Revised 5/1/03

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

STOCK DEFINITION AND GEOGRAPHIC RANGE

The humpback whale is distributed worldwide in all ocean basins, though it is less common in Arctic waters. In winter, most humpback whales occur in the temperate and tropical waters of the North and South Hemispheres (from 10°-23° latitude). Humpback whales in the North Pacific are seasonal migrants that feed on zooplankton and small schooling fishes in the cool, coastal waters of the western United States, western Canada, and the Russian Far East (NMFS 1991). 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 1967, Johnson and Wolman 1984). A recent vessel survey in whales in the western North Pacific. 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 of St. Lawrence Island (Moore et al. 2000). These recent sightings clearly demonstrate that the Bering Sea remains an important feeding area. 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.

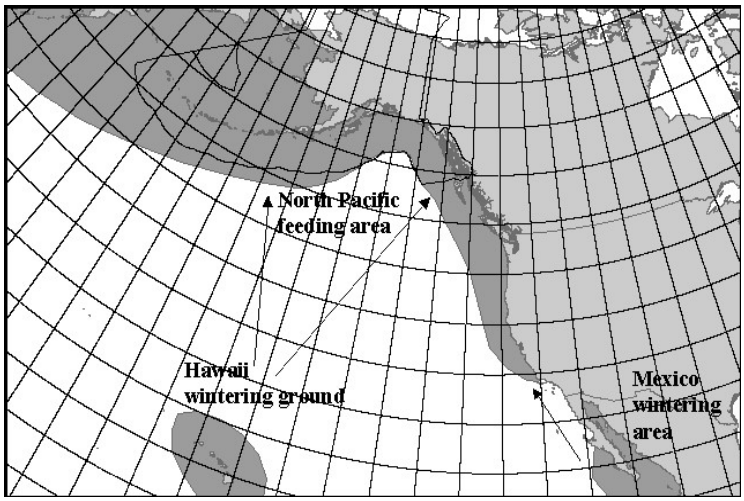

Figure 34. Approximate distribution of humpback whales in the eastern North Pacific (shaded area). Feeding and wintering areas are presented above (see text). See Figure 33 for distribution of humpback and Wolman

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. 33 and 32): 1) winter/spring populations in coastal Central America and Mexico which migrate to the coast of California4 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 Kodiak (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 Tag information, probably migrate 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 these whales is not well known (Calambokidis et al. 1993, Calambokidis et al. 1997). 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).

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, 3 stocks of humpback whales (as described above) 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.

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 these animals belong to the western or central North Pacific stocks. Three feeding areas for the Central North Pacific stock that have been studied using photo-identification techniques are 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 Prince William Sound and southeastern Alaska since studies began in 1977 (Perry et al. 1990, von Ziegesar et al. 1994; S. Baker, D. McSweeny, J. Straley, O. von Ziegesar, unpubl. data, Mizroch et al., in review); nine whales have been sighted between Kodiak Island, including the area adjacent to Kodiak along the Kenai Peninsula, and Prince William Sound; and 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. No interchange was reported between the Shumagin Islands and any other feeding area; however, given that the number of animals photographed in the vicinity of the Shumagin Islands was very small (15), this result may not be surprising. Mizroch et al. (in review) examined photographs from 1979 to 1996 and reported that under 1% of the individual whales photographed in either Southeast Alaska or Prince William Sound moved between areas. Fidelity to feeding areasis 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 severe reduction in the population in the Southeast Alaska feeding area would not be augmented by animals frequenting 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

This stock of humpback whales winters in Hawaiian waters (Baker et al. 1986). Baker and Herman (1987) used capture-recapture methodology 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 methodology in conjunction with a small sample size. Further, the data used to produce this estimate were collected between 1980 and 1983.

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 utilizes 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 149 individual humpback whales identified in Prince William Sound from 1977 to 1993 (von Ziegesar 1992, Waite et al. 1999). The abundance of the Prince William Sound feeding aggregation is thought to be less than 200 whales (Waite et al. 1999). 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.

Photo-identification studies initiated to the west of Kodiak Island in 1999 have identified approximately 350 individual humpback whales, and matches between these animals and animals documented in Hawaii, Japan and Mexico have occurred (B. Witteveen, unpublished report). It is not known how many animals occurring to the west of Kodiak Island belong to the western or central North Pacific stock.

In the Northern British Columbia region (primarily near Langara Island), 275 humpback whales were identified from 1992 to 1998 (G. Ellis, pers. comm., Pacific Biological Station, Nanaimo, BC, V9R 5K6).

