UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

Environmental Assessment
For Issuance of Scientific Research Permit No. 14118 for Cetacean Research in the Atlantic and Pacific Oceans

April 2012

Lead Agency: USDC National Oceanic and Atmospheric Administration National Marine Fisheries Service, Office of Protected Resources

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Location: Atlantic and Pacific Oceans

Abstract: The National Marine Fisheries Service (NMFS) proposes to issue a scientific research permit for takes of marine mammals in the wild, pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.) and the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 et seq.). The permit would be valid for five years from the date of issuance and would authorize harassment of ESA-listed humpback, fin, and sei whales, and non-listed Eastern gray, minke, and short- and long-finned pilot whales. Multiple research objectives would be addressed using data from scientific instruments (tags) attached to whales, including: (1) long-term movement and habitat use studies using satellite/GPS/depth tags, (2) medium-term acoustic studies using an audio recording package to examine transmitted and received sound, and (3) extended fine-scale behavioral ecology studies using multi-sensor data recording packages. Research activities that may result in taking include tagging, photo-identification, behavioral observations, tracking and monitoring, passive acoustics, photography and video both above and under water, and collection of sloughed skin.

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1.0 PURPOSE OF AND NEED FOR ACTION

Proposed Action
NMFS proposes to issue a scientific research permit that authorizes "takes"[1] of marine mammals in the wild pursuant to the Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1361 et seq.), the regulations governing the taking and importing of marine mammals (50 CFR Part 216), the Endangered Species Act of 1973 (ESA; 16 U.S.C. 1531 *et seq*.), and the regulations governing the taking, importing, and exporting of endangered and threatened species (50 CFR Parts 222-226) to Becky Woodward, Ph.D., University of Maine.

Purpose of and Need for Action: The MMPA and ESA prohibit "takes" of marine mammals and of threatened and endangered species, respectively, with only a few specific exceptions. The applicable exceptions in this case are an exemption for *bona fide* scientific research under Section 104 of the MMPA and for scientific purposes related to species recovery under Section 10(a)(1)(A) of the ESA.

The purpose of the permit is to provide the applicant with an exemption from the take prohibitions under the MMPA and ESA for harassment (including level A and B harassment as defined under the MMPA[2]) of marine mammals, including those listed as threatened or endangered, during conduct of research that is consistent with the MMPA and ESA issuance criteria.

The need for issuance of the permit is related to the purposes and policies of the MMPA and ESA. NMFS has a responsibility to implement both the MMPA and the ESA to protect, conserve, and recover marine mammals and threatened and endangered species under its jurisdiction. Facilitating research about species' basic biology and ecology or that identifies, evaluates, or resolves specific conservation problems informs NMFS management of protected species.

Scope of Environmental Assessment: This EA focuses primarily on the effects of the proposed action on three marine mammal species listed as endangered under the ESA, humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), and sei whales (*B. borealis*).

The National Oceanic and Atmospheric Administration (NOAA) has, in NOAA Administrative Order 216-6 (NAO 216-6; 1999), listed issuance of permits for research on marine mammals and threatened and endangered species as categories of actions that "do not individually or

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1 Under the MMPA, "take" is defined as to "harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect." [16 U.S.C. 1362(18)(A)] 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." The term "harm" is further defined by regulations (50 CFR §222.102) as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering."
2 "Harass" is defined under the MMPA as "Any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing a disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but does not have the potential to injure a marine mammal or marine mammal stock in the wild (Level B harassment)."

cumulatively have a significant effect on the human environment…" and which therefore do not require preparation of an environmental assessment (EA) or environmental impact statement (EIS). A possible exception to the use of these categorical exclusions is when the action may adversely affect species listed as threatened or endangered under the ESA (NAO 216-6 Section 5.05c).

There is no evidence from prior analyses[3] of the effects of permit issuance, or from monitoring reports submitted by permit holders[4], that issuance of research permits for take of marine mammals listed under the ESA results in adverse effects on stocks or species. Nevertheless, NMFS has prepared this EA, with a more detailed analysis of the potential for adverse impacts on threatened or endangered species resulting from takes of a specified number of individual whales, to assist in making the decision about permit issuance under the MMPA and ESA.

2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

Alternative 1- No Action

Under the No Action alternative, Permit No. 14118 would not be issued and the applicant would not receive an exemption from the MMPA and ESA prohibitions against take. It is unlikely the applicant would conduct the proposed research in the absence of a permit that exempts take.

Alternative 2 – Proposed Action (Issuance of permit with standard conditions)

Under the Proposed Action alternative, a five-year research permit would be issued for takes of seven cetacean species, including three species listed as endangered, during activities proposed by the applicant. The permit would include terms and conditions standard to such permits issued by NMFS.

In her application, Dr. Woodward requested to take a variety of species, including many ESA-listed species. When the application was published and sent to reviewers, PR1 received substantive comments from numerous reviewers. The proposed action was developed as a result of those comments and subsequent discussions with the applicant.

NMFS received substantive public comments on the application from one party. Those comments focused on specific questions regarding the methodology described by the applicant and on their belief that NMFS is required to prepare an EA before publishing the Notice of Receipt of an application. Specific comments can be found in the permit file.

After review of the application, the Marine Mammal Commission (MMC) recommended that NMFS:

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3 Since 2005, NMFS has prepared over 100 EAs for issuance of permits under the MMPA and ESA. In every case, the EA supported a finding of no significant impact regardless of the nature of the permitted take or the status of the species that were the subject of the permit or batched permits. These EAs were accompanied by Biological Opinions prepared pursuant to interagency consultation under section 7 of the ESA and further document that such permits are not likely to adversely affect listed species. A listing of recently completed EAs is provided in Appendix F.

4 All NMFS permits for research on marine mammals require submission of annual reports, which include information on responses of animals to the permitted takes.

- Issue the permit but condition it to authorize the proposed study in at least three phases (captive testing, monitoring wild animals, and tagging threatened and endangered species), as described in their letter;
- Require the applicant to report the results of each phase of study for NMFS review before allowing the next phase to begin; and
- Require the investigator to take steps to ensure that the activities to be conducted under this permit and those of other permit holders who might be carrying out research on the same species or in the same area are coordinated to avoid unnecessarily duplicative research and unnecessary disturbance of animals.

Following the public comment period, NMFS worked with the applicant to alter her application and develop the proposed action based on comments received. The phases described by the MMC in their comment letter are not practical for this particular study; however, the proposed permit limits authorized species and number of animals based on comments received and requires annual reauthorization by NMFS following review of annual reports. For example, North Atlantic right whales and beluga whales would not be authorized by the permit, although the applicant initially requested them. Additional species could be added in the future if the applicant requests an amendment to the permit, but are not being considered at this time. The scope of this EA is only that research which NMFS is considering permitting, as described in Section 2. If the applicant requests a permit amendment with additional species and takes, the effects would be subject to additional environmental review.

Coordination with other permit holders is a standard permit condition that is in all permits, including the proposed permit. Reauthorization of permits each year based on information provided in annual reports is a condition that NMFS includes in permits on an as-needed basis, and this condition is included in the proposed permit.

The research activities proposed by the applicant include close vessel approaches for: photo-identification, behavioral observations, tracking and monitoring, passive acoustics, photography and video both above and under water, and collection of sloughed skin, and to attach tagging instrumentation. These research activities would result in takes by harassment. No research-related mortalities are expected and none would be authorized.

The table in Appendix A specifies the species and numbers of marine mammals that would be taken, by location and research methods.

The application for File No. 14118 provides detailed descriptions of the research methods, including mitigation measures the applicant proposes to incorporate into conduct of the research. The following is a summary of the applicant's methods and how they may result in taking of marine mammals.

In the following sections, the tag types, methods of deployment, and duration of attachment, and methods of release or removal are described.

Peduncle Tags

A peduncle belt tag attachment mechanism has been developed as a noninvasive tagging option for medium to long-term cetacean studies. Two different types of peduncle tags would be used:

1) A form-fitting saddle pack tag which sits on the dorsal ridge of the peduncle just before the fluke insertion.
2) A peduncle-let harness which secures a towed tag package.

Both large and small whale systems would be refined, if needed, as attempts are made to attach them to free-swimming animals, but would remain within the description below. The deployment mechanism would be re-tooled and the peduncle belt scaled appropriately for use with each size class of animal. See below for details on large and small cetacean tagging systems.

Peduncle Saddle Pack Tag Overview

A peduncle belt would encircle the tail stock of the whale at the narrowest portion of the peduncle just before the fluke insertion point. The belt consists of three main parts: 1) a semi-rigid saddle that fits over the dorsal ridge of the peduncle, 2) a "girth" which holds the saddle in place, and 3) an electronics package. A form-fitting, hydrodynamically faired, semi-rigid saddle would fit over the dorsal ridge of the peduncle and house the electronics package. A removable top cap secures the tag electronics to the saddle, but allows the electronics package to be easily removed or exchanged.

To minimize chafing, the underside of the saddle would be padded using soft flexible materials such as those commonly used in the prosthetics and orthopedics industry. To keep the saddle from rocking and to minimize potential chafe (Winn et al. 2008), the belt would be cinched tight around the peduncle. It is anticipated that adjustable side straps similar to those found on the waist straps of backpacks would be used to cinch the belt down as it is being deployed. Once the saddle is in place and the buckle is latched under the peduncle, the tag deployment armature would be retracted. The outward movement of the lower legs pulls on the ends of the belt's side straps and snugs the belt against the skin.

The deployment system would be designed around the maximum anticipated girth size for a particular species. A spring-loaded tensioning system ensures a predictable and repeatable tightness for the belt at each deployment and allows the system to accommodate a variety of girths depending of size of animal encountered in the field. Excess strap material after the cinching process would remain on the saddle, but loose ends are not anticipated to exceed 1 foot in length for small whales or 2 feet in length for large whale species. Alternative cinching mechanisms may be employed as the system design develops.

Based on performance tests, an elastic link may also be incorporated into the belt to provide stretch relief. Although the caudal terminus is primarily composed of tendons rather than muscle and there is little volume change during movement, there is some flexure in the region as the whale moves. An elasticized "girth" may help keep the saddle firmly in place but allow flexure as the whale swims. Actual girth design would depend on the results of laboratory and harbor testing of the saddle system.

Integrated flotation packs and radio beacon allow the unit to be relocated and recovered.

Prototype Large Whale Saddle Pack Tag
A prototype large whale saddle pack tag is currently being developed as a long term tracking device targeted at right whales or other large whales that fluke out on a terminal dive. See Appendix B for photos of the design. An off-the-shelf Mk10-AF ARGOS/ Fast-loc GPS satellite tag (Wildlife Computers, Redmond, WA) has been selected as the electronics package during the initial saddle pack development. With these units, GPS locations can be acquired in less than 0.5 seconds – sufficiently fast to acquire a position as the whale flukes up on a terminal dive. The Mk10-AF tags also monitor depth, temperature and light level readings.

Data is logged on-board and transmitted in discreet packets to the ARGOS satellite system when the tag is above the water surface. Limited surface times require that only a subset of the logged data be transmitted while the tag is on the whale, but all data stored during the tag carry can be downloaded once the tag is recovered. Data can be retrieved from ARGOS by researchers in the field via a satellite internet connection on-board the research vessel, providing semi-real time tracking capability. At approximately 4" long x 2" wide x 1" tall and weighing 225g (~0.5 lbs), the Mk10-AF can easily be incorporated into a peduncle saddle pack housing.

A 2-3 ft section of a right whale peduncle was cast using WHOI's full sized replica of a right whale tail. This fiberglass cast was then used to construct a saddle which houses the tag electronics. Hydrodynamically faired syntactic foam blocks with a service depth of 1000m (BZ-24, CMT Materials, Attleboro, MA) were integrated into a carbon fiber clam shell housing to form a semi-rigid saddle which conforms to the dorsal ridge of the peduncle (Appendix B). Bar-shaped, ½" thick silicone pads with a Shore A 10 hardness (Dragon-Skin, Smooth-On Inc., Easton, PA) were cast and added to the underside of the saddle to form a "gullet" space under the saddle similar to that found in saddles in the equine industry. These silicone "bars" effectively lift the saddle off the whale's back and distribute the saddle pressure even onto the sides of the peduncle rather than on the dorsal ridge itself. An adjustable elasticized "girth" constructed of neoprene and 2" wide polypropylene webbing is used to snug the belt around the whale and form a flexible but secure attachment point for the saddle. This prototype saddle pack is roughly 11" long front to back, with side flaps extending 8" down either side of the peduncle.

Together, the current large whale saddle pack, electronics payload (Mk10-AF ARGOS/Fast-loc GPS satellite tag + VHF beacon), and redundant release system weigh approximately 4 ¼ lbs in air and are slightly positively buoyant in water.

Prototype Small Whale Saddle Pack Tag
The scaled down small whale saddle is designed around a data logging electronics package. See Appendix C for photos of the design. The WHOI-pioneered digital acoustic recording tag (DTAG) is a novel archival tag that has been developed to monitor the behavior of marine mammals and their response to acoustic stimuli. The tag is able to continuously record an audio record from a built in hydrophones as well as sample the 3D orientation and depth of the animal with a highly sophisticated sensor suite. The audio and sensor recordings are synchronous so the timing of sounds and motion can be determined precisely (Johnson & Tyack 2003). The version 2 DTAG electronics package measures roughly 4" long x 1 ½" wide x 7/8 tall" and weighs 135g (~ 0.3 lb) in air.

With the small whale saddle, no data would be transmitted. The DTAG would log the animal's behavior during the tag deployment. A small ARGOS unit (example: TAM-2618, 2.6" long x 1.1" wide x 0.75" tall, 49 g made by Telonics, Mesa, AZ) and a VHF beacon (example: MM110, 1.4" long x 0.5" diameter cylinder, 7g, made by Advanced Telemetry Systems, Isanti, MN) would be included in the saddle to aid in relocation and recovery of the unit once it detaches from the animal.

