Appendix D - An Annotated Bibliography of Cetacean Releases

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Additional references have been and continue to be added

Assembled here are selected references which may provide useful background for rehabilitating and returning captive cetaceans to their natural habitats. This is not an exhaustive listing. It was assembled primarily to provide a starting point for further research needed for Cetacean reintroduction.

Draft Document prepared by K.C. Balcomb, D. Claridge, S. Norman, H. Garrett, and D. Ellifrit. *Abstracted* from publications without authors' permission, or *Abstract* as presented by authors. Comments and additions invited.

Abel, R., 1986. Husbandry and training of captive dolphins. In Research on dolphins (M.M. Bryden and R.J. Harrison, eds.), Oxford University Press, Oxford, pp. 183-187. *Abstracted:* The application of basic animal handling and husbandry techniques, used widely in husbandry of domestic animals, can be applied to marine mammals with beneficial results. Introduces the useful term 'estimated normal body weight' to provide an index of animal condition. Recommends dolphins be weighed monthly. Weight loss of up to 12 percent is not noticeable to the eye by other than the most experienced observer.

Anonymous, 1993. Marine Mammal Inventory Report. National Marine Fisheries Service, NOAA. Available from Office of Protected Species, 1335 East-West Highway, Silver Springs, MD. 20910. *Abstracted:* MMIR August 1993 listing of all marine mammals held in accredited marine parks and aquaria, as reported to NMFS. Includes deceased specimens and some institutions outside of U.S. *Note*: Survivability and reporting appears variable between institutions. USDA now listing.

Asper, E., W. Young, and M. Walsh, 1988. Observations on the birth and development of a captive-born killer whale. IntZooYb(27):295-304.

Asper, E. and L. Cornell, 1988. Live capture statistics for the killer whale (*Orcinus orca*) 1961-1976 in California, Washington and British Columbia. Aquatic Mammals(5)1:

Avise, J.C., 1989 Gene trees and organismal histories: a phylogenetic approach to population biology. Evolution:1192-1208. *Abstracted*: A *"*gene tree*"* is the phylogeny of alleles or haplotypes for any specified stretch of DNA. Results of analyses for more than

20 vertebrate species strongly suggest that the demographies of populations have been remarkably dynamic and unsettled over space and recent evolutionary time.

Avise, J.C., J. Arnold, R. Ball, E. Bermingham, T. Lamb, J. Neigel, C. Reeb and N. Saunders, 1987. Intraspecific phylogeography: the mitochondrial DNA bridge between population genetics and systematics. Annual Review of Ecology and Systematics, 18:489-522. *Abstracted:* Mitochondrial DNA has provided the first extensive and readily accessible data avilable to evolutionists in a form suitable for strong geneaological inference at the intraspecific level. Many species have proved to exhibit a deep and geographically structured mtDNA phylogenetic history.

Backus, R.H., 1961. Stranded Killer Whale in the Bahamas. Journal of Mammalogy. 42: 418-419. *Abstracted*: Reports upon a killer whale which stranded live on Man-O-War Cay, Abaco in 1960. Photographs and specimen materials were taken. Note: The mandibles of this specimen are at Albury's store on Man-O-War Cay. One of first records documenting occurrence of killer whale in the Bahamas.

Bailey, R.E., 1965. Training and open ocean release of an Atlantic bottlenose porpoise, (*Tursiops truncatus*) (Montagu). NOTS TP 3838, pp, 1-18.

Baker, J.R., 1992. Skin Disease in wild cetaceans from British waters. Aquatic Mammals, 18.1, 2732. *Abstracted:* Eighty-one dead cetaceans of a variety of species and from British waters (most from 1989-1991) were examined for evidence of skin disease and 69% were found to be affected. The most common conditions were wounds and other traumatic injuries, viral infections (predominantly pox) and a variety of scars. One porpoise showed an area of raised rough irregular skin in the edge of a partly healed laceration. Histologically there was very marked elongation of the papillae and the outer layers of the epidermis were disorganized with a patchy build-up of the external layers. The lesion was considered to be a papilloma. *Note*: Viral organisms including those suspected of causing papillomas apparently occur in free-ranging North Atlantic cetacean populations.

Baker, J.R. and A.R. Martin, 1992. Causes of mortality and incidental parasites and lesions in harbour porpoises (Phocoena phocoena) from British waters. Veterinary Record.

Baker, J.R., 1992. Causes of mortality and incidental parasites and lesions in dolphins and whales from British waters. Veterinary Record.

Balcomb, K, J. Boran and S. Heimlich, 1982. Killer whales in Greater Puget Sound. RepIntWhalCommn(32):681-686.

Berzin A., and V. Vladimirov, 1982. A new species of killer whale (Cetacea, Delphinidae) from Antarctic waters. [in Russian] ZoolZh(62):287-295.

Bigg M. and A. Wolman, 1975. Live-capture killer whale (*Orcinus orca*) fishery, British Columbia and Washington, 1962-73. [In] Mitchell, E. (Ed) Review of biology and fisheries for smaller cetaceans, JourFishResBdCan 32(7):1213-1221.

Bigg, M., I. MacAskie, and G. Ellis, 1976. Abundance and movements of killer whales off eastern and southern Vancouver Island with comments on management. Unpub Report Atctic Biological Stn, Ste Anne de Bellevue, Quebec.

Bigg, M., 1982. An assessment of killer whale (*Orcinus orca*) stocks off Vancouver, Island, British Columbia. RepIntWhalCommn (32):655-666.

Bossart, G. and E. Eimstad, 1988. Erisipelothrix vesicular glossitis in a killer whale (*Orcinus orca*). JourZooAnMed 19(1-2):42-47.

Balcomb, K.C., 1994. A note on age specific survival and lifespan of killer whales, *Orcinus orca*. Submitted to Marine Mammal Science, November 1993. Returned for revision. *Abstracted:* Survival rates in young killer whales from age 1-21 are significantly lower than comparably calculated survival rates for the same age cohort in the wild. Maximum age for this species free-ranging in the Pacific Northwest is estimated from historical photographs to be at least 40+ for males and 60+ for females. Females in this population typically reach sexual maturity in their mid-teens, and males reach sexual maturity in their mid to late teens.

Barr, B., J.L. Dunn, M.D. Daniel and A. Banford, 1989. Herpes-like Viral Dermatitis in a Beluga Whale (Delphinapterus leucas). Journal of Wildlife Diseases. 25: 608-611. *Abstracted:* Approximately 35 months following its capture, a beluga whale developed focal pale gray skin lesions. These lesions persisted for at least 8 months. A biopsy from one of these sites revealed epithelial inclusions. Herpes-like viral particles were seen by transmission electron microscopy. The eventual regression of skin lesions and lack of other clinical signs suggests the virus was only mildly pathogenic in this animal.

Bassos, M.K. 1993. A behavioral assessment of the reintroduction of two bottlenose dolphins. Masters Thesis, UC Santa Cruz, CA. pp. 84. *Abstracted*: “The dolphins appear to have successfully reacclimated to life in the wild. They displayed typical behavioral patterns observed for other wild dolphins, and their ranging and social association patterns were similar to their most frequent associates.”

Benirschke, K. and H.H. Cornell, 1987. The placenta of the Killer Whale (*Orcinus orca*). Marine Mammal Science. Vol. 3, No. 1, pp. 82-86. *Abstracted*: Discusses the gross & histological description of a placenta from a captive killer whale. Grossly it was bicornuate with a distinctly separate allontoic cavity. The cord surface was covered with many black and fewer white pustules and plaques (the function of which is known). Histologically the chorion resembled other cetaceans', cuboidal to columnar epithelium covering the villi.

Best, P.B., D.W. Rice and A.A. Wolman, 1978. Age, Growth, and Sexual Dimorphism in Killer Whales (*Orcinus orca*). Proceedings (Abstracts),p. 24. International Conference on Determining Age of Odontocete Cetaceans, La Jolla, Calif. Sept.5-7, 1978.

Bigg, M.A., G.E. Ellis, J,K.B. Ford, and K.C. Balcomb, 1987. Killer Whales, a study of their genealogy and natural history in the Pacific Northwest. Phantom Press. *Abstracted:* Compiles photo-identification history of resident and transient killer whales in the Pacific Northwest of North America. *Note*: This study demonstrates utility of photo-identification technique for field studies of free-ranging killer whales.

Bigg, M.A., P.F. Olesiuk, G.E. Ellis, and K.C. Balcomb, 1990. Social organization and genealogy of resident killer whales (*Orcinus orca*) in the coastal waters of British Columbia and Washington State [In] Hammond, et. al. (Eds.) Individual recognition of Cetaceans. Int. Whal. Commn. Special Issue 12, Cambridge. *Abstracted:* 261 Pacific Northwest killer whales were alive in 1987 in two resident communities. A community comprises individuals that share a common range and associate with one another; a pod is a group of individuals within a community that travels together the majority of the time; a subpod is a group of individuals that temporarily fragments from its pod to travel separately; an intra-pod group consists of a cohesive group of individuals within a subpod that always travels in close proximity. The genealogical trees indicate that intra-pod groups are matrilines. A matrilineal group typically comprises 2-3 generations. Pod-specific dialects suggest that related pods eventually associate randomly. The lack of dispersal of the resident form of killer whale from their natal groups appears to be unique among mammalian social systems. This species has the potential to have developed many local races over its cosmopolitan range, with each race having unique social and behavioral characteristics.

Bossart, G.D. and L.A. Dierauf, 1990. Marine mammal clinical laboratory medicine. In: Handbook of marine mammal medicine: health, disease, and rehabilitation. (L.A. Dierauf,ed.) p.42. CRC Press, Boca Raton. *Abstracted:* Individual baseline blood values must be established for each animal in one's care before being confident that any particular value is abnormal. A minimum of two annual blood samples from each individual is recommended. A delay in more than 15 min in centrifugation of the clot from the serum can lower sodium, potassium, creatinine, blood urea nitrogen (BUN), and globulin values, and can raise calcium, phosphorous, total protein, and albumin values. There is little hematologic data on the larger cetaceans. Table 4. provides normal ranges of cetacean hematology and serum chemistry reported. Case history 1 describes erysipelas treatment for killer whale; 2 describes hepatitis B treatment in a dolphin; 3 describes marked elevation in GGT; 4 describes pancreatitis in dolphins; 5 describes melioidosis in a dolphin; 6 describes candidiasis in dolphins. Table 10 provides a flow diagram for marine mammal clinical diagnostics.

Bowers, C.A. and R.S. Henderson, 1972. PROJECT DEEP OPS: Deep Object Recovery with Pilot and Killer Whales. NUC TP 306. Undersea Surveillance and Ocean Sciences Department, Naval Undersea Center, San Diego, CA. Unclassified, 86 pp. *Abstracted:* Describes in detail the US Navy program from 1968 to 1971 for two male

killer whales (Ahab and Ishmael) which were captured in Puget Sound, WA and airlifted to Point Mugu, CA, and later to Kaneohe, HI. Both killer whales were maintained at NUC Hawaii in fenced ocean pens,"...with low maintenance costs and excellent animal health." By September 1970, both whales had attained "open ocean reliability", wherein they would accompany a vessel out to sea an average of five times per week for a round trip distance of 10-12 nautical miles, typically swimming alongside the vessel at speeds of 6-7 knots. Ishmael on 19 February 1971 did not respond to his underwater recall signal and apparently swam away. On 8 June 1971, Ahab went on a 24 hour excursion ranging over 50 nautical miles in a northwesterly direction along the Oahu coast, and no further sea trials were conducted with him. Ahab died in 1974 at an estimated age of 15-16. Note: This report is important documentation of transport of cold water adapted killer whales to tropical latitude, their successful maintenance and open ocean training, their instrumentation, and in Ishmael's case a release. We will examine all relevant US Navy photographs of Ishmael to ascertain whether he has been subsequently documented in any known populations of killer whales in the North Pacific Ocean.

Brill, R.L. and W.A. Friedl, 1993. Reintroduction to the wild as an option for managing Navy Marine Mammals. Technical Report 1549, Naval Command, Control and Ocean Surveillance Center, San Diego, CA, 92152-5001. *Abstracted*: This report documents the efforts made to provide information to respond to a Congressional request to "...develop training procedures which will allow mammals which are no longer required for this project to be released back into their natural habitat..." *Conclusions*: There is no compelling scientific reason for reintroducing nonendangered species. Proven methods of operant conditioning can be used to prepare marine mammals for reintroduction to the wild. The success of reintroducing marine mammals to the wild, however, depends upon resources, methodologies, and technologies which do not currently exist. The success of a Navy reintroduction program would depend on developing technologies for monitoring and tracking reintroduced animals to quantify the success of the effort."Such technology does not exist and its development is estimated to take at least 2 years." In terms of cost effectiveness, the lifetime care and maintenance of the animals is preferable to reintroduction. *Note*: The methodologies and technologies for reintroduction do exist and they were published and available as of the drafting of the Navy report.

