UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

MAY 6 2010

To All Interested Government Agencies and Public Groups:

Under the National Environmental Policy Act (NEPA), an environmental review has been performed on the following action.

TITLE: Environmental Assessment on the Effects of the Issuance of a Protected Species Cooperative Conservation Grant to the Washington Department of Fish and Wildlife (Award No. NA10NMF4720037) to Conduct Research on Green Sturgeon on the West Coast of the United States.

LOCATION: Research would take place in waters of Oregon and Washington.

SUMMARY: The current EA analyzed the effects of the proposed green sturgeon research, which will be conducted in Oregon and Washington. Specifically, the funded work would be used to: establish a cooperative coast-wide biotelemetry, tag, and biological data interchange system; characterize important habitats with potential threats by studying fine scale spatial distribution and movement patterns of sturgeon; design, evaluate and implement an approach to estimate coast-wide abundance and survival of Southern and Northern DPS green sturgeon; and develop a Fisheries Management and Evaluation Plan for Washington coastal fisheries not covered by an ESA Section 7(a)(2) Biological Opinion that meets NMFS criteria for exemptions from take in the ESA 4(d) rule. Data gathered in this project will be critical for recovery planning by providing a reference from which recovery and impacts can be measured.

The proposed action analyzed in the EA would not have significant environmental effects on the target or non-target species; public health and safety would not affected; no unique geographic area would be affected; and the effects of this study would not be highly uncertain, nor would they involve unique or unknown risks. Issuance of this award would not set a precedent for future actions with significant effects, nor would it represent a decision in principle about a future consideration. There would not be individually insignificant but cumulatively significant impacts associated with the proposed action, and there would not be adverse effects on historic resources. The award would contain mitigating measures to avoid unnecessary stress to the subject animals.

RESPONSIBLE
OFFICIAL: James H. Lecky
Director, Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910
(301) 713-2332

The environmental review process led us to conclude this action will not have a significant effect on the human environment. Therefore, an environmental impact statement will not be prepared. A copy of the finding of no significant impact (FONSI) including the supporting EA is enclosed for your information.

Although NOAA is not soliciting comments on this completed EA/FONSI, we will consider any comments submitted assisting us to prepare future NEPA documents. Please submit any written comments to the responsible official named above.

Sincerely,

for Paul N. Doremus, Ph.D.
NOAA NEPA Coordinator

Enclosure

Environmental Assessment
Issuance of a Protected Species Conservation and Recovery Grant to the Washington Department of Fish and Wildlife (Award File NA10NMF4720037) to Conduct Research on Green Sturgeon on the West Coast of the United States

Lead Agency:	USDC National Oceanic and Atmospheric Administration National Marine Fisheries Service, Office of Protected Resources
Responsible Official:	James H. Lecky, Director, Office of Protected Resources
For Further Information Contact:	Office of Protected Resources National Marine Fisheries Service 1315 East West Highway Silver Spring, MD 20910 (301) 713-1401
Location:	West Coast of United States

CHAPTER 1 – INTRODUCTION AND PURPOSE AND NEED FOR ACTION

1.1 DESCRIPTION OF PROPOSED ACTION

The National Marine Fisheries Service, Office of Protected Resources (NMFS PR) proposes to provide financial assistance in the form of a grant to the Washington Department of Fish and Wildlife (WDFW) (Brad James, P.I.). This award would be issued through the Protected Species Conservation and Recovery Grant Program (CFDA no. 11.472, Unallied Science Programs) authorized under section 6 of the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1535). The Oregon Department of Fish and Wildlife (ODFW) would partner with this project. In accordance with section 6(d)(2) of the ESA, the Federal Government will provide 90 percent of the cost of the project, and the state will provide the remaining 10 percent. This financial assistance award is planned to extend for three years (three annual payments) and is subject to semi-annual review by NMFS. The grant would support conservation activities for green sturgeon in Washington and Oregon.

1.2 PURPOSE AND NEED

The purpose of the proposed action is to allow NMFS to carry out it's responsibilities under Section 6 of the ESA, whereby NMFS is authorized to cooperate with states to the maximum extent practicable in carrying out programs for the conservation of threatened and endangered species and monitoring of candidate species. Scientific research is an important means of gathering valuable information about protected species to inform conservation and management measures and, ultimately, to recover listed species. In order to fully carry out these responsibilities, NMFS needs to take action in response to a request from WDFW for financial assistance to support a coast-wide monitoring program that will assess status and trends for future Population Viability Assessments and better manage threats to recovery of the North American green sturgeon population. Specifically, the funded work will 1) establish a cooperative coast-wide biotelemetry, tag, and biological data interchange system; 2) characterize important habitats with potential threats by studying fine scale spatial distribution and movement patterns of sturgeon; 3) design, evaluate and implement an approach to estimate coast-wide abundance and survival of Southern and Northern DPS green sturgeon; and 4) develop a Fisheries Management and Evaluation Plan for Washington coastal fisheries not covered by an ESA Section 7(a)(2) Biological Opinion that meets NMFS criteria for exemptions from take in the ESA 4(d) rule. Data gathered in this project will be critical for recovery planning by providing a reference from which recovery and impacts can be measured. Section 6(d) of the ESA allows NMFS to provide financial assistance to any State, through its respective State agency that has entered into a section 6 agreement with NMFS, to support conservation activities for threatened and endangered species, or to monitor the status of candidate species and recently de-listed species. There are currently no take prohibitions for threatened Green sturgeon; therefore, issuance of a scientific research permit under section 10(a)(1)(A) of the ESA for these activities is not required.

1.3 PROPOSED RESEARCH AREA AND METHODS

The proposed research under Award File 2176308 to WDFW would take place within state jurisdictional waters of Oregon and Washington from 2010 to 2013, with acoustic tagging occurring from July-October, 2010 and June-September, 2011 and 2012. The primary fish collection areas are Grays Harbor, Willapa Bay, the Columbia River estuary, and the Umpqua River. Additional areas that may be sampled are Tillamook Bay, Siuslaw River, Yaquina Bay, Alsea River, Coquille River, Coos Bay and Rogue River.

Collection Methods

Commercial fishers would be contracted to set sinking gillnets, positioned stationary or perpendicular to the current when possible. Contract fishers would be selected based on experience and would be trained in sampling protocols. The nets would generally be set for less than 30 minutes at the beginning of slack tide. The multi-stranded monofilament netting (2 to 6 ply) would typically be three joined panels (estimated at 274 m total net size) of different mesh size (18 to 24 cm) in order to sample different age classes. Nets would be placed in areas without large concentrations of birds and/or marine mammals. Researchers would capture approximately 475 green sturgeon per year in 90 days of sampling effort (two gillnet boats fishing approximately 45 days each per year) using this protocol. The expected captures per area are as follows: Grays Harbor, 100; Willapa Bay, 100; Columbia River, 175; Umpqua River, 75; and the other additional rivers mentioned above, 25. It is estimated that 80% of the fish captured in 2010 would be non-recaptures (recaptures from previous research) with more recaptures expected in 2011 and 2012. Sampling may also be augmented by tagging approximately 50 fish captured during white sturgeon stock assessment activities in the lower Columbia River (Oregon Department of Fish and Wildlife (ODFW) and WDFW cooperative work) for a total of approximately 525 fish sampled. Collections would occur from June to September in 2010, 2011, and 2012. Stressed fish would be released immediately upon capture, not worked up.

Fish Handling and Tagging

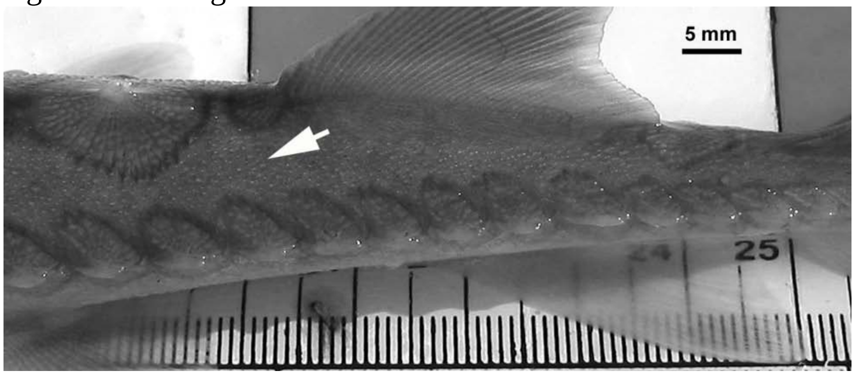
Sturgeon would be sampled, measured, tagged, and released. Sampling could involve drawing blood (for sexing animals and examining organochlorines or other chemicals), removing a fingernail sized piece of the pelvic fin (for genetics), and/or gill filament sampling. No more than 30 green sturgeon would be sampled for gill filaments. For that procedure, a 4mg gill filament sample would be removed (during surgical insertion of transmitters) with scissors and placed in small containers for immediate chemical fixing. The scissors would be sanitized with 70% isopropyl alcohol between each fish.

Measuring would involve determining total length using a standard measuring board and weighing using a sling attached to a suspended scale mounted to the boat structure or tripod.

Tagging would involve placement of a spaghetti tag through the anterior dorsal fin base, a sterilized (using 60-80% isopropyl alcohol) 12.50 x 2.07 mm 134.2 kHz ISO tag (Biomark's TX1411SST or earlier equivalent) PIT tag injection (see Figure 1 for placement), and/or sterilized (using benzalkonium chloride) surgical insertion of 16 mm VEMCO acoustic transmitters (model V16-H coded tag or model V16-TP). The VEMCO transmitters would be inserted through a 25 mm incision off midline and equidistant between the pectoral and pelvic fins and will be closed with 4-5 simple interrupted sutures. The size of the transmitters can be no more than 2% of the fishes body weight.

It would take less than 5 minutes to work up fish not undergoing surgery. To work up fish undergoing surgery, it would require less than 30 minutes.

Figure 1. PIT tag location



Recovery boxes or fish cars would be used for all fish. Differing recover devices would be tested and a suitable device amenable to both field conditions and fish safety would be chose based on this testing. Fish would be released when their breathing, strength, and equilibrium returns to normal.

Recaptured sturgeon would not be tagged or genetically sampled but would be weighed and measured.

Telemetry Receivers

There would be 6 or more fixed acoustic telemetry receivers (VEMCO VR2W: see http://www.vemco.com/products/receivers/vps.php for a description of the receiver) per estuary to monitor tagged sturgeon movement. The first priority would be to assure that receiver sites are maintained year-round near the entrance to estuaries known to be frequented by significant numbers of green sturgeon during the summertime (i.e., Grays Harbor, Willapa Bay, Columbia River estuary). The next priority would be to assure that a few estuaries along the Oregon coast have gateways. Given existing and planned receiver placement (through other funding), the exact placement of receivers is unknown. It is likely that this project would replace some existing receivers in all major estuaries and would place new receivers in the Umpqua River estuary (Winchester Bay), and the Rogue River estuary.

Receivers would be downloaded and reinitiated on a weekly to monthly basis depending on the anticipated level of detections and the prevailing weather conditions. Receivers would typically make use of navigational aids or oceanographic monitoring stations. If a receiver is independently located, the receiver would be moored with adequate weight to hold position, and a large buoy clearly marked as WDFW/ODFW research will be used to suspend the receiver.

1.4 APPLICABLE LAWS AND NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

This section summarizes federal, state, and local permits, licenses, approvals, and consultation requirements necessary to implement the proposed action, as well as who is responsible for obtaining them. Even when it is the recipient's responsibility to obtain such permissions, NMFS is obligated under NEPA to ascertain whether the applicant is seeking other federal, state, or local approvals for their action.

National Environmental Policy Act
The National Environmental Policy Act (NEPA) was enacted in 1969 and its Environmental Impact Statement requirement is applicable to all "major" federal actions significantly affecting the quality of the human environment. A major federal action is an activity that is fully or partially funded, regulated, conducted, or approved by a federal agency. The procedural provisions outlining federal agency responsibilities under NEPA are provided in the Council on Environmental Quality's implementing regulations (40 CFR Parts 1500-1508).

NMFS has, through NOAA Administrative Order (NAO) 216-6, established agency procedures for complying with NEPA and the implementing regulations issued by the Council on Environmental Quality. When a proposed action that would otherwise be categorically excluded is the subject of public controversy based on potential environmental consequences, has uncertain environmental impacts or unknown risks, establishes a precedent or decision in principle about future proposals, may result in cumulatively significant impacts, or may have an adverse effect upon endangered or threatened species or their habitats, preparation of an EA or EIS is required.

This draft Environmental Assessment is prepared in accordance with NEPA, its implementing regulations, and NOAA 216-6.

Endangered Species Act
Section 7 of the ESA requires consultation with the appropriate federal agency (either NMFS or the U.S. Fish and Wildlife Service) for federal actions that "may affect" a listed species or adversely modify critical habitat. NMFS issuance of an award affecting ESA-listed species or designated critical habitat, directly or indirectly, is a federal action subject to these Section 7 consultation requirements. Section 7 requires federal agencies to use their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species. NMFS is further required to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any threatened or endangered species or result in destruction or adverse modification of habitat for such species. Regulations specify the procedural requirements for these consultations (50 Part CFR 402).

Section 6 of the ESA provides that states and territories maintaining an adequate and active program for the conservation of endangered and threatened species may receive federal funds for the purpose of conserving those species. To remain eligible for this funding, States must enter into a section 6 agreement with NMFS and undergo annual reviews of their program to reconfirm the finding that the state's program is adequate and active in accordance with section 6(c) of the ESA. Activities supported through this financial assistance are authorized by regulation (50 CFR 17.21) and have been determined to comply with the requirements therein.

Marine Mammal Protection Act
The MMPA prohibits takes of all marine mammals in the U.S. (including territorial seas) with a few exceptions. The act defines "take" to mean "to hunt, harass, capture, or kill" any marine mammal or attempt to do so.

National Marine Sanctuaries Act
The NMSA (32 U.S.C. 1431 *et seq*.) authorizes the Secretary of Commerce to designate and manage areas of the marine environment with special national significance. The National Marine Sanctuary Program, operating under the NMSA and administered by NOAA's National Ocean Service (NOS) has the authority to issue special use permits for research activities that would occur within a National Marine Sanctuary. Obtaining special use permits is the responsibility of individual researchers. However, as a courtesy, the Office of Protected Resources consults with NOS when proposed research would occur in or near a National Marine Sanctuary.

