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Proposed Rulemaking to Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon

Regulatory Impact Review

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prepared for:

National Marine Fisheries Service

Southwest Region

501 West Ocean Blvd.

Long Beach, CA 90802-4213

prepared by:

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

INDUSTRIAL ECONOMICS, INCORPORATED

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SECTION 1 | INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

1. NMFS is currently proposing a rule that would implement protective regulations under the Federal Endangered Species Act (ESA) for the threatened Southern Distinct Population Segment of North American green sturgeon (*Acipenser medirostris*; hereafter, "Southern DPS"). This Regulatory Impact Review (RIR) is conducted in accordance with Presidential Executive Order (E.O.) 12866 (58 FR 51735, October 4, 1993), providing a comparative analysis of the costs and benefits of the alternatives under consideration for the proposed action. The analysis also compares each alternative against significance criteria found in the Executive Order.

EXECUTIVE ORDER 12866

2. As stated above, this RIR is conducted in accordance with E.O. 12866. The requirements for all regulatory actions specified in E.O. 12866 are summarized in the following statement from the order:

> In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits shall be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.

3. E.O. 12866 requires that the Office of Management and Budget review proposed regulatory programs that are considered to be "significant." E.O. 12866 defines "significant regulatory action" as an action that is likely to:

   1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments or communities;
   2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
   3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

The Regulatory Impact Review is intended to assist NMFS in selecting the regulatory approach that maximizes net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity).

ESA BACKGROUND

4. The ESA provides several means for the protection of threatened or endangered species. Section 7 of the ESA requires Federal agencies to consult with NMFS to insure that any activity they authorize, fund, or carry out (called the "agency action") does not jeopardize the continued existence of an endangered or threatened species, or destroy or adversely modify its critical habitat. The protections under section 7 of the ESA automatically apply when a species is listed as endangered or threatened. Section 9 of the ESA prohibits any person subject to the jurisdiction of the United States from the following activities, with respect to endangered species:

- Import any such species into, or export any such species from the U.S.;
- Take any such species within the U.S. or the U.S. territorial sea;
- Take any such species upon the high seas;
- Possess, sell, deliver, carry, transport, or ship, by any means whatsoever, any such species taken in violation of (2) and (3) above;
- Deliver, receive, carry, transport, or ship in interstate or foreign commerce, by any means whatsoever and in the course of commercial activity, any such species;
- Sell or offer for sale in interstate or foreign commerce any such species; or
- Violate any regulation pertaining to such species or to any threatened species of fish or wildlife.

5. All of the ESA section 9 prohibitions automatically apply when a species is listed as endangered but not when listed as threatened. For threatened species, section 4(d) of the ESA authorizes the Secretary to establish protective regulations if the Secretary, on the advice of NMFS, determines that they are necessary and advisable for the conservation of the threatened species. The set of protective regulations is called a 4(d) rule and may include any of the ESA section 9 regulations, or other regulations. NMFS determines what is necessary and advisable based on the biological status, conservation needs, and potential threats to the threatened species.

6. The primary purpose of a 4(d) rule is to govern take and provide for the conservation of the threatened species. To achieve this purpose, the 4(d) rule may include exceptions from the take prohibitions for activities that may cause take, but that overall contribute to the conservation and protection of the threatened species. Exceptions may also be included for activities in which measures have been adopted to minimize take to an acceptable level. The 4(d) rule would specify the criteria that must be satisfied to qualify

for an exception. These 4(d) rule "programs" would assure entities that their activities are consistent with ESA requirements and with the protection of the species.

7. NMFS may also provide coverage for an otherwise prohibited take through section 7 or section 10 of the ESA. Following completion of an ESA section 7 consultation, NMFS may issue an incidental take statement to authorize a certain level of take for the Federal agency action. Non-Federal entities may apply for two types of take permits under section 10 of the ESA: (1) a direct take permit for scientific research or enhancement purposes [section 10(a)(1)(A)], or (2) an incidental take permit for non-research activities [section 10(a)(1)(B)]. Federal entities may also apply for an ESA section 10(a)(1)(A) permit for scientific research and enhancement purposes. Take that results from activities conducted in compliance with an ESA section 7 incidental take statement, an ESA section 10 permit, or a 4(d) rule exception would not be in violation of the ESA prohibitions.

1.2 PURPOSE AND NEED FOR THIS ACTION

8. NOAA's National Marine Fisheries Service (NMFS) listed the Southern DPS as a threatened species under the ESA on April 7, 2006. Several factors were identified as threats to the Southern DPS, including the loss of spawning habitat, concentration of spawning into a single spawning river (the Sacramento River in California), entrainment by water project operations, commercial and recreational fisheries harvest, and poor water quality conditions. Unless these threats are addressed, the Southern DPS may face further declines in population numbers and be at risk of extinction.

9. NMFS evaluated the status of the Southern DPS and existing efforts to protect the species to determine whether or not a 4(d) rule is necessary and advisable. NMFS concludes that the threatened Southern DPS of North American green sturgeon are at risk of extinction primarily because their populations have been reduced by human "take," through activities that include, but are not limited to:

   1) commercial and recreational fisheries activities that directly target or incidentally catch Southern DPS fish;
   2) tribal fisheries activities that directly target or incidentally catch Southern DPS fish;
   3) poaching;
   4) collecting or handling Southern DPS fish for activities such as research, monitoring, and emergency rescues;
   5) habitat-altering activities that result in the elimination, obstruction or delay of passage of adult Southern DPS fish to and from spawning areas, or otherwise result in the inability of adult Southern DPS fish to migrate to and from spawning areas;
   6) habitat-altering activities that result in the destruction, modification or curtailment of spawning or rearing habitat for egg, larval or juvenile stages;

7) habitat altering activities that result in the elimination, obstruction or delay of downstream passage of larval or juvenile stages of Southern DPS fish;

8) entrainment and impingement of any life stage of Southern DPS fish during the operation of water diversions, dredging or power generating projects;

9) application of pesticides adjacent to or within waterways that contain any life stage of Southern DPS fish at levels that adversely affect the biological requirements of the Southern DPS;

10) discharge or dumping of toxic chemicals or other pollutants into waters or areas that contain Southern DPS fish; and

11) introducing or releasing non-native species likely to alter the Southern DPS' habitat or to compete with the Southern DPS for space or food.

10. NMFS has determined that additional regulations in a 4(d) rule are necessary and advisable to protect and conserve the Southern DPS. In this RIR, we describe and evaluate five alternative actions, or alternative 4(d) rules, including a no action alternative, a full action alternative (application of all ESA section 9 prohibitions), a full action alternative with exceptions, and two additional alternatives that would apply the take prohibitions to specific categories of activities, with and without exceptions.

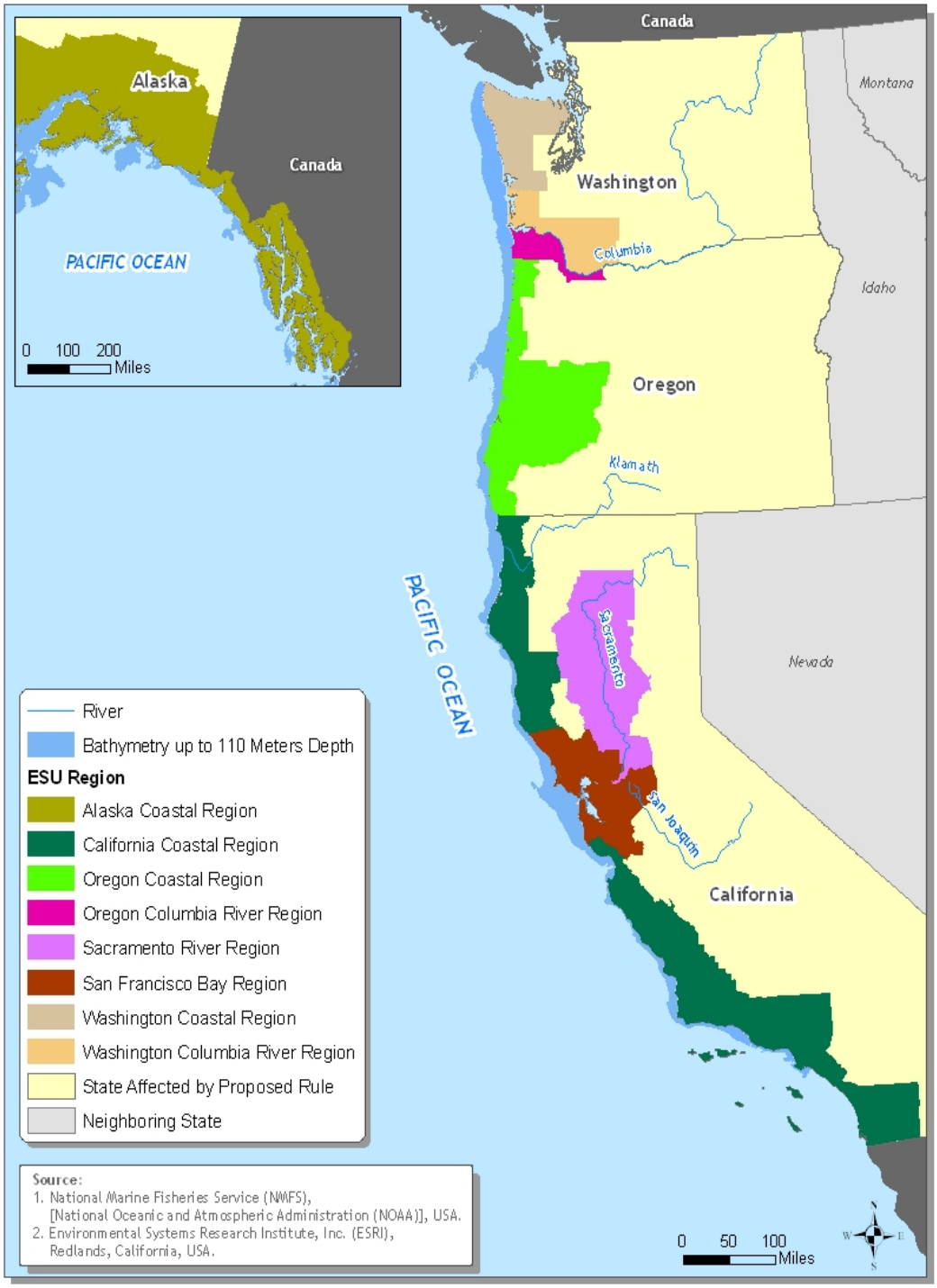
AFFECTED AREA

11. The alternatives would apply to freshwater river systems, coastal watersheds, bays, estuaries, and marine waters where Southern DPS fish are known to occur, including, but not limited to:

- The Sacramento River, lower Feather River, lower Yuba River, the Sacramento-San Joaquin Delta, San Francisco Bay, San Pablo Bay, Suisun Bay, and Humboldt Bay in California;
- Coastal bays, estuaries, and freshwater rivers in Oregon and Washington including: Coos Bay, Winchester Bay, Yaquina Bay, the lower Columbia River estuary, Willapa Bay, Grays Harbor, and Puget Sound; and
- Coastal waters within 110 meters depth from southern California (excluding the southern California Channel Islands) to Alaska, including the Strait of Juan de Fuca.

The study area defined for the purpose of this analysis is presented in Exhibit 1-1. Because the proposed rule is not bound to geographic regions, the study area identifies areas where the Southern DPS have been known to occur to date. We solicit additional data and comments from the public regarding potential geographic areas where the section (4)d rule may have economic impacts.

EXHIBIT 1-1. GENERAL AREAS WHERE SOUTHERN DPS FISH ARE LIKELY TO OCCUR



1.3 DESCRIPTION OF ALTERNATIVES

12. NMFS proposes to establish an ESA section 4(d) rule for the Southern DPS. NMFS is considering the following five alternative 4(d) rules for the Southern DPS of green sturgeon:

- *No Action Alternative*: Do not apply ESA section 9(a)(1) prohibitions or any other protective regulations to the Southern DPS.
- *Full Action Alternative*: Apply all ESA section 9(a)(1) prohibitions to the Southern DPS.
- *Alternative A*: All of the prohibitions under section 9 of the ESA would be adopted and applied to the Southern DPS. However, the take of Southern DPS fish would be prohibited in the specific categories of activities of most concern regarding the Southern DPS, rather than in all activities. These categories include: fisheries harvest; collection and handling for any purpose (e.g., scientific research, emergency fish rescue, commercial sale, consumption); construction, maintenance, or operation of migration barriers in spawning or rearing habitats; destruction or modification of spawning or rearing habitats; application of pesticides or discharge of pollutants beyond accepted levels into waterways used by Southern DPS fish; and activities that may entrain or impinge Southern DPS fish (e.g., operation of unscreened water diversions in spawning or rearing habitats, dredging, and power plant operations); and the release or introduction of non-native species.
- *Alternative B – Proposed Action*: Alternative B is the same as the Full Action Alternative, but with exceptions to the take prohibitions. The exceptions would apply to activities conducted under NMFS-approved plans or criteria for: recreational and commercial fisheries; Tribal fisheries and resource management; habitat restoration activities; Federal, state, and private research or monitoring; and emergency fish rescue.
- *Alternative C*: Alternative C is the same as Alternative A, but with the same exceptions as those under Alternative B. Alternative C differs from Alternative B in that the take of Southern DPS fish would be prohibited in specific categories of activities as specified in the 4(d) rule, rather than in all activities.

The main features of each alternative are summarized in Exhibit 1-2. The following sections describe each alternative in detail.

NO ACTION ALTERNATIVE

13. Under the No Action Alternative, NMFS would not establish a 4(d) rule (i.e., no change from current management policies). The No Action Alternative represents the physical and biological status quo. Federal agency actions would still be subject to requirements under section 7 of the ESA for any actions that may jeopardize the continued existence of the Southern DPS. Actions without a federal nexus, however, would not be subject to additional regulations under the ESA.

EXHIBIT 1-2. SUMMARY OF ALTERNATIVES

ALTERNATIVE	ACTIVITIES SUBJECT TO THE TAKE PROHIBITIONS	EXCEPTIONS
No action	n/a	n/a
Full action	All activities under section 9.	None
Alternative A	Specific categories (same as Alt C): • Fisheries harvest; • Collection and handling for any purpose (e.g., scientific research, emergency fish rescue, commercial sale, consumption); • Construction, maintenance, or operation of migration barriers in spawning or rearing habitats; • Destruction or modification of spawning or rearing habitats; • Application of pesticides or discharge of pollutants beyond accepted levels into waterways used by Southern DPS fish; • Activities that may entrain or impinge Southern DPS fish (e.g., operation of unscreened water diversions in spawning or rearing habitats, dredging, and power plant operations); and • The release or introduction of non-native species.	None
Alternative B: Proposed Action	All activities under section 9.	Activities conducted under NMFS-approved plans or criteria for: • Recreational and commercial fisheries; • Tribal fisheries and resource management; • Habitat restoration activities; • Federal, state, and private research or monitoring; • Emergency fish rescue; and • Enforcement activities.
Alternative C	Specific categories (same as Alt A): • Fisheries harvest; • Collection and handling for any purpose (e.g., scientific research, emergency fish rescue, commercial sale, consumption); • Construction, maintenance, or operation of migration barriers in spawning or rearing habitats; • Destruction or modification of spawning or rearing habitats; • Application of pesticides or discharge of pollutants beyond accepted levels into waterways used by Southern DPS fish; • Activities that may entrain or impinge Southern DPS fish (e.g., operation of unscreened water diversions in spawning or rearing habitats, dredging, and power plant operations); and • The release or introduction of non-native species.	Activities conducted under NMFS-approved plans or criteria for: • Recreational and commercial fisheries; • Tribal fisheries and resource management; • Habitat restoration activities; • Federal, state, and private research or monitoring; • Emergency fish rescue; and • Enforcement activities.

FULL ACTION ALTERNATIVE

14. The Full Action Alternative would apply all prohibitions under section 9(a)(1) of the ESA to the Southern DPS by: (1) prohibiting the take of Southern DPS fish within the U.S., the U.S. territorial sea, or upon the high seas ["take prohibitions," ESA section 9(a)(1)(B) and (a)(1)(C)]; and (2) prohibiting the import, export, possession, sale, delivery, carrying, transport, or shipping of Southern DPS fish in interstate or foreign commerce or for commercial activity, and the violation of any regulation pertaining to the species [ESA section 9(a)(1)(A) and (a)(1)(D) through (a)(1)(G)]. The Full Action Alternative would essentially provide the Southern DPS the same protections as an endangered species. The regulations would prohibit the take of Southern DPS fish, not the activities themselves. Activities that may cause take of Southern DPS fish include, but are not limited to:

- Commercial and recreational fisheries activities that target or incidentally catch green sturgeon in California, Oregon, Washington, and Alaska. Green sturgeon are primarily caught as bycatch in white sturgeon fisheries and coastal groundfish bottom trawl fisheries.
- Tribal fisheries activities that target or incidentally catch Southern DPS green sturgeon.
- Illegal sturgeon poaching activities.
- Collecting or handling Southern DPS fish for any purpose (e.g., scientific research and monitoring, emergency fish rescue).
- Land-use activities that may disturb soil and increase sediment input into streams used by the Southern DPS, including road construction, gravel mining, fire suppression, logging, grazing, or farming.
- Activities that destroy or alter habitat used by the Southern DPS, including dredging, discharge of fill material, and draining, ditching, diverting, blocking, or altering stream channels or surface or ground water flow.
- Constructing, maintaining, or operating water diversions without adequate protective measures (fish screens) to reduce or avoid fish entrainment.
- Operating, constructing, or maintaining dams, cross-channels, or other physical structures such that they create migration barriers for the Southern DPS.
- Altering the hydrology (water flow, water temperature, etc.) of waterways used by the Southern DPS in ways that adversely affect the species.
- Applying pesticides at levels that adversely affect the biological requirements of the Southern DPS.
- Discharge or dumping of toxic chemicals or other pollutants outside legally permitted levels into waters or areas supporting the Southern DPS.
- Introducing or releasing non-native species likely to alter the Southern DPS' habitat or to compete with the Southern DPS for space or food.