Britt, J.0. and E.B. Howard, 1983. Virus Disease In: Pathobiology of marine mammal diseases vol 1 (E.B. Howard,ed.) pp.50-51. CRC Press, Boca Raton. *Abstracted:* Evaluates material from 1,500 marine mammal necropsies.
The field of marine mammal virology is in its infancy. Section of chapter on viral diseases describing the gross and microscopic lesions of dolphin pox virus.

Brown, David H. and Kenneth S. Norris, 1956. Observations of Captive and Wild Cetaceans. Journal of Mammalogy 37(3): 311-26. *Abstracted*: Describes sightings of Pacific killer whales, some involving fairly close approaches to the research vessel and to Marineland for the Pacific oceanarium.

Buck, J.D. and S. Spotte, 1986. Microbiology of Captive White-beaked Dolphins (Lagenorhynchus albirostris) with comments on Epizootics. Zoo Biology. 5: 321-329. *Abstracted:* In March 1983, 6 female whitebeaked dolphins were rescued from an ice clogged bay in Newfoundland, Canada, and transported to Mystic Marinelife Aquarium. Anal and blowhole samples (swabs) were collected at frequent intervals for bacteriological analysis. One dolphin died of neurogenic shock syndrome in transit. The others died at intervals of 1-101 days during captivity. Staphylococci were implicated in the deaths of 3 of the 5 dolphins that remained alive after capture. Euysipelothrix rhusiopathiae probably caused the death of the fourth, and infection by unidentified gram-negative bacteria was responsible for the death of the fifth dolphin. The two dolphins that survived the longest (44 and 101 days) showed a predominance of species of Protues, Margalella, and Pseudomones. Several genera of potential significance to humans also were found (e.g., Vibrio alginolyticus, V. fluvialis and Erysipelohrix rhusiopathiae).

Buck, J.D., 1984. Microbiological observations on two stranded live whales. Journal of Wildlife Diseases. 20: 148-150. *Abstracted:* Little information is available on types of microorganisms associated with healthy cetaceans to compare with data from debilitated animals. More studies are needed to define which microbes are associated with both wild and recently stranded animals. It is also necessary to know if microorganisms associated with healthy or diseased animals are potentially zoonotic. Swabs were taken from a stranded pygmy sperm whale and a juvenile pilot whale. Most of the organisms isolated from the sperm whale have been reported in apparently healthy dolphins and pinnipeds. A few of the organisms from the pilot whale have been known to cause disease in humans. Caution chould be used by personnel who handle stranded animals to prevent exposure to bacteria that are potentially hazardous to humans.

Burn, D.M. and G.P. Scott, 1988. Synopsis of available information on marine mammal-fisheries interactions in the southeastern United States: preliminary report, NOAA/NMFS/SEFC/Miami Laboratory, Coastal Fisheries Resources Division Contribution CRD-87/88-26.

Case, R.A.M., 1948. A study of the incidence of disease in a whaling expedition to the Antarctic pelagic whaling grounds 1946-7. British Society of Medicine. 2: 1-17.

Castillo, O., H. Lehmann and L. Jones, 1977. The myoglobin of the killer whale. Biochimica et Biophysica Acta(491): 23-28.

Calambokidis, J., G.H. Steiger, J.C. Cubbage, K.C. Balcomb, and P. Bloedel, 1989. Biology of humpback whales in the Gulf of the Farallones. Final Report for Contract No. CX 8000-6-0003, to Gulf of the Farallones National Marine Sanctuary, Fort Mason Center, San Francisco, CA, pp. 91. *Abstracted*: Over 1,000 sightings of humpback whales were made during vessel and aerial surveys, and 225 different individuals were photo-identified from 1986-1988. On average, identified whales were seen more than five times each year. Humphrey, the whale that swam up the Sacramento River in 1985

(and was stuck in a slough until he was escorted back out under the Golden Gate Bridge 25 days later) was seen in all three years. Note: The successful return of Humphrey to the wild was considered impossible by many, including the authors, but the whale proved us wrong and survived to strand again in San Francisco Bay in 1988. He was escorted out again a few days later, and has not been seen since. His survival is a testament to his hardiness.

Cates, M.B. and J.P. Schroeder, 1986. The nutrition of acclimated newly captured *Tursiops truncatus*. Aquatic Mammals, 17-20. *Abstracted*: Two groups of Atlantic bottlenose dolphins, *Tursiops truncatus* – one in captivity for over 6 years, the other captured in the Mississippi Sound and transported to Hawaii in April, 1984, - were monitored monthly for weight changes and daily for food consumption. Gross energy was measured on each shipment of fish and used to calculate energy consumption of the individual dolphins. During this time, at least 3 major diet changes occurred, due to unavailability of preferred fish species and too poor quality of some of the substituted species. Similarities were noted between the two groups of dolphins as reflected in weight change patterns and caloric requirements. It appears that newly captured animals, even after long-distance transport, permanent change of environment and several diet changes, adapt readily, showing comparable nutritional responses with the acclimated group of animals.

Cates, M.B., L. Kaufman, J.H. Grabau, J. Pletcher and J.P. Schroeder, 1986. Blastomycosis in an Atlantic bottlenose dolphin. Journal of the American Veterinary Medical Association. 189: 1148. *Abstracted:* An adult female Atlantic bottle-nosed dolphin caught in the Mississippi Sound of the Gulf of Mexico was kept in an open ocean pen in Kaneohe bay, Hawaii. One year after capture, the dolphin developed lethargy, anorexia, and cranial swelling. An abscess was found on the right craniolateral aspect of the melon from which *Vibrio* sp, and later Candida sp, were isolated. Despite antibiotic and antifungal treatment, respiratory disease and anorexia developed and the dolphin died 4 weeks after the onset of illness. The rarity of blastomycosis in cetaceans and the delayed development of respiratory illness hindered diagnosis of the disease. Nutrition was not considered a factor in the development or progression of disease in this dolphin.

Christensen, I., 1982. Killer whales in Norwegian coastal waters. SciRepIWC(32):633-641.

Claridge, D.E. and K.C. Balcomb, 1993. In search of marine mammals. Bahamas Naturalist, Vol7(l):11-17. *Abstracted:* Describes photo-identification studies of free ranging cetaceans in Bahamian waters. Cites two recent sightings of killer whales in Bahamian waters. Also documents a successful reintroduction to the wild of a bottlenose dolphin which had spent seventeen years in captivity. *Note*: Killer whales have been sighted and/or photographed in Bahamian waters on at least three occasions in the past three years, and it now appears that at least some whales of this species widely range in these waters during all seasons of the year. It is not yet known how they relate to other killer whale sightings in the Caribbean or tropical Atlantic Ocean, nor has

their prey preference been identified. All that we know is that the habitat is apparently suitable for them and obviously within their thermoneutral range. In May and June 1995, a pod of killer whales was seen and photodocumented off Hope Town, Abaco. One of the whales had a spotted dolphin (*Stenella* sp.) in its mouth. They apparently eat marine mammals. One of the individuals in the pod matched to a whale previously photo-identified in the Gulf of Mexico.

Cordes, D.O., 1982. Dolphins and their diseases. New Zealand Veterinary Journal. 30: 46-49. *Abstracted:* Thirty-eight species of small cetaceans termed *"*dolphins and porpoises*"* are listed. This review is a contribution to the growing general and veterinary interest in the welfare and diseases of these animals.

Cornell, L.H., 1974. Puget Sound Already is a Killer Whale Sanctuary. Pacific Search. 9(1): 16-18. *Abstracted:* Sea World's defense of capturing killer whales in Puget Sound.

Cornell, L.H., 1983. Hematology and clinical chemistry values in the killer whale, *Orcinus orca*. Journal of Wildlife Diseases 19(3): 259-64. *Abstracted:* Clinical hematology and blood chemistry values reported for the killer whale collected over a 10-year period at Sea World facilities. *"*Normal*"* differences observed among age classes emphasize the importance of establishing an animal's individual hematologic and blood chemistry profile by routine sampling.

Cornell, L.H., 1993. Veterinary evaluation of Keiko. Report to Fund for Animals, July 1993. *Abstracted:* Cornell considered Keiko's problems iatrogenic (stress-related), and rehabilitation/release possible.

Cowan, D.F., 1968. Lung diseases in whale and dolphins. In Proceedings of 2nd Conference on Diseases of Aquatic Mammals, Boca Raton, Fla, pp. 145-151.

Cowan, D.F., 1966. Pathology of the pilot whale (Globicephala melaena). Arch. Path. 82: 178-179. *Abstracted:* A systemic necropsy examination of 55 pilot whales is described. The predominant disease is parasitism by a wide variety of worms, the most vulnerable organ system being the lower respiratory tract. The relationship of altered form and function to the severity of the disease is discussed. Other diseases include focal myocarditis, arteriosclerosis, basophilic degeneration of the myocardium, sarcosporidiosis of the cardiac and skeletal musculature, focal embolic glomerulitis, and simple colloid goiter and fillicular hyperplasia of the thyroid. Foreign body granulomata of the thyroid were found, due to ectopic colloid. A specimen of an osteoarthritic spine is described.

Coyle, V. and J. Hickman, 1988. Readaption and Release to the wild for Joe and Rosie. Published by ORCA, Oceanic Research Communication Alliance, Tides Foundation 873 Sutter St, Suite A, San Francisco, CA 94109. *Abstracted*: Provides summary of *"*Joe*"* and *"*Rosie*"* release project, together with newspaper clippings and information on followup. Apparently, there were reliable reports of these two dolphins coping successfully in the wild as late as October 1987. *Note*: Dr. Joe Geraci of Guelph

University examined the cause of the coincident western Atlantic dolphin die-off and reported it to be coincident with high contaminant levels in the dolphin tissues which may have suppressed their immune system. See Geraci, 1989 in this bibliography.

Cusick, P.K. and B.C. Bullock, 1973. Ulcerative dermatitis and pneumonia associated with Aeromonas hydrophila infection in the bottlenose dolphin. Journal of the American Veterinary Medical Association. 163: 578-579. *Abstracted*: The report is concerned with Aeromonas hydrophila infection in a bottle-nosed dolphin originally captured with the intent of training it for use as an entertainment attraction, but died while en route from St. Louis to North Carolina. It was received with a history of illness of about 2 months' duration that was unresponsive to treatment with several antibiotics. Previous examination had resulted in diagnoses of pneumonia and ulcerative dermatitis. *Psuedomonas* spp. had been isolated from the blood. The lesions described in this dolphin are quite similar in some respects to those described in some fish suffering from Aeromonas punctata infection. With the exception of a report concerning an alligator, pneumonia has not been an important factor in any of the reports of disease in aquatic animals associated with either A. punctata or A. hydrophila. The pneumonia in the dolphin of this report was marked.

Dailey, M.D. and R.K. Stroud, 1978. Parasites and associated pathology observed in cetaceans stranded along the Oregon Coast. Journal of Wildlife Diseases. 14: 503-511. *Abstracted:* Ten stranded cetaceans, representing 5 species, from the Oregon coast were examined between 1973-1977. Fourteen general of parasites, together with the pathogenesis and pathology with the presence of some of these parasites are reported.

Dalheim and Heyning, in press. Killer Whale. [In] Ridgeway and Harrison [Eds] Handbook of Marine Mammals vol 6., Academic Press, London.

Davis, R., 1975. Sea Wolves of the Pacific Northwest. British Columbia Outdoors. Pt.1, Vol.31(3) May/June, pp.6-10; Pt.II,Vol.31(4) July/Aug., pp.20-25. *Abstracted*: Lengthy discussion of pros and cons of capturing and keeping killer whales.

Demaster, D.P. and J.K. Drevenak, 1988. Survivorship Patterns in Three Species of Captive Cetaceans. Marine Mammal Science. 4(4): 297-311. *Abstracted*: Discussion of problems in determining the longevity of killer whales in captivity. Annual survival rate for males 0.88 and for females 0.96, calculated on daily basis.

