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# HUMPBACK WHALE (*Megaptera novaeangliae*): Central North Pacific Stock

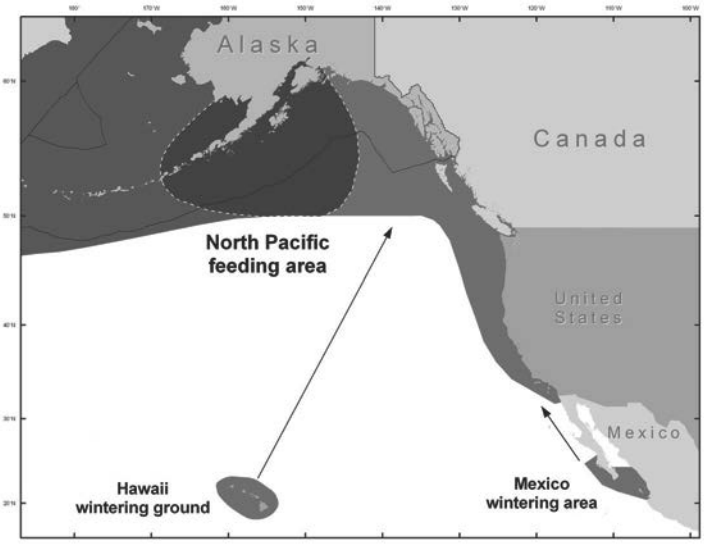
## STOCK DEFINITION AND GEOGRAPHIC RANGE

The humpback whale is distributed worldwide in all ocean basins, though in the North Pacific region it does not occur in Arctic waters. In winter, most humpback whales occur in the subtropical and tropical waters of the Northern and Southern Hemispheres. Humpback whales in the high latitudes of the North Pacific are seasonal migrants that feed on euphausiids and small schooling fishes (NMFS 1991, Clapham and Mead 1999). The historic feeding range of humpback whales in the North Pacific encompassed coastal and inland waters around the Pacific Rim from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Nemoto 1957, Tomlin of St. Lawrence Island (Moore et al. 2000).

1967, Johnson and Wolman 1984). A vessel survey in the central Bering Sea in July of 1999 documented 17 humpback whale sightings, most of which were distributed along the eastern Aleutian Island chain and along the U.S.-Russia Convention Line south

Humpback whales have been known to enter the Chukchi Sea (Johnson and Wolman 1984). The humpback whale population in much of this range was considerably reduced as a result of intensive commercial exploitation during the 20th century.

**Figure 39.** Approximate distribution of humpback whales in the eastern North Pacific (shaded area). Feeding and wintering areas are presented above (see text). Area within the dotted line is known to be an area of overlap with Western North Pacific stock. See Figure 38 for distribution of humpback whales in the western North Pacific.




Aerial, vessel, and photo-identification surveys and genetic analyses indicate that within the U. S. Exclusive Economic Zone (EEZ) there are at least three relatively separate populations that migrate between their respective summer/fall feeding areas to winter/spring calving and mating areas (Calambokidis et al. 1997, Baker et al. 1998; Figs. 38 and 39): 1) winter/spring populations in coastal Central America and coastal Mexico which migrate to the coast of California to southern British Columbia in summer/fall (Calambokidis et al. 1989, Steiger et al. 1991, Calambokidis et al. 1993) - referred to as the California/Oregon/Washington and Mexico stock; 2) winter/spring populations of the Hawaiian Islands which migrate to northern British Columbia/Southeast Alaska and Prince William Sound west to Unimak Pass (Baker et al. 1990, Perry et al. 1990, Calambokidis et al. 1997) - referred to as the Central North Pacific stock; and 3) winter/spring populations of Japan which, based on Discovery Mark