Magnuson-Stevens Fishery Conservation and Management Act: Under the MSFCMA Congress defined Essential Fish Habitat (EFH) as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). The EFH provisions of the MSFCMA offer resource managers means to accomplish the goal of giving heightened consideration to fish habitat in resource management. NMFS Office of Protected Resources is required to consult with NMFS Office of Habitat Conservation for any action it authorizes (e.g., research permits), funds, or undertakes, or proposes to authorize, fund, or undertake that may adversely affect EFH. This includes renewals, reviews or substantial revisions of actions.

CHAPTER 2 - ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 ALTERNATIVE 1 - NO ACTION ALTERNATIVE

Under the No Action Alternative, Award File NA10NMF4720037 would not be approved. This alternative would not fund research that supports a coast-wide monitoring program in order to assess status and trends for future Population Viability Assessments and better manage threats to recovery of the North American green sturgeon population. Current green sturgeon research would continue.

2.2 ALTERNATIVE 2 - GRANT APPROVAL FOR RESEARCH AS PROPOSED

Under the Proposed Action alternative, Award File NA10NMF4720037 would be approved. The grant would support research activities for the southern DPS of green sturgeon as described on pages 2-4.

CHAPTER 3 - AFFECTED ENVIRONMENT

The following discussion identifies resource areas that may be directly or indirectly affected by the proposed research activities.

3.1 SOCIAL AND ECONOMIC ENVIRONMENT

Although economic and social factors are listed in the definition of effects in the CEQ regulations and NAO 216-6, the definition of human environment states that "economic and social effects are not intended by themselves to require preparation of an EIS." However, an EIS or EA must include a discussion of a proposed action's economic and social effects when these effects are interrelated with effects on the natural or physical environment. The social and economic environment is not described in detail because there is no potential for social and economic effects. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects.

3.2 **BIOLOGICAL AND PHYSICAL ENVIRONMENT**

Green Sturgeon

The green sturgeon is an anadromous fish species, meaning adults spend time in the ocean but migrate into freshwater rivers to spawn. Green sturgeon are long-lived and the most marine-oriented of the sturgeons of the family Acipenseridae. The North American form of green sturgeon (hereafter, "green sturgeon") is related to the Asian form (*Acipenser mikadoi*, also called Sakhalin sturgeon), but is most likely a different species (Artyukhin *et al.*, 2007). Green sturgeon are one of two sturgeon species occurring on the U.S. West coast, the other being white sturgeon (*A. transmontanus*). Adults can grow up to 270 cm in total length (TL) and 175 kg in weight (Moyle, 2002). However, adults greater than 2 m TL and 90 kg in weight are not common (Skinner, 1962). Maximum ages most likely range from 60 to 70 years or older (Emmett *et al.*, 1991). Females tend to be older and larger than males, but males reach maturity at younger ages (Nakamoto *et al.*, 1995). Until recently, few studies have focused on green sturgeon due to its low abundance and low commercial value compared to white sturgeon The southern DPS of green sturgeon is listed as threatened under the ESA.

Green sturgeon range from the Bering Sea, Alaska, to Ensenada, Mexico. A few green sturgeon have been observed off of the southern California coast, including fish less than 100 cm TL (Fitch and Lavenberg, 1971; Fitch and Schultz, 1978, cited in Moyle *et al*., 1992). Green sturgeon abundance increases north of Point Conception, California (Moyle *et al.*, 1995). Green sturgeon occupy freshwater rivers from the Sacramento River up through British Columbia (Moyle, 2002), but spawning has been confirmed in only three rivers: the Rogue River in Oregon and the Klamath and Sacramento rivers in California. Based on genetic analyses and spawning site fidelity (Adams *et al.*, 2002; Israel *et al.*, 2004), NMFS determined green sturgeon are comprised of at least two distinct population segments (DPSs): (1) A northern DPS consisting of populations originating from coastal watersheds northward of and including the Eel River (i.e., the Klamath and Rogue rivers) ("Northern DPS"); and (2) A southern DPS consisting of populations originating from coastal watersheds south of the Eel River ("Southern DPS"). The ESA listed southern DPS green sturgeon are only known to spawn in the Sacramento River.

The Northern DPS and Southern DPS are distinguished based on genetic data and spawning locations, but their distributions outside of natal waters generally overlap with one another (Chadwick, 1959; Miller, 1972; California Department of Fish and Game (CDFG), 2002; Erickson and Webb, 2007; Moser and Lindley, 2007; Lindley *et al.*, 2008). Both Northern DPS and Southern DPS fish occupy coastal waters from southern California to Alaska and are known to aggregate in the Columbia River estuary and Washington estuaries in the late summer (Israel *et al.*, 2004; Moser and Lindley, 2007; Lindley *et al.*, 2008). Thus, green sturgeon observed in coastal bays, estuaries, and coastal marine waters outside of natal rivers may belong to either DPS. However, the Northern DPS of green sturgeon is not classified as a listed species under the ESA.

Adults and subadults
Green sturgeon spend a large portion of their lives in coastal marine waters as subadults and adults between spawning episodes. Subadult male and female green sturgeon spend at least approximately 6 and 10 years at sea, respectively, before reaching reproductive maturity and returning to freshwater to spawn for the first time (Nakamoto *et al.*, 1995). Adult green sturgeon spend as many as 2 – 4 years at sea between spawning events (Lindley and Moser, NMFS, pers. comm., cited in 70 FR 17386, April 6, 2005; Erickson and Webb, 2007). The average length at maturity for green sturgeon is estimated to be 152 cm TL (14 - 16 years) for males and 162 cm TL (16 - 20 years) for females in the Klamath River (Van Eenennaam *et al.*, 2006), and 145 cm TL for males and 166 cm TL for females in the Rogue River (Erickson and Webb, 2007). The maximum size of subadults is approximately 167 cm TL (Erickson and Webb, 2007).

Adult green sturgeon enter freshwater rivers every few years to spawn. Adults typically begin their upstream spawning migration in the spring and either migrate downstream after spawning, or reside within the river over the summer. In the Klamath River, tagged adults exhibited four movement patterns: (1) upstream spawning migration; (2) spring outmigration to the ocean; (3) summer holding (June to November) in deep pools with eddy currents (for those that do not exhibit post-spawning spring outmigration); and (4) outmigration after summer holding (Benson et al., 2007). Use of summer holding sites has also been observed in the Rogue River (Erickson et al., 2002) and in the Sacramento River (Unpublished, S. Lindley and M. Moser, NMFS, Feb 2008). Deep holding pools greater than 5 m in depth are believed to be important for spawning as well as for summer holding.2 Winter outmigration from the Klamath and Rogue rivers was initiated when temperatures dropped to 10 - 12°C or below 10°C, and discharge increased to greater than 100 m3/s (Erickson et al., 2002; Benson et al., 2007). In the Sacramento River, tagged adult green sturgeon were present through Novemberand December, before moving downstream with increased winter flows.1 Subadults may also migrate upstream, but for unknown purposes. Adults and subadults also occupy the San Francisco Bay, San Pablo Bay, Suisun Bay, and Sacramento-San Joaquin Delta adjacent to the Sacramento River. Adults and subadults primarily inhabit the Delta and bays during summer months, most likely for feeding and growth (Kelly et al., 2007; Moser and Lindley, 2007), but also enter the Delta and bays during their spring migration to the Sacramento River and during their winter outmigration from the Sacramento River to the ocean.

Outside of natal waters, adult and subadult green sturgeon inhabit coastal marine waters from the Bering Sea to southern California, primarily occupying waters within 110 meters (m) depth (Erickson and Hightower, 2007). Tagged subadults and adults have been documented to make sustained coastal migrations of up to 100 km per day (S. Lindley and M. Moser, NMFS, pers. comm. cited in BRT, 2005), but may also reside in aggregation/feeding areas in coastal marine waters for several days at a time. There is evidence that green sturgeon inhabit certain estuaries on the northern California, Oregon, and Washington coasts during the summer, and inhabit coastal marine waters along the central California coast and between Vancouver Island, British Columbia, and southeast Alaska over the winter (Lindley *et al.*, 2008). Large aggregations of green sturgeon occur in the Columbia River estuary and Washington estuaries and include green sturgeon from all known spawning populations (Moser and Lindley, 2007). Large numbers of green sturgeon also occur off Vancouver Island, BC (Lindley *et al.*, 2008). Seasonal migrations to these oversummering and overwintering habitats are most likely driven by the presence of food resources. Although adult and subadult green sturgeon occur in coastal marine waters as far north as the Bering Sea, green sturgeon have not been observed in freshwater rivers or coastal bays and estuaries in Alaska.

Adults and subadults inhabit a wide range of environmental conditions within coastal bays and estuaries. Adults and subadults in Willapa Bay and the San Francisco Bay Estuary occurred across the entire temperature and salinity range (11.9 – 21.9°C; 8.8 – 32.1 ppt), experienced large fluctuations in temperature and salinity (up to 2°C h-1 and 1 practical salinity unit (PSU) h-1), and occupied a wide range of dissolved oxygen levels from 6.54 to 8.98 mg O2/l (Kelly *et al.*, 2007; Moser and Lindley, 2007). Tagged adults and subadults in the San Francisco Bay Estuary occupied shallow depths during directional movements, but stayed close to the bottom during non-directional movements, presumably because they were foraging (Kelly *et al.*, 2007). Similar to freshwater rivers, winter outmigration from Willapa Bay was initiated when water temperatures dropped below 10°C (Moser and Lindley, 2007). Adult and subadult green sturgeon in the Columbia River estuary, Willapa Bay, and Grays Harbor feed on crangonid shrimp, burrowing thalassinidean shrimp (primarily the burrowing ghost shrimp *Neotrypaea californiensis*), amphipods, clams, juvenile Dungeness crab (*Cancer magister*), anchovies, sand lances (*Ammodytes hexapterus*), lingcod (*Ophiodon elongatus*), and other unidentified fish species (P. Foley, unpublished data cited in Moyle et al., 1995; C. Tracy, minutes to USFWS meeting, cited in Moyle *et al.*, 1995; O. Langness, WDFW, pers. comm., cited in Moser and Lindley, 2007; Dumbauld *et al.*, 2008). Burrowing ghost shrimp made up about 50 percent of the stomach contents of green sturgeon sampled in 2003 (Dumbauld *et al.*, 2008). Subadults and adults feeding in bays and estuaries may be exposed to contaminants that may affect their growth and reproduction. Studies on white sturgeon in estuaries indicate that the bioaccumulation of pesticides and other contaminants adversely affects growth and reproductive development and may result in decreased reproductive success (Fairey *et al.*, 1997; Foster *et al.*, 2001a; Foster *et al.*, 2001b; Kruse and Scarnecchia, 2002; Feist *et al.*, 2005; Greenfield *et al.*, 2005). Green sturgeon are believed to experience similar risks from contaminants (70 FR 17386, April 6, 2005).

Freshwater Riverine Systems

Green sturgeon occupy several freshwater river systems from the Sacramento River, CA, north to British Columbia, Canada (Moyle, 2002). As described in the previous section, Southern DPS green sturgeon occur throughout their natal river systems (i.e., the Sacramento River, lower Feather River, and lower Yuba River), but are likely to be restricted to the estuaries in non-natal river systems (i.e., north of and including the Eel River).

Bays and Estuaries
Southern DPS green sturgeon occupy coastal bays and estuaries from Monterey Bay, CA, to Puget Sound, WA. The Suisun, San Pablo, and San Francisco bays serve as important habitat areas for juvenile, subadult, and adult Southern DPS fish. These bays support rearing, feeding, and growth, and serve as an important migratory/connectivity corridor between the Sacramento River system and coastal marine waters. Outside of their natal system, subadult and adult Southern DPS fish also occupy coastal bays and estuaries in California, Oregon, and Washington, including estuarine waters at the mouths of non-natal rivers. Coastal bays and estuaries are believed to serve as important summer habitats for subadult and adult green sturgeon, supporting migration, feeding, and growth (Moser and Lindley, 2007; Lindley *et al.*, 2008). Bays and estuaries that will possibly be included in the action area are the Rogue River, Coos Bay, Winchester Bay, Siuslaw River, Alsea River, Yaquina Bay, Tillamook Bay, Lower Columbia River and estuary, Willapa Bay, and Grays Harbor.

Rogue River, OR (from the mouth to the head of the tide): The Rogue River estuary is located on the southern Oregon coast, adjacent to the city of Gold Beach in Curry County. The estuary extends upstream to approximately river mile 4.5 and provides food resources, water flow, water quality, and migratory corridors for subadult and adult migration. Northern DPS green sturgeon have been confirmed to spawn in the Rogue River (Erickson *et al.*, 2002; Farr and Kern, 2005). The presence of Southern DPS fish is categorized as likely based on the presence of Northern DPS fish, but thus far, no tagged Southern DPS subadults or adults have been detected in the Rogue River estuary (L. Lindy and M. Mosley, NMFS, Unpublished, February 2008). A low proportion of green sturgeon sampled in the Rogue River have been assigned to the Southern DPS based on genetic analyses (8.3 – 15.2%, or 13 fish, of 113 fish sampled) (Israel and May, 2006), but this was attributed to analysis error (J. Israel, UC Davis, Personal commun., February 2008)

Several special management concerns exist for the Rogue River estuary. The lower estuary is highly modified, due to filling of the estuary for dikes, a marina, and the development of and placement of riprap along the north shore. These modifications could affect water quality, water flow, and food resources for green sturgeon.

Coos Bay, OR: Coos Bay is located in Coos County in southwestern Oregon. Coos Bay is the deepest and largest bay on the Oregon coast, extending about 10.2 river miles upstream and covering an area of about 17.7 square miles. Coos Bay provides important summer habitat for subadult and adult green sturgeon. Data indicate larger numbers of green sturgeon and greater use of this area compared to other non-natal coastal estuaries in California (except for Humboldt Bay) and Oregon (except for Winchester Bay). From February 2000 to February 2004, ODFW captured and collected tissue samples from 12 green sturgeon (DPS unknown) in Coos Bay (Rien *et al.*, 2000; Farr *et al.*, 2001; Farr and Rien, 2002; Farr and Rien, 2003; Farr and Kern, 2004; Farr and Kern, 2005). Tagged Southern DPS subadults and adults from San Pablo Bay have also been detected in Coos Bay (L. Lindley and M. Moser, NMFS, Unpublished, February 2008)
Winchester Bay, OR: Winchester Bay is located at the mouth of the Umpqua River, in Douglas County, OR. Winchester Bay is the second deepest and largest bay on the Oregon coast, extending about 29.2 river miles upstream and covering an area of about 10.8 square miles. Winchester Bay is also an important oversummering area for subadult and adult green sturgeon. Adult and subadult green sturgeon are more commonly captured in Winchester Bay than in Coos Bay. From February 2000 to February 2001, 126 green sturgeon were captured in Winchester

Bay and tissue samples collected (Rien *et al.,* 2000; Farr *et al.*, 2001). A large proportion of green sturgeon captured in Winchester Bay have been assigned to the Southern DPS based on genetic analyses (58%, or 62 fish, of 106 fish sampled (Israel and May, 2006). In addition, tagged Southern DPS subadults and adults were detected in the Winchester Bay in the 1950s (one green sturgeon, 117 cm TL, tagged in San Pablo Bay; Chadwick, 1959) and more recently in 2005 and 2006 (S. Lindley and M. Moser, NMFS, Unpublished, February 2008). Green sturgeon have been observed upstream of the head of the tide in Umpqua River, including one adult (1.8 m in length) caught at rkm 164 in April 1979 and two juveniles (about 10 cm in length) regurgitated from two smallmouth bass caught at rkm 134 in July 2000 (Biological Review Team (BRT), 2005). These green sturgeon are believed to belong to the Northern DPS. No green sturgeon were observed above tidal influence in the Umpqua River in sampling surveys conducted by the ODFW in 2002, 2003, and 2004 (BRT, 2005).

