

than half since the 1989 *Exxon Valdez* oil spill (Matkin *et al.*, 1999). Only 11 members of the AT1 group have been seen since 1992 and the missing 11 members are either known or presumed to be dead (Matkin *et al.* 2000). Two additional males from this group have been confirmed dead within the past few summers. The deaths of these two whales reduced the known AT1 group to nine individuals. Of the remaining nine members, four are female. No new calves have been observed since the AT1 group was first recognized in 1984.

Identifying a "Population Stock" or "Stock" Under the MMPA

To designate the AT1 group of killer whales as a depleted stock under the MMPA, it must be a "population stock" or "stock". Section 3(11) of the MMPA defines "population stock" or "stock" as a group of marine mammals of the same species or smaller taxon, in a common spatial arrangement, that interbreeds when mature. Under the MMPA, population stocks must be identified and stock assessment reports must be prepared on the basis of the best scientific information available.

To interpret this definition fully, the objectives of the MMPA must be considered. Section 2(2) of the MMPA (16 U.S.C. 1361(2)(2)) states that species and population stocks of marine mammals "should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem in which they are a part, and, consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population." Further, section 2(6) provides that "the primary objective of their management should be to maintain the health and stability of the marine ecosystem. Whenever consistent with this primary objective, it should be the goal to obtain an optimum sustainable population, keeping in mind the carrying capacity of the habitat." Stocks must be identified in such a way that is consistent with these goals.

In interpreting the MMPA's guidance to identify stocks of marine mammals, NMFS reviewed legislative guidance related to population stocks and consequences for making incorrect decisions in its guidelines for preparing marine mammal stock assessment reports (see Electronic Access). In these guidelines, NMFS states, "For the purposes of management under the MMPA, a stock is recognized as being a management unit that identifies a demographically isolated biological population. It is recognized that in practice, defined stocks may fall short of

this ideal because of a lack of information, or for other reasons." The guidelines further stated, "Many types of information can be used to identify stocks of a species: distribution and movements, population trends, morphological differences, genetic differences, contaminants and natural isotope loads, parasite differences, and oceanographic habitat differences. Evidence of morphological or genetic differences in animals from different geographic regions indicates that these populations are reproductively isolated. Reproductive isolation is proof of demographic isolation, and thus separate management is appropriate when such differences are found." NMFS considered the following lines of evidence regarding the AT1 group of killer whales in proposing this stock determination: association information, acoustic and dialect differences, and genetic differences between AT1 and other groups of transient killer whales.

Association Information

The association data, which includes information on the movements and distribution of transient killer whales, support the conclusion that the AT1 group is discrete from other transient killer whales in Alaska. Although the distributions of AT1 killer whales and other transient killer whales have limited overlap, the AT1 group of transient killer whales does have never been seen moving in association with sympatric resident killer whale pods or with other transient groups that occasionally use Prince William Sound (Matkin *et al.* 1999a).

Matkin and Saulitis (1994) reported that seven different groups of GOA transients have been seen using Prince William Sound, that most of the whales in these seven groups were photographed only once, and that whales from the GOA transients were usually seen only once in a season. The AT1 group is regularly encountered in Prince William Sound and has been seen only in Prince William Sound and the Kenai Fjords. Matkin and Saulitis (1994) also reported that other transient whales were never seen mixing with the AT1 group.

Acoustic Differences

Acoustic analysis of the calls made by transient killer whales in Alaska provides further support for the discreteness of the AT1 group. Like many species of dolphins, killer whales have developed and depend on a complex system of communication and echolocation. Scientists have been able to distinguish different populations of killer whales by their vocal repertoire,

and dialects of some killer whale groups have remained constant for more than 25 years (Ford *et al.*, 2000).

The AT1 group has a vocal dialect distinct from that of any resident pod or other transient group in the eastern North Pacific (Saulitis *et al.*, 1993; Matkin *et al.*, 1999). Researchers have identified 14 discrete pulsed calls for the AT1 group in addition to echolocation clicks, and only one call produced by the AT1 group is similar to any other call used by transient groups between southeast Alaska and California (Saulitis, 1993). Under the assumption that the acoustic repertoire is learned at a young age and is thought to be relatively fixed for life, then the AT1 group has been separate for at least a period longer than the oldest individual in the group.

Genetic Relationships

At this time, NMFS recognizes one stock of transient killer whales, the eastern North Pacific stock. However, recent genetic analyses indicate that a finer structure exists and that the eastern North Pacific stock may consist of up to three stocks.

The population structure of transients in the North Pacific has been investigated by Barrett-Lennard (2000), who identified three groups of mammal-eating killer whales using genetics: WC transients, GOA transients, and the AT1 transients. Mitochondrial DNA (mtDNA) and nuclear DNA analyses indicate that the AT1 group is genetically isolated from the other killer whales within the currently defined eastern North Pacific transient stock (Barrett-Lennard, 2000; Matkin *et al.*, 1999).

mtDNA: Until recently, the mtDNA haplotype, which is inherited only from the mother, found in the AT1 whales has not been found in killer whales from other populations (Barrett-Lennard, 2000). The "AT1 haplotype" has recently been found in 4 whales from the Bering Sea area, which might suggest that there are individuals closely related to the AT1 group that frequent other parts of the North Pacific. However, mtDNA haplotypes are often of limited use in determining whether a particular individual is a member of a particular population. In contrast, mtDNA haplotype frequencies are very useful in describing population structure. Since all members of the AT1 group have the so-called AT1 haplotype, and only a few individuals in the Bering Sea have been found to have this haplotype, it is clear that the frequencies are quite different, which strongly suggests they are separate populations. Preliminary analysis of photographs of the Bering Sea whales