If the Full Action Alternative were implemented, proposed or ongoing activities would need to be modified to avoid take of Southern DPS fish. Interested entities could apply for an ESA section 10 take permit for scientific research or enhancement activities or activities that result in incidental take. ESA section 7 consultations for Federal agency actions would need to include an evaluation of whether or not the action is likely to cause take of Southern DPS fish. Take prohibitions would not apply to take that is permitted under an ESA section 10 permit or authorized by an ESA section 7 incidental take statement.

ALTERNATIVE A

15. Alternative A is the same as the Full Action Alternative, except that the take prohibitions [ESA section 9(a)(1)(B) and (a)(1)(C)] would only apply to specific categories of activities, rather than to all activities, that affect the Southern DPS. The take prohibitions would apply to specific categories of activities of most concern that cause take of Southern DPS fish or alter its habitat in a manner detrimental to the continued existence of the species. Alternative A would prohibit the take of Southern DPS fish for the following categories of activities:

    1) Commercial, recreational, and tribal fisheries activities within areas where Southern DPS fish occur (see Section 2.1 of this EA for a list of areas).

    2) Collecting or handling Southern DPS fish for any purpose including, but not limited to, scientific research and monitoring, emergency rescue, commercial sale, and consumption.

    3) Habitat-altering activities (e.g., construction, maintenance, or operation of dams and water diversion structures) that: (a) eliminate, obstruct, or delay passage of Southern DPS fish, or otherwise result in the inability of Southern DPS fish to migrate; or (b) destroy, modify, or curtail spawning and rearing habitat of egg, larval, and juvenile stages of Southern DPS fish. The take prohibitions would apply to areas containing spawning, rearing, and migratory habitat for Southern DPS fish in California (i.e., the lower Feather River, lower Yuba River, Sacramento River, Suisun Bay, San Pablo Bay, San Francisco Bay, and the Delta).

    4) Operation of water diversion, dredging, and power plant activities that result in the entrainment or impingement of any life stage of Southern DPS fish. Take resulting from entrainment or impingement at water diversions would be prohibited in the lower Feather River, lower Yuba River, Sacramento River, Suisun Bay, San Pablo Bay, San Francisco Bay, and the Delta. Take resulting from entrainment or impingement during dredging and power plant operations would be prohibited in U.S. coastal waters within 110 m depth from Monterey, California (including Monterey Bay), to Yakutat Bay, Alaska, as well as in the Strait of Juan de Fuca, Puget Sound, Grays Harbor, Willapa Bay, the lower

Columbia River estuary, Yaquina Bay, Winchester Bay, Coos Bay, Humboldt Bay, San Pablo Bay, Suisun Bay, San Francisco Bay, and the Delta.

5) Application or discharge of pesticides, toxic chemicals, or other pollutants adjacent to or within waterways that contain any life stage of Southern DPS green sturgeon, at levels exceeding those established by the States and the Environmental Protection Agency (EPA) under the Federal Clean Water Act.

6) Introduction or release of non-native species into waters adjacent to or within waterways that contain any life stage of Southern DPS green sturgeon.

ALTERNATIVE B – PROPOSED ACTION

16. Alternative B is the same as the Full Action Alternative (i.e., apply all prohibitions under section 9(a)(1) of the ESA), but would include exceptions to the take prohibitions for activities determined to be adequately protective of the Southern DPS. Under Alternative B, take may be covered by section 10 or section 7 of the ESA, or under one of the exceptions to the take prohibitions. Alternative B recognizes that: (1) a certain level of take may be allowable and necessary for activities that benefit the Southern DPS; and (2) activities may be modified to minimize take to a level that is adequately protective of the Southern DPS. Alternative B would specify the criteria that must be met to qualify for an exception from the take prohibitions or for an approved 4(d) program under the exceptions. The criteria include requirements for monitoring and evaluation and measures to minimize take of Southern DPS fish, as well as regular review by NMFS. The exceptions would provide three major benefits:

1) an exemption from the take prohibitions for activities conducted in compliance with the 4(d) criteria or NMFS-approved 4(d) programs;

2) a mechanism for NMFS to coordinate with entities to balance conservation with the use of natural resources; and

3) the establishment of programs and activities with measures to minimize take of Southern DPS fish and contribute to the conservation of the Southern DPS.

Alternative B includes six exceptions to the take prohibitions, which include fishery management and evaluation plans, Tribal resource management plans, scientific research programs, emergency fish rescue programs, and habitat restoration activities.

Fishery Management and Evaluation Plans

17. Commercial or recreational fisheries activities conducted under a NMFS-approved Fishery Management and Evaluation Plan (FMEP) would not be subject to the take prohibitions. State or Federal fisheries management agencies would develop the FMEPs for review and approval by NMFS. FMEPs would be required to address take of all green sturgeon in order to protect the listed entity, the Southern DPS. This is necessary because NMFS currently cannot discriminate between the non-listed Northern DPS and the listed Southern DPS via fishing gear, visual indicators, or spatial or temporal distribution. An FMEP would be required to meet the following criteria:

1) prohibit retention of green sturgeon (i.e., zero bag limit);
2) establish an incidental take management strategy that sets maximum incidental take levels and includes restrictions to minimize incidental take of green sturgeon;
3) provide biologically-based rationale demonstrating that the incidental take management strategy measures will not significantly reduce the likelihood of survival or recovery of the Southern DPS;
4) include effective monitoring and evaluation plans;
5) provide for the evaluation of monitoring data and revisions to the FMEP based on the data;
6) provide for effective enforcement and education; and
7) provide for biannual reports to NMFS, including the number of green sturgeon taken in the fishery and an evaluation and summary of the effectiveness of the FMEP.

Upon approval of an FMEP, NMFS would issue a letter of concurrence that specifies the implementation and reporting requirements. NMFS would evaluate FMEPs on a regular basis and make recommendations to improve effectiveness. A public comment period of no less than 30 days would be provided prior to approval of any new or amended FMEP and prior to withdrawing approval of an FMEP.

Tribal Resource Management Plans

18. Tribal resource management activities (e.g., fishery harvest, artificial production, research, water or land management) conducted by a tribe, tribal member, tribal permittee, tribal employee, or tribal agent according to a NMFS-approved tribal resource management plan (Tribal Plan) would not be subject to the take prohibitions. A Tribal Plan may be developed by one tribe or jointly with other tribes and may vary in content. The Secretary would consult with the tribe(s) on a government-to-government basis to provide technical assistance during development of a Tribal Plan. A Tribal Plan would be eligible for approval only if the Secretary determines that implementation of the plan would not substantially reduce the likelihood of survival or recovery of the Southern DPS. NMFS would evaluate the effectiveness of the plan on a regular basis and provide recommendations on ways to alter or strengthen the plans. New or amended TFMPs and the Secretary's determination on the TFMP would be published in the *Federal Register* for public comment (≥ 30 days) prior to approval.

Scientific Research Programs

19. NMFS believes that the research and monitoring activities carried out or permitted by state fishery management agencies in Alaska, Washington, Oregon, and California benefit the conservation of the Southern DPS. These studies provide valuable information necessary to assess the status of and threats faced by green sturgeon, and for evaluating the effectiveness of management practices in promoting the recovery of the

species. However, research activities constitute take of Southern DPS fish and must be monitored to ensure that the effects of take do not cause further declines in the population.

20. Under Alternative B, the take prohibitions would not apply to Federal, state, or private-sponsored scientific research activities if those activities meet the following criteria: (1) the scientific research complies with all required state reviews and permits and NMFS sturgeon research protocols (currently under development and scheduled to be finalized by the publication of the final ESA 4(d) Rule); (2) the research activity is directed at the Southern DPS and is not incidental to research or monitoring of another species; (3) take of live mature adults in the lower Feather River, lower Yuba River, Sacramento River, the Delta, or the Suisun, San Pablo, and San Francisco bays occurs from July 1 through March 1, to reduce the likelihood of interrupting the upstream spawning migrations of adults; (4) take is non-lethal; (5) take involving the removal of any life stage of the Southern DPS from the wild does not exceed 60 minutes; (6) take does not involve artificial spawning or enhancement activities; (7) information about the research activity is provided to NMFS at least 60 days prior to the start of the study, including the study objectives and justification, a summary of the study design and methods, estimates of the total non-lethal take of Southern DPS fish anticipated, funding sources, and a point of contact; and (8) research reports are submitted to NMFS on a schedule to be determined by NMFS staff that include the total number of Southern DPS fish taken, information that supports that take was non-lethal, and a summary of the project results. Research activities that involve action, permitting, or funding by a Federal agency must comply with the requirements of section 7(a)(2) of the ESA to insure that the action will not jeopardize the continued existence of the species.

21. For state-sponsored scientific research and enhancement activities that are not covered by the exception as described above, another exception would be provided. The take prohibitions would not apply to scientific research and monitoring activities conducted under a state-sponsored scientific research program established between NMFS and state fishery management agencies, that is, Alaska Department of Fish and Game (ADFG), Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), or California Department of Fish and Game (CDFG). The state 4(d) research programs would cover research and monitoring projects involving Southern DPS fish that are conducted or coordinated by one of these state fishery management agencies, or that are conducted by recipients of a permit issued by one of these state fishery management agency. These programs would help streamline the process for researchers, state agencies, and NMFS by allowing state fishery management agencies to maintain primary responsibility for coordination and oversight of research activities.

22. State ESA 4(d) research programs have already been developed and implemented in California, Oregon, and Washington for threatened West coast salmon and steelhead ESUs. Green sturgeon would most likely be incorporated into these existing state ESA 4(d) research programs, or a separate program would need to be developed for green sturgeon. Each year, researchers would be required to submit research applications to the

state fishery management agency. The state fishery management agency would evaluate and determine which projects are eligible for inclusion in the program and transmit approved applications to NMFS for review and approval. Researchers would not be required to apply for a separate permit from NMFS. Research and monitoring activities may fall into two categories: 1) ongoing state-supported research activities; and 2) future state-supported research activities.

23. Upon incorporation of green sturgeon into the state ESA 4(d) research program or development of such a program, ongoing state-supported research activities involving direct or incidental take of Southern DPS fish could be considered for coverage under the program. Researchers would submit their applications to the state fishery management agency and the state agency would be required to provide to NMFS the following information for each project, within 120 days after publication of the final 4(d) rule: 1) an estimate of the anticipated take (direct or incidental) of Southern DPS fish; 2) a description of the study design and methodology; 3) a justification for take of Southern DPS fish and the techniques to be employed; and 4) a point of contact. For a period of one year after publication of the final 4(d) rule, take prohibitions would not apply to ongoing state-supported research activities specified in an application for inclusion in the state research program submitted to the state agency. Take prohibitions would apply if the application is determined to be insufficient, the activities are denied inclusion in the state research program, or the one year grace period lapses (whichever occurs first).

24. Future state-supported research activities involving direct or incidental take of Southern DPS fish would be considered for incorporation into a state 4(d) research program when researchers submit an application to the state fishery management agency. The state agency would be required to submit for NMFS review and approval a list of all scientific research activities involving Southern DPS fish for the coming year and information on each project as described above. For both ongoing and future state-supported research activities, the state agency would be required to provide an annual report to NMFS that, at a minimum, summarizes for each approved project the number of green sturgeon taken (direct and incidental) and the results. Written approval of the scientific research program would be provided by the NMFS Northwest or Southwest Regional Administrator.

25. Other scientific research or enhancement activities that are not covered under the exception or state 4(d) research programs as described above would require an ESA section 10(a)(1)(A) permit. The take prohibitions would not apply to ongoing research activities for up to one year after publication of the final ESA 4(d) Rule, provided an application for an ESA section 10(a)(1)(A) permit is submitted to NMFS within 120 days after publication of the final ESA 4(d) Rule. This one year grace period would allow time for NMFS to review the applications. The take prohibitions would apply again if the application is declared insufficient, the permit is denied, or the one year grace period expires, whichever occurs first. If a complete permit application is submitted within 120 days after publication of the final ESA 4(d) Rule, but NMFS is not able to issue a permit

within one year after publication of the final ESA 4(d) Rule, ongoing research activities may continue until NMFS issues or denies a permit.

Emergency Fish Rescue Programs

26. NMFS believes that emergency fish rescue activities would contribute to the conservation of the Southern DPS. Emergency fish rescue activities include: aiding sick, injured, or stranded fish; disposing of dead fish; or salvaging dead fish for use in scientific studies. Collecting and handling fish should be conducted by trained personnel to protect fish from further injury and to ensure proper disposal of dead fish. Take prohibitions would not apply to emergency fish rescue activities conducted by, or in coordination with, NMFS, the U.S. Fish and Wildlife Service (USFWS), any Federal land management agency, or CDFG, ODFW, WDFW, or ADFG. The take prohibitions would not apply as long as the activity complies with required state or other Federal reviews or permits, benefits the Southern DPS, and occurs only because of emergency situations resulting form natural disasters, national defense, or security emergencies (see 50 CFR 402.05). Within 30 days after conducting the emergency rescue, each agency would be required to submit a report to NMFS including, at a minimum, the number and status of green sturgeon handled and the location of rescue and/or salvage operations. Project-related activities (e.g., salvaging fish trapped behind a man-made weir or dam) would not be considered an emergency fish rescue activity and would be subject to review under ESA section 7 or 10, or under another 4(d) program.

Habitat Restoration Activities

27. Habitat restoration activities conducted for the primary purpose of restoring natural aquatic or riparian habitat conditions or processes are likely to contribute to the conservation of the Southern DPS. These activities may include barrier removal or modification to restore water flow, riverine or estuarine bed restoration, natural bank stabilization, restoration of native vegetation, removal of non-native species, or removal of contaminated sediments. The take prohibitions would not apply to habitat restoration activities that meet the following criteria: (1) comply with required state and Federal reviews and permits; (2) submit a detailed description of the restoration activity to NMFS at least 60 days prior to the start of the project, including the geographic area affected, when the activities will occur and how they will be conducted, demonstration that all state and Federal regulatory requirements have been met, identification of funding sources, the severity of impacts (direct, indirect, and cumulative) on the Southern DPS, a description of methods to be used to ensure the likelihood of survival or recovery of the Southern DPS is not reduced, a plan for minimizing and mitigating any adverse impacts to spawning or rearing habitat, an estimate of the number of Southern DPS that may be taken and how that estimate was made, a plan for effective monitoring and adaptive management, a pledge to use best available science and technology, and a point of contact; and (3) progress reports are submitted on a schedule to be determined by NMFS staff, including the total number of Southern DPS fish taken, whether the take was lethal or not, a summary of the project status, and any changes in the methods employed. Habitat restoration activities carried out, permitted, or funded by a Federal agency must

comply with requirements under section 7(a)(2) of the ESA to insure that the action will not jeopardize the continued existence of the Southern DPS.

Enforcement Activities

28. Enforcement of the ESA and its implementing regulations is an essential component of protecting and recovering species once they are listed and may involve take. For example, when acting in the course of his or her official duties, a NMFS enforcement agent investing an alleged ESA take violation may need to collect a Southern DPS fish or samples thereof as evidence of the violation. Alternative B would provide an exception from the take prohibitions under which take of the Southern DPS without a permit would be allowed if conducted by an employee of NMFS in the course of his or her official duties and if such action is necessary for purposes of enforcing the ESA or its implementing regulations.

ALTERNATIVE C

29. Alternative C is the same as Alternative A (i.e., apply the take prohibitions to specific categories of activities), but would include the same exceptions to the take prohibitions as described for Alternative B. Alternative B and C differ primarily in the application of the take prohibitions. Alternative B would prohibit all take of Southern DPS fish, whereas Alternative C would prohibit the take of Southern DPS fish in specific categories of activities. Activities would need to be modified to avoid take of Southern DPS fish. Otherwise, take could be exempted from the take prohibitions under one of the exceptions, permitted by an ESA section 10 permit, or authorized by an ESA section 7 incidental take statement (for Federal agency actions).

SECTION 2 | DESCRIPTION OF AFFECTED ENTITIES

2.1 OVERVIEW

30. After the 4(d) rule goes into effect, activities affecting green sturgeon must change to avoid taking green sturgeon and avoid being in violation of the ESA. This analysis focuses on understanding the economic impacts of avoiding take of green sturgeon.

31. This approach does not assume the world will remain unchanged in the absence of regulation. Instead, it projects a future course of the world as a baseline, one that may involve substantial changes in economic and other conditions. It then projects another course in which the regulation has taken effect. The impacts of the regulation are then analyzed in terms of the differences between the two courses. Changes that would exist in the absence of the regulation are included in the baseline, and thus do not add to the regulation's benefits or costs.

