view of communication which

simply takes science - whether as a body of facts or as a process - and presents it straight to the public. The desired teaching points and the methods for delivering this information must be matched to a more realistic view of the informal learning setting and the audience for effective learning to occur (Miles, 1986).

Informal learning settings are better suited to improving motivations and attitudes rather than teaching facts

According to Screven (1987) informal learning settings are not effective venues in which to teach "facts, definitions, technical details, declarative knowledge, or other information normally found in classrooms and books. The conditions necessary for factual learning (lots of reading, cumulative practice, time, effort, detailed analysis) are seldom present " (p. 231). Few visitors are in a zoo or aquarium long enough, often enough or are focused enough to achieve these kinds of learning. Screven suggests that these settings are "better suited to improving motivations and attitudes towards science and providing frames of reference for dealing with science topics than to seeking school and book oriented teaching goals " (p. 231). They are better able to effectively communicate new ways to look at and think about things. They can present ways to explore, discover, ask questions and stimulate greater self-confidence in science topics and activities.

Evaluation of informal learning should be based on understanding not information retention

It is difficult to assess the indirect and long term impacts of informal learning (Birney, 1988). Moorfoot and Blake (1978) have suggested that evaluations should be explicitly designed to assess understandings rather than fact retention:

Outcome studies of science museum visits show that few visitors can describe the factual content of the exhibits they have seen, recognize or define terminology, match animals or plants with taxonomies or can make any of the key distinctions provided by exhibit content. Such evaluations have led some to incorrectly conclude that little learning takes place in science exhibitions...(Screven, 1987, p. 232)

Visitors do not tend to recognize when they are learning

Zoo visitors are learning at many levels - social, emotional and experiential. Much of this learning is difficult to communicate through pictures or videos. People have a tendency to recognize only transmissive approaches as learning so that these social, emotional and experiential learning experiences are often not recognized nor called learning by people interviewed in zoo and aquarium studies (Whittal, 1992): "Yet these categories of learning are receiving much interest among those of us who deal with informal learning goals in museological settings " (p.339).

The Theory: The Development of
Environmentally Responsible Behaviour

There is a "general tendency for laypersons as well as psychologists to believe that the only important thing about learning is the manipulation of information in the learner's mind."(Csikszentmihalyi,1987). Zoos and aquaria appear to have traditionally practiced education from this perspective. A review of the published journals of the American Association of Zoological Parks and Aquariums (AZA), the Canadian Association of Zoological Parks and Aquariums (CAZPA), the International Zoo Educators (IZE) as well as the AZA and CAZPA accreditation guidelines/standards for Education reveals a strong tendency to equate education with the dissemination of information. In many instances the words "education" and "information" or "messages" are used interchangeably.

This belief has led to the common assumption that conservation action can be brought about by presenting people with information about animals or environments; and explaining the problems which confront them. Conservation education programs in zoos and aquaria are based on the assumption that an informed individual will make the right (desired) decisions and follow the appropriate behaviour - an assumption based on the theory of cognitive consistency (Peyton & Decker, 1987). Learning is portrayed as a linear progression of cumulative steps through which an individual naturally evolves as he or she acquires increasing amounts of information. The model is analogous to building blocks in which each new level of information is added to the foundation of knowledge acquired at the previous step. The Alliance of Marine Mammal Parks

and Aquariums (1993), for example, reflects this theory in its description of education as "the dynamic process of gaining knowledge, expanding understanding, defining meaning and developing the skills to actively use the information that has been learned " (p. 1).

Individuals move up through stages of learning by acquiring more information. In its simplest form this theory could be represented as:

Information -> Action

This cognitive-based theory is based on the premise that information dictates attitudes, skills and behaviour. Yet this premise is not supported by the environmental education literature. The assumption that action evolves naturally from information is erroneous (Borden & Schettino, 1979; Hines et al, 1986; McClaren 1993). In reality, the behaviours of people regarding the environment are often not consistent with their knowledge. "It appears that environmental education continues to hold the belief that citizenship action can be brought about through a focus on environmental knowledge and awareness, although a growing body of research indicates otherwise" (Volk et al., 1984, p. 17).

Cognitive theories of how people learn generally emphasize one of two approaches. The first sees the main task as transmitting and assimilating data, or passing on as much information as possible to the learner. The second stresses the importance of

strategies for making sense out of data, of learning scientific principles and laws. Both are important and should be represented in the ideal learning environment. On the one hand, the audience should possess facts, basic information; on the other hand, there should be ways for visitors to engage in experimentation and manipulation that leads to the discovery of principles, to the understanding of regularities. Csikszentmihalyi (1987) argues that this cognitive view of learning is over-simplified. Learning involves the whole person, not just the rational mind. "It involves the senses, the desires, the longings, the feelings, and the motivations as well " (p. 81). There is significant evidence that the affective domain (emotions, attitudes, feelings, motivations, values and beliefs) is "key" to environmental education (Hines et al., 1987; Iozzi, 1989; Bardwell, 1992). Failure to incorporate affective factors into the process of environmental education may explain why, despite a widespread commitment, conservation education has not been successfully achieved. As discussed in Chapter one, zoos and aquaria are not achieving their conservation education goals. Similarly, environmental educators are not achieving their goal of environmentally responsible and active citizens (Hines et al., 1987).

Studies indicate that the relationship between information and action is neither simple, nor cumulative. Information alone does not result in action. Cognitive approaches assume that the individual is willing to assimilate the information presented, is willing to interact and ask questions, and is willing to take action.

This crucial assumption, however, begs the main question; namely, will the learner want to learn or to become actively involved?

Motivation is a critically important factor in environmentally responsible behaviour (Peyton & Miller, 1980; Petty & Cacioppo, 1981; Wilson, 1984; Hines et al., 1986; Peyton & Decker, 1987; Iozzi, 1989; Werner, 1989; Newhouse, 1990; Bardwell, 1992). Knowing how to take conservation action is important, yet possessing such knowledge certainly does not ensure that one will be motivated to take action. One's values system might induce one to choose personal comfort or convenience over environmental quality. Thus, one's motivation and values system are instrumental in determining whether positive or negative action, or indeed any action at all, is taken with respect to environmental matters. Motivation is affected by a host of personality factors. Those that significantly impact on environmental decision making include locus of control, attitude and feelings of personal responsibility.

Locus of control refers to an individual's perception of whether or not he or she has the ability to bring about change through his or her own behaviour. The concept is based on the belief that some people do not attempt to bring about change because they believe change to be the result of chance or to be in the hands of others (eg. God, parents, government). People with an internal locus of control believe that

their actions are likely to have an impact and are therefore, more likely to be motivated to take action (Peyton & Miller, 1980).

Personal responsibility refers to an individual's feelings of duty or obligation. Individuals who feel some degree of personal responsibility toward the environment are more likely to engage in responsible environmental behaviours than those individuals who don't possess such feelings (Hines et al, 1986; Werner, 1989; Newhouse, 1990).

Attitude is one of the most important influences on behaviour. Attitude refers to the enduring feelings an individual holds, pro or con, about a person, object or issue. Positive attitudes toward the environment and toward environmental action contribute to an individual's desire to take action. Information alone does not change attitudes. Studies conducted by Borden and Schettino (1979) showed that there was virtually no correlation between knowledge and attitude scales. The effects of feelings toward the environment and environmental knowledge were completely additive in their influence on current behavior. Participation in a cognitively based environmental education program or increasing knowledge alone does not have a significant impact on attitudes. Merely increasing knowledge of the environment is insufficient to induce positive affective growth.

The formation of attitudes involves an individual's values and beliefs. Values are defined as those standards held by an individual that influence perceptions of fact and are used to guide choice and action. Beliefs, refer to what the individual perceives to be knowledge. They may be factual or based on personal opinion (Petty & Cacioppo, 1981; Peyton & Decker, 1987). The attitudes an individual holds toward a particular issue may be simple or complex, stable or unstable, but they are largely determined by the individual's existing values and beliefs.

An individual must also possess the skills to act. The 'ability' to act is not simple. It depends on individuals having a knowledge of the subject, a knowledge of issues and a knowledge of appropriate action strategies. In addition to these different types of knowledge, they must also have the skill to determine which action strategy to apply to which issue and the skills necessary to accomplish a particular action strategy. Skills in the application of action strategies to issues, combined with the appropriate knowledge, must be developed in order for an individual to have the ability to act. There is an important distinction between the 'understanding' and the 'practice' of knowledge, skills, and action (Hines et al.,1986).

If the knowledge, motivation and skills to act are all present, an individual is likely to act. A number of situational factors can, however, interrupt this pathway. Economic constraints, social pressures and opportunities to choose different

actions, may enter the picture and serve to either counteract or to strengthen the action. A person may decide to take the bus to work, for example, to reduce air pollution and as a personal cost saving venture. If the bus schedule fails to get them to work on time, however, they may change their decision, and opt for the less environmentally sensitive option of driving a car.

Hines, Hungerford and Tomera (1986) have proposed a model of responsible environmental behaviour based on the factors discussed above (See Appendix 5). The complexity of the environmental decision making process and the ever-changing situational factors that affect it, illustrate how difficult it is to predict environmental behaviour. However, the model indicates several areas which are amenable to change through teaching. Hines, Hungerford and Tomera (1986) suggest that the knowledge and skill components (and to some degree the personality components) of the model can be addressed via issue identification, issue investigation, and action-taking approaches. They encourage educators to develop approaches which address both affective and cognitive experiences and which provide individuals with opportunities to develop and to practice those skills necessary to lead to conservation action.

From theory to practice

What type of knowledge or skill is most important to wise environmental decision-making? Two areas appear to be critical. The first is the ability to think critically about conservation issues through the development of values reasoning and issues identification skills. The second is the ability to understand the way in which ecosystems work; to be able to understand the connections between animals, environments and oneself through the development of a systems view of thinking about ecology.

Critical thinking and conservation issues

Conservation issues are by their nature complex, controversial and value-laden. Conservation issues arise when claims based upon differing values regarding the environment are applied to a common situation. Conservation issues are controversial because they involve different values. Deciding what conservation action one should take, therefore, depends upon the value system one holds. Unlike advocacy campaigns which tell people what to think, responsible education regarding controversial issues is concerned with helping learners better understand their own values and to develop the processes and skills they need to think critically and to make their own, well-informed decisions " (personal communication, Werner, 1990).

Kormondy (1984) encourages educators to help students realize the complexity of the world in which they are emerging and to understand that there are no easy solutions to the conservation issues they will face. The choices they make will ultimately reflect their own individual value systems and the ethical principles upon which they are based. In addition to being aware of and understanding issues, people must be able to identify their own values and to be able to reason about moral issues (Aikenhead, 1983; Werner, 1989). Thoughtful decisions require knowledge of the issues and awareness of the values involved. Ideally, conservation education programs should be designed to help people learn how to make decisions about issues rather than what to think about any specific example. Newhouse (1990) suggests that environmental educators should join forces with values/moral educators. "Ultimately people need to be able to make their own moral decisions about environmental matters. The job of educators is to ensure that everyone has all the tools necessary to make responsible environmental decisions " (pg 31).

The difference between indoctrination and education lies in part in how value issues and moral questions are dealt with. Kormondy (1984) warns that explorations of environmental values and ethics must be open and non-authoritarian not doctrinaire. Learners should be given the skills to make future decisions for themselves. They should not be merely persuaded or manipulated (Newhouse, 1990). Zoos and aquaria are regarded by the public as educational facilities (Kellert & Dunlap, 1989;

Roper, 1992) It is imperative, therefore, for zoo and aquarium educators to recognize and differentiate between when they are acting in education roles and when they are acting in advocacy roles and to make this distinction overt to their learners.

Newhouse (1990) recommends general guidelines for those interested in conservation education programs. The program must be appropriate for the level of knowledge, attitude and moral development of the individual. Information about how ecosystems naturally function is of central importance. Coupled with this should be information about action strategies, which may be best transmitted through the use of a respected role model. Such information should explain both sides of environmental issues, encourage people toward direct contact with the natural environment and stimulate a sense of responsibility and personal control.

Issues should be presented in terms of: the causes, the consequences and the context. Through well-chosen exemplars, learners may begin to recognize the concepts which underpin ecological systems. Concepts may be taught either inductively (by giving examples from which people try to determine what concept is common across the examples) or deductively (by defining the concept and then asking the students to identify examples of it). Recognition of these concepts is an important step in helping learners to anticipate and identify critical issues when they are presented with new, or unfamiliar environmental situations. The ideal is to

focus on "how to look at issues" by using specific examples so that the student learns a method they can use when presented with any issue. Students should be presented with a representative range of points of view and then asked to critically analyze each. Kauchak et al. (1978) have suggested that environmental issues be taught as moral dilemmas that students should analyze from their own personal perspectives.

Kopalla (1984) studied the effectiveness of one-sided communication (which contained only favourable arguments regarding an issue) versus two-sided communication (which contained both favorable and unfavorable arguments). Two-sided communication was more effective than one-sided communication in changing attitudes, regardless of the subjects' level of development. Kopalla found that self-generated thoughts are more influential in changing attitudes than are someone else's arguments; he suggests that whenever possible, people should be encouraged to think through an issue for themselves.

Advocacy versus Education

There is a trend amongst zoo, aquarium and other environmental organizations, to attempt to change public behaviour through advocacy. This raises an important question about the role of environmental organizations as conservation educators or conservation advocates. Advocacy involves the presentation of particular perspectives in order to garner support for them. Many environmental

organizations see children as tools or weapons in the environmental war to reach adult decision-makers (Poore, 1993). This approach is exemplified in the million-seller *50 Simple Things Kids Can Do to Save the Earth*. Among the simple things: "Ask your parents not to buy products made of rainforest wood. Talk to your parents about getting rechargeable batteries. Ask your principal to buy only recycled paper." Much of the book isn't really things to do, but things to tell others not to do.

According to Jackson-Gould, (1993a) zoos are now crossing the line into advocacy. At the Philadelphia Zoo, for example,

A Conservation Station will be established for casual visitors. It will distribute information developed by National Audubon Society for the Endangered Species Act Coalition, and will offer the public an opportunity to sign a petition, send a postcard, or perhaps record a video message to regional congressional representatives (Jackson-Gould, 1993b, p. 16).

The Brookfield Zoo's Department of Education has taken this approach one step further. Brookfield Zoo developed a grant to fund an extensive ESA program entitled "The Legislative Education Process: Be a Good Citizen." Plans include a docent-operated computer station to call up elected representatives by zip code, a mail box and sample letters for "Zoo Wild Mail." Visitors who write congress in support of the ESA and then send copy of their letter to the Zoo would receive free admission to a lecture series.

Advocacy campaigns treat conservation as if there were one right answer. They fail to address the complex, controversial, value-laden nature of conservation issues or give people tools to make their own decisions. Advocacy campaigns presuppose that people should take a particular action and are thus, designed to manipulate people to do so. They are prescriptive. Most often, advocacy relies upon emotional claims or influential spokespersons to externally motivate people to participate. The general public's reaction to advocacy campaigns is typically affective rather than cognitive. For most people, conservation reactions which are based on emotions in the absence of understanding are unlikely to be sustained. An attachment based on knowledge is more likely to lead to a long term interest than is an attachment based solely on an emotional attraction .

Unlike advocacy campaigns which tell people what to think, responsible education regarding controversial issues is concerned with helping learners develop the processes and skills they need to think critically and to make their own, well-informed decisions (Werner, 1990). The difference between indoctrination and education lies in part in how value issues and moral questions are dealt with. Kormondy (1984) warns that explorations of environmental values and ethics must be open and non-authoritarian. Learners should be given the skills to make future decisions for themselves. They should not be merely persuaded or manipulated (Newhouse, 1990). Zoos and aquaria are regarded by the public as educational facilities (Kellert and Dunlap, 1989; Roper, 1992) It is imperative, therefore, for

zoo and aquarium educators to recognize and differentiate between when they are acting in education roles and when they are acting in advocacy roles and to make this distinction overt to their learners.

A systems view of ecology:

An understanding of how ecological systems work is central to conservation education (Werner 1989, McClaren 1993). Rather than emphasizing detailed facts relevant to specific examples, educators are encouraged to help the learner to focus on the underlying concepts at work within any ecosystem. Systems are comprised of interconnected elements. The nature or degree of the interrelationships is often unknown. Three simple concepts help students to understand the basic principles at work in any system: things ramify, surprise effects and concealed wiring.

According to Hanvey (1982):

The first two rules constitute a prescription for caution and humility. They say 'watch out, consequences can be unexpected and profound'. The third rule helps to explain the reasons for that caution and humility - the connections that tie the system together are complex and to some extent hidden from view. (Hanvey,1982, p.17)

Rather than reciting a litany of problems, learners are encouraged to study problems and issues from the perspective of interrelationships and our collective interdependence. Understanding conservation issues from the point of view of interrelationships and interdependencies does raise moral questions. Defensible teaching strategies are required that respect and encourage the student's ability to

reason critically. Students need to be taught how to make defensible judgements about what is fair and just.

Facts are context dependent

Take a moment to consider the following pairs of sentences:

Belugas are Canada's most abundant whale. AND Belugas are a Canadian Endangered Species.

Belugas are hunted and eaten by the Inuit. AND Belugas are the world's most polluted mammal.