Several activities occurring in the bay could affect green sturgeon and their habitat including channel modifications/diking, road building (sedimentation), wetland filling and draining, other in-water construction or alterations (e.g., docks, marinas, stream channelization), urbanization (pollution and increased peak flows), NPDES activities and activities resulting in non-point source pollution (e.g., urbanization), and development and silviculture (loss of large woody debris and forest land cover).

Siuslaw River, OR (from the mouth to the head of the tide): The Siuslaw River estuary is located in Lane County on the Oregon coast. The estuary extends upstream to river mile 22.8 and is surrounded by wetlands. Little data exists on green sturgeon use of the Siuslaw River estuary. Green sturgeon adults and subadults are considered rare in the area (Emmett *et al.*, 1991). Northern DPS fish tagged in the Rogue River were detected in the Siuslaw River estuary in 2006, but no Southern DPS fish have ever been detected in the area (S. Lindley and M. Moser, NMFS, Unpublished, February 2008).

Alsea River, OR (from the mouth to the head of the tide): The Alsea River estuary is located near the city of Waldport in Lincoln County on the Oregon coast. The estuary is wide, extending upstream to river mile 11.5 and covering 0.8 square miles. Very little data exist on green sturgeon within the Alsea River estuary, though a report stating green sturgeon adults and subadults are rare in this area was prepared by Emmett *et al.* (1991).

Yaquina Bay, OR (from the mouth to the head of the tide): Yaquina Bay is a small bay located at the mouth of Yaquina River, near Newport in Lincoln County, Oregon. Yaquina Bay extends upstream to river mile 21.8 and covers 6.3 square miles. DPS differentiation has not been confirmed here. Green sturgeon are reported to be common in Yaquina Bay (Emmett *et al.*, 1991), most likely using the bay as oversummering habitat, though to a lesser extent than Winchester Bay and Coos Bay. From February 2000 to February 2004, 24 green sturgeon adults and/or subadults were captured by ODFW in Yaquina Bay and tissue samples collected (Rien *et al.*, 2000; Farr *et al.*, 2001; Farr and Rien, 2002; Farr and Rien, 2003; Farr and Kern, 2004; Farr and Kern, 2005). Green sturgeon have not been observed upstream of the head of the tide.

Tillamook Bay, OR (from the mouth to the head of the tide): Tillamook Bay is a small inlet located on the northern Oregon coast in Tillamook County. The head of the tide extends upstream into Kilchis River (up to river mile 2.0), Miami River (to rm 0.8), Tillamook River (to rm 6.0), Trask River (rm 4.3), and Wilson River (rm 3.1), and covers an area of 14.2 square miles. DPS differentiation has not been confirmed here. Green sturgeon are reported to be rare in Tillamook Bay (Emmett *et al.*, 1991). From February 2000 to February 2004, 9 green sturgeon adults and/or subadults were captured in sampling surveys by ODFW and tissue samples collected (Rien *et al.*, 2000; Farr *et al.*, 2001; Farr and Rien, 2002; Farr and Rien, 2003; Farr and Kern, 2004; Farr and Kern, 2005). Green sturgeon have not been observed upstream of the head of the tide.

Lower Columbia River and estuary (from the mouth upstream to Bonneville Dam (rkm 146), including tidally influenced waters of tributaries): The lower Based on CDFG tagging studies from September 1954 to October 1990, Southern DPS green sturgeon occupy the Columbia River estuary from July to December (n = 8 fish, 104 - 130 cm TL; CDFG, 2002). Southern DPS green sturgeon primarily aggregate in the estuary during the summer, with peak abundance in August (Adams *et al.*, 2002), presumably for optimization of growth, thermal refuge, and feeding. There is no evidence for spawning by green sturgeon within the Columbia River estuary, although at least one ripe adult was observed (WDFW, 2002, Letter to Ms. Donna Darm (5 pp., plus enclosures, 28 pp.), cited in Adams *et al.*, 2002).

Willapa Bay, WA (from the mouth to the head of the tide, including tidally influenced waters of tributaries): Willapa Bay is also recognized as an important oversummering habitat for green sturgeon. Willapa Bay is located north of the Columbia River on the south western Washington state coast, in Pacific County. Two main tributaries to Willapa Bay are Willapa River and Naselle River. The specific area covers 134.3 square miles and includes tidally influenced waters extending to river mile 10 on Naselle River. Willapa Bay is a very productive estuary with abundant food resources (e.g., burrowing shrimp, other benthic invertebrates) to support feeding by green sturgeon adults and subadults, based on gut content studies (Moser and Lindley, 2007; Dumbauld *et al.*, 2008) and anecdotal accounts. Green sturgeon are reported to be more common in Willapa Bay than white sturgeon (Emmett *et al.*, 1991). Historically, the largest harvests of green sturgeon were taken in Willapa Bay, numbering about 3,000 to 4,000 fish per year in the 1960s, but harvests have declined to few or none in recent years (WDFW, 2002, Letter to Ms. Donna Darm (5 pp., plus enclosures, 28 pp.), cited in Adams *et al.*, 2002). Large concentrations of green sturgeon aggregate in Willapa Bay in the summer months and occur from May to November (Adams *et al.*, 2002; Moser and Lindley, 2007), including both Northern DPS and Southern DPS fish. Genetic analyses indicate that a high proportion of green sturgeon within the estuary belong to the Southern DPS (75%, or 59 fish, of 79 fish sampled) (Israel and May, 2006). Green sturgeon are believed to optimize growth potential by foraging in the estuary (Moser and Lindley, 2007). Tagged green sturgeon from all spawning areas have been detected in Willapa Bay in 2002 – 2004 (S. Lindley and M. Moser, pers. comm. cited in BRT, 2005; Moser and Lindley, 2007). Tagged green sturgeon exhibited a high degree of intra-estuarine movement throughout Willapa Bay as well as inter-estuarine movement between Willapa Bay and the Columbia River estuary (Moser and Lindley, 2007).

Grays Harbor, WA (from the mouth to the head of the tide, including tidally influenced waters of tributaries): Like the Columbia River estuary and Willapa Bay, Grays Harbor provides important oversummering habitat for both Northern DPS and Southern DPS adult and subadult green sturgeon. Grays Harbor is an estuarine bay located in Grays Harbor County on the Washington state coast, north of Willapa Bay. Grays Harbor covers approximately 91.8 square miles. Green sturgeon have been detected at the mouth of the Chehalis River and at Sturgeon Landing, but not upstream of the head of the tide. The specific area thus includes tidally influenced waters extending upstream to river mile 33 on the Chehalis River, a tributary to Grays Harbor. PCEs present in this area include food resources, water flow, water quality, depth, and migratory corridors to support feeding, migration, and aggregation and holding by green sturgeon adults and subadults. Large concentrations of green sturgeon occur in Grays Harbor, with peak abundances in August (Adams *et al.*, 2002). Historically large numbers of green sturgeon were caught in tribal and commercial fisheries, totaling up to about 500 green sturgeon landed per year (WDFW, 2002, Letter to Ms. Donna Darm (5 pp., plus enclosures, 28 pp.), cited in Adams *et al.*, 2002). A large proportion of green sturgeon sampled were assigned to the Southern DPS, based on genetic analyses (~ 51%, or 35 fish, of 69 fish sampled) (Israel and May, 2006). The presence of Southern DPS fish has also been confirmed by tagging studies. One Southern DPS fish tagged in San Pablo Bay in October 1967 was recaptured in Grays Harbor on July 25, 1969 (Miller, 1972). In CDFG tagging studies from September 1954 to October 1990, 3 Southern DPS green sturgeon (106 – 127 cm TL) tagged in San Pablo Bay were recaptured in Grays Harbor in the commercial gill net fishery (CDFG, 2002). In 2006, several Southern DPS fish tagged in San Pablo Bay and the Sacramento River were detected in Grays Harbor (S. Lindley and M. Moser, NMFS, Unpublished, February 2008). Some individual green sturgeon spend the entire summer in Grays Harbor, whereas others move between estuaries. The estuary is believed to provide refuge and abundant food resources to support optimal growth potential in green sturgeon (Moser and Lindley, 2007).

Coastal Marine Waters

Subadult and adult green sturgeon s pend most of their lives inhabiting marine and estuarine waters from southern California to Alaska. The available data suggest that these are important habitats within which green sturgeon make seasonal, long-distance migrations most likely associated with foraging and aggregation areas along the coast. Green sturgeon primarilyoccur within the 110 m depth bathymetry (Erickson and Hightower, 2007). Green sturgeon tagged in the Rogue River and tracked in marine waters typically occupied the water column at 40 – 70 m depth, but made rapid vertical ascents to or near the surface, for reasons yet unknown (Erickson and Hightower, 2007).

Based on tagging studies of both Southern and Northern DPS fish, green sturgeon primarily spend their time in coastal marine waters migrating between coastal bays and estuaries, including sustained long-distance migrations of up to 100 km per day (S. Lindley and M. Moser, NMFS, pers. comm. cited in BRT, 2005) that are most likely driven by food resources. Some tagged individuals were observed swimming at slower speeds and spending long periods of time (on the order of days) within certain areas, suggesting these individuals were foraging (S. Lindley and M. Moser, NMFS, pers. comm., Febuary 2008). Tagged Southern DPS subadults and adults have been detected in coastal marine waters from Monterey Bay, CA, to Graves Harbor, AK, including the Strait of Juan de Fuca (Lindley *et al.*, 2008). Data on green sturgeon bycatch from NOAA's West Coast Groundfish Observer Program (WCGOP) confirm the presence of green sturgeon from Monterey Bay, CA, to Cape Flattery, WA, with the greatest catch per unit effort in coastal waters from Monterey Bay to Humboldt Bay, CA (West Coast Groundfish Observer

Program (WCGOP), NMFS, Unpublished, January 2002 to April 2007). It is important to note that several tagged Southern DPS green sturgeon have been detected off Brooks Peninsula on the northern tip of Vancouver Island, BC (Lindley *et al.*, 2008). Although WCGOP data were not available for bycatch of green sturgeon off southeast Alaska (green sturgeon were only captured in the bottom trawl fishery and bottom trawl fishing is prohibited off southeast Alaska), green sturgeon have been captured in bottom trawl fisheries throughout coastal waters off British Columbia (Lindley *et al.*, 2008), confirming that the distribution of green sturgeon extends north of Vancouver Island. Patterns of telemetry data, corroborated by the fisheries records, suggest that Southern DPS fish occupy oversummering habitats in coastal bays and estuaries in California, Oregon, and Washington and occupy overwintering grounds off central California (as far south as Monterey Bay) and in coastal waters between Vancouver Island and southeast Alaska (Lindley *et al.*, 2008).

Humboldt Bay, CA, to Coos Bay, OR (from the southern point at the mouth of Humboldt Bay to the southern point at the mouth of Coos Bay): Both subadult and adult green sturgeon occur within coastal marine waters from Humboldt Bay, CA, to Coos Bay, OR. These waters serve as a migration corridor for Southern DPS migrating north from Central Valley, CA, to Coos Bay and further north to oversummering and overwintering habitats. *Coos Bay, OR, to Winchester Bay, OR* (from the southern point at the mouth of Coos Bay to the southern point at the mouth of Winchester Bay): Southern DPS subadults and adults occur within coastal marine waters from Coos Bay to Winchester Bay, OR, during their migrations up and down the coast. From August 2001 to January 2007, 8 out of 406 green sturgeon incidentally caught on observed West Coast groundfish bottom trawl vessels were caught by vessels in the Charleston, OR, port group (J. Majewski, NOAA WCGOP, Personal commun., January 2007).
Winchester Bay, OR, to the Columbia River estuary (from the southern point at the mouth of Winchester Bay to the southern point at the mouth of the Columbia River estuary): Several records of green sturgeon within these marine waters indicate this area is important for migration. From February 2000 to February 2001, 4 green sturgeon of unknown DPS were captured for tissue sampling off of Newport, OR (Farr *et al.*, 2001). From August 2001 to January 2007, 9 green sturgeon were incidentally caught on observed West Coast groundfish bottom trawl vessels in the Astoria port group (n = 7 fish), Garibaldi (Tillamook) port group (n = 1 fish), and Newport port group (n = 1 fish) (J. Majewski, NOAA WCGOP, personal commun., January 2007). Southern DPS fish migrating between San Pablo Bay and Winchester Bay, the Columbia River estuary, and other coastal waters as described above migrate through this area.
Columbia River estuary to Willapa Bay, WA (from the southernmost point at the mouth of Columbia River estuary to the southernmost point at the mouth of Willapa Bay): Tracking of tagged green sturgeon indicated substantial exchange of green sturgeon between the Columbia River estuary and Willapa Bay (WDFW, 2002, Letter to Ms. Donna Darm (5 pp., plus enclosures, 28 pp.), cited in Adams *et al.*, 2002; Moser and Lindley, 2007). In 2004, 8 green sturgeon were detected in both Willapa Bay and the Columbia River estuary over the summer (Moser and Lindley, 2007). In addition, several green sturgeon tagged in the Columbia River estuary were detected in Willapa Bay (Moser and Lindley, 2007). Thus, the coastal marine waters between the two estuaries are an important migratory corridor for these inter-estuarine exchanges

Willapa Bay, WA, to Grays Harbor, WA (from the southernmost point at the mouth of Willapa Bay to the southernmost point at the mouth of Grays Harbor): As described in the previously, Southern DPS subadults and adults tagged in San Pablo Bay and Sacramento River occupy these coastal marine waters in their migrations to and from Willapa Bay and Grays Harbor.
Grays Harbor, WA, to the Washington-U.S./Canada border (from the southern point at the mouth of Grays Harbor, WA, to the Washington-U.S./Canada border): From August 2001 to January 2007, 1 green sturgeon of unknown DPS was incidentally caught on an observed West Coast groundfish bottom trawl vessel that was part of the Westport port group (J. Majewski, NOAA WCGOP, Personal commun., January 2007). In 2004 and 2005, Southern DPS fish tagged in San Pablo Bay were detected at Cape Elizabeth on the Washington state coast (Lindley *et al.*, 2008). Southern DPS subadults and adults migrate through coastal marine waters off of Washington state on their way to and from Grays Harbor, the Strait of Juan de Fuca, and overwintering sites off of Vancouver Island, British Columbia (Lindley *et al.*, 2008).
Other Affected Species- Biological and Physical Environment
In addition to green sturgeon located within the study region, a wide variety of non-target species could be found within the action area, including other marine mammals, sea turtles, invertebrates, teleost and elasmobranch fish, and sea birds. Since merely being present within the action area does not necessarily mean a marine organism will be affected by the proposed action, the following discussion focuses not only on the distribution and abundance of various species with respect to the timing of the action, but also on whether and by what means the proposed research activities may affect the non-targeted species. Due to the nature of netting, the researchers would expect to have some non-target species interactions, including interactions with listed species.

