

Marine Biologist Ken Balcomb's
Comprehensive Retirement Plan

A pre-proposal to return and rehabilitate a captive killer whale named Lolita to her home waters in Greater Puget Sound.

Prepared by Center for Whale Research
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Our Aims:

- 1) to reach a sensible business agreement with Lolita's owner(s) to retire her from show business and transport her back to her home waters to live out the remaining years of her life in a natural setting. In doing so, the paramount factor will be to ensure Lolita's health and well-being in cooperation with those who know her best.
- 2) to acclimate Lolita in a natural seawater pen and train her to "gate" to open water of Greater Puget Sound, much like the training accomplished by the US Navy for dolphins and killer whales (see: Bowers and Henderson, 1972).
- 3) to conduct comprehensive DNA, veterinary, and physiological studies of Lolita before, during and after her transition to home waters to determine the genealogy, relative health, and physiological demands of captive versus that of free-ranging whales.
- 4) to contribute to our understanding of the science of reintroducing cetaceans to the wild: whether or not she actually returns to her family, she can provide valuable information on foraging ability and free-ranging behavior of an ex-captive.
- 5) to ascertain whether a whale can remember and respond in its native dialect after long term separation from its family.
- 6) to allow Lolita to return completely to a free-ranging state with her family members, if she so chooses (reintroduce her to the wild), or to simply provision her and provide veterinary care while allowing her to free-range and return at will to a "sea-pen" location in which she feels secure.
- 7) to potentially recall Lolita at intervals from her free-ranging or reintroduced state to ascertain her continuing health status, and to obtain information about her environment via medical and instrument sampling.
- 8) to determine whether Lolita can acquaint other free-ranging whales with trained behaviors that may be of scientific value to us or survival value to them (e.g.. Can she introduce them to feeding sites or behaviors which permit close observation or veterinary care?).
- 9) to boost public awareness about marine conservation and the unique role of these remarkable cetaceans in the marine ecosystem.

Background and Significance

Why retire Lolita and subject her to a research project now?

Killer whales are actually large dolphins and are naturally very social and cooperative top marine predators, with highly evolved communication and mental processing abilities. They are specialists that strategize and cooperate with one another in very complex foraging situations, and they develop very long-term functional relationships with other whales (and, sometimes with people). With other whales these relationships begin along matrilineal lines, and subsequently extend to more distant kinship groups within a clan. Gametes disperse throughout the clan, but the individual whales, both male and female, remain in their natal matriline for life. This functional family approach to successful cooperative predation which they have evolved over millennia is now very obvious in field studies, yet this species' modern captive display in show business routines does little to depict it. On the contrary, the display is much like a marine circus with whale and human entertainers doing spectacular tricks together, and there is some controversy over whether that is appropriate display. Most of the whale entertainers were removed from their wild family at a very young age and forced into artificial social groups for these displays, or more recently for display and captive breeding purposes.

Killer whales are not an endangered species, and currently there is no management need to breed them for reintroduction, although reproductive and captive studies are of scientific interest and may have management value in the future. There has been recent discussion of reintroducing killer whales and other dolphins for humanitarian or management purposes, but the subject is controversial.

In the particular case we bring up - that of Lolita - captivity is primarily for public display and entertainment purposes, as her facility has no other killer whales and since 1981 has made no application to acquire any. Her case is controversial; but, nonetheless it represents a major concern for the whale and an image problem for the captive display industry that for the past fifteen years she has been essentially in solitary confinement in an outdated, inadequate and deteriorating facility in a program of limited educational or conservation benefit to the public. It is a case like that of Ivan, a gorilla that spent twenty years in a solitary cage in a shopping mall in Tacoma until last year.

Both Lolita and the Miami Seaquarium where she is housed are victims of changing demographics of South Florida tourism, with diminishing revenue for improving the situation and not much to look forward to in the economically foreseeable future. The facility is subject to severe damage from natural disasters such as the devastating Hurricane Andrew which caused the death of several of her fellow captive marine mammals. During that storm, her water filtration and cooling system were temporarily knocked out, and enormous jacks now support the concrete stadium around her, with puddles of seawater gathering around the leaking floor. It is likely that no marine park is currently willing to buy Lolita, because in their view she is approaching maximum longevity (which is statistically probable if she remains in captivity), and many think she is past her reproductive prime for captive breeding purposes. We are not privy to her owner's specific plans for Lolita, but we are concerned for her future and are trying to offer a plan before it is too late. We are also trying to anticipate future information needs in the science of cetacean reintroduction and in marine ecosystem management particularly as it pertains to this whale's home waters of Puget Sound. Lolita is perfect for both purposes, as we hope to demonstrate.