Each of these statements is accurate, and commonly expressed, yet their apparent contradictions underscore the complexity of ecological systems, and ultimately, conservation issues. Generalized statements about even a single species of whale, fail to account for important differences between individual populations or distinct habitats. While it is true, for example, that belugas are Canada's most abundant whale and that northern populations of belugas are hunted and eaten by Inuit, the population of belugas living in the St. Lawrence River is close to extinction. It is the St. Lawrence belugas which are so polluted that their bodies are treated as toxic waste when they die. St. Lawrence belugas are a Canadian Endangered Species.

As this beluga example illustrates, decisions involving beluga conservation in Canada vary significantly depending upon which population of whales is involved.

Each conservation issue results from its own specific set of factors and circumstances. To be effective, conservation solutions must address the specifics of each situation. Because conservation issues deal with living systems, the specifics are constantly changing. The dynamic, complex nature of ecosystems, and ultimately conservation issues may appear daunting. Rather than attempting to communicate the specific details of any one example, learners should be taught general skills that will help them to judge valid information and to ask good questions (Wurman, 1989).

Developing understanding in the age of information

The distinction between fact acquisition versus figuring out how to think about something and knowing how to find the relevant information is particularly important in the current information age: "More new information has been produced in the last 30 years than in the previous 5,000 (Large, 1984). A weekday edition of the The New York Times contains more information than the average person was likely to come across in a lifetime in seventeenth-century England (Wurman, 1989).

Many conservation education programs continue to focus on the presentation of environmental information as if such information were not available in other forums. Yet, in reality, learners are bombarded with information about the environment and environmental issues through the various forms of media on a daily basis. Thus, conservation educators are encouraged to shift their attention

toward helping learners to develop the skills necessary to make sense of the plethora of information. "More information should presumably present more opportunities for broader vision and understanding. Yet the sheer volume of the data amassed makes almost inevitable the reduction of our focus to what is in the end a very narrow endeavour (Sandberg-Diment, 1987). Information pollution is the nemesis of the information age (Naisbitt, 1982).

Developing intrinsically motivating activities

The behaviour of individuals is motivated by a number of intrinsic and extrinsic factors (Wilson 1984; Hines et al,1986). Extrinsic motivators are those incentives, rewards or punishments which may be externally applied. In a school setting, tests are a commonly used form of extrinsic motivator. High gas prices or tax receipts from donations to non-profit conservation organizations may be examples of extrinsic motivators that influence an individual's conservation behaviour. To a large degree, however, positive environmental actions are intrinsically motivated. There has to be something about the situation itself which is so important to a particular individual that he or she will want to understand it, develop skills to accomplish it and actually take action:

The most important incentives for conserving wildlife, in other words, will not be bribes of material enhancement, public spiritedness, or the acceptance of scientific theory, but a personal conviction that land managed for wildlife is land ultimately more satisfying, attractive and enjoyable for people...efforts on behalf of wildlife are really creative ventures on behalf of (oneself); the true self-interest stemming from a sense of relationship to the nonhuman world. (Kellert, 1987, p. 228)

Csikszentmihalyi (1987) has studied intrinsic motivation for two decades. His studies focus on the question "Why do people do things for which they receive no obvious external benefits - such as money, prestige, status or reward of any kind?". From these studies, he has developed a universal set of conditions that apply to those experiences that are intrinsically motivating. The first common condition of an intrinsically rewarding experience is the matching of challenges and skills:

People find situations most involving and finally most enjoyable when they see opportunities to act in a situation matched to their capacity to act - that is, when they perceive that what they are able to do and what is possible to do in a situation are more or less in balance, with a 50-50 chance of success...Intrinsically rewarding experiences are poised between the two negative extremes of anxiety and boredom. (p. 83).

The second condition for an intrinsically motivating experience is having clear goals. People generally get involved when they know what needs to be done, what the point of the activity is, and what the desired outcome is. This goal has to make sense and be achievable. A third condition is the availability of clear feedback, which means knowing how well one is doing in relation to the goal. A fourth condition is concentration. When concentration is intense, the person experiences several things that are unique to this type of involvement. One is the loss of the sense of time. When the activity is enjoyable, people forget clock time. Sometimes a few seconds seem to stretch out forever, or several hours may disappear without leaving any trace. There is also a loss of the sense of self. In the depth of involvement people no longer care about how they appear to others. They

feel part of a harmony, of an order that is greater than the confusion of everyday life.

In summary, intrinsically motivating situations share the following conditions: matching challenges and skills, goals, feedback, concentration - that leads to loss of a sense of time, to the loss of self, and perhaps to a sense of transcending the limitations of ordinary existence. Educators interested in facilitating intrinsically motivating experiences should attempt to include these characteristics into their program design and teaching. By making the goals of the program explicit, by matching the information or activity to the learners skill level and by providing on-going feedback, educators increase the likelihood of creating experiences that their learners will find intrinsically motivating.

Csikszentmihalyi (1987) raises an additional factor which is important to conservation educators. It relates to the way in which problems are presented. An individual may encounter a new problem or goal in one of two ways: one is as a presented problem, the other is as a discovered problem. With a presented problem, someone knows in advance what must be done. The rules for doing it are also known and there is an accepted method of solution and an agreed-upon answer. All the learner has to do is to apply the rules to the given situation until the correct solution is reached. Mathematics equations, fit nicely within this category. Solving presented problems is necessary but rarely intrinsically motivating. People

get involved more and learn more from discovered problems, that is, problems that involve bits and pieces of tantalizing information, but where you have to figure out for yourself what needs to be solved, what the problem is and how to go about the solution.

Developing positive environmental attitudes

It is extremely difficult to change environmental attitudes and values, yet once acquired, positive environmental attitudes and values, appear to be long lasting (Iozzi, 1989). Conservation education programs are most often designed by individuals who hold strong positive attitudes toward the environment. There is a tendency for the resultant program to be based on the assumption that the learners for whom it is designed also hold positive environmental attitudes. As a result, these programs tend to focus on information about the environment and the problems which face it. This may be the appropriate material to motivate someone who already values that environment to participate in conservation action.

However, as discussed earlier, information about environments or their demise, is not an effective means of instilling or increasing positive attitudes toward the environment in those individuals who do not already hold such a value.

Researchers and resource managers believe that understanding the underlying reasons for people's attitudes and behaviors toward wildlife would lead to a reduction in the conflicts and misunderstandings among the various users of natural

resources (Hendee, 1972, Kellert 1980, Shaw & Zube,1980). Unfortunately, there is relatively little research regarding the way in which environmental attitudes are formed. The number of research programs addressing peoples' attitudes to wild animals is small. This is surprising given the widespread concern for animal conservation and the role that population attitudes and interactions play in the success or failure of particular programs (Rowan, 1993).

Positive attitudes toward the environment are a critically important factor in motivating responsible environmental behaviour. What are the most effective educational techniques for developing the positive attitudes towards animals and the environment? One of the most effective techniques is modelling (Newhouse, 1990). Modelling is a psychological concept that involves learning through example (Koran et al, 1988). Modelling relies on associating animals or environments with people who are respected or liked. Modeling may explain the results obtained by Fortner (1985), who compared the relative effectiveness of a classroom presentation by a teacher with the showing of a Jacques Cousteau documentary. She found that, although presentations in either medium can result in increased and retainable knowledge, attitude changes were apparent only in the group that viewed the documentary. It could be that Jacques Cousteau is a better model for positive environmental attitudes than a science teacher is (Newhouse, 1990).

To be effective, modelling must meet at least three criteria: Subjects must believe that the rewards observed from the model will be the same if they perform the behavior; the benefits of the behavior must appear to outweigh the costs; and the model must be viewed in an emotionally positive light (Petty & Cacioppo, 1981). Positive examples, or success stories, represent another effective form of modelling. The narrative descriptions of successful efforts by ordinary people to bring about environmental change can help people see possibilities rather than inevitabilities (Bardwell, 1992). They help individuals build more adequate models about environmental problems and their roles in addressing them. Learning about environmental issues, their complexity, urgency and importance is overwhelming. While acknowledging the gravity and urgency of environmental issues, success stories, can provide the imagery and the inspiration people need to take action.

A person's childhood experiences with animals are important factors in the development of adult attitudes toward wildlife. Kellert (1985) recommends that environmental education be tailored to suit the level of attitude development of the learner. He identifies three age-related stages of developing in attitudes toward animals. The period from second to fifth grade was marked by a major increase in emotional concern and affection for animals. From grades five to eight, there was a dramatic increase in cognitive and factual understanding of animals. Finally between grades eight and eleven, there was a major expansion in ethical and ecological concern for animals and the natural environment. Kellert proposes that

program effectiveness would be improved if educational opportunities were provided that match children's level of development. Iozzi (1989) advocates that environmental education programs begin as early as possible as environmental attitudes and values develop as early as kindergarten age and even before. These attitudes should be further developed and regularly reinforced as a student progresses through school.

The affective domain is the "key" entry point to the teaching process (Iozzi, 1989). Thus, cognitive and affective factors should be considered together. Iozzi laments that such an approach is the exception rather than the rule. Teaching approaches that have proven to be most effective in developing positive attitudes toward the environment include facilitated experiences in living environments, open-ended inquiry methods of instruction, interdisciplinary approaches and guided discovery.

Iozzi (1989) cautions educators to choose appropriate teaching strategies carefully because they can unintentionally create negative attitudes and feelings toward a topic or issue simply by the way they prepare, organize and present material. For example, in a study of the reaction of inner city children to a day's visit at a nature centre, Kostka (1976) found that the positive attitudes of females in the group toward the environment actually declined as a result of the visit. Kostka attributed this decline to false expectations about what can be seen around a Minnesota nature center.

Locus of control and personal responsibility

Hines et al.(1987) found that individuals with an internal locus of control were more likely to report having participated in environmentally responsible behaviour than were those individuals with an external locus of control. These findings suggest that the process by which something is conserved may be as important as the product. For example, in the case of establishing Whytecliff Park as Canada's first marine protected area in 1993, participants were able to bring their own expertise in a variety of areas (politics, education, art etc) to the actual process of habitat designation. At the beginning of the process, many of the participants believed that government was responsible for marine protection. The surprising success, however, of this grassroots initiative caused many of the individuals involved to feel inspired to start another project. They felt that they were responsible and capable of influencing the protection of marine areas and the governments' actions. They in turn became models for others who were interested in marine protection but who had previously felt powerless to effect it. This project supports the recommendations of Newhouse (1990) that advisory committees help reduce feelings of lack of control on the part of private citizens. Educators can encourage the development of an internal locus of control through activities which give individuals a say in matters that will affect them and by encouraging them to make their own decisions and to critically evaluate the opinions of others.

The Learner: An Environmentally Literate Individual

Fenstermacher and Stolis (1992) recommend that educators develop a clear vision of what a well-educated person "looks like" and then design their programs toward these ends. McClaren's (1993) Model for Environmental Literacy comprises a list of factors pertinent to the development of a successful conservation education program. McClaren does an excellent job of listing the qualities that conservation educators should aspire to instill within their learners (See Appendix 6).

PUTTING IT ALL TOGETHER

The public galleries of zoos and aquaria are not effective venues for teaching facts or other information normally found in classrooms and books. The conditions necessary for factual learning (lots of reading, cumulative practice, time, effort, detailed analysis) are not present in a public gallery. Few visitors are in a zoo or aquarium long enough, often enough or are focused enough to achieve these kinds of learning.

By focussing their attention on the selection of information and, the way in which information is sequenced within a scheduled animal show or interpretive presentation, zoo and aquarium educators have attempted to insert a formal learning format into an informal setting. This approach has not been successful because it

fails to address the important role that social context, intrinsic motivation and prior visitor knowledge and attitudes play in the free-choice learning environment of zoos and aquaria.

Rather than trying to impose formal, transmission-based education formats such as scheduled shows or scripted presentations into their informal environments, zoo and aquarium educators are encouraged to value the benefits of their informal settings and to develop learning strategies that suit these unique environments. Because they are filled with hundreds (and often thousands!) of living animals, zoos and aquaria are excellent places to encourage new ways of looking at and thinking about animals, environments and ecological connections to people. They are wonderful places to explore, discover, ask questions and stimulate greater self-confidence in science topics and activities.

Most importantly in terms of conservation, zoos and aquaria have the ability to help visitors develop positive attitudes towards animals and conservation. Little of this learning, however, is the result of information transmission. Instead, the everyday actions of the staff and volunteers toward the animals, animal care and environmental decision-making send important messages to visitors about the "value" of animals. Modelling is one of the most effective means of influencing attitudes. Thus, it is imperative that zoos and aquaria operate in a manner that models ecological values for animals. The entertainment paradigm fosters attitudes

toward animals that do not result in a value for animals within natural ecosystems.
The utilitarian, humanistic and dominionistic attitudes currently being modelled
through animal shows do not support the overall goal of conservation.

Chapter 4: Spontaneous Interpretation of Real Life Events: An Innovation in Conservation Education

My belief that an interpretive strategy based on the spontaneous, real life behaviours of the animals in the Aquarium was viable and would better support the goals of conservation education was sparked by an incident in 1989. As Head of Visitor Services at the Vancouver Aquarium, I was responsible for the overall experience of visitors in the Aquarium's public galleries. This included the Interpretation program, gallery security and cleanliness. I had made it a practice to visit the public washrooms on a regular basis to make sure that they were being well maintained. On this particular afternoon, I was hurrying through Rufe Gibbs Hall, home to the Aquarium's BC freshwater fish collection, to check a washroom at the far end of the gallery. I rarely spent time in this gallery. It is one of the oldest sections of the Aquarium and its outdated architecture and dull coloured freshwater fish always seem pale in contrast to the more spectacular marine displays in other galleries.

I noticed one of the naturalists keenly peering into one of the small jewel tanks in a poorly lit corner of the gallery. When I returned from the washroom several minutes later, he was still watching the same display. He was so absorbed that I stopped to enquire as to what was so interesting. Erin pointed to the rough skin newts in the leaf litter and told me to watch them carefully. As I watched, Erin interpreted their actions. They were in the midst of a courtship display!

I asked Erin how often he observed such exciting, real life events. His response surprised me. He told me that he probably saw forty new things each day and that the true limitation wasn't the frequency of events themselves but the time he had available to look for them. I asked Erin if he would take me through the galleries each day for the next three days and show me what he saw. He agreed and that experience became the catalyst for an alternative approach to public interpretation at the Vancouver Aquarium.

Erin showed me things I never would have seen - ratfish egg cases, shiner perch giving birth to live young, mouth rearing cichlids, staghorn damsel fish guarding eggs, tropical humbugs competing for territories on a coral reef, a killer whale playing with a pebble, rapidly growing kelp (you could see the difference from one day to the next!), an eagle grabbing a young heron from its nest, steelhead trout spawning. There was no shortage of amazing things to see: the secret was knowing how to look for them.

The sense of excitement and intimacy that comes from discovering a real life event as it is actually happening is intense, inspiring and memorable. Each new discovery was exciting to Erin and his genuine enthusiasm was contagious to our visitors. I became convinced that if we could teach the Naturalists to see the real life events that were actually happening, we would be able to share the true excitement and unbelievable diversity of animals and ecosystems with our visitors.

Today, the Vancouver Aquarium is the only zoological institution to base its entire public gallery education strategy around the interpretation of spontaneous living events. More than 8,000 animals live at the Vancouver Aquarium. That means that at any given moment, there are more than 8,000 real life events happening within the perimeter of the institution. Unlike other cultural institutions such as museums, art galleries and science centres which display inanimate objects, aquaria and zoos have the unique opportunity to interpret actual living events:

The aesthetic experience of wildlife is one of spontaneous form in motion...At the cinema, the play, the symphony, there is movement but for the most part it is programmed so that the audience response is carefully controlled. There is nothing of that kind in the field (Rolston, 1987, p. 187).

There remains a great tendency for zoos and aquaria to present general biological information whose content and format is independent of the observable activities of the animals. The animals are portrayed as living illustrations of their species - dynamic objects which inspire public interest in the biological topics being presented - rather than living individuals of inherent interest. The current, observable behaviours (breeding, territorial displays, nest building, snake shedding

etc) that the exhibit animals themselves, initiate, are rarely profiled. Instead, the presentation of animal behaviour is most often limited to generalized statements on graphic panels or scripted narrations of trained behaviours featured in animal shows.

This presentation style utilizes a field guide approach to public education. Graphics, shows, narrators, videos etc. tell visitors what animal they are looking at and provide generalized natural history facts about the species on display. This approach fails to address a critical aspect of human motivation. Unless one knows enough to be able to "see" something of interest in an exhibit they are unlikely to develop enough of an interest to pay attention to the natural history information provided. The field guide approach fails to address the kind of information visitors are wondering about. ie. "What is that animal doing? Why are those animals doing that? Is there anything worth watching here?" Because it doesn't address the visitors' experience or agenda, it is unlikely to stimulate their motivation.

It is difficult to determine why other zoos and aquaria have not built their public gallery programs around the interpretation of real, spontaneous animal behaviours. Two factors, in particular, appear to have a significant influence. First there is the pervasive belief within the entertainment paradigm that visitors must have predictable, scheduled, entertaining experiences. There is a fear that the natural behaviours of animals would be too sporadic, or not spectacular enough to hold

visitor interest or to be entertaining. This has not proven to be true in the case of the Vancouver Aquarium. Secondly, zoos and aquaria typically fill their public interpretation positions with volunteers or summer students who lack the experience, skills and on-going familiarity with the animals in the collection, necessary to recognize and interpret animal behaviours.

