NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7
BIOLOGICAL OPINION

Title:	Biological Opinion on the Issuance of Permit No. 13545 for Research on Cetaceans within U.S. Waters and on the High Seas
Action Agency:	Permits, Conservation and Education Division, Office of Protected Resources, National Marine Fisheries Service
Consultation Conducted By:	Endangered Species Division, Office of Protected Resources, National Marine Fisheries Services
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NOAA's National Marine Fisheries Service
Endangered Species Act Section 7 Consultation

Biological Opinion

Agency:	Permits, Conservation and Education Division of the Office of Protected Resources, NOAA's National Marine Fisheries Service
Activity Considered:	The Proposal to Issue Permit No. 13545 for Research on Cetaceans within U.S. Waters and on the High Seas.
Consultation Conducted by:	Endangered Species Division of the Office of Protected Resources, NOAA's National Marine Fisheries Service
Approved by:	
Date:	FEB 0 1 2010

Section 7(a)(2) of the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*) requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "may affect" listed species or critical habitat that has been designated for them, that agency is required to consult formally with either NOAA's National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service, depending upon the listed resources that may be affected. Federal agencies are exempt from this requirement if they have concluded that an action "may affect", but is "unlikely to adversely affect" listed species or designated critical habitat, and NMFS or USFWS conclude with that conclusion (50 CFR 402.14[b]).

For the actions described in this document, the action agency is NMFS' Office of Protected Resources – Permits, Conservation and Education Division. The consulting agency is NMFS' Office of Protected Resources – Endangered Species Division. NMFS' Office of Protected Resources – Permits, Conservation and Education Division proposes to issue a permit for passive recording, acoustic tracking, close approaches, photography, videography, close pursuit and following (focal follows), biopsy sampling and the collection of sloughed skin and feces from cetaceans within U.S. waters and on the high seas, pursuant to the Marine Mammal Protection Act (MMPA) and the ESA. These actions will result in direct takes of sperm whales (*Physeter macrocephalus*), humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*), sei whales (*Balaenoptera* borealis), fin whales (*Balaenoptera physalus*) and North Atlantic right whales (*Eubalaena glacialis*), all of which are listed as endangered under the ESA. This ESA Section 7 consultation (Opinion) considers the effects of the proposed studies on endangered and threatened species and designated critical habitat.

Consultation History

On July 29, 2009, NMFS Office of Protected Resources - Permits, Conservation and Education Division requested consultation with NMFS Office of Protected Resources - Endangered Species Division on a proposal to issue a permit for research on sperm whales (*Physeter macrocephalus*), humpback whales (*Megaptera novaeangliae*), blue whales (*Balaenoptera musculus*), sei whales (*Balaenoptera* borealis), fin whales (*Balaenoptera physalus*) and North Atlantic right whales (*Eubalaena glacialis*) in U.S. waters and on the high seas. The permit application, discussion of the effects of the research on the target species as well as a draft of the proposed permit was submitted with this request. On September 1, 2009, NMFS Endangered Species Division initiated formal consultation on this proposed action.

BIOLOGICAL OPINION

Description of the Proposed Action

The National Marine Fisheries Service (NMFS) proposes to issue a permit for studies by Ocean Alliance (OA) on whale species, pursuant to the Marine Mammal Protection Act (MMPA) of 1972, as amended (MMPA; 16 U.S.C. 1361) and section 10(a)1(A) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq*.) The permit would exempt the applicant from the MMPA's and ESA's prohibition against "takes" of cetaceans and would last for five years. The ESA defines "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

These proposed activities under permit No. 13545 include vessel surveys, tracking visually and via commercial sonar, photography, videography, biopsy sampling, passive acoustic recording, focal follows, and collection of sloughed skin and feces on sperm, humpback, blue, sei and fin whales. North Atlantic right whales are subject to all proposed activities except biopsy sampling. This research is proposed to occur year-round in U.S. waters and on the high seas, based on the presence of target species.

<u>Passive Recording, Sonar and Acoustic Tracking,</u>
The proposed activities would occur from aboard a 28m steel-hulled ketch sailing craft equipped with a single 218hp engine. Passive acoustic recordings and tracking would be focused mainly on sperm whales, although other species including other listed whales as identified in the permit may be targeted if encountered. An acoustic array is proposed to be deployed 100-300m from the vessel's stern to search for and record whale vocalizations, which can be detected from up to 10 nmi. Along with visual observations, these recordings and sound detections are proposed to be used along with sonar from a Furuno FCV 292 dual band frequency "fish-finder" that transmits at 50 and 200 kHz in

order to obtain the whales' bearing. Once discovered, individual whales are proposed to be tracked for hours to days.

Close Approach, Photography, Videography and Focal Follows

A visual watch would be maintained during daylight hours from an observation platform located aboard the research vessel. Whales of both sexes and of all age groups are proposed to be tracked until visual observations are made. Approaches[1] of as close as three meters from target animals are proposed to be made once visual contact is established. The vessel normally travels at a speed of 4 to 6 knots in order to minimize disturbance to target species and to allow for greater maneuverability.

Focal follows are defined as the close and targeted prolonged approach and pursuit of individual animals. During focal follows, whales are proposed to be video-recorded in order to document identifying marks as well as to document individual and group behaviors. In addition, up to five digital photographs would be taken of each animal. These photographs and video-recordings would then be catalogued along with other data on location, group size, cluster characteristics and individual behavior. Focal follows would be conducted at a distance of as close as three meters if video sampling is to take place. Focal follows at distances of 75 to 500m would be maintained for more prolonged periods of observation.

Biopsy Sampling

Sperm, humpback, blue, sei and fin whales are proposed to be biopsied via CETA-DART type darts developed by Finn Larsen of the Danish Institute for Fisheries Research. The darts are to be deployed from a compound crossbow with a maximum range of 37m. No attempts will be made to biopsy whales determined by investigators to be less than six-months old. This age determination would be made by investigators based on personal expertise as well as from the timing of the sampling with the known breeding and calving seasons of each respective species. Whales would be approached from either the research vessel or from inflatable boats powered by 40hp outboard engines. The research vessel has 10m extension on its bowsprit to allow for a greater distance between the vessel and the target animal. A maximum of two attempts to obtain a single biopsy sample would be made per animal.

Biopsy samples are proposed to be taken from whales' sides or backs around the mid-body. The biopsy tips are made of steel cores with a cutting edge and three internal prongs to retain the skin/blubber samples. The darts take a sample that is 2.5-4.0cm long by 8mm in diameter and are equipped with a collar designed to prevent the biopsy core from penetrating any deeper than the blubber layer (see Whitehead et al., 1990). A 4.0cm biopsy tip, 8mm in diameter would be used for the larger whales and a 2.5cm tip, 8mm in diameter would be used for calves. Arrows are 16 inches long and have a carbon-graphite shaft. The darts are equipped with a foam floatation collar to allow for retrieval with a dip net. Samples would be processed aboard the research vessel.

[1] An "approach" is defined as a continuous sequence of maneuvers (including drifting) involving a vessel directed toward a cetacean or group of cetaceans closer than 100 yards.

Collection of Sloughed Skin and Feces

The proposed activities include close approaches to listed species in order to collect sloughed skin and feces. These samples are proposed to be collected using a mesh dip net attached to an extendable pole at from at least 30m from target animals. These samples would then be stored and processed aboard the research vessel.

Mitigation Measures

To minimize harassment, approaches would be aborted if animals are observed to display persistent unusual behavior, aggravation or distress such as repeated tail-slaps, forceful blows or breaching. This monitoring would begin upon first sight and continue during approach, while the proposed photography, videography and biopsy activities take place, and after these activities are completed. Target animals would be approached at a low speed of around 3 knots and at a parallel course to the whales' bearing to further minimize disturbance. Biopsy darts are designed to float and will be retrieved via dip nets from boats. This will eliminate the need for a retrieval line in which whales' fins and flukes could become entangled. Biopsy tips are to be thoroughly cleaned and sanitized with a 95% ethanol solution to prevent infection and disease transfer. No individual animal is to be "taken" more than three times in one day. Investigators must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions. Before attempting to sample an individual, investigators must take reasonable measures to avoid repeated sampling of any individual. In no instance will the investigator attempt to biopsy a cetacean anywhere anterior to the pectoral fin.

In addition to these measures, the following are some of the conditions of the proposed permit that also apply:

1. Investigators must suspend all permitted activities in the event serious injury or mortality of protected species occurs.

2. If authorized take is exceeded, investigators must cease all permitted activities and notify the Chief, NMFS Permits, Conservation and Education Division as soon as possible, but no later than within two business days.

3. To minimize disturbance of the subject animals the Permit Holder must exercise caution when approaching animals and must retreat from animals if behaviors indicate the approach may be interfering with reproduction, feeding, or other vital functions.

4. Where females with calves > 6 months of age are authorized to be taken.
    a. Must immediately terminate efforts if there is any evidence that the activity may be interfering with pair-bonding or other vital functions.
    b. Must not position the research vessel between the mother and calf.
    c. Must approach mothers and calves gradually to minimize or avoid any startle responses.
    d. Must not approach any mother or calf while the calf is actively nursing.

e. Must, if possible, sample the calf first to minimize the mother's reaction when sampling mother/calf pairs.

5. Before attempting to sample an individual, investigators must take reasonable measures (e.g., compare photo-identifications) to avoid repeated sampling of any individual.

Approach to the Assessment

NMFS approaches its section 7 analyses of agency actions through a series of steps. The first step identifies those aspects of proposed actions that are likely to have direct and indirect physical, chemical, and biotic effects on listed species or on the physical, chemical, and biotic environment of an action area. As part of this step, we identify the spatial extent of these direct and indirect effects, including changes in that spatial extent over time. The result of this step includes defining the *Action Area* for the consultation. The second step of our analyses identifies the listed resources that are likely to co-occur with these effects in space and time and the nature of that co-occurrence (these represent our *exposure analyses*). In this step of our analyses, we try to identify the number, age (or life stage), and gender of the individuals that are likely to be exposed to an action's effects and the populations or subpopulations those individuals represent. Once we identify which listed resources are likely to be exposed to an action's effects and the nature of that exposure, we examine the scientific and commercial data available to determine whether and how those listed resources are likely to respond given their exposure (these represent our *Response Analyses*).

The final steps of our analyses – establishing the risks those responses pose to listed resources – are different for listed species and designated critical habitat (these represent our *Risk Analyses*). Our jeopardy determinations must be based on an action's effects on the continued existence of threatened or endangered species as those "species" have been listed, which can include true biological species, subspecies, or Distinct Population Segments (DPSs) of species. The continued existence of these "species" depends on the fate of the populations that comprise them. Similarly, the continued existence of populations are determined by the fate of the individuals that comprise them – populations grow or decline as the individuals that comprise the population live, die, grow, mature, migrate, and reproduce (or fail to do so).

Our risk analyses reflect these relationships between listed species, the populations that comprise that species, and the individuals that comprise those populations. Our risk analyses begin by identifying the probable risks actions pose to listed individuals that are likely to be exposed to an action's effects. Our analyses then integrate those individual risks to identify consequences to the populations those individuals represent. Our analyses conclude by determining the consequences of those population-level risks to the species those populations comprise.

We measure risks to listed individuals using the individuals' "fitness," or the individual's growth, survival, annual reproductive success, and lifetime reproductive success. In particular, we examine the scientific and commercial data available to determine if an individual's probable lethal, sub-lethal, or behavioral responses to an action's effect on the environment (which we identify during our response analyses) are likely to have consequences for the individual's fitness.

When individual, listed plants or animals are expected to experience reductions in fitness in response to an action, those fitness reductions are likely to reduce the abundance, reproduction, or growth rates (or increase the variance in these measures) of the populations those individuals represent (see Stearns, 1992). Reductions in at least one of these variables (or one of the variables we derive from them) is a *necessary* condition for reductions in a population's viability, which is itself a *necessary* condition for reductions in a species' viability. As a result, when listed plants or animals exposed to an action's effects are *not* expected to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (e.g., Brandon, 1978; Mills and Beatty, 1979; Stearns, 1992; Anderson, 2000). As a result, if we conclude that listed plants or animals are *not* likely to experience reductions in their fitness, we would conclude our assessment.

Although reductions in fitness of individuals is a *necessary* condition for reductions in a population's viability, reducing the fitness of individuals in a population is not always *sufficient* to reduce the viability of the population(s) those individuals represent. Therefore, if we conclude that listed plants or animals are likely to experience reductions in their fitness, we determine whether those fitness reductions are likely to reduce the viability of the populations the individuals represent (measured using changes in the populations' abundance, reproduction, spatial structure and connectivity, growth rates, variance in these measures, or measures of extinction risk). In this step of our analyses, we use the population's base condition (established in the *Environmental Baseline* and *Status of listed Resources* sections of this Opinion) as our point of reference. If we conclude that reductions in individual fitness are not likely to reduce the viability of the populations those individuals represent, we would conclude our assessment.

