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Alaska Office

**Petition to List the Eastern North Pacific A11 Stock of Transient Killer Whales as Depleted Under the Marine Mammal Protection Act**

Submitted to the National Marine Fisheries Service November 13, 2002 by Alaska Center for the Environment, Alaska Community Action on Toxics, Center for Biological Diversity, Coastal Coalition, Defenders of Wildlife, the Eyak Preservation Council and National Wildlife Federation

Contact:

Jim Adams

Counsel, Alaska Office

National Wildlife Federation

750 West Second Ave, #200

Anchorage, AK 99501

(907) 258-4802

adamsj@nwf.org

750 West Second Avenue, Suite 200 • Anchorage, Alaska 99501 • Tel: 907-258-4800 Fax: 907-258-4811

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## Petition to List the AT1 Stock of Transient Killer Whales as Depleted

Pursuant to 16 U.S.C. § 1383b, Alaska Center for the Environment, Alaska Community Action on Toxics, Center for Biological Diversity, Coastal Coalition, Defenders of Wildlife, Eyak Preservation Council and the National Wildlife Federation petition the National Marine Fisheries Service (NMFS) to classify the AT1 stock of transient killer whales as a depleted stock under the Marine Mammal Protection Act (MMPA).

The MMPA recognizes that marine mammals are resources of "great international significance, aesthetic and recreational as well as economic." 16 U.S.C. § 1361(6). Congress enacted the MMPA to ensure that population stocks of marine mammals would "not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part." 16 U.S.C. § 1361(2).

In 1984, the AT1 stock of killer whales was made up of at least 22 members. Today, there are nine left and their prospects for recovery appear bleak. Only four of the remaining members are female, and two of those are too old to breed. No new calves have been observed since 1984. The AT1s are rapidly ceasing to be a significant functioning element of the Prince William Sound/Kenai Fjords ecosystem, and easily meet the statutory and regulatory criteria for listing as a depleted population.<sup>1</sup>

### Background

#### Species Description

Killer whales, *Orcinus orca*, are the only living members of the genus *Orcinus*.<sup>2</sup> One of the top predators of the ocean, they have no predators themselves except for humans. They have been observed in all oceans and seas of the world, but are most common in the northern latitudes. Along the West coast of North America, killer whales occur throughout the entire Alaskan coast, in the British Columbia and Washington inland waterways, and along the outer coasts of Washington, Oregon and California.

Roughly the size of a small bus, a twenty-foot adult can weigh anywhere from eight to thirteen thousand pounds. Perhaps the most distinguishing physical characteristic of killer whales is their dramatic black and white coloration. Their jet-black bodies have white patches above the eyes, under the jaw, and on the belly extending up onto their sides. Behind and below the dorsal fin is

<sup>1</sup> The AT1 group is currently considered a part of the eastern North Pacific transient killer whale stock. However, genetic and behavioral differences justify their listing as a separate stock, and the petitioning groups have submitted comments on NMFS' 2002 stock assessment report urging the agency to recognize the AT1 group as a separate stock. The comments are included as Attachment A.

<sup>2</sup> The taxonomic classification of killer whales: Kingdom Animalia; Phylum Chordata (vertebrates); Class Mammalia; Order Cetacea; Suborder Odontoceti (toothed whales); Family Delphinidae (oceanic dolphins); Genus *Orcinus*; Species *orca*.

a gray "saddle patch" that is often scratched and marked. Like human fingerprints, each whale's unique saddle patch markings, coupled with the shape of its dorsal fin, allow positive identification of the individual.

The spectacular dorsal fin of an adult male killer whale may rise six feet above its back, while females and immature males have much smaller, often falcate (curved) fins. Cosmopolitan in their distribution, killer whales may feed on a variety of fish, cephalopods and marine mammals. In the eastern North Pacific, where they perhaps have been best studied, culturally and genetically defined populations with distinctive feeding habits have been well described (Barrett-Lennard 2000; Saulitis et al. 2000).

Gestation in killer whales is approximately seventeen months and, once born, a whale takes over a decade to reach sexual maturity. Killer whales are long-lived and may reach 50 years of age or more.

Behaviorally, killer whales are complex social predators, with life history parameters and a pattern of cognitive development similar to humans (Olesiuk et al. 1990; Osborne 1990; Heimlich-Boran and Heimlich-Boran 1999; Osborne 1999). They have an advanced central nervous and sensory system, an extended juvenile developmental period, and a complex learned communication system. In the eastern North Pacific they have developed distinct cultures and unique populations (Osborne 1990; Morton 1990; Heimlich-Boran and Heimlich-Boran 1999; Ford 1991; Whitehead 1998).