At the Vancouver Aquarium we employ a full time staff of professional Naturalists. These individuals move through the entire Aquarium, interpreting interesting animal behaviours as they occur. An intimate understanding of the facility, its activities, current events and how they relate to a particular animal, exhibit or Aquarium function is essential to this style of interpretation. As part of this approach, Naturalists have developed a strong communication network: they gather information daily from animal care staff, aquarium researchers and research associates. This information is shared with Aquarium visitors directly, and with other Aquarium staff (ie. admissions staff, education programs staff and volunteers, communication staff and animal care staff) who then use it in their daily activities. Because the Naturalists are constantly in touch with activities of animals in the Aquarium and the interests of the public, they have become a vital resource for television, newspaper and radio interviews and written membership newsletters. These individuals form the matrix of an Aquarium wide information system that enables the Aquarium to translate current, observable animal events not only into visitor experiences but also into media stories, exhibit graphics and special events.

The Vancouver Aquarium's public education strategy is designed to help visitors discover something of personal interest to them about the animal, by discovering it through their own observations. Personal discovery leads to experiences that are internally motivating, memorable, and engaging. They are more likely to lead to true interest, understanding, value and commitment. The Naturalists' primary role is to facilitate visitor discovery (See Appendixes 7-9).

Developing a public education strategy that teaches people how to look at living animals compliments the activities that visitors themselves naturally engage in during their visits. Visitors to zoos and aquaria spend most of their time interacting with other members of their own group of family or friends. According to Kellert and Dunlap (1989) the most frequently observed intragroup behavior was conversations between adults and children regarding what the animals were doing: "The content of visitor conversations is an important indicator of the subjects' knowledge, attitudes and learning " (p. 67). The next most common observed intragroup behavior, also involving adults and children, was pointing. People pointed to help others locate hidden animals, to direct others to interesting behavior or physical features of the animals, or to focus attention on signs or exhibit characteristics. Pointing appeared to be an important way for visitors to share their interests and attitudes with others and to teach others about animal appearance and behavior.

Interactions between people watching animals may be an important component of informal learning (Rosenfeld,1980, Coe 1985, Bitgood & Benefield 1987). A trip to a zoo or aquarium is a unique social occasion shared as a group with family and friends. Visitors use the zoo experience as a means of strengthening family ties and enjoying time with one another (Swenson, 1983, Kellert, 1989). Motivation to learn in these settings is driven by social desires rather than information acquisition (Kellert, 1989b). The sharing and social circumstances that comprise the experience form an essential part of the learning process (Chase, 1975, Diamond, 1986). The Vancouver Aquarium's approach is individualized, enabling visitors to discover animals and learn within their own family group.

Behaviours that the animals elicit themselves are more realistic than trained behaviours. Birney (1985) found that one of the important educational values of the zoo experience is the realism associated with seeing and interacting with living animals. The chance to enter partially into the world of wild creatures is regarded as among the most important reasons why people visit zoos and aquaria. Kellert (1989b) discovered that the most frequent topics of discussion related to the exhibit animals' appearances and behaviours. Yet, visitors did not tend to recognize social or behavioural interactions between animals. The Vancouver Aquarium's approach is designed to draw visitor attention to the very behaviours they might not expect or

notice. This results in surprise discoveries. Rolston (1987) describes the importance of surprise to wildlife observation:

Excitement lies both in surprise and in the anticipated...The animal on the run and the bird in flight demand an intense focus: they constrain the observer's appreciation to the moment - catch as catch can - postponing reflection until later...This immediacy explains why television wildlife programs and wildlife art and photography are poor substitutes for the real thing. The surprise is gone. (pp.188-189)

It is interesting to note that the Vancouver Aquarium's unique approach probably couldn't have happened a decade ago. At that time, animals were essentially displayed as artifacts, often as single or paired specimens in architectural exhibits that appealed to human conceptions of attractiveness. Today, living exhibits are designed to mirror as closely as possible the animals' natural habitats. The animals themselves are displayed in social groupings more reflective of their natural ecology (Doordan, 1992). Visitors to the Vancouver Aquarium are able to watch damselfish compete for territories on a reef, for example because these fish are displayed in large schools in a simulated reef environment. The closer the living exhibit parallels an actual wild habitat, the greater the variety of real animal events, and thus interpretive opportunities. This presents a winning approach for both the animals and visitors (See Appendix 10).

The Vancouver Aquarium is quite unique in extending this naturalistic approach into its operational animal care practices. In most facilities, the animals are fed and trained on schedules determined by the staff. Given that the average length of a

visit to most facilities is somewhere between 1 1/2 and 3 hours, animal feeding sessions, animal care demonstrations and shows are scheduled at regular intervals throughout the day so that each visitor is essentially guaranteed to see one of these sessions during their visit. A schedule of events makes sense in a museum, art gallery or science centre where the display items are inanimate. The schedule has no impact on the objects themselves and may well serve a positive value for visitors. But how does this line of thinking apply to a zoo or aquarium where the display objects are indeed living?

Enormous advances in exotic animal care have occurred within the past few decades. Exotic animal care originally followed the traditions of domestic animal care. For instance, large herbivores as diverse as elephants, antelope, gorillas, giraffe or rhinos were (and in some cases still are) kept in separate stalls at night. Today, exotic animal care practices are increasingly reflective of the natural history of individual species. Thus, herding animals may remain together rather than being separated during the evening hours.

A naturalistic approach has, more recently, been extended to training and behavioural stimulation. A new field of study known as environmental enrichment has developed to address the needs of intelligent, social animals for change and diversity in zoo and aquarium settings. In his paper, "Naturalistic Variation and

Gorilla Husbandry”, Sutherland (1992) provides an overview of this new approach:

Over the past generation, significant improvements in husbandry have been achieved and greater emphasis and energy is now being shown in the areas of social dynamics, the physical environment and feeding behaviour....The Naturalistic Variability Program at the Calgary Zoo is an attempt to more closely approximate the considerable variation seen in the gorillas' natural habitat (pp. 1-2)

There has been a growing recognition within the zoo and aquarium community of the importance of environmental enrichment. Knowledge about animals in their wild environment and their response to different environmental stimuli in captivity is clearly fundamental (Shepherdson, 1992). Shepherdson stresses the importance of taking a comprehensive approach to enrichment. The most effective strategies appear to be those that are integrated into the animal care program. These naturalistic-based animal care strategies demand increased flexibility. In the same way that the physical design of naturalistic exhibits is based on the natural needs of the animals rather than a human conception of architecture, an animal-centred approach to animal care is based on the natural schedules and behaviours of the animals rather than on a human imposed schedule.

Real life events are spontaneous, thus, visitors to the Vancouver Aquarium are no longer presented with a list of regularly scheduled activities. Encouraging visitors to watch for on-going, spontaneous events throughout the Aquarium is vastly different from the standard approach of presenting them with a fixed schedule of

pre-determined events. It requires a completely different orientation system. We have developed an integrated two-way radio network through which animal care staff and Naturalists communicate current activities to staff and volunteers positioned at the main entrance and information desk. This enables us to alert visitors to animal behaviours, training sessions, research activities or animal care activities as they happen. Animal behaviours or staff activities that last for at least a day, are listed on quick change information boards at the entrance and throughout the Aquarium.

This naturalistic, animal-centred approach to exhibit design and animal care has resulted in an increased variety of animal behaviours "on display." Since 1990, the Naturalists have developed a system of changeable whiteboards to alert visitors to current happenings without increasing the number of Naturalist staff. The Naturalists use handwritten, changeable whiteboards to describe observable animal behaviours in individual exhibits. Through experimentation with different formats, the Naturalists have discovered that it is important that the whiteboards maintain their handwritten, spontaneous appearance in order for visitors to recognize them as being current.

The Vancouver Aquarium's Midas cichlid exhibit provides a good example of this system in practice. All of the behaviours associated with raising young fish can be seen in this exhibit. Unfortunately, visitors often miss this excitement because they

do not know what to look for. A whiteboard set up beside the exhibit coaches the visitors to look for specific behaviours. The Naturalists changed the whiteboard messages as the young fish grew and developed.

The response from visitors has been extremely positive. Visitors are intrigued by baby fish and are challenged to find the different sizes of young fish in the exhibit. One visitor wrote the Aquarium about the experience he had with his young son at the cichlid exhibit:

...My three year old son, who takes after his Dad, has very little patience and fulfils the requirement of spending no more than 3.5 seconds at any exhibit (with the exception of turtles, sharks and snakes). I never minded this as I enjoy a peaceful walk through the aquarium. However now that I have the opportunity to do my own "interpretation" even I am paying more attention. I stopped and read the sign which indicated that new baby cichlids had hatched.

After I read the sign I stopped and looked at the tank and mentioned it to my son. He was ecstatic! He was truly fascinated by the small animals and the fact they were babies. There is no doubt that we would have missed this exhibit had there not been the signs indicating what to look for. After the experience of observing the baby fish I now keep an eye out for interpretive signs. This has increased my viewing pleasure and knowledge considerably. Lest you think I am alone in my view I was fascinated to observe that a number of people felt they would have missed the exhibit without the interpretive sign.

The same dynamic approach has been applied to the interpretive exhibit development process. Unlike many facilities where animals are featured in generalized habitat exhibits, the Vancouver Aquarium designs its exhibits around real places. It chooses a real area of ecological significance as a focal point and then

develops its field research activities, educational eco-tours and interpretive and live animal exhibits around the site. In 1990 we developed an exhibit about the ice floe edge ecosystem of Lancaster Sound in the Canadian Arctic. As one group of Naturalists discussed perspectives of the Arctic with visitors at the Aquarium, other staff led members' educational tours to the actual Arctic site. At the same time, Aquarium researchers begin studies on Arctic marine ecology. FAX updates from the researchers provide real current information which helps visitors to form a more accurate understanding of the dynamics of the actual environment:

August 1, 1991. Cornwallis island, Northwest Territories - Resolute Bay Aquarium (an oupost of the Vancouver Aquarium)

...Today as I prepared yet more experiments on wee little zoo plankters (pteropods and amphipods this time) I have been consumed by ecosystem envy. Yesterday a chopper came in with news about whales on South Devon Island, at Radstock Bay...they had returned with excited stories, wild exclamations, thousands of questions and speculations about a most incredible feeding frenzy...This sort of frenzy has been found five times in the last eight years. Perhaps the most impressive thing was a one km long school of cod - arctic cod. The school was like a long dark streak of black ink along the shore - in some places the fish were right on hte beach. The fish on the beach had tens of thousands of birds excited...Some beluga whales nearly came to the water line but others were further off shore with the narwhals (only about 10 of these). About 500m off shore were the thousands of harp seals...Popular guesses said that the feeding event would be a one day wonder...

FAX reports provide a vital link between the Aquarium and the outside world. The Naturalists have developed an extensive network of FAX reports from people working in wild enviornments along the British Columbian coastline - and around

the world. FAX reports are used not only to follow Aquarium researchers but to follow wildlife, such as killer whales, along the coast of British Columbia.

This current information is critical to enhancing the visitors' understanding of links between the animals at the Aquarium and animals in wild environments. It is only with this understanding that people develop the desire to better understand and protect such complex ecosystems (McIntosh, 1992, p. 7).

Chapter 5: From Innovation to Implementation: Killer Whales at the Vancouver Aquarium

My involvement in the innovation of the public presentation of killer whales at the Vancouver Aquarium began in the spring of 1988. Throughout the month of April, I spent a number of sunny days sitting in the Aquarium's bleachers watching killer whale shows in my new position as Head of Visitor Services. I remember being struck by the uniformity of the narrators "speeches", by the staleness of their delivery and madly scribbling notes to myself of alternative presentation ideas. It seems incredibly naive in retrospect but it never occurred to me that the reason the shows all sounded so similar was because they had originally been scripted. I had come from a zoo background where scripted animal shows were not common. I simply assumed that the killer whale shows sounded alike because the guides were falling into a predictable habit of copying one another. I felt sure that the introduction of some new ideas and approaches would recover the interest and enthusiasm lacking in the guides delivery and be more relevant to a broader audience.

Among the most significant things that I noticed while sitting in those stands, were the comments and behaviours of the visitors during the shows. While the narrator relayed a series of biological facts about generic killer whales, the visitors chatted amongst their family groups about specific things they were seeing: "why is that man holding that stick with the floats on it?" or "why is that whale over in the corner?" or "how do they get the whale to jump like that?"

This "gap" in experience between the "performers" and the "audience" concerned me. No matter how well the show was performed, if the audience was interested in different things, little learning was likely to occur. I felt that learning would be enhanced if we could create an experience that began with the visitors perceptions and interests rather than having the biological content drive the presentation format. The narrators spent 7 1/2 hours a day dealing directly with visitors. I felt sure that if we created a system where they could bring their knowledge and experiences to bear on the killer whale presentations, the end result would be more satisfying and effective for visitors and staff alike.

The narrators were generally enthusiastic about the idea of creating their own narratives using their knowledge and experience with visitors. Those who had been doing the shows for a while were quite bored of the script and welcomed the opportunity to include some of the newer information they had been reading about killer whales. Yet, despite the narrators eagerness to change, it was more difficult to incorporate new themes and educational approaches than I had originally expected. The structured format of the whales' routine proved quite restrictive. The pattern of performed behaviours and the length of time required to do each was consistent, so the interpretive messages had to fit the time frames and order dictated by the routine. I remember videotaping the whales performing the "show" and then setting up the video in the interpreters office so they could practice fitting their new scripts into the existing animal routine.

Each Wednesday, as I listened to the marine mammal staff describe their training, animal care and medical plans at their weekly staff meeting, I became increasingly aware that structured format of the show was restrictive not only to the educational messages, but to the activities of the marine mammal staff as well. The very training behaviours that the visitors openly wondered about while watching the shows, were relegated to the 1 1/2 hours at the beginning of the day before the Aquarium opened. As I listened, I also became aware of the amazing variety of activities that the whales initiated on their own. Each week, I'd look forward to hearing the "inside scoop" on what the whales had been up to. I became convinced that if we could share this constantly changing, hidden world of whale behaviour and training with the visitors, we would better meet the interests of the visitors, our institutional educational mission and the needs of the whales.

Yet, my suggestions that we interpret training in progress or the spontaneous activities that the whales initiated on their own, during the presentations, were met with skepticism. Whales performing pre-determined or semi-structured routines had been the universally accepted norm in facilities displaying killer whales for nearly thirty years. A free form approach wouldn't guarantee the spectacular, synchronized leaps and breaches that have been the cornerstone of killer whale shows since their inception.

Killer whales as a catalyst of change

Killer whales are highly social mammals. On the coast of British Columbia, where they have been most thoroughly studied, they have been found to live in stable, matrilinear family groups. The oldest female is the dominant member of the group. In 1989, Bjossa, a female whale who at that time shared the Vancouver Aquarium's killer whale habitat with a same-aged male named Finna and a mature male named Hyak (as well as a mature female Pacific white-sided dolphin) began to display the dominant behaviour of a sexually mature female. Bjossa's dominant behaviour was natural. Yet its impact on the dynamics of the social group in the habitat were profound. In this new dominance hierarchy, Bjossa, rather than the trainers, exerted the greatest influence on the other animals in the habitat. This dominant behaviour had a dramatic influence on the whales' interactions with one another and their interactions with the marine mammal staff. This in turn, had a significant effect on the public presentations. Because Bjossa often chose to exert her dominance over the other two whales or the marine mammal staff during the presentations, it became impossible to guarantee the predictable sequence of presentation behaviours necessary for the execution of the scheduled killer whale show.

The Aquarium's initial response to the whales' behavioral changes and the resultant impact on the shows was to try to "fix them". For a period of approximately six

months, the interpretation and marine mammal staff groups continued to make minor adjustments to the existing presentation format with the stated hope that 'everything would go back to normal'. Posner et al (1982) describe this phase of conceptual change, in which a person tries to use existing concepts to deal with a new phenomenon, as assimilation: "There is a strong tendency for people to adjust to the "near occasion" of change, by changing as little as possible - either assimilating or abandoning changes which they have initially been willing to try, or fighting or ignoring imposed change " (p. 29, Fullan, 1982).

The staff's individual conceptions of what a killer whale presentation should be like were preventing them from accepting and dealing with the very real changes that the whales' new behaviours were causing. From accusations that the trainers were incompetent to derogatory comments about the whales, the general perception circulating throughout the Aquarium was that the whales were "screwing up". There was a strong belief that the livelihood of the Vancouver Aquarium depended upon finding a solution that would fix the whales and thus see a return of a dependable, marketable show format.

Faced with the real situation of whales who would often choose not to perform, the marine mammal staff and the interpretation staff, the two departments who were responsible for the shows, were forced to experiment. The marine mammal staff needed to find new ways of working with the animals that would ensure the health

and safety of the whales. The interpretation staff needed to find ways to meet the ongoing visitor expectation for a killer whale show while fulfilling their overall mission of conservation education.

Through ongoing discussion, debate and experimentation with different training techniques, it finally became apparent that the process of trying to modify the whales' behaviours in order to meet a structured theme was not going to work. Posner et al (1982) suggest that dissatisfaction with one's existing conceptions is an important condition which must be filled before the more radical form of conceptual change known as accommodation can occur. It was not until the staff were able to step outside of the entertainment paradigm and approach the situation from an alternative framework based on the needs of the animals and conservation education that they were able to develop a successful solution.