Diamond, S.S., D.E. Ewing and G.A. Caldwell, 1979. Fatal bronchopneumonia and dermatitis caused by Pseudomonas aeruginosa in an Atlantic bottlenose dolphin. Journal of the American Veterinary Medical Association. 175: 984-987. *Abstracted*: A captured female Atlantic bottle-nosed dolphin began to lose weight during transport to a holding facility. Areas of epidermal necrosis developed along with continued weight loss and normal appetite. On day 70 after capture, the dolphin was in great distress with dyspnea and anorexia, and hard dermal nodules had developed all over the body surface. They were hard, round, and raised, with necrotic centers, some being confluent. The dolphin subsequently died on day 70 and a necropsy was performed.

Most marine mammal clinicians believe that P. aeruginosa is an opportunistic organism. Diseases that lead to immunosuppression are frequently followed by secondary infections that range from peracute hemorrhagic bronchopneumonia to chronic abscessation. Pseudomonas is listed as one of the more frequent agents of pneumonia in mammals. It was believed that P. aeruginosa isolated from the lesions in this case was in fact the etiologic agent. *Note*: It was postulated that the dolphin probably came in contact with the organism during captivity and that its debilitated condition provided a fertile environment for P. aeruginosa to proliferate and cause the disease described.

Dover, S.R. 1992. Poxvirus infection in a killer whale: clinical signs and diagnosis. IAAAM Proceedings, Volume 23. College of Veterinary Medicine, Oklahoma State University. *Abstracted*: Poxvirus lesions noted in three year old captive killer whale (Sea World, Ohio) in 1991 and still present in 1992. "It begins as a small circular lesion and progressively enlarges. Adjacent lesions may coalesce to form larger areas. The lesions are visible in both pigmented and non-pigmented areas. They are slightly raised on the active borders only, with the exception of a lesion on this animals fluke, which was raised, pigmented and hyperplastic. There have been no behavioral signs of illness in this animal and hematologic and biochemical parameters indicated a mild inflammatory response. It does not appear to be detrimental to cetaceans, and is generally a self limiting disease.

Dragesund, O. and O. Ulltang, 1975. Stock size fluctuations and rate of exploitation of the Norwegian spring-spawning herring, 1950-1974. CounMeetIntCounExplorSea (H:47):1-27.

Keven Drews, "Springer the Orphaned Killer Whale Spotted with Calf off B.C.'s North Coast," MacLean's, posted July 8, 2013, http://www.macleans.ca/news/springer-the-orphaned-killer-whale-spotted-with-calf-off-b-c-s-north-coast/.

Dudok van Heel, W.H., 1977. Successful treatment in a case of lobomycosis (Lobo's Disease) in *Tursiops truncatus* (Mont) at Dolfinarium, Harderwijk. Aquatic Mammals. 5: 8-15. *Abstracted*: In the earlier paper (Poelma et al., 1974) the observation of a case of Lobomycosis (Lobo's disease) in the Dolphinarium, Harderwijk, was described. The animal, an old male Tursiops truncatus, was treated successfully with the fairly new drug Miconazole. The treatment lasted from September 17, 1974 until April 28, 1975. At the time of conclusion of this report (December 1976) no recurrence of the infection has been observed.

Dudok Van Heel, W.H., 1986. From the Ocean to the Pool. In: Research on Dolphins (M.M. Bryden and R. Harrison [eds.]), pp. 163-182. Oxford Science Publications. *Abstracted*: Dudok van Heel's detailed chapter on captive orcas is a primer on how to catch, transport, and maintain orcas. Longest survived transport 63 hours. Describes Icelandic captures.

Duffield, D.A. and K.W. Miller, 1988. Demographic Features of Killer Whales in Oceanaria in the United States and Canada, 1965-1987. Rit Fiskideildar. 11: 297-306.

Abstracted: Annual mortality rate estimated from *"*animal years*"* in captivity was 8.9%. Females have a linear growth rate up to age 10-12 and males up to 12-16 about the time they become sexually mature. Various females first gave birth at age 11, 12, 13, and 15. A 17-month gestation period based on serum and urine progesterone studies. Note: The mortality rates calculated were not age-specific; nonetheless, they do overall indicate a high mortality rate for captive killer whales.

Dunn, J.L., 1990. Bacterial and mycotic diseases of cetaceans and pinnipeds. In: Handbook of marine mammal medicine: health, disease and rehabilitation (L.A. Dierauf,ed.) pp.73-96. CRC Press, Boca Raton. *Abstracted*: goal of chapter to briefly acquaint its readers with the common, clinically important bacterial and mycotic diseases of marine mammals.

Dunn, J.L., J.D. Buck and S. Spotte, 1982. Candidiasis in captive etaceans. Journal of the American Veterinary Medical Association. 181: 1310-1315. *Abstracted:* Disseminated Candida albicans infections were found or suspected in 4 captive cetaceans. Ketaconazole at a dosage of 2.5mg/kg, BID, administered orally for 18 days, followed by 8 biweekly oral doses of lavamisole hydrochloride at the rate of 9 mg/kg, resulted in regression of clinical signs in an adult male Atlantic bottlenose dolphin (*Tursiops truncatus*). A higher dosage of ketoconazole (6mg/kg, BID) was effective in eliminating the shedding of C albicans from a adult belukha whale (Delphinus leucas). A juvenile female harbor porpoise (*Phocoena phocoena*) treated with nystat died with disseminated candidiasis, as did a juvenile male longfinned pilot whale (*Globicephala melaena*) treated with mystatin and levamisole.
Three other adult bottlenose dolphins, a juvenile female belukha whale, and a female Commerson's dolphin (*Cephalorhyncus commersonii*) kept in the same water system never had evidence of candidiasis. A 5th bottlenose dolphin (adult female) was culture-positive on one occasion, but never had signs of the disease.

Early, G. and T. Rumage, 1988. A whale's fancy and the three that got away. Whalewatcher, Vol 22(1): pp. 3-5. published by the American Cetacean Society, P.O. Box 2369, San Pedro, CA 90731. *Abstracted*: Three young pilot whales (*"*Baby*"*, *"*Notch*"* and *"*Tag*"*) were rescued from a mass stranding event at Cape Cod on 3 December 1986, and rehabilitated at the New England Aquarium. After making a significant recovery and gaining weight, the three whales were evaluated for behavioral and social fitness for release. Two critical behaviors assessed were ability to act as their own small group, and the ability to forage. *"*In the early feedings the whales would quickly eat the fish and not play with them. As live fish became a more regular part of the whales' diet, the whales would eat them more slowly and play with them longer.*" "*The stability of their group behavior was best seen in the whales' response to novel stimuli, in particular the playback of sounds from free ranging pilot whales.*" "*The whales reacted strongly to the playback.*" "*All whales, particularly *"*Baby*"* showed an increase in attention to the speaker during playbacks. No specific call or pattern of sounds appeared to have a specific effect on the whales, although thge activity level in the pool seemed to vary directly in proportion to the rate of calling on the tape.*"* The whales were released after seven months of rehabilitation and evaluation. See Mate, 1989 in this bibliography.

Erickson. K.L., W.G. Ferlin, L. Landon, S. Chivers, T. Reidarson, R.S. Wells, J. Stott, and D.A. Ferrick, 1993. Interleukin-2 receptor expression assay: a novel method for measuring immunocompetence. Abstracts, Tenth Biennial Conference on the Biology of Marine Mammals, Galveston, TX. November 11-15. *Abstracted*: Measuring the expression of IL-2R is a method of determining the activation capacity of lymphocytes, independent of their ability to proliferate. By stimulating lymphocytes with mitogen and assaying for the expression of IL-2R the authors were able to examine individual cells for their activation response.

Evans, W.E. [Editor], 1974. The California gray whale. Marine Fisheries Review, Special Number Vol 36(4): 64 pages. *Abstracted*: In early March 1971 an expedition sponsored by Sea World, Inc. of San Diego, under the direction of David W. Kenney with scientific support from the University of California, San Diego, captured a newborn female California gray whale (*Eschrictius robustus*) in Scammon's Lagoon, Baja California. Dr. Kenney's colleagues were doubtful that a newly born gray whale could be successfully maintained alive for more than a few months, let alone a year. Gigi II, as the whale was known, was radio tagged and released on 13 March 1972 off San Diego by the Naval Undersea Center (NUC) San Diego. In captivity, ultrasonography using the A-mode technique was employed to measure blubber thickness. At capture, she was 18'2*"* long and weighed 4,300 pounds and she was initially maintained in a 55,000 gallon holding tank. Gigi began feeding after two weeks and gained 4,200 pounds and grew to 24' long in eight months, at which time she was transferred to a one million gallon tank. She was radiotagged and released five miles off the California coast during the gray whale northern migration in 1972. The radio signals were monitored until 5 May, when they ceased; but, subsequently there were several confirmed sightings of Gigi, and the experiment was considered a qualified success. Note: This return of a large whale to its native waters was probably successful insofar as the whale surviving, in spite of the fact that the baby whale was released approximately 400 miles from where it was captured a year earlier. That the baby whale had never been near the release location was not an impediment to its release, nor was its prolonged captivity over a very formative period of its life. Natural instinct or the presence of migrating congeners may have provided her the clues necessary for its survival. It is also interesting to note that the *"*friendly whale*"* phenomenon began to be experienced by gray whale watchers not too many years after Gigi's release. It is interesting to speculate if her release and the phenomenon had any correlation. Presumably, after spending virtually all of her life in captivity, Gigi was able to migrate several thousand miles to the feeding areas of her natural population. *Note*: MFR Paper 1045 in this volume by Wahrenbrock et. al. describe studies on an earlier gray whale female calf, known as Gigi I, captured in February 1965. Although the whale at first seemed to thrive, it died of an uncontrollable infection about two months after it was captured. A tremendous amount of scientific information was gained from studies of these two whales. It should be noted that neither a capture or a release of a gray whale had ever been done before, nor has it been done since.

Flom, J.0. and E.J. Houk, 1979. Morphologic evidence of poxvirus in *"*tattoo*"* lesions from captive bottlenosed dolphins. Journal of Wildlife Diseases. 15: 593-596. *Abstracted*: Skin lesions known as *"*tattoos*"* were observed in several captive Atlantic bottlenosed dolphins (*Tursiops truncatus*) maintained at the Naval Ocean Systems Center in San Diego California. Biopsy of typical lesions and subsequent ultrasonic examination revealed intracytoplasmic particles with poxvirus morphology.

Flores Ochoa, L.M., 1991. Observaciones de conducta de una Orca en cautiverio en la Cuidad de Mexico. (In Spanish). Professional Thesis, UNAM, Faculty of Sciences, Mexico, D.F. Pp 90 + Appendices. *Abstracted*: This professional thesis describes behavioral, veterinary, and environmental conditions of *"*Keiko*"* in Reino Aventura from October 1986 to November 1987. Blood parameters, salinity and temperature conditions, behavioral observations, diet, and his veterinary condition (including skin problems) are noted. Ambient water temperatures varied from low of 13C in January to high of 23C in August/September. Salinity (p.p.m.) varied from 16.0 to 30.0. Ph varied from 7.15714 to 7.33929. And, mean chlorine concentrations (p.p.m.) varied from 0.16 to 0.26 free chlorine, and 0.42 to 0.70 total. Total kg fish consumed per day varied from 37 in June to 53 in October and November. Fish species consumed varied in proportion of smelt, capelin, herring, sierra, mackerel, and occasionally other species. The medical reports of his health indicated constant intestinal and stomach worms, and manifesting fever, as well as papillomas on his skin. *Note*: This is an excellent background reference which documents Keiko'shealth problems since at least 1986.

Flores Ochoa, L.M., 1993. The Law of the Sea and a Case of International Marine Scientific Research. Final Paper, International Law of the Sea, Univ. of Washington. *Abstracted*: Discusses Iceland's obligation under international law to permit the experimental release of Keiko in Icelandic waters.

Ford, J, G. Ellis and K. Balcomb, 1994. Killer Whales. UBC Press, Vancouver, Canada.

Francis, Daniel; Hewlett, Gil, 2007. *Operation Orca: Springer, Luna and the Struggle to Save West Coast Killer Whales.* Harbour Publishing. A record of the struggle to save West Coast American Killer Whales.

Gales, N. and K. Waples, 1993. The rehabilitation and release of bottlenose dolphins from Atlantis Marine Park, Western Australia. Aquatic Mammals, 19.2, 49-59. *Abstracted*: Nine dolphins in a socially perturbed group were released 13 January 1992 off Perth, Australia. Three of these dolphins were subsequently brought back into captivity; another presumably died; and the fate of the others is unknown, although unconfirmed sightings of radio tagged dolphins extend to January 1993 (one year). *"*The major reason for the ambiguity of the results was our inability to effectively track the dolphins whilst they were at sea.*"* Note: The authors state that there are undoubtedly some aspects of this release that they would have done differently. There were not any realistic alternatives for this dolphin group beyond a release attempt - The commercial marine park was closing, and efforts to relocate the dolphins to other facilities were

unsuccessful. The recaptured dolphins will be kept permanently in a large netted enclosure at Hillary's Marina in Perth, and fed by Underwater World personnel.