Killer whales of the Pacific Northwest coast of North America are referred to as "residents," "transients," and "offshores." The building block of the resident killer whale social structure is the matrilineal group, or matriline. A matrilineal group, which may be as small as two animals, consists of a female and all her offspring of both sexes. Permanent associations of matrilineal groups are termed "pods." Resident pods usually contain 7-36 individuals; emigration or immigration occurs only by birth or death (Matkin and Saulitis 1994; Matkin et al. 1999).

Breeding apparently does not occur within pods, but between whales from distantly related pods (Barrett-Lennard 2000). A number of associating and potentially interbreeding pods may form a "population," the largest social division. A population can number in the hundreds and can be separated from other populations on the basis of genetic or acoustic analysis and association patterns.

Transient killer whale social structure is more fluid and not as well understood as that of residents. There is some movement of individuals between groups within a population and thus a lack of clearly defined pods. However, at the population level the same separations based on genetic and acoustic analysis and association patterns can be made for transients as for residents.

#### Classification of Killer Whales

Scientists classify Pacific Northwest killer whales into three distinct forms: "residents," "transients," and "offshores."<sup>3</sup> Two of these sympatric (geographically overlapping but non-associating) forms of killer whales occur in the eastern North Pacific, including Prince William Sound and the Kenai Fjords—"transients" and "residents" (Ford et al. 2000; Saulitis et al. 2000). The resident and transient forms are each divided into at least three non-associating populations.

#### a) Resident Killer Whales

Resident killer whales are piscivorous—they prey on fish (Matkin et al. 1997). Resident killer whales remain in their natal pod for life (*Id.*). A pod is made up of multigenerational matrilineal groups, often consisting of a grand mother, her mature offspring, and her offspring's calves (Matkin et al. 1999a).

While resident killer whale pods each have their own repertoire of calls, shared calls between pods suggest a common lineage along matrilineal lines, and historic relationships may be reflected in the degree of call sharing (Matkin et al. 1997).

There are thirteen resident pods in Prince William Sound (*Id.*). During certain parts of the year, resident pods in Prince William Sound feed primarily on coho salmon (*Id.*). Many resident pods occasionally aggregate in Prince William Sound, with temporary mixing of pods. Researchers believe that mating may occur during this social aggregation (*Id.*).

#### b) Transient Killer Whales

While resident killer whales subsist on fish, transient killer whales prey on other marine mammals. Dall's porpoise, a known prey item of transient killer whales, are occasionally found in the company of resident killer whales. The porpoise appear able to readily distinguish between the two forms of killer whales, perhaps on the basis of their distinct vocalizations.

Other documented differences between transients and residents include measurable differences in morphology, group size (transient groups tend to have fewer whales), social organization, and acoustic dialects. Transients and residents avoid one another and do not interbreed, although rare interactions between transients and residents have been observed. Thus, a very small transient group may exist amongst a much larger resident population and be, in every sense, isolated.

Many factors potentially explain the wide cultural gulf between residents and transients. For example, the specialized hunting techniques required for feeding on salmon—including the refinement of echolocation ability and the learning of prey avoidance responses—are clearly different from the techniques required for hunting marine mammals. And the same factors that promote successful hunting of fish may actually decrease the successful hunting of marine mammal prey. For instance, the large group size of resident killer whales may enhance hunting success for salmon through the sharing of echolocation information over wide areas to locate

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<sup>3</sup> Offshore killer whales are recently discovered and have not yet been as extensively photo-identified as the two other forms of killer whales. They have been observed in groups of fifty and more, ranging from southern California to southeastern Alaska (Matkin et al. 1999a). These whales are distinct from, and not known to mix with, any resident or transient populations (NMFS 2000). Genetic analysis indicates that they are reproductively isolated, but are most closely related to the resident type killer whales (*Id.* citing Hoelzel et al. 1998).

patchily distributed salmon schools. In contrast, small group size may enhance the hunting success of transients, which depend upon stealth to capture marine mammal prey. Unlike the noisy, social pods of residents, transient killer whales stalk their prey silently, in small groups. Passive listening, rather than echolocation, may be employed in the prey detection (Saulitis 1993) (Saulitis et al. 2000).