information, probably migrate primarily to waters west of the Kodiak Archipelago (the Bering Sea and Aleutian Islands) in summer/fall (Berzin and Rovnin 1966, Nishiwaki 1966, Darling 1991) - referred to as the Western North Pacific stock. Winter/spring populations of humpback whales also occur in Mexico's offshore islands. The migratory destination of those whales is not well known (Calambokidis et al. 1993, Calambokidis et al. 1997), although some whales from the Revillagigedo Archipelago have been matched to animals seen west of Kodiak, Alaska (Witteveen et al. 2004). Some recent exchange between winter/spring areas has been documented (Darling and McSweeney 1985, Baker et al. 1986, Darling and Cerchio 1993), as well as movement between Japan and British Columbia, and Japan and the Kodiak Archipelago (Darling et al. 1996, Calambokidis et al. 1997), although recent preliminary data suggest some of these whales summer in the western Gulf of Alaska and Bering Sea (Witteveen et al. 2004). Calambokidis et al. (2001) concludes that there are at least three subpopulations of humpback whales on the wintering grounds (Hawaii, Japan, and Mexico), and possibly as many as six subpopulations, with subdivisions in Mexico, Japan, and Central America.

Currently, there are insufficient data to apply the Dizon et al. (1992) phylogeographic approach to classify population structure in humpback whales. Until further information becomes available, three stocks of humpback whales are recognized within the U. S. EEZ of the North Pacific: one in the eastern North Pacific (the California/Oregon/Washington - Mexico stock), one in the central North Pacific, and one in the western North Pacific. The California/Oregon/Washington - Mexico humpback whale stock is reported separately in the Stock Assessment Reports for the Pacific Region. Data from a large-scale study throughout the North Pacific conducted in 2004-06 (the SPLASH project) are expected to provide a much more comprehensive understanding of humpback whale population structure in the North Pacific in the near future.

The Central North Pacific stock of humpback whales consists of feeding aggregations along the northern Pacific Rim, and some humpbacks are present offshore in the Gulf of Alaska (Brueggeman et al. 1989). Humpback whales are also present in the Bering Sea (Moore et al. 2002); it is not conclusively known whether those animals belong to the Western or Central North Pacific stocks, or to a separate, unnamed stock. Three feeding areas for the Central North Pacific stock that have been studied using photo-identification techniques: southeastern Alaska, Prince William Sound, and Kodiak Island. There has been some exchange of individual whales between these locations. For example, six whales have been sighted in both Prince William Sound and southeastern Alaska since studies began in 1977 (Perry et al. 1990; von Ziegesar et al. 1994; S. Baker, D. McSweeney, J. Straley, O. von Ziegesar, unpubl. data; Mizroch et al. 2004); nine whales have been sighted between Kodiak Island, including the area adjacent to Kodiak along the Kenai Peninsula, and Prince William Sound; two whales have been sighted between Kodiak and southeastern Alaska (Waite et al. 1999). Calambokidis et al. (2001) reports interchange between Kodiak, Prince William Sound, and Southeast Alaska, although the number of individuals seen in multiple locations is small. Mizroch et al. (2004) examined photographs from 1979 to 1996 and reported that less than 1% of the individual whales photographed in either Southeast Alaska or Prince William Sound moved between areas. Based on sightings across all Alaska feeding areas, fewer than 2% of the individuals were seen in more than one area (Mizroch et al. 2004). Fidelity to feeding areas is maternally directed; that is, whales return to the feeding areas where their mothers first brought them as calves (Martin et al. 1984, Baker et al. 1987).

As noted above, there is very little interchange documented between the Southeast Alaska feeding area and the Prince William Sound, Kodiak, and Shumagin Islands feeding areas to the north. Because of the documented lack of interchange, it is possible that a reduction in the population in the Southeast Alaska feeding area would not be augmented by animals that normally use other feeding areas within a timeframe relevant to managers. Thus, NMFS is considering whether the Southeast Alaska feeding area, and possibly other feeding areas in the North Pacific, should be formally designated as separate stocks under the MMPA. In preparation for this decision, a PBR level and annual mortality rates will be calculated for the Southeast Alaska feeding area and included in the report for the entire Central North Pacific humpback whale stock in order to guide managers in prioritizing conservation actions.