ESA Listed Species- Salmon

Lower Columbia River Chinook
This Evolutionary Significant Unit (ESU) includes naturally spawned populations of spring and fall chinook (*Oncorhynchus tshawytscha*) in the Columbia River Basin and tributaries from the mouth of the Columbia River up to a transitional line above the Hood River and (Big) White Salmon River. This ESU includes the Willamette River to Willamette Falls, Oregon, exclusive of spring-run Chinook salmon in the Clackamas River. The Lower Columbia River Chinook ESU was listed under the ESA as threatened, effective March 24, 1999 (64 FR 14308, 24 March 1999; 70 FR 37160, 28 June 2005).

Spring Chinook salmon enter the lower Columbia River during mid-February to late-March. The larger Age-5 fish dominate the earlier portion of the run. The bulk of the spring Chinook are from the Willamette River (not part of the Lower Columbia River Chinook ESU).

Fall Chinook generally enter the Columbia River from late July through October, peak in the lower river from mid-August to mid-September. Columbia River fall Chinook are comprised of five major components; Lower River Hatchery (LRH), Lower River Wild (LRW), Bonneville Pool Hatchery (BPH), Upriver Brights (URB), and Mid-Columbia Brights (MCB). The LRH and BPH stocks are referred as tules and the LRW, URB, and MCB are referred to as brights. Minor run components include Lower River Brights (LRB) and Select Area Brights (SAB). The Lower Columbia Evolutionary Significant Unit (ESU) includes naturally spawning fish in the LRH and LRW management groups.

There appear to be three self-sustaining populations of fall Chinook in the lower Columbia River basin that have had little or no hatchery influence (Coweeman, East Fork Lewis, and Sandy rivers). Ocean distribution of tule fall Chinook (LRH) is primarily off the Washington coast. LRH hatchery stock return to the Columbia River in August and early September and mature soon after freshwater entry. Peak spawning time is in late September and early October.

The LRW management stock is comprised of wild/naturally-produced fish from the North Lewis, East Fork Lewis, and Sandy rivers (brights). These populations are self-sustaining with no significant hatchery influence. Ocean distribution of LRW fall Chinook is more northerly and they contribute to Canadian and Alaskan fisheries. LRW fall Chinook return to the Columbia River from August through December, with peak spawning in mid-November.

Chinook are the largest species of Pacific salmon (adults returning to the Columbia River in August average over 20 pounds). They have a moderately compressed elongated body, with the widest girth around the tips of the pectoral fins. Head length is about 3.7 into standard length (Hart ,1973). Large mesh-sizes are used to target Chinook, while allowing escapement of smaller salmonids.   For example, recent August and Late Fall Non-Indian Commercial Gillnet seasons in the lower Columbia River have used a minimum of 9 inches and a maximum of 9-3/4 inches mesh size.

Chinook adults appear to favor the top of the water column during the late flood stage and the bottom of the water column during ebb tides, but are found throughout the water column. (Vertical distributions are based on Bernhardt et al.'s (1969) gillnet selectivity studies, at Astoria and Vancouver sites in the lower Columbia River).

Upper Willamette Spring Chinook

The Willamette River spring Chinook salmon pass through the lower Columbia River from February through May, with peak abundance during mid-March to mid-April. Historically, wild spring Chinook salmon spawned in nearly all east side Willamette tributaries above Willamette Falls. During the 1950s and 60s, dams were constructed on all these tributaries. The wild run has been supplemented with hatchery fish, and currently the percent of wild fish in the current Willamette spring Chinook population is about 10-12%, with the majority destined for the McKenzie River.

NMFS classified spring Chinook salmon destined for the Willamette Falls and the Clackamas River (below the falls) into a single, and listed the wild component as a threatened species under the ESA, effective May 24, 1999 (64 FR 14308, 24 March 1999; 70 FR 37160, 28 June 2005). Returns of the component spawning above Willamette Falls (mostly comprised of hatchery fish) improved (2004 being a record return of 143,700 fish), but fell far short of the Willamette Basin Fish Management Plan objective of 100,000 fish during the past two years. Projections for 2007 forecast a return of 52,000 to the Columbia River mouth, with 10% (5,200 fish) being wild. Returns of Clackamas River component has averaged about 15,000. About 16% (1,600 fish) of the run is wild.

Upriver Spring Chinook

Mature spring chinook salmon, destined for watersheds above Bonneville Dam (Rkm 233), enter the Columbia River in late February and early March, reaching peak abundance in the lower river during April and early May, and clearing Bonneville Dam by mid June. The upriver run is composed of stocks from three geographically separate production areas: 1) the Columbia River system above the confluence with the mouth of the Snake River, 2) the Snake River system, and 3) Columbia River tributaries between Bonneville Dam and the Snake River confluence. The Snake River component (also see next section) was listed as threatened effective May 22,1992 (57 FR 14653, 22 April 1992; 57 FR 23458, 3 June 1992; 70 FR 37160, 28 June 2005), and the upper Columbia wild spring Chinook listed as endangered effective May 24, 1999.

The 1995 run marked an all-time low of 12,600 fish. The 2000-2004 run sizes were large with an annual average return of 283,900 adults to the Columbia River. An all-time record high of 437,900 fish was reached in 2001; however the run sizes have declined since that peak. The 2007 forecast of 78,500 adult upriver spring Chinook returning to the Columbia River, includes 1,200 wild upper Columbia spring Chinook.

Snake River Sockeye Salmon
Historically, eight tributary lake systems produced sockeye salmon (*Oncorhynchus nerka*) in the Columbia Basin. Six decades of hydropower development, has blocked access to 96% of the critical lake habitat (in terms of surface acreage). Today, modest returns occur in the Wenatchee and Okanogan subbasins, and extremely low numbers return to the Snake subbasin (WDFW and ODFW 2002). In 1991, the Snake River sockeye salmon were listed under the ESA as endangered (November 20, 1991, 57 FR 58619; effective December 20, 1991). The five-year average return to the Stanley Basin is 12 adult sockeye. Only 3 returned in 2006. During some years in the 1990s, no fish returned. In order to prevent extinction of the Snake River sockeye, a captive brood program was initiated.

Columbia River sockeye fisheries were closed from 1989 through 1999. Large returns in 2000 and 2001 allowed managers to open limit commercial, tribal, and recreational fisheries in the Columbia River. To avoid harvest of Snake River sockeye, fishers were not allowed to retain adipose fin-clipped fish (from the captive brood program). This preventive measure did not work as well as expected, because some fishers thought clipped fish were to be retained—traditionally fin-clipped (hatchery) fish are keepers, and unmarked (wild) fish are thrown back (personal communication, Lisa Harlan, Pacific States Marine Fish Commission, now with Smith-Root). The 2007 forecast for sockeye to the Columbia River is 27,300 adults. The Snake River component is forecast to be 300 fish. That would be the largest run since 2000.

Weighing only 4 pounds on average, Columbia River sockeye are the smallest of their kind in North American (WDFW and ODFW 2002). They have an elongated body that is moderately compressed, with the widest girth at the origin of the dorsal fin. The head length is about 4.5 into the standard length (Hart, 1973). Because of their small size, sockeye are able to escape capture in large mesh gillnets. Smaller mesh sizes are used to target sockeye (e.g., there was a 4-1/2 inch maximum mesh size restriction in the 2000 Columbia River Non-Indian Commercial Sockeye Fishery).

Ozette Lake Sockeye Salmon
Lake Ozette, along the north coast of the Olympic Peninsula, supports a small run of sockeye salmon. That run of sockeye was listed under the ESA as endangered in 1999 (64 FR 14528, 25

March 1999; 70 FR 37160, 28 June 2005). The Ozzette Lake Sockeye ESU includes all naturally spawned populations of sockeye salmon in Ozette Lake and the streams and tributaries flowing into Ozette Lake. It also includes fish from the Umbrella Creek and Big River sockeye hatchery programs.

Snake River Fall Chinook Salmon
Snake River fall Chinook salmon were listed under the ESA as threatened (April 22, 1992, 57 FR 14653; effective May 22, 1992), but their status was revised effective August 18, 1994 to endangered through an emergency interim rule (59 FR 42529, 18 August 1994; also see, 57 FR 23458, 3 June 1992, and 70 FR 37160, 28 June 2005).

The Columbia River fall gillnet fishery is split into an early fall (August) season and a late fall (mid- or late-September through October) season (Figure 12 in WDFW and ODFW 2002). Fall Chinook are landed mainly during the early fall, while coho (*Oncorhynchus kisutch*) are caught in the late fall season (Bernhardt *et al*. 1969). During the early to mid-September timeframe, early coho and fall Chinook salmon are intermingled in the lower Columbia River (Langness 1992). Bernhardt et al. (1969) suggested that restricting fishing gear to small mesh single wall gillnets would increase the coho harvest while protecting fall Chinook, particularly the large females. Subsequently, stretch mesh size restrictions have been imposed in the late fall, whenever it was desirable to harvest surplus coho but limit the Chinook take (for example in 2000; Table 7 of WDFW and ODFW 2002).

Lower Columbia River Coho Salmon
Coho salmon (*Oncorhynchus kisutch*) return to the Columbia River from August through November. The run consists of two components—early coho stock returns peak in early September, and late coho stock returns peak in mid-October. The major contributor of both stocks is hatchery production with wild production probably comprising less than 10% of the total run. Oregon facilities dominate the hatchery component in the early run. Fish from the Clackamas and Sandy rivers are the main components, since stocks below the Willamette River confluence are extirpated (WDFW and ODFW 2002).

In 1990, the wild portion of the coho salmon run from the Columbia River and its tributaries (exclusive of the Willamette River) downstream of Bonneville Dam, was petitioned for listing as threatened or endangered. NOAA Fisheries did not list these fish, because the small remnant runs are predominately hatchery-maintained and are not a species as defined in the ESA. In 1995, NOAA Fisheries combined the Columbia River (including the Willamette River), Willapa Bay, and Grays Harbor coho into the single Lower Columbia River/Southwest Washington Coast ESU, and identified it as a candidate species, worthy of further consideration (July 25, 1995; 60 FR 142). In July 1999, the State of Oregon listed wild coho salmon destined for lower Columbia River tributaries as endangered under their state ESA. In 2000, NOAA Fisheries accepted another petition to federally list lower Columbia River coho, and found that there was insufficient evidence to support emergency listing (November 3, 2000; 65 FR 214). Eventually, all coho salmon spawning naturally from the mouth of the Columbia up to and including the White Salmon and Hood rivers were listed under the ESA as threatened, effective August 26, 2005 (70 FR 37160, 28 June 2005).

Coho are a modest-sized species of Pacific salmon (adults returning to the Columbia River average around 6.5 pounds for early coho and 8.5 pounds for late coho). They have a moderately compressed elongated body, with the widest girth around the tips of the pectoral fins. Head length is about 3.4 into standard length (Hart, 1973). In recent years, a maximum 6-inch stretch mesh size has been used to select coho during periods of low Chinook abundance (e.g., during the 2000 late fall non-Indian commercial fishery in the lower Columbia River; WDFW and ODFW 2002).

Coho appear to be at the top or the bottom of the water column during the late flood stage in the Columbia River estuary (near Astoria). During ebb tides, they appear to remain on the bottom. This is true in deeper waters upriver (near Vancouver), but there is some distribution throughout the water column in this situation (vertical distributions based on gillnet selectivity studies by Bernhardt *et al*. 1969).

Columbia River Chum
Chum salmon (*Oncorhynchus keta*) return to the Columbia River from mid-October through mid December. A few are caught incidentally in the late fall non-Indian commercial gillnet fishery, with landings occurring after mid-October. Primary production areas include the Grays River, smaller tributaries just downstream from Bonneville Dam, and the mainstem Columbia River in select locations from the I-205 Bridge upstream to Bonneville Dam. Currently there are two hatchery supplementation programs releasing fry in these areas. Columbia River chum salmon were listed under the ESA as a threatened species effective May 24, 1999 (64 FR 14508, 25 March 1999; 70 FR 37160, 28 June 2005).

Winter Steelhead
Winter steelhead (*Oncorhynchus mykiss*) enter the Columbia River from November through May. All wild winter steelhead in the proposed study area are listed under the ESA as threatened (since 1999), except those within the Southwest Washington ESU (listing not warranted; see steelhead listing review 71 FR 834 dated 5 June 2006).

The non-listed Southwest Washington ESU includes all naturally spawned populations of winter-run steelhead in river basins of, and tributaries to the Columbia River below the Cowlitz River in Washington and the Willamette River in Oregon. The Southwest Washington ESU also includes all winter-run steelhead in river basins of Grays Harbor and Willapa Bay.

The other Columbia River winter steelhead are part of the Upper Willamette River Steelhead ESU, Lower Columbia River Steelhead ESU, or the Middle Columbia River ESU. The Upper Willamette River ESU steelhead are all winter-run, while the other two ESU are a mix of summer-run and winter-run steelhead. The Upper Willamette River ESU fish spawn in the tributaries from Willamette Falls up to and including Calapooia River. The Lower Columbia River ESU fish spawn in Washington tributaries between the Cowlitz and Wind rivers, inclusively. They also spawn in Oregon tributaries between the Willamette and Hood rivers, inclusively (except upper portion of Willamette is separate ESU). The Middle Columbia River ESU covers fish spawning from Mosier Creek, Oregon, upstream to Yakima River, Washington, inclusively. There are 16,200 wild winter-run steelhead (listed and non-listed ESU) expected in the Columbia River during 2007.