SECTION 7 CONSULTATIONS

32. The listing of the species requires section 7 consultations for activities that may adversely affect the species and involve Federal action, funding, or permitting. However, because take prohibitions are currently not in effect for green sturgeon, NMFS cannot issue incidental take statements for the species. Some consultations have included draft incidental take permits for green sturgeon in advance of the (4)d rule. However, terms and conditions, which constitute the non-discretionary changes to projects that must occur, have not been put into effect. For example, one consultation states: "The section 9 prohibitions against taking of listed species and the terms and conditions in the Incidental Take Statement of this biological opinion will not apply to North American green sturgeon until the final section 4(d) ruling under the ESA has been published in the Federal Register."[1] As such, this analysis assumes that changes to economic activities that result from section 7 consultations for the green sturgeon are directly related to implementation of the 4(d) rule, i.e., these impacts are not baseline.

[1] Biological Opinion on Mountain House Wastewater Treatment Plant (MHWWTP) expansion project in San Joaquin County, California, and its effects on Federally listed endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*), threatened Central Valley spring-run Chinook salmon (*0. tshawytscha*), threatened Central Valley steelhead (*0. mykiss*), threatened southern distinct population segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and designated critical habitat for Central Valley steelhead in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), September 1, 2006.

OVERLAP WITH SALMON AND STEELHEAD SPECIES

33. As presented in Exhibit 2-1, green sturgeon habitat almost entirely overlaps listed West Coast salmon and steelhead species habitat. The riverine areas also largely overlap designated critical habitat areas for West Coast salmon and steelhead species, as shown in Exhibit 2-2. While the habitat area affected by the 4(d) rule supports numerous other listed species, salmon and steelhead are most closely related in terms of habitat requirements and threats.

34. Because of the high visibility and regional importance of salmon and steelhead species, numerous protections have already been undertaken on behalf of these species. For example, a critical habitat analysis for salmon and steelhead examined nearly 1,100 consultation actions over three years, or approximately 370 actions annually for salmon and steelhead species. These actions included nearly 30 agencies in addition to NMFS.[2] In another example, the California Habitat Restoration Project Database, a database created in 1999 to capture and maintain data about habitat restoration projects in California benefiting anadromous fish, currently contains nearly 3,000 projects, of which 2,400 are completed and 600 are ongoing.[3] A number of other initiatives have been undertaken to address human-induced impacts on anadromous species, many of which are summarized in Appendix A.

35. For some economic activities, it appears likely that actions taken to protect salmon and steelhead species will be considered adequate to protect green sturgeon. The following section describes specific regulatory efforts that may benefit green sturgeon, a large number of which were developed to address threats to salmon and steelhead species.

[2] NMFS, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005.

[3] Fish barrier data is available from the Calfish program, a cooperative effort headed by CDFG Wildlife and Habitat Data Analysis Branch and CDFG NCNCR Information Services Branch. Accessed at http://www.calfish.org/ on August 21, 2007.

EXHIBIT 2-1. OVERLAP OF GREEN STURGEON STUDY AREA WITH SALMON/STEELHEAD ESUS

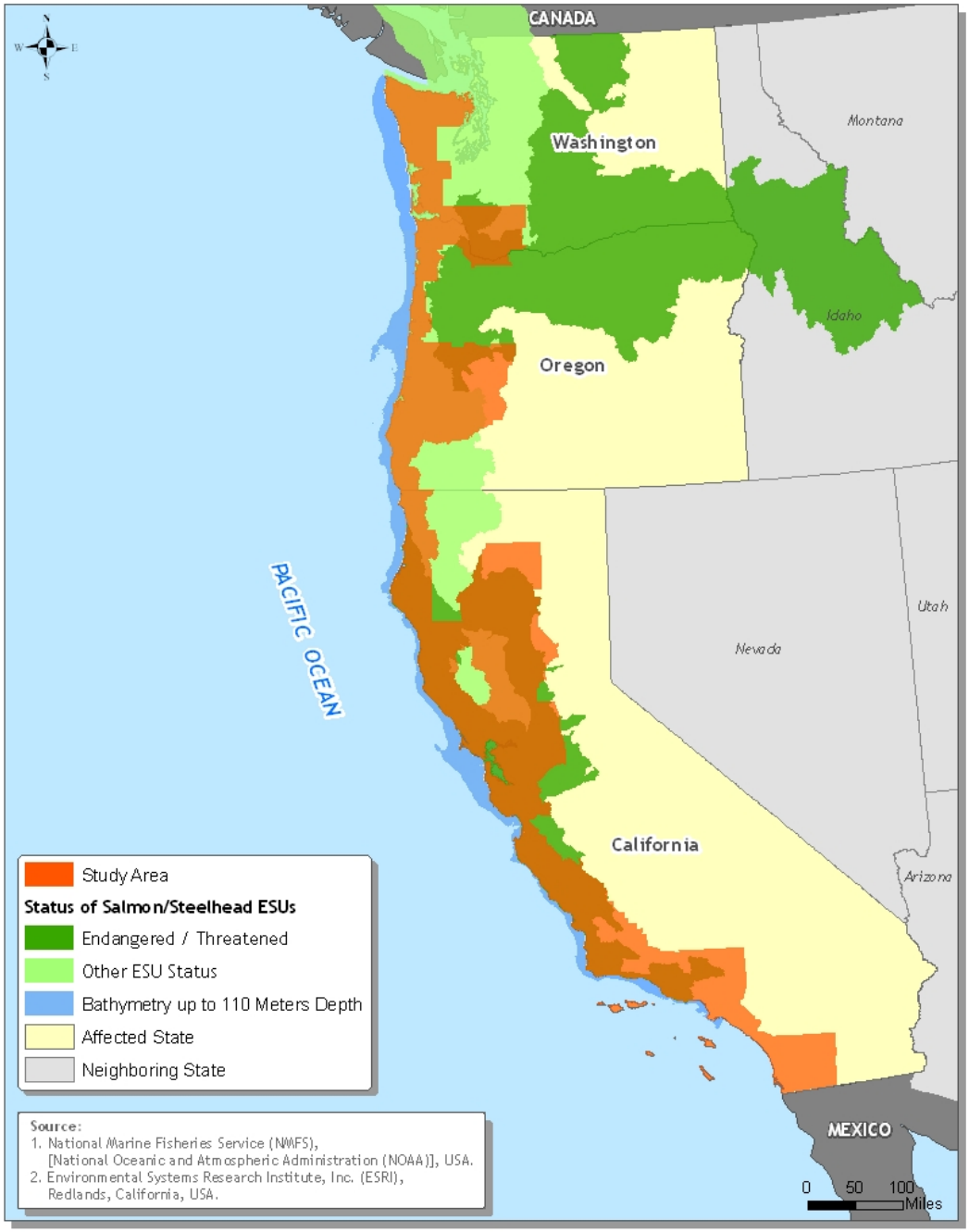
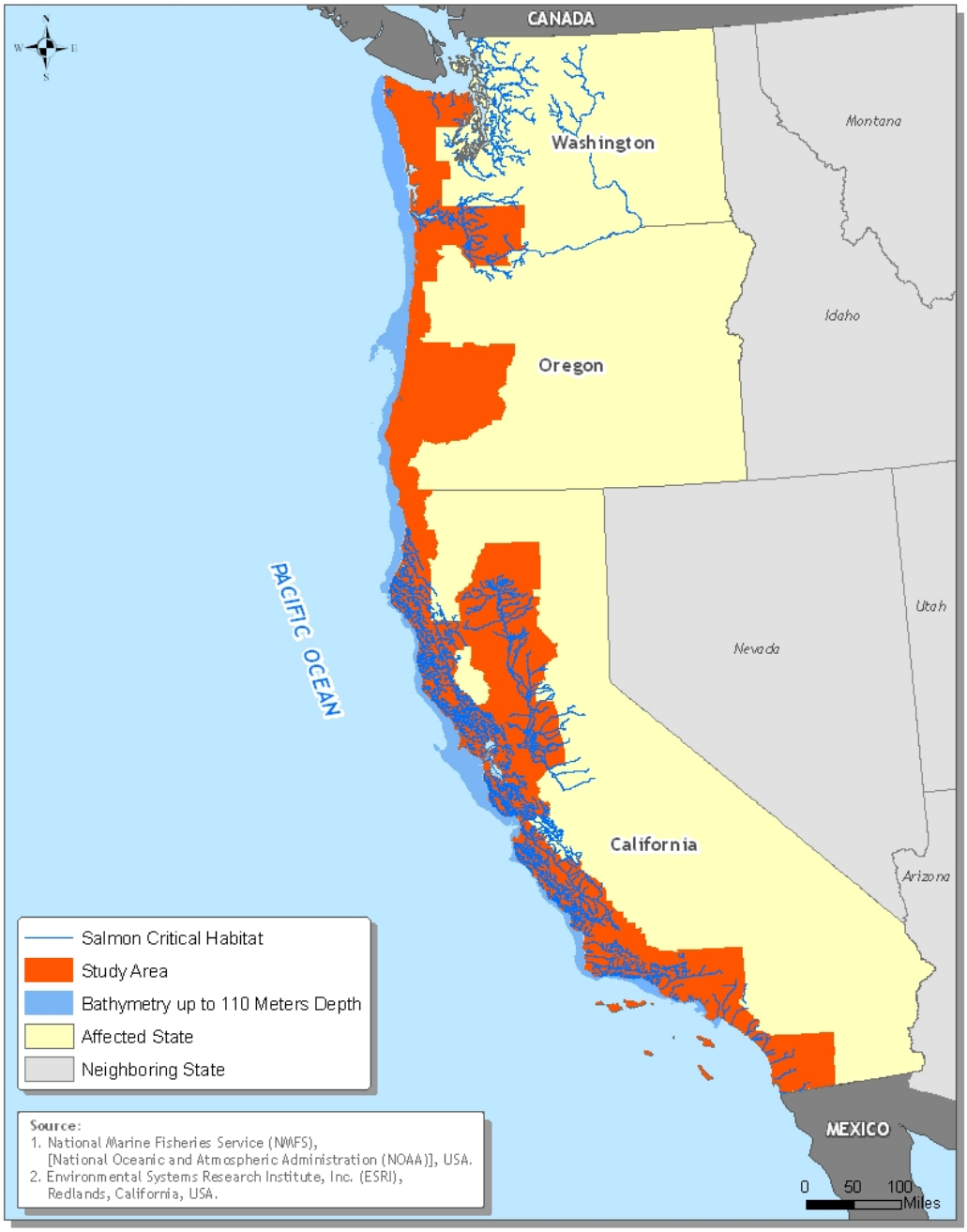


EXHIBIT 2-2. OVERLAP OF GREEN STURGEON STUDY AREA WITH SALMON/STEELHEAD CRITICAL HABITAT



36. It is worth noting that every consultation of the approximately 20 completed formal consultations that have addressed impacts on green sturgeon to date also address impacts to one or more listed salmon and/or steelhead species. Species included in green sturgeon consultations to date have largely been located in Northern California. These are summarized in Exhibit 2-3.

EXHIBIT 2-3. SALMON AND STEELHEAD SPECIES INCLUDED IN GREEN STURGEON CONSULTATIONS TO DATE

SPECIES (ESU)	STATUS	LISTING DATE	CRITICAL HABITAT DATE
Salmon, Chinook (Sacramento River winter-run)	Endangered	1/4/94	6/16/93
Salmon, Chinook (Central Valley spring-run)	Threatened	6/28/05	9/2/05
Salmon, Chinook (California Coastal)	Threatened	6/28/05	9/2/05
Salmon, Chinook (Central Valley fall/late fall-run)	Species of Concern	None	None
Salmon, coho (Central California Coast)	Endangered	6/28/05	5/5/99
Salmon, coho (Southern Oregon/Northern California Coast)	Threatened	6/28/05	5/5/99
Steelhead (California Central Valley)	Threatened	1/5/06	9/2/05
Steelhead (Central California Coast)	Threatened	1/5/06	9/2/05
Steelhead (South-Central California Coast)	Threatened	1/5/06	9/2/05
Steelhead (Northern California)	Threatened	1/5/06	9/2/05

LAWS AND REGULATIONS THAT PROTECT GREEN STURGEON

37. Federal laws other than the ESA, as well as State and local laws and regulations may protect green sturgeon even in the absence of section 4(d) take prohibitions. In many cases, a law or regulation directly affects an activity that also has the potential to affect green sturgeon. In those cases, this analysis incorporates the economic impacts of these other measures into the baseline (i.e., it does not consider them). Laws and Regulations that may provide some protections to green sturgeon are presented in Appendix A.

2.2 AFFECTED INDUSTRIES

38. This analysis classifies activities potentially affected by take prohibitions into 13 industry groups. The following sections describe how entities in potentially affected industries may change their activities in response to the 4(d) rule for the green sturgeon. A great deal of uncertainty exists with regard to how potentially regulated entities will attempt to avoid take for green sturgeon. This is caused by two factors: relatively little data exist on green sturgeon abundance and behavior, and NMFS has a short history of managing for green sturgeon.

39. In addition, the habitat for green sturgeon largely overlaps habitat for salmon and steelhead species. Several key variables, such as whether current fish passage facilities and fish screens designed to protect salmon species will be considered adequate to provide passage for green sturgeon over the long term, remain undetermined at this time. Thus, while a great deal of baseline protections are expected to be afforded to green sturgeon on behalf of salmon and steelhead species, the degree to which additional measures will be required for green sturgeon has not been determined. As such, this analysis does not provide estimates of total costs of conservation measures likely to be undertaken for green sturgeon. Instead, the analysis characterizes potential impacts on affected industries, and provides per project cost estimate information where possible.

2.3 COMMERCIAL, RECREATIONAL AND TRIBAL FISHERIES

40. Fisheries activities may result in direct take of Southern DPS fish. NOAA states that green sturgeon are currently taken as bycatch in commercial and recreational white sturgeon fisheries, salmon gill-net fisheries, coastal groundfish trawl fisheries, and coastal California set-net fisheries. Exhibit 2-4 presents observed annual green sturgeon landings in Oregon and Washington from 1981 through 2004. Green sturgeon catch declined overall during that period, with only 6,000 pounds of green sturgeon caught in 2004, down from a peak of 170,000 pounds in 1986.[4]

41. Bycatch reduction measures, including gear modifications, time/area closures, and shorter fishing seasons, are currently considered as part of fishery management plans (FMPs). Bycatch rates and discard survival are monitored through industry reports, at-sea observer programs, dockside sampling programs, and other monitoring activities under these plans. The Pacific Fishery Management Council (PFMC) and the North Pacific Fishery Management Council (NPFMC), two of eight regional fishery management councils established by the Magnuson-Stevens Fishery Conservation and Management Act, manage fisheries in the Exclusive Economic Zone, which is the area between three and 200 miles offshore of the U.S. coastlines of Washington, Oregon, California, and Alaska. The Councils' fisheries management process is based on FMPs that contain a set of management objectives and strategies for implementing them. The PFMC currently has FMPs for salmon, groundfish, coastal pelagic species, and highly migratory species. The NPFMC has FMPs for salmon, groundfish, crab and scallop. Annual fishery plans are developed under FMPs to meet year-specific circumstances related to the status of the stocks affected by the fisheries. NMFS reviews and approves these annual fishery plans and has also conducted an EIS on methods for implementing fishery management as part of the annual planning process.[5]

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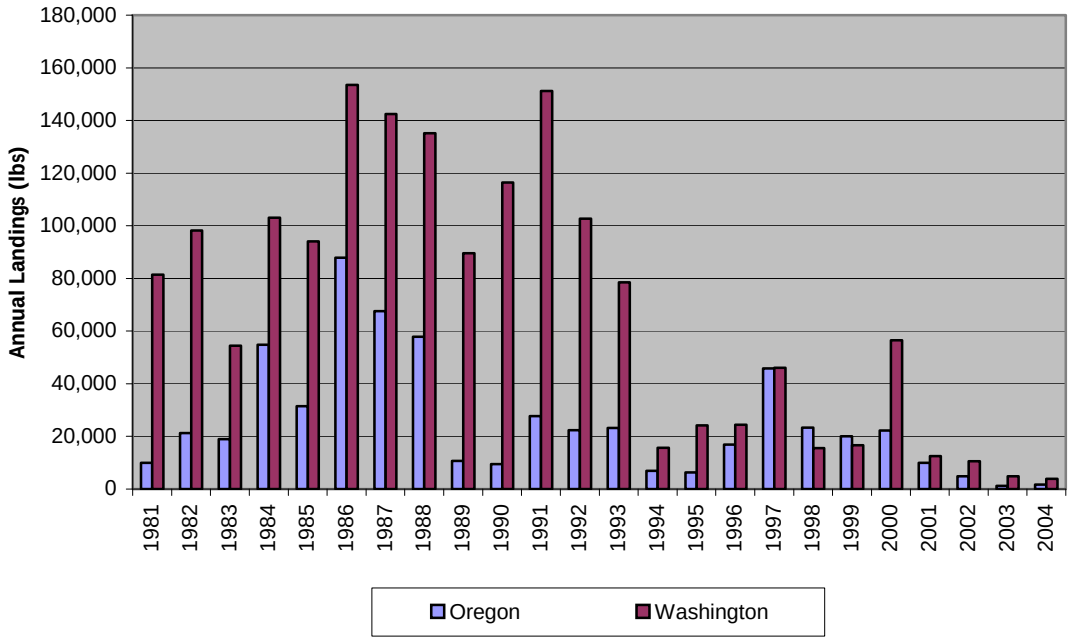
[4] Green sturgeon landings were not available for California over the same period.