Reducing the viability of a population is not always *sufficient* to reduce the viability of the species those populations comprise. Therefore, in the final step of our analyses, we determine if reductions in a population's viability are likely to reduce the viability of the species those populations comprise using changes in a species' reproduction, numbers, distribution, estimates of extinction risk, or probability of being conserved. In this step of our analyses, we use the species' status (established in the *Status of the Species* section of this Opinion) as our point of reference. Our final determinations are based on whether threatened or endangered species are likely to experience reductions in their viability and whether such reductions are likely to be appreciable.

To conduct these analyses, we rely on all of the evidence available to us. This evidence might consist of monitoring reports submitted by past and present permit holders, reports from NMFS Science Centers, reports prepared by State or Tribal natural resource agencies, reports from non-governmental organizations involved in marine conservation issues, the information provided by the Permits, Conservation and Education Division when it initiates formal consultation, and the general scientific literature. We supplement this evidence with reports and other documents – environmental assessments, environmental impact statements, and monitoring reports – prepared by other federal and state agencies like the Minerals Management Service, U.S. Coast Guard and U.S. Navy whose operations extend into the marine environment.

During the consultation, we conducted searches of peer reviewed scientific literature, doctoral dissertations, government reports and commercial studies. These searches included the use of literature search engines such as *Science Direct, Ingenta Connect, JSTOR,* and *Google Scholar* as well as the use of NOAA and university libraries. These searches focused on identifying recent information on the biology, ecology, distribution, status, and trends of the threatened and endangered species considered in this opinion. We considered the results of these searches based on the quality of their study design, sample sizes and study results.

Action Area

The proposed activities are to occur in the U.S. EEZ of the North Atlantic and North Pacific Oceans and on the Atlantic and Pacific high seas. Work in the North Atlantic work would occur in waters of the continental shelf and be focused, but not limited to, the Gulf of Maine and Gulf of Mexico. Work in the Pacific is proposed to occur in the U.S. EEZ and the high seas north to, but not including, Alaskan waters. This opinion assesses those activities proposed to occur in U.S. EEZ and on the high seas.

Exposure Analysis

Exposure analyses identify the co-occurrence of ESA-listed species within the action's effects in space and time, and identify the nature of that co-occurrence. They identify as possible, the number, age or life stage, and gender of the individuals likely to be exposed to the action's effects and the population(s) or subpopulation(s) those individuals represent. The proposed permit would authorize activities in the U.S. EEZ and the high seas of the North Atlantic and North Pacific Oceans. **Table 1** identifies the number of disturbance events to which listed species are proposed to be permitted under the proposed permit. The proposed permit does not distinguish how many of each type of disturbance the total number of "takes" comprises. Rather, any single type, or combination of "takes" can contribute to the total number allowed under the proposed permit. Consequently, in order to derive the most conservative assessment, risk will be assessed as if though the maximum number of disturbance events per species is comprised entirely of each respective type of disturbance. The individuals exposed may be of either sex or of any age greater than six months.

Table 1. Proposed disturbance events to listed species from the proposed activities over the duration of the proposed permit (five years).

SPECIES	Number of Takes[1] Allowed under the Proposed Permit	
	Annual	Total
Sperm Whale North Atlantic Stock	150	750
Sperm Whale North Pacific Stock	100	500
Humpback Whale	20	100
Blue Whale	20	100
Sei Whale	20	100
Fin Whale	20	100
North Atlantic Right Whale*	20	100

[1] Takes (as defined in the *Description of the Proposed Action* section above) may occur from any combination of the following activities: Passive acoustic recording, tracking visually or from sonar, collection of sloughed skin or feces, visual surveys or observations of individuals or populations, photography or photo-ID of animals, videography, skin/blubber biopsy, focal follows, or from incidental harassment resulting from these activities.
* Proposed for all activities except biopsies.

Status of Listed Resources

Species Likely to be Adversely Affected
NMFS has determined that the actions considered in this Opinion may affect the following listed resources provided protection under the endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.; ESA):

Sperm Whale	*Physeter macrocephalus*	Endangered
Humpback whale	*Megaptera novaeangliae*	Endangered
Blue whale	*Balaenoptera musculus*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Fin whale	*Balaenoptera physalus*	Endangered
North Atlantic right whale	*Eubalaena glacialis*	Endangered

The biology and ecology of these species are described in the *Species Descriptions* Section below, and will contribute to the effects analysis for this Opinion.

Species and Critical Habitat Not Affected or Not Likely to be Adversely Affected
Listed sea turtles and pinnipeds occur in the action area and could therefore be disturbed or harmed by the proposed activities. However, because the proposed activities are targeted specifically to whales and because of the relatively small size and slow speeds of the vessels, threats to these species are extremely unlikely and therefore discountable. The proposed activities are entirely aquatic in nature and therefore will not affect the nesting activities of any sea turtles or any rookeries or haulouts of any pinniped species.

Northern Pacific right whales occur in the range of the proposed action. However, right whale sightings are very rare in the eastern north pacific despite extensive survey efforts (see NMFS, 2006c; Wade et al., 2006). Because of the scarcity of this species in the proposed action area and the highly targeted nature of the proposed research activities, Northern Pacific right whales are very unlikely to be exposed to the proposed activities and therefore no effects to them are expected.

Individual animals and Evolutionarily Significant Units (ESUs) of marine and anadromous fish may occur in the action area. However, because of the oceanic nature and low speeds of the proposed activities, no negative impact any listed fish are expected. No effects are expected to any other listed species from the proposed activities.

The proposed activities could also occur in the designated critical habitat for the southern DPS of the green sturgeon and in the critical habitat of the gulf sturgeon[2]. For the southern DPS of the green sturgeon, critical habitat includes coastal U.S. marine waters within 60 fathoms (fm) depth from Monterey Bay, California, north to Cape Flattery, Washington, including the Strait of Juan de Fuca, Washington, to its United States boundary; the Sacramento-San Joaquin Delta and Suisun, San Pablo, and San Francisco bays in California; the lower Columbia River estuary; and certain coastal bays and estuaries in California, Oregon, and Washington. The gulf sturgeon critical habitat includes 14 geographic areas in the Gulf of Mexico from Florida to Louisiana where estuarine and marine areas are adjacent to spawning rivers (68 FR 13370).

For critical habitat to be listed, it must contain one or more Primary Constituent Elements (PCEs). PCEs, as defined by 50 CFR 424.12 – “Criteria for Designating Critical Habitat,” include, but are not limited to, the following: roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, host species or plant pollinator, geological formation, vegetation type, tide, and specific soil types. The PCEs for both the estuarine and marine portions of the southern DPS green sturgeon and the gulf sturgeon include prey availability, preservation of migratory routes and good water and sediment quality. The proposed activities should have no effect on any of these PCEs. Because of their non-destructive nature and limitation to offshore locations, the proposed activities are not likely to destroy or adversely modify the critical habitat of any listed species. Critical habitat has not been designated for the sperm whale, humpback whale, sei whale, fin whale or the blue whale.

Species Descriptions

Sperm Whale

Species Description and Distribution

Sperm whales exhibit a cosmopolitan distribution. In the North Pacific, they are widely distributed but are mostly found south of 40º N in winter (Rice, 1974; Gosho et al., 1984). Mature females and juveniles occupy temperate and tropical areas throughout the

[2] See for details: http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm

year and are joined by adult males in the winter (Reeves and Whitehead., 1997). Most males migrate north in summer to the waters of the Aleutian Islands, Gulf of Alaska, and the Bering Sea, with some animals remaining at northern latitudes throughout the year (Mellinger et al., 2004). Sperm whales are found year-round in waters off of California (Dohl et al., 1983; Barlow, 1995; Forney et al., 1995), and reach peak abundance there from April through June and from the end of August through mid-November (Rice, 1974). Sperm whales have been observed to occupy Washington and Oregon waters in all seasons except winter (Green et al., 1992). Sperm whales occupy Hawaiian waters throughout the year and are the most abundant large whale in these waters (Shallenberger et al., 1981; Lee, 1993; Mobley et al., 2000).

In the North Atlantic, the IWC recognizes one sperm whale population (Donovan, 1991). However, NMFS stock assessment reports describe a northern Gulf of Mexico stock and a western North Atlantic stock (Waring et al., 2008). In the western North Atlantic, concentrations of female and immature groups are found in the Caribbean Sea and south of New England along the eastern coast of the United States (Perry et al., 1999a). The northern distributional limit of female and juvenile groupings is likely around Georges Bank or the Nova Scotian shelf. Sperm whales primarily occur in waters off the east coast of the U.S. from New England south to North Carolina (Leatherwood et al., 1976; Schmidly, 1981). Seasonal aerial surveys confirm that sperm whales are present in the northern Gulf of Mexico in all seasons (Mullin et al., 1994; Hansen et al., 1996).

Life History Information

Female sperm whales become sexually mature at an average of 9 years of age (Kasuya, 1991). Male sperm whales become sexually mature between 9 to 20 years of age but are likely not large enough to successfully compete for females for another 10 years (Kasuya, 1991). The gestation period for sperm whales is about 15 months and calves are nursed for 4 to 6 years (Kasuya, 1991). Adult male sperm whales move north in summer to feed, while females and juveniles stay in tropical and temperate waters year round (Kasuya and Miyashita, 1988). Sperm whale "societies" are comprised of related and unrelated females and their offspring (Christal et al., 1998). Most females probably spend their entire life in the same family unit (Whitehead, 2002). Male sperm whales leave these groups (Rice, 1989) at an estimated age of six years (Richard et al., 1996) and return to breed when they reach their late twenties (Best, 1979). Adult male sperm whales are usually solitary, but may be found co-mingled in groups, with a mean group size of 20 to 30 (Whitehead, 2003). Genetic studies suggest that sperm whales of both genders commonly move across over ocean basins and that males, but not females, often breed in ocean basins that are different from the one in which they were born (Whitehead, 2003)

Sperm whales appear to be restricted to waters deeper than 300 m (Berzin, 1971) and in nearshore areas where steep drops in bathymetry result in upwelling events that correlate with highly productive waters (Berzin and Rovnin, 1966). Sperm whales may utilize the entire water column to forage but appear to feed near the bottom and often ingest stones, sand, sponges, and other objects (Whitehead et al., 1992a; Whitehead et al., 1992b). They feed year round and a large portion of their diet is squid (Clarke, 1996).

Listing Status

Sperm whales have been listed as endangered since 1970 under the precursor to the endangered Species Act (ESA) (35 FR 18319; December 2, 1970) and have remained on the list of threatened and endangered species after the passage of the ESA in 1973. They are also protected by the MMPA of 1972.

Population Status and Trends

For MMPA stock assessment reports, sperm whales within the Pacific U.S. EEZ are divided into three discrete areas: California, Oregon and Washington waters, Hawaii waters and Alaskan waters. An estimated 1,407 sperm whales existed in California, Oregon, and Washington waters during summer/fall based on pooled 1993 and 1996 ship line transect surveys within 300 nmi of the coast (Barlow and Taylor, 2001) and 2,593 sperm whales were observed from a survey of the same area in 2001 (Barlow and Forney, 2007). A 2005 survey of this area resulted in an abundance estimate of 3,140 whales, which was corrected for diving animals not seen during surveys (Forney, 2007). The most recent estimate of abundance for this stock is the geometric mean of the 2001 and 2005 summer/autumn ship survey estimates or 2,853 sperm whales (Carretta et al., 2008).

Whitehead (2002) estimated that there are approximately 76,803 sperm whales in the eastern tropical Pacific, eastern North Pacific, Hawaii, and western North Pacific. Minimum population estimates in the eastern North Pacific are 1,719 individuals and 5,531 in the Hawaiian Islands (Carretta et al., 2007). The minimum population estimate is unknown in the North Pacific (Carretta et al., 2007). The tropical Pacific is home to approximately 26,053 sperm whales and the western North Pacific has a population of approximately 29,674 (Whitehead, 2002).

The total number of sperm whales in the western North Atlantic is unknown (Waring et al., 2008). The best available current abundance estimate for western North Atlantic sperm whales is 4,804 based on data from 2004 (Waring et al., 2008). The best available current abundance estimate for Northern Gulf of Mexico sperm whales is 1,665, based on data from 2003 and 2004. There are insufficient data to determine trends for these populations (Waring et al., 2008).

Humpback Whale

Species Description and Distribution

The Humpback Whale (*Megaptera novaeangliae)* is a baleen whale that occurs throughout the world's oceans. The species is listed as endangered throughout its range, and is generally found over continental shelves, shelf breaks, and around oceanic islands (Balcomb and Nichols, 1978; Whitehead, 1987). Humpback whales exhibit seasonal migrations between warmer temperate and tropical waters in winter and cooler waters of high prey productivity in summer, although the seasonal distributions of this species are not fully understood (Reeves et al., 2004). The Humpback Whale has the longest known migratory movements of any mammal, with one-way distances up to 8,461 km (Rasmussen et al., 2007). Populations of humpback whales are not rigid. For example, Pomilla and Rosenbaum (2005) observed an individual animal to migrate from the Indian Ocean to the South Atlantic Ocean.