A heat-formable, low density polyethylene clamshell housing holds both the syntactic foam flotation pack (BZ-24, CMT Materials, Attleboro, MA) and the tag electronics. As with the large whale saddle, the underside is padded to minimize chafe and a similar set of "bars" raise the saddle off the dorsal ridge and distribute the load to the sides of the peduncle. Again, the saddle would be held in place with an adjustable, approximately 2" wide elasticized "girth" of neoprene and polypropylene webbing.

The peduncle ridge on smaller whales tends to be much sharper in its edges than those of the larger whales. To ensure that the buckle does not chafe the ventral dorsal ridge, a lower saddle is also being developed. The lower saddle pack would be smaller than the upper pack, but of similar construction. Components would include the buckle for belt, the belt-length adjusters, and a small bit of flotation to hydrodynamically fair the saddle. Like the upper saddle, the lower saddle would also have "bars" to form a "gullet" space over the dorsal ridge and padding to minimize chafe. Although it has not been designed yet, a similar lower saddle unit would likely be added to the large whale saddle pack tag as well.

The current small whale saddle pack is roughly 7 ½" long front to back and extends 4" down the sides of the peduncle (Appendix C). The entire unit has not been constructed, but the upper and lower saddles along with the electronics package (DTAG version 2 + ARGOS unit + VHF beacon) and redundant release system is anticipated to weigh less than 2 lbs in air and be slightly positively buoyant in water.

Future Saddle Design

The large and small whale prototypes described above are the first round of saddles that have been developed. It is anticipated that saddle shape, size, and materials would vary as the designs are progressively refined based on results from field testing of the devices. Tag electronics packages would also vary according to experimental design. Potential sensors suites for both large and small whale units are similar and include: location tracking devices (satellite transmitter, GPS, VHF beacon), behavioral sensors (pressure transducer, accelerometer, magnetometer, gyroscope, velocity sensor), acoustic sensors (hydrophone), environmental sensors (light level sensor, temperature, salinity, wet/dry sensor), physiological sensors (heat flux sensor, heart rate, Doppler blood flow), and visual sensors (video and/or still camera). No active acoustics would be emitted by the sensors.

The size and weight of the electronics payload in turn drives the size and shape of the saddle pack required to house and float the unit. It is anticipated that all saddle pack tags would be recoverable and as such would contain flotation packs and either an ARGOS transmitter or VHF beacon or both for recovery. Although the instrumentation may vary according to experimental design, saddle packs would not exceed the following in-air weight limits:

Large whale unit

- Maximum weight of electronics payload[5] in air 2 lbs.
- Maximum weight of assembled saddle pack unit[6] in air 5 lbs.

Small whale unit

- Maximum weight of electronics payload in air 0.75 lbs.
- Maximum weight of assembled saddle pack unit in air 2.5 lbs.

All saddle pack tags are designed to be slightly positively buoyant in water. As such, the main impact of the tag would be in the form of drag rather than in-air weight. Tags would be designed and faired to be as hydrodynamically shaped as possible to minimize potential drag effects.

Peduncle-let harness with towed tag

In this type of peduncle tag, the electronics package is housed in a buoy that trails the whale rather than in a saddle which fits over the dorsal ridge of the peduncle. A deployment system for attaching a towed tag to a free swimming, non-entangled whale is currently under development. This system is readily scalable to accommodate a variety of electronic payloads and different size-classes of animals to fit a number of experimental designs.

Large Whale Peduncle-let Harness & Tow Tether

A prototype peduncle-let harness has been constructed out of a custom fabricated ½" diameter, 12 carrier construction braided wool rope (CSR Inc, Sellersville, PA). See Appendices D and E for photos of the design. Two strands of this rope have been sewn together to form a 1" wide harness, while a single ½" diameter strand forms the tow tether. For the current large whale system, this harness is 10 ft long and has stop rings connected with low strength biodegradable breakaways (100lbs) at each end to prevent over-tightening of the loop on the peduncle. Together with an electronic timed release and galvanic timed release, the breakaways provide a redundant release system to ensure the harness releases from the whale if a problem were to arise.

Initially, tags would be deployed using a 200 lb breaking strength 100% wool rope for the harness and tow tether material. If necessary (i.e. the whale breaches and the rope breaks immediately), the line strength would be gradually increased by adding in a mixture of cotton fiber to the wool. Maximum single strand rope breaking strength would not exceed 500 lbs. Harness breaking strength is double that of the single line strength because it is two strands sewn together. The breakaway link strength would also be increased as necessary, but would always be less than that of the tow line to ensure that the breakaways engage first to remove the harness and let the whale go gear free.

Both harness and tow line are constructed of biodegradable materials.

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5 "Electronics payload" refers to any sensors or tracking devices housed in the saddle pack such as data loggers, cameras, satellite transmitters, VHF beacons, etc.

6 The "assembled saddle pack unit" weights refer to everything as a bundle, including the electronics payload – i.e. housing, flotation, electronics, releases, etc.

Prototype Large Whale Towed Telemetry Buoy
A 36" long x 9" max diameter fusiform shaped prototype buoy has been constructed as a large whale towed tag with sufficient space for a large payload of sensors and battery power. This hydrodynamic torpedo shape offers a low drag alternative to the 14" diameter round ball buoy traditionally used by the Large Whale Disentanglement Network. The buoy has an outer fiberglass shell filled with a combination of 6 lb/ft3 density Divinycell PVC foam (H100, Diab Inc., DeSoto, TX) and 32 lb/ft3 density VF-32 syntactic foam (Emerson & Cummings, Canton, MA) for hydrostatic stability and flotation. Lighter foam in the upper half of the buoy combined with a lead counterweight in the belly work together to ensure that the buoy tows in an upright orientation. A set of 4-way tail fins attach behind the back of the tower and extend 4" beyond the tail of the buoy. The vertical and downward angled 15 degree horizontal tail fins provide stabilization for the buoy and a component of lift which helps to increase surface times for the buoy. The tag electronics are housed inside a small 12" long x 4" wide x 2 ¼" tall removable climbing tower attached to the top of the buoy (Appendix D).

The current electronics package is the same Mk10-AF ARGOS/Fast-loc GPS tag (4" long x 2.25" wide x 1" tall, 225g, Wildlife Computers, Redmond, WA) that is being used in the large whale peduncle saddle pack tag together with a custom cast VHF beacon. Fully assembled, the buoy and electronics package weighs 35 lbs in air and has a reserve buoyancy of 17lbs. When towed at a speed of 4 knots via a submerged tow point, which simulates a whale swimming just below the surface, the prototype buoy has approximately 20 lbs of drag with a 60 ft long 3/8" diameter tow tether.

Future Peduncle-let Towed Buoy Designs
The current large whale buoy design is modeled after the Large Whale Disentanglement ball buoy and is strongly positively buoyant (~17 lbs reserve buoyancy) to maximize surface times over a wide range of swim speeds. As tag designs progress, it may become possible to reduce the reserve buoyancy and consequently the buoy size/weight while still maintaining performance. The large whale system described above represents a maximum buoy size/weight. Future buoy size would be reduced as much as possible and scaled according to the target species and electronic payload. Flotation materials, buoy construction, harness, and tow tether materials may change as the system is refined through field trials and may lead to further reductions in size and weight.

As with the saddle pack tag, drag is the primary obstacle to minimize rather than in-air weight. The fusiform shape of the buoy effectively presents a streamlined tag package specifically designed to minimize drag. Future buoys would likely be smaller but would not exceed the following maximum size/weight limitations:

Large whale buoy
- Maximum size 40" long (including fins) x 9" max diameter.
- Maximum weight 35 lbs in air.

Small whale buoy
- Maximum size 24" long (including fins) x 5 ½" max diameter.
- Maximum weight 20 lbs in air.

As with the peduncle saddle pack tags, potential sensor suites for both large and small whales units are similar and include: location tracking devices (satellite transmitter, GPS, VHF beacon), behavioral sensors (pressure transducer, accelerometer, magnetometer, gyroscope, velocity sensor), acoustic sensors (hydrophone), environmental sensors (light level sensor, temperature, salinity, wet/dry sensor), and visual sensors (video and/or still camera). Physiological sensors (heat flux sensor, heart rate, Doppler blood flow), may also be included within the harness that secures the buoy to the whale. No active acoustics would be emitted by the sensors.

Method of deployment

Peduncle Saddle Pack Tag

The tag deployment system would be refined, if necessary, as it is used on free-swimming whales. For large, slow moving whales, it is anticipated that the belt would be deployed from a small boat using a cantilevered pole system similar to that previously used in other cetacean tagging studies (Moore et al. 2001, Johnson and Tyack 2003). This system uses a 10-12 m pole cantilevered from the bow of a small boat to deploy the tag from greater distances than is typically possible with hand-held poles. For bow-riding species or species that typically approach vessels, a shorter hand-held pole may be substituted for the cantilever system. Current prototype deployment systems use a pneumatically powered armature mounted at the end of the pole. Once lowered onto the whale's back just before the caudal terminus, the deployment armature enacts a pliers-like closing and opening of sickle shaped arms to latch a buckle underneath the whale's peduncle.

Deployment systems would be tested in the harbor prior to field trials. The large whale deployment system would be tested using Woods Hole Oceanographic Institution's life-sized fiberglass model right whale tail to determine effectiveness of the system at various approach angles and speeds before taking the peduncle belt into the field. A cast of a pilot whale peduncle was recently made from an animal that washed ashore. This new model would be used to test the small whale saddle and deployment armature.

Peduncle-let Harness with Towed Tag

A variety of different techniques may be used to deploy the peduncle-let harness and towed tag depending on the species of interest, their size and behavior. A cantilevered or hand-pole deployment system similar to that used for the peduncle saddle pack tag may be employed. Such a system would use a spring or pneumatically powered unit to close a set sickle shaped arms around the peduncle and latch a buckle underneath. Alternately a remote line launcher such as a net gun or pneumatic device may be used to throw a "lasso" around the tail stock. This "lasso" technique is targeted at whales that fluke out on a terminal dive. All deployment methods would first be tested using either the full scale fiberglass right whale tail for large whale systems or the pilot whale peduncle cast for small whale systems.

Initial development efforts have focused on a net gun/tail lasso deployment system. See Appendix E for photos of the design. A CODA Enterprises (Mesa, AZ) net launcher has been integrated into a swiveling, tilting, shock absorbing deck mount to provide a firing platform suitable for deploying a tail lasso from a small inflatable boat. The regular net used with the CODA gun has been replaced with a custom designed 10 ft x 15 ft open rectangular lasso with a trailing line running back to the tagging boat. Half pound cylindrical weights are attached to each

of the lasso's four corners and loaded into the four barrels of the gun using an o-ring seal. The net gun uses a blank .308 cartridge to propel the weights out of its four barrels, and the splay of the gun barrels ensures that the corners of the lasso are widely spread to fully deploy the loop. Tests in the harbor using the deck mounted net gun system demonstrated an 80% lassoing success rate on a full-scale fiberglass model right whale tail. Range is roughly 35 ft.

The lasso contains:

1) An eye ring through which the tow tether runs back to the tag boat to cinch down the lasso,
2) A padded harness section which forms the tow point for the telemetry tag,
3) A daisy-chained redundant release system which releases the harness,
4) A stop ring which prevents the harness from cinching too tightly about the tail stock of the whale,
5) A stop – the point at which the buoy would eventually dock,
6) A tow tether which forms three sides of the lasso and the eventual tow line between the harness and the telemetry buoy, and
7) 0.5lb weights attached to the 4 corners (Appendix E).

The eye ring of the lasso is formed by a 2" outer diameter x 1 ½" inner diameter aluminum rappelling ring (Seattle Manufacturing Corporation, Ferndale, WA) through which the tow line is able to slide smoothly for opening and closing of the lasso. A similar stop ring placed at a distance of 10 ft from the eye prevents the lasso from over tightening against the tail stock of the whale.

As described above, the 10 ft section of the lasso that remains in contact with the whale's skin is constructed from two strands of ½" diameter braided wool/cotton blend line (CSR INC, Sellersville, PA) that are sewn together to form a 1" wide harness. The harness is incorporated into the bottom of the lasso between the eye ring and the stop ring together with a low strength biodegradable break away link and both electronic and galvanic timed releases as safety measures for removing the harness. The remainder of the lasso is constructed of a single strand of the wool/cotton blend line. Several different strength lines (200lb, 300lb, 400lb, and 500lb) have been developed and would be tested starting with the lowest strength first. The wool/cotton blend provides a low strength, stretchy, soft, large diameter rope that is biodegradable in sea water. Should the tagged whale or any conspecifics become entangled in the tow line, it can easily be broken by researchers or a disentanglement team or the whales themselves.

The corner weights are attached to rappelling rings which are free to slide along the tow tether. The rings stay in position long enough for the lasso to deploy, then slide the weights down to a common point at the eye of the lasso when the loop closes. For tag deployments greater than 1 day, a nichrome burn wire is used to release the weights from the harness about 4-6 hours after the lasso is deployed.

Once the lasso clears the fluke tips, the forward motion of the whale away from the tag boat would close the lasso down to a 10 ft padded section. The circumference of the lasso during deployment exceeds the desired tow length of the buoy, and a rope ascension module was developed to shorten the tow tether. The rope ascender design is based on same theory as a line

hauler for the lobster pot fisheries. This scaled down version uses an 18V battery powered DC motor from a hand-held cordless drill to spin a self-tailing grooved sheave which pulls the rope into itself, allowing the unit to ascend the line. The whole unit fits inside a 3 ¼" outer diameter, 2 ¾" inner diameter aluminum pressure housing with o-ring seals that waterproof the system and protect it from the sea-water environment (Appendix D). A Divinycell PVC foam (H100, Diab Inc., DeSoto, TX) tube slides over the pressure housing, providing a flotation pack for the unit. As the whale moves away, the rope ascension module would push the buoy up the line until it reaches a stop, at which point it would trim the trailing tether and leave the buoy trailing the whale at a distance of 40ft – roughly 1 body length of the whale.

General Tagging Protocol

The tagging protocol for each species would differ according to its behavior and the general environmental conditions presented during a particular cruise but would follow a general model for all types of peduncle tags. Typically there would be two vessels – a mother ship that would serve as a general observation and tracking platform and a smaller tagging vessel (~15-20 ft) which would actually deploy the tag.