From our review of cetacean releases to the wild, mostly of dolphins (but including short-term captive releases of killer whales), and from discussions with marine mammal veterinarians, trainers and

collectors, we suggest that these animals can be viably returned to the natural state, where longevity may be greatly increased. Dolphin releases have been successfully done even after prolonged captivity lasting more than a decade (for examples, see: Cetacean Releases, DRAFT 1994), but they have often been uncontrolled and/or without sufficient follow-up. There is a general need to develop a scientific protocol for increasing the probability of successful reintroduction of cetaceans in the future for both management and rehabilitation purposes. There is also political support for developing such a protocol: for example, in response to a Congressional request, the United States Navy (NRaD) recommended, among other things, that the Navy establish reintroduction as an exploratory initiative and foster the research and development of the necessary methods and technologies (Brill and Friedl, 1993).

In summary, the cumulative economic, demographic and biological risk factors appear greater to Lolita's survival and less humane in her present artificial surroundings in Florida than those resulting from bringing her back to her home waters of Washington State for potential reintroduction to her natural habitat and family. There is also a strong scientific and political incentive to begin developing a proposal to do just that. The merits of such a proposal are objectively clear when one considers the improved knowledge such a program will provide in the science of reintroduction such as has been called for, and the constructive benefit to the resident whales from the media attention generated (e.g., the huge promotion of the importance of maintaining a healthy ecosystem for the whales and their prey resources). The attention can also generate revenue potential for the Miami Seaquarium.

Why Lolita? Aren't there other whales in captivity to pick on?

Lolita is a native daughter of Washington, and is the last survivor in captivity from the Washington State population. Her free-ranging extended family has also survived, is well documented and is year-round "resident" to Greater Puget Sound, and they can be located in this habitat much of the time. This is a very unique situation, and it is not the situation for any other cetacean in captivity. In fact, Lolita probably offers the most unique opportunity for a rehabilitation and reintroduction study of any cetacean ever in captivity, and arguably her quality of life will be improved if she was made available for such study.

What specifically is known?

Lolita (AKA Tokitae) was captured on 8 August 1970 at Penn Cove, Whidbey Island about forty miles north of Seattle. She was a member of the southern resident community of killer whales (AKA orca, from the scientific name *Orcinus orca*) that frequent the Greater Puget Sound marine habitat. Lolita was one of seven young whales sold to marine parks around the world in this roundup of virtually the entire population. From more than a dozen such captures, approximately 58 young whales were removed, and approximately 68 mostly older individuals remained. Due to a Federal court order, and public resistance to further removals, no captures have occurred in the Greater Puget Sound region since 1976, and the population is now recovering and estimated to return to pre-exploitation size by the end of this century. All captures since 1976 have taken place in Iceland, and most of the killer whales in captivity are now Icelandic, or genetically mixed offspring from Pacific and Icelandic whales. The Icelandic whale population has not been well studied, and the logistics of rehabilitation and reintroduction study off Iceland are formidable, if not impossible due to that government's stance on whaling and animal issues.

Lolita was sent to the Miami Seaquarium in Florida in September 1970, to share a pool with a young male whale named "Hugo" captured in Puget Sound in 1968. The six other young whales exported from her capture went to parks in Texas, Australia, Japan, France, and the United Kingdom. All six, and Hugo,

have since died. Whereas, natural lifespan in the wild is currently estimated at 50-80 years (Olesiuk, et. al., 1990), all of these young animals died prematurely in their teens or younger. It is a sad fact that no whale lifespan in captivity has yet approached the average lifespan of these animals in the wild. The arbitrary breaking of bonds and mixing of whales from different populations in small enclosures to satisfy entertainment and breeding requirements may be causing a well-masked stress response which reduces survivability. The captive population is unlikely to produce animals suitable for future reintroduction in the current breeding scheme.

In any population, however, a few individuals are potential survivors of extreme situations, including those encountered in transport and captivity. Lolita is obviously one of these hardy survivors, perhaps in part because of her relatively advanced age at capture. She was about 15 feet long and six to seven years old in 1970, and is now a mature nulliparous adult about 31 years of age. She is approximately 22 feet in length, weighs about 8,000 pounds, and is reported to be in excellent physical health. Judging from her survival to date and her veterinary reports, she receives excellent care, quality food and training, and she is alert and responsive to people who come to see her shows. She has adapted well to human control. Even her owners admit, however, that her pool is too small, outdated, and seriously in need of maintenance. It is an 80' oval pool 12-20 feet deep filled with natural seawater that is drawn from Biscayne Bay and chilled to about 65 degrees F. The pool was severely damaged by Hurricane Andrew, and with just a little push from another hurricane, her entire physical support system could fail. Unfortunately, we see no feasible backup plan for her survival, except to move her to even less adequate tanks on site or perilously move her to another marine park in the event of another disaster. That is not really a viable plan for Lolita's long term benefit, so we propose developing one.