**POPULATION SIZE**

The current abundance estimate of humpback whales in the North Pacific is based on data collected by nine independent research groups that conducted photo-identification studies of humpback whales in the three wintering areas (Mexico, Hawaii, and Japan). Photographs taken between 1991 and 1993 were used to estimate abundance because samples throughout the entire North Pacific were the largest and most complete during this period. Using Darroch's (1961) method, which uses only data from wintering areas, and averaging the 1991-92, 1992-93, and 1991-93 winter release-recovery information results in an abundance estimate of 4,005 (CV = 0.095) for the entire central North Pacific humpback whale stock (Calambokidis et al. 1997).

Photo-identification methods were used to identify 315 individual humpback whales in Prince William Sound from 1977 to 2001 (von Ziegesar 1992, Waite et al. 1999, von Ziegesar et al. 2004). Waite et al. (1999) identified 127 individuals in the Kodiak area between 1991 and 1994, and calculated a total annual abundance estimate of 651 (95% CI: 356-1,523) for the Kodiak region. Witteveen et al. (2004) conducted a mark-recapture study near the Shumagin Islands from 1999-2002 and estimated a total population size of 410 (95% CI: 241-683). It is not known how many animals occurring in the Shumagin Islands belong to the Western or Central North Pacific stock.

This stock of humpback whales winters in Hawaiian waters (Baker et al. 1986). Baker and Herman (1987) used capture-recapture methods in Hawaii to estimate the population at 1,407 (95% CI: 1,113-1,701), which they considered an estimate for the entire stock (NMFS 1991). However, the robustness of this estimate is questionable due to the opportunistic nature of the survey methods in conjunction with a small sample size. Further, the data used to produce this estimate were collected between 1980 and 1983. Mobley et al. (2001) conducted aerial surveys throughout the main Hawaiian Islands during 1993, 1995, 1998, and 2000. Abundance during these surveys was estimated as 2,754 (95% CI: 2,044-3,468), 3,776 (95% CI: 2,925-4627), 4,358 (95% CI: 3,261-5,454), and 4,491 (95% CI: 3,146-5,836). These estimates, which are based on line transect methods, are slightly more conservative than the estimates determined using mark-recapture techniques, perhaps due to computational problems associated with the assumption that there is a heterogeneous sighting probability across different regions of Hawaii.

In the Northern British Columbia region (primarily near Langara Island), 275 humpback whales were photo-identified from 1992 to 1998 (G. Ellis, Pacific Biological Station, pers. comm.). As of 2003, approximately 850-1,000 humpback whales have been identified in British Columbia (J. Ford, Department of Fisheries and Oceans, Canada, pers. comm.); it is not known how many of these animals match with animals identified in U.S. waters.

Different studies have used different approaches to estimate the abundance of animals in Southeast Alaska. Baker et al. (1992) estimated an abundance of 547 (95% CI: 504-590) using data collected from 1979 to 1986. Straley (1994) recalculated the estimate using a different analytical approach (Jolly-Seber open model for capturerecapture data) and obtained a mean population estimate of 393 animals (95% CI: 331-455) using the same 1979 to 1986 data set. Using data from 1986 to 1992 and the Jolly-Seber approach, Straley et al. (1995) estimated that the annual abundance of humpback whales in southeastern Alaska was 404 animals (95% CI: 350-458). Straley et al. (2002) examined data for the northern portion of Southeast Alaska from 1994 to 2000 and provided an updated abundance estimate of 961 (95% CI: 657-1,076).

The sum of the available estimates for the known feeding areas is 2,036 (149 in PWS, 651 in Kodiak, 961 in Southeast, and 275 in British Columbia), which is well below the Calambokidis et al. (1997) estimate of 4,005 based on data collected from 1991 to 1993. However, the estimate for Southeast Alaska is known to be a minimum estimate because there is little to no photo-identification effort in the lower half of Southeast Alaska (south of Frederick Sound). In addition, many humpback whales feed seasonally near the Shumagin Islands, where photoidentification studies have only recently been initiated, and humpbacks are seen pelagically in the Gulf of Alaska. Also, Moore et al. (2002) have documented humpback whales in the Bering Sea, and it is not known whether these animals belong to the Central or Western North Pacific humpback whale stock.