Tagging and approach protocol would be as follows:

1) Stand off and observe whale behavior for 15 minutes to record pre-tagging behaviors for benchmarking reactions to tagging attempts.
2) Obtain photo-id pictures of the animal to ensure positive identification of the study animal.
3) Approach from the rear quarter within 10 m and deploy the peduncle tag using a pole (cantilevered or hand-held) or remote line launcher (net gun or pneumatic device). Tagging attempts would be recorded using a video camera to provide an objective means of evaluating the impact of the tagging event on the animal. Tagging attempts would be halted if the animal appears to be evasively avoiding the boat or displaying agitated behavior (tail slash, breaching, etc.).
4) Back away from the animal and record behavioral observation data from a distance greater than 100 m. Researchers would follow the whale at a distance onboard an observation platform for a portion of the tag carry. Whale behavior would be monitored and its travels tracked.
5) The animal would be re-visited and observed (daily, weekly, or monthly depending on the length of the tag deployment) throughout the tagged interval to monitor its health and to evaluate any potential impact of the peduncle belt. Photographs would undergo a veterinary review. Tail stock photos would be evaluated based on whether or not the harness becomes embedded in the flesh, any hemorrhage is noted from the skin below the harness, or a circumferential ulcer or loss of epithelium is noted in association with the harness around the peduncle. Body condition would also be visually assessed based to determine if there is any weight loss or loss of skin condition. If the health of the animal is compromised in any way as determined by the review, the peduncle tag would be removed from the animal.
6) Once the tag releases from the animal, the tag would be retrieved. The study animal would be re-approached to obtain photographs of the tail stock to evaluate any impacts of the tag on the skin tissue.

Emergency Tag Removal Technique

NOAA Fisheries and the Provincetown Center for Coastal Studies have established a large whale disentanglement program which has developed a number of tools and techniques for removing gear and entangling lines from whales with life-threatening entanglements. The Atlantic Large Whale Disentanglement Network covers the entire East Coast of the US and up into Canadian waters along the Eastern Seaboard. Jamison Smith, the NMFS project leader for the disentanglement program, has provided consultation during the peduncle belt development and has offered advice on potential safety mechanisms to be incorporated into the design and emergency harness release techniques that may be employed in the field.

Although not quite as extensive as the East Coast network, trained disentanglers are also available on the West Coast, Alaska, and Hawaii where some of the tagging is anticipated to occur. Teams include the Hawaiian Island Disentanglement Network, Whale Entanglement Team, and NOAA Fisheries Alaska Region Protected Resources Division.

Prior to any peduncle tagging activities, the regional disentanglement network would be notified of the planned research activities and the new tagging methodology under development. This prior notification would: 1) place the disentanglement network on alert should any assistance be required to help remove a tag in the event of an emergency, and 2) help avoid any mistaken reports of "entangled whales" when whales are actually tagged.

In the event of an emergency, the regional disentanglement network would be contacted to aid in removal of the tag from the whale. If necessary, trained personnel would be flown to the site. If a disentanglement response team is not available, the research team will remove the tag under their direction.

Method of release

Peduncle Saddle Pack Tag and Peduncle-let Harness with Towed Tag

A three way redundant release system ensures that the belt releases from the whale. The release is composed of:

1) an electronic timed release,
2) a galvanic timed release, and
3) a break-away link.

A prototype electronic release has been developed using a PIC micro-controller to trigger the burn of a nichrome wire release after a pre-set time has elapsed. When triggered, a charge from the battery passes through a nichrome wire causing it to dissolve in the electrolytic seawater and release the harness. This sort of accelerated galvanic corrosion release has no moving parts and has proven effective in short term suction cup attached tagging studies (Johnson and Tyack 2003). The wire is internal to the belt and never in contact with the whale.

The electronic timed release would be combined with a corrosive galvanic release to provide a redundant release system. International Fishing Devices Inc. has been manufacturing galvanic timed releases to release buoys on pot sets for fishermen and to provide backups for acoustic releases for many years (http://www.undersearelease s.com/). Although exact release times may vary according to water temperature, salinity, and the swim speed of the whale, the galvanic

release is a no-fail system. Once the link corrodes, the harness would release from the animal. It provides a slower corrosion rate than that of the electronic timed release and provides a guaranteed backup should the electronics fail.

A low strength (100-200 lbs.) breakaway link would also be included to minimize entanglement risk and ensure that the belt releases from the whale should the harness become fouled on any gear or other debris in the water.

Final Disposition of Tags

Tags are designed to be recovered and have integrated flotation packs as well as satellite and/or VHF beacons to aid in tag recovery. The entire tag package, including the harness, would release from the animal. It is anticipated that tags would be recovered in the field at the conclusion of an experiment. If tags are lost at sea or detach in a remote location where retrieval is logistically unfeasible, there is a good chance the tags would eventually wash ashore and subsequently be recovered. Each tag would include a contact phone number to aid in recovery of the unit in such scenarios.

Tags are likely to contain lithium batteries packs for electronic sensors. Batteries are typically potted in epoxy to protect them from sea water and depth. These batteries are well encapsulated and isolated from the environment. The risk of lithium leakage is minor. In some instances, batteries may be enclosed in an oil-filled flexible urethane baggie (DTAG version 2). Despite numerous experiments and deployments on deep-diving species, to date there have been no known battery leakages in this type of housing.

Peduncle belt experiments using DTAGs are likely to be fairly short term (days to a week in length) with a high emphasis on tag retrieval since all data is archived. It is unlikely that the tag would remain in the ocean at the end of the experiment.

Duration of attachment

The attachment duration is controlled by the programmed release time for the PIC micro-controller and the backup galvanic timed release. Initial deployments of peduncle tags would follow a conservative approach, starting with a single day and expanding slowly to a one week deployment. The field team would monitor the tagged whale at a distance throughout the tag carry and conduct daily check-ups on the animal to the extent weather and sea conditions allow. Photographs of the tail stock would be collected before, during, and after the tag deployment to monitor any effects of the tail harness. Photos would be collected from the research vessel using a standard SLR camera or handheld video recorder. In instances where animal behavior and water clarity permit, a pole cam would also be used to obtain still images or underwater video to aid in evaluating tag impact – particularly for those species which do not fluke out on terminal dives.

Video footage and still images would be used to conduct a veterinary assessment of the animal. Tail stock photos would be evaluated based on whether or not the harness becomes embedded in the flesh, any hemorrhage is noted from the skin below the harness, or a circumferential ulcer or loss of epithelium is noted in association with the harness around the peduncle. Body condition would also be visually assessed based on photographs to determine if there is any weight loss or

loss of skin condition. If there appear to be any adverse effects, the tag would be removed immediately. If everything goes well, subsequent deployment times would gradually be increased to a period of several weeks, then a month, then several months. Once the attachment mechanism has been fully tested, deployment lengths would be set according to the requirements of each individual experiment.

Requested Takes & Experimental Design

Tagging Goal Summary

Multiple tag deployments on multiple species are requested to test the suitability of the attachment technique for a wide variety of cetacean studies. The applicant would attempt to broaden the sampling of various populations by conducting this kind of tagging on a series of cruises throughout the northern hemisphere. A variety of age/sex classes engaging in a variety of behaviors would be targeted.

To maximize usable data from field seasons and to cover events where the tag prematurely detaches from the animal, the proposed plan is to tag up to 10 whales of each population in year 1. As the system is refined, tagging efforts would expand in year 2, increasing the number of tagged animals. The target species and location for any one year depends on future funding. See Appendix A for target and non-target species, numbers, and locations.

Animals Targeted for Tagging

These animals would experience level A harassment. They would be closely approached (to less than 10m) and instrumented with a peduncle type tag. Approaches would be slow, deliberate, and for as short a time as possible to minimize disruption. Any tagging attempt made where the tag makes contact with the animal, regardless of whether the tag remains on the animal or if the tag does not make contact but the animal reacts to the tagging attempt, would be considered a level A take.

Tagged animals would be monitored and observed during the tag carry. Focal follows would be used to relate data on the tag to observed surface behaviors. These follows are typically conducted from a distance of 100-500 m from the animal, depending on weather conditions and visibility from the platform. Photo-ID pictures would be collected to positively identify the tagged animal. Video would be collected during the tagging event and subsequently when the whale is revisited during the tag carry. Animal health would be monitored using close up photos of the caudal peduncle collected for veterinary analysis. Sloughed skin recovered with the tag would opportunistically be collected. Future monitoring of tagged animals would be considered level B takes if the animals are approached closer than 100 yards. Level A takes of animals targeted for tagging would include any of the following: attaching the tag using belt/harness (including unsuccessful attempts), tracking, behavioral observation, monitoring, photo-id, photography/videography, underwater photography/video, passive acoustic audio monitoring, and collection of sloughed skin.

Tagging efforts would concentrate on adult and sub-adult specimens. Both sexes would be tagged except humpback whales – only known male humpback whales in well-studied populations would be tagged. Lactating females and their calves would not be tagged. Where

possible, tagging efforts would be conducted away from breeding and calving grounds to minimize potential impacts to the animals during sensitive physiological and biological periods.

Up to three repeat tagging attempts would occur per individual per day. If an individual shows an adverse reaction, tagging attempts on that individual would cease. If reliable identification is possible, every attempt would be made not to re-approach or tag the same individual on different days within the same season. Individual animals would not be tagged more than once per year; however, repeat tagging between years is possible.

Animals Not Targeted for Tagging
These animals would experience level B harassment of animals in the vicinity of the target whale. Where possible, photo-id of non-target animals would be collected. Takes of these animals would include: incidental harassment, counting/survey, and photo-ID.

Most of the target species travel in close proximity with other individuals of the same species. An animal selected for tagging may surface close enough to other individuals that a close approach to the selected animal requires the tagging vessel to also approach relatively closely to these other individuals.

ESA-listed non-target species (fin whales and sei whales) may be encountered in the same areas as the proposed research. Although the tagging vessel and observation platform would not actively approach a non-target species within 100m, there is a potential for incidental harassment of these species during tagging efforts and they would be opportunistically photo-identified.

Permit Duration:
The proposed permit would be valid for five years from the date of issuance. A single one-year extension of the permit may be authorized and would be considered an amendment, pursuant to NMFS regulations at 50 CFR §216.39.

If granted, a one-year extension of the permit would authorize another full year of research that may result in the same kinds of take. The extension would not change any other terms or conditions of the permit. NMFS does not consider a one-year extension of this nature to represent a substantial change to the proposed action that involves changes in environmental impacts. As such, NMFS would not prepare a supplemental EA for the one-year extension unless significant new information or circumstances relating to environmental impacts is available (e.g., a change in the status of the target species, listing of new threatened or endangered species in the project area).

3.0 AFFECTED ENVIRONMENT

Location
Proposed research would take place throughout the year, in the

- North Atlantic from Maine to Texas
- North Pacific from Alaska to California including Hawaii.

The sites of field work within this broader geographic location would be chosen based on whale aggregation locations, collaborative research opportunities, and future funding. The applicant anticipates that the first large whale peduncle tag deployments would be on humpback whales, likely in the Stellwagen Bank National Marine Sanctuary or off of Jeffrey's Ledge along the New England coast depending on whale concentrations locations at the time of the field effort.

Biological Environment

Affected species/stocks:
Humpback, Eastern gray (*Eschrichtius robustus*), minke (*Balaenoptera acutorostrata*), and short- (*Globicephala macrorhynchus*) and long-finned pilot whales (*G. melas*) would be targeted for tagging (level A and B harassment). Fin and sei whales would not be tagged, but would be opportunistically photo-identified as part of the proposed research (level B harassment). All seven of these species are considered part of the affected biological environment. A brief description of the species and stocks targeted for research under the proposed action is below, summarized from NMFS Stock Assessment Reports (SARS); additional information on the status of these species can be found in the SARS and in the NMFS Recovery Plans for these species. All marine mammals stocks/species listed under the ESA are also considered depleted under the MMPA.

<u>ESA-Listed Species</u>

Fin whale*:* Fin whales occur in all major oceans worldwide, primarily in temperate to polar latitudes, and less commonly in the tropics. They occur year-round in a wide range of latitudes and longitudes, but the density of individuals in any one area changes seasonally.

Fin whales seasonally migrate between temperate and polar waters (Perry et al 1999). In the North Pacific, the International Whaling Commission (IWC) recognizes two stocks of fin whales, the east China Sea stock and the rest of the North Pacific (Donovan 1991). For management purposes under the MMPA, three stocks of fin whales are recognized in Pacific U.S. waters: the California/Oregon/Washington stock, the Northeast Pacific (Alaska) stock, and the Hawaii stock, and one stock is recognized in Atlantic U.S. waters: the Western North Atlantic stock.

California/Oregon/Washington stock: This stock is found along the U.S. west coast from California to Washington in waters out to 300 nmi. Because fin whale abundance appears lower in winter/spring in California (Dohl et al. 1983; Forney et al. 1995) and in Oregon (Green et al. 1992), it is likely that the distribution of this stock extends seasonally outside these coastal waters. The best available estimate of the stock's population size is 3,044 whales with a Potential Biological Removal (PBR) of 16 whales (Carretta et al. 2011). Some data indicate that fin whales have increased in abundance in California coastal waters (Barlow 1994, 1997), but these trends are not significant. Ship strikes average one serious injury or mortality each year. Fishery interactions may be approaching zero mortality and serious injury rate.

Northeast Pacific (Alaska) stock: Whales in this stock are found from Canadian waters north to the Chukchi Sea. Reliable estimates of current and historical abundance of fin whales in the

entire northeast Pacific are currently not available. Based on surveys which covered only a small portion of the range of this stock, a minimum estimate of the size of the population west of the Kenai Peninsula is 5,700 with a PBR level of 11.4 whales (Allen and Angliss 2011). Data suggests that this stock may be increasing at an annual rate of 4.8 percent; however, this is based on uncertain population size and incomplete surveys of its range (Allen and Angliss 2011). Fishery interactions may threaten this stock but fishery-related mortality levels can be determined to have met a zero mortality and serious injury rate.