Three transient killer whale populations are present in the eastern North Pacific: the West Coast transients, the Gulf of Alaska transients and the AT1 transients. These three populations are parapatric with respect to each other, i.e. they have separated genetically without geographic isolation (Barrett-Lennard 2000). The West Coast transients of southeast Alaska, British Columbia, and Washington number about 219 members (Ford and Ellis 1999). The Gulf of Alaska transient population is thought to have at least 60 individuals (*Id.*). There are only nine whales in the AT1 group (Matkin 2001). No association has been observed between any of these populations (Barrett-Lennard 2000).

The Gulf of Alaska transients and the AT1 transients inhabit Alaskan waters exclusively. Gulf of Alaska transients are found in the waters west of Glacier Bay (as far as Kodiak), and occasionally enter Prince William Sound, while the AT1 transients live exclusively in Prince William Sound and the Kenai Fjords. There have been no observations of interactions between members of these three populations, and genetic evidence indicates they have been separate for thousands of years (Barrett-Lennard 2000).

#### The AT1 Transient Group

In the 1980s, the AT1 transient group was one of the most frequently encountered killer whale groups in Prince William Sound (Matkin et al. 1999). This is exceptional among transients, because most transients are observed only infrequently, which makes it difficult for researchers to collect information about changes in their groups over time. However, researchers have been able to account for most of the members of the AT1 group each year since 1984 (*Id.*).

The AT1 transient group has been sighted year-round in Prince William Sound, as well as in Resurrection and Aialik Bays of adjacent Kenai Fjords (*Id.*). They specifically favor the southwestern part of Prince William Sound for hunting. While the group is known to have once had as many as twenty-two members, the number of AT1 transients has been reduced by more than half since the 1989 *Exxon Valdez* oil spill (*Id.*).

Nine AT1 whales have not been photographed since 1990, and two more have not been photographed since 1992 (*Id.*). Three now-deceased members of the AT1 group were last seen swimming around the leaking *Exxon Valdez* oil tanker. Two males, AT1 and possibly AT10, died in the last two years. AT1 was found dead in 2000. The body of another killer whale, found in the summer of 2001 near Johnstone Point, was too decomposed at the time to be positively identified, but has since been tentatively verified as a member of AT1 (final genetics tests are still in process due to difficulties in DNA extractions). The deaths of these two whales reduce the known AT1 group population to nine.

Of the remaining nine members, only four are female, and two of those are too old to reproduce (Matkin et al. 1999). No new calves have been observed since 1984 (*Id.*).

In Prince William Sound, AT1 transients feed primarily on Dall's porpoise and harbor seals. When hunting seals, the whales separate and slide along shorelines or through tight, rock-strewn channels. They also forage near tidewater glaciers in search of seals that haul out on the ice floes in late spring. In open water, where Dall's porpoise are found, the AT1 group may spread out across a passage, breathing quietly, milling at the surface, silently awaiting prey. The AT1 group members do not eat fish and they do not interact with the resident pods of Prince William Sound or the Gulf of Alaska transient group.

### **The AT1 Group Should Be Classified as a Depleted Stock under the MMPA**

#### **The AT1 Group Is a Stock**

Petitioners submitted comments on the 2002 NMFS eastern North Pacific transient killer whale stock assessment report urging NMFS to recognize the AT1 group as a separate stock of transient killer whales. See Attachment A. This position is supported by genetics, behavioral patterns, and practical management concerns. The Alaska Regional Scientific Review Group, a committee made up of marine mammal experts which was created to advise NMFS on MMPA issues, has also recommended that the AT1 group be recognized as a separate stock.

#### **The AT1 Stock Is Depleted**

The MMPA defines the term "depleted" as any case in which "the Secretary, after consultation with the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals . . . determines that a species or population stock is below its optimum sustainable population." 16 USC § 1362(1)(A). Section 3(9) of the MMPA defines the optimum sustainable population (OSP) of a stock as "the number of animals which will result in the maximum productivity of the population or species, keeping in mind the carrying capacity (K) of the habitat and the health of ecosystem of which they form a constituent element." 16 USC § 1362(9). NMFS regulations further define OSP as a population size that falls within a range from the population level of a given species or stock that is the largest supportable within the ecosystem (carrying capacity or K) to its maximum net productivity level (MNPL). MNPL is the abundance or population level that results in the greatest net annual increment in population numbers or biomass resulting from additions to the population from reproduction, less losses due to natural mortality. 50 CFR § 216.3.