Summer Steelhead

The Columbia River summer steelhead run is comprised of populations from lower and upper river tributaries. Summer steelhead enter freshwater year-round, with the majority entering from June through October. The lower river component of the run tends to arrive earlier than the upriver stocks, with abundance peaking in the estuary during May and June. The lower Columbia River steelhead ESU was listed as threatened by NMFS in 1998. Wild lower river summer steelhead are present in the Cowlitz, Kalama, Lewis, Wind, and Washougal rivers in Washington, and the Hood River in Oregon. The upper river component passes Bonneville Dam with a peak in early August (Group A Index; fish less than 78 cm fork length passing Bonneville dam from July 1st through October 31st) and a second peak in mid-September (Group B Index; larger fish destined for Snake River tributaries; fish greater than or equal to 78 cm fork length that pass Bonneville Dam from July 1st through October 31st). Fish passing Bonneville Dam during April 1st and June 30th are considered to be Skamania Index (primarily fish originating from the hatchery transplants above Bonneville Dam of lower river hatchery fish). NMFS divided the upriver summer steelhead run into three ESU: the middle Columbia ESU listed as threatened; the upper Columbia ESU (including the hatchery component) listed as endangered and later downgraded to threatened, and the Snake River ESU (including both Group A and B fish) listed as threatened (see steelhead listing review 71 FR 834 dated January 5, 2006). The summer steelhead run at Bonneville is expected to hit 241,500 (41,600 wild) Group A Index steelhead, and 56,400 (56,400 wild) Group B Index steelhead.

Southern Oregon/Northern California Coast Coho ESU
Listed as threatened on May 6, 1997. The ESU includes all naturally spawned populations of coho salmon in coastal streams between Cape Blanco, Oregon, and Punta Gorda, California, as well as three artificial propagation programs in the Cole River Hatchery (ODFW stock #52), Trinity River Hatchery, and Iron Gate Hatchery.

Oregon Coast Coho ESU
Listed as threatened with critical habitat designated on February 11, 2008. The ESU includes all naturally spawned populations of coho salmon in Oregon coastal streams south of the Columbia River and north of Cape Blanco, including Cow Creek (ODFW stock #37) coho hatchery. program.

Snake River Spring/Summer-run Chinook ESU
Listed as threatened on April 22, 1992. The ESU includes all naturally spawned populations of spring/summer-run Chinook salmon in the mainstem Snake River and the Tucannon River, Grande Ronde River, Imnaha River, and Salmon River subbasins, as well as fifteen artificial propagation programs: the Tucannon River conventional Hatchery, Upper Grande Ronde, Imnaha River, Big Sheep Creek, McCall Hatchery, Johnson Creek Artificial Propagation Enhancement, Lemhi River Captive Rearing Experiment, Pahsimeroi Hatchery, East Fork Captive Rearing Experiment, West Fork Yankee Fork Captive Rearing Experiment, and the Sawtooth Hatchery spring/summer-run Chinook hatchery programs.

ESA Listed Species- Marbled Murrelet

The Marbled Murrelet (*Brachyramphus marmoratus*) was listed as a threatened species pursuant to the ESA on October 1, 1992 (57 FR 191: 45328-45337, 1 October, 1992). The adults spend most of their time feeding in shallow areas, and within 1 to 2 kilometers offshore. They are usually sighted in pairs, but do aggregate in foraging areas during the summer and winter. Nesting occurs in coastal old growth forests. The breeding periods of incubation and rearing run from April through June. Juvenile birds begin to appear on the water shortly afterwards. By July, many of the chicks are fledgling (Speich *et al*. 1992).

From 1971 through 1985, several field studies observed a total of 500 Marbled Murrelets along the southern outer coast of Washington (Speich and Wahl 1989, and Speich *et al*. 1992). Marbled Murrelets were consistently observed in Grays Harbor Channel as well as near shore off Grays Harbor, and south to the Columbia River. There were no systematic surveys conducted within Grays Harbor or Willapa Bay, although Marbled Murrelets were observed in small numbers at the mouth of the Naselle River (south end of Willapa Bay) and near the north end of Grassy Island, near Leadbetter Point (north end/ mouth of Willapa Bay).

Alcid mortality was estimated for a gillnet sockeye fishery in Barkley Sound, British Columbia, by Carter and Sealy (1984). During their study, Marbled Murrelets were observed in small flocks landing or resting near gillnets. The birds were observed diving in the immediate proximity of nets, perhaps attracted to the presence of small fish that may congregate along the net wall. Marbled Murrelets were taken in gillnets almost exclusively at night (apparently associated with nocturnal feeding trips during the breeding period). Carter and Sealy (1984) stated that fewer birds would have been killed later in the summer, because murrelets are distributed in small and widely scattered flocks while molting.

Ainley *et al.* (1981) tested a variety of mesh sizes ranging from 37 mm (1.5 inches) to 233 mm (9.2 inches) and recorded their entanglement rates with seabirds. The highest entanglement rate occurred with mesh sizes from 106mm (4.2 inches) to 130mm (5.1 inches), which was significantly higher than the other three classes that were compared.

ESA and/or MMPA Listed Species- Marine Mammals

Pacific Harbor Seal
Since enactment of the Marine Mammal Protection Act of 1972, northwest populations of Pacific harbor seals (*Phoca Vitulina*) have steadily increased. They are now considered by NMFS to be healthy, productive, and growing. Harbor Seals are opportunistic feeders, preying on a wide variety of cephalopods (squid and octopus), and benthic and epibenthic fish. Their diet varies as they take advantage of food that is seasonally and locally abundant (NMFS 1997). In the Washington outer coastal estuaries and Columbia River, harbor seals have been found to feed primarily on eulachon (*Thaleichthys pacificus*), other smelt (*Osmeridae spp.*), northern anchovy (*Engraulis mordax*), Pacific herring (*Clupea pallasi*) codfish (*Gadidae spp.*), flatfish, crustaceans, lamprey (*Lamptera spp.*), and staghorn sculpin (*Leptocottus armatus*). Generally, harbor seals do not feed on salmonids as frequently as California sea lions (*Zalophus californianus*). When abundant, salmonids can be a significant portion of harbor seal diet as well (up to 60% in some samples; NMFS 1997, and Emmett 1997). Sturgeon are not identified as part of the harbor seal diet (for example in NMFS 1997). The lack of sturgeon in the harbor seal diet may be due to the lack of bony parts that can be used to identify sturgeon in the scat or stomach content analyses. However, the coinciding presence of other food sources that are more palatable than the “armored” sturgeon, may be the main reason they are not found in the diet. Only younger sturgeon would be potential prey, as the older sturgeon would be too big for a

harbor seal to handle.

California Sea Lion
Since enactment of the Marine Mammal Protection Act of 1972, northwest populations of Pacific harbor seals (*Phoca Vitulina*) have steadily increased. They are now considered by NMFS to be healthy, productive, and growing (Emmett 1997). California sea lions are opportunistic feeders, preying on a wide variety of fish and squid. Their diet is diverse, varying by location as well as seasonally and annually. During the non-breeding season, sea lions move into specific areas in response to local abundance of prey (NMFS 1997). In the Columbia River, they feed primarily on eulachon, rockfish (*Sebastes spp.*), Pacific herring, lamprey, and Pacific sand lance (*Ammodytes hexapterus*) (Brown et al. 1995). Never the less, salmonids may contribute substantially to the sea lion diet at specific times and locations (Roffe and Mate 1984, NMFS 1997). Based on studies along the Oregon and California coasts (Riemer and Brown 1996), Pacific mackerel (*Scomber japonicus*), cephalopods, codfish, skates (*Rajidae spp.*), and spiny dogfish are also significant parts of the sea lion diet that may show up in the Washington outer coastal estuaries. During the late winter/early spring of 2006 and 2007, California sea lions have been observing the behavior of the larger Steller sea lions below Bonneville Dam. They now prey on smaller sturgeon (under 5 feet in length), and consume larger sturgeon killed by the Steller sea lions.

Steller Sea Lion eastern DPS
The eastern DPS Steller sea lion is found from Southeast AK to Central California. Although this DPS has been doing well it is still listed as threatened under the ESA. Stellers breed and use haulouts in Oregon and only use haulouts in WA. Beach et al. (1985) obtained gastrointestinal tract samples from beach-cast specimens in the Columbia River, year-round for 1980 and 1981. Prey included Pacific Whiting (*Merluccius productus*), rockfish, eulachon, anchovy, Pacific herring, staghorn sculpin and lamprey. Salmonid consumption is suspected to be low, based on studies in the Rogue River (Roffe and Mate 1984) and the southern Oregon coast (Riemer and Brown 1996). On December 25, 2005, Steller sea lions were first seen preying on white sturgeon (3 to 9.5 feet in length) below Bonneville Dam. The massive size of the Steller sea lions allows them to take on these large fish. The attack upon sturgeon broodstock has continued and increased. NMFS has allowed the harassment of Steller sea lions and California sea lions in the lower Columbia River during the late winter/ early spring of 2007, but primarily for the purpose of protecting ESA-listed salmon and steelhead stocks.

Gray Whales
Grays (*Eschrichtius robustus*) are baleen whales. These large whales (39-46 feet long) migrate from their Arctic feeding grounds to their Mexican breeding areas, passing the Washington and Oregon coast between October and February heading south, and returning north between February and July. The species is usually seen over the continental shelf, about a mile off shore. They are bottom feeders that filter the sediment in relatively shallow waters, so they sometimes wander into saline coastal inlets and bays (e.g., Grays Harbor, Willapa Bay, and Puget Sound).

The NMFS recognizes two populations in the Pacific Ocean—the Western North Pacific or “Korean” stock that apparently breeds off the coast of Eastern Asia, and the Eastern North Pacific stock that breeds along the west coast of North America.

Since the International Whaling Commission (IWC) gave them partial protection in 1937, and full protection in 1947, recovery of the Eastern North Pacific Gray whale has been significant. NMFS removed the Eastern North Pacific Gray whale stock from the List of Endangered and Threatened Wildlife and Plant on 16 June 1994. As required by the ESA, NMFS monitored the status of this stock for 5 years following delisting. A workshop, convened by NMFS in 1999, reviewed the status of the Eastern North Pacific Gray whale stock, and determined that the stock was neither in danger of extinction, nor likely to become endangered within the foreseeable future (Rugh et al. 1999). While no longer an ESA-listed species, Eastern North Pacific Gray whales remain protected under the MMPA. The Western North Pacific Gray whale (not off Washington and Oregon) remains listed under the ESA as endangered, effective 1970.

Humpback Whales

Humpback Whales (*Megaptera novaeangliae*) are rorquals, measuring between 40-50 feet as adults. Humpbacks follow regular migration routes, summering in temperate and polar waters for feeding (North American west coast), and wintering in tropical waters for mating and calving (Hawaii). Because their feeding, mating, and calving grounds are close to shore, and because they are slow swimmers, the humpback whales were easy targets for early whalers. Despite depleted numbers, they continued to be processed well into the 20th Century (until 1965 in British Columbia; NMFS 1991). From 1913-1919, humpback whales were landed at the whaling station located in Bay City, Washington (Grays Harbor). Landings took place from April through October, with most brought in during June through August (Scheffer and Slip 1948). Sightings of humpback whales are less frequent in the waters of the Pacific Northwest (British Columbia, Washington, and Oregon) than in Central California and Southeast Alaska. None-the-less, humpbacks have been recorded recently in Pacific Northwest waters during every month except February, March, and April.

Currently under the MMPA, humpback whales are considered depleted. They are also listed under the ESA as threatened throughout their whole range, effective June 2, 1970 (35 FR 8491; which predates the 1973 ESA).

Killer Whales

The NMFS Biological Review Team (BRT) concluded that there were two distinct population segments (DPS) to the resident killer whale subspecies: a Northern Resident DPS; and, a Southern Resident DPS (Krahn et al. 2004). The Southern Resident DPS was classified as depleted under the MMPA in May 2003 (68 FR 31980), and listed under the ESA as endangered on November 18, 2005 (70 FR 69903).

Individuals and pods of Southern DPS resident killer whales have been sighted from Central California up to the Queen Charlotte Islands in northern British Columbia. In the winter months, the Southern DPS killer whales are found in the coastal waters. From late spring to early fall, the Southern Resident DPS pods are found in the Georgia Basin (Georgia Strait, San Juan Islands, and Strait of Juan de Fuca), with the K and L pods arriving in May-June and departing in October-November. However, during this season these pods make frequent short trips out to the Washington coast. Fish are the main diet of resident killer whales, especially salmon. These movements to the coast might be associated with the arrival of salmon. NMFS reports several sightings of these Southern Resident DPS pods off the three main coastal estuaries (Grays Harbor, Willapa Bay, and Columbia River), during March-April and September-October (corresponding to the bimodal peaks in salmon runs entering these estuaries).

ESA Listed Species- Sea Turtles

Leatherback sea turtles, listed as endangered in 1970 (35 FR 8491), arrive in the waters of Oregon and Washington in the summer coincident with seasonal migrations of jellyfish (Shenker 1984, Suchman and Brodeur 2005). While rarely encountered, these turtles can be found nearshore in the sampled areas. Loggerhead sea turtles, even more rare in the area, may also be present (B. Schroeder, April 2010, pers. comm.).

Critical Habitat

Species with designated critical habitat within the sampling areas include Chinook salmon, chum salmon, coho salmon, Steller sea lions, and green sturgeon. The action also occurs in the areas proposed as critical habitat for leatherback sea turtles on January 5th, 2010. Maps of the specific proposed or designated critical habitat areas can be found at: http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm.

Essential Fish Habitat (EFH)

Congress defined essential fish habitat for federally managed fish species as "those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). As such, EFH varies by species, geographic location, life stage, etc. A description of specific designated EFH for species within the action area can be found at: http://www.nmfs.noaa.gov/habitat/habitatprotection/profile/htm

Non-Target Non-Listed Species

Other species that may be captured include white sturgeon, summer Chinook, summer steelhead, spiny dogfish, seven-gill sharks, crescent gunnels, starry flounder, Dungeness crab, rock crab, cockles, and oyster species.