Hawaii stock: The best available abundance estimate for this stock is 174 whales based on a 2002 survey of the entire Hawaiian Islands EEZ (Barlow 2003) with a PBR of 0.2 whales per year (Carretta et al. 2010). Data is not available to determine a population trend for this stock. Insufficient information is available to determine whether the total fishery mortality and serious injury for fin whales is insignificant and approaching zero mortality and serious injury rate.

Western North Atlantic stock: The best population estimate is 3,985 animals with a PBR of 6.5 (Waring et al. 2011). For the period 2004 through 2008, the minimum annual rate of human-caused mortality and serious injury to fin whales was 3.2 per year (U.S. waters, 2.4; Canadian waters, 0.8) (Waring et al. 2011).

Commercial whaling for this species ended in the North Pacific Ocean in 1976. Other current threats include reduced prey abundance due to overfishing, habitat degradation, disturbance from low-frequency noise and the possibility that illegal whaling or resumed legal whaling would cause removals at biologically unsustainable rates. Of all species of large whales, fin whales are most often reported as hit by vessels (Jensen and Silber 2003).

Humpback whale*:* The humpback whale occurs throughout the world's oceans, generally over continental shelves, shelf breaks, and around some 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.

Humpback whale reproductive activities occur primarily in winter. Sources and rates of natural mortality are generally unstudied, but potential sources of mortality include parasites, disease, predation (killer whales, false killer whales, and sharks), biotoxins, and ice entrapment.

The four recognized stocks (based on geographically distinct winter ranges) of humpback whales in the United States are: the Gulf of Maine stock, the eastern North Pacific stock, the central North Pacific stock, and the western North Pacific stock.

Gulf of Maine stock: The Western North Atlantic population of humpback whales includes relatively discrete sub-populations which feed during summer in the waters of the Gulf of Maine, the Gulf of St. Lawrence, Newfoundland/Labrador, and western Greenland (Katona and Beard 1990). Other North Atlantic feeding grounds occur off Iceland and northern Norway (Christensen et al. 1992). In the winter, whales from all six feeding areas (including the Gulf of Maine) mate and calve primarily in the West Indies, where spatial and genetic mixing among sub-populations occurs (Clapham et al. 1993; Katona and Beard 1990; Stevick et al. 1998). Humpback whales also use the Mid-Atlantic as a migratory pathway and apparently as a feeding

area, at least for juveniles. Since 1989, observations of juvenile humpbacks in that area have been increasing during the winter months, peaking January through March, particularly in the vicinity of the Chesapeake and Delaware Bays (Swingle et al. 1993). Biologists theorize that non-reproductive animals may be establishing a winter feeding range in the Mid-Atlantic because they are not participating in reproductive behavior in the Caribbean.

Data suggests that up to 11,570 whales may reside within the entire North Atlantic (Palsbøll et al. 1997). In the Gulf of Maine, the best population estimate is 847 whales with a PBR of 1.1 whales annually (Waring et al. 2009). Barlow and Clapham (1997) estimated a rate of population increase of at 6.5 percent for this stock. Although the most recent abundance estimates indicate continued population growth, the size of the Gulf of Maine humpback whale stock may be below the optimum sustainable population in the U.S. Atlantic EEZ.

The total level of human-caused mortality and serious injury is unknown, but may be slowing recovery of the population. The main sources of human-caused serious injury and mortality are entanglement in fishing gear and vessel collisions. On average three animals are seriously injured or killed as a result of fishery interactions and another 1.4 whales due to vessel collisions annually. The total level of U.S. fishery-caused mortality and serious injury is unknown, but reported levels are more than 10% of the calculated PBR and, therefore, cannot be considered to be insignificant or approaching zero mortality and serious injury rate.

North Pacific stocks: Their summer range includes coastal and inland waters from Point Conception, California, north to the Gulf of Alaska and the Bering Sea, and west along the Aleutian Islands to the Kamchatka Peninsula and into the Sea of Okhotsk (Tomlin 1967; Johnson and Wolman 1984). Humpback whales also summer throughout the central and western portions of the Gulf of Alaska, including Prince Wouldiam Sound, around Kodiak Island, and along the southern coastline of the Alaska Peninsula. Japanese scouting vessels continued to observe high densities of humpback whales near Kodiak Island during 1965–1974 (Wada 1980). In Prince Wouldiam Sound, humpback whales have congregated near Naked Islands, in Perry Passage, near Cheega Island, in Jackpot, Icy and Whale Bays, in Port Bainbridge and north of Montague Islands between Green Island and the Needle (Hall 1979, 1982; von Ziegesar 1984; von Ziegesar and Matkin 1986). The few sightings of humpback whales in offshore waters of the central Gulf of Alaska are usually attributed to animals migrating into coastal waters (Morris et al. 1983), although use of offshore banks for feeding is also suggested (Brueggeman et al. 1987).

Winter breeding areas are known to occur in Hawaii, Mexico, and south of Japan. Around the Hawaiian Islands, humpback whales are most concentrated around the larger islands of Maui, Molokai, Lanai, and Kahoolawe. Newborn and nursing calves with cows are seen throughout the winter and comprise 6 to 11 percent of all humpbacks sighted during aerial surveys. Humpbacks from the Mexican wintering grounds are found with greatest frequency on the central California summering ground (NMFS 1991). In the western Pacific, humpbacks have been observed in the vicinity of Taiwan, Ogasawara Islands, and Northern Mariana Islands (NMFS 1991).

Population estimates for the entire North Pacific increased from 1,200 in 1966 to 6,000-8,000 in 1992. More recently, photo-identification results from SPLASH, an international collaborative

research program on the abundances, population structure, and potential human impacts on humpback whales in the North Pacific involving more than 50 research groups and 300 researchers, estimated the abundance of humpback whales in the North Pacific to be just under 20,000 animals (Calambokidis et al. 2008). The population is estimated to be growing six to seven percent annually (Carretta et al. 2008). The SPLASH study collected data from all known wintering and feeding areas for humpback whales in the North Pacific, and the data suggest the likely existence of missing wintering areas that have not been previously described. Humpback whales that feed off the Aleutians and in the Bering Sea were not well represented on any of the sampled wintering areas and must be going to one or more unsampled winter locations (Calambokidis et al. 2008).

Three management units of humpback whales are recognized within the North Pacific: the California/Oregon/Washington, the central North Pacific stock, and the western North Pacific stock.

California/Oregon/Washington stock: Formerly known as the Eastern North Pacific stock, this stock includes humpback whales that feed off the west coast of the United States. Their winter migratory destination is primarily in coastal waters of Mexico and Central America. The best available abundance estimate for this stock is 2,043 whales and appears to be increasing in abundance (Carretta et al. 2011). The stock is impacted by U.S. commercial fishery interactions (3.2 whales seriously injured or killed annually) and ship strikes (0.4 animals/year); the PBR allocation in U.S. waters is 11.3 whales annually (Carretta et al. 2011).

Central North Pacific stock: The central North Pacific humpback whale stock is referred to as the winter/spring population of the Hawaiian Islands which migrates to northern British Columbia/Southeast Alaska and Prince Wouldiam Sound west to Kodiak (Baker et al. 1990; Perry et al. 1990; Calambokidis et al. 1997). The best available abundance estimate for this stock is 10,103 whales (Allen and Angliss 2011). The stock is impacted by U.S. commercial fishery interactions (3.8 whales seriously injured or killed annually) and ship strikes (1.6 animals/year); the PBR allocation in U.S. waters is 61.2 whales annually (Allen and Angliss 2011).

Western North Pacific stock: The western North Pacific Stock is referred to as the winter/spring population of Japan and probably migrates to waters west of the Kodiak Archipelago (the Bering Sea and Aleutian Islands) in summer/fall (Berzin and Rovnin 1966; Nishiwaki 1966; Darling 1991). The best available abundance estimate for this stock is 934 whales (Allen and Angliss 2011). The stock is impacted by U.S. commercial fishery interactions (0.2 whales seriously injured or killed annually) and subsistence takes (0.2 animals/year); the PBR allocation in U.S. waters is 2.6 whales annually (Allen and Angliss 2011).

Sei whale*:* Sei whales are widely distributed in all oceans, although this species is not found as far into polar waters as other rorquals (Gambell 1985). Several stocks of sei whales have been identified, but updated estimates of the number of sei whales worldwide are not available. Commercial whaling reduced sei whale numbers in the North Pacific from 42,000 whales to approximately 7,000 to 12,000 animals by 1974 (Tillman 1977). For management purposes, sei whales within the Pacific U.S. EEZ are divided into two discrete, non-contiguous areas: 1)

waters around Hawaii, and 2) California, Oregon and Washington waters; in the Atlantic U.S. EEZ the Nova Scotia stock is used for management purposes.

Eastern North Pacific stock: The IWC recognizes only one stock of sei whales in the North Pacific, but some evidence exists for multiple populations (Masaki 1977; Mizroch et al. 1984; Horwood 1987). Lacking additional information on sei whale population structure, sei whales in the eastern North Pacific (east of longitude 180°) are considered a separate stock for management purposes under the MMPA. The best abundance estimate for whales off the coasts of California, Oregon and Washington is 126 animals with an annual PBR level of 0.17 (Carretta et al. 2011). No population trend is available for this stock. The offshore drift gillnet fishery may threaten this stock but no mortalities or serious injuries have been reported. The current rate of sei whale ship strike deaths or injuries is zero; however, it is likely that some ship strikes are unreported.

Hawaii stock: Little information is known about animals in Hawaii waters. The best abundance estimate for whales off Hawaii is 77 animals with an annual PBR level of 0.1 (Caretta et al. 2010). No population trend is available for this stock. There have been no reported fishery-related mortality or serious injuries of sei whales in the Hawaiian Islands EEZ. The increasing levels of anthropogenic noise in the marine environment is a concern and may have habitat associated impacts (Carretta et al. 2011).

Nova Scotia stock: The southern portion of this stock's range is the Gulf of Maine and Georges Bank. Sei whales are not common in the U.S. Atlantic waters south of this location. Sei whales are generally found in deeper waters, characteristic of the continental shelf edge region (Hain et al. 1985). There are insufficient data to determine trends of the sei whale population in the North Atlantic. The best population estimate is 386 animals with an annual PBR level of 0.4 (Waring et al. 2011). For the period 2004 through 2008, the minimum annual rate of human-caused mortality and serious injury to sei whales was 1.0. This value includes incidental fishery interaction records, 0.6, and records of vessel collisions, 0.4.

Non-ESA Listed Target Marine Mammals

Eastern gray, minke, and short- and long-finned pilot whales are non-ESA listed species of marine mammals from populations that are considered either stable or increasing in size. The most current estimates of abundance, productivity, and human-caused mortality for these stocks may be found in the respective Stock Assessment Reports, which are available online at http://www.nmfs.noaa.gov/pr/sars/species.htm.

Non-Target Marine Animals

An assortment of sea birds, sea turtles, fish and invertebrates may be found in the action area during the proposed research. The permit would only authorize takes of members of the seven marine mammal species described above. The takes of these marine mammals by harassment would not affect any non-target marine animals and they are not considered further.

Biodiversity and Ecosystem Function

The proposed action is directed at marine mammals and does not interfere with benthic productivity, predator-prey interactions or other biodiversity or ecosystem functions. Marine mammals would not be removed from the ecosystem or displaced from habitat, nor would the

permitted takes affect their diet or foraging patterns. Further, the proposed action does not involve activities known or likely to result in the introduction or spread of non-indigenous species, such as ballast water exchange or movement of vessels among water bodies. Thus, effects on biodiversity and ecosystem function would not be considered further.

Ocean and Coastal Habitats
The action area includes a variety of designated critical habitat, however the proposed action is directed at marine mammals and would not affect habitat. It does not involve alteration of substrate, movement of water or air masses, or other interactions with physical features of ocean and coastal habitat. Thus, effects on habitat are not considered further.

Unique Areas
Research would be conducted in the marine portion of several sanctuaries, monuments, and marine protected areas located within the action area, including:

- Stellwagen Bank National Marine Sanctuary
- Gray's Reef National Marine Sanctuary
- Florida Keys National Marine Sanctuary
- Flower Garden Banks National Marine Sanctuary
- Papahānaumokuākea Marine National Monument
- Hawaiian Islands Humpback Whale National Marine Sanctuary
- Olympic Coast National Marine Sanctuary
- Cordell Bank National Marine Sanctuary
- Gulf of the Farallones National Marine Sanctuary
- Channel Islands National Marine Sanctuary
- Monterey Bay National Marine Sanctuary

Essential fish habitat (EFH) designated for various species of fish, which includes hard and soft bottom substrates is also located throughout the action area.

The proposed action is directed at marine mammals and does not alter or affect unique areas, including any components of EFH; therefore effects on unique areas are not considered further. Humpback whales are considered a resource of the Hawaiian Islands Humpback Whale National Marine Sanctuary. Effects of permit issuance on humpback whales are considered in section 4.

Historic Places, Scientific, Cultural, and Historical Resources
There are no districts, sites, highways or structures listed in or eligible for listing in the National Register of Historic Places in the action area. The proposed action represents non-consumptive use of marine mammals and does not preclude their availability for other scientific, cultural, or historic uses, including subsistence harvest by Alaskan Natives. Thus, effects on such resources would not be considered further.

Social and Economic Resources
The proposed action does not affect distribution of environmental burdens, access to natural or depletable resources or other social or economic concerns. It does not affect traffic and transportation patterns, risk of exposure to hazardous materials or wastes, risk of contracting

disease, risk of damages from natural disasters, food safety, or other aspects of public health and safety. Thus, effects on such resources would not be considered further.

4.0 ENVIRONMENTAL CONSEQUENCES

Effects of the No Action Alternative
There are no direct or indirect effects on the environment of not issuing the permit. The takes of marine mammals, including those listed as threatened or endangered, resulting from the applicant's research would not be exempted. It is unlikely the applicant would conduct the research in the absence of a permit, because to do so would risk sanctions and enforcement actions.

Effects of the Proposed Action Alternative
Under this alternative, the permit would be issued with standard permit conditions.

There are no other scientific research permits authorizing this type of tag attachment for cetacean research. The attachment method is under development to allow a minimally invasive alternative method of conducting medium to long term cetacean tagging studies. The only option for tags of this duration is to use attachment methods that penetrate the animal's skin and blubber.