NMFS currently recognizes four stocks of humpback whales in the North Pacific Ocean: two Eastern North Pacific stocks, one Central North Pacific stock, and one Western Pacific stock (Hill and DeMaster, 1998). In the North Pacific, the species is found off the Hawaiian Islands, from Mexico north to the Gulf of Alaska and Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and Sea of Okhotsk (Nemoto, 1957; Tomilin, 1957; Johnson and Wolman, 1984). Humpbacks that occur off Central America and Mexico in the winter and spring migrate to the coast of California north to British Columbia in summer and fall (Steiger et al., 1991). Although the Pacific coast of Central America is not considered a major wintering area for this species, humpback whales are reported off the west coast of Panama as well as Costa Rica (Steiger et al., 1991).

The Gulf of Maine stock is the only humpback whale population recognized in the North Atlantic. Here, humpback whales are found in six separate subpopulation feeding areas in the summer months: the eastern coast of the United States, the Gulf of St. Lawrence, Newfoundland, western Greenland, Iceland, Scotland, northern Norway, and in the Barents Sea (Katona and Beard, 1990; Sigurjónsson and Gunnlaugsson, 1990; Christensen et al., 1992; Palsbøll et al., 1997; Perry et al., 1999a). In the fall and winter, humpback whales from all feeding areas migrate to calving and mating grounds in the Caribbean, where mixing among subpopulations occurs (Katona and Beard, 1990; Palsbøll et al., 1997).

Life History Information

Humpback whale reproductive activities occur primarily in winter, and gestation takes about 11 months (Winn and Reichley., 1985), followed by a nursing period of up to 12 months (Baraff and Weinrich, 1993). Calving occurs in the shallow coastal waters of continental shelves and some oceanic islands (Perry et al., 1999a). The calving interval is likely two to three years (Clapham and Mayo, 1987), although some evidence exists of calving in consecutive years (Glockner-Ferrari and Ferrari, 1985; Clapham and Mayo, 1987; 1990; Weinrich et al., 1993). Mother/calf groups are found in relatively stable pairs (Ersts and Rosenbaum, 2003). Sexual maturity in humpback whales is reached between five and 11 years of age (Clapham, 1992; Gabriele et al., 2007). During the breeding season, humpback whales form small unstable groups (Clapham, 1996), and males sing long, complex songs directed toward females, other males or both. Males compete for mates and are polygamous (Clapham, 1996).

Although largely solitary, humpback whales often cooperate during feeding activities (Elena et al., 2002). They exhibit a wide range of foraging behaviors, and feed on a range of prey types including small schooling fishes, euphausiids, and other large zooplankton (Nemoto, 1957; Nemoto, 1959; Nemoto, 1970a; Krieger and Wing., 1984; Krieger and Wing., 1986). Because most humpback prey are likely found above 300 m (984 ft) depths, most dives are probably relatively shallow, with maximum diving depths are approximately 60-170m, with occasional deeper dives (Hamilton et al., 1997). Dives usually range between two and five minutes, but can last to around 20 minutes (Dolphin, 1987). Feeding groups are sometimes stable for long periods of times, and there is good evidence of some territoriality on both feeding (Clapham, 1996) and wintering grounds (Tyack, 1981).

Listing Status

Humpback whales have been listed as endangered under the ESA since 1973; critical habitat has not been designated for this species. The International Whaling Commission (IWC) first protected humpback whales in the North Pacific in 1965, and this species is also protected by CITES and the MMPA. Humpback whales are listed as "vulnerable" under the IUCN Red List of threatened Species (IUCN, 2005).

Status and Trends

Estimates of the current size of humpback whale populations vary widely. Winn and Reichley (1985) suggest that the global population of humpback whales consisted of at least 150,000 whales in the early 1900s. However, based on mitochondrial DNA analysis, Roman and Palumbi (2003) estimated that pre-exploitation populations of humpback whales to be 240,000 in the North Atlantic alone. Rice (1978) estimated pre exploitation numbers of humpback whales in the North Pacific to be around 15,000. But these data are less reliable.

In the 1980s, North Pacific humpback whale population estimates ranged from 1,407 to 2,100 (Darling and Morowitz, 1986; Baker and Herman., 1987). By the mid-1990s, the population was estimated to have risen to around 6,000 (Calambokidis et al., 1997; Cerchio, 1998; Mobley et al., 1999). Between 2004 and 2006, a comprehensive assessment of the population of humpback whales in the North Pacific identified 7,971 unique individuals from photographic records (Calambokidis et al., 2008). Based on the results of that effort, Calambokidis (2008) estimated that the current population of humpback whales in the North Pacific Ocean consisted of about 18,300 adult whales.
In the North Atlantic, Stevick et al., (2003) estimated that approximately 11,570 animals existed in 1993 with an estimated rate of increase of 0.0311 animals per year. Assuming that this rate of increase has remained constant over the years, the estimated 2009 population size for North Atlantic humpback whales would be around 18,886 individuals.

All of these estimates suggest that the global population of humpback whales numbers in the tens of thousands. These populations are of sizes that are likely large enough to withstand natural environmental and genetic stresses to fitness. However, their resilience to anthropogenic stressors is less clear.

<u>Blue Whale</u>

Species Description and Distribution

The blue whale (*Balaenoptera musculus*) is the largest living animal. They are a cosmopolitan species and exist primarily in the open ocean from tropical to polar waters worldwide. Though widely distributed, the blue whale is listed as endangered throughout its range. Blue whales are highly mobile but their migratory patterns are not well known

(Perry et al., 1999a; Reeves et al., 2004). However, the distribution of blue whales is assumed to be determined primarily by food requirements, with seasonal migration toward the poles in spring to feed on zooplankton during the summer months. Most blue whales migrate toward the warmer waters of the subtropics in the fall to reproduce while some individuals do not migrate (Yochem and Leatherwood, 1985; Clark and Charif, 1998).

Blue whales are typically found swimming alone or in groups of two or three. However, larger foraging aggregations, including aggregations mixed with other whales, are regularly reported (Corkeron et al., 1999; Shirihai, 2002). In the North Pacific, Nishiwaki (1966) noted the occurrence of blue whales In waters off of the Aleutian Islands and in the Gulf of Alaska. However, there have been no recent blue whale sightings in Alaskan waters despite several extensive surveys (Leatherwood et al., 1982; Stewart et al., 1987; Forney and R. L. Brownell, 1996; Carretta et al., 2008). Blue whales have been recorded off Oahu and the Midway Islands (Northrop et al., 1971; Thompson and Friedl., 1982; Barlow et al., 1997a).

In the North Atlantic, blue whales are typically found in the open ocean from the Arctic to mid-latitude waters with only occasional occurrences in the U.S. EEZ (Yochem and Leatherwood, 1985; Wenzel et al., 1988). Yochem and Leatherwood (1985) noted that blue whales' winter range may extend south to the Gulf of Mexico, and they have been observed in much of the North Atlantic (Yochem and Leatherwood, 1985; Clark et al., 1995). In the western North Atlantic, blue whales are most often observed in the waters off of eastern Canada in the Gulf of St. Lawrence (Sears, 1987).

Life History Information

Blue whale reproduction occurs mostly in winter (Yochem and Leatherwood, 1985). Gestation takes between 10 and 12 months (NMFS, 1998b), and nursing continues for six to seven months. The calving interval is probably two to three years and sexual maturity in is reached at about five years of age (Yochem and Leatherwood, 1985).

Important feeding areas for the blue whale include the edges of continental shelves (Yochem and Leatherwood, 1985; Reilly and Thayer, 1990). The food of blue whales consists of large euphausiid crustaceans (Kawamura, 1980; Yochem and Leatherwood, 1985). Although fish and copepods are observed to have been consumed by blue whales, they are not believed to be a major food source for this species (see Kawamura, 1980).

Data indicate that some summer feeding takes place at low latitudes in highly productive waters caused by upwelling events (Reilly and Thayer, 1990). Although it is reasonable to assume that blue whales compete with other baleen whales for prey (Nemoto, 1970a), there is little evidence to suggest that this is the case (Clapham and Brownell, 1996). The migratory nature of most blue whales may help them avoid competition with other whales (Clapham and Brownell, 1996).

Listing Status

Blue whales have been listed as endangered under the ESA since 1973; critical habitat has not been designated for this species. The blue whale is also protected by CITES and the MMPA. The North Atlantic stock of blue whales is listed as “vulnerable” under the IUCN Red List of threatened Species (IUCN, 2005b).

Status and Trends

Recent information on blue whale population abundance and trends in the North Atlantic is unavailable and there is uncertainty about estimates of blue whale abundance in the North Pacific Ocean. An ocean-wide population estimate for the-Pacific is not available, but the population has been estimated to be as high as 3,300 (Wade and Gerrodette., 1993) and as low as 1,400 (Barlow et al., 1997a; Barlow et al., 1997b). The feeding stock of blue whales in California is estimated at 1,940 (Forney et al., 2000). However, these data are insufficient to estimate population trends. Although the population in the North Pacific is expected to have grown since being given protected status in 1966, estimates from line transect surveys declined between 1991-2005 (Carretta et al., 2007). However, this estimate may be subject to interannual variability in the fraction of the population that utilizes California waters during the summer and in autumn.

There is uncertainty concerning the size of the blue whale population in the North Atlantic. Sigurjonsson (1995) estimated the population to be between 1,000 to 2,000 individuals. Sears et al. (1990) identified 308 individual blue whales in the Gulf of St. Lawrence, which provides a minimum estimate for their population in the North Atlantic. Approximately 400 whales have been identified in the Gulf of St Lawrence (Ramp et al., 2006).

Estimates for the Southern Hemisphere population of blue whales range from 5,000 to 6,000 with an average rate of increase of four to five percent per year (Yochem and Leatherwood, 1985). Butterworth *et al.* (1995) estimated the Antarctic population to be 710 individuals. More recently, Branch *et al.* (2004) estimated the blue whale population in the Southern Ocean to be between 860 and 2,900 animals.

<u>Sei Whale</u>

Species Description and Distribution

The sei whale (*Balaenoptera borealis*) occurs in all oceans of the world except the Arctic and is listed as endangered throughout its range. The migratory pattern of this species is thought to encompass long distances from high-latitude feeding areas in summer to low-latitude breeding areas in winter, however the location of winter areas is largely unknown (Perry et al., 1999b). Sei whales are associated with deeper waters and areas along the edges of continental shelves (Hain et al., 1985). However, individuals may move into more shallow inshore waters (Waring et al., 2008).

In the North Pacific Ocean, sei whales have been reported primarily south of the Aleutian Islands, in Shelikof Strait and waters surrounding Kodiak Island, in the Gulf of Alaska, and inside waters of southeast Alaska (Nasu, 1974). In the western North Atlantic, a major portion of the sei whale population occurs from northern waters, potentially including the Scotian Shelf, and south as far as North Carolina (Mitchell and Chapman, 1977; Waring et al., 2008). In the Southern Hemisphere, the distribution of sei whales during austral summer is thought to be between 40°S and 50°S based on historic catch data; the winter distribution of this species generally unknown (Gambell, 1985; Perry et al., 1999a). Movements of sei whales in the Southern Hemisphere are thought to be generally similar to those of blue and fin whales, except within a smaller range of latitudes (Gambell, 1985; Perry et al., 1999a).

The sei whale population in the western North Atlantic is assumed to consist of two stocks: the Nova Scotia, Iceland-Denmark Strait, and Northeast Atlantic stocks (Donovan, 1991; Perry et al., 1999a). However, the identification of sei whale population structure is difficult (Donovan, 1991; Perry et al., 1999a). The IWC only recognizes one stock of sei whales in the North Pacific (Donovan, 1991).

Life History Information

Rice (1977) notes that mating activities for sei whales occur primarily in winter. Gestation is about 12.7 months, calves are weaned at 6 to 9 months of age, and the calving interval is about 3 years (Rice 1977). Sei whales become sexually mature at about age 10 (Rice 1977). The species appears to lack a well-defined social structure, and individuals are usually found alone or in small groups of up to six whales (Perry et al., 1999a). Larger groupings have been observed in feeding areas (Gambell, 1985).

Sei whales are primarily planktivorous, feeding mainly on euphausiids and copepods, although the species is also known to consume fish (Waring et al., 2008). In the Northern Hemisphere, sei whales are known to consume small schooling fish and squid (Nemoto and Kawamura, 1977; Mizroch et al., 1984; Gambell, 1985; Calkins, 1986). Rice (1977) suggested that the diverse diet of sei whales may allow them greater opportunity to take advantage of variable prey resources, but may also increase their potential for competition with commercial fisheries.

Listing Status

Sei whales have been listed as endangered since 1970 under the precursor to the Endangered Species Act (ESA) (35 FR 18319; December 2, 1970) and then remained on the list of threatened and endangered species after the passage of the ESA in 1973. They are also protected by the Convention on International Trade in Endangered Species of wild flora and fauna and the MMPA.

Status and Trends

Ohsumi and Wada (1974) estimated that the pre-whaling numbers of sei whales in the North Pacific numbered 58,000-62,000 individuals. Tillman (1977) revised this number to 42,000 with an estimated population abundance in 1974 of 7,260-12,620. There are insufficient data to determine trends of the sei whale population in either the Atlantic or the Pacific Ocean (Carretta et al., 2007; Waring et al., 2008).