Historically, MNPL has been expressed as a range of values determined theoretically by estimating the stock size, in relation to K, that will produce the maximum net increase in population abundance. The estimated MNPL has generally been determined to be 50 to 70 percent of K. 67 Fed. Reg. 44132. For marine mammal stock reviews, NMFS has generally used 60% of K as the estimated MNPL, and intends to use that figure for the eastern North Pacific southern resident population of killer whales. *Id.* at 44133. It is therefore appropriate for use in this case.

The carrying capacity of the Prince William Sound/Kenai Fjords area where the AT1 stock ranges is unknown. However, NMFS generally uses the best estimate of maximum historical abundance as a proxy for carrying capacity. *Id.* at 44132.

When observation of the AT1 killer whales began in 1984, there were 22 members of the stock. It is extremely unlikely that this is the maximum historical abundance of the population, but it can be taken as a conservative minimum historical abundance figure. Taking it to be *K*, the OSP would be 60% of 22, or 13 whales. The AT1 stock has now been reduced to nine members, taking it far below this conservative estimate of OSP. Under the MMPA and NMFS' own regulations, the AT1 stock must therefore be designated a depleted stock.

### Causes of the Depletion of the AT1 Stock

The AT1 stock's decline is attributable to a combination of factors. Exposure to crude oil is one probable culprit, as some members of the stock were observed swimming through oil during the 1989 *Exxon Valdez* oil spill, and several animals were never seen again afterward. Chemical contaminants may also play a prominent role. An autopsy performed on one AT1 male which stranded and died in the summer of 2000 revealed extraordinarily high levels of DDT and PCBs in the whale's body tissue. Underwater vessel noise, which continues to increase in Prince William Sound, may disrupt the whales' hunting patterns, and populations of their primary prey, harbor seals, have declined more than 80% over the last thirty years in the Sound.

#### a) *Exxon Valdez* Oil Spill

In 1989, the *Exxon Valdez* ran aground on Bligh Reef in northeastern Prince William Sound, spilling over eleven million gallons of crude oil. Nine AT1 whales have not been photographed since 1990, and two more have not been photographed since 1992. Because they had been sighted so regularly in previous years, those missing whales are presumed to be dead. Three of them were observed swimming in the oil leaking from the *Exxon Valdez* shortly after the spill (Matkin et al. 1999a)

In addition to their direct contact with the oil, AT1 whales were susceptible to ingesting substantial amounts of hydrocarbons by feeding on oiled seals. The harbor seal population in Prince William Sound, already in serious decline before the spill, experienced a 35% decline in oiled areas post-spill. Oiled harbor seals became lethargic, and because transient killer whales usually consume them whole or in large pieces, the AT1 whales probably consumed quantities of oiled prey (Matkin et al. 1999a).

#### b) Chemical Contaminants

Transported across the globe on air and ocean currents, toxic substances such as PCBs and DDT have infiltrated Alaska's coastal food chain. These chemicals, some of which have been banned in the United States for over twenty years, persist in the marine ecosystem, leach from contaminated United States sites, and migrate from other parts of the world to the United States' offshore ecosystems.

Studies indicate that toxic chemicals are altering the habitats of marine life, and bottom dwelling fish in heavily polluted sediments are suffering from liver tumors and other serious diseases. High levels of toxic heavy metals have also been found in the mammalian prey of transient killer whales, and it is likely that these toxins are amplified through the food chain as they are devoured by killer whales, the ecosystem's top predators.

The range of effects of chronic ingestion of DDT and its metabolites include increased risk of mortality and liver tumors, alteration of metabolic and other enzyme systems, neurological effects, estrogenicity, reproductive effects such as failure to reach estrus and poor survivorship of young, and cancer promotion (Smith 1991).

The recent Petition to List the Southern Resident Killer Whales as Endangered Species Under the Endangered Species Act, submitted to NMFS by the Center for Biological Diversity on May 1, 2001, contains a thorough discussion of some of the scientific literature on contaminants in marine mammals and the potential effects to killer whales. See Attachment B, Southern Resident Petition, pp. 32 to 43. That discussion and the studies it relies on are incorporated here by reference.

Transient killer whales' contaminant levels are on average ten to twenty times higher than levels found in resident killer whales. These contaminants consist of DDT and its breakdown compounds, and various PCB compounds, which are known to affect reproduction in marine mammals. Among the seventy-seven killer whales tested in the Gulf of Alaska between 1994 and 1999, the highest levels occurred in transients (Matkin et al. 1999). Among the ten whales sampled in the Gulf of Alaska in 1999 and 2000, several transients appear to be among the most contaminated marine mammals ever measured (Matkin et al. 1999).