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 capture-recapture data) and obtained an 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 1994-00 and provided and 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 1991to 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 photo-identification studies have only recently been initiated, and humpbacks are seen pelagically in the Gulf of Alaska. Finally, Moore et al. (in press) has documented humpback whales in the Bering Sea, and it is not conclusively 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): $N_{MIN} = N/\exp(0.842\times[\ln(1+[CV(N)]^2)]^{½})$. Using the population estimate (N) of 4,005 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 cannot be 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 has 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. As a result, although data support an increasing population size for this stock, it is not possible to assess the rate of increase.

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

Utilizing 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. Although there are no estimates of the growth rate of the entire humpback whale population in the North Pacific , it is clear that the abundance has increased in Southeast Alaska in recent years. The available information indicates that the rate of increase between 1979 and 2000 is estimated at 0.088, which is a more accurate estimate of the maximum net productivity rate than the default estimate. Thus, it seems reasonable to use a 0.088 as a new, conservative estimate of the current rate of increase as 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). An estimate of the maximum net productivity rate is not available for the entire stock, so the default value of 0.04 will be used for both the entire stock and the portion of the stock which occurs in Southeast Alaksa. Thus, for the entire Central North Pacific stock of humpback whale, PBR = 7.4 animals (3,698 × 0.02 × 0.1). The PBR level for the Southeast Alaska portion of this stock, PBR = 3.5 animals (868 × 0.04 × 0.1), and the PBR level for the northern portion of the stock is 3.9 animals (7.4 - 3.5).

ANNUAL HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Fisheries Information

Four different commercial fisheries operating in Alaska waters within the range of the Central North Pacific humpback whale stock were monitored for incidental take by fishery observers during 1990-01: Bering Sea/Aleutian Island groundfish trawl, Gulf of Alaska groundfish trawl, longline, and pot fisheries. One humpback whale mortality was observed in the Bering Sea/Aleutian Islands groundfish trawl fishery in 1998 and one in 1999. Average annual mortality from the observed fisheries in Alaska was 0.6 humpbacks from this stock (Table 27a). Note, however, that the stock identification is uncertain and the mortality may have been attributable to the western stock of humpback whales. Thus, this mortality is assigned to both the central and western stocks. Fishery observers also monitored the Hawaii swordfish, tuna, billfish, mahi mahi, wahoo, oceanic shark longline/setline fishery during the same period. The range of observer coverage for this fishery, as well as the annual observed and estimated mortalities, are presented in Table 27a. The observer program in the Hawaii fishery was voluntary from 1990 through 1993, leading to very low levels of observer coverage during those years (<1%). In 1994, the observer program became mandatory and observer coverage has been approximately 4-5% since that time. Fishery observers recorded one humpback whale entangled in longline gear in 1991. The fate of this animal is unknown, though it is presumed to have died. The mortality rate was not estimated from the 1991 mortality due to the low level of observer coverage in that year (<1%). Therefore, that single mortality also appears as the estimated mortality for 1991 and should be considered a minimum estimate. Note that another humpback whale was reported by fishers and whalewatch operators entangled in longline gear off Maui during 1993 (E. Nitta, pers. comm., National Marine Fisheries Service). This report was never confirmed and the fate of this animal is also unknown. The estimated mean annual mortality rate in all observed fisheries during the 5-year period from 1997 to 2001 is 0.4 humpback whales per year from this entire stock.

An additional source of information on the number of humpback whales killed or injured incidental to commercial fishery operations is the self-reported fisheries information required of vessel operators by the MMPA. During the 4-year period between 1990 and 1993, there were no fisher self-reports of humpback whale injuries or mortalities from interactions with commercial fishing gear in any Alaska fishery within the range of the Central North Pacific humpback whale stock. Logbook data are available for part of 1989-94, after which incidental mortality reporting requirements were modified. Under the new system, logbooks are no longer required; instead, fishers provide selfreports. Data for the 1994-95 phase-in period is fragmentary. After 1995, the level of reporting dropped dramatically, such that the records are considered incomplete and estimates of mortality based on them represent minimums (see Appendix 7 for details). In 1994, the incidental take of a humpback whale was reported in the Southeast Alaska salmon purse seine fishery. Another humpback whale is known to have been taken incidentally in this fishery in 1989, but due to its historic nature has not been included in Table 27a. In 1996, a humpback whale was reported entangled and trailing gear as a result of interacting with the Southeast Alaska drift gillnet fishery. This whale is presumed to have died. Together, these two mortalities result in an annual mortality rate of 0.4 (0.2 + 0.2) humpback whales based on selfreported fisheries information (Table 27a). This is considered to be a minimum estimate because logbook records (fisher self-reports required during 1990-94) are most likely negatively biased (Credle et al. 1994).

Table 27a. Summary of incidental mortality of humpback whales (Central North Pacific stock) due to commercial fisheries from 1990 through 2001 and calculation of the mean annual mortality rate. Mean annual mortality in brackets represents a minimum estimate. For a particular fishery, the most recent 5 years of available data are used in the mortality calculation when more than 5 years of data are provided. n/a indicates that data are not available.