[5] "Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin," National Marine Fisheries Service, Northwest Region, and Alaska Department of Fish and Game, November 2003.

EXHIBIT 2-4. ANNUAL GREEN STURGEON LANDINGS IN OREGON AND WASHINGTON (1981-2004)



Source: NOAA Fisheries, Office of Science and Technology, Annual Commercial landing statistics, accessed at http://www.st.nmfs.noaa.gov/st1/commercial/landings/annual_landings.html Queried on January 16, 2007. Green sturgeon landings were not available for California over the same period.

42. Exhibit 2-5 summarizes the status of fisheries that are known to take green sturgeon as bycatch. The following sections describe each fishery in more detail.

EXHIBIT 2-5. SUMMARY OF FISHERIES HARVESTING GREEN STURGEON AS BYCATCH, BY STATE

STATE	STATE-MANAGED			FEDERALLY-MANAGED
	WHITE STURGEON	SALMON	STEELHEAD	GROUNDFISH
California	Recreational	None	None	Commercial
Oregon	Commercial, Recreational, & Tribal	Commercial, Recreational, & Tribal	Commercial, Recreational, & Tribal	Commercial
Washington	Commercial & Recreational	Commercial & Recreational	Commercial & Recreational	Commercial

Note: Eight green sturgeon have been recorded in observed sets in the at-sea hake fishery and Alaska groundfish trawl fishery since 1990. Source: Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin," National Marine Fisheries Service, Northwest Region, and Alaska Department of Fish and Game, November 2003 citing J. Ferdinand and V. Tuttle, NMFS, Seattle, WA. Personal communication. November 2006.

CONSERVATION MEASURES TO PROTECT THE GREEN STURGEON

43. With regard to fisheries, the Proposed 4(d) Rule states that additional measures that may be implemented in order to protect the Southern DPS include:

- zero retention of green sturgeon in all fisheries;
- minimizing incidental catch;
- monitoring of incidental catch;
- increased enforcement;
- fisheries closures in areas important to the species; and
- outreach and education on proper catch and release methods and green sturgeon conservation issues.

The Proposed Action (Alternative B) and Alternative C provide an exception that would allow for take of green sturgeon in commercial and recreational fisheries "if fisheries activities were conducted under approved Fisheries Management and Evaluation Plans (FMEPs). We believe that, in many cases, fisheries for non-listed fish will have acceptably small impacts on the threatened Southern DPS as long as state fishery management programs are specifically tailored to meet certain criteria." The Full Action Alternative and Alternative A do not provide this exception.

IMPACTS ON THE FISHING INDUSTRY

44. Impacts on the fishing industries in affected states will depend on the particular responses by managing agencies, but could include, given the additional measures described in the Alternative B (Proposed Action):

- Loss of fishing days/value of catch due to fishing area closures, or altering the length of fishing seasons. Depending on the extent and duration of closures, impacts could vary widely. As a result, fishing closures may result in the largest economic impacts on the fishing industry of potential impacts.
- Gear modifications/restrictions. Specific gear modifications that could be required to avoid green sturgeon bycatch have not been identified at this time.
- Costs of expanding NOAA's Observer Program to include observers on additional vessels and/or during additional periods.
- Administrative costs to modify FMEPS to include green sturgeon.

45. To the extent that incremental fisheries closures are undertaken for green sturgeon or gear modifications or restrictions are required, green sturgeon take prohibitions could affect commercial and recreational fishing efforts. However, the degree to which closures may be implemented are unknown at this time for any alternative. Exhibit 2-6 summarizes the number of potentially affected fishing entities (vessels) by commercial fishery by state. The following sections describe the current status of the existing fisheries, the number of potentially affected entities, and the estimated annual value of fisheries.

EXHIBIT 2-6. NUMBER OF POTENTIALLY AFFECTED ENTITIES BY COMMERCIAL FISHERY, BY STATE[1]

STATE	STATE-MANAGED		FEDERALLY-MANAGED	TOTAL
	WHITE STURGEON[1,2]	SALMON & STEELHEAD[1,2]	GROUNDFISH[2]	
California	0	682	471	1,153
Oregon	N/A	736	268	1,004
Washington	N/A	409	135	544
TOTAL	**N/A**	**1,827**	**874**	**2,701**

Notes:
1. Commercial sturgeon, salmon and steelhead fisheries in the Columbia River basin are managed collectively as the Columbia River Gillnet fishery and are managed under the terms of the Columbia River Fish Management Plan (CRFMP). The number of potentially affected entities includes approximately 315 licenses issued in the Columbia River Gillnet fishery for 2004.
2. Review of the West Coast Commercial Fishing Industry in 2004, Pacific States Marine Fisheries Commission. Prepared by the Research Group for the Pacific States Marine Fisheries Commission, September 2006. Vessel counts include home port vessels as well as out-of-state vessels making landings in each state. The study notes that tracking individual vessels for mobility between fisheries was difficult, and thus vessel counts are not exact.

46. Some level of existing protections for salmon and groundfish species may benefit green sturgeon, e.g., fishing windows (seasons), gear, NOAA's Observer program.

COMMERCIAL STURGEON FISHERIES

Washington

47. Several state-managed commercial white sturgeon fisheries exist in Washington. Commercial sturgeon gillnet fisheries exist in the lower Columbia River, Willapa Bay, and Grays Harbor. Commercial catch in Washington was 2.3 million pounds of white sturgeon and 4,100 pounds of green sturgeon in 2005 (green sturgeon represented 1.8 percent of sturgeon landed by weight).[6] The value of commercial sturgeon landings in all of Washington has remained relatively steady between 2004 and 2006, with ex-vessel revenues for white sturgeon averaging $367,000 annually, compared to $4,600 for green sturgeon.[7] Green sturgeon represented roughly 1.3 percent of total landed sturgeon during the period, as measured by revenue. Since July 2006, retention of green sturgeon Washington Columbia River commercial fisheries has been prohibited by emergency rule. Washington State adopted a permanent rule on January 26, 2007 to prohibit the retention of green sturgeon in commercial fisheries statewide.

[6] Pacific Coast Fisheries Information Network (PACFIN), Washington All Species Report, Accessed at http://www.psmfc.org/pacfin/ September 2007.

[7] Ibid.

Oregon

48. Within Oregon waters, a state-managed commercial sturgeon fishery is open in the Columbia, Siuslaw, Coos, and Coquille Rivers and the Pacific Ocean. White sturgeon landings were 177,000 round pounds in 2006.[8] Green sturgeon landings were 900 in 2006. Green sturgeon represented less than one percent of sturgeon catch by weight between 2004 and 2006. The value of commercial sturgeon landings in all of Oregon has been very stable between 2004 and 2006, with ex-vessel revenues for white sturgeon averaging $343,000 annually, compared to $1,200 for green sturgeon. Green sturgeon represented roughly 0.4 percent of total landed sturgeon during the period, as measured by revenue.[9] Since July 2006, retention of green sturgeon in Oregon commercial fisheries on the Lower Columbia River has been prohibited by emergency rule. Retention of green sturgeon is still allowed in Oregon commercial fisheries outside of the lower Columbia River.

California

49. The commercial sturgeon fishery in California has been closed since 1917, following a decline in sturgeon populations in the late 1800s due to heavy commercial fishing.

COMMERCIAL SALMON AND STEELHEAD FISHERIES

50. Green sturgeon are caught as bycatch in the non-Indian commercial and recreational salmon and steelhead fisheries in the lower Columbia River, Willapa Bay, and Grays Harbor. These fisheries are regulated by the states of Washington and Oregon. As in the white sturgeon fishery, retention of green sturgeon is prohibited. Exhibit 2-7 summarizes the value and total weight of commercial salmon and steelhead fisheries in Oregon, Washington and California (2004 to 2006).[10]

EXHIBIT 2-7. COMMERCIAL LANDED CATCH (AVERAGE FROM 2004-2006)

SPECIES GROUP	MEASURE	WASHINGTON	OREGON	CALIFORNIA	TOTAL
Salmon	Ex-Vessel Revenue	$19.1 million	$9.5 million	$12.1 million	$40.6 million
	Round-Weight (lbs)	24.9 million	4.14 million	4.43 million	33.5 million
Steelhead	Ex-Vessel Revenue	$0.4 million	$0.004 million	$0	$0.4 million
	Round-Weight (lbs)	0.3 million	.011 million	0	0.3 million

Source: Pacific Coast Fisheries Information Network (PACFIN), W-O-C All Species Report, Accessed at http://www.psmfc.org/pacfin/ September 2007.

[8] Pacific Coast Fisheries Information Network (PACFIN), Oregon All Species Report, Accessed at http://www.psmfc.org/pacfin/ September 2007.

[9] Ibid.

[10] Pacific Coast Fisheries Information Network (PACFIN), W-O-C All Species Report, Accessed at http://www.psmfc.org/pacfin/ September 2007.

51. In Alaska, the total value of the commercial salmon fishery (measured by ex-vessel value) increased from $205.1 to $255.0 million between 2001 and 2005. This corresponds with a total catch of 689 and 698 million pounds in 2001 and 2005, respectively.[11]

COASTAL GROUNDFISH FISHERIES

52. Groundfish include rockfish, flatfish, roundfish, skates, sharks, and other species of fish and may be harvested using trawl, troll, longline, hook-and-line, pot, gillnet, and other types of gear. Green sturgeon bycatch occurs in commercial groundfish trawl fisheries off the coasts of California, Oregon, Washington, and Alaska, including the at-sea hake fishery. Green sturgeon are primarily taken in the West coast groundfish trawl fishery off the coast of California. Between 2001 and 2007, 450 green sturgeon were recorded by groundfish observers off the California coast. In contrast, only eight green sturgeon were recorded by observers in the at-sea hake fishery and Alaska groundfish trawl fishery since 1990.[12]

53. Between 2000 and 2005, groundfish landings in Washington, Oregon, and California fluctuated between 279 and 304 million pounds, with a low of 170 million pounds in 2002. This corresponds with an ex-vessel value of $65.1 million in 2000, as compared to $56.5 million in 2005.[13]

54. In 2003 and 2004, total groundfish landings in Alaska were approximately 4.8 billion pounds each year, or 2.17 million metric tons.[14] The value of Alaska groundfish fisheries remained relatively stable between 2000 and 2004, with a maximum of $1.2 billion and a minimum of $1.1 billion in 2000 and 2002, respectively.[15]

RECREATIONAL STURGEON FISHERIES

55. State-managed recreational sturgeon fisheries occur in California, Oregon, and Washington. Similar to commercial fisheries, white sturgeon are the primary target sturgeon species. Overall, the total catch (with releases) of sturgeon in the tri-state area

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[11] National Marine Fisheries Service, Steller Sea Lion And Northern Fur Seal Research, Final Programmatic: Environmental Impact Statement, May 2007, accessed at http://www.nmfs.noaa.gov/pr/pdfs/permits/eis/fpeis.pdf, October 2007.

[12] "Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin," National Marine Fisheries Service, Northwest Region, and Alaska Department of Fish and Game, November 2003 citing J. Ferdinand and V. Tuttle, NMFS, Seattle, WA. Personal communication. November 2006.

[13] National Marine Fisheries Service, Steller Sea Lion And Northern Fur Seal Research, Final Programmatic: Environmental Impact Statement, May 2007, accessed at http://www.nmfs.noaa.gov/pr/pdfs/permits/eis/fpeis.pdf, October 2007. Ex vessel value is the post-season adjusted price per pound for the first purchase of commercial harvest. The ex-vessel value is usually established by determining the average price for an individual species, harvested by a specific gear, in a specific area.

[14] Ibid.

[15] Ibid.

remained relatively stable between 2005 and 2006, averaging 5.6 million fish each year. In 2004, the total catch was significantly larger, totaling 16.9 million.[16]

Washington

56. Washington reports that 25,764 sturgeon were caught by recreational anglers in the 2001 fishing season. Of these 85 were identified as green sturgeon and 86 were unclassified.[17] Regulations prohibiting the retention of green sturgeon in recreational fisheries are currently in effect throughout Washington state (as of May 1, 2007).

Oregon

57. Between 1986 and 1999, catch record cards were issued for sturgeon in Oregon, but did not differentiate between white and green sturgeon. During that period, an average of 45,000 sturgeon tags were issued annually.[18] In 2000, an Adult and Juvenile Combined Fish Tag combined the salmon-steelhead, sturgeon and halibut tags. New regulations prohibiting the retention of green sturgeon in recreational fisheries are currently in effect for the Columbia River downstream of the Bonneville Dam (as of January 1, 2007). Retention of green sturgeon is still allowed in recreational fisheries in Oregon outside of the lower Columbia River.

California

58. New regulations prohibiting the retention of green sturgeon in recreational fisheries are currently in effect throughout California, as of March 1, 2007.

RECREATIONAL SALMON FISHERIES

59. In Washington, 639,763 salmon were caught in marine areas, 405,324 salmon in freshwater, and an additional 11,042 salmon caught in unknown areas in the 2000-2001 fishing year, for a total of approximately 1.1 million fish caught. The number of steelhead catch record cards were 75,976 in the 2001-2002 fishing year in Washington.[19] In Oregon, catch record cards for salmon and steelhead were 172,299 in 1999.[20]

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[16] Pacific States Marine Recreational Fisheries Monitoring (RECFIN) database, accessed September 2007 at http://www.recfin.org/.

[17] Manning, Terrie and Sheila Smith. Washington State Sport Catch Report 2001, Washington Department of Fish and Wildlife, May 2005.

[18] Oregon Department Of Fish And Wildlife, Sales And Fees Of Fishing Licenses And Tags By Calendar Year, 2007, accessed at http://www.dfw.state.or.us/ODFWhtml/economic_information/salesbyfish_1975-2003.pdf on September 5, 2007.

[19] Manning, Terrie and Sheila Smith. Washington State Sport Catch Report 2001, Washington Department of Fish and Wildlife, May 2005.

[20] Oregon Department Of Fish And Wildlife, Sales And Fees Of Fishing Licenses And Tags By Calendar Year, 2007, accessed at http://www.dfw.state.or.us/ODFWhtml/economic_information/salesbyfish_1975-2003.pdf on September 5, 2007. As noted above, salmon-steelhead, sturgeon and halibut tags were combined.

TRIBAL FISHERIES

60. Sturgeon habitat areas encompass lands owned by several Federally recognized Indian Tribes.

61. The Quinault Indian Nation conducts a commercial/subsistence sturgeon fishery in Grays Harbor. White sturgeon are the primary target species of this fishery. Green sturgeon are occasionally encountered, but usually not retained. After the Southern DPS was listed, the Quinault Indian Nation adopted a zero retention policy for green sturgeon.[21]

62. Bycatch of green sturgeon also occurs in Tribal fisheries for salmon and steelhead in Grays Harbor and Willapa Bay.[22] Exhibit 2-8 describes Federally recognized Indian Tribes within the study area by region.

EXHIBIT 2-8. FEDERALLY RECOGNIZED INDIAN TRIBES WITHIN THE GREEN STURGEON STUDY AREA

REGION	FEDERALLY RECOGNIZED TRIBES
Sacramento Region	Cachil DeHe Band of Wintun Indians of the Colusa Indian Colusa Rancheria; Mooretown Rancheria of Maidu Indians
California Region	Big Lagoon Rancheria; Cher-Ae Heights Indian Community of Rancheria; Elk Valley Rancheria; Smith River Rancheria
Oregon Region	Confederated Tribes of the Coos, Lower Umpqua, & Siuslaw Tribe; and Cow Creek Band of Umpqua
Washington Columbia Region	Cowlitz Indian
Washington Coastal	Hoh Indian Tribe & Reservation; Jamestown S'Klallam Tribe; Lower Community of the Lower Elwha; Makah Indian Tribe & Tribe & Reservation; Quinault Tribe & Reservation; and Shoalwater Indian
Alaska Coastal	Yakutat Tlingit Tribe
Sources: 70 FR 71194, November 25, 2005; U.S. Bureau of Indian Affairs. Notes: No federally recognized Indian Tribes are located within the San Francisco Bay or Oregon Columbia River regions.	

2.4 DAMS, POWER PLANTS AND WATER DIVERSIONS

63. Operation of flood control projects, pumping plants, water diversions, water intake structures, hydropower projects, fish screen projects, and coastal power plants may affect green sturgeon. In the region affected by this rule, these projects provide water, as well as power and flood protection, to a wide variety of public and private uses. Generally, Federal agencies, State agencies, regional public agencies, and regional private agencies supply water to end users by means of highly developed water systems consisting of dams and reservoirs, pumping plants, power plants and aqueducts. Agricultural

[21] "Final Programmatic Environmental Impact Statement for Pacific Salmon Fisheries Management off the Coasts of Southeast Alaska, Washington, Oregon, and California, and in the Columbia River Basin," National Marine Fisheries Service, Northwest Region, and Alaska Department of Fish and Game, November 2003 citing J. Schumacker, Quinault Indian Nation, WA. Personal communication. November 2006.