Geraci, J.R. & M.C. Keyes, 1970. Veterinary medicine in the conservation and management of marine mammal resources. Journal of the American Veterinary Medical Association. 157:19701974. *Abstracted*: Discusses ways in which the veterinarian plays a role in the conservation and management of marine mammal resources. Examples are developing more effective, long-lived markers, assessing the factors underlying the pathologic and epizootiologic features of disease in nataural populations, and disseminating information, beyond the limits of professional circles, to the general public. Through unique training, they are able to assist the conservationist in reestablishing the integrity of the marine mammal community.

Geraci, J.R., S.A. Testaverde, D.J. St. Aubin and T.H. Loop, 1978. A mass stranding of the Atlantic white-sided dolphin (Lagenorhynchus acutus): a study into pathobiology and life history. Final Report to the Marine Mammal Commission. National Technical Information Service Report No. PB289361. 155pp.

Geraci, J.R., B.D. Hicks and D.J. St Aubin, 1979. Dolphin Pox: A Skin Disease of Cetaceans. Canadian Journal of Comparative Medicine. 43: 399-404. *Abstracted*: Poxvirus has been identified morphologically from skin lesions in captive and free-ranging bottlenosed dolphins (Tursiops Truncatus) and a stranded Atlantic white-sided dolphin (Lagenorhynchus acutus). The lesions, commonly referred to as ring or pinhole lesions, appear as solitary coalesced circular gray blemishes. Advanced ring lesions may take the form of black punctiform stippled patterns known as *"*tattoos*"*. Histologically, the stratum externum is thickened, and there is ballooning degeneration and eosinophilic intracytoplasmic inclusions in the stratum intermedium. These inclusions contain virus particles which exhibit typical poxvirus morphology. Stress, environmental conditions and general health appear to play a major role in the clinical manifestation of dolphin pox.

Geraci, J.R., 1986. Marine Mammals (Cetacea, Pinnipedia and Sirenia), [In] Fowler, Zoo and Wild Animal Medicine, 2nd Edition. pp:750-797. *Abstracted*: In the husbandry section discussing environment, it is noted that cetaceans can be maintained permanently in pools having a minimal lateral dimension of at least two or more times the adult size and a depth of not less than one half to two thirds the animals' length. All but freshwater cetaceans require either natural or artificial seawater. A safe and relatively natural salinity range is 25 to 35 parts per thousand, with a pH of 7.5 to 8.2. The desired goals can be achieved most easily by the use of an *"*open*"* system, whereby water is continuously discarded and replaced. Free chlorine, maintained at levels from 0.3 up to 3.0 ppm at pH 7.6 and above is safe and controls most bacteria. When free chlorine combines with organic matter, harmful chloramines may be formed. Temperatures of 2 to 20C are suitable for beluga and killer whales. Air temperature also can be critical to cetaceans. In most cases it is the rate of change and not the ultimate temperature that is important. *"*For example, one killer whale adjusted easily to Canadian winter air temperatures of below -22C after having spent five years in a

subtropical pool in which air temperatures sometimes exceeded 40C. It should also be pointed out that the animal was prepared for the impending temperature change with a threefold increase in food.*"* In the food handling section, it is noted that only products of the finest quality (according to human standards) should be purchased. The selection should be varied to include high and low fat fishes. One should avoid feeding a single food type. Mackerel has a notably short shelf life (less than four months). Thaw fish as close to feeding as possible, in a cool room or in cool water (8C or less). Store thawed fish whole in a closed container at cool temperature; prepare cut fish just before feeding; discard unfed fish after 24 hours. Whole fish should be fed whenever possible - eviscerated fish has lower nutritional value. A general food quantity guideline for young whales is 5-9% of body weight per day, old whales 2-5%. A good quality, mixed fish diet requires little, if any supplements. As a rule of thumb, vitamin supplement formulas should be based upon energy expenditure, not on gross weight of animal. General all-purpose human and veterinary preparations at rate of 1 tab/150kg administered twice weekly is sufficient. If diet contains herring additional thiamin should be given twice weekly at the rate of 25mg/kg fish.

Geraci, J.R., 1989. Clinical investigation of the 1987-88 mass mortality of bottlenose dolphins along the U.S. Central and South Atlantic Coast. Final Report to National Marine Fisheries Service and U.S. Navy, Office of Naval Research and Marine Mammal Commission. Published by Wildlife Disease Section, Department of Pathology, University of Guelph, Ontario, Canada N1G 2W1. *Abstracted*: Over 740 bottlenose dolphins stranded along the Atlantic coast during the 11-month period beginning June, 1987. Data or specimens from 347 of these were available for analysis by the investigating team. Results: pathology - those that came ashore in August and early September 1987 had a range of skin lesions (pock-like craters and pox-like lesions - viral infection was suspected); a second type of skin lesion noted was the sloughing of large areas of skin, exposing underlying intensely reddened dermis (one manifestation of systemic bacterial invasion which seems to have been the ultimate cause of death of many of the dolphins in summer. Virology - papovavirus was detected in 4 of 12 dolphins. The virus was immunologically related to simian virus 40. The size, shape and localization of the virus was consistent with a reovirus identity. Bacteriology- a wide variety of bacteria was recovered including Edwardsiella, Streptococcus, Vibrio, Pseudomonas, Klebsiella, Acinetobacter, Bacillus, Staphylococcus and members of the Vibrio group predominated. Overall, *"*geographic and temporal patterns of mortality lacked the hallmark of infectious disease.*"* *"*The accumulating evidence led us to consider a point source contaminant as the cause of mortality.*"* *"*Levels of contaminants in the dolphins' blubber were found to be among the highest recorded for a cetacean.*"*... *"*a commentary on the state of eastern coastal waters.*"* But, *"*it is unlikely that contaminants were the key to the event.*"* Rather, *"*The circumstantial evidence suggests that PbTx [brevetoxin produced by a dinoflagellate] is the most probable cause of the mortality.*"* *Note*: subsequent analyses implicate a morbillivirus in this mass die-off. A phocine morbillivirus was detected in samples from New England since 1986, and perhaps earlier (MMC 1994 report to Congress).

Gorzelany, J.F., 1992. The rescue, rehabilitation, and reintroduction of an injured Atlantic bottlenose dolphin along the southwest Florida coast. 20th Annual Conference of the International Marine Animal Trainers Association, Freeport, Bahamas.

Greenwood, A.G. and D.C. Taylor, 1985. Captive Killer Whales in Europe. Aquatic Mammals. 11(1): 10-12 *Abstracted*: Of 32 killer whales examined after dying in aquariums around the world, half had died of bacterial infections, one quarter of pneumonia.

Greenwood, A.G., R.J. Harrison and H.W. Whitting, 1974 Functional and Pathological Aspects of the Skin of Marine Mammals. In: Functional Anatomy of Marine Mammals, vol.2 (R.J. Harrison, ed.) pp.82-89. *Abstracted*: *"*Skin disease in wild cetaceans is known from a number of reports (see below) but has rarely been accorded any importance in the ecology of these animals. Lesions, although often multiple, are usually mild, and in stranded animals are usually overshadowed by more serious pathological changes elsewhere. In captive dolphins, however, skin disease is one of the major problems facing the veterinarian. Disfigured dolphins are unacceptable in a commercial establishment where they come in close contact with the public, who quite rightly interpret the external appearance of the animals as reflective of their handling and care since capture. More serious from the medical viewpoint is that any large area of skin damage may allow entry of organisms into the body, initiating systemic disease. Much care goes into the maintenance of high quality water for captive cetaceans, but despite all our efforts most dolphins live in a highly contaminated and infective environment, particularly those in artificial seawater systems.*" "*It is a feature of cetacean skin that although it bleeds very readily when injured, clean superficial wounds heal remarkably rapidly, often within 48 hours.*" "*A considerable number of the recognized skin conditions in dolphins, particularly in captive *T. truncatus* from the Gulf of Mexico, have the appearance and behavior of viral disease.*" "*An incidental finding at a recent autopsy of a young captive killer whale (Taylor and Greenwood, unpublished observations) was a group of papillomatous lesions on the skin of the ensheathed penis, closely resembling verracue*"..."*Similar lesions have been seen on the dorsal fin of another killer whale. Such lesions appear to be benign.*" Note*: Reiterating, skin disease in wild cetaceans has rarely been accorded any importance in the ecology of these animals; and, papillomatous lesions in killer whales appear to be benign. It appears that papilloma exists in wild cetacean populations all over the world. The young killer whale reported to have papilloma was from the Pacific Northwest, indicating the virus is probably present in the wild population.

Guinet, C., 1991. Intentional stranding apprenticeship and social play in killer whales (*Orcinus orca*), CanJZool(69)11:2712-2716.

Haley, D., 1970. Views on the Killer Whale Dispute. Pacific Search. 5(1): 1-3. *Abstracted*: Interviews with scientists, conservationists, killer whale captors, and aquarium owners involved in the controversy over capturing orcas in Puget Sound.

Haley, D., 1973. Albino Killer Whale. Sea Frontiers. 19(2), Mar./Apr.: 66-71. *Abstracted*: The life and death of *"*Chimo*"*, the white whale captured in 1970 off Vancouver Island. An all white individual killer whale appeared off the coasts of Vancouver Island in 1924. Dr. Clifford Carl, curator of the BC Provincial Museum collected sighting records for more than 20 years. In 1946, a biologist sighted the white whale in a pod of ten. In 1970, another white killer whale was reported. It was assumed that this whale, later named *"*Chimo*"*, was the offspring of the earlier reported whale which was named *"*Alice*"*. The capture of Chimo by Bob Wright took place near the spot where the first white killer whale was seen 47 years earlier. Chimo was estimated at five years of age, 15' and adapted to captivity. Soon after capture a yellow substance appeared on her skin, lesions formed, and she lost weight. Examination revealed a blood calcium deficiency. Her dose of Vitamin A was increased from 200,000 to 3,000,000 units daily, and food from 75 to 120 pounds. Diagnosed as Chidiak-Higashi syndrome, always fatal, underlying cause dysfunction of the white blood cells. Chimo became ill on October 28, 1972 and died five days later. Pathologist Dr. Ken Thornton (Royal Jubilee Hospital, Victoria) indicated cause of death streptococcal infection which developed into interstitial pneumonia. *"*Because CH syndrome is inherited as a recessive trait, there must be considerable inbreeding to bring it out. This may be a bit of evidence to support the idea that killer whales live in the same pods through long-going family relationships, instead of changing pods frequently.*"*

Hewlett, K.G., 1974. The Killer Whale: A Need for Perspective. Pacific Search. 9(1): 18-19. *Abstracted*: Vancouver Aquarium curator argues the importance of zoos and aquariums and of keeping killer whales captive.

Hoelzel, A.R., 1993. Genetic ecology of marine mammals. Symp. zool. Soc. Lond. No. 66:15-32. *Abstracted:* Three categories of application of molecular genetics: (1) paternity testing and kinship analysis; (2) estimation of effective population size; (3) the assessment of genetic distance between populations.

Hoelzel, A.R., 1992. Conservation genetics of whales and dolphins. Molecular Ecology No. 1:119-125. *Abstracted*: Obvious geographic boundaries correlate to genetic distance in some species, and not in others. Furthermore, morphological variation within species can be fairly extensive without correlating to genetic distance, or relatively minor between morphotypes that are as genetically distinct as some species.

Hoelzel, A.R. and D.R. Bancroft, 1992. Statistical analysis of genetic variation, In: A.R. Hoelzel (ed), Molecular genetic analysis of populations, a practical approach. IRL Press, Oxford University Press, Oxford. pp 159-186.

Hoelzel, A.R. and G.A. Dover, 1991. Genetic differentiation between sympatric killer whale populations. Heredity 66:191-195. *Abstracted*: DNA fingerprinting nuclear genomes and sequencing the D-loop region of the mitochondrial genome showed very low levels of variation within populations relative to comparisons between allopatric populations, suggesting inbreeding. The two sympatric populations in the northeastern

Pacific (resident and transient) were as genetically distinct as North Pacific populations from a South Atlantic population.