**Minimum Population Estimate**

The minimum population estimate ($N_{MIN}$) for this stock is calculated according to Equation 1 from the PBR Guidelines (Wade and Angliss 1997): $N_{MIN} = N/\exp(0.842H[\ln(1+[CV(N)]^2)]^{½})$. Using the population estimate (N) of 4,005 (estimated in 1993; Calambokidis et al. 1997) and its associated CV(N) of 0.095, $N_{MIN}$ for the entire Central North Pacific humpback whale stock is 3,698. Although the Southeast Alaska feeding aggregation is not being formally considered a stock, the calculation of a PBR for this area may be useful for management purposes. Using the population estimate (N) of 961 and its associated CV(N) of 0.12, $N_{MIN}$ for this aggregation is 868.

**Current Population Trend**

Comparison of the estimate for the entire stock provided by Calambokidis et al. (1997) with the 1981 estimate of 1,407 (95% CI: 1,113-1,701) from Baker and Herman (1987) suggests that the stock increased in abundance between the early 1980s and early 1990s. However, the robustness of the Baker and Herman (1987) estimate is questionable due to the small sample size and opportunistic nature of the survey. Mizroch et al. (2004) calculate an annual population rate of increase of 10%. This is within the range of 8.8 to 14.4% reported by Best (1993) for humpback whales off South Africa, and is identical to the 10% value reported by Bannister and Hedley (2001) for humpback whales off western Australia. Mobley et al. (2001) estimated an annual increase of 7% for 1993-2000 using data from

aerial surveys that were conducted in a consistent manner for several years across the main Hawaiian Islands and were developed specifically to estimate a trend for the Central stock. Zerbini et al. (in press) used line transect data from sequential surveys to estimate a trend of 6.6% (95% CI: 4.7-8.4%).

The estimated number of animals in the Southeast Alaska portion of this stock has increased. The 2000 estimate of 961 (Straley et al. 2002) is substantially higher than estimates from the early and mid-1980s. A trend for the Southeast Alaska portion of this stock cannot be estimated from the data, however, because of differences in methods and areas covered.

## CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

Using a birth-interval model, Barlow and Clapham (1997) have estimated a population growth rate of 6.5% (SE = 1.2%) for the well-studied humpback whale population in the Gulf of Maine. Mobley et al. (2001) conducted annual surveys of the humpback whale breeding grounds in Hawaii and estimated a rate of increase of 7% for the period 1993-2000. Furthermore, it is clear that the abundance has increased in Southeast Alaska in recent years. While 7% is the best available estimate of current rate of increase, and may or may not be the same as the stock's maximum net productivity rate, it seems reasonable to use 0.07 as a new, conservative estimate of the maximum net productivity rate.

## POTENTIAL BIOLOGICAL REMOVAL

Under the 1994 reauthorized Marine Mammal Protection Act (MMPA), the potential biological removal (PBR) is defined as the product of the minimum population estimate, one-half the maximum theoretical net productivity rate, and a recovery factor: $PBR = N_{MIN} \times 0.5R_{MAX} \times F_R$. The recovery factor ($F_R$) for this stock is 0.1, the recommended value for cetacean stocks listed as endangered under the Endangered Species Act (Wade and Angliss 1997). The default value of 0.04 for the maximum net productivity rate will be replaced by 0.07, which is the best estimate of the current rate of increase and is considered a conservative estimate of the maximum net productivity rate. Thus, for the entire Central North Pacific stock of humpback whale, PBR = 12.9 animals (3,698 × 0.035 × 0.1). The PBR level for the Southeast Alaska portion of this stock, PBR = 3.0 animals (868 × 0.035 × 0.1), and the PBR level for the northern portion of the stock is 9.9 animals (12.9 – 3.0).

## ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

### Fisheries Information

Until 2004, there were four different federally-regulated commercial fisheries in Alaska that occurred within the range of the Central North Pacific humpback whale stock that were monitored for incidental mortality by fishery observers. As of 2004, changes in fishery definitions in the List of Fisheries have resulted in separating these four fisheries into 17 fisheries (69 FR 70094, 2 December 2004). This change does not represent a change in fishing effort, but provides managers with better information on the component of each fishery that is responsible for the incidental serious injury or mortality of marine mammal stocks in Alaska. Between 2000 and 2004, there were incidental serious injuries and mortalities of Central North Pacific humpback whales in the Bering Sea/Aleutian Islands sablefish pot fishery (Table 37). Estimates of marine mammal serious injury/mortality in observed fisheries are provided in Perez (2006).

**Table 37.** Summary of observer reported incidental mortalities and serious injuries of humpback whales (Central North Pacific stock) due to commercial fisheries from 2000 through 2004 and calculation of the mean annual mortality rate. Details of how percent observer coverage is measured is included in Appendix 6. * Mortality seen by observer, but not during a monitored haul. ** These mortalities occurred in an area of known overlap with the Western North Pacific stock of humpback whales. Since the stock identification is unknown, the mortalities are reflected in both stock assessments.

| Fishery name | Years | Data type | Observer coverage | Observed mortality (in given yrs.) | Estimated mortality (in given yrs.) | Mean annual mortality |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| Bering Sea sablefish pot | 2000<br>2001<br>2002<br>2003<br>2004 | obs data | 62.6 38.7<br>40.6 21.7<br>49.1 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0*<br>1<br>0 | 0.20**(N/A) |
| Minimum total annual mortality | | | | | | North: 0.2<br>SE: 0.0<br>Total: 0.2 |

Reports of entangled humpback whales found swimming, floating, or stranded with fishing gear attached occur in both Alaskan and Hawaiian waters. All reports of mortalities or injuries of humpback whales from the Central North Pacific stock from 2001 to 2005 are provided in Appendix 8 and a summary of the information is provided in Table 38. Overall, there were 54 reports of human-related mortalities or injuries during this 5-year period. Of these, there were 40 incidents which involved commercial fishing gear, and 15 of those incidents involved serious injuries or mortalities. This estimate is considered a minimum because not all entangled animals strand and not all stranded animals are found, reported, or cause of death determined.

**Table 38.** Summary of Central North Pacific humpback whale mortalities and serious injuries caused by entanglement and ship strikes from stranding reports, 2001-2005. A summary of information used to determine whether an injury was serious or non-serious is included in Appendix 8. Fisheries with zero average annual mortality indicate historical marine mammal interactions.

| Area | Human activity/fishery | Year | Mortality | Serious | Not determinable | Average annual serious injury/ mortality rate (2001-2005) |
|---|---|---|---|---|---|---|
| North | Ship strike | 2001<br>2002<br>2003<br>2004<br>2005 | 1<br>0<br>0<br>0<br>1 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>1 | 0.4 |
| | Unspecified gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 2<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>1 | 0.4 |
| | Salmon set gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0 0<br>0<br>0<br>0 | 0 0<br>0<br>0<br>0 | 0 |
| | Unspecified gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | 1<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>1 | 0<br>0<br>0<br>0<br>0 | 0.4 |
| | Purse seine | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0.0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Unspecified pot gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0 0 | 0.0 |
| | Crab pot gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0 0 | 0.0 |
| | Yakutat salmon set gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | 1<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0 0<br>0<br>0<br>0 | 0.2 |