There have been no direct estimates of sei whale populations for the eastern Pacific Ocean or the Pacific Ocean as a whole. During ship and aerial surveys between 1991 and 2005, there were five confirmed sightings of sei whales in California, Oregon, and Washington waters (Hill and Barlow, 1992; Carretta and Forney, 1993; Mangels and Gerrodette, 1994; Barlow, 2003; Forney, 2007). The minimum population estimate based on line transect surveys of out to 300 nmi between 2001 and 2005 is around 28 whales (Carretta et al., 2007), and the best abundance estimate is 49 (Barlow and Forney, 2007; Forney, 2007).

No sei whale sightings were made during twelve aerial surveys around the main Hawaiian Islands from 1993 to 1998 (Mobley et al., 2000). Barlow (2003) estimated a summer/fall number of 77 whales from a 2002 line-transect survey of the entire Hawaiian Islands EEZ. This is currently the best available abundance estimate for the Hawaiian stock (Carretta et al., 2007). No data are available on current population trend and the effects of possible unauthorized harvesting make this estimate uncertain (Yablokov, 1994 as cited in Carretta et al., 2007).

The most current population estimate for the North Atlantic is over 4,000 sei whales (Braham, 1991). Based on an aerial survey conducted in August 2006, NMFS estimated the current abundance of the Nova Scotia stock at 207 individuals, with a minimum population estimate of 128 (Waring et al., 2008). However, the total number of sei whales in the U.S. Atlantic EEZ remains unknown (Waring et al., 2008).

<u>Fin Whale</u>

Species Description and Distribution

Fin whales (*Balaenoptera physalus*) are widely distributed throughout the world's oceans. They are the second largest baleen whale by length, and are long-bodied and slender, with a prominent dorsal fin set about two-thirds of the way back on the body. They are dark gray dorsally and white ventrally, but the pigmentation pattern is often complex. Distinctive features of pigmentation, along with dorsal fin shapes and body scars, are useful for photo-identification (Agler et al., 1993).

Fin whales are less concentrated in nearshore environments and appear to favor deep waters (Clark et al., 1995). They appear to avoid both highly polar and highly tropical waters (Sergeant, 1977). Fin Whale migration patterns are less predictable than for similar species and not all individuals migrate every year (COSEWIC, 2005). Most Fin whales in the Northern Hemisphere migrate seasonally from the Arctic in summer to lower latitudes in winter to breed. However , the locations of these breeding grounds are uncertain (Perry et al., 1999a). Other groups of individuals may remain year-round in a particular area.

In the North Pacific in summer, fin whales are found in the Chukchi Sea, the Sea of Okhotsk, waters of the Aleutian Islands and the Gulf of Alaska south to California (Gambell, 1985). Rice (1974) suggested that Northern Pacific fin whales may winter off of southern California. However, further research is needed to confirm this (Forney et al., 2000). Fin whales have been observed feeding in Hawaiian waters during mid-May (Shallenberger et al., 1981; Balcomb, 1987). In the North Atlantic Ocean in summer, fin whales occur in foraging areas from the coast of North America to the Arctic, around Greenland, Iceland, northern Norway, Jan Meyers, Spitzbergen, and the Barents Sea. In the western Atlantic, they winter from the edge of sea ice south to the Gulf of Mexico and the West Indies (Gambell, 1985). In the eastern Atlantic, they winter from southern Norway, the Bay of Biscay, and Spain with some whales migrating into the Mediterranean Sea (Gambell, 1985).

Life History Information

The calving interval for fin whales is around two to three years (Agler et al., 1993). Fin whales become sexually mature between five and 15 years of age (Gambell, 1985; COSEWIC, 2005). Calving and mating activities occur in late fall and winter (Mackintosh and Wheeler, 1929; Nishiwaki, 1952; Tomilin, 1957) although off season births do occur off the eastern United States (Hain et al., 1992). Gestation lasts about 12 months and nursing occurs for 6 to 11 months (Perry et al., 1999a). Agler (1993) reported that the gross annual reproductive rate of fin whales in the Gulf of Maine was about eight percent during the 1980s.

Fin whales are most common in both oceanic and coastal temperate to polar regions and are less common near the equator. They have been observed singly, in pairs, and in larger groupings of three to 100 animals (Balcomb, 1987). The amount of time fin whales spend diving varies from a tens of seconds to over an hour (Watkins et al., 1981; Gambell, 1985; Hain et al., 1992; Croll et al., 2001). Hain et al. (1992) found that individuals or pairs represented about 75% of sightings in waters off the U.S. Atlantic Coast. Individuals or groups of less than five represented about 90% of these observations and the mean group size was 2.9 (Hain et al., 1992). They have also been reported grouped with other balaenopterid whale species (Corkeron et al., 1999; Shirihai, 2002).

Fin whales feed on euphausiids and large copepods in addition to schooling fish (Nemoto, 1970b; Kawamura, 1982; Watkins et al., 1984). Their diet varies seasonally and geographically (Watkins et al., 1984; Shirihai, 2002). Competition may occur with other baleen whales or other consumers of these prey types (Nemoto, 1970b; Kawamura, 1980), although Payne et al.(1990) concluded that fin whales are less stressed by fluctuations in prey availability than are humpback whales due to their greater ability to exploit patchy prey aggregations.

Listing Status

Fin whales have been listed as endangered under the ESA since 1973; critical habitat has not been designated for this species. The IWC began management of commercial whaling for fin whales in 1969 and they were fully protected from commercial whaling in 1976 (Allen, 1980). The species is also protected by CITES and the MMPA. Fin whales are listed as endangered on the IUCN Red List of threatened Species (IUCN, 2005c).

Status and Trends

NMFS recognizes three stocks of fin whales: North Atlantic, North Pacific, and Antarctic. In the North Pacific, NMFS recognizes three populations: Alaska, Hawaii and California/Oregon/Washington (Barlow et al., 1997; Hill and DeMaster, 1998). Moore et al. (2000) conducted surveys for whales in the central Bering Sea in 1999 and estimated the fin whale population to be approximately 4,951 animals. 3,279 Fin Whales were estimated to be off California, Oregon, and Washington based on ship surveys in summer/autumn of 1996 and 2001 (Barlow and Taylor, 2001). A 2005 ship survey of the same area resulted in an abundance estimate of 3,281 Fin Whales (Forney, 2007). The geometric mean of line transect estimates from summer/autumn ship surveys conducted in 2001 and 2005 in California, Oregon, and Washington waters out to 300 nmi is 3,454 animals (Barlow and Taylor, 2001; Forney, 2007). Based on the available information, it is feasible that the North Pacific population as a whole has failed to increase significantly over the past 30 years.

There is no evidence of a population trend from recent line-transect abundance surveys conducted in 1996, 2001, and 2005 in these waters. In Hawaii, the best available estimate is 174 animals (Carretta et al., 2007). This number is based on a 2002 shipboard line-transect survey of the entire Hawaiian Islands EEZ (Barlow, 2003). No data are currently available on the population trend of this population (Carretta et al., 2007).

The best abundance estimate available for the western North Atlantic fin whale stock is 2,269 (Waring et al., 2008). However, because of the incomplete coverage of the survey as well as the lack of data regarding movement patterns and population structure, this estimate should be considered a conservative one. Hain et al. (1992) estimated that there were approximately 5,000 fin whales in the western North Atlantic Ocean based on a 1978-1982 survey. Data are limited on the population status of this stock and thus insufficient to determine population trends (Carretta et al., 2007).

<u>North Atlantic Right Whale</u>

Species Description and Distribution

A western and an eastern population of right whales are recognized in the North Atlantic: (IWC, 1986). The western population migrates along the North American coast from Nova Scotia to Florida. Sightings of the eastern North Atlantic population of right whales are very rare (Best et al., 2001).

Right whales occur in sub-polar to temperate waters in all major ocean basins in the world. Most sightings in the western north Atlantic are concentrated within five primary habitats or high-use areas: coastal waters off the southeastern U.S., Cape Cod and Massachusetts Bays, the Great South Channel, the Bay of Fundy, and the Nova Scotian Shelf (Winn et al., 1986). In 1994, the first three of these areas were designated as critical habitat for the North Atlantic right whale.

Right whales have been observed from the mid-Atlantic Bight northward through the Gulf of Maine during all months of the year. In New England, peak abundance of right whales in feeding areas occurs in Cape Cod Bay beginning in late winter. In early spring, peak right whale abundance occurs in Wilkinson Basin to the Great South Channel (Kenney et al., 1995b). In late June and July, right whale distribution gradually shifts to the northern edge of Georges Bank. In late summer and fall, much of the population is found in waters in the Bay of Fundy and around Roseway Basin (Winn et al., 1986; Kenney et al., 1995b; Kenney, 2001).

Life History Information

In the western North Atlantic, calving takes place between December and March in shallow, coastal waters. Females give birth to their first calf at an average age of 9 years (Best and Kishino, 1998; Hamilton et al., 1998). Gestation lasts from 357 to 396 days in southern right whales, and it is likely similar in the northern species (Best, 1994). Weaning seems to be variable, but has been reported to be 8 to 17 months in North Atlantic populations (Hamilton et al., 1995). Calves are 5.5-6.0 meters in length at birth (Best, 1994). The calving interval for right whales is between 2 and 7 years (Knowlton et al., 1994; Best et al., 2001; Burnell, 2001; Cooke et al., 2001). Interestingly, from 2001-2005, a dramatic increase in North Atlantic right whale calving (23 calves per year) indicated that the calving interval may have decreased in this population (Kraus et al., 2005).

Right whales fast during the winter and feed during the summer, although some may opportunistically feed during migration. Right whales use their baleen to sieve prey, from the water. They rely on dense patches of copepods, found in highly variable and spatially unpredictable locations in the Bay of Fundy, Roseway Basin, Cape Cod Bay, the Great South Channel, and other areas off northern U.S. and Canada (Wishner et al., 1988; Murison and Gaskin, 1989; Mayo and Marx, 1990; Baumgartner et al., 2003). Although right whales feed on copepod aggregations at the surface (Mayo and Marx, 1990), they more commonly dive below the surface to exploit areas of high prey density (Kenney et al., 1995a; Baumgartner et al., 2003).

Listing Status

The North Atlantic right whale was originally listed as endangered under the precursor to the Endangered Species Act (ESA) and under the ESA since its inception in 1973 (35 FR 8495). The original listing included both the North Atlantic and the North Pacific 'populations.' Following a comprehensive status review, NMFS concluded that North Atlantic right whales are indeed two separate species. On December 27, 2006 (71 FR 77704 and 71 FR 77694), NMFS published two proposed rules to list these species separately. The final rule published on March 6, 2008 (73 FR 12024). The North Atlantic right whale is also protected by CITES and the MMPA.

Status and Trends

Based on the lack of data, precise distribution and migration patterns of the eastern North Atlantic right whale population are largely unknown. The 1998 IWC Workshop on the Comprehensive Assessment of Right Whales agreed that only animals found in the western North Atlantic can be considered a functioning extant unit based on current sightings information.

Based on a census of individual whales identified using photo-identification techniques and an assumption of mortality of whales not seen in seven years, the western North Atlantic stock size was estimated to be 295 individuals in 1992 (Knowlton et al., 1994). An updated analysis using the same method gave an estimate of 299 animals in 1998 (Kraus et al., 2001). A more recent review of the photo-id recapture database on June 15, 2006, indicated that 313 individually recognized North Atlantic right whales were known to be alive during 2002 (Waring et al., 2008).

Caswell et al. (1999) determined that the western North Atlantic right whale population is declining at a rate of 2.4% per year. The authors also determined that if the mortality rate as of 1996 is not slowed and reproduction not improved, extinction could occur within 100 years. Fortunately, some data indicate a slight increase in the number of cataloged whales, but these data are variable (Waring et al., 2008).

Environmental Baseline

By regulation, environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR §402.02).

The *Environmental Baseline* for this Opinion includes the effects of many activities on the survival and recovery of ESA listed species in the action area; it focuses primarily on past and present impacts to these species. A number of human activities have contributed to the current status of listed marine species in the action area. Some of those activities, (e.g. commercial whaling and intentional shooting) no longer regularly occur. However, the effects from these activities may still persist. Other human activities are ongoing and appear to be directly or indirectly affecting these species. Additionally, unrelated factors may be acting together to affect listed species. For example, vessel effects combined with the stresses of reduced prey availability or increased contaminant loads may reduce foraging success and lead to chronic energy imbalances and poorer reproductive success; or all three factors may work to lower an animal's ability to suppress disease (Williams et al., 2002; NMFS, 2008).

Taken together, the components of the environmental baseline for the action area include sources of natural mortality as well as influences from natural oceanographic and climatic features in the action area. Circulation and productivity patterns influence prey distribution and habitat quality for listed species. The effects of climatic variability on these species in the action area and the availability of prey remain largely undetermined; however, it is likely that any changes in weather and oceanographic conditions resulting in effects on prey populations would have consequences for marine mammals.