Although an EA has not been previously prepared for this specific type of tag attachment, other types of tagging, such as suction cup and implantable tags, and the methodologies proposed by the applicant for approach, behavioral observation, photo-id, photography/videography, tracking, monitoring, underwater photography/video, passive acoustic audio monitoring, and collection of sloughed skin are standard research techniques that have been analyzed in numerous EAs, including a recent EA for research on humpback whales (NMFS 2010). Each of the EAs concluded with a Finding of No Significant Impact (FONSI). See Appendix F for relevant NEPA documents.

Overall, it is expected that the harassment associated with research activities may result in short-term behavioral responses by individuals, but would not be expected to result in stock- or species-level effects. Tagged animals would be closely monitored and in the event of an emergency, the regional disentanglement network would be contacted to aid in removal of the tag from the whale. The applicant anticipates that a saddle pack tag could be cut off using a hook knife on a hand pole and the tether of a towed tag could be grappled and tension applied to the line until the harness breakaway link engages and the unit detaches from the whale.

The issue most relevant to this analysis is the potential for negative impacts on the target species. It is important to recognize that an adverse effect on a single individual or a small group of animals does not translate into an adverse effect on the population or species unless it results in reduced reproduction or survival of the individual(s) that causes an appreciable reduction in the likelihood of survival or recovery for the species. In order for the proposed action to have an adverse effect on a species, the exposure of individual animals to the research activities would first have to result in:

- direct mortality,
- serious injury that would lead to mortality, or
- disruption of essential behaviors such as feeding, mating, or nursing, to a degree that the individual's likelihood of successful reproduction or survival was substantially reduced.

Subsequently, mortality or reduction in the individual's likelihood of successful reproduction or survival would then have to result in a net reduction in the number of individuals of the species. In other words, the loss of the individual or its future offspring would not be offset by the addition, through birth or emigration, of other individuals into the population. That net loss to the species would have to be reasonably expected, directly or indirectly, to appreciably reduce the likelihood of both the survival and recovery of the listed species in the wild.

Level B harassment, as defined by the MMPA, would occur during approach, behavioral observation, photo-id, photography/videography, tracking, monitoring, underwater photography/video, and passive acoustic audio monitoring. Level B harassment would also occur concurrently with tagging. The effects of closely approaching cetaceans have been analyzed in multiple EAs and it has been repeatedly determined that close vessel approaches could lead to disturbance of marine mammals, but reactions are generally short-term and of a low impact.

Behavioral responses would be expected to vary from no response to diving, tail slapping, or changing direction and any potential effect of vessel approach should be short-lived and minimal. These short-term behavioral responses would not likely lead to mortality, serious injury, or disruption of essential behaviors such as feeding, mating, or nursing, to a degree that the individual's likelihood of successful reproduction or survival would be substantially reduced.

Level A harassment, as defined by the MMPA, would occur during tagging activities, when physical contact is made that has the potential to injure animals. The chance of injury or mortality would be minimized by the methodologies described by the applicant (see Section 2) and by conditions of the permit. The actual tagging events would be short-lived and relatively non-invasive.

In addition to the potential for behavioral responses to close approach described above, potential effects to individuals targeted for tagging include behavioral responses to attachment of the tag, increased hydrodynamic drag, and the possibility for irritation at the attachment site.

Free-swimming cetaceans often react when hit by tags delivered by remote devices, such as tagging guns and crossbows. Cetaceans may also react when tags miss the animal and hit the water nearby. NMFS anticipates similar reactions by whales tagged using the proposed methods.

In most cases, the reactions of the remotely tagged animal and non-target animals last little more than a few minutes, after which behavior appears to return to normal (Watkins and Tyack 1991, Goodyear 1993, Hooker et al. 2001). The physical presence of a tag may lead to an alteration in the normal behavior of tagged animals, including a temporary disruption of feeding or mating activities.

The applicant has conducted three field seasons using the peduncle-let tag attachment on humpback whales in the Bay of Fundy, Canada. In total, 18 attempts were made to attach the tag in 2009, 7 attempts in 2010, and 5 attempts in 2011. All attempts were unsuccessful. In general, reactions to the tagging attempts were relatively short term, with the whales returning to their previous behavior on the next surface series. Specific information provided by the applicant indicated:

- Line touches on the back or fluke typically resulted in a low level response. If the line fell in the water around the body without contacting the whale, there was general no noticeable response.
- Activity at the time of the shot may have played a factor in the response level.
- Some animals appeared to respond to the sound of the shot as much as to the touch of the line.
- If the companion animals were still at the surface during the attempt, the tagging effort often elicited a response in the companion animals as well as the target animal. The sound of the shot may have been a factor in these cases as well.
- The strongest reaction observed was a delayed reaction. In this case, the lasso did drape over the trailing edge of the fluke as the tail went down, but there was no tail flick to dislodge it, and the lasso immediately floated free once the tail was below the water surface. The whale and its companion resurfaced about five minutes later, still traveling in the original direction and with no noticeable increase in speed. The first couple of breaths appeared normal with no change in behavior. The whales then separated slightly and started breaching simultaneously. They performed multiple breaches, tail lobs, etc with trumpet blows then moved back toward one another with tail swishes at the surface. Towards the end of the display, it appeared that the animals may have been annoyed with one another. The boat was a quarter mile away from the animals at this time. They did another 5 minute dive, surfacing with some flipper slapping before returning to their pre-tagging slow travel behavior. This was the first strong reaction noted to any of the peduncle belt tagging activities, after 25 attempts. It is unclear why these particular animals reacted strongly or why the response was delayed. While it must be assumed that the breaching was in response to the tag attempt, there is also a possibility that the behavior could have been related to some social interaction between the two animals.

Because this type of attachment has not been previously analyzed for use on cetaceans, the effects of suction cup and implantable tags are used for comparison.

Suction cup tagging procedures have been analyzed in several EAs and biological opinions, where findings resulted in no significant impact on the animals. The possibility of injury to an animal comes from the remote risk of the suction cup landing in or striking a sensitive part of the animal, such as the eye, mouth, or blowhole. However, given the skills of the experienced researchers and the attachment methods in the proposed action, this risk would be minimal or non-existent. This type of tag may migrate along the skin of the animal and the suction cups used for attachment may cause inflammation.

Implantable tags routinely used on cetaceans have a greater potential for disturbance in application and are more invasive than suction cup tags. Implantable tags typically penetrate the surface of the blubber layer. Tags generally work their way out of the blubber after weeks or months, but some new satellite tags may remain implanted for over a year (Mate *et al.* 2007).

Inflammation is expected to occur after tag implantation and infection is possible in association with implantable tags. Post-tagging swelling or indentations may occur after the tags are lost, extruded, or migrate out. However, there is no evidence that these swellings are signs of infection of the epidermis or poor health (NMFS 2006).

For both suction cup and implantable tags, disturbance of the animal mainly occurs during the close approach and attachment of the tag. Responses often seen include head lifts, fluke lifts, exaggerated fluke beats on diving, quick dives, or increased swimming speeds. Other observed responses include evasive swimming behavior, fluke slaps, head lunges, and decreased surfacing rates. Observations after tagging have shown that responses are short-term (Mate *et al*. 2007). NMFS anticipates that an individual whale's response to tagging using the proposed methods would be similar to responses to suction cup and implantable tags. These responses would not likely injure individuals or cause disruption of essential behaviors such as feeding, mating, or nursing, to a degree that the individual's likelihood of successful reproduction or survival was substantially reduced.

Energetic impact risks

It is anticipated that the health risk to an animal and the overall impact of the tag on the whale are relatively low with peduncle type tags. Although the size and weight of the saddle pack or towed tag would vary according to the electronics package, the unit would be scaled according to the size of the target species, keeping the size and weight of the unit small compared to that of the animal. The relative size of the peduncle type tags is similar to that of a watch on a human wrist. The towed buoy and electronics package weighs 35 lbs in air and has a reserve buoyancy of 17lbs. When towed at a speed of 4 knots via a submerged tow point, which simulates a whale swimming just below the surface, the prototype buoy has approximately 20 lbs of drag with a 60 ft long 3/8" diameter tow tether. Tow speeds tested ranged from 1 knot (3.5 lbs. drag) up to 5 knots (25lbs of drag). This drag is roughly 40% less than the drag of the Disentanglement ball buoy that has been used on numerous entangled right and humpback whales. It is not expected that the low drag generated by either tag would significantly impact the whale's energy expenditure.

Tissue abrasion risks

The peduncle harness for both saddle pack and towed tags are designed to be minimally abrasive to the skin tissue, and it is anticipated that chafe would be minimal. In a recent study evaluating the factors influencing the depth and severity of wounds generated during whale entanglements, Winn *et al.* (2008) demonstrated that draw-length, or linear motion of the entangling line relative to the skin tissue, is one of the key factors in determining whether a line would cut into the tissues or benignly press against the skin.

Abrasive testing of fishing gear on fluke samples suggests that the tissue exhibits a pliant ability to deform in response to a shear load, but yet readily return to its original state when the load is removed. This tissue compliance appears to limit the abrasive impact of the test line by preventing it from sliding across the epidermal surface. It is anticipated that this natural skin compliance would absorb rocking motion of the saddle or slippage of the harness due to normal swimming activity and prevent motion of the belt relative to the skin, keeping chafe at a minimum.

The applicant provided the following information on the anticipated effects of this attachment type:

1) Beamish (1978) tethered a humpback to shore using a "padded harness" around the peduncle just in front of the flukes for a period of 29 days. The resultant publication does not detail the "padded harness", but recent discussions with two participants in the study, Scott Kraus and Joseph Geraci, revealed that the tether could have been a 1-2" diameter hawser. No chafing of the tail stock was recalled by either individual.
2) In 2002, Moore towed a dead 14.65-m sperm whale (MH 02 673Pm) by the tail at 8 knots 60 miles from Nantucket to New Bedford using a 4" cargo strap wrapped around the peduncle. There was no damage to the skin except where the tow line was oscillating on the moving fluke blade (Moore, unpublished necropsy report, June 7, 2002). The proposed peduncle belt attachment mechanisms should not contact the fluke blade.
3) In 2003, a dead 13.7-m right whale (Eg 2150) was towed by the tail by a 50 ft dragger at a speed of 3 knots. The whale was secured using a 1 ¼" nylon line tied tightly with a bowline onto itself to make a choke knot around the peduncle just in front of the fluke insertion. The carcass was missing the skin at the onset, but a post-towing inspection of the line anchor point showed only a moderate compression furrow with minimal chafing of the dermis despite 12 hours of towing into a 35 knot gale in the Bay of Fundy (Moore, unpublished necropsy report, Oct. 4, 2003).
4) Woodward *et al.* (2006) developed an abrasion tester to simulate the action of a tail harness on the leading edge of the fluke. A fluke tissue sample was obtained from an adult stranded right whale (NEAq Eg 1004). The outer sleeve of a 1" double braided nylon rope (Yalon manufactured by Yale Cordage, Saco, ME) was looped around the leading edge of the fluke specimen that was firmly clamped in a small static sea water tank. Both ends of the harness were clipped into a carabineer which hung below a driving sleigh. This simulated a loose loop around the peduncle. A second line attached the carabineer to a driving sleigh which slid 6" back and forth along a rail, wiggling the bitter end of the line in a manner intended to induce a back and forth sawing motion on the tissue. This setup mimicked a harness encircling the peduncle with a telemetry buoy trailing at a distance behind the whale. The fluke tissue showed a substantial amount of flexure and compliance even though the sample was firmly clamped in the static sea water tank. There was very little movement of the harness in relation to the skin tissues – just a slight shifting back and forth, suggesting that the frictional force of the harness against the skin and the compliance of the tissue itself were sufficient to prevent the harness from slipping back and forth and sawing on the skin tissues. An accelerated test (60 strokes/minute) was run over a 36+ hour period using 20 lbs. of weight on the test system. This sawing rate is roughly 5 times the normal fluke stroke rate for a right whale (Nowacek *et al.* 2001). Thus, the test results would be indicative of approximately 7 days of normal swimming. There was no apparent abrasion to the fluke tissue, just a slight polishing of the surface and a compression mark where the harness contacted the skin. A little bit of bubbling of the skin can be seen within the harness track; however this bubbling is apparent in untested portions of the fluke sample as well. The sample used in this study had been frozen and thawed three times and there may be some degradation of the overall tissue sample. It appeared as though a layer of skin was beginning to slough off the sample. It is interesting to note that if this bubbling is indicative of sloughing skin

that the harness did not abrade even this loosened skin tissue off the sample. Of course, with any "collar" or belt, there is always a possibility that epidermal abrasion may occur. Provided such abrasion levels are low, the skin tissue under the belt may harden slightly and provide a "callused" area beneath the belt. Once the belt is removed, skin tissues should gradually return to normal. In the worst case scenario, some slight scar tissue may form.

Entanglement risks

By adding a saddle or towed tag to the animal, there is an increased risk of entanglement. The added profile of the tag or the trailing tow tether may be more likely to snag and catch on gear the animal encounters in the water column than just the whale's appendages. The towed tag has the added risk of possible entanglement in the approximately 40 feet of tow tether if the whale has a severe reaction to the tagging event. Currently, it is unknown what behavioral response would be elicited from the whale when the lasso initially touches it. The whale may speed up and dive, roll in a cork-screw, back up or not respond at all when it encounters the line. If the whale were to start thrashing, it could become ensnared in the line. While unlikely, such an entanglement could become fatal if it were severe enough. As described below, a variety of safety features have been incorporated into tag designs to minimize the risk of entanglements occurring and to remove tags in the unlikely event of an entanglement.

In addition to entanglement risks during tag deployment, there is also a risk that the whale could double back on its tow line during the tag carry or that another whale could become entangled during a social contact with the tagged individual.