Adopting a new approach involved making a major conceptual change. For the twenty years that killer whales have been displayed at the Vancouver Aquarium, the presentations have served as times when the whales display certain behaviours for the benefit of the visitors. The fixed theme of the presentations led to a necessary inflexibility in the pattern and scope of trained behaviours. Training was seen as a means to achieve predictable end products. Although the behaviours and the messages changed slightly over time, the underlying concept remained constant (Kelsey, 1991).

Every innovation has perceived costs or benefits that determine whether it will be implemented. According to Werner (1989) perceptions of cost and benefit vary depending upon an individual's own frame of reference. For those staff operating within the entertainment paradigm, movement away from scheduled killer whale shows represented a frightening loss. For those staff operating within the conservation education paradigm it represented a remarkable opportunity. Claims regarding the costs and benefits to the institution and its goals were conflicting and controversial. Given the powerful influence of the entertainment paradigm throughout the zoo and aquarium industry, and its accompanying belief that entertaining killer whale shows were essential to visitor satisfaction and, hence, the Aquarium's economic survival, I do not believe that the Vancouver Aquarium would have voluntarily chosen to discontinue killer whale shows in order to adopt a new interpretive strategy within the conservation education paradigm.

It was the whales themselves, who through their actions, essentially forced Aquarium staff to examine their belief that killer whale shows were essential and to gradually redefine the the paradigm in which they were operating. The killer whales were the major catalyst for the change which would enable the Vancouver Aquarium to be truly innovative in its public practice of conservation education.

Killer whales are extremely social, intelligent and active animals. In the wild, they are challenged mentally and physically by the rigors of life in the ocean. These challenges include hunting and travelling together as a group in changing weather, seasonal and geographical situations. Killer whales in aquaria do not have a constantly changing aquatic environment to challenge them. Challenge, must therefore come from somewhere else. Taken from this perspective, the new role of the marine mammal staff is to provide the whales with a wide variety of mental and physical challenges in place of those provided by the wild environment. Training the whales to do new behaviours or to try behaviours in different combinations is seen as an important part of keeping the whales mentally and physically fit. Training from this perspective is seen as a dynamic, ever-changing process rather than a means by which to achieve fixed end products:

...The training has moved from a human dominated to an animal motivated perspective where the needs of each individual animal dictate the direction of the training. Trainers are now becoming animal behaviourists as opposed to show presenters and are developing good ability to read the subtle cues provided by the animals...(Wright, 1991)

Gradually, the marine mammal staff began conducting real training sessions rather than fixed presentations during public hours. The Naturalists interpreted the training activities as they occurred. The exciting thing about this new perspective is that in addition to providing the whales and the marine mammal staff with increased flexibility, it also served as a more effective viewpoint from which to model to the public, the intrinsic value of killer whales and a discovery approach to learning.

One of the fascinating aspects of this process of conceptual change was to watch how frequently the live training sessions were judged from the old conceptual framework. For example, if a member of the marine mammal staff asked Bjossa to do a certain behaviour and she didn't do it, the marine mammal staff member would often judge the incident from the old product-oriented perspective and feel that the behaviour was a failure. Interestingly, the interpreter involved in interpreting the whale's activities would frequently adopt the marine mammal staff's perspective and thus interpret the 'error' rather than what the whale was physically doing.

The process of encouraging the interpreters to make conceptual changes was enhanced when this social phenomenon was explicitly identified and its implications discussed. It was especially useful to review the success of an individual presentation with both the interpreter and the marine mammal staff together so that the difference in the two groups' perspectives could be exposed and discussed.

Moving from a product-oriented approach to a process-oriented approach to interpretation and whale training has been difficult. Fostering the belief that the philosophy was viable, and transforming the innovation into institutionalized practice has been challenging.

From Innovation to Implementation

In 1990, the Vancouver Aquarium became the first institution in the world to display and interpret killer whales outside the context of a scheduled show. Unlike the innovations in killer whale presentations that had preceded it, this change involved more than the incorporation of new technologies, themes or trained behaviours. This innovation involved changes in core values, attitudes and beliefs. It involved new ways of looking at aquaria, conservation education, animal care, interpretation and visitor experience (See Appendix 11 -12). It represented a fundamental shift in thinking. Developing a public education strategy based on conservation education rather than entertainment represents a true paradigm shift: "...whether they are instantaneous or developmental, paradigm shifts move us from one way of seeing the world to another" (Covey, 1989, p.30).

The term "innovation" defines something new from the point of view of the user. Newness is always relative to an individual. The term "implementation" refers to the actual use of an innovation, to the program-in-use. Implementation occurs as innovations are translated into practice. This translation is context dependent: people interpret an innovation in the light of their own beliefs, concerns, expectations and values (eg. about visitors, animals, training, education, the role of the aquaria, etc.) and within their own context (e.g., perceptions of institutional

support, level of position, skills, sense of priorities, etc.). Implementation is an ongoing accomplishment rather than an event (Werner, 1988).

Paradigm shifts require changes in beliefs, skills and behaviours. The crux of change involves the development of meaning in relation to a new idea, program, or set of activities. Regardless of the rationale change, it is individuals who have to develop new meaning. Change will not occur unless the individuals responsible for making it happen come to experience the sense of excitement, the mastery of new skills and clarity about what the change is and why it works.

The marine mammal staff who care for the killer whales and the Naturalists who interpret the animals to the public were the major implementers of this innovation. They were the people who most directly influenced and were in turn, most directly influenced by the innovation. This vignette presents a simplified view of significant changes which accompanied the implementation of the conservation education paradigm by the Naturalists and the Marine Mammal staff. In reality, the process of implementing this innovation has been extremely difficult and complex.

Developing and operating an interpretive strategy based in the new conservation education paradigm involved a wide array of innovations, many of which were intimately connected to one another. Many of these innovations were only discovered through the process of implementation. Fullan (1982) defines this type

of implementation, in which both the practice and the innovation change one another, as mutual adaptation.

People experience change in different ways and begin in different places. There is a powerful urge toward status quo:

No matter how honorable the motives, each and every individual who is necessary for effective implementation will experience some concerns of meaning about new practices, goals, beliefs, and means of implementation. Clear statements at the onset may help, but do not eliminate the problem; the psychological process of learning and understanding something new does not happen in a flash. (Fullan, 1982)

True change is difficult, complex and uncomfortable. It involves "passing through the zones of uncertainty...the situation of being at sea, of being lost, of confronting more information than you can handle"(Schon, 1971, p. 12).

The following discussion will examine the implementation process as it effected and was effected by various stakeholders. These stakeholders have been grouped into three general categories: the implementers (the marine mammal staff and the naturalists), the institution and the visitors.

The implementers: Marine mammal staff

In the case of the marine mammal staff, the innovation required significant changes in the philosophy and practice of whale training. No two staff experienced the changes in the same way. Some staff understood, valued, accepted and

implemented the change very quickly. Others are still, several years later, continuing to struggle with discrepancies between their own past experiences, skills and beliefs and those dictated by the innovation. While there was strong feeling that the new approach taken by the Aquarium to displaying killer whales benefited the health and welfare of the animals (Atkinson, 1991; Wright, 1992), it was difficult to put this philosophical support into practice.

Shows have created a culture in which trainer success is judged by the ability of the trainer to have a whale reliably perform a specific behaviour on demand. In the conservation education paradigm, the success of a trainer is based on very different criteria. In the conservation education paradigm, a "good" trainer is one whose training programs are based on environmental enrichment for the whales, one who can read the subtle cues provided by the whales and change his or her own training strategies accordingly and one whose training approach results in whales who will reliably execute behaviours necessary for preventative health care, medical treatment and research. This shift in focus threatens the occupational identity of marine mammal trainers. Occupational identity represents the accumulated wisdom of how to handle a job, derived from ones own experience and the experience of all who have had the job before or share it with them. Change threatens to invalidate this experience robbing people of the skills they have learned and "confusing their purposes, upsetting the subtle rationalizations and compensations by which they reconciled the different aspects of their situation." (Marris, 1975, p. 16).

The degree of variability involved in the Vancouver Aquarium's approach is reflected in this excerpt from a letter written by the Aquarium's Head Trainer (Wright, personal communication, 1992):

The animals are on a completely flexible, ever changing format. At the beginning of each day a very loose schedule is drawn up for predicted animal interaction times. Every day, without expectation, these times, lengths of sessions and types of sessions are altered as animal events unfold. This is absolutely necessary for the well being of these animals...At the end of each day we find a schedule that has been unashamedly compromised and crafted around all of the marine mammals immediate needs. No animal has been forced to fit into our timetable, animal health and welfare has been the primary motivator throughout the day...This flexible schedule also allows trainers to spend much more time with the animals. There is no idle time spent waiting for sessions to begin - the visitors are now truly seeing much more trainer/animal interactions.

Lacinak et al. (1992) argue that even though they have scheduled killer whale shows, Sea World facilities are active in environmental enrichment and creating variety for whales: "While our shows follow a fixed format, the behaviours, show segments and especially the variable reinforcement schedule constantly changes, so from the animals perspective, each show is different " (p. 475). It is the degree of flexibility and the true ability of the staff to freely alter activities depending upon the whales' behaviours that is the main difference between a scheduled show and a completely randomized approach from an animal care perspective. No matter how flexible the show format, scheduled shows still dictate that whatever activity the whales are engaged in on their own, must be interrupted in order to have the whales perform.

Abandoning the show format and schedule in favour of a completely flexible approach raised a number of interesting and often unexpected concerns for the marine mammal staff. For staff who had been at the Aquarium for a number of years it meant the loss of a predictable work regime within which they were familiar and competent in working. Loss of the schedule meant that the training staff could no longer schedule their work day around the show schedules. It continues to be difficult for some of the marine mammal staff to be completely flexible and to let go of the idea of having a set lunch hour and set coffee breaks.

The conservation education paradigm employs an animal-centred approach to animal care. There has been some misunderstanding that an animal-centred approach means that the animals will no longer be trained. On the contrary, this approach has led the Aquarium to involve the whales in a greater variety of sessions and training activities (Wright, 1991). Animal-centred refers to the orientation of decision making. According to the Vancouver Aquarium's Marine Mammal Department Training Manual (1993), an animal-centred approach is:

...an operational imperative that considers the immediate and future welfare of each individual marine mammal and group of marine mammals foremost, rather than allowing anthropocentric preferences to dictate decision making and policies relating to marine mammals at the Aquarium.

It was very difficult for trainers with utilitarian attitudes to accept the idea that the whales should be "allowed" to socialize rather than perform on cue. In addition to

having to deal with a completely new set of beliefs, trainers had to deal with "doubts and feelings of awkwardness or incompetence" that accompany the development of new skills (Fullan, 1992, p. 37). This was especially difficult because the killer whale exhibit is in full public view. Experienced trainers were often reluctant to "learn" new skills in front of the public rather than demonstrating mastery.

In addition, the trainers had to deal with colleagues, other members of staff and visitors who have come to judge the competency of a trainer on his or her ability to "make an animal do something". It takes a strong belief in the animal-centred approach and maturity on the part of the trainers to put the needs of the animals ahead of their own egos in these situations.

Some trainers were concerned that the animals themselves would not adjust to a flexible format. In a particularly poignant case, one of the trainers who had worked with Hyak, an older male whale, was very resistant to the idea that Hyak needed variety and choice. He reluctantly agreed to allow Hyak to choose whether or not he would participate in high activity behaviours on days when the whale appeared sluggish. When Hyak died, an autopsy revealed that he had suffered significant lung damage as a young animal and that the lung infection that caused his death may have affected his ability to participate in strenuous exercise. The trainer was very attached to Hyak. The realization that this whale had a problem that the trainer was

unaware of but that could have affected his ability to perform caused this trainer to abandon his belief that the whales should be made to do things. He became an enthusiastic supporter of the flexible approach.

An interesting issue developed around visitor applause. In the show format, visitors passively watched and regularly applauded at the end of killer whale shows. Because interpreted whale watching was ongoing and informal, there was no ending, visitors were free to come and go as they pleased. It was difficult for some staff to accept the loss of applause. For some of the trainers, the applause had become an indication of how well they had done their jobs. While the Head Trainer encouraged the trainers to shift their focus from the visitors to the whales and to evaluate their successes based on the responses of the whales, the naturalists were able to positively compensate for the trainers lost recognition by introducing the trainers by name during their sessions. This was an important step in helping the trainers feel comfortable with the transition away from shows.

One of the biggest impediments to adoption of the flexible approach by longer term marine mammal staff was the belief that the Management staff of the Aquarium didn't really support the change. These staff had a strong belief that the show was essential to the livelihood of the Aquarium and they were convinced that the Management staff would not allow the show to disappear. Given the influence of the entertainment paradigm and the ambivalence of the Management staff toward the

change (discussed later in this chapter), this perspective is easily understood. Only after having personal experiences with the new approach that led them to believe that it was ultimately better for the animals, did these staff eventually embrace the change.

The flexible approach has a number of benefits. "The trainers can now work the animals whenever the animals would like to work, there is no pressure on a trainer to make a whale perform (Wright, 1991, p.7). This has led to a more relaxed killer whale group structure and has given the whales increased motivation and interest (Robinson, 1990). It also enables staff to observe and accommodate seasonal changes in whale behaviour such as breeding which used to be interrupted by the show schedule. The flexible approach creates more time to train and engage in killer whale research. Over the past few years, the killer whales at the Vancouver Aquarium have been involved in a hearing threshold study. The purpose of the study is to determine the hearing range of killer whales. This type of research can only be accomplished in a captive setting where humans and whales can work cooperatively. This research has important conservation implications. Increasing sound pollution in the world's oceans is considered to be a major threat to whales in their natural environments. Understanding what sounds whales can hear is necessary in order to make appropriate alterations to noise producing vessels and machinery (Shore, 1993). Because they are able to put the whales needs first, this approach has gained strong support from members of the Aquarium's training staff

who used to perform killer whale shows in other facilities in Canada, the United States and England.

Because of its emphasis on variety, the flexible approach has changed the way in which the trainers and naturalists work together. When the shows were scripted, the amount of interaction between the trainers and the naturalists was minimal. The trainers would teach the naturalists to identify the hand signals and the naturalists would make sure that they used the appropriate segment of dialogue to match each trained behaviour. Some trainers were nervous about the idea of the naturalists speaking freely. They were hesitant to share information about training with the naturalists for fear that they might not represent it accurately. It was also difficult for some of the trainers who were used to the show format to be asked to explain untrained whale behaviour. They were reticent to describe the whales' activities over the two-way radio or to tell naturalists what training strategy they were planning to do in case it didn't work out as they predicted. The trainers themselves were in the process of learning to recognize and interpret the complex social interactions between the animals. The flexible approach demands ongoing communication between the naturalists and the trainers. This is especially important because there is no longer a script and both must react cooperatively with the audience and with the whales. This relationship depends upon mutual trust and continues to improve with time.

Open communication and a trusting relationship between the naturalists and the marine mammal staff is crucial to the success of this approach. This means ever greater awareness and appreciation for the different challenges each group faces. Sometimes, when there is a concern regarding the health of one of the whales or a training procedure is not going as planned, the marine mammal staff can become so focused on what they're doing that they are less likely to remember to radio updates to the naturalists. The updates are an important part of having the visitors feel included in what is going on. It has taken time and discussion for the naturalists and the marine mammal staff to come to believe that on-going communication is important to both groups and that they are in fact, one team. This has been substantially improved since both groups began shadowing one another as part of new employee training and professional development.

The implementers: the naturalists

Beliefs are of central importance to implementation. Just as the marine mammal staff had to examine and eventually alter their existing beliefs about; whales, the purpose of training and the importance of shows - the naturalist staff were faced with a large number of changes which had complex implications for their positions.

The change from presenting memorized scripted killer whale show narrations to live interpretations of dynamic events had a dramatic effect on the naturalist position.

The knowledge and experience needed to recognize and interpret a constantly changing variety of whale interactions and training sessions to a less-structured audience demands a high level of professional expertise. Whereas the show narrators position used to be filled on a seasonal basis by university students, the interpretive position required professional, full time naturalists. The position changed from presenter to educator.

Narrators are skilled in public speaking. Although oral presentation skills remain important, different skills are needed to recognize and interpret animal behaviour. The naturalists, like the visitors, had historically spent little time watching the whales outside the context of a show. It is not so difficult to interpret the whales activities when the whales are having an active day, but it takes real expertise for the naturalists to hold visitor attention when the whales choose to rest for long periods. We have discovered that the whales have seasonal as well as individual fluctuations in their activity patterns. Mid-summer (the time of the Aquarium's busiest crowds) tends to be a particularly slow period of whale activity. Until an individual naturalist was able to "see" what the animals were doing, he or she tended to be dissatisfied and concerned that nothing was happening. In order for the naturalist to convey enthusiasm for discovery observations to the visitor it was crucial that he or she truly believed that what the animals did on their own was interesting. Learning how to "see" became an important emphasis of training.

In the show format, the activity of the whales and the contents of the script were predetermined. It was therefore, unnecessary for the naturalists to consider the composition of the audience. Whether the audience was mainly kindergarten children, Japanese tourists or local families, the show remained the same. The new approach requires the naturalists to be able to adjust to a wide variety of interpretive situations and to different visitors' needs. The naturalists have developed a complex range of interpretive techniques and visitor participation activities. With experience the naturalists are able to engage visitors in watching for even the subtlest changes in the social dynamics or behaviours of individual whales.