Hoelzel, R., 1991. Analysis of regional mitochondrial DNA variation in the killer whale: implications for cetacean conservation, [In] Genetic ecology of whales and dolphins, IWC Special Issue:225-234.

Hoyt, E. 1977. *Orcinus orca*: Separating facts from fantasies. Oceans 10: 23-36. *Abstracted*: A paper covering aspects of the natural history of killer whales, especially in the Pacific Northwest and, at the same time, dispelling some myths that earned it the name *"*killer*"* whale.

Hoyt, E., 1987. Saving Whales from Themselves. Equinox. (36),Nov./Dec.,p. 140. *Abstracted*: Story of pilot whales successfully returned to the wild after stranding and many months in captivity could provide a model for returning captive orcas to the wild.

Hoyt, E., 1990. Orca. The Whale Called Killer. Camden House, Ontario, Canada, pp. 1-290. *Abstracted*: Erich Hoyt and his colleagues spent seven summers following orcas in the waters off northern Vancouver Island, intent on dispelling the killer myth. First published in 1981, this revised edition contains the latest world-catch and live-capture statistics as well as updated records of killer whales kept captive.

Hoyt, E., 1993. The Performing Orca. Why the Show Must Stop. Whale and Dolphin Conservation Society, London. *Abstracted:* Erich Hoyt describes the justifications for captivity in relation to the known natural history of the species. (To obtain a copy, email FranC@wdcs.org.).

Hui, C.A. and S.H. Ridgway, 1978. Survivorship Patterns in Captive Killer Whales (*Orcinus orca*). Bulletin. 77(2): 45-51. Southern California Academy of Sciences, Los Angeles. *Abstracted*: Study of causes and rates of killer whale mortalities at established North American aquariums undertaken by the Biosciences Dept. of Naval Ocean Systems Center, San Diego, to answer a specific query by a congressional committee looking into the survival of captive killer whales.

Hunter, R. Bob Hunter (column), 1974. The Vancouver Sun. October 25, p. 56. *Abstracted*: The argument against keeping killer whale captives. Temporary sentences - *"*putting them back*"* - as a lesson in conservation that aquariums could teach.

Irvine, B., 1970. Conditioning marine mammals to work in the sea. Marine Technology Society Journal, 4(3):47-52.

Irvine, B. and R.S. Wells, 1972. Results of attempts to tag Atlantic bottlenose dolphins (*Tursiops truncatus*). Cetology 13:1-5.

Isenberg, H.D. and A. Balows, 1981. Bacterial pathogenicity in man and animals. In: The Prokaryotes [M.P. Starr, H. Stolp, H.G. Truper, A. Balowa and H.G. Schlegel (ed)] pp. 83-122. Springer-Verlag, New York.

Jakobsson, J., 1985 Monitoring and management of the Northeast Atlantic Herring Stocks. Canadian Journal of Fisheries and Aquatic Sciences, Vol 42 (1): 207-221. *Abstracted:* The collapse of all the major herring stocks in the Northeast Atlantic due to overfishing in the late 1960's and early 1970's was undoubtedly the most striking phenomenon in the history of the European fisheries. Figure 2. shows migration pattern of the Atlanto-Scandian herring during a period of high stock level which suggests interrelationship of Icelandic, Norwegian and Barents Sea stocks. Fishing catches peaked at 3.5 million tons per year in the mid-1960's, and then rapidly declined to about 200,000 tons by 1980. The stocks are gradually increasing at present. *Note*: The killer whales which are predators on these stock(s) of herring could also be interrelated with their movements. Satellite information on oceanographic conditions and likely herring school locations are needed, as well as areas where herring are likely to be to be seen to see if killer whales are also present.

Jalakas, I., 1993. Gentle Killers. Scanorama Magazine, Sept., pp 46-52. *Abstracted*: Popular Scandinavian article describing photo-identification and acoustic studies of killer whales near Tysfjord, Norway by Tiu Simila, Anna Bisther, and Hanne Strager. Roughly 360 ID's of approximately 500 whales. *"*We are pleased if we see a pod ten times in a season.*"* The same killer whales come to Tysfjord every year. *Note*: Tiu Simila in personal communication has indicated that at least one pod of killer whales found off the Norwegian coast has a dialect unlike the others, and more similar to Icelandic dialect. This may be preliminary evidence of interrelationship of these killer whales, or at least evidence of their broad distribution.

Jett, John, Jeff Ventre, 2015. Captive killer whale (*Orcinus orca*) survival. Marine Mammal Science Volume 31, Issue 4, pages 1362–1377. *Abstract*: Killer whales (*Orcinus orca*) were first placed into captivity in 1961 and are now found in theme parks around the world. Despite successful breeding of captive killer whales since 1985 there is growing concern for their welfare in captivity, which often includes claims of poor survival. We employed Kaplan-Meier and Cox Proportional hazards models and annual survival rate analyses on 201 captive killer whales to discern how sex, facility (U.S. *vs*. foreign), captive-born *vs*. wild-captured, pre- *vs*. post-1 January 1985, and animal age upon entering captivity affect survival. Overall median survival estimate was 6.1 yr, with no difference between male and female survival. Killer whales in U.S. facilities (12.0 yr) demonstrated a significantly higher median survival than those in foreign facilities (4.4 yr), as did whales entering captivity post-1 January 1985 (11.8 yr) *vs*. those entering prior to 1 January 1985 (3.9 yr). Median survival for captive-born (14.1 yr) was significantly higher than wild-captured killer whales (5.5 yr), though the two failed to differ among the post-1 January 1985 cohort. Facility location and pre- *vs*. post-1 January 1985 were predictors of the hazard rate. Survival of captive killer whale cohorts has generally improved through time, although survival to age milestones are poor when compared to wild killer whales.

Johnston, D.G. and J. Fung, 1969. Bacterial flora of wild and captive porpoises. Journal of Occupational Medicine. 11: 276-277. *Abstracted*: Deaths have occasionally occurred among marine mammals held in captivity by a Naval facility in Point Magu, California. Necropsy studies of fatal infections among captive porpoises resulted in isolation of bacteria commonly associated with humans (*Proteus vulgaris, E. coli*, and *Pseudomonas earuginosa*). It was suspected the animals were being infected by contamination of pool water by their own trainers. Conclusions regarding the source of the infection could not be established without knowledge of the normal bacterial flora of the wild animal and of the sea water. Specimens were cultured form several wild porpoises upon capture and compared with cultures taken after 4-6 weeks in captivity. Samples of seawater from 5 areas of ocean occupied by these animals were obtained at various times. *Streptococcus fecales* and *S. gemma* were not identified in sea water nor in newly captured animals, but were cultured from 5 of the animals after 4-6 weeks in captivity. It seems reasonable to conclude these organisms represent introduction of bacteria into the environment of captive animals, presumably by human attendants entering the water.

Johnston, D.G. and S.H. Ridgway, 1969. Parasitism in some marine mammals. Journal of the American Veterinary Medical Association. 155: 1064-1072.
Abstracted: Among marine mammals in captivity at the Naval Faclity in Point Magu, California, a variety of interesting pathologic features have been found, including bacterial infections and parasitic lesions. Parasitism has accounted for a major portion of the pathologic changes found in marine mammals. Parasitic infestation has been the subject of many reports. Endoparasites found have included a variety of cestodes, nematodes, and trematodes. The incidence of parasitism is striking, and one cannot ignore the possible hazards of similar parasitism to men who work within the ocean environment.

Katona, S.K., J.A. Beard, P.E. Girton, and F. Wenzel, 1988. Killer whales (*Orcinus orca*) from the Bay of Fundy to the Equator, including the Gulf of Mexico. [In, Sigurjonsson and Leatherwood, Eds. North Atlantic Killer Whales, Journal of the Marine Research Institute Reykjavik, Vol. XI, pp 205-224. *Abstracted*: Authors suggest the existence of a small seasonally migrating population of killer whales along the United States eastern seaboard and possibly a year-round population south of 35N. Killer whales occur in the Gulf of Mexico and in tropical waters (sea surface temperatures to 30C) of the North Atlantic ocean.

Kamiya, T., T. Tobayama and M. Nishiwaki, 1979. Epidermal Cyst in the Neck of a Killer Whale. Scientific Reports. No.31: 9394. Whales Research Institute (Tokyo).

Ketterer, P.J. and L.E. Rosenfeld, 1974. Septic embolic nephritis in a dolphin caused by Staphylococcus aureus. Australian Veterinary Journal. 50: 123. *Abstracted:* Fatal Staphylococcus aureus infection in an adult dolphin (Trusiops truncatus) is described. Haematogenous spread of infection from a subcutaneous abcess resulted in septic embolic nephritis.

Klontz, George W., 1970. Medical care of newly captured killer whales. The Southwestern Veterinarian. Summer: 267-9. *Abstracted*: A noted aquatic animal veterinarian reports on the capture and post-capture management, nutrition and immunization of the killer whale.

Lambertson, R.H., B.A. Kohn, J.P. Sundberg and C.D. Buergelt, 1987. Genital Papillomatosis in sperm whale bulls. Journal of Wildlife iseases. 23: 361-367. *Abstracted*: Examination of 31 male sperm whales (*Physeter catadon*) caught off the western coast of Iceland revealed three cases of genital papillomatosis involving the unsheathed penis. One subadult and 2 sexually mature bulls were affected. Gross lesions resembled papillomas common in terrestrial mammalian species. Transmission electron microscopy of these lesions revealed nonenveloped intranuclear virus particles 28-40 nm in diameter and round to hexagonal in shape. In two cases immunoperoxidase staining was negative for group-specific papillomavirus antigen. These findings indicate that the spectrum of animal species affected with virus-associated genital papillomotosis includes at least one globally distributed species of the order Cetacea.

Leatherwood, S. and R.R. Reeves, 1982. Bottlenose dolphins (*Tursiops truncatus*) and other toothed cetaceans. In: Wild mammals of North America: Biology, management, economics (J.A. Chapman G.A. Fedlhamer,eds.), pp. 369-414. Johns Hopkins University Press, Baltimore. 1147pp.

Linden, E., 1989. Setting free the dolphins. Whalewatcher Vol 22(1): pp.6-7. Published by the American Cetacean Society, P.O. Box 2639, San Pedro, CA 90731. *Abstracted*: Describes people involved in release of *"*Joe*"* and *"*Rosie*"*, a male and female bottlenose dolphins used in Dr. John Lilly's communication experiments at Marineworld-Africa, U.S.A. at the time based in Redwood City, CA.

Lopez, J. and D. Lopez, 1985. Killer whales (*Orcinus orca*) of Patagonia, and their behavior of intentional stranding while hunting nearshore. J.Mamm. 66(1):181-183.

Lubow, A., 1977. Riot in Fish Tank II. New Times. Oct.14: 36-53. *Abstracted*: The story of the freeing of two captive dolphins in Hawaii and a discussion of the rights of animals.

MMC Workshop, 1975. Killer Whale Workshop Report, 28 April 1975. Marine Mammal Commission.

Martineau, D., A. Legace, P. Beland, R. Higgins, D. Armstrong and L.R. Shugart, 1988. Pathology of Stranded Beluga Whales (*Delphinapterus leucas*) from the St. Lawrence Estuary, Quebec, Canada. Journal of omparative Pathology. 98: 287311. *Abstracted*: From June 1983 to May 1986, 13 carcasses of stranded beluga whales from a polluted area of the St. Lawrence River, Canada were necropsied. High performance liquid chromatography was performed on the brains of 3 animals to determine concentrations of benzo-a-pyrene (BaP). Two juvenile animals had severe multisystemic lesions, one of which, a severe necrotizing dermatitis, was associated with a Herpes-like particle.

Four adults had 5 varieties of tumors. An adult had a systemic nocardiosis and a juvenile was affected by a non 0:1 Vibrio cholerae septicaemia. High concentrations of BaP adducts were found in the brains analyzed. Occurrence of Bap adducts in the brain of 3 whales of this population coincides with the high incidence of tumors. This and the previous finding of high concentrations of organochlorine in the tissues of these animals suggest an important role of industrial contaminants in the recent decrease of this population.