| Area | Human activity/fishery | Year | Mortality | Serious | Not determinable | Average annual serious injury/ mortality rate (2001-2005) |
|---|---|---|---|---|---|---|
| | Cook Inlet salmon set gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | N/A<br>N/A<br>N/A<br>N/A<br>0 | N/A<br>N/A<br>N/A<br>N/A<br>1 | N/A N/A<br>N/A<br>N/A<br>0 | 0.2 |
| | Kodiak salmon purse seine | 2001<br>2002<br>2003<br>2004<br>2005 | N/A<br>N/A<br>N/A<br>N/A<br>1 | N/A<br>N/A<br>N/A<br>N/A<br>0 | N/A N/A<br>N/A<br>N/A<br>0 | 0.2 |
| | Lower Cook Inlet salmon purse seine | 2001<br>2002<br>2003<br>2004<br>2005 | N/A<br>N/A<br>N/A<br>N/A<br>1 | N/A<br>N/A<br>N/A<br>N/A<br>0 | N/A N/A<br>N/A<br>N/A<br>0 | 0.2 |
| | Average annual serious injury/mortality rate fishery only | | | | | 1.6 |
| | Average annual serious injury/mortality rate total | | | | | 2.0 |
| SE | Ship strike | 2001<br>2002<br>2003<br>2004<br>2005 | 1<br>0<br>1<br>2<br>1 | 0<br>0<br>0<br>1<br>1 | 0<br>0<br>0<br>0<br>0 | 1.4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Unspecified gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>2<br>0 | 0<br>2<br>0<br>1<br>1 | 0.4 |
| | Salmon set gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0.0 |
| | Unspecified gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>1 | 0<br>0<br>0<br>0 1 | 0.2 |
| | Purse seine | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 0.0 |
| **Area** | **Human activity/fishery** | **Year** | **Mortality** | **Serious** | **Not determinable** | **Average annual serious injury/ mortality rate (2001-2005)** |
| | Unspecified pot gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 1<br>0<br>0<br>0<br>0 | 0.0 |
| | Crab pot gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>1<br>0<br>2 | 0<br>0<br>0<br>1<br>2 | 0.6 |
| | SE salmon drift gillnet | 2001<br>2002<br>2003<br>2004<br>2005 | N/A<br>N/A<br>N/A<br>N/A<br>1 | N/A<br>N/A<br>N/A<br>N/A<br>0 | N/A N/A<br>N/A<br>N/A<br>0 | 0.2 |
| | Average annual serious injury/mortality rate fishery only | | | | | 1.4 |
| | Average annual serious injury/mortality rate total | | | | | 2.8 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Hawaii | Unspecified gear | 2001<br>2002<br>2003<br>2004<br>2005 | 0<br>0<br>0<br>0<br>0 | 0<br>0<br>0<br>0<br>0 | 1<br>0<br>0<br>0 0 | 0.0 |
| | Average annual serious injury/mortality rate fishery only | | | | | 0.0 |
| | Average annual serious injury/mortality rate total | | | | | 0.0 |

The overall U. S. commercial fishery-related minimum mortality and serious injury rate for the entire stock is 3.2 humpback whales per year, based on observer data from Alaska (0.20), stranding records from Alaska (3.0), and stranding records from Hawaii (0). The estimated fishery-related minimum mortality and serious injury rate incidental to commercial fisheries for the northern portion of the stock is 1.8 humpback whales per year, based on observer data from Alaska (0.20), stranding records from Alaska (1.6) and stranding data from Hawaii (0) (Table 38). The estimated minimum mortality and serious injury rate incidental to the commercial fisheries in Southeast Alaska is 1.4 humpback whales per year, based on stranding records from Alaska (1.4), and stranding data from Hawaii (0) (Table 38).

As mentioned previously, these estimates of serious injury/mortality levels should be considered a minimum. No observers have been assigned to several fisheries that are known to interact with this stock, making the estimated mortality rate unreliable. Further, due to limited Canadian observer program data, mortality incidental to Canadian commercial fisheries (i.e., those similar to U.S. fisheries known to interact with humpback whales) is uncertain. Though interactions are thought to be minimal, data regarding the level of humpback whale mortality related to commercial fisheries in northern British Columbia are not available, again indicating that the estimated mortality incidental to commercial fisheries is underestimated for this stock.

**Subsistence/Native Harvest Information**

Subsistence hunters in Alaska have not been reported to take from this stock of humpback whales.