[22] Ibid.

operations rely on water diversion for irrigation of crops. Municipal suppliers provide water and power for both commercial and residential use.

64. The Proposed Action describes two primary categories of impacts to green sturgeon that may result from dams and water diversions:

1) Operation of dams and water diversions may cause entrainment and impingement of green sturgeon. This may affect all life stages of green sturgeon and therefore is a threat wherever sturgeon are found.

2) Construction, maintenance, or operation of dams and diversions may eliminate, obstruct, or delay upstream and/or downstream passage of green sturgeon to and from spawning habitats.

CONSERVATION MEASURES TO ADDRESS IMPACTS OF DAMS AND DIVERSIONS

65. As stated above, operation of dams and water diversions pose entrainment and impingement threats to all life stages of the Southern DPS, and threats to spawning and rearing habitat. The Proposed Action identifies separate conservation measures for the two categories of potential impact on sturgeon. These measures are summarized in Exhibit 2-9.

EXHIBIT 2-9. POTENTIAL CONSERVATION MEASURES FOR DAMS AND DIVERSIONS

PURPOSE OF CONSERVATION MEASURE	POTENTIAL CONSERVATION MEASURE
Minimize entrainment and impingement	• Installation of fish screens; • Construction of bypass and other fish protection facilities; • Adjustments in the timing of operations; • Fish salvage operations; • (for coastal power plants) Altering the timing of day when water intake pumps are operated, altering the velocity of water intake; and use of alternative cooling systems that do not require water intake.
Minimize elimination, obstruction, or delay of upstream and/or downstream passage of green sturgeon to and from spawning and rearing habitats	• Installation of adequate fish passage facilities, or modification of existing facilities; • Other measures to specifically aid sturgeon passage at dams and diversions; • Application of other fish salvage measures, such as salvage operations.
Source: Proposed Rulemaking to Establish Take Prohibitions for the Threatened Southern Distinct Population Segment of North American Green Sturgeon	

IMPACTS ON DAMS AND DIVERSIONS

66. Dam owners and operators may undertake capital, programmatic, and/or operational changes to existing projects in order for projects to comply with take prohibitions. The primary conservation efforts likely to be undertaken to avoid take of green sturgeon

appear to be the installation of fish screens and the construction of fish passage facilities to accommodate green sturgeon. It is also possible that some changes to the operations of dams could be required to reduce entrainment or impingement, or to reduce impacts on spawning habitat. These changes may occur in response to section 7 consultations, section 10 permits, or otherwise. It is possible diversions with screens that meet salmon/steelhead criteria may not require modifications those screens. Given the large amount of overlap in habitat areas with salmon species, incremental effects of the sturgeon rulemaking may be minimal related to fish screens.

67. It should be noted that individual dams vary substantially in their potential for harming green sturgeon, and thus the type and extent of necessary modifications to avoid take will vary. Following the pattern established by listed West coast salmon and steelhead species, it appears likely that the changes needed to accommodate the biological needs of the green sturgeon at a particular dam or diversion project will be determined on a case by case basis. Thus, until a particular project is reviewed by NMFS, the type and level of changes necessary and feasible to avoid take of the species is speculative, and the data needed to estimate these impacts for all projects are not available. The following sections present a brief review of the status of existing dam projects with respect to fish screens and fish passage within the range of the green sturgeon, to the extent that information is available.

Fish Passage

68. According to the Proposed Action, the dams within spawning areas for sturgeon are most likely to need to create fish passage for the green sturgeon. The primary barriers likely to be targeted for passage issues include the following barriers in the Sacramento River and San Francisco Bay areas:[23]

- Red Bluff Diversion Dam (Sacramento River)
- Sacramento Deep Water Ship Channel locks (Sacramento River)
- Fremont Weir (Sacramento River)
- Sutter Bypass (Sacramento River)
- Delta Cross Channel Gates (Sacramento River)
- Shanghai Bench (Feather River)
- Sunset Pumps (Feather River)

In addition to these barriers, any number of smaller water diversions within the Sacramento River and San Francisco Bay areas could require fish passage efforts be undertaken and/or facilities be constructed. Based on the most recent data available from the California Fish Passage Database, there are approximately 7,000 known barriers to

[23] These areas were labeled as potential migration barriers in the Proposed Listing rule.

fish passage within parts of the study area in the Sacramento River and San Francisco Bay regions.[24]

Fish Screens

69. Unscreened agricultural, municipal, and industrial water diversion structures may entrain green sturgeon and are considered to be a threat throughout the range of the species. Exhibit 2-10 summarizes the primary sources of data on fish passage barriers and water diversions for California, Oregon and Washington.[25] These databases not only locate the potential barriers to fish passage but also attempt to include best available information on the type of the barrier (dam, road crossing, tidegate, diversion etc.) and whether efforts have been made to install fish screens or other structures to facilitate fish passage through the barrier. However, such information still remains unavailable for a majority of the mapped barriers. As shown in Exhibit 2-11, there are 15,590 inventoried barriers in the study area, and the fish passage status of 66 percent is still unknown.

EXHIBIT 2-10. GIS DATABASES FOR WATER DIVERSIONS AND FISH PASSAGE BARRIERS BY STATE

STATE	DATABASE DESCRIPTION
California	California Fish Passage Assessment Database (PAD) and Fish Screen and Fish Passage Program (FSFPP). PAD is an ongoing inventory (available via internet download) of known and potential barriers to anadromous fish in California. This dataset also includes FSFPP's inventories of all screened and unscreened diversions and fish passage problems for the Central and San Joaquin Valley region.
Oregon	Oregon Department of Fish & Wildlife (ODFW) County Culvert Inventory Database. ODFW maintains a dataset that contains an inventory of barriers to fish passage that potentially affect anadromous and/or resident fish migration within the state of Oregon. The ODFW barrier database has been developed over the past several years primarily through the compilation of data from published reports and databases.
Washington	Washington Department of Fish and Wildlife (WDFW) Fish Passage and Diversion Screening Inventory (FPDSI). WDFW's database contains information on location, diversion type, and fish passage status of road-based stream and crossing structures across Washington State. This data set is continually updated as the result of ongoing inventory efforts.

[24] Fish barrier data is available from the Calfish program, a cooperative effort headed by CDFG Wildlife and Habitat Data Analysis Branch and CDFG NCNCR Information Services Branch. Accessed at http://www.calfish.org/ on August 21, 2007.

[25] Fish barrier data for Alaska were not available for this analysis.

EXHIBIT 2-11. SUMMARY OF FISH PASSAGE STATUS FOR BARRIERS WITHIN STUDY AREA BY STATE

STATE	NUMBER OF BARRIERS	FISH PASSAGE STATUS				
		NO BARRIER	PARTIAL BARRIER	TOTAL BARRIER	UNKNOWN	TOTAL
California	11,838	5%	15%	10%	70%	100%
Oregon	398	24%	10%	7%	60%	100%
Washington	3,354	13%	29%	5%	53%	100%
TOTAL:	**15,590**	**7%**	**18%**	**9%**	**66%**	**100%**

Sources: California Fish Passage Assessment Database; Oregon Department of Fish and Wildlife County Culvert Inventory Database; and Washington Department of Fish and Wildlife Fish Passage and Diversion Screening Inventory.

Fish Passage and Fish Screen Costs

70. Costs of fish passage for West Coast salmon and steelhead species have varied widely. Costs may be similar for green sturgeon, though it is also possible that passage requirements may differ from salmon requirements.[26] An analysis of the Pacific Northwest Hydrosite Database in 2005 found that costs of fish passage and fish screens for salmonids (at predominantly hydropower facilities) ranged from $97,000 to $4.4 million (2007 dollars).[27] The California Habitat Restoration Project Database (CHRPD), a database created in 1999 to capture and maintain data about habitat restoration projects in California benefiting anadromous fish, includes data on 72 fish passage projects, for which the average cost is $239,000 (2007 dollars).[28] The estimated range of costs used in this analysis is presented in Exhibit 2-20.

71. Fish screen costs have also varied widely according to the scale of the project, ranging from $600 for a small pump screen to $1.7 million for a complex ditch screen at a high water volume facility. The CHRPD includes records of several small (less than 25 cubic feet per second) agricultural diversions, for which costs ranged from $6,000 to $40,000 (2007 dollars).[29] An approximate estimate of average costs for all project types is $80,000 to $130,000 per fish screen (2007 dollars) (see Exhibit 2-12).[30]

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[26] Churchwell, Roger. "Sturgeon passage study," Department of Water Resources, Division of Environmental Services/Fish Facilities Section, Presentation at Green Sturgeon Workshop, June 2006.

[27] NMFS, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005.

[28] Fish barrier data is available from the Calfish program, a cooperative effort headed by CDFG Wildlife and Habitat Data Analysis Branch and CDFG NCNCR Information Services Branch. Accessed at http://www.calfish.org/ on August 21, 2007.

[29] Ibid.

[30] Oregon Fish Screen Program, Fish Screen Costs from 2003-2005. Bernie Kepshire, Fish Screening State Coordinator, Oregon Department of Fish and Wildlife, Fish Division. Email communication on January, 23, 2007; Fish Screen Projects Funded by the California Department of Fish and Game Fisheries Restoration Grant Program, February 2007.

EXHIBIT 2-12. ESTIMATED COSTS OF INSTALLING FISH SCREENS OR FISH PASSAGE ($2007)

PROJECT MODIFICATION	LOW	HIGH
Dam Projects		
Cost of Installing Fish Passage	$92,000	$4,200,000
Water Diversion Projects		
Cost of Installing a Fish Screen	$80,000	$130,000
Source: Adapted from NMFS, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005. Adjusted to 2007 dollars using the U.S. Bureau of Economic Analysis, National Economic Accounts, National Income and Product Accounts table, 2008.		

Baseline Protections

72. As noted in Chapter 1, nearly all inland areas in the range of the green sturgeon overlap with the range of listed West Coast salmon and steelhead species. A number of efforts are already underway for anadromous species in the area occupied by the green sturgeon with regards to fish passage and fish screens. As shown in Exhibit 2-13, California, Oregon and Washington all maintain current policies or regulations requiring fish screens or fish passage facilities for all new diversions and/or for existing diversions that undergo significant changes, such as diversion enlarging, relocation, or repair.

EXHIBIT 2-13. SUMMARY OF ANADROMOUS FISH PASSAGE/SCREEN PROGRAMS BY STATE

STATE	PROGRAM DESCRIPTION
California	In June 2001 the California Department of Fish and Game released a "Statewide Fish Screening Policy." Under this policy, the installation of fish screens is required for any new diversion, or on the intake of any existing diversion that is either enlarged, relocated, or at which the season of use is changed, in salmon and steelhead (anadromous) waters of the State. In addition, all diversions covered by this section which are located within the essential habitat of a State (CESA) listed species, or the critical habitat of a federally (ESA) listed species, shall be deemed to require screening.
Oregon	Since August 2001, the owner or operator of an artificial obstruction located in waters in which native migratory fish (including sturgeon) are currently or were historically present must address fish passage requirements prior to certain trigger events. Trigger events include installation, major replacement, a fundamental change in permit status (e.g., new water right, renewed hydroelectric license), or abandonment of the artificial obstruction. In order to sufficiently address fish passage requirements, the owner/operator is typically required to develop a fish passage plan that provides adequate passage and is approved by ODFW.
Washington	Beginning in 1981, all water diversion devices must be equipped at or near its intake with a WDFW approved fish guard or screen to prevent the passage of game fish into the device and, if necessary, with a means of returning game fish from immediately in front of the fish guard or screen to the waters of origin.[31]

[31] See Revised Code of Washington (RCW) (Sections 77.57.010; 77.57.020; 77.57.030; and 77.57.040) at http://apps.leg.wa.gov/RCW/default.aspx. Last accessed on November 7, 2007.

2.5 SCIENTIFIC RESEARCH PROJECTS: TARGETED TAKE OF GREEN STURGEON

73. The Proposed Action would not prohibit "Federal, state or private-sponsored research or monitoring activities", as long as they adhere to a set of nine requirements, including adhering to NMFS sturgeon research protocols and limiting take of the sturgeon to July through March in spawning areas. Otherwise, research will require a section 10 permit from NMFS.

74. While few research projects to date have directly targeted green sturgeon, more targeted green sturgeon research projects are expected in the future. The exact number of projects that may occur after the section 4(d) rulemaking is nonetheless unclear. For example, in California, NMFS staff are aware of at least four or five future projects that will directly target green sturgeon in the near future.[32]

CONSERVATION MEASURES TO PROTECT THE GREEN STURGEON DURING RESEARCH

75. A recent biological opinion for scientific research that may encounter green sturgeon stated that, in order to continue research activities project entities are required to: [33]

(1) Annually report the number of green sturgeon captured (non-lethal and lethal) as a result of project activities; and

(2) As data are available, determine the ratio of green sturgeon and white sturgeon being captured during research activities to provide information on the actual take of green sturgeon, and on the abundance of green sturgeon in the respective river system.

Costs associated with implementing these conservation measures appear to be limited to the labor required to collect and analyze data and write the annual reports. The labor required would depend on the number of green sturgeon that is encountered each year. For the ongoing projects in the Central Valley region, research activities have not been directed at green sturgeon and, as a result, the number of green sturgeon encountered per year are relatively low. Annual labor requirements have averaged no more than 8 to 12 hours per year. The low level of green sturgeon take is, however, due in large part to projects that have been designed with species other than the green sturgeon in mind. For projects that directly target green sturgeon, which are expected to increase as a result of the listing of the Southern DPS under the ESA, the annual labor requirement to fulfill required conservation measures will likely be greater -- estimated by one researcher as approximately 40 to 45 hours per year.[34] Exhibit 2-14 summarizes the estimated annual cost per year type of scientific research project.

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[32] Written communication with NMFS staff, November 14, 2006.

[33] National Marine Fisheries Service, Biological Opinion on 2006 California Department of Fish and Dame 4d Research Program.

[34] Alicia Seesholtz, Environmental Scientist, DWR-DES Feather River Program, February 5, 2007

EXHIBIT 2-14. ESTIMATED COSTS PER TYPE OF SCIENTIFIC RESEARCH PROJECT ($2007)

TYPE OF GREEN STURGEON INTERACTION	LABOR HOURS (PER YEAR)	HOURLY LABOR RATE (PER HOUR)*	NUMBER OF ONGOING SCIENTIFIC PROJECTS	ESTIMATED ECONOMIC IMPACT (PER YEAR)
Incidental	8 to 12	$78.06	3	$2,000 to $3,000
Direct	40 to 45	$78.06	~10	$31,000 to $35,000
* Includes overhead costs such as benefits and sick leave (Email communication with Alicia Seesholtz, Environmental Scientist, DWR-DES Feather River Program, February 5, 2007).				

76. Under the Proposed Action, some scientific research may not be covered by the exception, and thus would require a section 10 permit. However, it appears that the labor hours required to accommodate green sturgeon during research would be largely the same with or without the exception in the Proposed Action. That is, the difference in additional costs among projects would largely depend on whether or not they needed to undertake the administrative effort involved in a acquiring a section 10 permit. Thus, costs to scientific research activities may be the same across alternatives, other than that more administrative costs to acquire a section 10 take permit would likely be required under the Full Action Alternative and Alternative A.

2.6 CROP AGRICULTURE AND POINT SOURCE POLLUTERS (NPDES-PERMITTED ACTIVITIES)

77. Point source polluters discharge toxins into rivers and harbors, usually regulated by EPA via NPDES permits. Nonetheless, such activities may harm green sturgeon. Crop agriculture uses pesticides and herbicides, which can also threaten green sturgeon. In January 2004, the EPA was enjoined from authorizing the application of a set of pesticides within certain distances from "salmon-supporting waters."[35] The basis for this injunction was the EPA's failure to consult with NMFS concerning possible adverse effects of pesticide applications on salmon and steelhead protected under the ESA. The court in Washington Toxics Coalition versus EPA imposed two types of restrictions on application of pesticides covered in the lawsuit. For aerial applications, no pesticides can be applied within 100 yards of "salmon-supporting waters"; for ground applications, the distance is 20 yards. To the extent that management actions are needed for herbicide use, they could include the following best management practices for application that were outlined in a consultation on salmon and steelhead species:[36]

[35] Washington Toxics Coalition, *et al.* v. EPA, C01-0132 (W.D. WA), 22 January 2004.

[36] NMFS, Northwest Region, Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation on the Port of St. Helens Industrial Outfall and Portland General Electric Power Plant, Port Westward Industrial Park, Columbia River, Columbia County, Oregon (Corps No. 200200448), August 1, 2003.

- All vegetation removal will be restricted to above the ground surface, thus leaving the root systems intact and retaining bank stability.
- Within 100 ft of each side of any waterway vegetation taller than 15 ft may be cut to the 15 ft level.
- No Garlon will be applied with a 100-foot buffer on either side of all streams with ESA-listed fish. Rodeo may be used within this area.
- Trained individuals will apply herbicides using only low pressure spot spray and direct wicking application methods. All herbicide applications will be conducted in accordance with label instructions.
- Spray activities will only occur during dry, calm weather conditions to prevent drift and runoff. No spraying will occur during winds greater than five mph or during rain events. No spraying of the herbicide will occur if rain is forecast within 24 hours.
- Spill response procedures have been developed and reviewed with each applicator before commencing herbicide application operations.
- All chemical storage, chemical mixing, and post-application equipment cleaning is completed in such a manner as to prevent the potential contamination of any perennial or intermittent waterbody, unprotected ephemeral waterway, or wetland.
- Use only those sprayers with a single nozzle, such as backpack or hand sprayers, to spray the herbicide in the riparian zone.
- All hand operated application equipment is leak and spill proof.