Mate, B., 1989a Satellite-Monitored Radio Tracking as a Method for Studying Cetacean Movements and Behaviour. Sci. Rep Int. Whale Commn. 40:389-391. *Abstracted*: In summer 1987, a pilot whale tagged with an Argos satellite-monitored radio tag was tracked for 95 days in the western North Atlantic. The whale was located 479 times by satellite during movements of at least 7,588 km and sighted from an aircraft several times in the company of other pilot whales. Duration of dive data were collected on 187,866 dives. Transmitter temperature information was also sent and indicated that virtually all deep dives occurred at night, when the whale was likely feeding on squid. Surface resting occurred most often immediately after sunrise on a four-to seven-day cycle. Future movement and dive information in conjunction with oceanographic data will be important in identifying the critical habitats of whales and understanding their behavior. Satellites offer an important new cost-effective tool for studying whales. *Note*: The technology existed as of 1989 to satellite tag released whales and track them over long distances for significantly long periods of time. Dr. Mate has also satellite tagged Bowhead whales and bottlenosed dolphins with good success. Addendum from Pers comm: Two other pilot whales attached with radio tags in 1991 were sighted in February 1994 with harnesses still attached.

Mate, B., 1989b. Watching whale habits and habitats from earth satellites. Whalewatcher Vol 23(2):pp13-15. Published by the American Cetacean Society, PO Box 2639, San Pedro, CA 90731. *Abstracted:* Describes successful tracking of cetaceans by satellite. Shows photograph of satellite tag on pilot whale reported in Mate 1989a in this bibliography.

Matkin, C., 1994. The killer whales of Prince William Sound. Prince William Sound Books, Valdez, AK.

Matkin, C. and E. Saulitis, 1994. Killer whale *Orcinus orca*. Report to the US Marine Mammal Commission, unpublished 1994.

Matthews, A. (pers. comm., 1994). With respect to Keiko, comments from former manager of Marineland, Ontario. *Abstracted:* Matthews went to Marineland, Ontario in 1983, by which time Keiko was already there. Both Kiska (a female) and Keiko (a male) had the skin problem (papilloma?), only Kiska was worse. The problem was cyclic, getting worse in April/May/June. Dr. Charlie Godsell thought it might be related to photo-period, and treated both with autovaccine. Kiska was cured, and Keiko wasn't. He was subsequently sold to Reino Aventura for approximately $125,000 Canadian. The Hunt Brothers of Chicago also were trying to sell a killer whale to Reino Aventura at that time

(ca. February 1985), and they unsuccessfully attempted to block the Canadian sale through Congressional obstruction (non MMPA authorized whale flying over US airspace). Gunnar Jonsson came to Marineland Ontario and stayed one year to learn marine park side of business (he was son of Jon Gunnarson of Iceland who figured prominently in orca capture business). When questioned about the skin problem, Gunnar is alleged to have said that they [Iceland captors] see it all of the time in wild orcas, as well as in the ones they catch. Papillomatosis not considered a problem to the whales, it affects only their appearance.

Mayer, Sue. 1988. A Review of the Scientific Justification for Maintaining Cetaceans in Captivity. A Report for the Whale and Dolphin Conservation Society. (To obtain a copy, email FranC@wdcs.org.)

Medway, W. and J.R. Geraci, 1964. Hematology of the bottlenosed dolphin (*Tursiops truncatus*). American Journal of Physiology. 207(6): 1367-1370.
Abstracted: The hemaetology of six bottlenosed dolphins, kept in an aquarium filled with simulated sea water, has been studied. Blood samples were easily collected from a branch of the braclial vessels. With the exceptions of the low total red cell count, larger mean corpuscular volume, and the high normal eosinophil count, the other hemaetological parameters are comparable to those of the common domestic animals.

Medway, W. and H.F. Schryver, 1973. Respiratory Problems in Captive Small Cetaceans. Journal of the American Veterinary Medical Association. 163 (Sept 15): 571-573.

Miller, R.M. & S.H. Ridgway, 1963. Clinical experiences with dolphins and whales. Small Animal Clinics 3: 189193.

Mooney, Jerye, 1997. Captive Cetaceans: A Handbook for Campaigners. A Report for the Whale and Dolphin Conservation Society. (To obtain a copy, email FranC@wdcs.org.)

Mori, H., 1972. Bacteria in the stomach of marine little toothed whales (translated from Japanese). Bulletin of the Japanese Society of Scientific Fisheries. 38: 11771183.

Muller, Kirk, and Scott (editors), 1983. Epithelial neoplasms. From Small Animal Dermatology (Muller, Kirk, and Scott, editors), Third Edition, pp. 721-724. *Abstracted*: Cutaneous papillomas are common in canines but rare in cats. Canine viral papillomatosis is common and caused by a DNA papovavirus. It is contagious and has an incubation period of about 30 days, and almost always occurs as multiple lesions. Cutaneous papillomas occur in older dogs and cats. In cats, there is no breed or sex predilection, but in dogs papillomas are more common in males and in cocker spaniels and Kerry blue terriers. Note: Both cutaneous and viral papillomas are usually benign. Rare cases of papillomatosis have been completely unresponsive to treatment, perhaps due to immunologic defects. Clinical management of cutaneous papillomas may include surgical excision, cryosurgery, electrosurgery, or observation without treatment. Canine

viral papillomatosi usually undergoes spontaneous regression within about 3 months and solid immunity follows experimental or natural infection. Autogenous or commercially produced wart vaccines are without documented value.

Myrick, A., P. Yochem and L. Cornell, 1988. Toward calibrating dentinal layers in captive killer whales by use of tetracycline labels. [In] Siggurjonsson and Leatherwood, North Atlantic killer whales, RitFisK XI: 285-296.

Nakajima, M. and I. Takikawa, 1961. Swine Erysipelas in the dolphins (translated from Japanese). Journal of the Japanese Association of Zoological Gardens and Aquariums. 3: 69-73.

Newman, K. and H. Markowitz, 1993. Echolocation by killer whales (*Orcinus orca*) while in pursuit of live fish. Abstracts of Tenth Bienniel Conference on Marine Mammals, Galveston, TX. *Abstracted*: Two captive killer whales at Marine World-Africa USA were presented with live coho salmon and were documented to echolocate and catch the live fish. Echolocation clicks reveal spectral energy up to 80 kilohertz. Note: The two captive killer whales were captured in 1969 and 1980, indicating that even long-term captives can and will pursue, capture, and eat live fish. Providing live fish can be considered *"*environmental enrichment*"* in captive settings.

NOAA Fisheries, "Celebrating Springer—Orphan Orca That Overcame the Odds," July 12, 2012,
http://www.nmfs.noaa.gov/pr/laws/mmpa/anniversary/celebrating_springer.html.

O'Barry, R., 1988. Glimpses of the journey home. Whalewatcher Vol 22(1): pp. 8-10. Published by the American Cetacean Society, P.O. Box 2639, San Pedro, CA 90731. *Abstracted*: Chronicles release of *"*Joe*"* and *"*Rosie*"* from 19 Feb to 15 July 1987. On 13 July, *"*The gate was opened today and both dolphins swam out immediately. They first swam approximately 300 yards up Blue Bank Creek into the marshlands. This was the longest distance each has travelled in a straight line in more than seven years.*"* See also Coyle and Hickman, 1988 in this bibliography.

Olesiuk, P.F., M.A. Bigg and G.E. Ellis, 1990. Life history and population dynamics of resident killer whales (*Orcinus orca*) in the coastal waters of British Columbia and Washington State. Reports of the International Whaling Commission (Special Issue 12): 209-248. *Abstracted*: Life history parameters for resident killer whales in coastal waters of British Columbia and Washington State are presented: females have a mean life expectancy of 50.2 years, males 29.2 years. Maximum longevity estimated 80-90 years and 50-60 years, respectively.

Orlov, M.V., A.M. Mukhlya and N.A. Kulikov, 1988. Hormonal indices in the bottlenosed dolphin (Tursiops truncatus) in the norm and in the dynamics of experimental stress (translated from Russian). Zhurnal Evolyutsionnoi
Biokhimii i Fiziologii. 24: 557-563.

Prato, C.M., T.G. Akers and A.W. Smith, 1974. Serological evidence of calicivirus transmission between marine and terrestrial mammals. Nature (London). 249 (5954): 255. *Abstracted:* The recent isolation of two serotypes of San Miguel sea lion virus (SMSV) a calicivirus indistinguishable from vesicular exanthema of swine virus (VESV), from California sea lions (*Zalophus c. californianus*) and Northern fur seals (*Callorhinus ursinus*) points to: (1) the widespread distribution of SMSV, and (2) the role of marine mammals as possible reservoirs of viral diseases of terrestrial animals.

Ridgway, S.H., 1965. Medical Care of Marine Mammals. Journal of the American Veterinary Medical Association. 147 (Nov 15): 1077-1085. *Abstracted*: From an anatomical standpoint, the cetaceans most closely resemble cattle internally, whereas the sea lion is more like a dog in anatomy and behavior. Disease problems encounterd include erysipelas, diabetes, gastric ulcers, scurvy, and pheumonia. A number of unidentified dermatoses have caused proglems. Parasitic conditions include tapeworms, tapeworm cysts, flukes, and numerous other parasites. Life cycles for most of the parasites of marine mammals are unknown. Methods for various clinical procedures have been established. Therapeutic agents that have been used include antibiotics, steroids, vitamins, tranquilizers, and vermifuges.

Ridgway, S.H., 1979. Reported Causes of Death of Captive Killer Whales. Journal of Wildlife Diseases. 15: 99-104. *Abstracted*: Navy veterinarian discusses causes of captive killer whale deaths.

Ridgway, S.H. and M.D. Dailey, 1972. Cerebral and cerebellar involvement of trematode parasites in dolphins and their possible role in stranding. Journal of Wildlife Diseases. 8: 33-34. *Abstracted*: Seven dolphins (*Delphinus sp*.) that were found stranded near Point Magu, California between 1966 and 1970 were geven complete necropsy examinations. In all seven cases a similar pathological picture was observed. The findings included adult trematodes in the bile and pancreatic ducts, severe liver damage, and massive brain necrosis due to the presence of numerous trematode ova in the brain tissue. The authors suggest that the stranding and subsequent deaths of all 7 animals resulted from this disease.

Ridgway, S.H. and C.A. Fenner, 1982. Weight-length relationships of wild caught and captive Atlantic bottlenose dolphins. Journal of the American Veterinary Medical Association. 181: 13101315. *Abstracted*: Length and weight mesurements were obtained on 144 Atlantic bottlenosed dolphins. Data were compared for wild-caught dolphins (n = 124), dolphins in training (n = 34), and dolphins that had died in an emaciated condition (n = 15). The purpose of the study was to establish guidelines for use in estimating when a dolphin is over- or underweight. Regression lines were plotted to give the minimal aceptable weight for any length from 185 to 265 cm.

Ridgway, S.H. and D.G. Johnston, 1965. Two interesting diseases cases in wild cetaceans. American Journal of Veterinary Residents. 26: 771-775. *Abstracted*: A Pacific common dolphin, (*Delphinus bairdi*) stranded on a beach was found to be

infested with larval tapeworm cysts, *Phyllobothrium delphini*. These cysts ranged from 2 to 25 mm in diameter and were found in the fat, muscle , and peritoneum of the lower abdomen. Unidentified ova were found in several cerebral and cerebellar abscesses. These ova and associated lesions apparently caused spatial disorientation and eventually death. An emaciated young Pacific white-sided dolphin, (*Lagenorrynchus obliquedens*) was captured after it had spent 2 weeks in a small boat harbor. It was kept in captivity for 4 days, while it was treated with antibiotics and multiple vitamin preparations. It died as a result of fish filling the rumen and esophagus, thus causing pressure against the air passages and resulting in death due to choking. Numerous gastric ulcers, which may have caused the inability to digest fish, were found at necropsy.

Robson, Frank D., 1984. Strandings. The Science Press, Johannesburg, South Africa, pp. 124. *Abstracted:* This paper discusses strandings, rehabilitation efforts, and cites many examples of successful reintroductions in New Zealand and Australia.

Rudloe, Jack and Ann, 1994. Sea Turtles: In A Race for Survival. National Geographic. 185(2): 94-120. Note: Turtle No. 79 was tracked by telemetry for 2,728 miles before her signal faded out.

Schroeder, J.P., J.G. Wallace and M.B. Cates, 1985. An infection of *Vibrio alginolyticus* in an Atlantic bottlenose dolphin housed in an open ocean pen. Journal of Wildlife Diseases. 21: 437-438. *Abstracted*: An adult male Atlantic bottlenosed dolphin (*Tursiops truncatus*) had a history of recurring skin problems. Culture taken from the ulcerated lesions yielded *Vibrio alginolyticus*. Treatment of skin with antibiotics continued for 13 weeks until all skin cultures were negative. Species of Vibrio have been found as normal inhabitants of newly captured small cetaceans. The potential for human acquistion of infections of Vibrio exists.

Sergeant, D., (1969). Feeding rates of Cetacea. FiskDirSkrSerHavUnders. 15:246-258.