**Other Mortality**

Ship strikes and other interactions with vessels unrelated to fisheries have also occurred to humpback whales. Those cases are included in Appendix 8 and summarized in Table 38. Of those, nine ship strikes constitute "other sources" of mortality or serious injury; seven of these ship strikes occurred in Southeast Alaska and two occurred in the northern portion of this stock's range. It is not known whether the difference in ship strike rates between Southeast Alaska and the northern portion of this stock is due to differences in reporting, amount of vessel traffic, densities of animals, or other factors. Averaged over the year period from 2001 to 2005, these account for an additional 1.8 humpback whale mortalities per year for the entire stock (0.4 ship strikes/year for the northern portion of the stock, and 1.4 strikes/year for the southeast portion).

**HISTORIC WHALING**

The number of humpback whales in the North Pacific may have numbered approximately 15,000 individuals prior to exploitation (Rice 1978). Intensive commercial whaling removed more than 28,000 animals from the North Pacific during the 20th century and may have reduced this population to as few as 1,000 before it was placed under international protection after the 1965 hunting season (Rice 1978). This mortality estimate likely underestimates the actual kill as a result of under-reporting of Soviet catches (Yablokov 1994).

**STATUS OF STOCK**

As the estimated annual mortality and serious injury rate for the entire stock (5.0; 3.2 of which were fishery-related; Table 39) is considered a minimum, it is unclear whether the level of human-caused mortality and serious injury exceeds the PBR level (12.9) for the entire stock. The estimated annual mortality and serious injury rate in Southeast Alaska (2.8, of which 1.4 were fishery-related) is less than the PBR level if calculated only for the Southeast Alaska portion of the population (3.0). The minimum estimated U. S. commercial fishery-related mortality and serious injury for this stock is not less that 10% of the calculated PBR for either the entire stock or the portion of the stock in Southeast Alaska and, therefore, can not be considered to be insignificant and approaching a zero mortality and serious

injury rate. The humpback whale is listed as "endangered" under the Endangered Species Act, and therefore designated as "depleted" under the MMPA. As a result, the Central North Pacific stock of humpback whale is classified as a strategic stock. However, the status of the entire stock relative to its Optimum Sustainable Population size is unknown.

**Table 39.** Summary of serious injury (SI) and mortality (M) levels for the Central North Pacific (CNP) stock of humpback whales. * The average annual SI/M in HI is 0. ** This is the sum of the observed SI/M (0.2), the AK strandings (3.0), and the average HI stranding rate (0). *** This is the sum of 3.2 + 1.8.

| Area | Data types for fishery-related information | | | | Ship strikes | Total | "PBR" |
|---|---|---|---|---|---|---|---|
| | Observer data | AK Strand. | HI Strand. | Total fish. | | | |
| Northern | 0.2 | 1.6 | 0 | 1.8 | 0.4 | 2.2 | 9.9 |
| Southeast | N/A | 1.4 | 0 | 1.4 | 1.4 | 2.8 | 3.0 |
| TOTAL | 0.2 | 3.0 | 0* | 3.2** | 1.8 | 5.0*** | 12.9 |

**Habitat Concerns**

This stock is the focus of a large whale watching industry in its wintering grounds (Hawaii) and a growing whale watching industry in its summering grounds (Alaska). Regulations concerning minimum distance to keep from whales and how to operate vessels when in the vicinity of whales have been developed for Hawaii waters in an attempt to minimize the impact of whale watching. In 2001, NMFS issued regulations to prohibit most approaches to humpback whales in Alaska within 100 yards (91.4 m; 66 FR 29502; 31 May 2001). The growth of the whale watching industry, however, is a concern as preferred habitats may be abandoned if disturbance levels are too high. High levels of sound from the Acoustic Thermometry of Ocean Climate (ATOC) program, the U.S. Navy's Low Frequency Active (LFA) sonar program, and other anthropogenic sources (i.e., shipping and whale watching) in Hawaii waters is of potential concern for this stock. Results from experiments in 1996 off Hawaii indicated only subtle responses of humpback whales to ATOC-like transmissions (Frankel and Clark 1998). Frankel and Clark (2002) indicated that there were also slight shifts in humpback whale distribution in response to ATOC. Efforts are underway to evaluate the relative contribution of sound (e.g., experiments with LFA sound sources) to Hawaii's marine environment, although reports summarizing the results of recent research are not available.

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