CHAPTER 4 - ENVIRONMENTAL CONSEQUENCES

4.1 ALTERNATIVE 1: No Action

An alternative to the proposed action is no action, i.e., denial of the grant. This alternative would eliminate any potential risk to the environment from the proposed research activities. However, the no action alternative would not allow research to be conducted and would deny the opportunity to benefit from both the research and management pursued in this proposal.

4.2 ALTERNATIVE 2: Issue grant with standard conditions

Any impacts of the proposed action would be limited to the biological and physical environment. The impacts of the boating activities, netting, or affixing transmitters would have negligible impacts on the physical environment. Sample collections and fish handling would be conducted by trained personnel according to standard scientific protocols. The type of actions proposed in this grant application would be unlikely to adversely affect the socioeconomic or physical environment or pose a risk to individual and/or public health or safety. There are no significant social or economic impacts of the proposed action interrelated with significant natural or physical environmental effects.

Green Sturgeon Interactions

Capture

Gill netting techniques, while potentially lethal for many species of fish, are somewhat safer for sturgeon. However, given the implications of water temperature and DO, both soak times and mesh size are important factors considered for safely capturing and sampling sturgeon. The mesh size and 30 minute soak times are appropriate for green sturgeon and should not cause undue injury or stress. The applicant would never leave the nets unattended while sampling, reducing the stress time on sturgeon. It is more difficult to directly assess the extent of any delayed mortality of sturgeon that may occur after individuals are released from gill nets. In the current "Fisheries BiOp" for the Columbia River (accessible at https://pcts.nmfs.noaa.gov/pls/pcts-pub/pcts_upload.summary_list_biop?p_id=107547), the estimated handling mortality is 5.2%. That is a conservative value, because the assumption was made that a green sturgeon that did not swim off immediately upon release was a not going to survive. The applicant expects a much lower handling mortality rate. Not all green sturgeon encountered are going to be of southern DPS origin. In the Columbia River and Willapa Bay, the applicant expects that 80% of fish would be from the southern DPS. Grays Harbor and Winchester Bay are about 50% southern DPS, which would be a reasonable estimate for other Oregon estuaries except for the Rogue River (a natal stream for the Northern DPS). These estuary stock compositions were developed through work done in cooperation with UC Davis GVL (Israel et al. 2006, and Israel and May 2007). To limit stress and mortality of sturgeon due to capturing with gill nets dissolved oxygen would also be measured prior to each net set to ensure that at least 5.0 mg/L concentration is maintained.

Fish Sampling and Handling

The handling, measuring, and weighing procedures are simple and not invasive and NMFS expects that individual sturgeon would normally experience no more than short-term stresses as a result of these activities. No injury is expected from these activities, and sturgeon would be worked up as quickly as possible to minimize stresses resulting from their capture. The applicant would also be required to follow procedures designed to minimize the risk of either introducing a new pathogen into a population or amplifying the rate of transmission from animal to animal of an endemic pathogen when handling animals. These activities would not injure or compromise the animal and would not add appreciably to the stress the animal would experience during capture and other activities discussed here.

The applicant proposes to take a small non-deleterious pelvic tissue sample which has the possibility to impact the fishes ability to swim. The procedure is common and accepted practice in sturgeon permits and does not impair the sturgeon's ability to swim and is not thought to have any long-term impact (Moser *et al*. 2000).

The applicant proposes to use PIT tags which could cause stress during restraint and minor wounds from attachment. A 12.50 x 2.07 mm 134.2 kHz ISO tag (Biomark's TX1411SST or earlier equivalent) PIT tag would be injected posterior to the dorsal fin using a sterilized hypodermic needle. The attachment and retention of PIT tags is not known to have any other direct or indirect effects on green sturgeon. As such, the tagging of green sturgeon PIT tags is unlikely to have any significant impact on the reproduction, numbers, or distribution of green sturgeon in the proposed action areas.

The applicant also requests the use of internally implanted transmitters that could cause pain and discomfort to the fish, as well as cause infection. To address these concerns, the researchers propose to use the best management practices as endorsed by NMFS in the sturgeon Protocol (Moser *et al.* 2000). Only fish in optimal conditions would be internally tagged. Fish would not be anesthetized and held for a short period of time for recovery. Moreover, implanting transmitters would only be attempted when fish are in excellent condition and would not be attempted on pre-spawning fish in spring or fish on the spawning ground, nor if the water temperature exceeds 27° C to reduce handling stress, or is less than 7° C as incisions do not heal rapidly in lower water temperatures. To ensure normal mobility and swimming behavior of the juvenile sturgeon receiving internal transmitters, the total weight of all transmitters and tags would not exceed 2% of the weight of the fish.

The gill filament sampling may have adverse impacts on the 30 fish that would be tested, although no major impacts are anticipated. A 4 mg sample would constitute less than 0.08% of the weight of one gill arch. Tests done during 2009 on white sturgeon proved that this procedure could be done with insignificant blood loss. About two dozen samples were then taken from green sturgeon in 2009, with similar success (Olaf Langness, March 2010, pers. comm.). This procedure would not adversely impact green sturgeon and sampling would cease if there was an observed mortality.

Although more invasive surgical procedures are required for internal implantation, this tagging procedure provides greater retention rates than external attachment. In general, adverse effects of the proposed tagging procedure could include pain, handling discomfort, hemorrhage at the site of incision, risk of infection from surgery, affected swimming ability, and/or abandonment of spawning runs. However, using proper sterilized conditions, and the surgical techniques would minimize or eliminate potential short-term adverse effects from tagging and greatly lower the risk of injury and mortality. NMFS expects the tagging would result in no more than short-term stress to the animal. These practices would minimize or eliminate potential short-term adverse effects from tagging and greatly lower the risk of injury and mortality.

Many fish have sensitivity to sound energy from 200 Hz up to 800 Hz, some species are able to detect lower frequency sounds (Popper 2005). The frequency of the acoustic tags used in the research (69 kHz) is well above the hearing threshold and would be inaudible to most fish.

All of these activities are minimally intrusive with respect to habitat and are of short duration. They are not likely to have an adverse impact on habitat in the action area and thus would not jeopardize any of the listed fish by reducing the ability of that habitat to contribute to their survival and recovery. The primary effects the proposed activities would have on the threatened species will be direct impacts arising from intentional "take," a major portion of which takes the form of harassment. Harassment generally leads to stress and other sub-lethal effects and is caused by capturing and handling fish.

The following subsections describe the types of activities being proposed. The activities would be carried out by trained professionals using established protocols and have widely recognized specific impacts. No researcher would be authorized unless their activities incorporate NMFS' uniform, pre-established set of mitigation measures.

Salmon Interactions

Salmon and steelhead could be injured in nets or harassed by boats. Due to the mesh size of net, timing of the test fishery, and emphasis on daylight operations, salmon and steelhead bycatch would be low. Unlisted summer chinook and steelhead stocks would be the most common salmonid bycatch. The estimated encounter rate is less than five chinook salmon per estuary each year with the exception of the Columbia River where researchers may encounter as many as 20 chinook salmon per year. Annual handling of steelhead would likely be less than five fish total from all estuaries combined. Encounters with listed other salmon species are unlikely based on prior experience.

Marine Mammal, Sea Turtle, and Seabird Interactions

While interactions between nets/boats and marine mammals, seabirds, and sea turtles in the sampled area is rare, the possibility exists that these animals could be struck by the boat, entangled in a net, or stressed by the presence of the boat. As advised by the NMFS Office of Protected Resources, as noted in the mitigation measures below, measures to minimize marine mammal and sea turtle interactions would be required. The applicant would monitor and report any take of marine mammals or ESA listed species to the NMFS Northwest Regional Office of Protected Resources. No marine mammals or sea birds have been captured in past sampling and none are expected in future years. Given that the gear would exceed 130 mm (5.1 inches), and that the researchers would be conducting operations only during daylight hours, entanglement with marbled murrelets is extremely unlikely. Sampling would not take place when seabirds and marine mammals are observed near the nets, thereby reducing the risk of interactions.

Non-Target Non-Listed Species

White Sturgeon (*Acipenser transmontanus*) are expected to be the most common bycatch during our operations in Washington and Oregon estuaries and may suffer from similar capture effects as green sturgeon. Due to the population being centered in the Columbia River, the greatest number would be encountered during our Columbia River operations. Willapa Bay can have a significant presence at times; however, the ratio of whites caught per green is usually low (Table 1). Encounters with white sturgeon would decrease the further the operations are from the Columbia River (i.e. Grays Harbor or Winchester Bay). Assuming a green:white sturgeon ratio of 0.1:1.0 in the Columbia River, the applicant anticipates encountering about 1,750 white sturgeon per year (based on 175 green sturgeon). Assuming a G:W of 10:1, the applicant expects to encounter about 10 white sturgeon per year in Willapa Bay (based on 100 green sturgeon). Assuming a G:W of 20:1, the applicant expects to encounter about 5 white sturgeon per year in Grays Harbor and Winchester Bay (based on 100 and 75 green sturgeon respectively). In other sampled areas, it is estimated that less than 5 white sturgeon per year would be encountered. Given that virtually all white sturgeon would be released alive and that the white sturgeon population is large and healthy, there are no anticipated individual or population level effects expected.

Table 1. The ratio of green sturgeon to white sturgeon caught during WDFW green sturgeon directed test fishing, 2003-2009.

Estuary	**Columbia River**			**Willapa Bay**			**Grays Harbor**		
Sturgeon	**Green**	**White**	**G/W**	**Green**	**White**	**G/W**	**Green**	**White**	**G/W**
Year									
2003	--	--	--	35	81	0.4	--	--	--
2004	186	867	0.2	25	0	NC	--	--	--
2005	--	--	--	--	--	--	219	14	15.6
2006	--	--	--	--	--	--	--	--	--
2007	4	46	0.1	10	1	10.0	--	--	--
2008	23	417	0.1	105	15	7.0	46	0	NC
2009	--	--	--	72	0	NC	--	--	--

Up to 100 spiny dogfish and ten seven-gill sharks may be caught in Willapa Bay, Grays Harbor and Winchester Bay annually, possibly injuring these fish. The capture of less than three individuals from one or two other shark species may occur each year. Crabs and other benthic creatures are likely to be taken and released alive in all the estuaries, since we are deploying diver gillnets. Other bycatch from all estuaries combined would include: crescent gunnels (1,000), starry flounder (100), Dungeness crab (1,000), rock crab (500), cockles (1,000), and oysters (100) annually. The applicant could not estimate the exact potential mortality of bycatch organisms, but it is believed that most bycatch would be released alive. The applicant believes that the fact that they would frequently observe the net would essentially restrict the number of bycatch organisms taken. The applicants also believe that their quick response to any capture and 30 minute net times would considerably reduce potential mortality. No significant population level effects are expected on bycatch species.

Physical Impacts - While the researcher's boats would pass through and over the water column of the area, NMFS determined that this portion of the research activities would not adversely impact the physical environment (including any portion that is considered critical habitat and EFH). There would be very little bottom drag by nets on the bottom habitat. Therefore the effect of the net and anchor on the bottom habitat is expected to be minimal. The acoustic receivers would primarily utilize previous receiver locations and would not impact bottom habitat.

Critical Habitat
The proposed activities would be conducted in green sturgeon and salmonid designated critical habitat and proposed leatherback sea turtle critical habitat. The effects of the action on salmonid, sturgeon, and leatherback habitat are expected to be minor. In general, the activities would be (1) boating activities; (2) capturing fish with gill nets; (3) handling fish to count/mark/tag them, obtain biological samples, and to check fish for marks and tags; and (4) non-lethal sampling for tissue samples. All of these techniques are minimally intrusive, of short duration, and are not expected to measurably affect habitat. Therefore, NMFS found that the proposed activities would not likely adversely modify or destroy designated critical habitat.

4.3 SUMMARY OF COMPLIANCE WITH APPLICABLE LAWS, NECESSARY FEDERAL PERMITS, LICENSES, AND ENTITLEMENTS

Compliance with the Endangered Species Act: To comply with Section 7 of the ESA Regulations (50 CFR 402.14(c)), a Section 7 consultation was initiated by the NMFS PR, under the ESA. In accordance with Section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.), a biological opinion was prepared for this proposed action and it concluded that after reviewing the current status of the green sturgeon, the environmental baseline for the action area, and probable cumulative effects, it is NMFS' biological opinion that issuance of Award No. 2176308 , as proposed, is not likely to jeopardize the continued existence of the green sturgeon or other NMFS ESA-listed species and is not likely to destroy or adversely modify designated critical habitat.

Compliance with the Marine Mammal Protection Act: NMFS has determined that while the award creates the possibility of interactions with marine mammals, the possibility of incidental take through such interactions is considered remote. The awarding of the grant, therefore, should not require the recipient to obtain authorization for incidental take under the MMPA in order to conduct the research activities.

*Compliance with the Magnuson-Stevens Act***:** Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires NMFS to complete an EFH consultation for any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by the agency that may adversely affect EFH. The issuance of the proposed permit would not impact designated EFH. The Office of Habitat Conservation was contacted and concurred via email that the proposed action as it would be conditioned would have minimal impacts on EFH. Therefore, no further consultation was necessary.

*Coordination with the National Ocean Service***:** The actions in the applications for Award No. 2176308 would not occur in a National Marine Sanctuary. The research activities would not impact any National Marine Sanctuaries, so no consultation was conducted.

4.4 MITIGATION MEASURES

The activities authorized under proposed Award NA10NMF4720037, if approved, would follow certain procedures in order to minimize and mitigate effects of the proposed action. If the grant is awarded, the following Special Award Conditions (SACs) would be placed on the award to ensure compliance with appropriate research protocols. The researchers state in their application that only trained personnel would be allowed to handle the fish.

1. Accidental Mortality: If a sturgeon is seriously injured or dies during capture or sampling, the researchers will notify the NMFS Office of Protected Resources as soon as possible, but no later than two days following the event. The researchers will then re-evaluate the techniques that were used and those techniques must be revised accordingly to prevent further injury or death. Depending on the severity of the circumstances and the response of the researchers, NMFS may suspend authorization of research activities.

2. Fish would be handled with care and kept in water to the maximum extent possible during sampling and processing procedures.

a. Total handling time of any individual sturgeon would not exceed 15 minutes.

b. Researchers would wear smooth rubber gloves to reduce abrasion of skin and removal of mucus.

3. Net conditions:

a. At water temperatures greater than 27^{o} C, net sets will not exceed 30 minutes.