Most fatal entanglements in commercial fishing gear involve high strength lines that run through the mouth or wrap around the body or a body part. To minimize the entanglement risk of peduncle type tags, a number of safety features have been incorporated:

<u>Low strength tow line</u> – For the peduncle-let harness and towed tag system, the tow tether is designed to easily segment into short bits at a low breaking strength. It would either be constructed entirely of low strength material (starting with a 200 lbs breaking strength, increased if necessary up to a maximum of 500 lbs. breaking strength) or would include low strength breakaway links every 3ft within a stronger primary line. Should the whale become entangled during the tag deployment, the lines could easily be broken by the whale, and the short segments prevent a line from potentially wrapping a body part. In the event of an emergency, the lines could also be cut by a disentanglement team if necessary.

<u>Self-shortening tether</u> – For the peduncle-let harness system, the towed tag would ascend the tow line to a pre-determined distance, and then trim the trailing tether. This allows the tow line to be shortened from the 100ft+ lasso circumference required to clear the fluke tips during the tag deployment to a maximum trailing distance of 40 ft (approximately one body length). Out of 23 towed tag deployments, the Large Whale Disentanglement Network has not yet had an animal become entangled in the tow tether. Typical tow lengths range from 50 ft to > 120 ft behind the whale for periods up to 99 days. In one case, they observed a right whale performing a hair-pin turn in which it encountered some of the 200 ft of gear trailing its body. Reports indicate that the whale stopped and backed up when it encountered the

line, suggesting that the whales are aware of the gear and would take avoidance measures if possible. In the case of the peduncle-let harness and towed tag system, maximum tow lengths would be 40 ft. This should minimize entanglement risk to the animal while maximizing surface time for the telemetry buoy.

Break-away links – For the peduncle-let harness system, the harness itself has a 100-200 lb. break-away link to ensure that the harness releases from the whale should the harness become fouled on any gear or other debris in the water. This is a lower strength breakaway than the tow tether itself to ensure that the harness releases from the whale first, letting it go gear free. The saddle pack tag has a breakaway link in the girth system. If the saddle were to snag on something in the water column, the harness would break away from the animal, preventing injury or any sort of entanglement risk.

Tagged animals would be closely monitored and in the event of an emergency, the regional disentanglement network would be contacted to aid in removal of the tag from the whale. If necessary, emergency tag removal would be conducted under the direction of the disentanglement network. For these reasons, long-term entanglements that could cause serious injury or mortality to individual animals are not expected.

The Fish and Wildlife Service has used a similar attachment method with manatees for three decades. Weak links were incorporated into the system so that the tether would detach from the peduncle belt if the tag or tether became entangled (Rathbun *et al.* 1987, Deutsch *et al.* 1998). The weak link has worked well as a release mechanism (Rathbun *et al.* 1987); tags frequently detached when entangled in vegetation or dock pilings (Reid *et al.* 1995).

Summary of effects of tagging
There is no evidence that responses of individual whales to tagging would exceed short-term stress and discomfort. No long-term effects would be anticipated. Tagging activities would not be expected to have any additional effects that were not analyzed by previous EAs for other types of tags. The short-term behavioral responses that might result from research activities would not likely lead to mortality, serious injury, or disruption of essential behaviors such as feeding, mating, or nursing, to a degree that the individual's likelihood of successful reproduction or survival would be substantially reduced. In addition, conditions and mitigation measures would be placed in the permit to further limit the potential for negative effects from these activities.

An ESA Section 7 consultation was conducted on the proposed research. A Biological Opinion was prepared and resulted in the determination that the proposed action is not likely to jeopardize the continued existence of any ESA-listed species or destroy or adversely modify designated critical habitat.

Controversy
Federal agencies are required to consider "the degree to which effects on the quality of the human environment are likely to be highly controversial" when evaluating potential impacts of a proposed action. [40 CFR §1508.27] The application for the proposed permit was made available for public review and comment (75 FR 13730) and provided to the Marine Mammal

Commission (MMC) for review and comment. Comments on the application shaped the proposed action, and are described in Section 2.

Issuance of the permit is not expected to be controversial based on potential environmental impacts.

Cumulative Effects

Cumulative effects are defined as those that result from incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of which agency (federal or nonfederal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

Cetaceans in the proposed study areas are regularly exposed to human activities, including entanglement in fishing gear; vessel activity including whale watching; and anthropogenic noise from vessels, military and industrial activities. A summary of the identified anthropogenic activities that may impact whales and dolphins is presented here to assess the potential for cumulatively significant impacts resulting from the proposed action. Impacts may be chronic as well as sporadic effects like behavioral changes that can stress the animal and ultimately lead to increased vulnerability to parasites and disease. The net effect of disturbance is dependent on the size and percentage of the population affected, the ecological importance of the disturbed area to the animals, the parameters that influence an animal's sensitivity to disturbance or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin 1980).

Considering the nature of the proposed research activities, the minimal, temporary harassment that target animals would experience, and the mitigation measures that would be employed, the proposed research would contribute a negligible increment over and above the effects of the baseline activities currently occurring in the marine environment where the proposed research would occur.

The following activities have been identified as factors that may impact cetaceans.

Entanglement: Because cetacean distribution overlaps with fishing areas, gear entanglements can occur and cause death by drowning or serious injuries such as lacerations, which in turn can lead to severe infections. Entanglement in fishing gear and ghost gear has been a concern for multiple species in the action area. Furthermore, the number of deaths attributed to fishing gear interactions may be grossly underestimated. In many cases, veterinarians and researchers are unable to determine a cause of death from a carcass. Another possibility is that some whales become entangled, drown, and fail to resurface, so their carcasses are never recovered and examined.

Ship strikes and noise: In addition to fishing vessels, cetaceans in the study area face traffic from a variety of other vessels, including commercial shipping, whale watching, ferry operations, and recreational boats. Vessels have the potential to affect marine mammals through their physical presence and activity and the increased underwater sound levels generated by boat engines.

Vessel strikes are rare, but do occur and can result in injury or death. Many types and sizes of vessels have been involved in ship strikes, including container/cargo ships/freighters, tankers, steamships, U.S. Coast Guard (USCG) vessels, U.S. Navy vessels, cruise ships, ferries, recreational vessels, fishing vessels, whale watching vessels, and other vessels . Vessel speed (when recorded) at the time of a large whale collision has ranged from two to 51 knots (Jensen and Silber 2003).

Harassment from whale-watching is not regulated by permits, nor are the effects monitored. The growth of whale watching during the past two decades has meant that whales in some areas (Hawaii, Puget Sound, Monterey Bay) are experiencing increased exposure to vessel traffic and sound. This brings added risk for vessel strikes, displacement from habitat and interference with social interaction and communication (Kovacs and Innes 1990; Kruse 1991; Wells and Scott 1997; Samuels and Bejder 1998; Bejder et al. 1999; Colborn 1999; Cope et al. 1999; Mann et al. 2000; Samuels et al. 2000; Boren et al. 2001; Constantine 2001). Not only do greater numbers of boats accompany the whales for longer periods of the day, but there has also been a gradual lengthening of the viewing season in some areas. Federal regulations, prohibiting approaches to humpback whales within 100 yards, are established for Hawaii and Alaska. NMFS has developed viewing guidelines for marine mammal species in all regions.

There is evidence that anthropogenic noise has substantially increased the ambient level of sound in the ocean over the last 50 years (Andrew et.al. 2002, McDonald et.al. 2006). Much of this increase is due to increased shipping activity, industrial activity and military operations. Some individuals or populations are regularly exposed to natural and anthropogenic sounds and may tolerate, or have become habituated to, certain levels of exposure to noise (Richardson 1995). The net effect of disturbance is dependent on the size and percentage of the population affected, the ecological importance of the disturbed area to the animals, and their behavioral plasticity (Geraci and St. Aubin 1980).

In some areas where industrial and commercial activity takes place, noise originates from the construction, operation, and vessel and aircraft support. Many researchers have described behavioral responses of marine mammals to sounds produced by helicopters and fixed-wing aircraft, boats and ships, as well as dredging, construction, and geological explorations (Richardson 1995; Nowacek et.al. 2007). Most observations have been limited to short-term behavioral responses, which included cessation of feeding, resting, or social interactions. Several studies have demonstrated short-term effects of disturbance on humpback whale behavior (Hall 1982; Baker et al. 1983; Krieger and Wing 1984; Bauer and Herman 1986, Miller et.al. 2000), but the long-term effects, if any, are unclear or not detectable. Actions such as repair of bridges and ports, as well as explosive removal of structures have been analyzed previously and been found to have a negligible impact on the marine mammal stocks.

Contaminants: Human actions, such as emitting discharge from wastewater facilities, dredging, ocean dumping and disposal, aquaculture, and coastal development are known to have deleterious impacts on marine mammals and their prey's habitat, ultimately affecting the animals themselves as they are bioaccumulated. Point source pollutants from coastal runoff, at sea disposal of dredged material and sewage effluents, oil spills, as well as substantial commercial

and recreational vessel traffic and impacts of fishing operations continue to negatively affect marine mammals in the proposed action areas.

Climate Change: The extent to which climate and/or ecosystem changes impact the target cetacean species is largely unknown. However, NMFS recognizes that such impacts may occur based on the biology, diet, and foraging behavior of dolphins and whales. Inter-annual, decadal, and longer time-scale variability in climate can alter the distribution and biomass of prey available to large whales. The effects of climate-induced shifts in productivity, biomass, and species composition of zooplankton on the foraging success of planktivorous whales have received little attention. Such shifts in community structure and productivity may alter the distribution and occurrence of foraging whales in coastal habitats and affect their reproductive potential as well. Similar shifts in prey resources could likewise impact large whales if climate change alters the density, distribution, or range of prey.

Incidental Harassment Authorizations: In addition to scientific research permits, NMFS issues Letters of Authorization (LOAs) and IHAs under the MMPA for the incidental take of marine mammals. NMFS has issued one IHA, three rulemakings, and 17 LOAs for the take of multiple target species in the action area.

Other Scientific Research Permits and Authorizations: Some species and locations within the proposed study area are the focus of a high level of research effort (e.g., humpback whales in the Pacific Ocean). This is due, in part, to intense interest in developing appropriate management and conservation measures to recover these species. Given the number of permits, associated takes, and research vessels present in the environment, repeated disturbance of individual animals is likely to occur in some instances, particularly in coastal areas (due to the proximity to shore). It is difficult to assess the effects of such disturbance. However, NMFS has taken steps to limit repeated harassment and avoid unnecessary duplication of effort through permit conditions requiring coordination among permit holders. NMFS expects that the temporary harassment of individuals would dissipate within minutes, and therefore animals would recover before being targeted for research by another Permit Holder. NMFS would continue to monitor the effectiveness of these conditions in avoiding unnecessary repeated disturbances.

A total of 33 permits authorize the harassment of one or more of the cetacean species targeted or incidentally taken in the proposed action area (Appendix G). Nearly all the permits authorize a smaller study area or region, reducing the chance of repeated harassment of individual whales by researchers. Most of this research does not overlap in area or timing. However, some spatial overlap exists. The majority of the takes authorized by these permits are for Level B harassment that would result in no more than disturbance to the target species.

Several of the active permits would expire before or soon after Permit No. 14118 can be issued. NMFS expects that some researchers would request new permits, or renewals, to continue their work once their current permit expires. NMFS cannot predict with certainty the level of take of each species that may be requested in the future but, conservatively, expects the amount of future research to be similar to or slightly greater than current levels as interest in marine conservation, biology, and management of these species grows.

In addition to the scientific research permits, 14 Letters of Confirmation (LOC) under the General Authorization have been issued for long- and short-finned pilot whales, gray whales, and minke whales; these LOCs confirm that the research would result in no more than Level B harassment of non-ESA marine mammals.

None of the active research permits or LOCs authorizes activities likely to result in the serious injury or mortality of any animal. Further, no such incidences have been reported by permitted cetacean researchers. In addition, all permits issued by NMFS for research on protected species, including the proposed permit, contain conditions requiring the Permit Holders to coordinate their activities with the NMFS regional offices and other Permit Holders conducting research on the same species in the same areas.

In general, harassment of marine mammals during permitted research has not been shown to result in long-term or permanent adverse effects on individual animals, regardless of the number of times the harassment occurs. The frequency and duration of the disturbance under the proposed permit would allow adequate time for animals to recover from adverse effects such that additive or cumulative effects of the action on its own are not expected.

No measurable effects on population demographics are anticipated because any sub-lethal (disturbance) effects are expected to be short-term and recoverable, and the proposed action is not expected to result in mortality of any animals. There exists the possibility that adverse effects on a species could accrue from the cumulative effects of a large number of permitted takes by harassment relative to the size of a population. However, there is no evidence that current or past levels of permitted takes have resulted in such species level effects.

It is also important to note that many of the target whales are migratory and may transit in and out of U.S. waters and the high seas. NMFS does not have jurisdiction over the activities of individuals conducting field studies in other nations' waters, and cumulative effects from all scientific research on these species across the Proposed Action area cannot be fully assessed. However, where possible, NMFS attempts to collaborate with foreign governments to address management and conservation of these trans-boundary ESA-listed species.

Summary of Cumulative Effects

There may already be significant adverse impacts on marine mammals from the existing levels of human activities. However, the relative incremental effect of the proposed action would not be significant. The proposed takes of specified numbers of marine mammals by harassment during the life of the permit are not likely to contribute to collectively significant adverse impacts on marine mammal stocks or species, including those listed as threatened or endangered. The effects of the takes would be transitory and recoverable, associated with only minor and short-term changes in the behavior of a limited number of individual marine mammals.

Although the effects of repeated or chronic disturbance from scientific research activities should not be dismissed, the potential long-term benefits and value of information gained on these species also must be considered. The applicant's research is expected to provide valuable information on a new type of tag attachment and on these species' biology and ecology that in

turn may be used to improve their management and reduce the effects of human activities on these populations.

5.0 MITIGATION MEASURES

There are no additional mitigation measures beyond those that are part of the applicant's protocols or conditions that would be required by permit, as discussed in the description of the Proposed Permit Alternative. The applicant's protocols are incorporated into the permit by reference.