The economic analysis of critical habitat for the Pacific salmon and steelhead assumed that pesticide restrictions on 20 and 100 yard buffer areas surrounding "salmon supporting waters" would preclude harvest on certain crop types. This analysis applied county-specific data on the average value per acre of the three crop categories from the National Agriculture Statistics Service (NASS) and spatial data from NOAA Fisheries to determine the number of affected acres of the three crop types in each occupied watershed. For each crop type, data from the USDA National Agricultural Statistics Service, 2002 Census of Agriculture, are used regarding the acres of cropland and net operational dollar gain (ignoring government payments) on a per-County basis. Dividing the latter by the former produced an estimate of the average net operational dollar gain per acre by crop type and county. The analysis then determined a foregone value of cropland due to pesticide restrictions using this value of three crop categories, oil seeds and grains, vegetables and melons, and fruit and tree nuts, within these buffer areas.

EXHIBIT 2-15. ESTIMATED PER ACRE IMPACTS BY CROP TYPE

TYPE OF CROP	ESTIMATED ANNUAL IMPACTS PER ACRE (2005$)
Oil seed and grain	$64 (-$1,019 to $275)
Vegetable and melon	$1,075 (-$810 to $4,239)
Fruit and tree nut	$657 (-$5,315 to $4,656)
Source: National Marine Fisheries Service. Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs. August 2005.	

78. The Proposed Action states that, "the national standards for use of pesticides and toxic substances may not be conservative enough to adequately protect the Southern DPS as was found for listed salmonids in recent draft and final jeopardy biological opinions issued by NMFS to the U.S. Environmental Protection Agency. Thus, voluntary programs established to aid agricultural producers in meeting NMFS-imposed water quality standards may be required to minimize adverse impacts on the Southern DPS." It is unclear to what extent current standards might be considered inadequate, and it is possible that monitoring or voluntary compliance with EPA standards may suffice to avoid take of green sturgeon for these activities. Listed salmon and steelhead species are found in all units where agricultural pesticide application is a threat to green sturgeon habitat. Thus, to the extent that this rule is being followed within salmon and steelhead critical habitat, it appears likely that salmon restrictions under the recent litigation could provide adequate protections for green sturgeon.

2.7 HABITAT-ALTERING ACTIVITIES FOR WHICH INCREASED SEDIMENT LOAD IS THE PRIMARY CONCERN

79. The Proposed Action identifies "habitat-altering activities" that destroy, modify or curtail spawning or rearing habitats for egg, larval, or juvenile stages as threats to green sturgeon. Specific concerns include:

- increased sediment input or runoff into streams;
- filling or isolation of stream channels, side channels, and intermittent waters;
- direct removal or alteration of physical structures;
- obstruction of downstream migration.

Specifically, the 4(d) rule identifies increased input of runoff of fine sediments into streams resulting from activities such as mining, logging, farming, grazing, and bridge and road construction as threats to early life stages of green sturgeon. The rule states "the effect that increased input of fine sediments or runoff has at the individual, population and species levels will depend on the temporal and spatial extent of habitat change. The only way to determine this is to analyze particular activities on a case-by-case basis." Direct removal of rocks, soil, gravel, and vegetation are noted to likely result in adverse impacts on the survival of larvae and juveniles. These activities would be prohibited throughout the range of the green sturgeon in all alternatives considered for this rule. However, in all of these cases, there appears to be a large overlap with salmon and

steelhead requirements for these activities. Thus, the additional impact of the green sturgeon rulemaking is uncertain.

CONSERVATION EFFORTS FOR HABITAT-ALTERING ACTIVITIES

80. A large variety of ongoing "habitat-altering" activities could be considered to affect green sturgeon. These could include instream construction, transportation-related activities, utility lines, sand and gravel mining, agricultural cropping activities or livestock grazing, and residential or commercial development

81. The rule suggests that existing laws require potentially adequate levels of protection from sediment runoff but that the following actions would help to reduce potential impacts:

- additional measures to reduce erosion and sediment input or runoff into streams,
- avoidance of stream crossings by roads and other linear development,
- protection of riparian areas,
- construction of fish protection and passage facilities,
- and avoidance of activities in and around spawning and rearing habitats during specific times of year

For one past consultation on a bridge replacement project, conservation measures were not separated among salmon and green sturgeon, and appear to be the same for all affected fish species.[37]

IMPACTS TO HABITAT-ALTERING ACTIVITIES FOR WHICH SEDIMENT IS THE PRIMARY CONCERN

82. Potential impacts on affected industries are characterized as follows:

- **Sand and Gravel Mining.** Gravel mining activities that affect green sturgeon are anticipated to include the removal of gravel for industrial purposes, such as for road construction material, concrete aggregate, fill, and landscaping. It is possible that sand and gravel mining activities could be restricted in riparian areas to accommodate green sturgeon. This analysis does not anticipate that this impact will result in a reduction in the overall market supply of gravel to the impacted regions.
- **Livestock Grazing.** Changes to livestock grazing activities and forestry activities in sturgeon habitat may include fencing riparian areas, placing salt or mineral supplements to draw cattle away from rivers, total rest of grazing allotments when possible, and frequent monitoring.

[37] NMFS, Southwest Region, Biological Opinion on the proposed Airport Road Bridge Replacement Project located near the City of Anderson, Shasta County, California, and its effect on endangered Sacramento River winter-run Chinook salmon, threatened Central Valley spring-run Chinook salmon, threatened Central Valley steelhead, their respective critical habitats, and the southern distinct population segment of North American green sturgeon, January 6, 2006.

- **Road and bridge construction, reconstruction, and maintenance/Forestry and Logging.** Transportation projects that affect green sturgeon may include the widening of a road, the reconstruction of a bridge, or the restoration of a ferry terminal. Forestry activities appear most likely to be restricted during the process of building or using roads in the course of timber production. Project modifications may include modifying activities to avoid both direct and indirect take of green sturgeon. The cost of project modifications will likely be borne by or passed on to the Federal government (e.g. Federal Highways or USFS), which accordingly will ultimately bear the majority of the costs.
- **Residential and commercial development.** The 4(d) rule for the green sturgeon appears unlikely to significantly increase costs to developers, reduce revenues, impose mitigation costs, or result in project delays. In salmon and steelhead consultations, the most common impacts on residential and related development have been related to stormwater outfall construction/expansion. Typical project modifications associated with stormwater outfall projects have included implementing state-recommended stormwater plans, activities to reduce stormwater volume and/or pollutants, minimizing hardscape of the outfall structure, and vegetation replacement.

83. Exhibit 2-16 summarizes potential per project costs of implementing conservation efforts for the green sturgeon for habitat-altering activities.

EXHIBIT 2-16. POTENTIAL ANNUALIZED COSTS OF IMPLEMENTING CONSERVATION EFFORTS FOR THE GREEN STURGEON FOR HABITAT-ALTERING ACTIVITIES ($2007)

SPECIFIC ACTIONS	TYPICAL CONSERVATION MEASURES TAKEN FOR SALMON AND STEELHEAD SPECIES	POTENTIAL COSTS PER PROJECT[A]
Sand and Gravel mining		
Removal of sand and gravel from active river channels and floodplains for industrial purposes, such as for road construction material, concrete aggregate, fill, and landscaping	Limits on gravel extraction	$0 to $1.5 million
Livestock grazing		
Grazing on public lands	Fencing riparian areas, placing salt or mineral supplements to draw cattle away from rivers, total rest of grazing allotments when possible, and frequent monitoring.	$16,000 per stream mile (over 30 years)
Road and Bridge Construction, Reconstruction, and Maintenance/Forestry and Logging		
Road construction, road widening, road maintenance, bridge reconstruction, bridge replacement, culverts, ferry terminal restoration/expansion, aircraft/airport repair and maintenance	Pre-construction surveys, development and implementation of a site specific spill prevention, containment, and control plan (SPCCP), removal of toxicants as they are released, water quality monitoring, use of boulders, rock, and woody materials from outside of the riparian area, monitoring and evaluation both during and following construction.	$19,000 to $158,000 (over 8 years)
Residential and Commercial Development		
Construction or expansion of stormwater outfalls, discharge or fill of wetlands, flood control projects, bank stabilization, instream work	Timing restrictions for in-stream work, best management practices (BMPs), vegetation replacement, filtration systems, and water quality monitoring[38]	$264,000

Note:
[a] Adapted from NMFS, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005.

[38] Unlike terrestrial species, habitat for green sturgeon is not itself part of the supply of developable land. For this reason, protection of the aquatic habitat need not take the form of supplanting development if the impacts of the development can be mitigated. As a result, section 7 consultations regarding the ESUs for real estate developments have been limited to specific components of the development without direct impact on the supply of land or housing.

2.8 IN-WATER CONSTRUCTION AND DREDGING ACTIVITIES

84. Actions associated with in-stream activities that could impact the green sturgeon include dredging, construction or repair of breakwaters, docks, piers, pilings, bulkheads, boat ramp, and docks. Economic impacts result from direct project costs associated with restrictions on the duration and extent of in-water work, erosion and sediment control measures, heavy equipment restrictions, and efforts to minimize take. Exhibit 2-17 summarizes potential per project costs of implementing conservation efforts for the green sturgeon for in-water construction projects and dredging activities.

EXHIBIT 2-17. POTENTIAL PER PROJECT COSTS OF IMPLEMENTING CONSERVATION EFFORTS FOR IN-WATER CONSTRUCTION PROJECTS AND DREDGING ACTIVITIES ($2007)

SPECIFIC ACTIONS	TYPICAL CONSERVATION MEASURES TAKEN FOR SALMON AND STEELHEAD SPECIES	PER PROJECT COSTS (DISCOUNTED AT 7%)	
		LOW	HIGH
In-Stream Construction			
Construction or repair of breakwaters, docks, piers, pilings, bulkheads, boat ramp, utility lines, and dredging.	Shoreline planting, construction materials restrictions, use of bubble curtains, habitat restoration, spill prevention contaminant control plan, erosion controls, timing restrictions, requirements to use directional drilling, monitoring	$19,000	$158,000
Dredging			
Dredging activities	Work window constraints, extension of the prescribed work window, additional survey work, and mobilization costs. Could also include identification of disposal sites.	$263,000	$1.0 million

Note: Adapted from NMFS, Final Economic Analysis of Critical Habitat Designation for Seven West Coast Salmon and Steelhead ESUs, Long Beach, CA, August 2005. Adjusted to 2007 dollars using the U.S. Bureau of Economic Analysis, National Economic Accounts, National Income and Product Accounts table, 2008.

2.9 TIDAL- AND WAVE- ENERGY PROJECTS

85. Tidal- and wave-energy projects harness the kinetic energy contained in ocean waves or tidal currents. Tidal- and wave-energy projects require the placement of equipment such as buoys or turbines into the water column. Although not explicitly addressed in the Proposed rule, these projects may occur in green sturgeon habitat, and would appear to have the potential to affect the species.

86. There currently are no active generating wave or tidal energy projects located within the study area. However, 36 projects have applied to the Federal Energy Regulatory Commission (FERC) for preliminary permits to investigate the feasibility of project

development within the study area.[39] A preliminary permit is the first step in the FERC licensing and permitting process. A preliminary permit covers a three-year time frame, and allows the applicant to test and refine project components. Under some preliminary permits like the one for the Tacoma Narrows project, applicants have placed test equipment in the water; however, full construction of the project requires further permitting. Of the 36 projects that have applied for a preliminary permit, 24 have already received their permits and are proceeding with further project scoping (see Exhibit 2-18).

87. The number of future projects that are likely to be permitted for construction is still speculative. Projects that receive preliminary permits and undergo further scoping ultimately may not be constructed for a variety of reasons; based on available data, it is not possible to predict how many of these projects will or will not be constructed.

88. Because tidal and wave energy projects in green sturgeon habitat on the West Coast are in the preliminary stages of development, NMFS has yet to make specific recommendations about project modifications that may be required to mitigate potential adverse impacts on green sturgeon or its habitat. Tidal and wave energy projects have the potential to affect the habitat of a wide range of species, including green sturgeon, Pacific salmon and steelhead, and marine mammal species, which have similar habitat requirements. Again, due to the preliminary stages of permitting for most projects, NMFS has made few conservation recommendations related to these species. Nonetheless, some level of baseline protection is thought to exist for these species under the Act.

[39] Federal Energy Regulatory Commission. *Issued Hydrokinetic Permits.* Accessed at: http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/permits-issued.asp on March 19, 2008. Federal Energy Regulatory Commission. *Pending Hydrokinetic Permits.* Accessed at: http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/permits-pending.asp on March 19, 2008.

EXHIBIT 2-18. ISSUED AND PENDING PRELIMINARY PERMITS ISSUED BY FERC FOR TIDAL AND WAVE ENERGY PROJECTS (AS OF MARCH 2008)

UNIT	PROJECT #	PROJECT NAME	WATER BODY	APPLICANT	FILING DATE	ISSUED DATE	CLASSIFICATION
Issued Preliminary Permits							
11	P-12585	San Francisco Bay	San Francisco Bay	Golden Gate Energy	4/26/2005	10/11/2005	Tidal -- Current
25	P-12729	Willapa Bay	Willapa Bay	Natural Currents Energy Services, LLC	5/30/2006	3/29/2007	Tidal -- Current
27	P-12690	Admiralty Inlet	Puget Sound	PUD No.1 of Snohomish County, WA	11/22/2006	3/9/2007	Tidal -- Current
27	P-12687	Deception Pass	Puget Sound	PUD No.1 of Snohomish County	6/15/2006	3/1/2007	Tidal -- Current
27	P-12698	Guemes Channel	Puget Sound	PUD No.1 of Snohomish County	9/20/2006	2/22/2007	Tidal -- Current
27	P-12688	Rich Passage	Puget Sound	PUD No.1 of Snohomish County	6/15/2006	2/22/2007	Tidal -- Current
27	P-12692	San Juan Channel	Puget Sound	PUD No.1 of Snohomish County	6/15/2006	2/22/2007	Tidal -- Current
27	P-12691	Agate Passage	Puget Sound	PUD No.1 of Snohomish County	4/28/2006	2/22/2007	Tidal -- Current
27	P-12689	Spieden Channel	Puget Sound	PUD No.1 of Snohomish County	11/2/2006	2/22/2007	Tidal -- Current
27	P-12612	Tacoma Narrows	Puget Sound	Tacoma Power	9/14/2005	2/22/2006	Tidal -- Current
30	P-12753	Humboldt County Wave Project	Pacific Ocean	Finavera Renewables	12/7/2006	2/14/2008	Wave
31	P-12752	Coos County Wave Project	Pacific Ocean	Aqua-Energy Group	4/17/2006	4/26/2007	Wave
32	P-12743	Douglas County	Pacific Ocean	Douglas County	6/15/2006	4/6/2007	Wave
32	P-12749	Coos Bay	Pacific Ocean	Oregon Wave Energy Partners I, LLC	3/27/2006	3/9/2007	Wave
33	P-12713	Reedsport OPT Wave Park	Pacific Ocean	Ocean Power Technologies, Inc.	3/29/2006	2/16/2007	Wave
38	P-12731	Angoon	Kootznahoo Inlet	Natural Currents Energy Services, LLC	4/3/2006	3/29/2007	Tidal -- Current
38	P-12696	Gastineau Channel	Gastineau Channel	Oceana	8/28/2006	3/23/2007	Tidal -- Current
38	P-12697	Wrangell Narrows	Wrangell Narrows	Oceana	8/28/2006	3/23/2007	Tidal -- Current
38	P-12695	Icy Passage	Icy Passage/Strait	Oceana	6/15/2006	3/23/2007	Tidal -- Current
39	P-12744	Cook Inlet	Cook Inlet	Chevron Technology Ventures, LLC	10/6/2006	6/11/2007	Tidal -- Current
39	P-12705	Central Cook Inlet	Cook Inlet	Oceana	6/28/2006	6/7/2007	Tidal -- Current

UNIT	PROJECT #	PROJECT NAME	WATER BODY	APPLICANT	FILING DATE	ISSUED DATE	CLASSIFICATION
39	P-12694	Kachemak Bay	Cook Inlet	Oceana	6/15/2006	5/18/2007	Tidal -- Current
39	P-12679	Cook Inlet	Cook Inlet	ORPC Alaska	6/15/2006	4/17/2007	Tidal -- Current
39	P-12678	Resurrection Bay	Gulf of Alaska	ORPC Alaska	6/15/2006	4/16/2007	Tidal -- Current
Pending Preliminary Permits							
28	P-13052	Green Wave San Luis Obispo Wave Park	Pacific Ocean	Green Wave Energy Solutions, LLC	10/19/2007	N/A	Wave
30	P-13076	Sonoma coast Hydrokinetic Energy	Pacific Ocean	Sonoma County Water Agency	11/15/2007	N/A	Wave
30	P-13075	Centerville OPT Wave Energy Park	Pacific Ocean	California Wave Energy Partners, LLC	11/9/2007	N/A	Wave
30	P-13053	Green Wave Mendocino Wave Park	Pacific Ocean	Green Wave Energy Solutions, LLC	10/19/2007	N/A	Wave
30	P-12781	Mendocino County WaveConnect	Pacific Ocean	PG & E	2/27/2007	N/A	Wave
31	P-12780	Fairhaven Wave Power Station	Pacific Ocean	Fairhaven O.P.T. Ocean Power	2/28/2007	N/A	Wave
31	P-12779	Humboldt County WaveConnect	Pacific Ocean	PG & E	2/27/2007	N/A	Wave
33	P-13047	Oregon Coastal Wave Energy	Pacific Ocean	Tillamook Intergovernmental Development Entity	10/1/2007	N/A	Wave
33	P-12793	Florence Oregon Ocean Wave Energy Project	Pacific Ocean	Energetech America LLC	4/16/2007	N/A	Wave
33	P-12750	Newport OPT Wave Park	Pacific Ocean	Oregon Wave Energy Partners II, LLC	11/2/2006	N/A	Wave
33	P-12727	Lincoln County Wave Energy	Pacific Ocean	Lincoln County, Oregon	8/17/2006	N/A	Wave
36	P-13058	Grays Harbor Ocean Energy and Coastal Protection	Gray Harbor and	Washington Wave Company, LLC	11/5/2007	N/A	Wave

Source: Federal Energy Regulatory Commission, *Issued Hydrokinetic Permits,* accessed at: http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/permits-issued.asp on March 19, 2008; Federal Energy Regulatory Commission, *Pending Hydrokinetic Permits,* accessed at: http://www.ferc.gov/industries/hydropower/indus-act/hydrokinetics/permits-pending.asp on March 19, 2008.