In the show format, the naturalists were regarded as experts. They disseminated the information that visitors were supposed to learn. In live interpretation, it isn't possible to know everything or to plan a sequence of statements because new things happen all the time. The role of the naturalist thus shifted from expert to facilitator. In the new format, the naturalist's job is to help the visitors learn to see and make sense of behaviours as they actually occur. The visitors and the naturalist learn together. Making the switch from expert to guided observer was difficult. It was initially quite intimidating to speak over the microphone without a set speech or sense of what might happen next.

This task was made increasingly difficult by the fact that during training sessions, there were three whales and one dolphin all doing different things. As the trainers

felt more comfortable with the new approach, they also became more creative. At any given moment, a naturalist might have to choose between interpreting a trainer playing hide and seek with a whale, a second whale learning to participate in a research study, a dolphin leaping several metres out of the air and a third whale resting at the surface. Determining which activity to focus on demanded a stronger connection between the naturalist and the visitors. It was important for the naturalist to be able to "feel" where the visitors attention was.

By relocating their position from inside the killer whale exhibit near the marine mammal staff to outside the exhibit within the crowd, the naturalists significantly improved their ability to have a joint experience with the visitors. It also raised new concerns. The less formal structure and the closer proximity of the naturalist to the visitor resulted in a dramatic increase in visitor questions. This was very positive from an educational point of view but it was also difficult to coordinate questions with the spontaneous interpretation of living events. Through discussion and experimentation each naturalist developed his or her own strategy for addressing visitor questions.

Over time, the training sessions and the interactions between the animals became so variable that it proved advantageous for the marine mammal staff to be able to provide explanations for what the visitors were seeing. This was accomplished by providing the naturalists and the trainers with two-way radios. This was very

effective from a visitor interest point of view, but it meant that in addition to providing live animal interpretation and fielding visitor questions, the naturalists also had to learn to incorporate spontaneous updates from the marine mammal staff into their interpretations.

Unlike scripted narrations where the choice and organization of information is often written and edited by someone other than the naturalist, the new approach depends upon naturalists who are able to search out new information and critically evaluate when and how to share it with visitors. Rather than passively "delivering the news", the naturalists are responsible for acquiring information from a wide array of current sources: visiting scientists, from personal experiences watching whales in the wild, from media reports, from FAX updates from wild whale watchers, from the marine mammal staff, from scientific journals, etc. Working with changing information required a completely different system for handling information. This system evolved with the innovation.

The new approach required a completely different daily organization and internal communication system. As with the trainers, the naturalists day used to be scheduled around the killer whale shows. Other animal feedings (sharks, seal, sea otters, reef fish) were also scheduled around the killer whale show times. The spontaneous nature of the killer whale training sessions meant that the naturalists had to be available whenever the trainers did a session. This became increasingly

difficult as we removed scheduled feedings from other animals in favour of the same animal-centred approach we had used with the whales. Today the naturalists and animal care staff rely on on-going two-way radio communication to coordinate their activities.

In the new approach no two killer whale interpretations are the same. They vary with the animals, the marine mammal staff, the visitors and the naturalists.

According to Werner and Case (1988), this lack of uniformity can be expected because naturalists "bring to the innovation their individual views about what is worth knowing, how students learn best and under what conditions" (p. 1). A selection of Naturalist descriptions regarding their own personal approaches is included in Appendix 13.

One of the challenges the naturalists continue to face is how to deal with a thirty year history which has taught visitors to expect the whales to perform tricks on schedule. Because the Vancouver Aquarium is the first (and as yet, only) facility to take this approach, the naturalists are frequently asked about showtimes. As anyone who has worked in a highly public position realizes, it can be extremely tiring to answer the same question hundreds of times. Yet, I have been astounded by the naturalists commitment to helping the visitors, volunteers and other staff to understand the innovation. Because the naturalists were encouraged to translate this theoretical innovation into actual practice, they themselves have been both

implementers and innovators. They feel committed to the success of the approach and have worked tirelessly to improve its effectiveness.

Unless the naturalists themselves had firmly believed in the new approach, they never would have had the stamina and conviction necessary to see it through the difficult process of change. From the onset, we approached the innovation as an ongoing process. We frequently met to discuss what stage we were at, what problems had arisen, and what solutions we might experiment with. It was important to discuss not only the innovation itself, but the process of change. The naturalists were thus, able to recognize strong reactions as an expected and necessary part of the change process rather than interpreting them as an indication that the innovation was failing. Ownership of the innovation process by the naturalists was critical to its successful implementation. The fact that they were able to understand and explore the process of change with others was also crucial. The naturalists were able to successfully do as Marris (1975) advises:

They must listen as well as explain, continually accommodating their design to other purposes, other kinds of experience, modifying and renegotiating long after they would like to believe that their conception was finished. If they impatiently cut this process short, their reforms are likely to be abortive. " (p.167)

The Institution

The assumption that if people understand and value an innovation, the culture of the organization will change to accept it is false (Werner, 1991). Most innovations are really bundles of innovations. This was certainly true in the case of the changes to the killer whale show. Killer whale shows had formed the foundation upon which the institution had built its marketing strategy, business plan and visitor experience. This innovation impacted every aspect of the Aquarium's operation. For staff not directly involved with the care and interpretation of the whales, the decision to discontinue killer whale shows and to implement an interpretive approach based on the conservation education paradigm was not chosen, it was imposed. The whales themselves initiated the change which was then supported and developed from the "bottom up". This was a significant departure from the traditional manner in which decisions regarding the whale show had been made. Previously, the structure and scheduling of the killer whale shows was determined by members of the Aquarium's senior management staff.

"Innovations are based upon assumptions and values, both implicit and explicit (Werner, 1988, p. 9). The implementation of a non-entertainment based innovation challenged a number of core beliefs of the zoo and aquarium culture. It questioned the pervasive assumptions that killer whales must perform scheduled shows, that visitors to zoos and aquariums must be entertained, that visitors must have set schedules and that the best way to educate was to entertain. It also challenged the

belief that killer whale shows were essential to the economic viability of the Vancouver Aquarium. It proposed a solution that was based in a fundamentally different philosophy than the existing entertainment paradigm.

Acceptance does not simply follow from the rational explanation of an innovation. Even good programs are not enough, if it is simply expected that others will easily accept them or could be forced to. According to Fullan (1982) the main reason for failure is simple - the developers went through a process of acquiring their meaning of the new innovation and once it was presented to others, there was no provision for allowing others to work out the meaning for themselves of the changes before them:

It is easier - more tangible, clear, and satisfying in the short run - to concentrate on *developing* a new program than to enter the conflict-filled, ambiguous, anxious world of seeing what others think of the idea. Planning and coping with change is not peaceful, because we can never let up for long. (p. 29)

In order to be successfully implemented, the new beliefs upon which the innovation was based had to be accepted and supported by the Aquarium as an institution not simply by the marine mammal staff and the naturalist teams. According to Werner (1988), when faced with a change that contradicts ones current beliefs the choice is basically between either maintaining or surrendering ones own beliefs. Beliefs may be maintained in two ways. First, a belief may be maintained by denying the change, ignoring the doubt produced by the innovation or by isolating oneself from

competing viewpoints and by strengthening relationships with people who share the existing views. Second, beliefs may be maintained through limited modification:

The beliefs undergo minor alterations in order to account for anomaly and to resolve doubt, yet the basic beliefs in question are not affected. Rather, the alterations represent a degree of accommodation or compromise in which some limited aspects of our beliefs are changed. (p. 11)

Whether change is perceived as sudden or slow, a shift in beliefs involves different stages of denial, accommodation and acceptance. These stages are rarely experienced in a neat pattern or in a linear fashion. More commonly these stages are interrelated; anomaly, doubt and resolution overlap with one another. An examination of the changes and reactions that the Aquarium as an institution went through in response to this innovation reveals the integrated nature of these three stages. The information contained within each of the following sections is presented in chronologic order. It is important to note, however, that the three sections occurred simultaneously. In other words, at any given point in time, staff within the institution were in various stages of denial, accommodation or acceptance of the innovation.

Denial

The catalyst for the implementation of the new innovation was the change in behaviour of the whales. The easiest way to deny the necessity of adopting the new innovation was to deny that the whales behaviour had changed or secondarily, to deny that it couldn't be changed back to its original form. As described in the

vignette, the Aquarium's initial response to the whales' behavioral changes and the resultant impact on the shows was to try to "fix them". A series of different experts was hired to reinstate the show. In the fall of 1989 a behavioral consultant specializing in cetacean training programs was hired to evaluate the situation and recommend solutions. A few months later, in the spring of 1990, a new head trainer with experience in variable reinforcement training techniques was hired from Britain to put a successful training program in place and to train the marine mammal staff in the new training style. The belief that an individual would be found who would once again have the whales' performing on schedule continued to persist in the minds of some individuals.

Staff who were not directly involved with the whales had a tendency to deny that the whales' behaviour had actually changed. Failure to embrace this belief led to a number of suggestions for improvements to the new format which assumed the whales would perform as they had in the past. Individuals who held this belief tended to propose new scheduling regimes rather than deal with the fact that a primary issue centred around the whales' need for variability (personal communication, March 21, 1991).

People do not tend to question their beliefs until something contradicts them. Thus, the assumption that visitors wanted an entertaining killer whale show and that the best form of education was entertainment, was not questioned by the institution.

When ones beliefs are questioned there is a tendency to deny the anomaly and thereby attempt to maintain ones own beliefs intact (Werner, 1988). When the senior management staff began questioning the changes to the killer whale presentation, the Interpretation department explained both the theory and practical reasons supporting the change and proposed that a professional education evaluator be hired to conduct a study of visitor response to the new response and to assess public attitudes, understanding and expectations of the innovation, so that it might be improved. The institutional response reflected through this senior staff memo was to deny the necessity of further inquiry and to recommend changes appropriate to the entertainment paradigm:

I feel somewhat upset with the prospect that the Vancouver Aquarium might need to spend (\$) to find out what our visitors are getting out of the killer whale presentation. We have always been leaders with our presentations and have evolved, shaped and led our colleagues. This has been done by our own gut feeling and experience of what is the correct approach. Who should know better than us how a presentation should proceed. The sense of what I see happening in a presentation is that the message is good, however it is the method of delivery that needs help. The best educators are always the best entertainers...I really believe if we are going to spend money at all it is in the area of theatrical coaching for the Interpreters... (personal communication, November, 6, 1990)

The tendency for an individual to oscillate between denial and acceptance of a new belief is clearly reflected in the following excerpt which was written by the same individual, just two weeks later:

It is becoming more and more apparent that the scheduled presentations of Marine Mammals cause more problems than they solve. First the time restraints of scheduled presentations do not allow the trainers to spend adequate time with the animals. This is needed for good husbandry and adequate exercise for the whales. Secondly, with the emphasis on natural

history presentations there is less need for the theatrical show approach. (personal communication, November 21, 1990)

In a number of instances, fear that the new innovation would jeopardize the livelihood of the Aquarium kept many staff committed to the existing approach. This fear prevented them from considering the advantages of the new approach or considering the possibility of developing new marketing strategies accordingly:

While everyone agrees that the emphasis of the presentations should be different from that of former years, we should acknowledge the need to entertain as well as to educate...For many years we have used the image of the killer whales on our logo and in our advertising and therefore, most visitors expect to see a whale "show". this in fact is the most asked question at the admissions area. If we fail to fulfill our visitors expectations we may eventually see a decline in revenue, both at admissions and in the Clamshell. (personal communication, February, 1991)

Those who held this view maintained support for their existing belief by strengthening relationships with people who shared the existing views (Werner, 1988). They would come to meetings armed with statistics about decreasing attendance and attribute the decreases to the loss of the scheduled killer whale shows. This proved to be a powerful strategy for maintaining the status quo because it caused other staff who philosophically agreed with the new approach to question its validity. Interestingly, the Aquarium's Head of Finance did not share this view. There was no denying that the Aquarium's attendance was in decline but directly attributing the drop to the discontinuation of the killer whale show was difficult to support. Attendance reports indicated that the decline had actually begun before the implementation of the non-scheduled approach. According to the

Financial group the decline was more likely due to a combination of factors, including the introduction of the G.S.T and a province wide slump in tourism. Interestingly, the "belief" that the Aquarium's survival was linked to the killer whale shows and thus, the "belief" that the decline must be caused by their loss was so strong, that the financial reports did little to sway those who held this view.

The danger to an institution of failing to resolve the issue of denial is illustrated in the way the new innovation was introduced to the press. For months, the naturalists, marine mammal staff and various other staff members had been requesting that the public affairs department launch the new approach in the media. The positive feedback from visitors who had experienced the new approach convinced these staff that the innovation would be positively received. The Public Affairs division remained firmly entrenched in the belief that the shows would be reinstated and thus refused to alter the advertising strategy. Thus, killer whale shows were still being advertised months after the new approach began operating within the Aquarium. This resulted in the very negative situation in which the visitors were set up to expect one thing and presented with another:

The visitor brochure must be modified to sell the new approach. Currently, admissions is handing out brochures with natural history presentation times crossed out. This solution is unattractive and fuels visitor belief that something has been taken away from their experience... (personal communication, July 10, 1991)

On July 8, 1991, the Aquarium Director circulated an all staff memo in support of the innovation: "...From now on there will be whale interpretation and presentation rather than the old fashioned whale "shows". Remember, the Aquarium is not a circus of the sea - it is a fascinating presentation of aquatic natural history..." The Director requested a promotional launch of the new innovation. Despite the directive, the public affairs department did not support the change. Rather than launching the innovation as a world first in terms of killer whale display and interpretation that had been under development for nearly two years, their approach was to announce the sudden loss of the show and to perpetuate the unsubstantiated claims that the format change had caused a loss in attendance. The front page of the Vancouver Sun reflects this perspective:

"Whales - and crowds - take a dip"

...Aquarium spokesman, Stefani Paine said the two-week-old change in format, in which the whales are allowed to do what they want instead of performing tricks and jumping for herring in regularly scheduled shows, has already affected attendance. 'I don't think there's any pretending that it's not having any effect' she said, 'But it's probably just a couple of percent. (Vancouver Sun, July 16, 1991)

The following excerpt from a daily staff report indicates the serious visitor impact of the failure to have a promotional strategy consistent with the innovation:

Woman approached me in the Amazon (gallery) told me she saw me earlier this morning at the killer whales. Wanted to tell me that she is very pleased with the changes, but is surprised at the misinformation. She told some friends that she was coming to the Aquarium today - friends advised her not to go because of the high admission price and no shows. However, since she is a member, she thought she would check it out. when she found out

what actually was going on here, she was pleased - again, though, media misinformation problem.. She said she would spread the word to her friends about what is REALLY going on at the Aquarium. (personal communication, July 27, 1991)

Fear that the "end of the whale shows" would spell Aquarium disaster was further fuelled by the announcement, ten days after the media "launch", that the Vancouver Aquarium was laying off 14 staff members. This was the first staff layoff episode in the institution's history. Although Aquarium Director Murray Newman stated emphatically that the cuts were made because of a decrease in revenues attributed to a decrease in tourism:"there are simply fewer tourists in the city and 70 percent of our attendance is tourists (Vancouver Sun, July 26, 1991)", many staff were convinced that the real culprit was the loss of the killer whale shows. The layoffs represented a serious threat to the implementation of the innovation. A number of staff who had embraced the change found it difficult to continue to support it in light of what they believed to be its economic costs.

Even when presented with direct evidence of public support for the new innovation some individuals continued to deny the viability of the innovation. They maintained their beliefs by claiming that the survey results or economic reports were not accurate.

Accommodation

As stated previously, beliefs may be maintained through limited modification. The alterations represent a degree of accommodation or compromise in which some limited aspects of the existing beliefs are changed. For example, when Bjossa, the female killer whale became pregnant, a number of staff seized upon the pregnancy as a rationale for the discontinuation of the shows. It was easier for them to believe that the variable approach was a temporary measure in response to pregnancy rather than a permanent loss of the show. Attributing the cause of the innovation to the unrelated factor of pregnancy enabled some staff to embrace the change without altering their belief that shows would return. This modification created its own set of problems in that staff, volunteers and visitors alike became confused about the actual innovation. Staff who chose to accommodate the innovation by attributing it to Bjossa's pregnancy reflected this belief in the way they communicated with public. For example, when asked to change the phone message that listed the killer whale show schedule for a message advertising the new innovation, the end result was a phone message that stated: "There are no scheduled killer whale shows at present due to the pregnant state of the female killer whale."

A host of other explanations were used by those individuals who attempted to accommodate the change by viewing it as a temporary response to an isolated event: "The idea that our change in policy is a recent event, and a reaction to animal rights groups, to Hyak's death, to Bjossa's pregnancy or the old age of the animals: none of these is true " (personal communication, July 18, 1991).

Other individuals were able to accept the animal-centred, non-scheduled innovation, while still maintaining their belief that visitors should have schedules, by limiting the application of the innovation to the killer whales. Thus, on the same day that the Aquarium publicly announced its switch "away from scheduled performances" in terms of the whales, a meeting was called to:"discuss the logistics of scheduled feedings to help promote visitorship." The agenda included: proposed fish feedings, proposed marine mammal feedings and proposed fish feeding with divers (personal communication, July 12, 1991).