Shotts, Jr., Emmett B., Wayne Jones and F. Deborah Talkington, 1979. A Study of Bacterial Flora Associated with the Spiracle of Captive Dolphins. From Aquatic Animal Medicine: A State of the Art. Proceedings of a conference held April 25, 1979 at Whitney Hall, Marineland of Florida, p. 111. *Abstracted*: A study was made of the microflora associated with the spiracles of a group of twenty captive dolphins. Results showed Coagulase positive Staphylococci (60%) was the most common organism isolated. Other organisms included alpha streptococci (2.5%), Pseudomonas aeruginosa (5%), Pseudomonas putrifaciens (5%), Corynebacteria (2.5%), and Candida spp (47%).

Simila, T., 1991. Killer whales in Lofoten and Vestralen Islands 1990. A report to the College of Fisheries Science, Tromso University, Norway.

Sigurjonsson. J., 1992, et. sequitur. A note on proposal to re-introduce a killer whale into Icelandic coastal waters. Memorandum to the Minister of Fisheries, Iceland, 27 April 1992. *Abstracted*: *"*1) From the point of view of the status of the stock, there is nothing that would justify a transfer of a single animal from an aquarium abroad into the sea around Iceland. The population is far from being threatened and numbers locally at least in the high hundreds, and in Icelandic and adjacent waters most likely in the range of 6,000 animals.*" "*2) Killer whales are being claimed to be extremely *"*social*"* creatures, living in relatively stable social units, called pods. We have been able to identify at least 6 separate pods of killer whales, that number up to 31 known individual animals (plus some additional *"*unknown*"* ones) each.*" "*...if the pod phenomenon has some major significance to the wellbeing of the animal, the likelihood of the animal to suffer from not finding its family is quite great if now put free into the wild.*" "*3) ... The animal has thus spent more than half its life in captivity and has been deprived very important years of learning in the wild, both before and after puberty, which may strongly influence its ability to survive in the wild.*" "*4) ... it should be pointed out that in general, transfer of animals from one geographical area (or ecosystem) to another is of major concern within the marine sciences, particularly in relation to mariculture.*" "*In conclusion, a transfer of the killer whale in question [Tillicum] seems not to be advisable when considering the status of the stock off Iceland, the risk of difficulties the animal may meet in the unprotected wild environment, and the potential consequences of the introduction of the animal into the marine environment off Iceland.*"* Note: This memo is on file at the National Marine Fisheries Service, Office of Protected Species in a dossier on the Sea World permit application for a killer whale named *"*Tillicum*"*, which was imported into the US on an emergency basis and later changed to *"*public display*"*. The NMFS had allowed the emergency importation only on the condition that if a public display permit were not issued, he would be re-exported to Canada or returned to his native waters in Iceland. Essentially an identical letter was prepared by Sigurjonsson for a proposal to reintroduce *"*Ulises*"* from Barcelona (also imported to the US by Sea World on 9 February, 1994). We got the distinct feeling that Iceland does not wish to 'humanize' a whale by allowing import of a movie star like Keiko, but the reasoning for rejection was not supported by any scientific evidence.

Sigurjonsson, J. & S. Leatherwood (Eds.), 1988. North Atlantic Killer Whales. (Special issue of Rit Fiskideildar). Vol.11: 1-316. Reykjavik, Iceland Marine Research Institute. *Abstracted*: Twenty-one papers on killer whales in the North Atlantic based on a 1987 workshop held in Provincetown, Mass. Some individual articles are listed and annotated elsewhere in this bibliography. *Note*: This was the first concentrated attempt to evaluate the species in the North Atlantic, particularly around Iceland, where they continue to be sought for the world's aquariums.

M. Simon, M. B. Hanson, L. Murrey, J. Tougaard,& F. Ugarte, 2009. An attempt to release Keiko the killer whale. *Marine Mammal Science* **25** (3): 693–705. http://www.orcanetwork.org/Main/PDF/simon2009keiko.pdf. *Abstract:* A number of cetaceans have been released into the wild, with research or the improved welfare of the individuals in question as the main goal. In a few cases, releases have been monitored with methods such as telemetry or photo-identification (Gales and Waples

1993, Veit et al. 1997, Wells et al. 1998, Reynolds et al. 2000). As a rule, the animals released successfully into the wild had been captive for relatively short periods of time (e.g., 2 yr, Wells et al. 1998), were held in sea pens rather than concrete tanks, and some were released in the company of conspecifics (Veit et al. 1997, Wells et al. 1998). We describe here the last phases of a project aimed at releasing a single killer whale that had been captured as a calf, raised in tanks and kept isolated from conspecifics during most of his life.

Singh and Gupta, 1985. Antiviral efficacy of homeopathic drugs against animal viruses. Division of Virology, Central Drug Research Inst, India. The British Homeopathic Journal, 74.

Skoch, E.J., 1990. Heavy metals in marine mammals: presence and analytical methods. [In] l.A. Dierauf (Ed.), Handbook of marine mammal medicine: Health Disease and Rehabilitation, CRC Press, Boca Raton. pp. 127-137. *Abstracted*: The physiologic and anatomic differences from terrestrial animals that exist in marine mammals (compartmentalized kidneys, blubber layers, adaptations for deep diving), as well as the fact that there is relatively little accumulated data on normal marine mammal levels of toxic metals available, pose great problems in interpretation of analytical results and determination of toxic levels. A major source of contamination besides water is food. The wild marine mammal does not feed on exactly the same food source every day, so the animal may actually be exposed to fewer metals over a period of time than the captive animal, which receives relatively the same food source every day and thereby has the potential for exposure to a much heavier dosage of metals over time. Making the food metal data a part of the animal's health record may help prevent chronic or long-term poisoning in an animal. *Note*: This is a reasonable counter-argument to the notion that marine mammals do not do well in the wild due to pollution, etc. The food for captive marine mammals comes from the wild. For the reasons given, it should be checked by a laboratory before feeding to captive animals.

Small, R. and D. DeMaster, 1995a. Survival of five species of captive marine mammals. Marine Mammal Science 11(2):209-226. Abstract: Survival in captivity was calculated for 1707 bottlenose dolphins (BD), 72 killer whales (KW), 73 white whales (WW), 3,090 California sea lions (CSL), and 47 Steller sea lions(SSL) based on data in the Marine Mammal Inventory Report (MMIR) of the NMFS. Mean annual survival rates (ASRs) between 1988 and 1992 were 0.951, 0.937, and 0.954 for BD, KW, and WW, respectively, and 0.952 and 0.969 for CSL and SSL, respectively. These estimates represent significant increases in survival for both BD and CSL over the last 5 yr. Using all of the MMIR data (1940-1992), the ASR of BD calves (<1yr of age) was significantly less than the ASR of non-calves (0.666 vs 0.946, P,<0.0001). Survival of captive-born CSL was significantly higher than those born in the wild (0.962 vs 0.945, P = 0.003), but the difference was not significantly different for BD (0.948 vs 0.944, P = 0.60). For non-calf BD and KW, captive animals survived at a slightly lower rate (BD 0.944 vs 0.961, P = 0.07; KW 0.938 vs 0.976 P < 0.001) than animals in the wild (BD: Wells and Scott 1990, KW: Olesiuk et. al. 1990). Survival of captive non-pup SSL was slightly higher (0.968 vs 0.930) than animals in the wild (York 1994, life table analyses).

Survival rates were significantly different among institutions for BD calves and non-calves, CSL pups and non-pups, and SSL non-pups. *Note*: Perhaps the most relevant finding was that: *"*Survival of the wild population Olesiuk et al. studied, based on approximately 250 non-calves, was significantly higher than our estimates for non-calf captive killer whales (0.976 vs. 0.938, P<0.001).*"*

Small, R. and D. DeMaster, 1995b. Acclimation to captivity: a quantitative estimate based on survival of bottlenose dolphins and California sea lions. Marine Mammal Science 11(4):510-519. *Note*: The authors compared survival in captivity over the 5-year period between 1988 and 1992 with estimates based on data from 1965 through 1987, and found that: *"*Survival in captivity for killer whales (*Orcinus orca*)...remained the same.*"* The implication of the former statement by Small and DeMaster (1995a) is that longevity for captive killer whales is significantly less than for free-ranging killer whales, since survival rates are significantly higher in the wild. The implication of the latter statement by Small and DeMaster (1995b) is that survival for captive killer whales did not improve up to 1992.

Smith, A.W. and D.E. Skilling, 1979. Viruses and virus diseases of marine mammals. Journal of the American Veterinary Medical Association. 175:918-920. *Abstracted:* Poxvirus and several serotypes of calicivirus cause recognizable disease in marine mammals. Pox lesions in pinnipeds are raised and proliferative and are seen most frequently after confienment in captivity. In cetaceans, a poxvirus is associated with a much more benign and chronic lesion called a *"*tattoo*"*. Numerous caliciviruses of differing antigenic types have been isolated from vesicular lesions and aborted fetuses of northern fur seals and California sea lions as well as from clinically normal and orphaned northern elephant seal pups. An adenovirus has been isolated from a sei whale and an enterovirus has been isolated from a gray whale.

Smith, A.W., D.E. Skilling and A.B. Latham, 1981. Isolation and identification of five new serotypes of calicivirus from marine mammals. American Journal of Veterinary Residents. 41: 693-694. *Abstracted:* Five new serotypes of calicivirus have been isolated from marine mammals. San Miguel sea lion virus (SMSV)-8 and SMSV-10 were recovered from vesicular lesions on the flippers of northern fur seals in the Pribilof Islands of Alaska. Serotype SMSV-9 was isolated from a sea lion in southern California, and SMSV-11 was isolated from 2 northern fur seal pups in southern California. Serotype SMSV-12 was also isolated in southern California from sea lion and fur seal pups.

Smith, A.W., D.E. Skilling and S.H. Ridgway, 1983. Calicivirus-induced vesicular disease in cetaceans and probable interspecies transmission. Journal of the American Veterinary Medical Association. 183: 1223-1225. Abstracted: A calicivirus isolated from cetaceans is a new serotype designated cetacean calicivirus Tursiops 1 (CCV-Tur-1). It appears to have spread from an initially infected Atlantic bottlenosed dolphin to a California sea lion, and was then carried by the sea lion to a second facility several miles away, where a second dolphin became infected and developed vesicular skin lesions that eroded, leaving shallow ulcers. Cetaceans and pinnipeds belong to

separate orders, so this finding of interspecies transmission demonstates the potentially broad host spectrum for yet another calicivirus.

Smith, A.W., D.E. Skilling, S.H. Ridgway and C.A. Fenner, 1983. Regression of cetacean tattoo lesions concurrent with conversion of precipitin antibody against a poxvirus. Journal of the American Veterinary Medical Association. 183: 1219-1222. *Abstracted:* Tattoo lesions linked to the cetacean poxvirus of bottlenose dolphins regressed with treatment. Two types of regression were observed: (1) The tattoo patterns become raised and blanched, then disappeared along with sloughing skin. (2) When an incision was made through the tattoo lesion, the tattoo appeared in a zone around the incision. Poxviruses removed from the raised, blanched skin lesions and the typical tattoo lesions were reacted with dolphin serums and examined by immunoelectron microscopy. Antibody was not detected against either of the poxvirus preparations when the dolphins had the typical tattoo lesions. However, after the raised, blanched lesions appeared, serums obtained during acute or convalescent stages were positive for the virus separated from the lesions. Regression of typical tattoo lesions was concurrent with antibody conversion.

Solorzano Velasco, J.L., 1992. Papillomatosis case in an (*Orcinus orca*) IAAAM Proceedings, Volume 23, College of Veterinary Medicine, Oklahoma State University. *Abstracted*: Describes arrival of *"*Keiko*"* to Mexico City from aquarium in Canada in February 1985. In December, 1985, *"*... a dark gray neoformation was observed with a coliflower surface similar to papilloma tissue, with a slow growth, in two years its volume did not grow more than 15 cm2, and had no apparent disturbances for the animal. Its location was bilateral in the external surface of the pectoral fins' foldings and it did not present any problems for the growth of the Orca.*"* *"*It has been observed that with the passing of time this papilloma tissue increases its volume seldom. We consider that this is due to immunological depression determined by hematology tests taken regularly and etology, manifested by inactivity, depression and even aggressive behavior.*" "*New lesions have appeared in sites which involve continuous movement as in the base of the fluke tail.*"* *"*With histopathology was found tissue and cell organization that allow the identification of this neoformation as a tipical basal papilloma, which corresponds to the clinical image.*"* Immunochemistry negative to papovavirus; Electrophoresis positive with bovine, rabbit and human papovavirus; culture isolated two viruses corresponding with Herpes and Papovavirus; Electron Microscopy revealed intraplasmatic particles suggesting a Papovavirus. Autovaccine attempted: first and second inoculations good results, third and fourth inoculations contrary results.