The baseline also includes human activities resulting in disturbance, injury or mortality of individuals. Historically, commercial harvest of whales occurred and significantly affected these species. Although these activities are not conducted as in the past, effects from these activities may still persist today. Current anthropogenic activities and effects on individuals in the action area are thought to include habitat degradation (e.g., due to contaminants, risk of oil spills, underwater sound sources, changes in prey availability), interactions with fishing gear and with vessels (including ship strikes), alternative energy projects, and scientific research. Conservation and management efforts are ongoing and have a positive effect on the status of listed marine mammals within the action area.

The following discussion summarizes the natural and human phenomena in the action area that may affect the likelihood that these species will survive and recover in the wild. These include natural mortality; oceanographic and climate conditions; commercial harvest; habitat degradation due to environmental contaminants and the risk of oil spills, sound and changes in prey availability; interactions with fishing gear and vessels and scientific research and conservation efforts.

<u>Natural Stressors in the Action Area</u>

Natural Sources of Stress and Mortality

Sperm Whales

Although it is unclear how they affect sperm whale populations, predation on calves from killer whales (Arnbom et al., 1987) and possibly large sharks (Best et al., 1984) has been documented. Recently, bone necrosis has been observed in sperm whales, possibly caused by the formation of nitrogen bubbles following deep dives and subsequent ascents (Moore and Early, 2004) which could potentially contribute to mortality. However, the effects of necrosis on the fitness of individuals or populations are unknown.

Humpback Whales

The causes of natural mortality in humpback whales are largely unknown although parasites may play a significant role (Lambertsen, 1986). Humpback whales are known to be parasitized by the nematode, *Crassicauda boopis,* which is a significant cause of death in the closely related fin whale (Lambertsen, 1986). Killer whale attacks have also been documented on humpback whales (Dolphin, 1987), but it is unclear what impacts this has on population trends for this species. Lethal strandings attributed to harmful algal blooms have also been documented (Geraci et al., 1989) and lethal entrapment in ice has also been observed (Mitchell, 1979).

Blue Whales

Little is known about natural mortality of blue whales. In the North Atlantic, ice entrapment is known to injure and kill some blue whales (Beamish, 1979; Sergeant, 1982) and individuals have been observed to bear scars thought to be from contact with ice (Sears et al., 1987). Killer whales have been observed to attack blue whales (Tarpy, 1979), and blue whales in the Gulf of California bear scars that are consistent with killer whale attacks (Sears et al., 1990). However, it is uncertain how these attacks can impact populations (Reeves, 1998).

Sei Whales

Important natural mortality factors are largely unknown in sei whales. However, diseases have been observed in this species. The sei whale is often heavily infected with endoparasitic helminth worms (Rice, 1977). In addition, in the 1980's, roughly seven percent of sei whales off California were observed to have an unknown disease that causes them to shed their baleen plates which impairs their feeding ability (Mizroch et al., 1984). However, it is unknown how these diseases affect sei whale populations.

Fin Whales

Sources and rates of natural mortality are largely unknown in fin whales. Ice entrapment is known to injure and kill some whales in the Atlantic (Sergeant et al., 1970). Disease presumably plays a role in natural mortality as well (Lambertsen, 1986). Urinary tract diseases caused by parasites has been suggested to be the primary cause of natural mortality in North Atlantic fin whales (Lambertsen, 1986). Killer whale attacks may result in serious injury or death in young or sick fin whales (Perry et al., 1999a). Rates of natural mortality in fin whales generally are thought to range between four and six percent (Aguilar and Lockyer, 1987).

North Atlantic Right Whales

Large sharks and killer whales may conceivably prey on right whales (Kraus, 1990; NMFS, 2005b). However, no such predation has been observed (Kraus, 1990; NMFS, 2005b). Scars, presumably from killer whale attacks, have been reported, but it is not known what impact this has on right whale populations (Kraus, 1990).

Oceanographic Features and Climatic Variability

Climatic variability and change may be affecting listed species through change in habitat and prey availability. However, these effects are not well understood. Possible effects of climatic variability for marine species include the alteration of community composition and structure, changes to migration patterns or community structure, changes to species abundance, increased susceptibility to disease and contaminants, alterations to prey composition and altered timing of breeding (MacLeod et al., 2005; Robinson et al., 2005; Kintisch, 2006; Learmonth et al., 2006; McMahon and Hays, 2006). Naturally occurring climatic patterns, such as the Pacific Decadal Oscillation and the El Niño and La Niña events, are identified as major causes of changing marine productivity worldwide and may also therefore influence listed species' prey abundance (Mantua et al., 1997; Francis et al., 1998; Beamish et al., 1999; Hare et al., 1999; Benson and Trites, 2002). Gaps in information and the complexity of climatic interactions complicate the ability to predict the effects of climate change and variability may have to these species (Kintisch, 2006; Simmonds and Isaac, 2007).

<u>Anthropogenic Stressors</u>

Commercial Harvest

Although commercial harvesting no longer targets any listed species in the proposed action area, prior exploitation may have altered the population structure and social cohesion of the species such that effects on abundance and recruitment can continue for years after harvesting has ceased.

Sperm Whales

Sperm whales were subject to commercial whaling in all parts the world. Whitehead (2002) suggested that the pre-exploitation worldwide population of sperm whales was approximately 1,100,000. This number had been reduced to approximately 360,000 by the 1990's (Whitehead, 2002; Taylor, 2008). The IWC gave sperm whales complete protection from commercial whaling in 1986 (IWC, 1982). Japan still takes a small number of sperm whales each year under an exemption for scientific research and Norway and Iceland have formally objected to the IWC ban on commercial whaling and therefore may resume whaling of sperm whales under IWC rules.

In the North Pacific, sperm whale hunting began in the early 1800s (Best, 1983). After the introduction of modern whaling technology, the peak annual catches by modern whaling before the war were less than 2,000, but soon climbed to over 16,000 by 1968 (Ohsumi, 1980). Between 1910 and 1976, approximately 269,000 sperm whales were taken in the North Pacific (Ohsumi, 1980). However, deliberate mis-reporting of Japanese catch data has been suggested (Kasuya, 1998). Under reporting by Soviet whalers is also known to have occurred (Yablokov, 1994). An estimated 180,000 animals are now believed to have been killed by Soviet whalers between 1949 and 1971 (Brownell et al., 1998) before the IWC implemented it's international observer policy to curtail mis-reporting of whale catch data. This figure is approximately 60% higher than official reports (Brownell et al., 1998).

No reliable records exist for the number of sperm whales killed in the North Atlantic before the 1900s, but estimates are in the hundreds of thousands (see NMFS, 2006b). Better records exist for catches after the advent of modern whaling. An extrapolation of all catch data in the North Atlantic after 1905 resulted in an estimated figure of 38,235 whales killed since 1905 (IWC, 1981).

Humpback Whales

Commercial whaling heavily depleted worldwide humpback whale numbers, but most populations have increased since whaling was banned in 1966 (Reilly, 2008). For Humpback whales in the Pacific Ocean, whaling operations took nearly 30,000 whales from 1900 to 1965 with an unknown number harvested prior to 1900 (Perry et al., 1999a). In 1965, the IWC banned the commercial hunting of Humpback Whales in the Pacific.

In the western North Atlantic, 522 humpback whales were harvested off Greenland from 1886 to 1976 (Kapel, 1979) and 1,397 animals were harvested off of eastern Canada from 1903 to 1970 (Mitchell, 1974). At least 1,579 humpback whales were killed in the eastern North Atlantic and Arctic from 1868 to 1955, with other un-documented harvestings also occurring (Perry et al., 1999a). This stock was given protected status in the North Atlantic in 1955, with an allowance for subsistence harvesting (Brown, 1976). Reported subsistence harvests of this stock have been of one or two animals in most years since 1986 (IWC, 2007).

In the Southern Hemisphere, some 208,359 humpback whales were recorded to have been killed between 1904-2002 (Yablokov et al., 1998; Clapham and Baker, 2002). Soviet whalers killed more than 48,000 humpback whales after World War II with nearly 13,000 animals harvested in the 1959-1960 season alone (Clapham and Baker, 2002). The population of whales that inhabited the coastal waters of New Zealand collapsed in 1960 (Clapham and Baker, 2002). Although rare, some animals have been recently observed in these waters (Clapham and Baker, 2002).

Blue Whales

While the pre-whaling worldwide abundance of blue whales may have been as high as 200,000 individuals (Maser et al., 1981; U.S. Department of Commerce, 1983), current estimates range from 3,300 (Wade and Gerrodette., 1993) to as low as 1,400 (Barlow et al., 1997). The IUCN estimated an approximate 50% decline in blue whales worldwide over the last 75 years when commercial whaling was widely practiced (Reeves et al., 2003). Rice (1974) suggested that the pre-1924 North Pacific blue whale population size was around 6,000. Approximately 9,500 whales of this population were reported killed between 1910 and 1965 (Ohsumi and Wada., 1972). An estimated 360,644 southern hemisphere blue whales have been killed by whalers from 1904 to 2000 (Yablokov et al., 1998; Clapham and Baker, 2002). In addition, an unknown number of blue whales were taken illegally by the Soviet Union after gaining protection from commercial whaling in 1966 (Yablokov et al., 1998). At least 11,000 blue whales were killed in the North Atlantic in the 19th to mid-20th centuries (Sigurjónsson and Gunnlaugsson, 1990).

Sei Whales

The stocks of sei whales have been heavily depleted before gaining protection from commercial harvest in the 1970s and 1980s (Reeves et al., 2003). After the blue and fin whales became scarce due to overharvesting, sei whales were heavily exploited (Reeves et al., 2003). The IUCN estimated an approximate 50% decline in sei whales worldwide over the last 75 years when commercial whaling was widely practiced (Reeves et al., 2003). Most of this decline occurred in the Southern Hemisphere (Reeves et al., 2003). In the North Pacific, 72,215 sei whales were reported to have been killed by commercial whalers between 1910 and 1975 (Horwood, 1987). There were 14,295 sei whales reported to have been killed in the North Atlantic between 1885 and 1984 (Horwood, 1987). A total of 152,233 sei whales were killed in the Southern Hemisphere between 1910 and 1979 (Horwood, 1987). The extent to which stocks have recovered since then is unknown. Relatively little recent research has been conducted on this species (Reeves et al., 2003).

Fin Whales

Coinciding with the advent of modern whaling practices, the IUCN estimated an approximate 50% decline in fin whales worldwide over the last 75 years, with most of this decline occurring in the Southern Hemisphere (Reeves et al., 2003). Prior to commercial harvest, there may have been up to 45,000 Fin Whales in the North Pacific. By the early 1970s, commercial whaling may have reduced this population to between 13,620 and 18,630 (Ohsumi and Wada, 1974). Commercial whaling for fin whales ended in the North Pacific in 1976. There were 703,693 fin whales killed in the Antarctic from 1904 to 1975 (IWC, 1990).

In the North Atlantic, there may have been as many as 30,000 to 50,000 fin whales before commercial exploitation (Sergeant, 1977). However, Roman and Palumbi (2003) estimated that, based on genetic analysis, the historical population size for North Atlantic fin whales may have been as high as 360,000. Over 48,000 fin whales were caught between 1860 and 1970 in the Atlantic (Braham, 1991). Fin whales are still hunted in Greenland and subject to catch limits under the IWC's Aboriginal Subsistence Whaling Scheme. From 1996 to 2007, subsistence catches are reported to be 126 animals from the North Atlantic (IWC, 2007). The best current abundance estimate available for the western North Atlantic fin whale stock is 2,269 (Waring et al., 2008).

North Atlantic Right Whales

Conclusions based on historical whaling data suggest that the numbers of right whales in the western North Atlantic numbered in the hundreds before commercial exploitation (Reeves and Mitchell., 1987). More recent analysis concluded that these numbers may have been closer to 1,000, and that the greatest population decline occurred in the early 1700s (Reeves et al. in Breiwick et al., 1993). However, the authors caution that these estimates were based on incomplete records. Although extensively hunted historically, there has been little hunting of right whales in the 20th century. Hunting in the 19th and early 20th centuries, largely by Norwegian whaling operations, are likely to have irreversibly damaged or extirpated this stock (Collett, 1909; Brown, 1976).

Pollution

Pesticides and Contaminants

Exposure to pollution and contaminants has the potential to cause adverse health effects in marine species. In the eastern North Pacific, marine ecosystems receive pollutants from a variety of local, regional, and international sources and their levels and sources are therefore difficult to identify and monitor (Grant and Ross, 2002). Marine pollutants come from multiple municipal, industrial and household as well as from atmospheric transport (Iwata, 1993; Grant and Ross, 2002; Garrett, 2004; Hartwell, 2004).

The accumulation of persistent pollutants through trophic transfer may cause mortality and sub-lethal effects in long-lived higher trophic level animals (Waring et al., 2008), including immune system abnormalities, endocrine disruption and reproductive effects (Krahn et al., 2007). Recent efforts have led to improvements in regional water quality and monitored pesticide levels have declined, although the more persistent chemicals are still detected and are expected to endure for years (Mearns, 2001; Grant and Ross, 2002).