2.10 LIQUEFIED NATURAL GAS (LNG) PROJECTS

89. According to NMFS, liquefied natural gas (LNG) projects represent a potential threat to green sturgeon by affecting water quality in the event of leaks, spills, or pipeline breakage.

90. No LNG projects have yet been constructed within the study area. This analysis identified a total of 12 LNG terminals that have been proposed within the study area.[40] These projects are still in the development stages, and are awaiting approval from FERC and/or the U.S. Coast Guard (depending on their location).

91. In addition to the LNG terminals themselves, pipelines are necessary to distribute natural gas. Usually an LNG terminal connects to a large, interstate pipeline (which may service several terminals) via smaller sendout pipelines. This network of pipelines has yet to be fully developed on the West Coast.

92. Similar to tidal/wave energy projects, the number of future LNG projects likely to be built is speculative. Many LNG projects are abandoned during the development stages for various reasons unrelated to listed species. Based on available data, this analysis cannot forecast how many projects may or may not ultimately be constructed

93. Because the proposed LNG projects are still in the preliminary stages, NMFS has yet to make specific recommendations about any project modifications that might be required to mitigate potential adverse impacts on green sturgeon or its habitat. Other listed species, including the Oregon Coast coho salmon and Pacific salmon and steelhead, are present in Coos Bay and the Lower Columbia River units.

94. Until specific plans for the projects are made available, their potential impact on green sturgeon habitat will remain uncertain, as will the nature of any project modifications that might be requested to mitigate adverse impacts. According to NMFS, these modifications may include spatial restrictions on project installation, site relocation, and specific measures to prevent or respond to catastrophes.

2.11 DESALINATION PLANTS

95. According to NMFS, desalination plants may pose a threat to green sturgeon critical habitat through the discharge of hypersaline effluent that may affect water quality. However, the available consultation data upon which we based our analysis do not indicate that NMFS or the Fish and Wildlife Service has consulted on past desalination projects regarding impacts on listed marine species. Further, existing desalination plants do not appear to have implemented measures to manage the discharge of hypersaline effluent for human protection or otherwise, to date. Discharges from desalination plants are subject to Clean Water Act requirements, but because there is no past consultation

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[40] California Energy Commission, *Location and Capacity of Proposed LNG Terminals,* March 2008. Accessed at: http://www.energy.ca.gov/lng/projects.html.

history, it is not clear whether CWA requirements adequately address hypersaline effluent in marine waters for green sturgeon.

2.12 AQUACULTURE

96. According to NMFS, application of pesticides at aquaculture farms and the subsequent runoff has the potential to impact green sturgeon habitat by affecting water and sediment quality. Aquaculture operations are subject to a variety of federal and state water quality standards, affording green sturgeon and its habitat a level of baseline protection. In addition, many of the proposed units are considered to contain essential fish habitat (EFH) for salmon as well as a variety of other fish species. However, with the exception of in Humboldt Bay, NMFS has yet to recommend project modifications for aquaculture facilities.

97. In California and Washington, aquaculture farming takes place on approximately 22,000 fresh and saltwater acres. In these two states, 312 farms generate approximately $162.8 million in sales on an annual basis.[41]

98. Oysters are one of Washington's main aquaculture products, generating $38.3 million in sales in 2005. The industry is concentrated primarily in Willapa Bay, Grays Harbor, and Puget Sound, all of which are located within the study area. California's aquaculture industry is more diverse with farms specializing in a wide range of products and located across the state. Exhibit 2-19 below summarizes the number of aquaculture farms located in each unit.

99. Humboldt Bay's primary aquaculture operation, Coast Seafoods, underwent section 7 consultation in November 2005. The consultation considered the effects of the project on Southern Oregon/Northern California Coast coho salmon, Northern California steelhead, and California Coastal Chinook salmon. As a result of this consultation, Coast Seafoods undertook a variety of conservation measures including agreeing not to "discharge feed, pesticides, or chemicals (including hormones and antibiotics) into marine waters."[42]

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[41] U.S. Department of Agriculture. *2005 Census of Aquaculture.* October 2006. Accessed at: http://www.agcensus.usda.gov/Publications/2002/Aquaculture/AQUACEN.pdf on March 15, 2008.

[42] National Marine Fisheries Service, Section 7 Consultation on Coast Seafoods Project, November 2005.

EXHIBIT 2-19. AQUACULTURE FARMS BY UNIT

UNIT	DESCRIPTION	NUMBER OF FARMS
12	Tomales Bay, CA	3
15	Humboldt Bay, CA	1
25	Willapa Bay, WA *	46
26	Grays Harbor, WA *	46
27	Puget Sound, WA *	46
28	CA-Mexico Border to Monterey Bay, CA	8

Notes:

***** Data on the specific location of Washington aquaculture farms were not available. Therefore, this analysis assumed that Washington's oyster aquaculture farms were evenly divided between these three units.

Sources: U.S. Department of Agriculture, *2005 Census of Aquaculture.* October 2006, accessed at: http://www.agcensus.usda.gov/Publications/2002/Aquaculture/AQUACEN.pdf on March 15, 2008; California Department of Fish and Game, *Registered Aquaculturist Public Report,* March 2008, accessed at: http://www.nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=3265 on March 15, 2008; California Department of Fish and Game, M*arine Aquaculture,* July 2007, accessed at: http://www.dfg.ca.gov/mlpa/pdfs/agenda071007jh.pdf.

2.13 COMMERCIAL SHIPPING ACTIVITY

100. According to the U.S. Coast Guard, ballast water discharged from commercial ships is one of the largest pathways for the introduction and spread of aquatic nuisance species.[43] According to NMFS, the release of ballast water and associated impacts on water quality (and the potential introduction of non-native species), are considered to be a potential threat to green sturgeon.

101. Between 1997 and 2005, the ports of Seattle and Tacoma (in the Puget Sound unit) were the third and forth largest West Coast ports in terms of import and export volume, behind Los Angeles and Long Beach, California. Total trade entering and leaving ports in Puget Sound in 2005 was 39.5 million metric tons. In contrast, the port at Grays Harbor, Aberdeen, traded 0.9 million metric tons in 2005, only two percent of that traded in nearby Puget Sound ports. U.S. waterborne foreign trade by unit in metric tons (MTONs) is summarized in Exhibit 2-20.

[43] U.S. Coast Guard, Ballast Water Management Program, accessed at http://www.uscg.mil/hq/g-m/mso/bwm.htm on April 11, 2008.

EXHIBIT 2-20. U.S. WATERBORNE FOREIGN TRADE BY U.S. CUSTOM PORTS, 2001-2005, METRIC TONS

UNIT	U.S. CUSTOM PORTS	2001	2002	2003	2004	2005
Puget Sound, WA	Seattle, WA	13,547,624	12,099,867	12,575,622	16,439,240	19,836,198
	Tacoma, WA	11,960,539	11,931,507	14,113,190	16,629,221	18,945,454
	Everett, WA	360,074	405,691	355,599	429,583	528,527
	Olympia, WA	73,123	116,024	297,440	231,853	121,084
	Port Townsend, WA	54,090	50,546	152,389	41,442	83,057
	Subtotal	*25,995,450*	*24,603,635*	*27,494,239*	*33,771,338*	*39,514,320*
San Francisco Bay, CA	Oakland, CA	9,145,774	8,763,833	9,513,698	10,635,322	13,063,466
	Richmond, CA	8,743,877	8,557,507	10,428,132	4,861,126	4,178,074
	Redwood City, CA	741,209	825,292	1,184,873	1,600,156	1,467,494
	San Francisco, CA	4,609,077	4,339,228	3,703,401	12,050,345	8,382,572
	Subtotal	*23,239,937*	*22,485,860*	*24,830,104*	*29,146,950*	*27,091,606*
Suisun Bay, CA	Martinez, CA	2,335,519	1,766,684	3,050,584	1,720,134	2,344,685
	Crockett, CA	454,104	512,594	383,437	147,961	178,243
	Subtotal	*2,789,623*	*2,279,278*	*3,434,022*	*1,868,095*	*2,522,928*
Coastal AK waters northwest of Yakutat Bay, AK	Anchorage, AK	6,685,446	6,349,005	6,459,258	6,902,991	5,559,977
	Kodiak, AK	166	23	1,194	3,108	5,724
	Valdez, AK	2,401	6,707	5,145	19,505	2,467
	Sand Point, AK	73,510	25,369	2,998	3,006	0
	Subtotal	*6,761,524*	*6,381,104*	*6,468,595*	*6,928,610*	*5,568,168*
San Pablo Bay, CA	Carquinez Strait, CA	1,499,809	1,886,782	1,986,420	422,662	1,102,670
	Selby, CA	465,737	340,225	315,733	112,010	159,624
	San Pablo Bay, CA	0	0	0	82,080	41,738
	Subtotal	*1,965,546*	*2,227,006*	*2,302,153*	*616,752*	*1,304,032*
Grays Harbor, WA	Aberdeen, WA	698,954	831,715	665,547	672,681	904,396
	Subtotal	*698,954*	*831,715*	*665,547*	*672,681*	*904,396*
AK/Canada Border to Yakutat Bay, AK	Ketchikan, AK	0	0	0	82,798	109,086
	Skagway, AK	0	0	0	0	40,530
	Juneau, AK	0	0	0	28,287	11,947
	Petersburg, AK	0	0	0	0	7,998
	Wrangell, AK	0	0	0	0	1,660
	Subtotal	*0*	*0*	*0*	*111,085*	*171,220*

Source: U.S. Department of Transportation, Maritime Administration, Port Import Export Reporting Service (PIERS), collected from Vessel Manifests and Bills of Lading, Accessed at Http://www.marad.dot.gov/marad_statistics/index.html, January 2008.

102. As discussed above, discharge of ballast water by large vessels within the EEZ is regulated by the U.S. Coast Guard. The Coast Guard could initiate consultation with NMFS regarding issues related to green sturgeon if the agency suspects that ballast water discharge may affect green sturgeon critical habitat. Consultations related to this issue on any listed West Coast species were, however, absent from the available consultation

record. As such, any modifications to Coast Guard regulations or ensuing changes to ballast water discharge requirements for commercial shipping activities are unknown at this time.

2.14 ECONOMIC ANALYSIS OF THE EXPECTED EFFECTS OF EACH SELECTED ALTERNATIVE

103. As described above, this analysis classifies activities potentially affected by take prohibitions into 13 industry groups. Exhibit 2-21 presents a comparison of impacts on industry sectors potentially affected by the 4(d) rule by Alternative. The following are observations about the expected effected of each Alternative:

- As shown, the Full Action Alternative would likely affect the largest number of entities, with the Proposed Action potentially affected that same number of entities.
- For all Alternatives, the specific conservation efforts likely to be taken for green sturgeon are expected to vary by affected activity, and are uncertain.
- Under the Full Action Alternative, compliance with section 7 requirements or section 10 permits under the Act would be required for all affected economic activities.
- Under the Proposed Action and Alternative C, the need for section 10 permits or review under section 7 would be alleviated in some cases because exceptions are identified that would allow activities to continue without the need for a section 10 permit or a section 7 review. Nonetheless, the economic impacts on affected industries may remain largely unchanged, other than the need to incur additional administrative costs associated with receiving a permit from NMFS under the Full Action Alternative or Alternative A.

For example, one exception would allow (i.e., not prohibit) take for scientific research activities conducted by state fishery management agencies. As such, these activities could continue without a need for an incidental take permit (ITP) for green sturgeon. However, the conservation efforts undertaken by the researchers to accommodate green sturgeon may remain largely the same as if they did receive an ITP. Thus, economic impacts on scientific research activities may be largely the same across alternatives, with the exception of efforts to acquire an ITP.

EXHIBIT 2-21. POTENTIALLY AFFECTED INDUSTRIES BY ALTERNATIVE

POTENTIALLY AFFECTED INDUSTRY	NO ACTION	FULL ACTION	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C
Commercial, recreational, and Tribal fisheries	N	Y	Y	P	P
Dams and water diversions	N	Y	Y	P	P
Power production	N	Y	Y	P	P
Scientific research activities/Emergency Rescue Activities	N	Y	Y	P	P
Crop agriculture	N	Y	Y	P	P
Sand and gravel mining	N	Y	S	P	S
Forestry and Logging	N	Y	S	P	S
Livestock grazing (beef cattle ranching)	N	Y	S	P	S
Road and bridge construction, reconstruction, and maintenance	N	Y	S	P	S
Residential and commercial development	N	Y	S	P	S
In-water construction and dredging activities (including utility line construction, marinas, and other heavy and civil engineering construction)	N	Y	Y	P	P
Point source pollution (NPDES-permitted activities)	N	Y	Y	P	P
Installation of tide gates, culverts, and debris or sediment-trapping road crossing structures leading to filling on or isolating wetlands	N	Y	N	P	N

Key: N =No impacts anticipated, Y=Impacts anticipated, P=Potential industry impacts, S=Potential industry impacts in spawning areas only (Sacramento River and San Francisco Bay Regions).

104. In another example, although the Proposed Action would allow an exception for approved fishery management plans, the rule stipulates that a fishery management plan will only be approved if it meets six criteria, which include prohibiting retention of green sturgeon (i.e. zero bag limit) and setting maximum incidental take levels, include restrictions to minimize incidental take of the green sturgeon (e.g., temporal/spatial restrictions, size, gear). As such, it is unclear whether the fishing industry will receive regulatory relief by operating under a FMEP rather than a section 10 permit. The fishing industry may receive some regulatory relief by operating under an FMEP rather than a section 10 permit because the FMEP may allow take (as long as fish are not retained), whereas the section 10 permit is likely to set a maximum on the number of green sturgeon that can be taken.

- The Alternative A and Alternative C would prohibit some actions in geographically limited areas, e.g., some habitat-altering activities are only expressly prohibited in the spawning and rearing areas. Five industry sectors would only experience take prohibitions in spawning and rearing areas. These include sand and gravel mining, forestry and logging, livestock grazing, road and bridge construction, and residential and commercial development. These economic activities would only be affected by the 4(d) rule in San Francisco Bay and Sacramento River areas. This outcome would alleviate the burden on regulated entities in some areas, and would likely reduce the overall number of entities affected.
- Activities related to filling on or isolating wetlands, such as installation of tide gates, culverts, and debris or sediment-trapping road crossing structures, would be subject to the take prohibitions under the Full Action Alternative and the Proposed Action, but not prohibited under Alternatives A and the Alternative C.
- Under the No Action Alternative, no additional impacts to regulated entities would be expected following this rule.

APPENDIX A: LAWS AND REGULATIONS THAT MAY PROVIDE BASELINE PROTECTION FOR GREEN STURGEON

CLEAN WATER ACT (33 U.S.C. 1251 ET SEQ. 1987)

1. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States. It gives the Environmental Protection Agency (EPA) the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface waters.

2. According to the CWA, it is unlawful for any person to discharge a pollutant from a point source into navigable waters, unless a permit is obtained under its provisions; this requires issuance of Section 404 permits from the U.S. Army Corps of Engineers (USACE). As part of pollution prevention activities, the USACE may limit activities in waterways through its 404 permitting process, independent of green sturgeon concerns. These reductions in pollution may benefit green sturgeon.

3. Under the National Pollutant Discharge Elimination System (NPDES) program, EPA sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply to these limits. Under the water quality standards program, EPA, in collaboration with States, establishes water quality criteria to regulate ambient concentrations of pollutants in surface waters.