Fishery name	Years	Data type	Range of observer coverage	Observed mortality (in given yrs.)	Estimated mortality (in given yrs.)	Mean annual mortality

Hawaii swordfish, tuna, billfish, mahi mahi, oceanic shark longline/setline	90-00	obs data	<1-5%	0, 0, 0, 0, 0	0, 0, 0, 0, 0	0
Fishery name	**Years**	**Data type**	**Range of observer coverage**	**Observed mortality (in given yrs.)**	**Estimated mortality (in given yrs.)**	**Mean annual mortality**
Bering Sea/Aleutian Is. (BSAI) groundfish trawl	97-01	obs data	62-77%	0, 0, 1, 0, 0	0, 2, 2, 0, 0	0.6 (CV = 0.44)
Observer program total						0.6
				Reported mortalities		
Southeast Alaska salmon drift gillnet	90-01	self reports	n/a	0, 0, 0, 0, n/a, n/a, 1, n/a, n/a, n/a, n/a, n/a	n/a	[$0.2]
Southeast Alaska salmon purse seine	90-01	self reports	n/a	0, 0, 0, 0, 1, n/a, n/a, n/a, n/a, n/a, n/a, n/a	n/a	[$0.2]
Minimum total annual mortality from observer programs and self reports						North: [$0.6] SE: [$0.4]

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 1997 to 2001 are provided in Table 27b and a summary of the information is provided in Table 27c. Overall, there were 34 reports of human-related mortalities or injuries during this 5-year period. Of these, there were 27 incidents which involved commercial fishing gear, and 24 of these incidents involved serious injuries or mortalities. An additional seven incidents of human-related mortality or injury involved ship strikes and will be discussed in a forthcoming section. 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 27b. Human-related strandings and entanglements of humpback whales (central North Pacific stock) from stranding reports, 1997-2001. Areas are designated "SE" for Southeast Alaska or "North" for all other feeding areas; "Unk" indicates that the feeding area to which a whale belongs is unknown; it is assumed that the entanglement was reported in the area where the entanglement occurred, and that duplicate sightings have been removed. An asterisk in the "number" column indicates cases that were not considered serious injuries and thus were not included in the summarized information included in Table 27c.

Year	Number	Area	Condition	Description	Area

1997	1*	Island of Hawaii	Released alive	Alaska crab pot floats removed by U.S. Coast Guard	Unk
1997	1	57 30 N 135 13 W NW Shelter Island	Alive	Collision with skiff	SE
1997	1	Peril Straits, AK	Injured	Entangled in line; attempt to disentangle failed	SE

Year	Number	Area	Condition	Description	Area
1997	1	58 18 N 134 24 W NW Shelter Island	Injured	Tail wrapped in crab pot line	SE
1997	1	58 21N 134 57 W NW Admiralty Island	Alive; entangled	Line and 2' diameter buoy attached	SE
1998	1	Maalaea Bay, Lanai	Alive; entangled	Disentangled from gear, but some line still attached	Unk
1998	1	Sitka, AK	Alive; entangled	Commercial gillnet around flippers	SE
1998	1*	Jakolof Bay	Alive	Disentangled from personal use pot gear	North
1998	1	Ketchikan, AK	Injury; status unknown	Salmon purse seiner net (commercial) torn through, thought to have died	SE
1998	1	Juneau, AK	Injured	Ship strike (8/11)	SE
1998	1	Juneau, AK	Entangled	No details available	SE
1998	1*	Wrangell, AK	Alive	Commercial crab pot buoy removed	SE
1998	1*	Homer, AK	Alive	Tanner crab pot cut loose	North
1998	1	Juneau, AK	Injured	Ship strike (9/24)	SE
1998	1*	Sitka, AK	Alive	Commercial crab pot line cut free	SE
1998	1	Ketchikan	Entangled	Swimming freely with pot gear attached	SE
1999	1	Homer	Entangled	In crab pot gear; released	North
1999	1	Prince of Wales Island	Entangled	In unknown pot gear, released	SE

1999	1	Metlakatla	Injury; status unknown	Ship strike	SE
2000	1*	Lynn Canal	Entangled, released alive, status unknown	Purse seine gear	SE
2000	1*	Skagway	Entangled, released alive	Shrimp pot gear	SE
2000	1	Uyak Bay	Entangled	Unknown gear	North