Hydrocarbons

Exposure to hydrocarbons released into the environment via oil spills and other discharges pose risks to marine species. Marine mammals are generally able to metabolize and excrete limited amounts of hydrocarbons, but exposure to large amounts of hydrocarbons and chronic exposure over time pose greater risks (Grant and Ross, 2002). Acute exposure of marine mammals to petroleum products causes changes in behavior and may directly injure animals (Geraci, 1990). Cetaceans have a thickened epidermis that greatly reduces the likelihood of petroleum toxicity from skin contact with oils (Geraci, 1990), but may inhale these compounds at the water's surface and ingest them while feeding (Matkin and Saulitis, 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability.

Marine Debris

Types of marine debris include plastics, glass, metal, polystyrene foam, rubber, and derelict fishing gear from human marine activities or transported into the marine environment from land. The sources of this debris include littering, dumping and industrial loss and discharge from land. Marine debris can damage important marine habitat, such as rookeries and haulout sites by making them inhospitable to the species that rely on them. Marine animals can also become entangled in marine debris, or ingest it, which may lead to injury or death.

The bottom-feeding habits of sperm whales suggest that they could ingest marine debris (Lambertsen, 1997). One of 32 sperm whales examined for pathology in Iceland had a lethal disease thought to have been caused by the complete obstruction of the gut with plastic marine debris (Lambertsen, 1997). Given the limited knowledge about the impacts of marine debris on baleen whales, it is difficult to determine the extent of the threats that marine debris poses to these species.

Noise

Noise generated by human activity has the potential to affect listed species. This includes sound generated by commercial and recreational vessels, aircraft, commercial sonar, military activities, seismic exploration, in-water construction activities and other human activities. These activities all occur within the action area to varying degrees throughout the year. Marine mammals generate and rely on sound to navigate, hunt and communicate with other individuals. As a result, anthropogenic noise can interfere with these important activities. The effects of noise on marine mammals can range from behavioral effects to physical damage (Richardson et al., 1995).

Commercial shipping traffic is a major source of low frequency anthropogenic noise in (NRC, 2003). Although large vessels emit predominantly low frequency sound, studies report broadband noise from large cargo ships that includes significant levels above 2kHz, which may interfere with important biological functions of cetaceans (Holt, 2008). Commercial sonar systems are used on recreational and commercial vessels and may affect marine mammals (NRC, 2003). Although, little information is available on potential effects of multiple commercial sonars to marine mammals, the distribution of these sounds would be small because of their short durations and the fact that the high frequencies of the signals attenuate quickly in seawater (Richardson et al., 1995).

On May 5, 2003, the U.S. Navy guided missile destroyer U.S.S. Shoup passed through the Strait of Juan de Fuca and Haro Strait operating its mid-frequency sonar during a training exercise. Southern resident killer whales (SRKWs) were present at the time and exhibited unusual behaviors (Commander U.S. Pacific Fleet, 2003). NMFS concluded that the SRKWs were exposed to levels likely to cause behavioral disturbance, but not temporary or permanent hearing loss (see NMFS, 2005a, 2006a).

Seismic surveys using towed airguns also occur within the action area and are the primary exploration technique for oil and gas deposits and for fault structure and other geological hazards. Airguns generate intense low-frequency sound pressure waves capable of penetrating the seafloor and are fired repetitively at intervals of 10-20 seconds for extended periods (NRC, 2003). Most of the energy from the guns is directed vertically downward, but significant sound emission also extends horizontally. Peak sound pressure levels from airguns usually reach 235-240dB at dominant frequencies of 5-300Hz (NRC, 2003). Most of the sound energy is at frequencies below 500Hz. In the United States, all seismic projects for oil and gas exploration and most research activities involving the use of airguns with the potential to take marine mammals are covered by incidental harassment authorizations under the MMPA.

Fishing Activities

Entrapment and entanglement in fishing gear is a frequently documented source of human-caused mortality in large whale species (see Dietrich et al., 2007). These entanglements also make whales more vulnerable to additional dangers (e.g., predation and ship strikes) by restricting agility and swimming speed. There is concern that many marine mammals that die from entanglement in commercial fishing gear tend to sink rather than strand ashore thus making it difficult to accurately determine the extent of such mortalities.

Marine mammals probably consume at least as much fish as is harvested by humans (Kenney et al., 1985). Therefore, competition with humans for prey is a potential concern for whales. The sperm whale's principle prey is large squid (Clarke et al., 1980; Clarke and Macleod., 1980; Clarke, 1996), but they will also eat large sharks, skates, and fishes (Clarke, 1977; Clarke, 1980; Rice, 1989). Reductions in fish populations, whether natural or human-caused, may affect listed whale populations and their recovery.

Sei whales consume a diverse set of prey which may allow them a greater opportunity to take advantage of variable resources (Waring et al., 2008). However, this attribute may also increase their potential for competition with commercial fisheries (Rice, 1977). Similarly, humpback and fin whales are known to feed on several species of fish that are harvested by humans and fishery-caused reductions in prey resources could also have an influence on these species (Waring et al., 2008). However, the extent of competition between humans and whales is not known.

Krill species are their principle prey of blue whales and are not commercially exploited on a large scale in the Northern Hemisphere. Similarly, right whales feed almost exclusively on copepods and therefore are not in direct competition with human fishing operations. However, reduced zooplankton abundance due to habitat degradation is a potential indirect threat to these species.

Ship Strikes and Other Vessel Interactions

Ships have the potential to affect whales through strikes and from noise and visual disturbance by their physical presence. Responses to vessel interactions include disturbance of vital behaviors and social groups, separation of mothers and young and abandonment of resting areas (Kovacs and Innes., 1990; Kruse, 1991; Wells and Scott, 1997; Samuels and Gifford., 1998; Bejder et al., 1999; Colburn, 1999; Cope et al., 1999; Mann et al., 2000; Samuels et al., 2000; Boren et al., 2001; Constantine, 2001; Nowacek et al., 2001). Whale watching, a profitable and rapidly growing business with more than 9 million participants in 80 countries and territories, may increase these types of disturbance and negatively affect listed species (Hoyt, 2001).

Ship strikes are considered a serious and widespread threat to whales. This threat is increasing as commercial shipping lanes cross important breeding and feeding habitats and as whale populations recover and populate new areas or areas where they were previously extirpated (Swingle et al., 1993; Wiley et al., 1995). As ships continue to become faster and more widespread, an increase in ship interactions with whales is to be expected. Studies show that the probability of fatal injuries from ship strikes increases as vessels operate at speeds above 14 knots (Laist et al., 2001).

However, ships moving at relatively slow speeds may be a threat as well. On Oct. 19, 2009 a ship mapping the seafloor off CA for NOAA reported a “a shudder underneath the[ir] ship" (NMFS unpublished data). A whale was spotted soon thereafter and was observed to be bleeding profusely. A dead 20m long blue whale was found washed up on Ft. Bragg beach in northern CA soon thereafter and was the apparent victim of a ship strike (Unpublished report from Fugro Pelacos, Inc. to NMFS). The vessel that struck the whale was only traveling at approximately 5.5 knots (NMFS unpublished data).

Twenty-one confirmed mortalities of large whales resulted from 42 confirmed ship strikes in the North Atlantic between the years of 2000-2004 alone (Cole et al., 2006). Fin whales are the most frequently struck whale, although right whales, humpback whales and sperm whales are also commonly struck (Laist et al., 2001). In some locations, one-third of all fin whale and right whale strandings appear to involve ship strikes (Laist et al., 2001) and ship strikes are directly implicated in impeding the recovery of North Atlantic right whales (Caswell et al., 1999).

Scientific Research

Large whales in the action area have been the subject of scientific research activities, as authorized by NMFS permits. Research in the action area has included biopsy sampling, close vessel and aircraft approaches, the collection of sloughed skin, tagging, active acoustic experiments and anatomical data gathering using ultrasound devices. No mortalities are authorized for any animal of any age. There are twenty-nine permits authorizing research on one or more of the target whale species for the proposed action. Fourteen of these permits are for research in the Atlantic and 15 are for research in the Pacific with one for both the Pacific and Atlantic Oceans. No authorized studies on these whales in the action area reported to have caused mortalities. Appendix A lists the types and number of takes of each target species including those in the proposed permit.

Appendix B lists the permit holders, permit numbers, expiration dates and other information for these permits.

Conservation and Management Efforts

Several conservation and management efforts have been undertaken for listed marine mammals in the action area. Recovery plans under the ESA help guide the protection and conservation of listed species and final plans are in place for the humpback whale (NMFS, 1991), the blue whale (NMFS, 1998b) and the north Atlantic right whale (NMFS, 2005b). Recovery plans are in development for the sperm whale (NMFS, 2006b) and the Fin Whale (NMFS, 1998a). NMFS implements conservation and management activities for these species through its Regional Offices and Fishery Science Centers in cooperation with states, conservation groups, the public, and other federal agencies.

In the North Atlantic, NMFS has several programs in place to help reduce ship strikes to whales. One of these measures is the implementation of new rules that limit vessel traffic of ships greater than 65 feet to speeds of 10 knots or less in areas when right whales are known to congregate. Other programs include the modification of shipping lanes from areas of high right whale concentrations. Although these efforts are targeted primarily to help conserve North Atlantic right whales, they are also beneficial to other whales which inhabit the same waters and are subject to similar threats.

Similarly, in an effort to reduce fishing gear entanglement by whales in the North Atlantic, NMFS developed the Atlantic Large Whale Take Reduction Plan. This plan has improved safety measures in fishing gear in order to reduce entanglements by whales. This plan also expanded restrictions on fishing grounds and prohibited gillnet fishing in restricted areas during the calving season.

In the Pacific, several conservation measures have been implemented to help reduce entanglements and other threats to whales. These include placing observers aboard driftnet fishing vessels and those engaged in seismic activities. These observers record and monitor any takes of protected species. In addition, the Pacific Offshore Cetacean Reduction Plan has been implemented and, among other measures, requires the use of acoustic pingers to help repel marine mammals from fishing operations.

The NMFS, in cooperation with the U.S. Coast Guard and the National Ocean Service's Channel Islands National Marine Sanctuary, has helped implement the broadcasting of speed advisories to vessels in the Santa Barbara Channel when blue whales are present. This effort is intended to lessen the possibility of ship strikes to blue whales, but will benefit other whale species as well.

Various efforts are underway with other Agencies and non federal entities to monitor and record the status of whale populations. The Structure Levels of Abundance and Status of Humpbacks (SPLASH) project is an international effort to understand the population structure of humpback whales in the North Pacific. In the North Atlantic, a similar effort called More North Atlantic Humpbacks (MoNAH) project seeks to population size of

North Atlantic humpback whales that visit West Indian calving grounds. In addition, the status of other protected whale species is monitored by surveys conducted every three years.

Effects of the Proposed Action

Pursuant to Section 7(a)(2) of the ESA, federal agencies are directed to ensure that their activities are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. Direct adverse effects of the permitted activities on listed species that are within the action area would include disruption of feeding, breeding, resting and other behaviors. Some displacement may result from these activities. The duration of the behavioral disruptions and displacements are expected to vary by species and type of disturbance.

In this section, we describe the potential physical, chemical, or biotic stressors associated with the proposed action, the probability of individuals of listed species being exposed to these stressors based on the best scientific and commercial evidence available, and the probable responses of those individuals (given probable exposures) based on the available evidence. As described in the *Approach to the Assessment* section, for any responses that would be expected to reduce an individual's fitness (i.e., growth, survival, annual reproductive success, and lifetime reproductive success), the assessment would consider the risk posed to the viability of the population(s) those individuals comprise and to the listed species those populations represent. The purpose of this assessment is to determine if it is reasonable to expect the proposed studies to have effects on listed species that could appreciably reduce their likelihood of surviving and recovering in the wild.

For this consultation, we are particularly concerned about behavioral disruptions that may result in animals that fail to feed or breed successfully or fail to complete their life history because these responses are likely to have population-level consequences. The proposed permit would authorize non-lethal "takes" by harassment of listed species during activities. The ESA does not define harassment nor has NMFS defined the term pursuant to the ESA through regulation. However, the MMPA of 1972, as amended, defines harassment as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal or marine mammal population in the wild or has the potential to disturb a marine mammal or marine mammal population in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering [16 U.S.C. 1362(18)(A)]. The latter portion of this definition (that is, "...causing disruption of behavioral patterns including...migration, breathing, nursing, breeding, feeding, or sheltering") is almost identical to the U.S. Fish and Wildlife Service's regulatory definition of "harass"[3] pursuant to the ESA. For this Opinion, we define harassment similarly as an intentional or unintentional human act or

3 An intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR 17.3)

omission that creates the probability of injury to an individual animal by disrupting one or more behavioral patterns that are essential to the animal's life history or its contribution to the population the animal represents.

Potential Stressors

The assessment for this consultation identified several possible stressors associated with the activities proposed to be authorized under proposed permit: (1) potential ship strikes; (2) noise and visual disturbance from boats engaged in the proposed activities; (3) effects from biopsy activities. The following section describes these stressors in greater detail and explains the probability of interactions and the probable responses of listed animals based on the best available evidence.