#### c) Increased Vessel Traffic

Vessel traffic in Prince William Sound is steadily increasing. In the summer of 2000, the Alaska Department of Transportation completed a road connection to the town of Whittier, Alaska. Whittier sits on the western shore of Prince William Sound, a site that, until the road completion, received relatively little visitation. In the tunnel's first year of operation, visitor traffic to Whittier increased 250% (DOT Estimate of Vehicle Traffic for 2000), and visitation to Prince William Sound is projected to increase fifteen-fold over the coming years (Whittier Access Project BIS 1995).

Vessel traffic is dispersed throughout Prince William Sound and the Kenai Fjords, and the type and size of craft in any one area varies greatly. Tour and fishing boats explore almost every region of the two water bodies, and oil tankers travel through Prince William Sound daily. In 1997, an estimated 662 recreation and tourism boats used Prince William Sound daily. By 2015, that number is expected to increase to between 1,621 and 2,408 boats daily (*Id.*).

Motor noise created by increasing vessel traffic may significantly impact the AT1 stock's ability to hunt. Unlike resident whales, which use echolocation to find schools of salmon and other fish, transients hunt silently, listening for their prey's movement. This makes them particularly sensitive to underwater noise when foraging for marine mammals. Hunting may become



impossible if the ambient noise from vessels is too high (Saulitis et al. 2001), or the increased difficulty of hunting may result in a greater expenditure of energy for less food for the whales.

Greater boat access will mean more use of Prince William Sound for fishing and wildlife viewing. Increased fishing could result in depleted fish stocks, which could impact fish-dependent species that the AT1 whales feed on such as the harbor seal and the Steller sea lion. Increased wildlife viewing is likely to lead to increased harassment, both intentional and unintentional, by wildlife viewers. Harassment is difficult to measure, but cumulatively it has the potential to severely degrade the AT1 whales' habitat by forcing the whales to retreat to areas of Prince William Sound where they can escape the harassment but where their food source may be less sustainable. The killer whale populations of Puget Sound and British Columbia are currently suffering severely from exactly this type of good-intentioned harassment.

Other direct and indirect effects of increased traffic which may have cumulative impacts on the AT1s include increased pollution, increased potential for collisions, and degraded wildlife habitat.

#### d) Reduction in Available Prey Species

AT1 transient whales in Prince William Sound are known to prey primarily on Dall's porpoises and harbor seals. However, the population of harbor seals in North Gulf waters has dropped over 80% in the 20 years from 1977 to 1997 (*Exxon Valdez Oil Spill Trustee Council 1997*). The National Marine Fisheries Service 1998 Stock Assessment for harbor seals states that the "overall Gulf of Alaska stock size remains small compared to its size in the 1970s and 1980s."

Substantial declines in harbor seal populations have occurred specifically in Prince William Sound. Even before the Exxon Valdez oil spill, harbor seals had declined in the Sound by 40% since 1984 (Frost et al. 1999; Frost et al. 1996). After the oil spill, the harbor seal population in the area declined an additional 18-19% (Frost et al. 1996). The latest data show a total decline throughout the Sound of 58% since 1984 (Frost et al. 1999), and an 80% reduction in harbor seal numbers in Prince William Sound since 1973. In contrast, harbor seal numbers in British Columbia, southeastern Alaska and Washington State have been increasing at 12% per year since 1970 (Olesiuk et al. 1990).

#### Conclusion

The AT1 stock of transient killer whales is rapidly ceasing to be a significant and functioning element of the Prince William Sound/Kenai Fjords area ecosystem. It seems certain that a failure to recognize the difficulties the AT1 stock faces and attempt to redress them will end in the extirpation of the population.

A depleted listing will allow NMFS to put together a conservation plan with steps to protect the AT1 stock. It will also focus attention and research money on the whales, both of which are necessary to save the population and to learn from its difficulties. A depleted listing is required by both the letter and spirit of the MMPA, and petitioners urge NMFS to take this opportunity to

ensure that the genetically and behaviorally unique AT1 population of transient killer whales does not simply vanish without a trace.

Please keep me informed of your decision and contact me if I can provide more information.

Sincerely,



Jim Adams  
Counsel, Alaska Office  
National Wildlife Federation  
750 West Second Ave, #200  
Anchorage, AK 99501  
(907) 258-4802  
adamsj@nwf.org