In summary, the permit conditions limit the level of take as described in the take table and require notification, coordination, monitoring, and reporting. Researchers would be required to retreat from animals if behaviors indicate the approach may be interfering with reproduction, pair bonding, feeding, or other vital functions. Although injury and mortality are not expected, if they occur due to authorized the authorized actions, the permit contains measures requiring researchers to cease activities until protocols have been reviewed and revised with NMFS. The permit would require annual reauthorization by NMFS based on information provided in annual reports. Reauthorization of permits each year based on information provided in annual reports is a condition that NMFS includes in permits on an as-needed basis.

Review of monitoring reports of previous permits for the same or similar research protocols indicate that these types of mitigation measures are effective at minimizing stress, pain, injury, and mortality associated with takes.

6.0 LIST OF PREPARERS AND AGENCIES CONSULTED

Agencies Consulted

No agencies were consulted during the preparation of this EA.

Prepared By

This document was prepared by the Permits and Conservation Division of NMFS' Office of Protected Resources in Silver Spring, Maryland.

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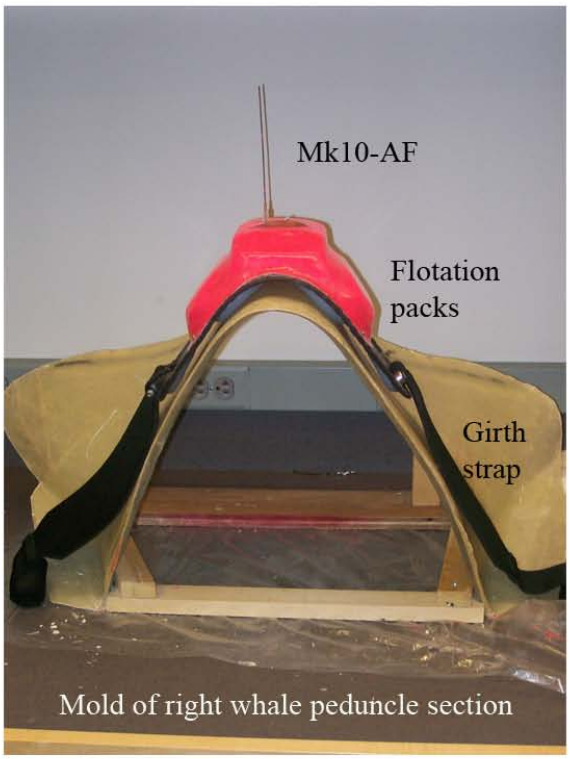
APPENDIX A: Target and Non-target Species. The permit would be conditioned to require annual reauthorization. Once the applicant has enough data to demonstrate the tagging methods can effectively be used, the permit holder may request an amendment to the permit to increase numbers and/or add additional species.

			Year 1		Year 2		Year 3		Year 4		Year 5	
	Species	ESA listing status	Max. # tagged[7]	# non-target animals harassed	Max. # tagged	# non-target animals harassed	Max. # tagged	# non-target animals harassed	Max. # tagged	# non-target animals harassed	Max. # tagged	# non-target animals harassed
Atlantic	Humpback whale males only	Endangered	10	150	15	225	15	225	15	225	15	225
	Pilot whale, long-finned	Not listed	10	700	20	1400	20	1400	20	1400	20	1400
	Pilot whale, short-finned	Not listed	10	700	20	1400	20	1400	20	1400	20	1400
	Fin whale	Endangered	*	100	*	100	*	100	*	100	*	100
	Sei whale	Endangered	*	50	*	50	*	50	*	50	*	50
	Minke whale	Not listed	10	50	10	150	10	150	10	150	10	150
Pacific	Humpback whale males only	Endangered	10	150	15	225	15	225	15	225	15	225
	Pilot whale, long-finned	Not listed	10	700	20	1400	20	1400	20	1400	20	1400
	Pilot whale, short-finned	Not listed	10	700	20	1400	20	1400	20	1400	20	1400
	Fin whale	Endangered	*	100	*	100	*	100	*	100	*	100
	Sei whale	Endangered	*	50	*	50	*	50	*	50	*	50
	Eastern gray whale	Not listed	10	150	10	150	10	150	10	150	10	150
	Minke whale	Not listed	10	50	10	150	10	150	10	150	10	150

7 A maximum of 3 attempts would be made to tag each individual.

APPENDIX B: Large Whale Saddle Pack Tag.

Prototype Large Whale Saddle Pack Tag



Front View:

Prototype carbon-fiber clam shell saddle with integrated side and top flotation packs shown sitting on cast of a right whale peduncle section. Mk-10 AF tag electronic package fits inside the housing, and an elasticized "girth" holds the saddle in place.

Saddle Size

11" long front to back
8" down either side of peduncle
weighs roughly 4.5 lbs in air
slightly positively buoyant in water

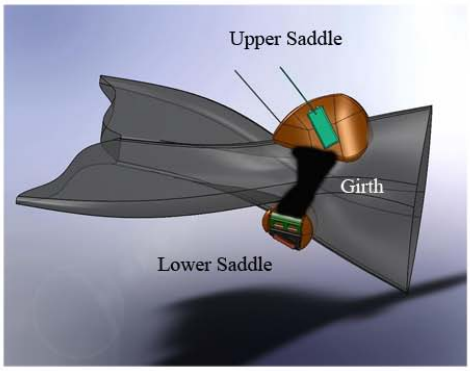
Top View:

Saddle pack shown on full sized model right whale tail. Girth passes around the peduncle at the narrowest point just before the fluke insertion.

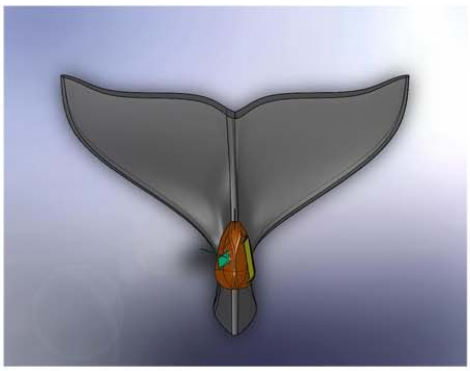
Fluke measures 14 ft tip to tip.

APPENDIX C: Small Whale Saddle Pack Tag.

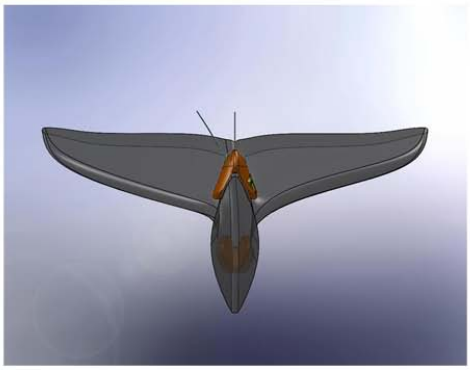
Prototype Small Whale Peduncle Saddle Pack Tag



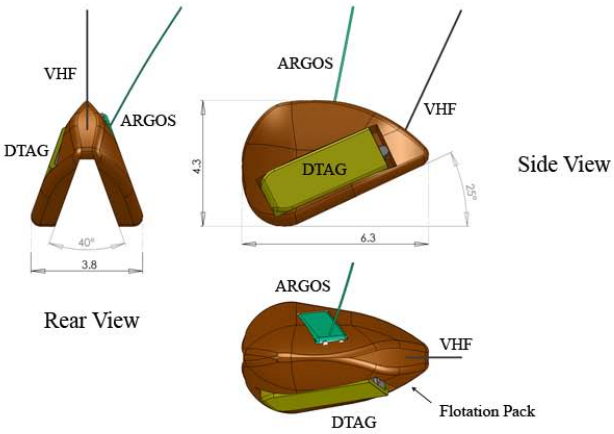
Side View



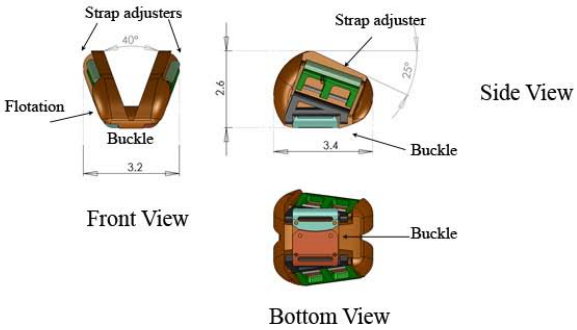
Top View



Front View



Upper Saddle Detail

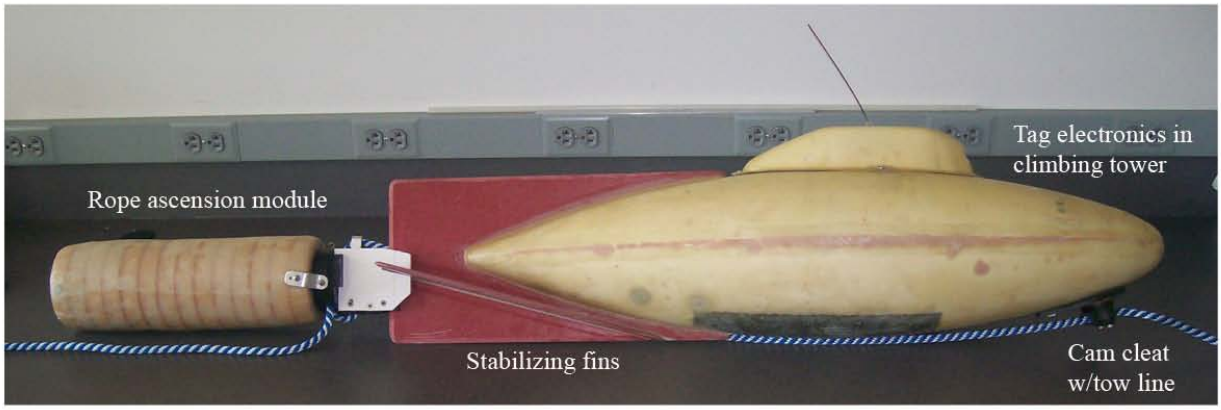


Lower Saddle Detail

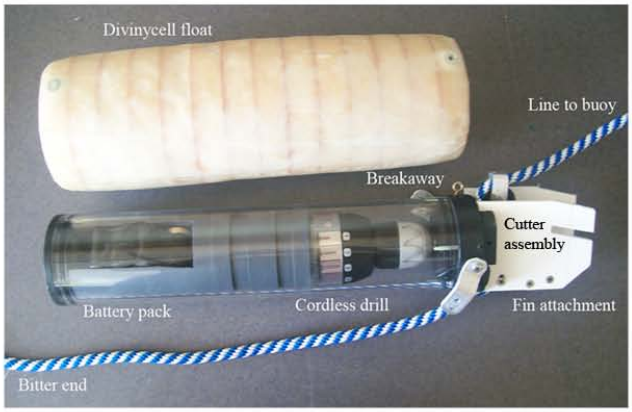
APPENDIX D: Towed Buoy and Rope Ascension Module.

Large Whale Towed Buoy & Rope Ascension Module Prototypes

Telemetry Buoy with Rope Ascension Module

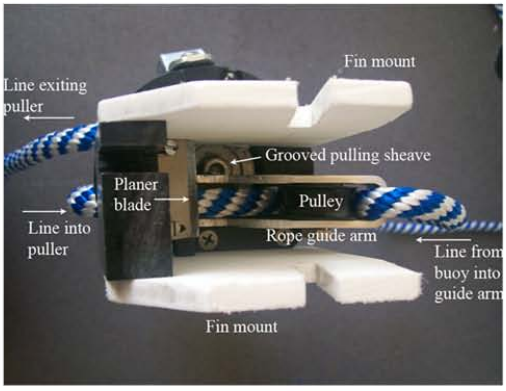


Tow line passes through a cam cleat mounted on the nose of the buoy, then along the belly of the buoy and into the rope ascension module.



Detail of Rope Ascension Module

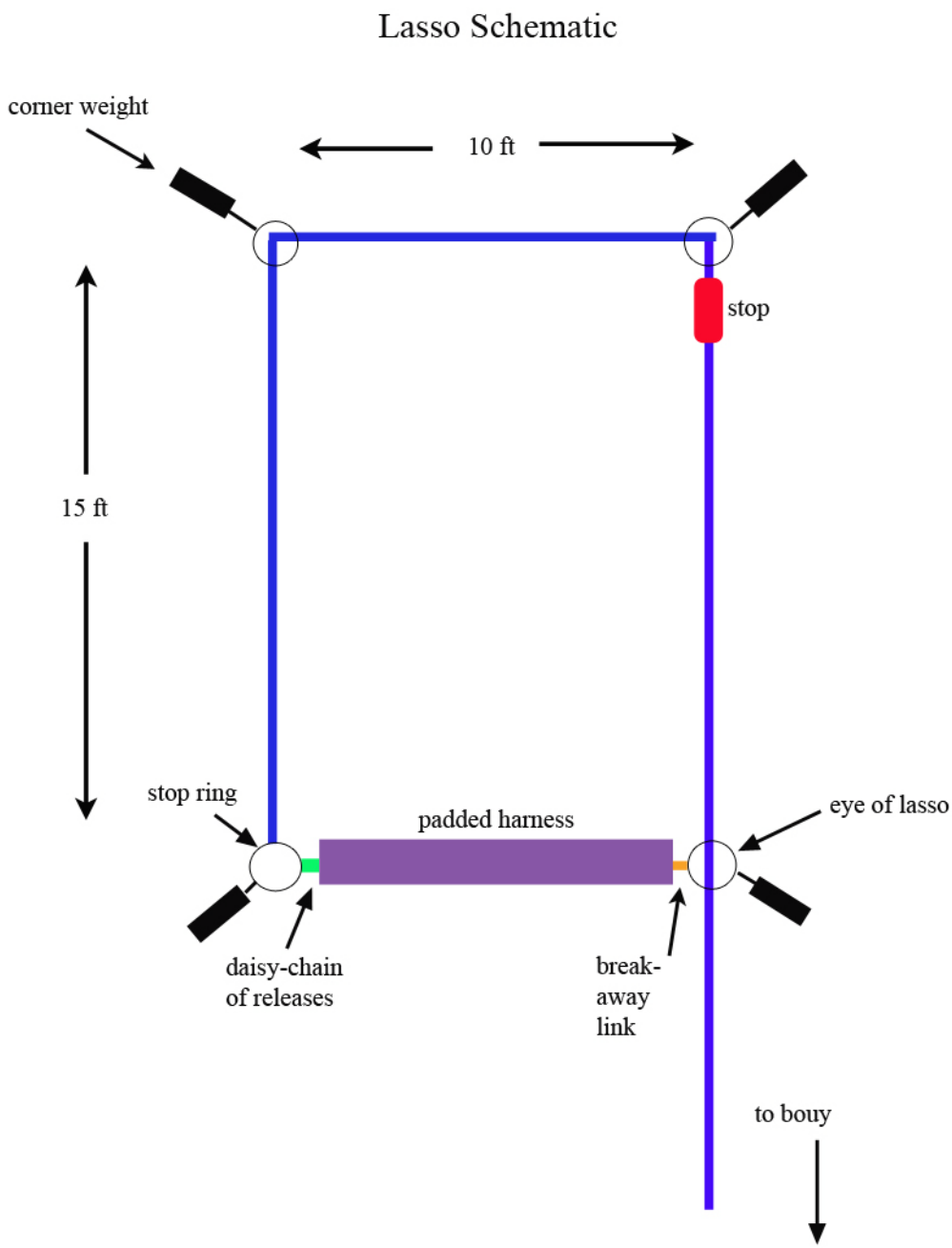
Design is based on line hauler theory from the pot fisheries. A cordless drill spins a self-tailing grooved sheave which pulls the rope into itself, allowing the unit to ascend the line. The unit fits into a pressure housing with a foam flotatuon pack. The module pushes the buoy up the line until it reaches a stop, at which point the cutter assembly trims the trailing tether and leaves the buoy only trailing the whale.