The Proposing Institution

The Center for Whale Research, Inc. was founded to promote, support and conduct benign scientific research on marine mammals of the Order Cetacea - whales, dolphins and porpoises. The research methodology is primarily that of photo identification in population and behavioral studies in the wild. Photo-identification relies on the demonstrated permanence of pigmentation and scar patterns which are extremely reliable, for example in killer whales. The knowledge gained from these studies is provided to governments, to the public and to conservation organizations.

The Center is funded by contributions from individuals and organizations, occasional grants, sales of whale related items, and contracted studies. It is incorporated as a non profit organization in the State of Washington with IRS 501 (c)(3) tax deductible status [EIN 91 1334319].

The principle studies underway as of 1995 are the Orca Survey - a long term photo identification study of killer whales in the Pacific Northwest since 1976; and, the Bahamas Marine Mammal Survey - a general survey of marine mammals in the Bahamas Islands, with particular emphasis on photo identification studies of bottlenose dolphins, pilot whales, and beaked whales. Other studies include collaboration on population studies of humpback and blue whales in the North Pacific Ocean, and development of technologies and techniques for benign studies of free-ranging cetaceans. Much of the Center's fieldwork is conducted in cooperation with Earthwatch, a Massachusetts based volunteer environmental organization.

The Center is staffed by a full time volunteer director, a volunteer publicist, and five part time volunteer researchers. Over ninety percent of the Center's budget is spent on program activities. For purposes of this project, if a scientifically responsible plan is developed and approved, the Center will undertake

dedicated fundraising and will solicit extensive collaboration with Pacific Northwest zoos and aquaria, the Miami Seaquarium, and agencies in the State of Washington to bring Lolita home.

The staff and volunteers of the Center are keenly interested in the well-being of all whales and dolphins, both in the natural state and in captivity. Lolita potentially bridges the gap that has developed between captive marine mammal research and research on a free-ranging population quite nicely. As a result, she offers the sciences of Zoology and Reintroduction Biology a most unique opportunity.

Why do we think Lolita has a family to return to?

What is known of her family?

The Southern Resident Community of killer whales is comprised of three pods, J, K, and L. This population now totals 94 in mid-August of 1995, which is roughly 39% higher than its size of 68 when we censused it in 1976. All three southern resident pods were cropped during 1967-73 in a live capture fishery for aquaria. At least 44 of the 58 removals were of southern residents, mostly immature whales that were taken or killed during captures in this period. Perhaps up to 14 whales that were taken or captured were so-called Transients that are genetically distinct and have a range from Alaska to California. A photographic catalogue of both residents and transients was published by Bigg, et. al. (1987), and the resident catalogue has been recently updated by Ford, et. Al. (1994). Photographs taken during Lolita's capture demonstrate that she came from a southern resident pod; she is therefore genetically compatible with the region's population.

The southern resident pods are seen regularly during the summer in the protected inshore waters of Georgia Strait and Puget Sound, especially in the vicinity of Haro Strait, west of San Juan Island, and off the southern tip of Vancouver Island. Southern residents, especially K pod and L pod, frequently make excursions out of Juan de Fuca Strait to areas off the west coast of Vancouver Island and the Olympic Peninsula, where they forage amongst commercial trollers on the offshore banks to catch salmon. In September and October, all three pods can often be found off the mouth of the Fraser River in Georgia Strait, intercepting late season runs of salmon before they enter the river. During the winter, J pod is the most commonly sighted pod in inshore waters, especially in the Alki Point, Vashon Island and Pt. Defiance areas.

From twenty years of detailed individual photo-identification study, we have learned that the southern resident killer whale society is matrilineal and apparently matriarchal. No offspring has been observed to emigrate from its natal pod, nor have any immigrated. The maternal bond is quite strong and apparently life-long, as for example in elephants. Average longevity in this population is calculated to be 29-50 years, males and females respectively, and sexual maturity in both sexes occurs in the teens (Olesiuk, et. Al., 1990). Social maturity for males occurs in late teens or early twenties. Sexual activity is precocial, mating is presumed to be polygynous, but paternity is not known. mtDNA studies now underway may soon reveal fascinating detail to overlay the observational studies (see, for example, Amos, et. al., 1991). They will in all probability also reveal Lolita's matrilineal affinity.