St. Aubin, D.J. anmd J.R. Geraci, 1988. Capture and handling stress suppresses circulating levels of Thyroxine (T4) and Triiodothyronine (T3) in beluga whales (*Delphinapterus leucas*). Physiol Zool. 61: 170-175. *Abstracted*: 24 juvenile beluga whales were captured in western Hudson Bay. Seventeen were blood sampled and released immediately, one was held in shallow water for 15 hours before release, and six were retained in captivity for 10 weeks. Plasma concentrations of T3 decreased markedly during the first 24 hrs after capture, and by 2-4 days there was a similar reduction in T4. Concentrations of both hormones remained suppressed throughout the

10 week period in captivity. Stimulation of adrenal activity by injection of adrenocorticotropic hormone (ACTH) resulted in a further decline in T3 after 6-12 hrs. Handling stress was alone sufficient to produce similar changes in whales injected with saline as a control. This study deomonstrated the acute sensitivity of thyroid hormone balance to stress in beluga whales.

Steuer, K.L., 1989 (unpublished). A comparative institutional survey of factors influencing mortality of cetaceans in U.S. zoos and aquaria. Unpublished report to the Animal Protection Institute of America, International Wildlife Coalition, and Humane Society of the United States.

Stevens, W.M., 1969. Captive Killer. Sea Frontiers, Vol 15:3, pp. 140-141. *Abstracted*: Reports on first killer whale to be maintained in warm-water region (Miami Seaquarium) in refrigerated tank (25 degrees cooler than air) in May 1968. *"*On the rare occasions that orcas venture into subtropical or tropical seas, they evidently make frequent dives to the cold mid-water depths where the temperature may be 30-40 degrees below that of surface waters.*"*

Streitfield, M.M. and C.G. Chapman, 1976. *Staphylococcus aureus* infections of captive dolphins (*Tursiops truncatus*) and oceanarium personnel. American Journal of Veterinary Residents. 37: 303-305. *Abstracted*: Samples from blowhole and pharynx of 1 dolphin ill with a respiratory tract infection and 31 healthy dolphins at 2 oceanariums were examined by bacteriologic culture technique. During the same period, nasal and volar forearm skin samples were collected from 32 healthy personnel and from the furuncle on the forearm of 1 attendant. Coagulase-positive staphylococci were isolated from 8 dolphins (including the ill dolphin) and from 14 persons. Staphylococci from the dolphins were totally or partially sensitive to every antibiotic, whereas almost all of the isolates from persons were resistant to penicillin and ampicillin, as well as to certain other antibiotics. *Note*: It was concluded that, although Staphylococcus aureus could be isolated commonly from captive dolphins, there was no evidence of cross infection between the dolphins and the oceanarium personnel.

Stroud, Richard K. and Thomas J. Roffe, 1979. Causes of Death in Marine Mammals Stranded along the Oregon Coast. Journal of Wildlife Diseases. 15 (January): 91-96. *Abstracted:* Sixty-eight marine mammals stranded on the Oregon beaches were examined at necropsy. Gunshot was the primary cause of death in 30% of the pinnipeds examined. Bacterial infections (27%) and parasitism (27%) were also of major importance in the death and debilitation of Oregon marine mammals. Traumatic death or debilitation other than gunshot was observed in 11 animals (16%). Predation, starvation due to neonatal abandonment, viral encephalitis (presumptive diagnosis), dystocia and neoplasia were diagnosed as primary or contributory causes of stranding.

Sweeney, J.C. and S.H. Ridgway, 1975. Common Diseases of Small Cetaceans. Journal of the American Veterinary Medical Association. 167: 533-540. *Abstracted*: Relative mortality among captive cetaceans compared with that in the wild populations has not been assessed. Among certain species, natural mortality is approximately 10%

of the population per year. By careful selection of animals, good nutrition, safe environment, and a good preventative medicine program, disease and mortality of captive cetaceans can be minimized. Cetaceans less than 2 years old and those more than 14 years old tend to become ill and die at a greater frequency than those within the middle age group. This report attempts to deal with the more commonly found diseases of small cetaceans. Information on their diagnosis, treatment and prevalence is presented by organ or tissue primarily affected.

Summers, W.St.C., 1983. A possible case of Lobo's disease acquired in Europe from a bottlenosed dolphin (Tursiops truncatus). Bull. Soc. Path. Ex. 76: 777-784.

Taylor, D.C., 1971. Killer Whales, *Orcinus orca*, at Flamingo Park Zoo and Cleethorpes Marineland and Zoo. International Zoo Yearbook. 11: 205-206. *Abstracted*: Veterinarian's account of captive killer whales in England. Details husbandry and care of killer whale imported from Seattle, Washington, to a temporary facility in England, while awaiting transport to a permanent home at marineland of France.

Terbush, A.D., 1993. Letter from Chief, Permits Division, Office of Protected Species, NMFS, NOAA to Robert R. Ambridge, Ocean Reef Club, Key Largo, FL July 12, 1993. *Abstracted*: *"*Any application for the release of captive animals must consider a number of practical contingencies as well as scientific factors. A primary consideration is the effects of the release on wild stocks.*"* Release criteria which might be applicable to dolphins: *"*Animals should be in good physical condition before release and have maximum fat stores.*"* Routine blood profiles should be run to ensure that animals do not have medical problems.*" "*Serum agglutination tests should be run for pathogens that could affect wild populations.*" "*Animals should demonstrate an ability to feed in the wild. This would include identification of a variety of endemic fish as a source of food, demonstration of the ability to catch live fish, and exhibition of foraging behavior after being presented with live fish. Animals should exhibit a lack of behavioral focus on humans and should not exhibit performance behaviors in the presence of humans.*" "*A method should be in place to locate the animals for a period of up to six months; i.e., satellite or radio tags, or both.*" "*Stranding networks in the area of release should be alerted.*" "*Procedures must be in place to recapture the animals if there is evidence that they are not adapting successfully or if they become nuisance animals.*"*

Thompson, P.M. and P.S. Hammond, 1992. The use of photography to monitor dermal disease in wild bottlenose dolphins. Ambio. *Abstracted*: There is concern that some populations of small cetaceans have declined as a result of increases in pollution and other human activities in coastal areas. Pollution and other environmental stresses may directly or indirectly increase the susceptibility of dolphins and porpoises to disease. However, new opportunities exist to monitor the health status of cetacean populations. This paper describes skin lesions which were observed on bottlenosed dolphins from Scottish waters and suggests that conventional photo-identification studies could be extended to assess the prevalence of dermal disease symptoms in cetacean populations.

Thomson, C.A. and J.R. Geraci, 1986. Cortisol, aldosterone, and leucocytes in the stress response of bottlenosed dolphins (*Tursiops truncatus*). Canadian Journal of Fisheries and Aquatic Science. 43(5): 1010-1016. *Abstracted*: The activity associated with capturing, restraining and removing bottlenosed dolphins (*Tursiops truncatus*) from water stimulates a stress response as reflected by circulating cortisol, aldosterone, and eosinophils. Serum cortosol increased from resting levels of about 30-110 nmol/L within one hour, aldosterone rose from less than 280 pmol/L to up to 1800 pmol/L within three hours, and circulating eosinophils were depressed to less than 40% of their initial numbers within 7 hours after the animals were removed from water (calm-capture). This basic response was not enhanced when the capture procedure was prolonged for 3 hours (chase-capture) or when the dolphins were given acrenocorticotropic hormone, and was similar to that observed in free-ranging dolphins after they had been held in a net for up to 5 hours. Eosinophil numbers appear to be a consistent and practical indicator of stress in dolphins.

Valentry, Duane, 1969. Big Star All at Sea. Sea Frontiers, Vol 15:4, pp. 219-223. *Abstracted:* Popular article describing captive conditions of pilot whale (*Globichephala malaena*) and his successful release to the wild in 1967.

Van Bressem, M.F., K. Van Waerebeek, A. Garcia-Godos, D. DeKegel and P.P. Pastoret, 1994. Herpes-like virus in Dusky dolphin (*Lagenorhyncus obscurus*) from coastal Peru. Marine Mammal Science (in press). *Abstracted*: Documents skin lesions associated with herpes-like HSV-1 and Zoster. Mildly pathogenic, no evidence of poor health.

Wells, Bassos-Hull, and Norris 1998 Experimental return to the wild of two bottlenose dolphins. Marine Mammal Science Volume 14, Issue 1, 51–71. *Abstract*: In the first scientific experiment of its kind, two young male bottlenose dolphins (*Tursiops truncatus*) were captured in Tampa Bay, Florida, and then returned to the wild at the same locale in October 1990, after two years in captivity. The dolphins' age/sex class and the capture and release site were selected prior to their collection. The ranging and social association patterns of the host community were examined prior to, and, including the two animals, after release. The dolphins remained together for the first month, then began interacting more with other dolphins and less with each other. Within the first year, one dolphin returned to the waters near his capture site and has remained there at least through September 1993. The other dolphin has remained in his original home range at least through June 1996. Observations of each dolphin have shown them to be fully integrated into the local dolphin societies. They displayed typical behavioral, ranging, and social association patterns. Their body condition has been excellent at each observation. They have not been observed interacting with humans. The apparent success of this experiment cannot necessarily be generalized to all potential candidates for return to the wild, but the results can be used to guide future experiments.

Wells, R.S., 1989. Return to the wild: Completion of a *"*Dolphin Sabbatical*"*, Whalewatcher Magazine Vol 23(4); pp. 3-5. American Cetacean society, P.O. Box 2639, San Pedro, CA 90731. *Abstracted:* Two young male dolphins, Echo and Misha, were captured in Tampa Bay, Florida in July 1988 *"*to explore the idea that dolphins

might be brought into captivity for brief periods and then released back into the wild.” While in captivity, the dolphins were used in echolocation experiments, after which they are to be returned to the area of capture. The projected budget for the release, radiotracking and first year of observations was $95,201. See Bassos, 1993 in this bibliography for followup thesis.

Werner, Linda, R. Halliwell and D. Buesse, 1979. Immunologic Investigation in Dolphins with Cutaneous Candidiasis. From Aquatic Animal Medicine: A State of the Art. Proceedings of a conference held April 25, 1979 at Whitney Hall, Marineland of Florida (Robert L. Jenkins & Joseph G. Halusky, eds.), p. 113. *Abstracted*: Levamisole phosphate, an immune potentiating drug, has recently proven effective in achieving regression of skin lesions in dolphins with Candida albicans infections, which might suggest that immune deficiency might contribute to the pathoetiology of this disease. A group of dolphins were challenged intradermally with CA extract, resulting in lymphocyte transformation (LT) suppression, indicating immune deficiency may be acquired with chronic CA infection, and not necessarily a primary or predisposing factor. Immune suppression, therefore, constituted a rationale for the use of levamisole in conjunction with antifungal therapy. The etiology of CA infection in dolphins is multifactorial, that altered environment may introduce predisposing factors and that acquired immune deficiency may account for disseminated infections refractory to conventional modalities of therapy. *Note*: Skin tests results and the increased incidence of CA infection in artificial environments indicate that there is greater exposure, and perhaps increased susceptibility in captivity compared to the natural environment.

White, J.R., 1984. Born Captive, Released in the Wild. Sea Frontiers. 30 Nov-Dec, pp. *Abstracted*: Description of Miami Seaquarium's efforts to indroduce captive-born and captive reared Florida manatees back to the wild. Major concern is whether or not the animal will readily adapt to the natural foods and social interactions of the wild herds. Two captive-born, captive-reared subadult manateees were introduced to a large, fenced-off section of the Homosassa River for acclimation to a natural habitat. They were to be monitored in this enclosure for one year. Following acclimation, radio harnesses were to be attached to study their movements and interactions with wild herds.

White, J.R. and R. Floyd., 1988. Nutritional Management of Marine Mammals. In Proceedings, IAAAM 5, 19. *Abstracted*: An Atlantic bottlenosed dolphin, *Tursiops truncatus*, on a diet of raw fish, developed signs of illness including prolonged anorexia, emaciation and regurgitation. Immediate response to thiamine hydrochloride, administered parenterally, suggested a thiamine deficiency. It was concluded that cetaceans on a diet of raw fish should be given supplemental thiamine HCl in addition to that contained in most multivitamin formulas.