Attempts to limit the innovation to the killer whales resulted in philosophical and practical inconsistencies that were difficult for the staff and visitors to rationalize. It was difficult to understand why the needs of the whales should dictate a variable schedule, when the needs of the thousands of other animals could be fit around a predetermined schedule . In reality, the innovation had evolved as an overall philosophy. Animal care staff had been experimenting with the flexible animal-centred approach in all areas of the Aquarium. It was simply the high profile of the killer whales which caused the institutional concern to be focused on only that species. Despite the fact that the variable, animal-centred approach to killer whales had frequently been explained as only one part of a comprehensive animal-centred approach, the senior staff at the meeting appeared surprised to discover strong consensus from animal care staff that the animal-centred innovation enhanced their

abilities to care for the fish, invertebrates, reptiles, amphibians, birds and the other mammals too. Applying the variable approach across the entire facility enabled the naturalists to draw visitor attention to changing real life events in the exhibits throughout the Aquarium rather than having to adhere to a fixed schedule of events. This meeting was one of the first times that animal care staff from areas other than the whale department had voiced unified support for the innovation. It proved to be a critical meeting for acceptance of the innovation.

The debate over schedules provides one of the clearest examples of slight modifications in order to maintain existing beliefs. Following the media announcement of "no scheduled shows" the Aquarium went through a period in which those staff who had not yet embraced the non-scheduled aspect of the innovation attempted to fit the new approach into some form of schedule. It became clear, fairly early into the implementation process that visitors had come to equate schedules with shows. It didn't matter if the information accompanying the schedule explicitly stated that the schedule was for natural history talks about whales, visitors still expected to see whales performing. The same was true of internal announcements or postings. As long as the words killer whale occurred in conjunction with a time, visitors expected to see whales performing (personal communication, August 28, 1991). The naturalists discovered that when a schedule was not presented, visitors tended to recognize the innovation as a new approach and to feel excited that they were involved in something new and unique. When a

schedule was used, visitors tended to judge the experience from their old framework and to rate it in terms of how good a "show" it was.

It was extremely difficult for front line staff and volunteers to embrace the idea of dynamic activity rather than scheduled events. For thirty years, visitors had been trained to organize their Vancouver Aquarium visit around the killer whale show schedule. Zoos and aquaria around the world present visitors with a fixed schedule of events. Although most staff and volunteers were readily able to accept the idea that each day would be different, they still attempted to fit the events of each day into a scheduled framework:

Would it not be possible for us to say whilst we have no regular times, we know today the marine mammal staff are going to work with the whales at x hours? It does not seem to be an unreasonable request on the part of the visitors to have a time so that they can better organize their visit to the Aquarium. (personal communication, Summer, 1991)

It is not possible to be both animal-centred and schedule-oriented. Animal-centred means that the activities of the trainers constantly vary in response to the whales. It is based on up-to-the-moment flexibility. The general times that the trainers set for training sessions constantly flexed throughout the day depending upon the activity of the whales. Thus, if you told visitors that the marine mammal staff would be working with the whales at 2:30, the marine mammal staff might discover that the whales were engaged in courtship at that time, and decide to not to interrupt this activity with a training session. We discovered that if we did, as the volunteer

memo suggested, tell the visitors that the trainers were planning to work with the whales at 2:30 the visitors would sit in the bleachers waiting for a 2:30 "show." They would invariably be disappointed when the marine mammal staff didn't make the whales do something on schedule. If, however, we told them up front that there were spontaneous events happening throughout the entire Aquarium and that right now, for example, the whales were engaged in courtship behaviours (and whale courtship is rarely seen in the wild because it occurs underwater) and the anaconda were in the midst of shedding", they reacted surprised and often pleased to have arrived on a day when something so "unexpected" was happening.

Schedules run counter to the overall concept of the innovation which structures the interpretive experience and the animal care practices around the real life activities of the animals rather than a predetermined schedule. Moving from a predetermined series of events to discovery learning requires a true paradigm shift. Originally we attempted to help staff and visitors to achieve the shift by explaining why we didn't do shows: "Killer whales are intelligent animals with constantly changing needs; these needs include variety. We've made an exciting change for the whales' benefit. Strictly scheduled show times have now been replaced with natural history interpretation, animal care sessions, ongoing research, training sessions and simply, the excitement of real life!" (Sign at the information desk, summer 1991). This approach, however, was unsuccessful because it simply heightened visitors desires to have schedules so they wouldn't miss any of the different whale

sessions. Eventually, we were able to see that by continuing to describe the innovation solely in terms of the whales, we were inadvertently continuing to focus visitor attention on only one segment of the innovation. It was clear that in order for visitors, staff and volunteers to be able to accept the new innovation they had to be able to "see" that a wide variety of things were happening throughout the Aquarium at any given moment. This way they were able to believe that the innovation represented an overall gain in experience rather than the loss of something they valued - the show.

A host of different techniques were used to help visitors to see that the Aquarium was full of changing real life events. Naturalists move throughout the entire Aquarium, interpreting interesting animal behaviours. Animal care staff use two-way radios to keep in touch with the Naturalists to let them know when an animal care session is going to happen. Information volunteers located in the centre of the Aquarium are also on the two-way radio network so that they can direct visitors towards whatever activity the Naturalists are currently interpreting. Changeable white boards on the front plaza and at the information kiosk are updated with the current activities as they are broadcast over the radio. Changeable whiteboards are placed throughout the Aquarium to alert visitors to look for specific current activities within a particular exhibit. All of the written information available to visitors focuses on helping them to discover on their own. An Adventure Guide

and Whale Watching Card help the visitor to orient themselves in the Aquarium, find areas of interest and gives tips on how to watch the whales.

Acceptance

"If we accept the importance of conversation for clarifying beliefs, then there are some implications for planning implementation. During implementation there needs to be opportunity of discussion to deal with beliefs that may be problematic...If such clarification does not occur, participants may view one another as being illogical, stubborn or even stupid, not realizing that what seems obvious and reasonable to them is not shared by other participants because the underlying beliefs cannot be something done once, but must be ongoing as the program is made to fit their situation." (Werner, 1988, p.11)

Walt Werner's words underscore the importance of discussing the fundamental values upon which an innovation is based. The conservation education paradigm is based on an animal-centred approach to animal care and interpretation. People who work at the Vancouver Aquarium care deeply about animals. Countless discussions during staff meetings, training sessions, and personal conversations were necessary for individuals to determine how the perceived inconveniences, and in some cases, drastic changes that the innovation demanded, were worthwhile in terms of the overall value. Eventually, it was the knowledge and the belief that the innovation was indeed better for the animals that led to its acceptance amongst the staff.

It is difficult to determine at what point the innovation became institutionalized. Evidence that the innovation had broad support was clearly demonstrated in the spring of 1992. In May 1992, the Board of Governors of the Vancouver Aquarium proposed that scheduled killer whale presentations be reinstated during the summer months with the hope of increasing attendance. Through discussion, the Board and staff decided to "continue existing format but with a recommendation for a press conference". The rationale behind this decision was as follows:

There is strong staff support for the Aquarium's current format for presentation and display of marine animals. It is thought that this new policy is not a change in operational procedure but rather a true compromise of a valued philosophy. There is a lack of evidence to support that the return to some form of scheduled presentation will improve Aquarium attendance. External and internal surveys show that there is wide acceptance by Aquarium guests for the existing presentation concept and staff financial evaluations do not indicate that the Aquarium is doing worse economically than the overall trends for British Columbia indicate...Unfortunately, the existing format of animal care and interpretation was never given wide release to the media... This would be a great opportunity to release a statement ...we could also outline our summer promotion and explain to the public and media the philosophical approach they can expect when they come to the Aquarium. (personal communication, June 5, 1992).

An initial press release was issued and the innovation has continued to evolve since that time.

Visitor response

Visitor response to the innovation has been positive. In August, 1991, the Angus Reid Group conducted its Public Attitudes Study on Cetaceans at the Vancouver Aquarium. The Angus Reid report found widespread support for the Aquarium's innovative approach to killer whales:

There is widespread support for the recent change from 'whale shows' to continuous observation. The general public (62%), Aquarium members (71%) and visitors (78%) feel that this was a change for the better. There is no evidence to suggest that the discontinuation of whale shows has kept visitors away from the Aquarium. (p. 3)

Indeed, since the recession in 1990, gate admissions have steadily increased to their pre-recession levels; rising by 16% in the past four years.

Given the scope of the change, the number of visitor letters and comment cards regarding the change has been relatively small. The following represents a cross-section of both positive and negative responses (Additionally, see Appendix 14).

Note the expression of utilitarian and humanistic attitudes:

New whale show is an improvement

Dear Editor:

The new killer whale show at the Vancouver Aquarium, is perhaps, now more exciting than the previous one ever was.

Instead to the audience watching pre-scheduled, predictable tricks exhibited by the whales and their trainers, now we are allowed to observe marine mammals' spontaneous behaviours as they happen naturally.

On a recent visit we felt privileged to watch the whales interacting with each other and their trainers in a surprising show of fascinating

behavior. It was enhanced by the enthusiastic commentary of the knowledgeable and articulate aquarium host.

Instead of the whales performing on command in feeding schedules determined by the public clock, now we are like scientists at the exciting moment of discovery catching unexpected insights into whale life, in the animals' own time, according to their own choice.

The whales' interest in the new philosophy seemed obvious, as was their apparent delight at new-found freedom and respect.

M.E. Baker
West Vancouver

(North Shore News, August 23, 1991)

"I'd like to see the whales perform where they put them through their paces, make them jump in the air and you know, put on shows for the kids and that."

"This approach is far superior. It's more human I think."

(CBC TV, 1991)

Dear Vancouver Aquarium:

We would like to take this opportunity to commend you on your decision not to force the marine life at The Vancouver Aquarium to do indignant "tricks" for the public. It is refreshing to see some thought being given to another species' needs besides our own.

"I came here (the Vancouver Aquarium) to see the whales do what they are supposed to do (tricks). The quote is that of a woman I heard who had some pretty confused notions as to what whales are "supposed to do". Frightening, isn't it? The time is long over due for reversing this type of ignorance and we thank you for taking a great step in the right direction.

(September 1, 1991)

Regarding no whale shows at set times: "That's no good. We pay and get nothing!"

(July 13, 1992)

Dear Sir or Madam

I would like to voice my complaint against you stopping the whale shows. People are always giving into small interest groups. It's not fair to the majority of people who enjoy them. How would we ever have learned of the intelligence of these beautiful animals if it wasn't the easy way in which they learn to do tricks or show off their lovely skills, & intelligence. Their shows have always been the highlight of any visitors we've had from the prairies. I hope you will reconsider & bring them back again next year.

(September 27, 1991)

Dear Staff:

Since I had visited the Aquarium in May I must tell you how pleased I was about the whales training. I am very happy that the whales are not forced to jump to please the tourists. I am glad that you give them their freedom in their tanks. The Aquarium is a wonderful place and on my visits to Vancouver I always go the the Aquarium.

(July 30, 1993)

Response from Aquarium Members

In June, 1994, the Vancouver Aquarium retained a marketing strategy firm to conduct focus groups on the topic of membership. One group consisted of lapsed members while the other consisted of present members. "The cancellation of the choreographed, structured whale shows was applauded by several respondents in both groups. It was a change that relected the Aquarium's good side, and thus allowed them to rationalize their support." (Integra, 1994, p.7)

Response from colleagues

The Canadian Association of Zoological Parks and Aquariums

The Canadian Association of Zoological Parks and Aquariums inspection committee was impressed with virtually all aspects of the the Aquarium. The report speaks highly of the Aquarium's dedication to public education and awareness - 'It is, without a doubt, a leader in educational programming in Canada.' There was acknowledgement and approval of changes to cetacean husbandry and display programs, and clear evidence was found that the Aquarium "...looks upon these cetaceans as extremely valuable representatives of an entire ecosystem." (Atkinson-Grosjean, 1992, p.19)

The zoological community

Despite the CAZPA report, there appears to be a broad lack of understanding amongst other zoos and aquaria regarding the innovation. To date, little information regarding the innovation has been shared with the zoological community. This could be remedied through a concerted effort aimed at clarifying the approach through conference presentations, publications and ongoing dialogue and discussion.

Zoological educators

Susan Normandia " (personal communication, September 1991), a zoo educator and visitor researcher with a special interest in the use of shows and public displays

to teach conservation education compared her experiences watching killer whales at the Vancouver Aquarium, Sea World San Diego, and L Pod in Puget Sound. The following are excerpts from Ms. Normandia's observations of watching a killer whale interpretation at the Vancouver Aquarium:

Observation: Narrator positioned amongst the visitors in the audience.

Comment: Gives the impression that she is observing along with the visitors, rather than being in a position of dominance on a stage or in the exhibit.

O: Narrator focuses visitors attention on what can be observed in the exhibit rather than expounding on extraneous list of facts.

C: The public looks to aquarium professionals to tell them what is important about the animals on exhibit. If a narrator tells guests that the whale's name is Bubbles and that it can jump 15 feet into the air, they may be led to believe that this is what aquarium staff think is the most important thing they should know. If the aquarium educator demonstrates by his or her behavior and commentary that it is most important to observe the animal's behavior, then this is what they will lead others to believe is most important. Observation is the most elementary process of science. If aquarium visitors gain some insight into how to look at animals from a nonanthropomorphic point of view, perhaps they will transfer this skill to species in the wild and subsequently build a foundation for true nature appreciation.

O: No, scheduled show times.

C: Not having show times leads me to believe that the Vancouver Aquarium honors that the whales have their own daily "agenda". It gives the impression that the animals' behavior is their own rather than that requested by a trainer. I would be interested in the average aquarium visitor's perception of this non-schedule.

O: Little visible emphasis on operant conditioning.

C: In my view, there is a certain lack of "wildness" exhibited by an animal that is responding to a command and being rewarded with food. At

Vancouver this kind of interaction is kept to a minimum. It would be interesting to know if the average visitor picks up on this distinction and if they support this kind of presentation or feel that the trainer should make the animals "do" something.

One last comment. After seeing the Orcas in the three settings, I realized that my perception of the three groups of whales was fundamentally different. I felt the most endeared toward the Sea World animals. I found myself wanting to get close to the large mammals - to touch them or to swim with them like the trainers. My experience of the Vancouver Aquarium animals and L pod was quite different. The later two experiences engendered more of a respect at a distance than the playful "warm and fuzzy" feeling I had when I saw the Sea World animals. It never entered my mind to dive in with the Vancouver Aquarium animals or with the 50 members of L Pod in Puget Sound. (Normandia, November 26, 1991)

Chapter 6: Conservation education: A vision for today and tomorrow

April 19, 1994 - A Great Day

Sometimes, the successful implementation of an innovation is illustrated in a single experience. Such an experience occurred on April 19, 1994. The Naturalists and other members of the front-line staff had just convened in the tropical gallery for their morning interpretive planning meeting when one of the marine mammal staff called on the two-way radio to say that killer whales had been spotted by a West Vancouver resident. The whales were headed directly for Vancouver Harbour, just moments away from the Aquarium.

This was exciting news and I was instantly reminded of another April day, six years earlier, when a gray whale was spotted in Vancouver Harbour. The gray whale experience was memorable. It was my fourth day of work at the Aquarium and I remember the thrill of jumping into a colleague's car and zooming to Prospect point above the Stanley Park sea wall in the hopes of catching a glimpse. We saw the whale that day, but few others did. It was a private experience shared by the six or seven staff members who happened to be lucky enough to be near the phone when the call came in.

The killer whale experience was entirely different. This time, news of the whale sighting was immediately incorporated into the day's interpretive plan. While one group of Naturalists grabbed binoculars, two-way radios and a video camera and headed down to the seawall, a second group posted word of the sighting on the quick change information boards and stationed themselves on the marine mammal deck. Thanks to live updates via the two way radios, the Naturalists on deck were able to interpret the activities of the killer whales at the Aquarium and the activities of the whales in the harbour simultaneously. This information was shared with the staff and volunteers who conduct the school and members programs, who in turn, shared it with their visiting groups.

By stationing one group at the seawall and a second on the Aquarium's marine mammal deck, Naturalists were also able to encourage visitors to head down to the sea wall to experience this unusual sighting. The Naturalists at the sea wall and the Aquarium visitors who joined them, in turn, encouraged bus loads of school children who happened to be in Stanley Park on a school field trip and many other people walking the sea wall to join in. It was not easy to spot the whales, even in such close

proximity, so everyone had a good chance to develop and practice their wildlife observation skills. The excitement of scanning the water in search of a dorsal fin or watching intently for a "blow" was contagious.

A portable video monitor was set up in one of the Aquarium's galleries so that visitors and staff who had not seen the whales as they swam through the harbour could look at what happened. The tape was also used by the Aquarium's marine mammal scientist for photo identification. Every killer whale in British Columbia has been identified by the shape of its dorsal fin and saddle patch. The scientist was able to identify the group as one of the pods of transients (marine mammal-eating killer whales). Within the pod was a new calf that had not previously been sighted. As he hurried off to get a closer look by boat, the Naturalists reported the identification information to the province-wide marine mammal sighting hotline. It was thus, transferred onto their information network and sent to other researchers as well as the tourist offices along the coast of British Columbia.

While this was going on, the sighting information and live updates were also being shared with the Vancouver media via the Aquarium's communication coordinator. This resulted in television and radio coverage that was not only local, but national in scope. The following day, the front page of the Vancouver Sun carried a full colour photo and headline about the unusual sighting.

Vancouver Harbour is one of the busiest in North America. The image of wild killer whales against the backdrop of ocean tankers was a vivid reminder of overlap between human activity and wild animals. The live interpretation and the media reports emphasized the educational message of ecosystems connections. The Aquarium was also able to assist these individual whales in a more direct manner. The marine mammal scientist who was observing the whales from a boat in the harbour was able to assist the coast guard in alerting other boats to the whales' location and to the importance of maintaining an appropriate distance from the animals.