What have we done so far, and what steps need to be taken?

Our greatest concerns are for the long term well-being of Lolita, the pods to which she may be reintroduced, and the cause of conservation and wise management of Greater Puget Sound marine resources. We wish to take all possible precautions to minimize risk or suffering to Lolita in development

of this proposal. As in the case for Ivan the gorilla, we have to approach this whole project with the mindset that we have a naturally wild but socially deprived animal in our care, and we have to keep its best interests in mind. From a captive wild animal's point of view, our wishes and efforts may be irrelevant. It may long for freedom, and savor its remembrance, or it may accept the free meals and medical plan, ad hoc. But, in almost all cases where the option is available, creatures in captivity prefer being with others of their kind over solitary confinement. That is the humane standard of captivity. Where possible, the choice should be left to the wild animal involved whether it should remain alone. In that, Lolita may be a most unique cetacean candidate, being large-brained and potentially vocally communicative. We are encouraged from the recent successful reintroduction of the captive gorilla, Ivan, to the company of other gorillas following over 20 years in a solitary cage in a shopping center. Ivan quickly adapted to his new social setting in a new environment and mated with a female gorilla within days of his reintroduction.

Several steps need to be taken prior to proposing that anyone transport the captive whale Lolita from the Miami Seaquarium to her native waters for rehabilitation and potential reintroduction. These can be logically divided into several phases some of which may run concurrently: 1) developing a detailed scientific and husbandry protocol that meets the professional standards of the zoological display industry; 2) gaining public support (including permission from the owner of Miami Seaquarium) for a whale rehabilitation/reintroduction project; 3) selecting a sea-pen site or sites and meeting government criteria for rehabilitation/reintroduction of a marine mammal; 4) conducting pre-transport evaluations and experiments, including acoustic experiments to assess potential recognition by her pod; 5) assembling a team of specialists to actually carry out the transport and acclimatization of Lolita; and, 6) including sufficient safeguards such that any actual return to the wild will be up to Lolita, not us or other parties.

The success of each phase of the project will help determine the timing and procedures for subsequent phases. For example the degree of apparent mutual recognition elicited by the acoustic experiment will provide data on which the proposed timing of the eventual transport and potential reintroduction will be based. A short term experiment to determine if Lolita can and will pursue and devour live fish in her tank, similar to an experiment conducted by Newman and Markowitz (1993) at Marine World Africa USA in California in 1993, may also be done. In that experiment, the two whales, which had been in captivity for 24 and 13 years, immediately echolocated on, caught and ate the fish. If such an experiment is permitted by the owner, allowing Lolita to catch live fish may be continued as environmental enrichment even after the results of the experiment are known.

Broad based political support for the project will be important in all phases for several reasons. Many areas of oversight, experience and expertise will be relevant to various aspects of the project, and a generally supportive public will encourage help from the scientific community, permitting and supervisory agencies, land owners, possible funding sources, and others. Widespread public interest in the project will also help to fulfill an important objective: To draw attention to the whales that live in and depend on the waters of Puget Sound and thereby engender a sense of stewardship toward them and their ecosystem.

When the whales' health and well being are an important consideration, the overall health of the Puget Sound marine ecosystem will become important for the public to understand and improve. For example, the whales' need for bountiful salmon and other fish runs requires that wetlands, streambeds and rivers be productive for them to simply eat. We know and otherwise suspect that PCB's and other contaminants build up in whales' fatty tissues and may cause reproductive failure or firstborn neonate

mortality. From a general awareness of these ecosystem effects, the public will be more concerned about point and non-point pollution, oil spills and other sources of contamination that must be prevented to ensure water quality. Whales, especially a star whale like Lolita returning home, can help rally active concern to protect and conserve natural resources.

For the millions of people who will follow Lolita's progress back to her native waters and reunion with her family, the health of her habitat and her prey sources will become generally known. Lolita is not only a unique individual; she is a unique vehicle to understanding and appreciation for marine conservation.

Examples of some scientific experiments that might be conducted with Lolita's help.