Table 2 identifies the number of disturbance events to which listed species may be exposed under the proposed activities. The proposed permit does not distinguish how many of each type of disturbance the total number of "takes" comprises. Rather, any single type of "take" or combination thereof can contribute to the total number allowed under the proposed permit. Because of this, we assess the risks of each respective proposed activity as if that activity alone comprises all of the proposed takes per species.

Table 2. Possible disturbance events to listed species from the proposed activities over the duration of the proposed permit (five years).

SPECIES	Number of Takes[1] Allowed under the Proposed Permit	
	Annual	Total
Sperm Whale North Atlantic Stock	150	750
Sperm Whale North Pacific Stock	100	500
Humpback Whale	20	100
Blue Whale	20	100
Sei Whale	20	100
Fin Whale	20	100
North Atlantic Right Whale*	20	100

[1] Takes (as defined in the *Description of the Proposed Action* section above) may occur from any combination of the following activities: Passive acoustic recording, tracking visually or from sonar, collection of sloughed skin or feces, visual surveys or observations of individuals or populations, photography or photo-ID of animals, videography, skin/blubber biopsy, focal follows, or from incidental harassment resulting from these activities.
* Proposed for all activities except biopsies.

Response Analyses

As discussed in the *Approach to the Assessment* section of this Opinion, response analyses determine how listed resources are likely to respond after being exposed to an action's effects on the environment or directly on listed animals themselves. For the purposes of consultation, our assessments try to detect potential lethal, sub-lethal, physiological or behavioral responses that might reduce the fitness of individuals. The proposed activities have the potential to produce disturbances that may affect listed marine mammals.

The responses by animals to human disturbance are similar to their responses to potential predators (Harrington and Veitch, 1992; Lima, 1998; Gill and Sutherland, 2001; Frid and Dill, 2002; Frid, 2003; Beale and Monaghan, 2004; Romero, 2004). These responses include interruptions of essential behavior and physiological processes such as feeding, mating, nursing, resting, digestion etc. This can result in stress, injury and increased susceptibility to disease and predation (Frid and Dill, 2002; Romero, 2004; Walker et al., 2006).

Risks to listed individuals are measured in terms of changes to an individual's "fitness." Fitness is defined as the individual's growth, survival, annual reproductive success and lifetime reproductive success. When listed plants or animals exposed to an action's effects are not expected to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (Brandon, 1978; Mills and Beatty, 1979; Stearns, 1992; Anderson, 2000). As a result, if the assessment indicates that listed plants or animals are not likely to experience reductions in their fitness, we conclude our assessment. If possible reductions in individuals' fitness are likely to occur, the assessment considers the risk posed to populations to which those individuals belong, and then to the species those populations represent.

All of the proposed activities require that investigators closely approach listed whales by boat. This creates the possibility of vessels striking an animal. In addition, biopsy darting requires direct physical contact with individuals. These activities have the potential wound, injure, or kill listed whales. In addition, these animals may undergo changes in behavior in response to disturbances from the proposed activities. Sperm whales are the major target species and therefore have the greatest probability of being exposed. However, other species of whales will be targeted opportunistically when possible.

Boat Strikes, Noise and Visual Disturbance

The proposed close approaches, photography, videography, tracking, focal follows, pursuit, biopsy activities and skin and feces collections give rise to the possibility for ship strikes and can cause noise and visual disturbance to listed whale species. Whales of both sexes and of all age groups are proposed to be tracked, and approaches as close as three meters may be made after visual contact is established. The proposed tracking activities involve the use of a Furuno FCV 292 "fish-finder" type sonar which also has the potential to disturb listed species from the sound it emits. During focal follows whales are proposed to be video-recorded and photographed. These focal follows would be conducted at distances of as close as three meters to approximately 500 meters from the target animals.

Cetaceans exhibit a variety of responses to noise and visual disturbances from boat based human activities. These include short-term changes in swimming and feeding behaviors, as well as diving and staying submerged for longer periods of time (Watkins et al., 1981; Malme et al., 1984; Richardson et al., 1985; Baker and Herman., 1987; Brown et al., 1991; Clapham and Mattila, 1993; Jahoda et al., 1997; Patenaude et al., 2002; Best et al., 2005). These responses create additional energy expenditures that result in the animal incurring an energy debt that must be compensated for by increased foraging. This can further interrupt normal behavior. Individually and collectively, these disturbances can adversely affect already imperiled individuals and populations.

Expected Responses to Potential Boat Strikes, Noise and Visual Disturbance

There is a potential for boat strikes to listed species resulting from the proposed activities. However, because of their small size, maneuverability and slow operating speeds, boat strikes are extremely unlikely. As a result, any risk of boat strikes to listed species is highly unlikely and no reduction in the fitness of any individual listed whale is expected.

Commercial sonar systems such as the one proposed are used widely on recreational and commercial vessels. They use high operating frequencies, low power, narrow beam patterns, and short pulse lengths (NRC, 2003). Frequencies fall between 1 and 500 kHz, and may therefore be within the hearing range of whales. However, the areas that would be affected would likely be very small due the high attenuation of the low power and high frequency sound used. The short durations of the signals from this instrument would further reduce the possibility of disturbance (Richardson et al., 1995). Therefore, any risks that the proposed use of this sonar may pose to listed species are discountable.

Noise and visual disturbances that would result from the proposed activities are expected to be brief and not to have long-term consequences to any animal. Whales often display great tolerance to vessel traffic (Richardson et al., 1995). Although some startle reactions have been observed in sperm whales upon close approaches (Whitehead et al., 1990), reactions to boat activities are usually minor when small vessels operate non-aggressively (Papastavrou et al., 1989). Similarly, a study involving the close approaches of research vessels to humpback whales showed that responses were minimal when approaches were slow (Clapham and Mattila, 1993). These behavioral changes, if they even occurred, were short lived (Clapham and Mattila, 1993). Watkins (1986) found that several species of baleen whales simply ignored weak vessel noises altogether.

Actions will be terminated if animals are observed to display unusual behavior, aggravation or distress. In addition, no mortality or physical injury is expected as a result of these proposed activities. Therefore, based on the proposed mitigation measures and the fact that these species are not likely to significantly alter their behavior or physiology as a result of these disturbances, no reduction in the fitness of any individual whale is expected.

Biopsies

Whales six months and older are proposed to be biopsied via darts deployed from a compound crossbow. Whales would be approached from either the research vessel or from inflatable boats. A maximum of two attempts to obtain a single biopsy sample would be made per animal. Investigators would take reasonable measures to avoid repeated sampling of any individual whale. The biopsy darts are designed to float and will be retrieved via dip nets from boats which will eliminate the need for a retrieval line that could become entangled on whales' fins and flukes. Biopsy tips are to be thoroughly cleaned and sanitized with a 95% ethanol solution to prevent infection and disease transfer. Up to 750 sperm whales in the North Atlantic and 500 sperm whales in the North Pacific could be biopsied according to the proposed permit. One hundred each of humpback, blue, sei and fin whales from all waters could also be biopsied according to the proposed permit.

The available data regarding the responses of cetaceans to biopsy techniques are qualitative and largely anecdotal in nature. While most whales have been observed to exhibit a range of short term behavioral responses to biopsy darting, no mortality has been documented from biopsy techniques on large cetaceans (Bearzi, 2000).

Expected Responses to Biopsies

The likelihood of significant responses by whales to biopsy sampling is low and any responses that may occur are expected to be minor and temporary. Gauthier and Sears (1999) studied the behavioral responses of fin, blue, and humpback whales to crossbow deployed biopsy sampling activities similar to those proposed. Of these, roughly 45% of successful biopsies elicited no response. Those that did resulted in behaviors such as tail flicking and the animals submerging. Most whales returned to normal activities and exhibited normal behavior after a few minutes. Whales reacted similarly when biopsied more than once.

Weinrich (1992) noted that, although rare, biopsy attempts on humpback whales may result in vigorous responses which can lead to near physical exhaustion. Strong reactions in humpback whales occurred in only 3.3% of biopsy attempts and were always associated with unusual occurrences such as the entanglement of retrieval lines on the flukes or fins of the target animal (Weinrich et al., 1991). More common reactions included decreased time at the surface, a reduction in movement and an increase in tail flicks. Mother/calf pairs appeared to be no more sensitive to biopsy activities than were other whales, although mothers tended to be more evasive of approaching boats (Weinrich et al., 1992). A study by Clapham and Mattila (1993) showed that 67% of humpback whales exhibited either no reaction or only a low-level reaction in response to biopsy procedures. Brown *et al.* (1994) reported that detectable reactions to biopsy sampling occurred in 41.6 % of humpback whales sampled. No long-term effects were observed in any of these studies and no significant age or gender differences in whale responses to biopsy procedures were reported.

Regarding toothed whales, Engelhaupt (2001 unpublished data) summarized the reactions of sperm whales to biopsy sampling under NMFS Permit No. 909-1465-00. Of 59 sperm whale biopsy samples collected in the northern Gulf of Mexico, 61% exhibited either a minor reaction such as submerging or exhibited no response at all. Seventeen percent exhibited a strong response such as slashing tail kicks, an exhibition of a high arched back, tail slaps or defecation followed by a deep dive. Twenty-two percent exhibited a moderate short term modifications in behavior such as trumpet blows and hard tail flicks (see Weinrich et al., 1991). These responses were all short lived, and in many cases the whale would quickly resurface and resume its previous behavior. Similarly, Hooker et al. (2001) found that reactions in northern bottlenose whales to biopsy darting were weak and short lived and that target animals did not avoid the research vessel following biopsy procedures and often re-approached the vessel within several minutes.

A maximum of two attempts to obtain a single biopsy sample would be made per animal and investigators would take reasonable measures to avoid repeated sampling of any individual. Strong responses to biopsy darting in past studies usually resulted when whales became entangled in retrieval lines. Because the proposed research shall use no such lines, these responses are expected to be unlikely. Furthermore, approaches would be aborted if animals are observed to display unusual behavior, aggravation or distress. These mitigation methods should further reduce the likelihood of any significant disturbance occurring.

There is a risk of infection and disease transfer from biopsy procedures. However, the biopsy tips are to be sterilized with on a 95% ethanol solution. Therefore, the possibility of infection or disease transfer is not expected to be significant. The proposed biopsy sampling is not expected to result in any long term adverse affects to listed whales. No reduction in fitness is expected to any individual listed animal from the proposed biopsy procedures.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Future Federal actions, including research authorized under ESA Section 10(a)1(A), that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. After reviewing available information, NMFS is not aware of effects from any additional future non-federal activities in the action area that would not require federal authorization or funding and are reasonably certain to occur during the foreseeable future.

NMFS expects the natural phenomena in the action area (e.g., oceanographic features, storms, and natural mortality) will continue to influence listed whales as described in the *Environmental Baseline*. We also expect current anthropogenic effects will also continue, including the introduction of sound sources into marine mammal habitat, changes in prey availability, vessel traffic and scientific research. Potential future effects from climate change on marine mammals in the action area are not definitively known. However, climatic variability has the potential to affect these species in the future, including indirectly by affecting prey availability.

As the size of human communities increase, there is an accompanying increase in habitat alterations resulting from an increase in housing, roads, commercial facilities and other infrastructure. This results in increased discharge of sediments and pollution into the marine environment. These activities are expected to continue to degrade the habitat of cetaceans as well as that of the prey on which they depend.

Integration and Synthesis of Effects

The following text integrates and synthesizes the *Status of the Species*, the *Environmental Baseline* and the *Effects of the Action* sections of this Opinion. This information, in addition to the known cumulative effects, is used to assess the risk the proposed activities pose to sperm, humpback, blue, sei, fin and North Atlantic right whales.

As explained in the *Approach to the Assessment* section, risks to listed individuals are measured using changes to an individual's "fitness." When listed plants or animals exposed to an action's effects are not expected to experience reductions in fitness, we would not expect the action to have adverse consequences on the viability of the populations those individuals represent or the species those populations comprise (e.g., Brandon, 1978; Mills and Beatty, 1979; Stearns, 1992; Anderson, 2000).

When individual, listed plants or animals are expected to experience reductions in fitness in response to an action, those fitness reductions can reduce the abundance, reproduction, or growth rates of the populations that those individuals represent (see Stearns, 1992). If we determine that reductions in individual plants' or animals' fitness reduce a population's viability, we consider all available information to determine whether these reductions are likely to reduce the viability of any species as a whole.

The proposed issuance by PR1 of scientific research Permit No. 13545 would authorize direct "takes" of sperm, humpback, blue, sei, fin and North Atlantic right whales within U.S. waters and on the high seas. The proposed activities under this permit include passive recording, sonar and acoustic tracking, close approaches, photography, videography, focal follows, the collection of sloughed skin and feces and biopsy sampling.

The permit would be valid for five years and allow for total "takes" of 750 North Atlantic sperm whales, 500 North Pacific sperm whales and 100 each of humpback, blue sei, fin and North Atlantic right whales. Any single type of "take" or combination thereof can contribute to the total number allowed under the proposed permit. Biopsy sampling would not be permitted on North Atlantic right whales.