Year	**Number**	**Area**	**Condition**	**Description**	**Area**
1/28/01	1	Hawaii	Injured	Entangled in line/buoy from an AK fishery; released, injured - extent unknown	Unk
6/19/01	1	Dixon Entrance	Possibly injured	Ship strike	SE
5/28/01	1	Resurrection Bay	Entangled, released alive	Swimming freely with multiple lines and buoys attached	North
6/15/01	2	Kodiak	Entangled	Attempt to disentangle failed; mother/calf pair	North
7/12/01	1	Yakutat	Found dead	Entangled in salmon set gillnet	North
7/16/01	1	Glacier Bay	Found dead, decomposed	Ship strike	SE
July 01	1	Bering Glacier	Found dead, decomposed	Entangled in fishing gear	North
8/13/01	1*	Hoonah	Entangled, released alive	Shrimp pot gear	SE
9/18/01	1	Anchorage	Dead	Ship strike	North
9/19/01	1*	Lynn Canal	Entangled, release alive, status unknown	Shrimp pot gear	SE

10/30/01	1*	Sitka	Entangled, release alive, status unknown	Longline gear	SE

Table 27c: Summary of central North Pacific humpback whale mortalities and serious injuries caused by entanglement and ship strikes from stranding reports, 1997-2001. Information used to determine whether an injury was serious or nonserious is included in Table 27b; all animals not identified with an asterisk in Table 27b are considered serious injuries or mortalities.

Area	**Human activity/Fishery**	**Mortalities**	**Serious injuries**	**Average annual serious injury/mortality rate, 1997-2001**
Northern				
	Ship strikes	0, 0, 0, 0, 1	0, 0, 0, 0, 0	0.2
	Crab gear	0, 0, 0, 0, 0	0, 0, 1, 0, 0	0.2
	Unspecified fishing gear/line	0, 0, 0, 0, 1	0, 0, 0, 1, 3	1.0
	Salmon set gillnet	0, 0, 0, 0, 1	0, 0, 0, 0, 0	0.2
			Total	1.4/year fishery only 1.6/year total
Southeast				
	Ship strikes	0, 0, 0, 0, 1	1, 2, 1, 0, 1	1.2
	Crab pot gear	0, 0, 0, 0, 0	1, 0, 0, 0, 0	0.2
	Unspecified fishing gear/line	0, 0, 0, 0, 0	2, 2, 1, 0, 0	1.2
	Unspecified gillnet	0, 0, 0, 0, 0	0, 1, 0, 0, 0	0.2
	Salmon purse seine	0, 0, 0, 0, 0	0, 1, 0, 0, 0	0.2
			Total	1.8/year fishery only 3.0/year total
Hawaii - summer feeding area unknown				
	Unspecified fishing gear	0, 0, 0, 0, 0	0, 1, 0, 0, 1	0.4/year

The estimated minimum mortality and serious injury rate incidental to commercial fisheries for the northern portion of the stock is 2.0 humpback whales per year, based on observer data (0.6), and stranding records (1.4) Tables 27b and 27c). The estimated minimum mortality and serious injury rate incidental to the commercial fisheries in Southeast Alaska is 2.2 humpback whales per year, based on observer data (0.4) and stranding records (1.8; Tables 27b and 27c). As mentioned previously, these estimates 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, the lack of data regarding the level of humpback whale mortality related to commercial fisheries in northern British Columbia are not available, again reinforcing the point 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 interactions with vessels unrelated to fisheries have also occurred to humpback whales. These cases are included in Table 27b and summarized in Table 27c. Of those, seven ship strikes constitute "other sources" of mortality; six of these ship strikes occurred in Southeast Alaska and one 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 5 year period from 1997to 2001, these account for an additional 1.4 humpback whale mortalities per year.

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 the Soviet catches (Yablokov 1994).

STATUS OF STOCK

As the estimated annual mortality and serious injury rate for the entire stock (5.0; 3.6 of which was fisheryrelated) is considered a minimum, it is unclear whether the level of human-caused mortality and serious injury exceeds the PBR level (7.4) for the entire stock. However, the estimated annual mortality and serious injury rate in Southeast Alaska (3.0, of which 1.8 was fishery-related) is greater than the PBR level if calculated only for the Southeast Alaska portion of the population (3.8). The minimum estimated fishery 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. At least some portions of the stock have increased in abundance between the early 1980s and 2000, and the fact that the current rate of increase in Southeast Alaska may have recently declined may indicate that the Southeast Alaska portion of the stock is approaching its carrying capacity. However, the status of the entire stock relative to its Optimum Sustainable Population size is unknown.

Habitat Concerns

This stock is the focus of a large whalewatching industry in its wintering grounds (Hawaii) and a growing whalewatching 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 whalewatching. In 2001, NMFS issued regulations to prohibit most approaches to humpback whales in Alaska within 100 yards (91.4m; (66 FR 29502; May 31, 2001)). The growth of the whalewatching industry, however, is a concern as preferred habitats may be abandoned if disturbance levels are too high.

Noise 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 whalewatching) in Hawaii waters is

another 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 noise (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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