By the end of the day, millions of people across Canada, had shared in the excitement of a spontaneous wildlife event and observed the close connection between human development and wild killer whales. The experience was especially memorable for those lucky individuals who saw the whales first hand. As I stood on the sea wall with a number of Aquarium staff, volunteers and visitors, I was surprised to discover that this was the first time many of them had ever seen a killer whale in "the wild". Approximately 400 killer whales live off the coast of British Columbia. Although BC is the best place in the world to see killer whales, sightings are still uncommon. These animals spend about 95% of their time underwater.

Unless you travel to certain areas which the whales tend to use on a regular seasonal basis, the likelihood of seeing a killer whale in the wild is rare.

Days later, the Naturalists and Aquarium visitors were still swapping stories of the killer whales in the harbour. Many people had seen the media coverage and were eager for more information. Staff kept their eyes open for incoming FAX reports to see if this pod had been sighted in another location. Thus, the initial sighting developed into a number of additional learning experiences.

For me, the most rewarding experience was watching this single, spontaneous wildlife event transform into a living educational experience for so many people. The philosophy of involving people in real, current wildlife events as they are actually happening had become institutionalized to such a degree that each staff group within the Aquarium naturally responded to the opportunity at hand. Because each group shared a common understanding, and a well-developed internal communication system, they were able to translate the experience to visitors, staff, volunteers, scientists, boat captains and the media and thus multiply their individual effectiveness. The innovation had become standard practice.

In our increasingly urbanized society, zoos and aquaria are the primary means through which most people in North America directly experience animals.

Modelling is one of the most effective means of developing attitudes toward animals, the environment and conservation action. Through their everyday operations (intentional and unconscious), zoos and aquaria model values for animals which have a profound influence on public attitudes. The value for animals which an individual holds is one of the most important factors affecting conservation action.

Although popular and successful for hundreds of years, the entertainment paradigm is no longer an effective framework for zoos and aquaria to operate within.

Attempts to "fit" conservation into the entertainment paradigm has resulted in a contradictory public persona in which simplified, gloomy messages about impending environmental doom are inserted into entertaining animal shows and graphics listing "environmental solutions" are placed without context alongside popcorn stands. Although widely practiced, this approach has not been successful. More than a decade after it was formally adopted, zoos and aquaria are not achieving their conservation education goal.

Zoos and aquaria are unique places where people experience living animals. Visitors come to these settings to be involved in personally meaningful, positive, social experiences with their friends and families. To be successful, zoos and aquaria must cultivate intrinsically motivating, exciting, meaningful experiences for their visitors that encourage the development of ecological values for animals. As long as they believe that visitors must be entertained, and that entertainment means passively watching a performance, zoos and aquaria will not be open to the vast array of opportunities to achieve their goals that already exist within their facilities. Currently, zoos and aquaria envision themselves as public display facilities that house animals. Like museums and art galleries, they develop new displays to encourage visitation from a public who views them as static and unchanging. They often feel pulled between the perceived entertainment needs of their visitors, the needs of the animals in their care and their conservation goals. Typically, real

research and husbandry activities occur either before public hours or behind-the-scenes so as not to interfere with the naturalistic image of the exhibits.

Paradoxically, zoos and aquaria may best be able to increase visitor satisfaction and visitation, and model appropriate values toward animals and conservation, by shifting their attention away from passive display toward active animal care and research for conservation. By redefining themselves as active conservation centres, zoo and aquarium staff can participate more effectively in research, animal care, breeding and observation activities while creating a public experience that is real, current and ever-changing. When we first began this approach at the Vancouver Aquarium, we were concerned that some of the slower, repetitive research projects would be too tedious for our visitors to enjoy. Instead, we have found that visitors are more interested in seeing "real" science in action rather than research shows. They feel that it is necessary and appropriate that animals at the Aquarium participate in research associated with conservation issues in the wild. We also found that research, because it often involves a mix of technology, animal care, training and observation appeals to a wide range of different interests. They show an active interest in visiting researchers and their projects. These real projects form a natural jump-off point from which to discuss current conservation issues in the wild; their difficulty, complexity, and the unique ways in which they are being addressed.

We also worried that by encouraging the aquarists, marine mammal and Amazon staff to experiment with the living exhibits their activities might interfere with the aesthetics of the living displays. Instead we have found that the visitors enjoy watching the aquarists experiment with different filters and cleaning techniques. They are respectful and understanding of exhibits that are partitioned off to accommodate nesting animals or new babies. Postmortems of fish that have died in the exhibits provide a fascinating opportunity to involve visitors in anatomical dissections and increase their awareness of how postmortems help aquarists to monitor the health of animal groups.

The Vancouver Aquarium's approach appeals to the exploratory, discovery oriented, social learning which naturally occurs in informal settings. As well, it appeals to the high public interest and support for education and research and conservation in zoos and aquaria evidenced in recent polls (Angus Reid Group, 1991; DFO, 1992; Roper, 1992). Successful implementation of this approach at the Vancouver Aquarium challenges the pervasive belief within the zoo and aquarium industry that entertainment is essential to institutional survival. As well, both Canadians and Americans rate education far higher than entertainment as essential functions of the "zoo" . More than half of the respondents in the US poll (Roper) rated educating people about environmental conservation as an essential function of zoos and aquariums. Only twenty percent believe that "entertaining people while they are learning about animals" is essential " (p. 20).

Not only is education in zoos and aquaria viewed as more important than entertainment by the public, but in certain cases, an entertainment format may actually be perceived as negative. Killer whale shows, for example, have historically been the most popular aquarium attraction. Yet, recent public opinion polls suggest that public support for entertainment-based programs is changing. According to a 1992 Department of Fisheries and Oceans poll, presenting whales in an entertaining show format is not an acceptable purpose for keeping a cetacean in captivity for a majority of the Canadian public. This shift in support reflects an increasing trend in the North American public towards animal -rights sentiments. Although the intention of zoos and aquaria is to inspire public involvement in animal conservation through close-contact with a "living ambassadors," the unrealistic, often anthropomorphic portrayal of animals commonly employed in the entertainment paradigm, leads to increased affection and concern for the individual animals in aquaria.

The public's strong feelings toward whales are not matched by knowledge. The North American public is characterized by an overall lack of basic biological knowledge of marine mammals, the ocean environment and its biotic resources (Kellert, 1989; Kellert, 1991). Thus while animal-rights is one of the fastest growing movements in America (Regan, 1992, Finegood, 1992), conservation of animals within their natural environments continues to decline. Indirect, habitat-

related competitive relationships between marine mammals and human development pose the greatest conservation threat to marine mammals (Hofman & Bonner, 1985). The same is true of animals in a terrestrial context.

Attitudes toward wildlife are important to an understanding of wildlife values because they reflect a broader set of beliefs, feelings, and social norms (Shaw and Zube, 1980). In order to motivate people to conserve, many zoos and aquaria have focused upon the value of plants and animals to people. Thus, it is important to conserve the rainforests because the plants within it provide important medicines. Human-centred values may result in the short-term conservation of plants or animals as long as the benefit to the plant or animal does not come at too great a compromise to humans. The crux of wildlife conservation, however, the reason that it is controversial, is that conservation often demands inconvenience or compromise of a "valued" human-oriented activity. When the conflict (whether real or imagined) occurs between animals and people, wildlife conservation that is based upon a human-centred value for animals or plants will not be sustained. For example, in Prince William Sound, Alaska, killer whales are positively regarded by the population at large, and protected by the marine mammal protection act. Yet, increasing numbers of whales have been shot in recent years by fishermen who perceive the whales as a threat to their black cod fishery.

Longterm wildlife conservation depends on the development of ecologicistic attitudes; upon an ecology-centred approach in which the needs of people, animals and the environment must all be accommodated in the solution. By placing the needs of the animals and conservation first and creatively marrying these to the changing needs of our visitors, the Vancouver Aquarium is actively modelling an eco-centric process.

Conservation, like education, is not an isolated event but a life-long process. Ecological values for animals do not develop instantly but inductively, over time, with the aid of case histories, by feeling and consensus, through knowledge and experience. The difficulty with conservation is that natural selection has programmed people to think mostly in physiological time whereas ecological time spans centuries and can only be conceived in an intellectual mode without an immediate emotional impact:

To choose what is best for the near future is easy. To choose what is best for the distant future is also easy. But to choose what is best for both the near and distant futures is a hard task, often internally contradictory, and requiring ethical codes... (Wilson, 1984, p. 123)

The philosophical foundations of the modern practice of conservation remain shaky. According to Wilson "It is time to invent moral reasoning of a new and more powerful kind, to look to the very roots of motivation and understand why, in what circumstances and on which occasions, we cherish and protect life (Wilson, 1984, pp. 138,139). Zoos and aquaria have a professional obligation to challenge

their poor record of conservation education success and to seek alternatives better suited to their stated goal. As well, Gregg and Posner (1990) warn that the public is growing increasingly skeptical of conservation claims. They will demand proof of conservation success. As in the case of environmental issues and the business community, "one example that contradicts its claims - no matter how vocal the claims or how many examples it cites to support them - will destroy its credibility....In the 1990s , no one will be able to play public relations games with the environment " (p. 112).

The Vancouver Aquarium provides a case example of an alternative approach to conservation education currently in practice. It is hoped that this paper will inspire others to constructively question the cultural norms which exist within the zoo and aquarium community and to begin the difficult yet extraordinarily rewarding experience of creating new ways to achieve conservation education.

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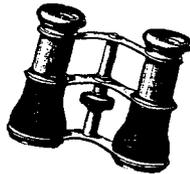
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Appendix 1: Attitude Occurrence in American Society

<i>Attitude</i>	<i>Estimated Percentage of American Population Strongly Oriented toward the Attitude</i>	<i>Common Behavioral Expressions</i>	<i>Most Related Values/Benefits</i>
Naturalistic	10	Outdoor wildlife-related recreation—backcountry use, nature birding and nature hunting	Outdoor recreation
Ecologicistic	7	Conservation support, activism and membership, ecological study	Ecological
Humanistic	35	Pets, wildlife tourism, casual zoo visitation	Companionship, affection
Moralistic	20	Animal welfare support/membership, kindness to animals	Ethical, existence
Scientific	1	Scientific study/hobbies, collecting	Scientific
Aesthetic	15	Nature appreciation, art, wildlife tourism	Aesthetic
Utilitarian	20	Consumption of furs, raising meat, bounties, meat hunting	Consumptive, utilitarian
Dominionistic	3	Animal spectator sports, trophy hunting	Sporting
Negativistic	2	Cruelty, overt fear behavior	Little or negative
Neutralistic	35	Avoidance-of-animal behavior	Little or negative



Source: *Animals and People Sharing the World* edited by Andrew N. Rowan, graph from Stephen R. Kellert's article "Human-Animal Interactions." © 1988 by the Trustees of Tufts University, by permission of the University Press of New England

Appendix 2: Worldwide Distribution of Killer Whales (February 1994)

USA

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1 (MW)	0.1	Iceland -1980	15
1 (MW)	0.1	BC -1969	27
1 (MS)	0.1	Washington-1970	28
21 (SW)	7.14	Captive born-11	1-8
		Iceland-9	12-17
		Canada-1	30

MEXICO

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1	M	Iceland - 1982	15

FRANCE

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1	M	Iceland - 1978	17
1	M	Iceland - 1989	6
1	F	Iceland - 1982	13
1	F	Iceland - 1989	6
1	U	CB - 1993	1

ARGENTINA

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1	F	Stranded	6
1	M	Stranded	7

HONG KONG

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1	F	Iceland - 1977	18

JAPAN

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1 (TA)	Unk	Japan - 1981	Unk
1 (KSW)	M	Iceland - 1982	13
1 (KSW)	M	Iceland - 1987	6
1 (KSW)	F	Iceland - 1987	6
1 (KSW)	F	Iceland - 1987	11
1 (AW)	M	Iceland - 1986	9
1 (AW)	F	Japan - 1981	12
1 (AW)	F	Iceland - 1989	6
1 (AW)	F	Iceland - 1989	6

CANADA

<u>Number</u>	<u>Sex</u>	<u>Source</u>	<u>Estimated Age</u>
1 (VA)	M	Iceland - 1980	15
1 (VA)	F	Iceland - 1980	15
1 (MNF)	M	Iceland - 1986	15
1 (MNF)	F	Iceland - 1981	13
1 (MNF)	F	Iceland - 1979	16
1 (MNF)	M	Iceland - 1986	11
1 (MNF)	F	CB - 1992	2

(MW) Marine World Africa USA
(MS) Miami Seaquarium
(SW) Sea World
(TA) Taiji Aquarium
(KSW) Kamogawa Sea World
(AW) Adventure World
(VA) Vancouver Aquarium
(MNF) Marineland Niagara Falls

Appendix 3: Quotes Illustrating the Anthorpomorphic Nature of Killer Whale Shows - Vancouver Aquarium Scripts

A killer whale show outline from the late 1960s describes Hyak, a young male killer whale as "sort of an extrovert; a show-off; pleased with himself; sometimes he's friendly, although he can be quite moody; seeks attention; doesn't like to be ignored by the trainer."

In the mid 1970s, the script included: "Skana, Hyak and their friend, White Wings, the dolphin, want you to know more about them before they begin their show...Kids, why don't you say hello to Skana. Clap, she can hear you. See now she is waving. Good morning Skana...You're now going to have a look at Skana's flipper. Lift up your arm and spread your hands out. The same bones that are in your hand and arm are in the killer whale's flipper...Just like your Mom or Dad or friends take care of you when you are sick, killer whales help one another if they are sick or injured. The other whales would support the sick animal at the surface, keeping its blowhole above water so it could breathe.

In the early 1980s, the script read: "Although the animals in our pool look so different from ourselves, they have a lot in common with you and me. Can you guess what we have in common with whales and dolphins? If you guessed that we are both mammals, you are right..."

And, from the mid 1980s: "You may have noticed the whales bobbing up in the water, watching the activities through the windows. They are as curious as we are!...The whales like to start off the show with a big splash!...They are greeting their trainers with a flippershake...Killer whales are mammals like you and I...They have skin which can get sunburnt just like ours...Just like us, these animals were once attached to their mothers by an umbilical cord.."

Appendix 4: Typical Killer Whale Shows

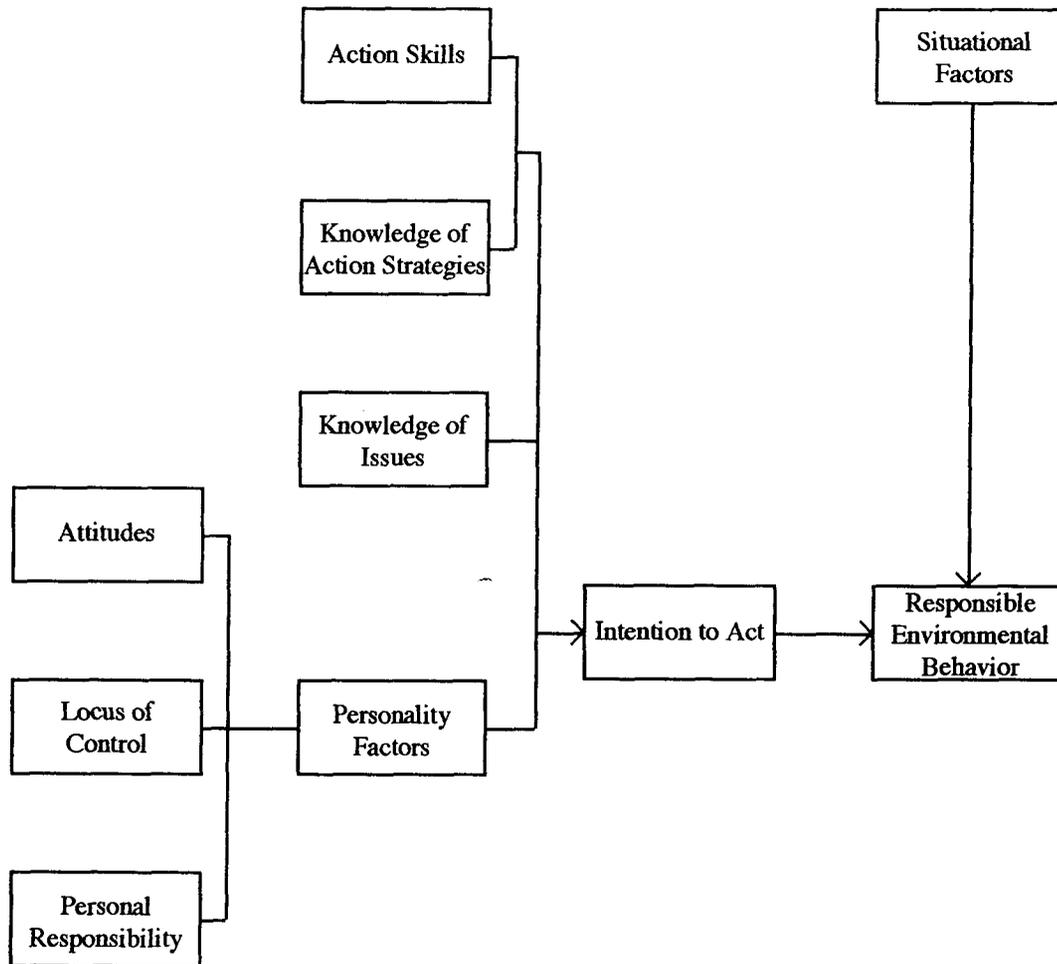
Criteria in a typical killer whale show

- Choreographed sequences of trained killer whale behaviours
- Emphasis on the relationship between trainer and whale
- Splash!
- Scripted Narrations
- Generalized biology of killer whales
- Anthropomorphism: the "Just like us" phenomena
- Emphasis on training
- Simplified conservation statement
- The 'wild'