Current and Historic Stressors

The current and historic stressors to these species are detailed in the *Environmental Baseline* section of this Opinion. These stressors include natural mortality, depletion of populations due to historic harvesting, pollution, noise, fishing interactions, ship strikes, vessel interactions and scientific research. Of these, the reduction of whale populations from historic harvest has likely had the most detrimental and long lasting effects. Although commercial harvesting no longer targets any listed species in the proposed action area, prior exploitation may have altered the population structure and social cohesion of the species. These effects continue even after harvesting has ceased.

Sperm whale populations have been depleated heavily due to commercial whaling worldwide. Commercial whaling has also depleted worldwide humpback whale numbers, but populations have increased since whaling was banned in 1966 (Reilly, 2008). The IUCN estimated an approximate 50% decline in blue, fin and sei whales worldwide over the last 75 years when commercial whaling was widely practiced (Reeves et al., 2003). North Atlantic right whale hunting in the 19th and early 20th centuries is likely to have irreversibly damaged or extirpated the species (Collett, 1909; Brown, 1976).

Possible Stressors from the Proposed Activities

The assessment for this consultation identified several possible stressors associated with the activities to be authorized under proposed permit: (1) potential ship strikes; (2) noise and visual disturbance from boats engaged in the proposed activities and (3) effects from biopsy activities. For this consultation, we are particularly concerned about behavioral disruptions that may result in animals that fail to feed or breed successfully or fail to complete their life history because these responses are likely to have population-level consequences for sperm, humpback, blue, sei, fin or North Atlantic right whales.

Expected Responses to Stressors from the Proposed Activities

As explained in the *Response Analyses* section of this Opinion, because of their small size, maneuverability and slow operating speeds, boat strikes are extremely unlikely. As a result, any risk of boat strikes to listed species is therefore discountable. Similarly, noise and visual disturbances that would result from proposed activities are expected to be brief and not to have any long-term consequences to individual sperm, humpback, blue, sei, fin or North Atlantic right whales or the populations or species that they comprise.

The likelihood of significant responses by whales to biopsy sampling is also low and any responses that may occur are expected to be minor and temporary. Therefore, based on the proposed mitigation measures and the fact that these animals are not likely to significantly alter their behavior or physiology as a result of disturbances from of the proposed biopsy activities, these activities are not expected to reduce the fitness or the likelihood of survival and recovery of listed individual sperm, humpback, blue, sei or fin whales or the populations or species that they comprise.

Conclusion

After reviewing the current status of species; the environmental baseline for the action area; the anticipated effects of the proposed activities and the cumulative effects, it is NMFS Office of Protected Resources - Endangered Species Division's opinion that the NMFS Office of Protected Resources - Permits, Conservation and Education Division's permit No. 13545 to Ocean Alliance, as proposed, is not likely to jeopardize the continued existence of sperm, humpback, blue, sei, fin or North Atlantic right whales under NMFS' authority.

Incidental Take Statement

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the "take" of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Sections 7(b)(4) and 7(o)(2), taking that is incidental and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement. However, as discussed in the accompanying Opinion, only the species targeted by the proposed research activities will be significantly harassed as part of the intended purpose of the proposed action. Therefore, the NMFS does not expect the proposed action will incidentally take threatened or endangered species.

Conservation Recommendations

Section 7(a) (1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information.

We recommend the following conservation recommendations, which would provide information for future consultations involving the issuance of marine mammal permits that may affect endangered whales as well as reduce harassment related to the authorized activities:

1. *Cumulative Impact Analysis*. The Permits Division should work with the Marine Mammal Commission, International Whaling Commission, and the marine mammal research community to identify a research program with sufficient scope and depth to determine cumulative impacts of existing levels of research on whales. This includes the cumulative sub-lethal and behavioral impacts of research permits on listed species.

2. *Estimation of Actual Levels of "Take."* For future permits authorizing activities similar to those contained in the proposed permit, the Permits Division should continue to review all annual and final reports submitted by investigators that have conducted whale research as well as any data and results that can be obtained from the permit holders. This should be used to estimate the amount of harassment that occurs given the level of research effort, and how the harassment affects the life history of individual animals. The results of the study should be provided to the endangered Species Division for use in the consultations on future research activities.

3. *Assessment of Permit Conditions*. The Permits Division should periodically assess the effectiveness of its permit conditions, including those for notification and coordination of research.

4. *Data Sharing*. For any permit holders planning to be in the same geographic area during the same year, the Permits Division should encourage investigators to coordinate their efforts by sharing research vessels and the data they collect as a way of reducing duplication of effort and the level of harassment threatened and endangered species experience as a result of field investigations.

In order for NMFS' endangered Species Division to be kept informed of actions minimizing or avoiding adverse effects on, or benefiting, listed species or their habitats, the Permits Division should notify the endangered Species Division of any conservation recommendations they implement in their final action.

Reinitiation Notice

This concludes formal consultation on the proposal to issue scientific research permit No. 13545 for Research on cetaceans within U.S. waters and the high seas. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of proposed take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of authorized take is exceeded, NMFS= Permits, Conservation and Education Division must immediately request reinitiation of section 7 consultation.

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Appendix A. Current and proposed permitted number and type of "takes" of target species of the proposed permit[a].

	Year End	Level B* Activities		Biopsy		Tagging		Active Acoustics	
		Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Sperm Whale (North Atlantic)	2010	7,650	150	1,250	150	275	0		
	2011	1,050	150	125	150	25	0		
	2012	1,000	150	100	150	25	0		
	2013	1,000	150	100	150	25	0		
	2014	0	150	0	150	0	0		

	Year End	Level B Activities		Biopsy		Tagging	
		Current	Proposed	Current	Proposed	Current	Proposed
Sperm Whale (North Pacific)	2010	6,985	100	605	100	562	0
	2011	1,040	100	215	100	65	0
	2012	160	100	95	100	35	0
	2013	160	100	95	100	35	0
	2014	0	100	0	100	0	0

	Year End	Level B Activities		Biopsy		Tagging		Active Acoustics	
		Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Humpback Whale (North Atlantic)	2010	5,611	20	1,190	20	423	0	600	0
	2011	3,311	20	815	20	173	0	600	0
	2012	1,661	20	215	20	173	0	600	0
	2013	1,445	20	215	20	65	0	600	0
	2014	45	20	0	20	0	0	600	0

	Year End	Level B Activities		Biopsy		Tagging		Active Acoustics	
		Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
Humpback Whale (North Pacific)	2010	22,110	20	3,035	20	1,015	0	280	0
	2011	6,250	20	385	20	95	0	0	0
	2012	2,370	20	260	20	25	0	0	0
	2013	1,020	20	260	20	25	0	0	0
	2014	0	20	0	20	0	0	0	0

	Year End	Level B Activities		Biopsy		Tagging	
		Current	Proposed	Current	Proposed	Current	Proposed
	2010	1,116	20	115	20	158	0
Sei Whale (North Atlantic)	2011	816	20	100	20	158	0
	2012	816	20	75	20	158	0
	2013	600	20	75	20	50	0
	2014	0	20	0	20	0	0

	Year End	Level B Activities		Biopsy		Tagging	
		Current	Proposed	Current	Proposed	Current	Proposed
	2010	2,160	20	220	20	127	0
Sei Whale (North Pacific)	2011	150	20	50	20	15	0
	2012	80	20	40	20	15	0
	2013	80	20	40	20	15	0
	2014	0	20	0	20	0	0

	Year End	Level B Activities		Biopsy		Tagging	
		Current	Proposed	Current	Proposed	Current	Proposed
	2010	1,768	20	260	20	403	0
Fin Whale (North Atlantic)	2011	1,068	20	170	20	153	0
	2012	966	20	145	20	153	0
	2013	750	20	145	20	45	0
	2014	0	20	0	20	0	0

	Year End	Level B Activities		Biopsy		Tagging		
		Current	Proposed	Current	Proposed	Current	Proposed	
Fin Whale (North Pacific)	2010	6,365	20	825	20	634	0	
	2011	1,635	20	125	20	60	0	
	2012	130	20	65	20	30	0	
	2013	130	20	65	20	30	0	
	2014	0	20	0	20	0	0	

	Year End	Level B Activities		Biopsy		Tagging		
		Current	Proposed	Current	Proposed	Current	Proposed	
Blue Whale (North Atlantic)	2010	510	20	115	20	250	0	
	2011	10	20	25	20	0	0	
	2012	10	20	0	20	0	0	
	2013	10	20	0	20	0	0	
	2014	0	20	0	20	0	0	

	Year End	Level B Activities		Biopsy		Tagging		
		Current	Proposed	Current	Proposed	Current	Proposed	
Blue Whale (North Pacific)	2010	5,025	20	635	20	604	0	
	2011	2,165	20	165	20	90	0	
	2012	105	20	55	20	25	0	
	2013	105	20	55	20	25	0	
	2014	0	20	0	20	0	0	

	Year End	Level B Activities		Biopsy		Tagging		Ultrasound	
		Current	Proposed	Current	Proposed	Current	Proposed	Current	Proposed
North Atlantic Right Whale	2010	6,400	20	300	0	220	0	120	0
	2011	800	20	60	0	40	0	0	0
	2012	600	20	60	0	40	0	0	0
	2013	600	20	60	0	40	0	0	0
	2014	0	20	0	0	0	0	0	0

* Level B activities are defined as any activity that has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

[a] The proposed takes for biopsy sampling, tagging, ultrasound and active acoustics would occur simultaneously with Level B activities. These tables represent a worst-case scenario for each stock.

Appendix B. Active NMFS Scientific Research Permits Authorizing Take of Target Species.

Permit No.	Holder	Expiration Date	Ocean Basin	Species Authorized
655-1652-01*	Kraus	1/31/2010	Atlantic Ocean	North Atlantic right whales
633-1763-01	Center for Coastal Studies	5/1/2010	Atlantic Ocean	North Atlantic right whales
1036-1744	DiGiovanni	5/1/2010	Atlantic Ocean	North Atlantic right, sei, blue, fin, and humpback whales
594-1759	Georgia DNR	5/1/2010	Atlantic Ocean	North Atlantic right whales
1121-1900	NOAA S & T	1/1/2011	Atlantic Ocean	humpback, fin and blue whales
948-1692	Pabst	5/31/2011	Atlantic Ocean	humpback, fin, sperm, and North Atlantic right whales
633-1778-01	Center for Coastal Studies	6/30/2011	Atlantic Ocean	humpback, fin, sei, blue, and sperm whales
1058-1733	Baumgartner	5/31/2012	Atlantic Ocean	humpback, fin and sei whales
775-1875	NMFS, NEFSC	1/15/2013	Atlantic Ocean	sperm, blue, sei, fin, humpback and North Atlantic right whales
605-1904	Whale Center of New England	2/15/2013	Atlantic Ocean	humpback, fin, and sei whales
1128-1922	Mercado	1/15/2014	Atlantic Ocean	Humpback whales
779-1633-01*	NMFS, SEFSC	**until new permit is issued	Atlantic Ocean	blue, fin, sei, humpback, sperm and North Atlantic right whales
369-1757	Mate	5/31/2010	Atlantic & Pacific Oceans	In both oceans: humpback, fin, sperm and blue whales
1071-1770-02	The Dolphin Institute	6/30/2010	Pacific Ocean	humpback, sperm, fin and blue whales
731-1774-05	Baird	8/31/2010	Pacific Ocean	sei, fin, blue, humpback, and sperm whales
540-1811-02	Calambokidis	4/14/2011	Pacific Ocean	blue, humpback, fin, sei, and sperm whales
781-1824	NMFS, NWFSC	4/14/2011	Pacific Ocean	blue, fin, humpback, and sperm whales
727-1915	Scripps Institute of Oceanography	2/1/2013	Pacific Ocean	blue, fin, sei, humpback, and sperm whales

Permit No.	Holder	Expiration Date	Ocean Basin	Species Authorized
1127-1921	Hawaii Marine Mammal Consortium	6/30/2013	Pacific Ocean	humpback, blue, fin, sei and sperm whales
782-1719-09*	NMFS, NMML	6/30/2010	Pacific Ocean	humpback, blue, fin, sei, and sperm whales
774-1714-10*	NMFS, SWFSC	6/30/2010	Pacific Ocean	sei, blue, fin, sperm, and humpback whales
473-1700-02*	Jan Straley	6/30/2010	Pacific Ocean	humpback, fin and sperm whales
1120-1898	Eye of the Whale	7/31/2012	Pacific Ocean	humpback whales
1049-1718*	Kate Wynne	6/30/2010	Pacific Ocean	humpback, fin, sperm and sei whales
1039-1699*	Ann Zoidis	6/30/2010	Pacific Ocean	humpback whales
10018	Rachel Cartwright	6/30/2013	Pacific Ocean	humpback whales
716-1705-01*	Fred Sharpe	6/30/2010	Pacific Ocean	humpback whales
1128-1922	Mercado	1/15/2014	Atlantic Ocean (Puerto Rico)	Humpback whales
909-1726	Englehaupt	6/30/2010	Atlantic Ocean	sperm whales

*Permits operating under a one-year extension in which no additional takes were authorized between 2009 and the expiration date in 2010.
**The SEFSC has been granted an extension of their current permit while the new application is processed.