End View of Line Cutter Assembly

The line from the buoy runs into the guide arm on the right and out under the planar blade. The line then feeds into the grooved pulling sheave which is powered by the motor from the cordless drill. A small breakaway anchors the guide arm down during normal operation, but once it breaks, the arm pivots upward, bringing the rope in contact with the planer blade and trimming the trailing line.

APPENDIX E: Lasso to Deploy Peduncle-let Harness with Towed Tag.



The 10 ft x 15ft rectangular loop closes down to a 10 ft padded harness as the tow line to the buoy pulls through the eye ring of the lasso. A stop ring prevents the lasso from cinching too tightly around the peduncle and a daisy-chain of releases (electronic and galvanic timed releases, and breakaway links) provide a redundant release system for tag removal.

APPENDIX F: Recent Environmental Assessments for Marine Mammal Research Permits.

NMFS Permits Division has prepared EAs with Findings of No Significant Impact (FONSI) for issuance of permits to conduct research on the listed and proposed for listing species, as well as for issuance of permits to conduct tagging studies on numerous species of marine mammals. Those EAs were prepared to take a closer look at potential environmental impacts of permitted research on marine mammals listed as threatened or endangered, and not because the Permits Division determined that significant adverse environmental impacts were expected or that a categorical exclusion was not applicable. As each EA and associated FONSI has documented, research on marine mammals generally does not have a potential for significant adverse impacts on marine mammal populations or any other component of the environment.

The NEPA documents that contain analyses relevant to the proposed action include:

- *Environmental Assessment for Issuance of a Scientific Research Permit for Cetacean Studies (File No. 15330) (NMFS 2011)*

  For issuance of File No. 15330, issued to Dr. Robin Baird, an EA was prepared. The purpose of research is to determine the abundance, distribution, stock structure of cetaceans, movement patterns, habitat use, and diving behavior of cetaceans. The majority of research would occur around the Hawaiian Islands; although additional effort would occur along the west coast of North America, and possibly in other U.S. territories (e.g., Palmyra, Wake, Johnston, Guam, and American Samoa) as well as international waters of the Pacific Ocean. The proposed research covers seven species of pinnipeds, 40 species of cetaceans, and unidentified mesoplodon species. This EA described and analyzed the effects of vessel surveys, aerial surveys, photo-identification, acoustic recording, breath sampling, biopsy sampling, and dart and suction cup tagging. A FONSI was signed on July 26, 2011 based on the best available information suggesting that the proposed permit actions elicit only moderate to minimal reactions, that most animals show no observable change in behavior in response to Level A activities, such as biopsy sampling or tagging, and no long term impact or reduction in fecundity are expected.

- *Environmental Assessment for Issuance of a Scientific Research Permit for Cetacean Studies in the Pacific, Arctic and Atlantic Oceans (April 2011) (File No. 15215)*

  For issuance of a new permit to the NMFS National Marine Mammal Laboratory (NMML), an EA was prepared. The proposed research covers 33 species of cetaceans and the incidental harassment of nine species of pinnipeds. The study area encompasses the Pacific, Arctic and Atlantic Oceans. The purpose of the research is to continue studies that evaluate trends, abundance, distribution, movement patterns, habitat use, health and stock structure of cetaceans in U.S. and international waters over long periods of time. The EA described and analyzed the effects of a variety of research techniques, including: vessel and aerial surveys, photo-identification, feeding studies, biological sampling, tagging, live capture and release, and a suite of procedures associated with captures. A small number of unintentional mortalities would be authorized for capture

activities and these were also analyzed in the EA. A FONSI was signed on April 22, 2011. The FONSI determined that the proposed research is not expected to result in any cumulative adverse effects to the target species or non-target species found in the study area. For targeted species, the research would not be expected to have more than short-term effects to individuals and the loss of a limited number of animals during captures. These impacts are expected to be negligible to marine mammal stocks and species. No cumulative adverse effects that could have a substantial effect on any species, target or non-target, would be expected.

- *Environmental Assessment for The Issuance of Scientific Research Permits for Research on Humpback Whales and Other Cetaceans* (NMFS 2010)

  The objective of the eight permits is to collect information on the biology, foraging ecology, behavior, and communication of a variety of marine mammal species in the Pacific Ocean, with a focus on humpback whales. This EA described and analyzed the effects of aerial surveys, vessel surveys for behavioral observations, photo-identification, underwater photography and videography, collection of sloughed skin and feces, sampling whale blows, passive acoustic recordings, export and re-import of parts, tags attached by suction cup or by implanting darts, barbs, or a portion of the tag into the skin and blubber, biopsy sample collection, and acoustic playbacks. A FONSI was signed July 14, 2010 based on the best available information suggesting that the proposed permit actions elicit only moderate to minimal reactions, that most animals show no observable change in behavior in response to biopsy sampling or tagging and no long term impact or reduction in fecundity are expected.

- *Environmental Assessment on the Effects of the Issuance of a Scientific Research Permit [File No. 14097] for Pinniped, Cetacean, and Sea Turtle Studies* (NMFS 2010).

  For issuance of a new permit to the NMFS Southwest Fisheries Science Center (File No. 14097), an EA was prepared. The objectives of the study are to conduct population assessments to determine abundance, distribution patterns, foraging ecology, behavior, and communication for most marine mammal and sea turtle species in U.S. territorial and international waters. Research would be conducted through vessel surveys, aerial surveys, photogrammetry, photo-identification, biological sampling, radio tagging, and satellite tagging. Cetacean, pinniped, and sea turtle parts, specimens, and biological samples would also be salvaged and imported/exported. This EA described and analyzed the effects of research activities ranging from close approaches during aerial and vessel surveys for photo-identification to biopsy sampling and acoustic playbacks. Two alternatives were proposed: 1) no action and 2) authorize all the proposed activities; one was found to be unsuitable because they would fail to provide critical information on the ecology and biology of marine mammals that would help conserve, manage, and recover these species. A FONSI was signed July 01, 2010 based on the best available information suggesting that the proposed permit actions elicit only moderate to minimal reactions, that most animals show no observable change in behavior in response to biopsy sampling or tagging and no long term impact or reduction in fecundity are expected.

- *Supplemental Environmental Assessment on the Effects of the Issuance of Nine National Marine Fisheries Service Permit Actions for Scientific Research Activities on Marine Mammal Species in the U.S. Territorial Waters and High Seas of the Eastern, Central, and Western North Pacific Ocean, with a Primary Focus on the Waters Off Hawaii and from California Northward to Southeast Alaska (Including Gulf of Alaska and Aleutian Islands), and Including Foreign Territorial Waters of Japan* (NMFS 2005).

  For issuance of File No. 731-1774 and 8 other permits, an SEA was prepared that analyzed the effects of increased action and cumulative impacts of research on primarily humpback and also blue, sei, and fin whales during the Pacific basin wide study termed SPLASH. It concluded that no significant cumulative effect of the requests were expected. A FONSI was signed September 16, 2005.

- *Environmental Assessment on the Effects of the Issuance of Eleven National Marine Fisheries Service Permitted Scientific Research Activities on Marine Mammal and Sea Turtle Species in the U.S. Territorial Waters and High Seas of the North Pacific Ocean (including the Gulf of Alaska and Bering Sea), Arctic Ocean (including the Chukchi Sea and Beaufort Sea), Southern Ocean (including waters off Antarctica), and Foreign Territorial Waters of Mexico (Gulf of California only), Canada, Russia, Japan and the Philippines* (NMFS 2004).

  This was a batched EA which analyzed the issuance of 11 research permits. The objective of the various permits was to collect information on the biology, foraging ecology, behavior, and communication of a variety of marine mammal and sea turtle species in the action area, with a focus on humpback whales in the North Pacific. This EA described and analyzed the effects of research activities ranging from close approaches during aerial and vessel surveys for photo-identification to biopsy sampling and acoustic playbacks. Four alternatives were proposed: 1) no action; 2) authorizing the proposed activities except invasive sampling; 3) authorize all the proposed activities; and 4) retraction of all permits and no further issuance of permit requests. All but alternative 3 were found to be unsuitable because they would fail to provide critical information on the ecology and biology of marine mammals that would help conserve, manage, and recover these species. A FONSI was signed June 30, 2004 based on the best available information suggesting that careful approaches to cetaceans, even repeated approaches, elicit only moderate to minimal reactions, and that most animals show no observable change in behavior in response to biopsy sampling or tagging.

APPENDIX G : Active Scientific Research Permits In the Action Area.

Permit No.	Permit Holder	Expiration date	Location	Species	Harassment
10014	New Jersey Department of Environmental Protection	12/31/2012	NJ	Humpback, fin, sei, minke, long- and short-finned pilot whales	Level B only
10018	Cartwright	6/30/2013	AK, HI	Humpback, short-finned pilot whales	Level B only
13846	Whale Trust (Darling)	7/31/2015	AK, WA, HI	Humpback, gray whales	Level A & B
13927	Associated Scientists at Woods Hole (Hain)	10/31/2016	Southeast US	Humpback whales	Level B
14097	NMFS SWFSC	6/30/2015	AK, WA, OR, CA, HI	all	Level A & B
14122	Straley	7/31/2015	AK	Humpback, fin, sei, gray whales	Level A & B
14241	Woods Hole Oceanographic Institute	7/31/2014	Atlantic	Long- and short-finned pilot whales	Level A & B
14245	NMFS NMML	5/1/2016	Atlantic & Pacific	All	Level A & B
14296	Witteveen	7/31/2015	AK	Humpback, fin, sei, minke, gray whales	Level A & B
14353	Zoidis	7/31/2015	HI	Humpback, minke, short-finned pilot whales	Level A & B
14451	University of Hawaii at Manoa	7/31/2015	Atlantic & Pacific	All	Level B only
14534	NOAA S&T	7/31/2015	CA	Humpback, fin, sei, minke, gray whales	Level A & B
14585	University of Hawaii at Hilo (Pack)	7/31/2015	Pacific	Humpback, fin, sei, minke, short-finned pilot whales	Level A (humpbacks) & B
14586	Florida Atlantic University	11/30/2015	Atlantic	Humpback, fin whales	Level B
14599	Alaska Whale Foundation (Sharpe)	7/31/2015	AK	Humpback whales	Level A & B
14610	Alaska Department of Fish and Game	5/31/2015	AK	Humpback, gray whales	Level A & B

Permit No.	Permit Holder	Expiration date	Location	Species	Harassment
14682	University of Hawaii (Au)	11/15/2015	HI	Humpback, short-finned pilot whales	Level A & B
15271	Moss Landing Marine Labs	3/31/2016	CA, OR, WA	Humpback, fin, gray whales	Level A & B
15330	Cascadia Research Collective (Baird)	8/1/2016	Pacific	Humpback, fin, sei, gray, minke, short-finned pilot whales	Level A & B
15483	Mate	12/31/2015	OR	Gray whales	Level B only
15616	North Gulf Oceanic Society	2/28/2016	AK	Gray, minke whales	Level A & B
532-1822	Center for Whale Research (Balcomb)	4/14/2012	AK, CA, OR, WA	Humpback, gray whales	Level B only
540-1811	Cascadia Research Collective (Cascadia)	4/14/2012	CA, OR, WA	Humpback, fin, sei, minke, gray whales	Level A & B
605-1904	Whale Center of New England	2/15/2013	Atlantic	Humpback, fin, sei whales	Level A & B
633-1778	Center for Coastal Studies	6/30/2012	Atlantic	Humpback, fin, sei, minke, long-finned pilot whales	Level A & B
727-1915	Scripps Institute of Oceanography	2/1/2013	WA, OR, CA, HI	Humpback, fin, sei, minke, gray, short-finned pilot whales	Level A & B
775-1875	NMFS NEFSC	1/15/2013	Atlantic	Humpback, fin, sei, minke, short- and long-finned pilot whales	Level A & B
781-1824	NMFS, NWFSC	4/14/2012	AK, WA, OR, CA	Humpback, fin, minke, short-finned pilot whales	Level A & B
945-1776	Glacier Bay National Park and Preserve	3/31/2012	AK	Humpback, minke whales	Level B only
948-1692	Pabst	5/31/2012	Atlantic	Humpback, fin, minke, short- and long-finned pilot whales	Level B only
1058-1733	Baumgartner	5/31/2012	Atlantic & Pacific	Humpback, fin, sei, gray whales	Level A & B
1120-1898	Eye of the Whale	7/31/2012	AK	Humpback whales	Level B only
1127-1921	Hawaii Marine Mammal Consortium	6/30/2013	HI	Humpback, fin, sei, minke, short-finned pilot whales	Level A & B