Images of killer whales portrayed through shows

- killer whales are "just like us" - human
- killer whales love to perform
- killer whales are benevolent giants
- killer whales live harmoniously in a romanticized "wild"
- killer whales are constantly active
- killer whales are helpless. They need human protection

Appendix 5: Proposed Model of Responsible Environmental Behavior



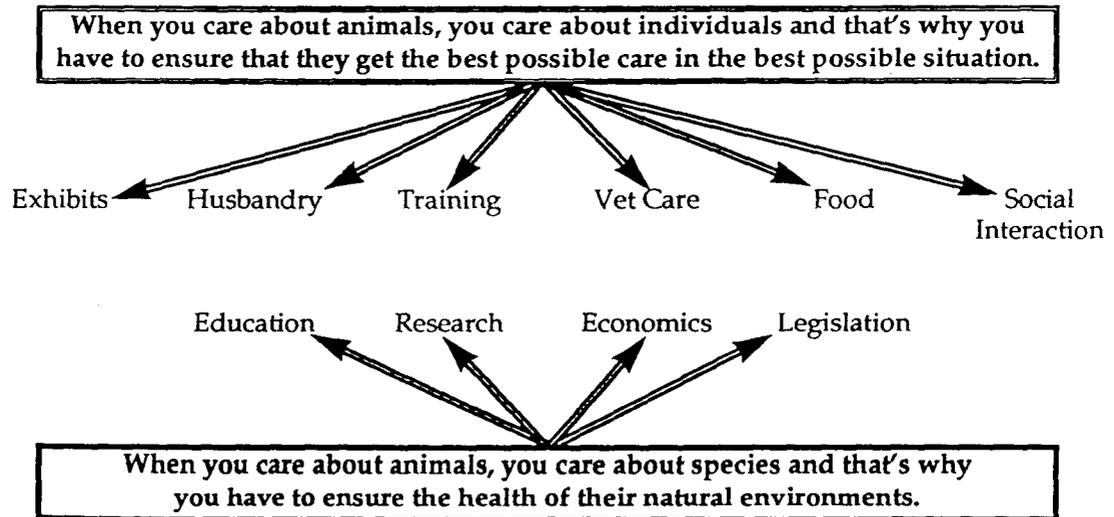
(Hines, Hungerford & Tomera, 1987)

Appendix 6: Model for Environmental Literacy

1. The ability to think about **SYSTEMS**
2. The ability to think about **TIME** (forecast, anticipate, evaluate consequences over time)
3. The ability to think critically about **VALUE ISSUES**
4. The ability to separate **NUMBER, QUANTITY, QUALITY** and **VALUE**
5. The ability to distinguish between the **MAP** and the **TERRITORY** (to distinguish between a representation and the real thing.)
6. The capacity to move from **AWARENESS** to **KNOWLEDGE** to **ACTION**
data = information = knowledge = action. Need to do intellectual work, sense making, framework development
7. A basic **SET** of Ecological concepts and the capacity to **LEARN NEW ONES** and to **REVISIT** and **DISCARD** existing ones.
8. The ability to work **COOPERATIVELY** with others.
9. The capacity to respond to the environment **AESTHETICALLY**.
10. The capacity to reconcile a **LOVE** of **NATURE** with a **LOVE** of **HUMANITY**

(McClaren, 1993)

Appendix 7: A Framework for Interpretation



(Kelsey, 1991)

Appendix 8: Vancouver Aquarium Interpretive Approach

The Vancouver Aquarium interpretive approach is designed to develop learners who:

- understand basic principles operating within ecosystems and are able to apply these principles to their understanding of unfamiliar situations
- possess an ecological value for animals and environments
- are able to identify and critically evaluate controversial conservation issues
- are able to recognize and access accurate and relevant environmental information from a number of sources
- are able to understand the connections between animals, ecosystems, conservation issues and their own personal lifestyles
- have an internal locus of control with respect to the environment - feel inspired and confident in their ability to make positive contributions to conservation situations.
- have the ability to judge which activities and causes are best suited to their own personal skills and interests.
- feel internally motivated to effect conservation
- feel personal responsibility toward the conservation of the global ecosystem.
- have developed the skills they require to effect conservation

Interpretive experiences are designed:

- to be visitor centred
- to be facilitative
- to interpret from an ecological perspective
- to model ecological values
- to model ways of learning about animals, ecosystems and conservation issues that may be applied to other situations (ie. animal observation skill acquisition, critical thinking techniques, values reasoning skills)
- to create a positive, exciting, enjoyable, motivating, informal learning environment
- to profile the multifaceted roles and activities of the (Vancouver) Aquarium (research, animal rehabilitation, conservation actions) and to show the Aquarium as part of a larger conservation oriented network.
- to create real, relevant, dynamic learning opportunities for the public in the Aquarium galleries.
- to help visitors to discover, through their Aquarium experiences, their intimate connections with ecosystems.

Rather than using predetermined interpretive programs, Naturalists create unique experiences with each visitor in response to a number of factors including:

- visitor group dynamics, agendas and previous experiences
- current observable behaviours of the animals in the exhibits
- current activities of the animal care staff
- significant wildlife events in the natural environment
- current activities of Aquarium researchers and associates
- current media stories related to environmental events or conservation issues.

Appendix 9: Interpretation at the Vancouver Aquarium - topics and approaches

conservation issues

- model methods for exploring conservation issues through values reasoning
- use real, current examples of conservation issues to serve as exemplars of underlying principles
- present conservation issues as discovery challenges - encourage learners to develop their own approaches and solutions rather than prescribing a course of action to be taken.

ecological systems

- use real, current examples of the concepts which occur in ecological systems - interconnections, hidden wiring, surprise factors
- link observable animal behaviours in zoo or aquaria habitats to the behaviour of animals in natural ecosystems
- model ways of learning about current connections between animals, environments and people.

motivation

- encourage and support visitors' interests in and ecological values for animals
- model ecological values and interest in animals
- model environmentally responsible behaviour
- model animal observation skills - focus visitor attention on real, current animal behaviours as they happen
- help visitors to understand who is responsible for what - encourage visitors to develop an internal locus of control with respect to environmental decision making

action strategies and skills development

- focus on the importance of cooperation in achieving conservation success
- provide opportunities for people to develop cooperative skills
- provide examples and model environmental solutions and cooperative partnerships
- model responsible environmental behaviour
- use success stories to model successful conservation strategies

animal knowledge and ecological values

- provide opportunities for visitors to develop animal observation skills
- direct visitor attention to real, current, animal behaviours as they happen
- develop animal exhibits and animal care policies that address the ecological needs of animals and that actively model an ecological value for animals
- use animal-centred language
- provide real, current examples of interrelationships between animals, environments and people

Appendix 10: Example of Events Interpreted by Vancouver Aquarium Naturalists During the Week of July 13, 1991

Breeding Animals

steelhead spawned
ratfish with egg cases
staghorn damsel fish spawned/caring for eggs
gravid perch/perch mating
heron watch - fledging herons, eagle grabbed juvenile from nest
pregnant marmoset
skate egg cases
caiman courtship
gravid alligator lizard
gravid striped perch

New Arrivals

sticklebacks born in pond
microscopic life of the pond
frogs in pond
shiner perch giving birth
new tropical coral reef exhibit - how animals settle into a new habitat
invertebrate exhibit - discovering what animals came in with the coral rocks,
evolving ecosystem
young rockfish/greenlings
new scarlet ibis
silverspot sculpins
first orphan seal of the summer on display
injured sea otter - great opportunity to talk about VPA's role in MM rehabilitation

Evolving Ecosystems

kelp forest - growth of different types of algae
invertebrate exhibit - what animals came in with the new coral rocks
wetlands exhibit " (pond) - plant growth, development of insects, microscopic life

Animal of the Week

pinecone fish
ratfish
daily FAX from Robson bight
KW observations - respiration
- swimming/social patterns

What's Coming Up

daily FAX from Resolute Bay -what's happening in the Arctic-Mark G.
researcher news from the Queen Charlotte Islands - John F.

(McIntosh, 1991)

Appendix 11: A Comparison Chart: Entertainment & Conservation Education Paradigms

	Entertainment Paradigm	Conservation Education Paradigm
Educational Theory	Transmission	Constructivism
Setting	Formal	Informal
Topic	Facts	Critical thinking, values, attitudes, issues, observation skills, ecosystem connections
Content of Interpretation	Scripted	Goal remains consistent. Content varies. Live interpretation: responsive to current animal activity, audience composition, interests, etc.
Timing of Interpretive Session	Scheduled	Spontaneous, responsive to real events (animal care, research, social behaviours, etc.) as they are actually happening.
Timing of training sessions	Scheduled	Varies throughout the day in response to the animals' social behaviours.

Content of training sessions	Predetermined	Goal remains consistent. Content responsive to the current behaviour of the animals & animal care or research needs
Medium	Shows	Variety of Discovery learning experiences
Value for Animals	Humanistic, Utilitarian, Dominionistic	Ecologicistic
Audience	Uniform, Passive absorbers of information	Diverse, actively constructing knowledge
Exhibit	Set, diorama	Habitat
Role of Naturalist	Performer, Expert	Facilitator
Role of Trainer	Performer, Caregiver	Caregiver
Role of Animal	Performer	Itself, no role
Viewing of Animal Activities	Partially open to public	Totally open to public
Animal Activities that are interpreted	Trained behaviours	Spontaneous, real behaviours, trained behaviours, animal care sessions, research sessions
Educational Belief	Best education is entertaining	Educational methodologies vary with the learner, topic, setting

**View of
conservation
education**

presentation of
simplified problems
and solutions and
telling people
what to do

encouraging ecological
values and teaching
people ways of
looking at complex,
changing,
controversial, value-
laden issues so they
can make their own
decisions

**conservation
issues
profiled**

generalized

current, specific issues
in real
locations

Appendix 12: A Comparison Chart: Animal Rights & Conservation Education

	Animal Rights	Conservation Education
Focus	Individual Animal	Individual Animal & Populations of Animals
View of Wild	Pristine, romanticized	Intimately connected to human activities/ environmental issues
Biological Knowledge	Low	High
Emotional Attachment	High	High
Attitudes toward Animals	Humanistic/Moralistic	Ecologicistic
Goal	Protection of Individuals	Care of Individuals & Conservation of Populations/ Ecosystems

Appendix 13: Naturalists Perspectives on Killer Whale Interpretation (January, 1993)

Naturalist #1

In my interpretive sessions I attempt to facilitate the visitor's appreciation of the whales and the ecosystem that they are a part of. I do this by connecting what is happening in front of the visitor with the wild experience. I also use the interpretive sessions to discuss research at the aquarium and in the wild as well as conservation issues and initiatives.

I try to make my interpretive sessions fun, interesting and informative. I do this through actively involving the visitor: asking them questions, directing them to pick out features and behaviours. I also watch the response of visitors, gearing my interpretation towards the interests and ages of the listeners.

I always make sure that people know where I am and invite them to talk to me and bring me their questions and just generally try to make the sessions informal, personal conversations which seems to encourage people to feel comfortable when they approach me."

Naturalist #2

"Interpretive Goals -> Informative Approach

What I like to get out of an interpretation as a listener is:

- A) **Objective Scientific Information** - data, facts and figures, etc.
- B) **Background History** - how did we obtain this data? research history- stories about the discovery process etc.
- C) **Interpretation**- bring this info into a larger context. Use of the data to 'answer' questions. making educated guesses. What does this information mean? How can we use it?

How can I apply this to the killer whales (examples)

- A) **Information** - stats - size, weight, speeds, how much they eat, what they eat, number" (population), distribution, etc.
- B) **Background** - role of research - John Ford's research, audiogram, x-ray stuff, role of the marine mammal staff
 - use of faxes
- C) **Interpretation** - taking what is happening -ie. animal behaviour both during training sessions and outside this time - into natural environment
 - answering questions with my interpretation of what is happening and providing visitors with the information that I am observing and interpreting and not just stating facts.

How do I attempt to accomplish this at each interpretive talk:

A) **Information** - don't try to pass on all that I know

- limit the information provided to that which is relevant to what is happening
- use the whales! Finna, Bjossa and White Wings are most important tools we have
- use them in all interpretations to determine what should be discussed.
- try to guess what the public is wondering

B) **Background** - tell stories, introduce faxes, read any that are relevant (this would apply to both providing info about how we know about whales and to putting the killer whales in the context of their natural environment.)

- use the radio to involve the marine mammal staff more directly in the interpretations.

C) **Interpretation** - use phrases like "this might be..." "we think..." "I think...." when making interpretive comments in order that visitors understand that I am drawing conclusions from my observations. In one to (one) discussions, I can elaborate on this to allow visitors to see that observation and interpretation are skills they can learn and use.

Questions I ask myself after an interpretation:

- Did I use " (provide) relevant information?
- Did I draw visitor attention to the whales and what they were doing?
- Did I provide a background context for the information?
- Did I explain what was happening?
- Did I make interpretations about whale behaviour, whale/trainer interactions, whale/environmental interactions and was I clear that these were my interpretations?

Naturalist #3

My main goal involves instilling an awareness of killer whales and their habitats (global waters & local BC waters) by highlighting current research, whale watching and in-house training. HOW?

- 1) By recounting my own kw watching or natural history experiences and interesting stories shared by staff and visitors.
- 2) Using info from faxes to supplement kw research (on-site) and further whale watching efforts.
- 3) Involve visitors in experience by connecting off-site recounted stories with aquarium watching.
- 4) Explain basic marine mammal concepts to build visitors confidence of whale watching on their own.

Strengths: allows me to share info in a genuinely interested & enthusiastic manner because the experiences are mostly my own.

Weaknesses: To avoid confusion, I strive to make clear transitions from in-house husbandry and research training to watching wild kw.

Goal: to continue to accumulate more stories through kw watching, interview & readings because my angle revolves around my own experiences.

Naturalist #4

While interpreting kw's, I have a number of goals in mind but the number one priority is to instill a sense of awe and respect for kw's in the visitor.

HOW?

- By expressing my own sense of awe
- By having fun while interpreting (I believe that if I'm obviously enjoying myself and think those animals are 'neat', visitors will pick up on this)
- By helping the visitors to "see". I point out behaviours to look for (ie. "Finna has just gone beneath the surface of the water. Can you find him? try to follow what he is doing beneath the surface.")
- By relating personal experiences

Another priority is for me to relate what the visitor is seeing to kw's in the ocean. I will tell the visitor to watch a behaviour that is happening right now, right in front of them, and then discuss why kw's would do the same thing off the coast of BC. For example"

"Watch Bjossa slap her tail flukes on the surface. You can see the kw's here at the Aquarium do this throughout the day. If you're fortunate enough to go whale watching off the coast of BC, you may see kw's doing this same behaviour. Researchers believe kw's may do this for a number of reasons....."

Tied in with the above goal is providing the visitor with a sense of ecosystem.

HOW?

- Tell them to watch the Great Blue Heron. Discuss that they are very much a part of the natural habitat of kw's and can be seen all along our coast. I may mention that you can spot them anywhere along Vancouver's beaches standing motionless in the water waiting for a fish.
- Tie in the kw's with the other animals out on the Marine Mammal deck. This can be done when talking about what kw's eat - salmon ("Can be seen right behind you in the North Pacific Exhibit), harbour seals and belugas ("Can be seen out here on the MM deck")

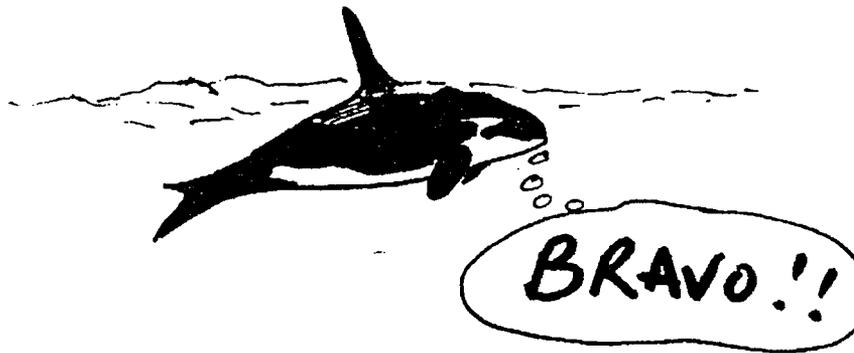
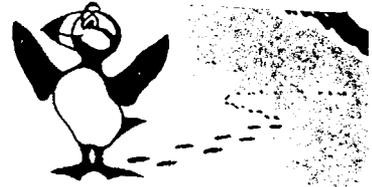
At some point in the presentation, I like to discuss the unique approach the Vancouver Aquarium has:

- Why the trainers (are) here - not only to feed but to exercise, physically and mentally, research etc.
- Talk about importance of flexibility in training times, dynamic nature of training period.

Appendix 14: Visitor Response to Non-scheduled Approach to Killer Whale Interpretation

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ATTN : AQUARIUM MANAGEMENT
AND STAFF



Good decision folks
Charlie Rieband
Alison Scott