4. Holding Conditions:

a. Total holding time of any one green sturgeon, after removal from the net, will not exceed two hours.

b. Sturgeon will be held in floating net pens, recovery boxes, or live cars during processing.

c. If water temperature exceeds 27^{o} C, sturgeon will never be held for longer than 30 minutes.

d. Sturgeon are extremely sensitive to chlorine; therefore, holding tanks that have been sterilized with bleach will be thoroughly flushed with fresh water between sampling periods to ensure that sturgeon are not exposed to chlorine in the bleach.

e. No sampling will occur at dissolved oxygen levels less than 5.0 mg/L.

5. Tagging Conditions:

a. Researchers will not insert large PIT tags into juvenile sturgeon less than 330 mm in length; if investigators choose to insert PIT tags into juvenile sturgeon in this size class, PIT tags will not be larger than 11.5 mm x 2.1 mm.

b. Prior to placement of tags - the entire fish will be scanned with a waterproof PIT tag reader and visually inspected to ensure detection of fish tagged in other studies. Previously PIT-tagged fish would not be retagged.

c. Total weight of tags (external and internal) on any fish will not exceed 2% of the fish's total body weight.

d. Surgical implantation of internal tags will not occur when water temperatures exceed 27^{o} C or are less than 7^{o} C, or be implanted in pre-spawning fish or fish on the spawning grounds.

6. Sampling Conditions: Extreme care would be used when collecting tissue samples (tissue/fin ray). Instruments will be cleaned between each fish sampled to avoid possible disease transmission.

7. Salmon and Steelhead: Should a salmon or steelhead be taken incidentally during the course of netting, researchers will notify the NMFS Northwest Region Protected Resources Division within 48 hours of any capture.

a. Salmon and steelhead will be released alive back to the river/estuary.

8. Aquatic Nuisance Species

a. To prevent potential spread of aquatic nuisance species identified in the watershed, all equipment assigned to the research should be inspected and sanitized according to existing agency protocols (ODFW 2009 AIS Protocol) for the prevention of inadvertent introduction and distribution of aquatic invasive species. Alternatively, equipment will not be reassigned to other watersheds until the research is completed or is suspended.

b. If the research has been completed or is suspended, all gear and equipment used will be bleached, washed and air dried before being redeployed to another location.

9. Marine Mammals, Seabirds, and Sea Turtles

a. In all boating and research activities within the study area, a close watch will be made for marine mammals, seabirds, and sea turtles to avoid interaction and harassment. Researchers are advised to review the marine mammal approach and viewing guidelines online at http://www.nero.noaa.gov/prot_res/mmv/.

b. In the unlikely event a marine mammal, seabird, or sea turtle is captured, the animal will be assessed and, if possible, and if safe for the researchers and animal, the animal must be supported to prevent it from drowning. The NOAA Protected Resources Division must be contacted as well as the appropriate local stranding partner http://www.nmfs.noaa.gov/pr/health/networks.htm.

10. Bycatch of non-listed species

a. All bycatch will be released alive as quickly as possible.

4.5 CUMULATIVE EFFECTS

Effects of past and ongoing human and natural factors occurring in or near the action area have contributed to the current status of the species. Threats include road building, urbanization, stream channelization, wetland filling and draining, tree removal, riparian vegetation removal, overallocation of agricultural and municipal surface water, dikes, dams, pollution, bycatch, etc. . These activities and threats are expected to continue into the future. Synthesis of the information about the status of the species, past and present activities affecting the species, possible future actions that might affect the species, and effects of the proposed action provide a basis for determining the additive effects of the activities supported by the proposed grant. Given the cumulative threats information and the known effects of the proposed action, NMFS concludes that the proposed action would not likely reduce the species' likelihood of survival and recovery in the wild by adversely affecting their birth rates, death rates, or recruitment rates. In particular, NMFS would not expect the proposed research activities to affect adult mortality in a way that appreciably reduces the population.

This EA considers the cumulative effect the research would have on live animals that are occupying freshwater, estuarine and marine waters. The short-term stresses resulting from the research activities proposed are expected to be minimal. Taking into account the effects and impacts resulting from the handling and surgeries, NMFS expects that the additional short-term stress of the research activities would not significantly affect the sturgeon. The proposed activities would be completed as quickly as possible, typically taking less than 30 minutes per animal. The award would contain conditions (see section 4.4. Mitigation Measures) to mitigate potential adverse impacts to green sturgeon. Other work is in the lab and office and will not have any appreciable impacts. Overall, the proposed actions would be expected to have no more than short-term affects on green sturgeon or non-target species. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions would be minimal and not significant. The data generated by the research activities associated with the proposed action would help determine the distribution of green sturgeon, a critical management gap. In addition, the research would provide information that would help improve management and recovery of green sturgeon, and would outweigh any adverse impacts that may occur.

The proposed action would not be expected to have any effects on any other marine species or other portions of the environment and would not result in any significant cumulative effects to either.

CHAPTER 5 - LIST OF PREPARERS AND AGENCIES CONSULTED

Preparers:
Office of Protected Resources
National Marine Fisheries Service
Endangered Species Division
Silver Spring, MD 20910

Agencies Consulted:

Office of Protected Resources
National Marine Fisheries Service
Endangered Species Division (section 7 team)
Silver Spring, MD 20910

Northwest Regional Office
National Marine Fisheries Service
Habitat Conservation Division
Seattle, WA 98115

CHAPTER 6 - LITERATURE CITED

Adams, P. B., C. B. Grimes, S. T. Lindley, and M. L. Moser. 2002. Status review for North American green sturgeon, *Acipenser medirostris*. NOAA, National Marine Fisheries Service, Southwest Fisheries Science Center, Santa Cruz, CA. 50 p.

Ainley, D.G., A.R. DeGange, L.L. Jones, and R.J. Beach. 1981. Mortality of seabirds in high-seas salmon gill nets. Fishery Bulletin 79(4): 800-806.

Artyukhin, E. N., P. Vecsei, and D. L. Peterson. 2007. Morphology and ecology of Pacific sturgeons. Environmental Biology of Fishes 79:369-381.

Barnard, J. 2003. Protection sought for green sturgeon. The Associated Press. February 21, 2003.

Beach, R.J., A.C. Geiger, S.J. Jeffries, S.D. Treacy, and B.L. Troutman. 1985. Marine mammals and their interactions with fisheries of the Columbia River and adjacent waters, 1980-1982 third annual report. Washington Department of Wildlife, Olympia, WA. 316pp.

Benson, R. L., S. Turo, and B. W. McCovey Jr. 2007. Migration and movement patterns of green sturgeon (*Acipenser medirostris*) in the Klamath and Trinity rivers, California, USA. Environmental Biology of Fishes 79:269-279.

Biological Review Team (BRT). 2005. Green sturgeon (*Acipenser medirostris*) status review update. Prepared for the National Marine Fisheries Service. 36 pp.

California Department of Fish and Game. 2002. California Department of Fish and Game comments to NMFS regarding green sturgeon listing. California Department of Fish and Game. 79 pp (plus appendices).

Carter, H.R., and S.G. Sealy. 1984. Marbled Murrelet mortality due to gill-net fishing in Barkley Sound, British Columbia, *in* D.N. Nettleship, G.A. Sauger, and P.F. Springer (eds.) 1984. Marine birds: their feeding ecology and commercial fisheries relationships. Proc. of the Pac. Seabird Group Symp., Seattle, Washington, January 6-8, 1982. Can. Wildl. Serv. Spec. Pub., Ottawa. Pp. 217-220.

Chadwick, H. K. 1959. California sturgeon tagging studies. California Fish and Game 45:297-301.

Dumbauld, B. R., D. L. Holden, and O. P. Langness. 2008. Do sturgeon limit burrowing shrimp populations in Pacific Northwest estuaries? Environmental Biology of Fishes, DOI 10.1007/s 10641-008-9333-y:14 pp.

Emmett, R. L., S. A. Hinton, S. L. Stone, and M. E. Monaco. 1991. Distribution and abundance of fishes and invertebrates in West Coast estuaries, Volume II: Species life history summaries.

ELMR Report No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, MD. 329 pp.

Emmett, R.L. 1997. Estuarine Survival of Salmonids: The Importance of Interspecific and Intraspecific Predation and Competition, *in* Emmett, R.L., and M.H. Schiewe (eds.) 1997. Estuarine and Ocean Survival of Northeastern Pacific Salmon: Proceedings of the Workshop. U.S. Department of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NMFS-NWFSC-29. 9 pp of 313pp. http://www.nwfsc.noaa.gov/pubs/tm/tm29/Papers/Emmett.htm

Erickson, D. L. and J. E. Hightower. 2007. Oceanic distribution and behavior of green sturgeon. American Fisheries Society Symposium 56:197-211.

Erickson, D. L. and M. A. H. Webb. 2007. Spawning periodicity, spawning migration, and size at maturity of green sturgeon, *Acipenser medirostris,* in the Rogue River, Oregon. Environmental Biology of Fishes 79:255-268.

Erickson, D. L., J. A. North, J. E. Hightower, J. Weber, and L. Lauck. 2002. Movement and habitat use of green sturgeon *Acipenser medirostris* in the Rogue River, Oregon, USA. Journal of Applied Ichthyology 18:565-569.

Fairey, R., K. Taberski, S. Lamerdin, E. Johnson, R. P. Clark, J. W. Downing, J. Newman, and M. Petreas. 1997. Organochlorines and other environmental contaminants in muscle tissues of sportfish collected from San Francisco Bay. Marine Pollution Bulletin 34:1058-1071.

Farr, R. A., M. L. Hughes, and T. A. Rien. 2001. Green sturgeon population characteristics in Oregon. Annual progress report. Sport Fish Restoration Project F-178-R, Oregon Department of Fish and Wildlife, Portland, Oregon. 31 pp.

Farr, R. A. and T. A. Rien. 2002. Green sturgeon population characteristics in Oregon. Annual progress report. Sport Fish Restoration Project F-178-R, Oregon Department of Fish and Wildlife Portland, Oregon. 46 pp.

Farr, R. A. and T. A. Rien. 2003. Green sturgeon population characteristics in Oregon. Annual progress report. Sport Fish Restoration Project F-178-R, Oregon Department of Fish and Wildlife, Portland, Oregon. 29 pp.

Farr, R. A. and J. C. Kern. 2004. Green sturgeon population characteristics in Oregon. Annual progress report. Sport Fish Restoration Project F-178-R Oregon Department of Fish and Wildlife, Portland, Oregon. 32 pp.

Farr, R. A. and J. C. Kern. 2005. Green sturgeon population characteristics in Oregon. Final progress report. Sport Fish Restoration Project F-178-R, Oregon Department of Fish and Wildlife, Portland, Oregon. 73 pp.

Fairey, R., K. Taberski, S. Lamerdin, E. Johnson, R. P. Clark, J. W. Downing, J. Newman, and M. Petreas. 1997. Organochlorines and other environmental contaminants in muscle tissues of sportfish collected from San Francisco Bay. Marine Pollution Bulletin 34:1058-1071.

Feist, G. W., M. A. H. Webb, D. T. Gundersen, E. P. Foster, C. B. Schreck, A. G. Maule, and M. S. Fitzpatrick. 2005. Evidence of detrimental effects of environmental contaminants on growth and reproductive physiology of white sturgeon in impounded areas of the Columbia River. Environmental Health Perspectives 113:1675-1682.

Fitch, J. E. and R. J. Lavenberg. 1971. Marine food and game fishes of California. University of California Press, Berkeley. 179 pp. Cited in Moyle *et al.*, 1992.

Fitch, J. E. and S. A. Schultz. 1978. Some rare and unusual occurrences of fishes off California and Baja California. California Fish and Game 64:74-92. *Cited in*: Moyle, P. B., P. J. Foley, and R. M. Yoshiyama. 1992. Status of green sturgeon, *Acipenser medirostris,* in California. Final Report submitted to the National Marine Fisheries Service, University of California, Davis. 11 pp.

Foster, E. P., M. S. Fitzpatrick, G. W. Feist, C. B. Schreck, and J. Yates. 2001a. Gonad organochlorine concentrations and plasma steroid levels in white sturgeon (*Acipenser transmontanus*) from the Columbia River, USA. Bulletin of Environmental Contamination and Toxicology 67:239-245.

Foster, E. P., M. S. Fitzpatrick, G. W. Feist, C. B. Schreck, J. Yates, J. M. Spitsbergen, and J. R. Heidel. 2001b. Plasma androgen correlation, EROD induction, reduced condition factor, and the occurrence of organochlorine pollutants in reproductively immature white sturgeon (*Acipenser transmontanus*) from the Columbia River, USA. Archives of Environmental Contamination and Toxicology 41:182-191.

Greenfield, B. K., J. A. Davis, R. Fairey, C. Roberts, D. Crane, and G. Ichikawa. 2005. Seasonal, interannual, and long-term variation in sport fish contamination, San Francisco Bay. Science of the Total Environment 336:25-43.

Hart, J.L. 1973. Pacific Fishes of Canada. Fisheries Research Board of Canada Bulletin 180. 740pp.

Israel, J. A., J. F. Cordes, M. A. Blumberg, and B. May. 2004. Geographic patterns of genetic differentiation among collections of green sturgeon. North American Journal of Fisheries Management 24:922-931.

Israel, J. A. and B. May. 2006. Green sturgeon in Pacific estuaries: potential impacts of mixed stock fisheries. Presentation at Green Sturgeon Public Scoping Workshops, Sacramento, CA, May 31-June 1, 2006

Kelly, J. T., A. P. Klimley, and C. E. Crocker. 2007. Movements of green sturgeon, *Acipenser medirostris,* in the San Francisco Bay Estuary, California. Environmental Biology of Fishes 79:281-295

Krahn, M.M., M.J. Ford, W.F. Perrin, P.R. Wade, R.P. Angliss, M.B. Hanson, B.L. Taylor, G.M. Ylitalo, M.E. Dahlheim, J.E. Stein, and R.S. Waples. 2004. 2004 status review of southern resident killer whales (*Orcinus orca*) under the Endangered Species Act. NOAA Technical Memmorandum NMFS-NWFSC-62.

Kruse, G. O. and D. L. Scarnecchia. 2002. Assessment of bioaccumulated metal and organochlorine compounds in relation to physiological bismarkers in Kootenai River white sturgeon. Journal of Applied Ichthyology 18:430-438.

Lindley, S. T., M. L. Moser, D. L. Erickson, M. Belchik, D. W. Welch, E. Rechisky, J. T. Kelly, J. C. Heublein, and A. P. Klimley. 2008. Marine migration of North American green sturgeon. Transactions of the American Fisheries Society 137:182-194.

Miller, L. W. 1972. Migrations of sturgeon tagged in the Sacramento-San Joaquin Estuary. California Fish and Game 58:102-106.