1) DNA studies for genealogical relationships. mt DNA from blood or biopsy samples will further confirm Lolita's origin as well as improve general understanding of free-ranging pods. mtDNA studies using skin samples are already underway in free-ranging populations in Prince William Sound, Southeast Alaska, northern British Columbia, and in offshore, transient, and southern BC/Washington. In September, 1995, biopsy studies for DNA analysis will commence in Washington State. Potentially, all of Lolita's immediate living relatives will soon be known. It is vital that holders of animals in captive populations contribute samples from their animals and make the results available for scientific and conservation purposes. We suggest that for this, all Icelandic whales should be sampled, and all genetic crosses should be studied in detail. This information is very important to science, and should not be considered proprietary.

2) Communication studies. As a first step in reintroducing Lolita to her pod, we propose playback experiments to Lolita from recordings of several pods to look for recognition of her native dialect. We also propose making recordings of Lolita's vocalizations for playback experiments in the vicinity of her extended family to look for response. Based upon results of those experiments, we anticipate further proposing establishing a live two way communication link via satellite between Lolita's tank in Miami and her extended family in Puget Sound. Orca pods and communities share vocabularies of calls, and we believe that when she hears her family's characteristic vocalizations, Lolita will recognize them and vocally respond. This interaction will help establish the level of recognition between Lolita and her family, and may help prepare her emotionally for reintroduction.

3) Physiological studies. Physiological techniques and telemetry have advanced significantly since the US Navy conducted studies of free-ranging killer whales in the late 1960's and early 1970's (see: Bowers and Henderson, 1972; and Ridgeway, 1972 versus Mate, 1989; and Goodyear and Andrews, 1993). It is now technically feasible to instrument a free-ranging whale using benign suction cup attachment of physiological and other transducers and computer memory chips to send data back via radio signal, either with line of sight or satellite relay. Lolita can be trained to gate, range freely, and return to the security of her enclosure, all the while sending information such as body temperature, heart rate, acoustic emanations, brain wave patterns, depth of dive, oceanographic and ambient acoustic conditions. In routine medical examinations before and after free-ranging experiments, she can present urine, blood samples, respiratory air samples, etc. for unprecedented access to information regarding the physiological state of a captive versus free-ranging killer whale. The US Navy is doing similar studies with dolphins, and potentially has interest in obtaining information on this larger species of cetacean.

When we examine the Navy criteria (Brill and Friedl, 1993) of attributes for a candidate for a reintroduction program, we find that Lolita is very nearly ideal:

1) exact knowledge of its group and location from which the animal was acquired is known.

- 2) the animal was collected in the wild (not captive born).
- 3) the animal was self-sufficient before acquisition.
- 4) in terms of the animal's age at reintroduction, there is a low risk of mortality (Lolita is in her prime of life).
- 5) the animal is socially competent (Lolita has lived for six years with her family, for ten years with Hugo, and for the past fifteen years with other cetaceans).
- 6) if made available for return to a sea-pen and free-ranging studies in Puget Sound, the animal will have had experience in a variety of environments.
- 7) the animal exhibits flexible responses to novel and varied environmental conditions.
- 8) the animal's behavior is readily modified through the standard techniques of operant conditioning.
- 9) the animal exhibits no aberrant behavior.
- 10) the animal is in excellent health and physical condition.
- 11) the animal has not been exposed to any life-threatening diseases.

When we consider questions concerning whether it is more humane to return Lolita to her home waters versus leaving her in her solitary tank in Miami, whether it is more humane to transfer Lolita to another marine park and the company of unrelated animals of her species or return her to her family, and whether it is more appropriate to display her for entertainment purposes or employ her in a scientific development of reintroduction procedures and inquiry into her species ecological requirements, we get into controversial areas of discussion; but, we nonetheless consider Lolita the ideal candidate for such discussion, and we hope that science, conservation, and her species will benefit from it.

Concluding Remarks

There is probably no more appropriate forum for such discussion of reintroduction of a captive killer whale to its home waters in the Pacific Northwest than in the 1995 Annual Meeting of the AZA in Seattle this September. A major topic of discussion at this meeting will be reintroduction of zoological specimens to wild populations, pros and cons. The peer group of assembled AZA experts have the most expertise, and the most at stake, aside from the animals themselves. The Governor of Washington State has called for discussion with Miami Seaquarium on the subject of returning Lolita, because she is the last remaining native daughter in captivity, and she offers the key to arousing tremendous public interest in the conservation and preservation of the Greater Puget Sound marine environment. We hope that this pre-proposal is seriously considered by AZA participants as a way of bringing their aquarium colleagues into step with current attitudes regarding their role in conservation. These creatures are more than circus actors for entertainment, they are important for public education and conservation purposes; and, their maintenance must be in accordance with humane standards.

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