Moser, M. and S. Lindley. 2007. Use of Washington estuaries by subadult and adult green sturgeon. Environmental Biology of Fishes 79:243-253.

Moyle, P. B. 2002. Inland fishes of California, 2nd edition. University of California Press, Berkeley and Los Angeles, CA. 502 pp.

Moyle, P. B., R. M. Yoshiyama, J. E. Williams, and E. D. Wikramanayake. 1995. Fish species of special concern in California, 2nd edition. California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. 277 pp.

National Marine Fisheries Service (NMFS). 1997. Investigation of Scientific Information on the Impacts of California Sea Lions and Pacific Harbor Seals on Salmonids and on the Coastal Ecosystems of Washington, Oregon, and California. U.S. Department of Commerce, National Oceanic and Atmospheric Administration Technical Memorandum NMFS-NWFSC-28. 172pp. http://www.nwfsc.noaa.gov/pubs/tm/tm28/note.htm

Nakamoto, R. J., T. T. Kisanuki, and G. H. Goldsmith. 1995. Age and growth of Klamath River green sturgeon (*Acipenser medirostris*). U.S. Fish and Wildlife Service Project 93-FP-13, Yreka, CA. 20 pp.

Riemer, S.D., and R.F. Brown. 1996. Marine mammal (pinniped) food habits in Oregon. Oregon Department of Fish and Wildlife, Wildlife Diversity Program, Technical Report #96901. 26pp.

Rien, T. A., L. C. Burner, R. A. Farr, M. D. Howell, and J. A. North. 2000. Green sturgeon population characteristics in Oregon. Annual progress report. Sport Fish Restoration Project F-178-R, Oregon Department of Fish and Wildlife, Portland, Oregon. 67 pp.

Roffe, T.J., and B.R. Mate. 1984. Abundances and feeding habits of pinnipeds in the Rogue River, Oregon. Journal of Wildlife Management 48(4):1262-1274.

Rugh, D.J., M.M. Muto, S.E. Moore, and D.P. DeMaster. 1999. Status review of the Eastern

North Pacific stock of Gray whales. NOAA Tech. Mem. NMFS-AFSC-103.

Scheffer,V.B. and J.W. Slip. 1948. The whales and dolphins of Washington State with a key to the cetaceans of the west coast of North America. Am. Midl. Nat. 39:257-337.

Skinner, J. E. 1962. An historical review of the fish and wildlife resources of the San Francisco Bay area. California Department of Fish and Game, Water Projects Branch Report no. 1, Sacramento, California: California Department of Fish and Game. 226 pp. 226 pp.

Speich, S.M., and T.R. Wahl. 1989.Catalog of Washington seabird colonies. U.S. Department of Interior Biological Report 88(6).

Speich, S.M., T.R. Wahl, and D.A. Manuwal. 1992. The numbers of Marbled Murrelets in Washington marine waters, *in* Status and conservation of the Marbled Murrelet in North America. Western Foundation of Zoology 5(1).

Van Eenennaam, J. P., J. Linares, S. I. Doroshov, D. C. Hillemeier, T. E. Willson, and A. A. Nova. 2006. Reproductive conditions of the Klamath River green sturgeon. Transactions of the American Fisheries Society 135:151-163.

Washington Department of Fish and Wildlife (WDFW), and Oregon Department of Fish and Wildlife (ODFW). 2002. Status Report—Columbia River Fish Runs and Fisheries, 1938-2000. Joint Columbia River Management Staff. 324pp.

Finding of No Significant Impact
for Issuance of a Protected Species Conservation and Recovery Grant to the Washington Department of Fish and Wildlife (Award File 4720037) to Conduct Research on Green Sturgeon on the West Coast of the Unitėd States

National Marine Fisheries Service

The National Marine Fisheries Service, Office of Protected Resources (NMFS PR) proposes to provide financial assistance in the form of a grant to the Washington Department of Fish and Wildlife (WDFW) (Brad James, P.I.) to conduct research on green sturgeon, a species listed as threatened under the Endangered Species Act (ESA). This award would be issued through the Protected Species Conservation and Recovery Grant Program (CFDA no. 11.472, Unallied Science Programs) authorized under section 6 of the ESA of 1973 as amended (16 U.S.C. 1535). The Oregon Department of Fish and Wildlife (ODFW) would partner with this project. In accordance with section 6(d)(2) of the ESA, the Federal Government will provide 90 percent of the cost of the project, and the state will provide the remaining 10 percent. This financial assistance award is planned to extend for three years (three annual payments) and is subject to semi-annual review by NMFS. The grant would support conservation activities for green sturgeon in Washington and Oregon.

In accordance with the National Environmental Policy Act (NEPA), as implemented by the regulations published by the Council on Environmental Quality and NAO 216-6, NMFS prepared an Environmental Assessment (EA) analyzing the impacts on the human environment associated with award issuance (*Issuance of a Protected Species Conservation and Recovery Grant to the Washington Department of Fish and Wildlife (Award No. NA10NMF*4720037*) to Conduct Research on Green Sturgeon on the West Coast of the United States, April 2010).* The EA is hereby incorporated by reference in its entirety. The analyses in the EA support the following findings and determination.

The applicant is requesting funds to 1) establish a cooperative coast-wide biotelemetry, tag, and biological data interchange system; 2) characterize important habitats with potential threats by studying fine scale spatial distribution and movement patterns of sturgeon; 3) design, evaluate and implement an approach to estimate coast-wide abundance and survival of Southern and Northern DPS green sturgeon; and 4) develop a Fisheries Management and Evaluation Plan for Washington coastal fisheries not covered by an ESA Section 7(a)(2) Biological Opinion that meets NMFS criteria for exemptions from take in the ESA 4(d) rule.

The National Oceanic and Atmospheric Administration's Administrative Order 216-6 (May 20,

1999) contains criteria for determining the significance of the impacts of a proposed action. In addition, the Council on Environmental Quality (CEQ) NEPA implementing regulations at 40 C.F.R. 1508.27 state that the significance of an action should be analyzed both in terms of "context" and "intensity." Each criterion listed below is relevant to making a finding of no significant impact and has been considered individually, as well as in combination with the others. The significance of this action is analyzed based on the NAO 216-6 criteria and CEQ's context and intensity criteria. These include:

1. Can the proposed action reasonably be expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat (EFH) as defined under the Magnuson - Stevens Act and identified in Fishery Management Plans?

   Response: The project's proposed research activity, including boating and netting activities, would not take place in national marine sanctuaries. Also, no coral reef ecosystems occur in the action area and thus none would be affected. However, designated EFH would overlap with a section of the proposed action area. Although researcher's boats would pass through and over the water column in the action area where EFH does exist, NMFS determined this portion of the researcher's activities would not adversely impact the physical environment, including any portion considered EFH. Additionally, with respect to anticipated effects on EFH by gill nets, NMFS concluded netting would result in minimal disturbance to the physical environment, including the bottom substrate and any portion having EFH.

   NMFS PR requested concurrence on whether the proposed action as conditioned would have adverse impacts or not on designated EFH in the action area. The NMFS, Northwest Office of Habitat Conservation was contacted and agreed by email that the proposed boating and netting activities would have no more than minimal impact to EFH.

2. Can the proposed action be expected to have a substantial impact on biodiversity and/or ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc.)?

   Response: No substantial impact on biodiversity or ecosystem function within the affected area is expected. The impact from the use of boat anchors is expected to be minimal.

   Due to the nature of netting, the researchers would expect that other non-target species would become enmeshed. Other non-target species collected in the past during gill netting by the applicant include: white sturgeon, summer salmon, summer steelhead, spiny dogfish, ten seven-gill sharks, crescent gunnels, starry flounder, Dungeness crab, rock crab, cockles, and oysters. However, the nets would be monitored and would be only be set for 30 minutes. Non-target fish would be removed from the net and immediately released at the site of capture. It is believed that virtually all by-catch would be released alive without long-term effects on predator-prey relationships.

3. Can the proposed action reasonably be expected to have a substantial adverse impact on public health or safety?

   Response: Issuance of this award is not expected to have substantial adverse impacts on public health or safety that could reasonably be expected by the proposed research activities. This action would involve the use of ethanol pre-measured in vials for preservation, storage, and transportation of tissue samples. All handling would be conducted by trained personnel.

4. Can the proposed action reasonably be expected to adversely affect endangered or threatened species, their critical habitat, marine mammals, or other non-target species?

   Response: The proposed research activities could potentially have adverse effects on individual green sturgeon, salmon, or steelhead including mortality, but the effects are not expected to have adverse population-level impacts.

   The award activities require standard NMFS research and mitigation protocols to minimize stress and harmful effects. NMFS determined in a BiOp that salmon, steelhead, green sturgeon, and leatherback sea turtles would not be jeopardized by this action, nor would critical habitat be adversely modified.

   It is possible that this action may have adverse impacts on salmonids although gill nets would be set to minimize interactions. Nets would be checked at short intervals to ensure the quick release of any salmon or steelhead. NMFS believes that salmonids captured in a gillnet during sturgeon research would result in short-term stresses and pose a potential risk to the salmon or steelhead but is not likely to result in serious injury or mortality.

   In the unlikely event that marine mammals, sea turtles, or marine birds are encountered while netting, researchers would be directed by award conditions to avoid contact with these animals. If researchers do come into contact with any of the aforementioned animals, either through boating or netting activities, the Office of Protected Resources suggested appropriate precautionary measures that would be required. Namely, netting would not be deployed when animals are observed within the vicinity of the research; and animals would be allowed to either leave or pass through the area safely before net setting is initiated. Also, in all boating activities (including travel to acoustic arrays outside of the netting area), researchers would be advised to watch for marine mammals to avoid harassment or interaction.

5. Are significant social or economic impacts interrelated with natural or physical environmental effects?

   Response: There would be no significant social or economic impacts interrelated with natural or physical environmental effects. Only researchers would be affected by this action.

6. Are the effects on the quality of the human environment likely to be highly controversial?

   Response: The effects on the quality of the human environmental are not likely to be controversial. This project is similar to other existing projects that have negligible effects on the human environment and are not controversial.

7. Can the proposed action reasonably be expected to result in substantial impacts to unique areas, such as historic or cultural resources, park land, prime farmlands, wetlands, wild and scenic rivers, essential fish habitat, or ecologically critical areas?

Response: The activities in this proposed award would not be expected to result in significant impacts to any unique areas mentioned above. Similar research has been conducted in the proposed area that has not impacted unique areas.

8. Are the effects on the human environment likely to be highly uncertain or involve unique or unknown risks?

   Response: Potential risks of proposed research methods are not unique or unknown, nor is there significant uncertainty about impacts. Monitoring reports from other projects of a similar nature, and published scientific information of impacts on green and white sturgeon and salmon species, indicate the proposed activities would not result in significant adverse impacts to the human environment or the species. There is considerable scientific information available on the likely impacts for the proposed action.

9. Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

   Response: Overall, the proposed action would be expected to have no more than short-term effects on green sturgeon and no effects on other aspects of the environment. The incremental impact of the action when added to other past, present, and reasonably foreseeable future actions discussed in the environmental assessment would be minimal and not significant.

10. Is the proposed action likely to adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural or historical resources?

    Response: The action would not adversely affect any district, site, highway, structure, or object listed in or eligible for listing in the National Register of Historic Places. The proposed action would also not cause loss or destruction of significant scientific, cultural or historical resources. The proposed action will not occur in the aforementioned areas.

11. Can the proposed action reasonably be expected to result in the introduction or spread of a non-indigenous species?

    Response: The U.S. Geological Survey has documented several aquatic nuisance species occurring in the action area having potential to be spread by the actions of the proposed research. However, the applicant has agreed to follow certain conditions proposed by NMFS to minimize the potential spread of these aquatic nuisance species. The applicant would also adhere to the ODFW 2009 AIS Protocol. Therefore, the proposed research activities would not be expected to result in the introduction or spread of non-indigenous species to other watersheds.

12. Is the proposed action likely to establish a precedent for future actions with significant effects or represent a decision in principle about a future consideration?

    Response: The decision to issue this award would not be precedent setting and would not affect any future decisions. NMFS has issued numerous awards to study green sturgeon. Issuance of an award to a specific individual or organization for a given research activity does not in any way guarantee or imply NMFS would authorize other individuals or organizations to conduct the same research activity. Any future request received, including those by the applicant, would be evaluated upon its own merits relative to the criteria established in the MMPA, ESA, and NMFS' implementing regulations.

13. Can the proposed action reasonably be expected to threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment?

    Response: Issuance of the proposed award is not expected to violate any Federal, State, or local laws for environmental protection. This award would not relieve the applicant of the responsibility to comply with other Federal, State, local, or international laws or regulations.

14. Can the proposed action reasonably be expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species?

    Response: The proposed procedures would have potential adverse impacts on individual sturgeon. However, because sturgeon are a robust species and respond well to the types of handling proposed, the cumulative effects on the species are not likely long-term or significant. NMFS expects that the proposed research activities would not appreciably reduce green sturgeon likelihood of survival and recovery in the wild by adversely affecting their birth rates, death rates, or recruitment rates. In particular, NMFS expects that the proposed research activities would not affect adult sturgeon in a way that appreciably reduces the reproductive success of adults, the survival of young, or the number of young that annually recruit into the breeding populations of any of these species.

    Likewise, it is possible that this action may have adverse impacts on salmon although gill nets would be set and tended to minimize salmon interactions. Nets would be constantly monitored and only set for 30 minutes. Based on the award conditions placed on the researchers to minimize impacts to salmon, NMFS believes that salmon captured in a gillnet during sturgeon research would result in short-term stresses and pose a potential risk, but is not likely to result in serious injury or mortality.

    NMFS also considered impacts of potential marine mammal, sea turtle, and seabird interactions during sturgeon research. Although interactions with marine mammals, sea turtles, or marine birds would be considered rare based on historical records in the river, the award conditions state that nets would not be set if marine mammals, marine bird, or sea turtles are seen in the vicinity of the research, and also mandates that animals must be allowed to leave the area before the nets are set, minimizing potential adverse impacts to these species.

DETERMINATION

In view of the information presented in this document and the analysis contained in the Environmental Assessment (EA) prepared for Issuance of Award No. NA10NMF4720037 it is hereby determined that the issuance of Award No. NA10NMF4720037 will not significantly impact the quality of the human environment as described above. In addition, all beneficial and adverse impacts of the proposed action have been addressed to reach the conclusion of no significant impacts. Accordingly, preparation of an Environment Impact Statement for this action is not necessary.

APR 22 2010

James H. Lecky
Director, Office of Protected Resources

Date