4. Under section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters are required to submit a State certification to the licensing or permitting agency. For example, the 1995 Bay-Delta Water Quality Control Plan and Water Right Decision 1641 incorporates objectives such as providing water for fish and wildlife, including anadromous fish. Costs associated with this and other existing water control plans are considered baseline protection in this analysis.

MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT REAUTHORIZATION ACT 2006

5. This regulation signed by the President in January, 2007, updates the older Magnuson-Stevens Fishery Conservation and Management Act (as amended through 1996) that was designed for identification of essential fish habitat in fishery management plans and consideration of actions to ensure the conservation and enhancement of habitat. The newer Magnuson-Stevens Reauthorization Act mandates the use of annual catch limits and accountability measures to end overfishing, provides for widespread market-based fishery management through limited access programs, and calls for increased international cooperation. This act may provide protection to green sturgeon by imposition of stringent measures to prevent fishing of green sturgeon, and improve conditions by encouraging market based conservation strategies.

NATIONAL FOREST MANAGEMENT ACT (16 USC §§ 1600-1614 1976)

6. This Act requires assessment of forest lands, development of a management program based on multiple-use, sustained-yield principles, and implementation of a resource management plan for each unit of the National Forest System. The Act may provide

protection to green sturgeon within National Forests, primarily through its authorization of the Northwest Forest Plan (NWFP) and PACFISH. NWFP and PACFISH provide numerous protections for anadromous fish species related to Federal lands management activities (The NWFP and PACFISH are discussed in more detail below).

NORTHWEST FOREST PLAN (1994)

7. The "Forest Plan" is a Federal interagency cooperative program that has recently been implemented to provide a coordinated management direction for the lands administered by the U.S. Forest Service (USFS) and Bureau of Land Management (BLM). The Northwest Forest Plan defines Standards and Guidelines (S&Gs) for forest use throughout the 24 million acres of Federal lands in its planning area (the range of the Northern spotted owl, Western Oregon, Western Washington, and Northwestern California). Specifically, the NWFP provides S&Gs for management of timber, roads, grazing, recreation, minerals, fire/fuels management, fish and wildlife management, general land management, riparian area management, watershed and habitat restoration, and research activities on USFS and BLM lands. To accomplish its goals, the NWFP defines seven land allocation categories, including “matrix lands,” areas where the majority of timber is to be taken, and Riparian Reserves and Key Watersheds, where distances from rivers are set within which many activities are restricted. The Aquatic Conservation Strategy (ACS) component of the plan specifically provides for fishery habitat, protection, and restoration. One of the most important substantive protective measures implemented through the Plan are riparian reserves. These are buffered strips of land that, depending on stream class and type of watershed, range from 300 feet on perennial streams to 50 feet on ephemeral streams.

PACFISH (INTERIM STRATEGIES FOR MANAGING ANADROMOUS FISH-PRODUCING WATERSHEDS) (1995)

8. The USFS and the BLM are developing an ecosystem-based, aquatic habitat and riparian-area management strategy (commonly referred to as "PACFISH") that addresses Federally-managed, anadromous fish watersheds in eastern Oregon, Washington, Idaho, and portions of California (areas outside the Northwest Forest Plan). The strategy is being developed in response to significant declines in naturally-reproducing salmonid stocks, including steelhead, and widespread degradation of anadromous fish habitat east of the Cascade mountain range. Like the Northwest Forest Plan, PACFISH is an attempt to provide a consistent approach for maintaining and restoring aquatic and riparian habitat conditions which, in turn, are expected to promote the sustained natural production of anadromous fish. Presently, an interim strategy has been instituted to halt degradation to fish habitat and to ensure that future opportunities for habitat restoration are not foregone while comprehensive studies are completed for longer-term management strategies. Like the NWFP, PACFISH provides guidelines for timber, roads, grazing, recreation, minerals, fire/fuels management, lands, riparian area, watershed and habitat restoration, and fisheries and wildlife restoration. Standards and guidelines under PACFISH are nearly identical to those in the NWFP.

FEDERAL POWER ACT (16 U.S.C. § 800 1920, AS AMENDED)

9. The Federal Power Act (FPA) was promulgated to establish a regulatory agency to oversee non- Federal hydropower generation. The resulting Federal Energy Regulatory Commission (FERC), an independent Federal agency governing approximately 2,500 licenses for non-Federal hydropower facilities, has responsibility for national energy regulatory issues.

10. This Act may provide protection to green sturgeon habitat from hydropower activities. Section 10(j) of the Federal Power Act (FPA) was promulgated to ensure that FERC considers both power and non-power resources during the licensing process. More specifically, section 18 of the FPA states that FERC shall require the construction, operation, and maintenance by a licensee at its own expense of a fishway if prescribed by the Secretaries of Interior (delegated to the Fish and Wildlife Service) and Commerce (NOAA).

FISH AND WILDLIFE COORDINATION ACT (16 U.S.C.§§ 661-666 1934, AS AMENDED)

11. This regulation provides that, whenever the waters or channels of a body of water are modified by a department or agency of the U.S., the department or agency first shall consult with the U.S. Fish and Wildlife Service and with the head of the agency exercising administration over the wildlife resources of the State where modification will occur with a view to the conservation of wildlife resources.

12. The purpose of this Act is to ensure that fish and wildlife resources are equally considered with other resources during the planning of water resources development projects by authorizing NMFS to provide assistance to Federal and State agencies in protecting game species and studying the effects of pollution on wildlife. This Act may offer protection to green sturgeon habitat by requiring consultation concerning the species with NMFS for all instream activities with a Federal nexus.

RIVERS AND HARBORS ACT (33 USC §§ 401 ET SEQ. 1938)

13. The Rivers and Harbors Act (RHA) places Federal investigations and improvements of rivers, harbors and other waterways under the jurisdiction of the Department of the Army, USACE and requires that all investigations and improvements include due regard for wildlife conservation.

14. This Act may provide protection to the green sturgeon related to in-stream construction activities. Under sections 9 and 10 of the RHA, the USACE is authorized to regulate the construction of any structure or work within navigable waterways. This includes, for example, bridges and docks.

NATIONAL ENVIRONMENTAL POLICY ACT (42 USC §§ 4321-4345 1969)

15. The National Environmental Policy Act (NEPA) requires that all Federal agencies conduct a detailed environmental impact statement (EIS) in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.

16. The NEPA process may provide protection to the green sturgeon for activities that have Federal involvement, if alternatives are considered and selected that are less harmful to green sturgeon and its habitat than other alternatives.

WILDERNESS ACT (16 USC §§ 1131-1136 1964)

17. The Wilderness Act established the National Wilderness Preservation System. With a few exceptions, no commercial enterprise or permanent road is allowed within a wilderness area. Temporary roads, motor vehicles, motorized equipment, landing of aircraft, structures and installations are only allowed for administration of the area. Measures may be taken to control fire, insects and disease. Prospecting for mineral or other resources, if carried on in a manner compatible with the preservation of wilderness, is allowed.

18. The Wilderness Act may offer protections to West Coast salmon and steelhead by limiting land disturbing activities in Wilderness Areas in National Forests. Human activity in wilderness areas is likely to be greatly reduced when compared to non-wilderness areas, which is likely to benefit green sturgeon. To the extent that Wilderness Area designations have precluded human activity and plans for activity in areas containing green sturgeon, then Wilderness Area impacts are incorporated into the baseline.

THE SIKES ACT IMPROVEMENTS ACT (16 USC §670 1997)

19. The Sikes Improvement Act (SIA) requires military installations to prepare and implement an Integrated Natural Resources Management Plan (INRMP). The purpose of the INRMP is to provide for:

- The conservation and rehabilitation of natural resources on military installations;
- The sustainable multipurpose use of the resources, which shall include hunting, fishing, trapping, and nonconsumptive uses; and
- Subject to safety requirements and military security, public access to military installations to facilitate the use of the resources.

INRMPs developed in accordance with SAIA may provide protection to the green sturgeon on military lands.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) (CALIFORNIA NATURAL RESOURCES CODE §15065(A))

20. CEQA is a California State statute that requires State and local agencies (known as "lead agencies") to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA instructs the lead agency (typically a county or city community development or planning department in the case of land development projects) to examine impacts from a broad perspective, taking into account the value of species' habitats that may be impacted by the project in an Environmental Impact Report (EIR). The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or

feasible alternatives will reduce the impacts to a level less than significant. It is within the power of a lead agency to decide that negative impacts are acceptable in light of economic, social, or other benefits generated by the project.

CENTRAL VALLEY PROJECT IMPROVEMENT ACT

21. Passed in 1992 by Congress, the Central Valley Project Improvement Act (CVPIA) is an addendum to the Central Valley Project Act that promotes environmental protection and restoration within California's Central Valley. The CVPIA has two objectives: preserving fish and wildlife and their habitats, and increasing the benefits of the Central Valley Project by adding incentives to use agricultural water more efficiently. To accomplish these objectives, the CVPIA allows contractors to participate in water markets, changes the pricing structure for the water contractor's, creates a restoration fund to finance activities that enhance fish and wildlife and their habitat, and allocates water for environmental uses. Specific provisions of the CVPIA that potentially benefit green sturgeon (and which have already been initiated) include: dedication of 800,000 acre-feet of CVPIA yield for fish and wildlife; release of pulsed flows to increase survival of migrating anadromous fish, and installation of fish screens at water diversions. The CVPIA also places limitations on water contracting and establishes a restoration fund of 50 million dollars annually.

22. More specifically, the CVPIA requires the Secretary of the Interior to develop and implement "a program which makes all reasonable efforts to ensure that, by the year 2002, the natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a longterm basis, at levels not less than twice the average levels attained during the period of 1967- 1991" (Section 3406[b][1]). This program is already in progress; it is known as the Anadromous Fish Restoration Program (AFRP). A coalition of fish experts from the Federal and state agencies, private industry and academia (AFRP Core Group) has developed a working plan for restoring salmon and steelhead in the Central Valley. The working plan provides a platform upon which the participating agencies and public will build a final plan. Actions are recommended for each watershed; they cover a broad spectrum of habitat restoration activities, such as improving instream flows, maintaining adequate water temperatures, correcting fish passage problems at dams and diversions, and restoring spawning gravel and riparian habitat. Further details on the recommended actions may be found in the Working Paper on Restoration Needs: Habitat Restoration Actions to Double Natural Production of Anadromous Fish in the Central Valley of California.

CALFED AND THE ENVIRONMENTAL WATER ACCOUNT

23. To address the long-term resource needs of the Central Valley, U.S. Bureau of Reclamation (BOR), the California Department of Water Resources, and other Federal and state agencies have initiated the California Bay-Delta Authority (CALFED) Program. This long-term planning effort established by legislation enacted in 2002 is designed to develop a comprehensive water management and ecosystem restoration plan for the Central Valley. A key component of CALFED's Water Management Strategy, the

Environmental Water Account (EWA) was created to address two problems, declining fish populations and unreliable water supplies. Its purpose is to better protect fish by making it possible to modify water project operations in the Bay-Delta and still meet the needs of water users.

24. The EWA buys water from willing sellers or diverts surplus water when safe for fish, then banks, stores, transfers and releases it as needed to protect fish and compensate water users. For example, EWA managers might coordinate with water project operators to curtail pumping at specific times to avoid harming fish, and then provide water to cities and farms to compensate for the reduced pumping.

FOR THE SAKE OF THE SALMON

25. This 1994 regional initiative by Federal, state, local, and tribal governments, and private and public organizations is intended to provide overall coordination and direction in protecting and restoring salmon throughout the Pacific Northwest. It is a proactive framework designed to identify solutions to salmon protection problems that are often beyond the scope of a single authority. It focuses on a four-part strategy which includes the following components:

- Identify and seek to modify public and private policies that contribute to the decline of the salmon and determine the means by which essential activities can be made less harmful to ecosystems;
- Take immediate steps to protect remaining healthy habitat;
- Improve the efficiency and cost effectiveness of government activities that protect and restore the health and productivity of salmon habitat; and,
- Encourage a conservation and stewardship ethic toward our natural environment in government, public, and private decision making. The NMFS and FWS strongly support this initiative.

LONG-TERM MANAGEMENT STRATEGY (LTMS) FOR THE PLACEMENT OF DREDGED MATERIAL IN THE SAN FRANCISCO BAY REGION

26. The LTMS is a multi-agency effort on the part of the USACE, EPA, NOAA and others to eliminate unnecessary dredging and maintain in an economically and environmentally sound manner those channels necessary for navigation in San Francisco Bay and Estuary. The LTMS considered three long-term strategies for channel maintenance, all of which attempt to reduce the amount of sediment disposed within the San Francisco Bay estuary. The LTMS also establishes dredging windows for salmon and other aquatic species. Seasonal limitations on dredging were established to accommodate salmon spawning.

27. NOAA reviews USACE dredging permit applications at the programmatic level, as opposed to the individual permit level, unless projects cannot occur within the allotted dredging windows and a formal consultation is required.

ESA - SACRAMENTO RIVER WINTER-RUN CHINOOK SALMON RECOVERY PLAN AND SECTION 7 CONSULTATIONS

28. The flow of the upper Sacramento River is regulated by Shasta/Keswick dams and flow augmentation is managed through a Trinity River diversion, all of which are owned and operated by the BOR. The BOR generally operates the Shasta and Trinity divisions of the Central Valley Project (CVP) in accord with a CVP Operations Criteria and Plan and the winter-run chinook (*O. tshawytscha*) biological opinion for operation of CVP and State Water Project (SWP). Many requirements in this and other winter-run chinook biological opinions should directly benefit green sturgeon in the Sacramento River and Sacramento-San Joaquin Delta, by increasing flows, stabilizing ramping rates, and improving water temperatures, passage past dams and diversions, and water quality.

MITCHELL ACT

29. The NMFS administers the Mitchell Act which was passed by Congress in 1938 (and amended in 1946) for the purpose of providing for the conservation of the fisheries resources of the Columbia River. The Columbia River Fisheries Development Program (CRFDP) was established to coordinate activities authorized under the Mitchell Act. As such, the CRFDP is a cooperative effort between NMFS, the FWS, and the fisheries agencies of Oregon, Washington, and Idaho. In addition to funding the operation and maintenance of artificial propagation facilities, the CRFDP funds activities relating to stream improvements, such as fishway development, irrigation diversion screening, and stream clearing. Under the CRFDP, over 850 screens have been constructed to prevent fish mortality at irrigation diversions. The majority of these are in the Salmon River basin in Idaho and on eastern Oregon Columbia River tributaries. The CRFDP currently provides the majority of funding for multi-agency, cooperative, accelerated programs of screen construction, rehabilitation, and replacement. The program's goal is to have all irrigation diversions which impact anadromous salmonids in the Columbia River basin screened by 2002.

PRINCIPLES FOR AGREEMENT ON BAY-DELTA STANDARDS BETWEEN THE STATE OF CALIFORNIA AND THE FEDERAL GOVERNMENT

30. On December 15, 1994, the Federal government, the State of California, water users, and environmental advocates signed a three-year agreement on new protections for the San Francisco Bay and Delta entitled Principles for Agreement on Bay-Delta Standards Between the state of California and the Federal Government (Principles). Several measures under the Principles should improve habitat conditions for green sturgeon, in particular for juveniles rearing and migrating through the Sacramento-San Joaquin Delta. Increased outflow in the Delta from February through June will likely improve green sturgeon rearing habitat in the Delta. Closures of the Delta Cross Channel gates on the Sacramento River should reduce the diversion of juvenile green sturgeon into the central Delta and direct them away from the SWP and CVP pumping plants towards more suitable rearing habitat on the north and west side of the Delta. Water export restrictions in the spring may also provide benefits for juvenile fish in the Delta.

31. In addition to the protections afforded by modification of CVP and SWP operations, the Principles established a program, know as Category III, to develop, fund, and implement nonflow related fish and wildlife protection measures in the Central Valley. The Category III program has initiated a number of actions that are likely to benefit green sturgeon including the installation of fish screens on several previously unscreened water diversions.

THE COMPREHENSIVE CONSERVATION AND MANAGEMENT PLAN FOR THE SAN FRANCISCO BAY-DELTA ESTUARY

32. The Comprehensive Conservation and Management Plan for the San Francisco Bay-Delta Estuary helps to restore and maintain the estuary's water quality and natural resources. This plan is jointly sponsored by the EPA and the State of California, and is considered to be a blueprint for restoring and maintaining the chemical, physical, and biological integrity of the Bay and Delta. Many of the recommended actions may improve rearing and migratory conditions for green sturgeon by improving water quality and flows and restoring riparian habitat, shallow water areas, and tidal slough habitats.

THE KLAMATH ACT

33. On October 27, 1986, Congress passed the Klamath Act (PL 99-552), authorizing a 20-year-long Federal-State cooperative Klamath River Basin Conservation Area Restoration Program for rebuilding of river's fish resources. The Act created a 14-member Klamath River Basin Fisheries Task Force and directed the U.S. Secretary of Interior to cooperate with the Task Force in creating and implementing the Klamath River Basin Conservation Area Fishery Restoration Program. In 1991, the Task Force developed a Long Range Plan for the Klamath River Basin Conservation Area Restoration Program. The Plan is intended to give initial guidance to the Task Force in its long-range direction in accomplishing the restoration of Klamath basin anadromous fisheries which include: restore, by the year 2006, the biological productivity of the Klamath River basin in order to provide for viable commercial and recreational ocean fisheries and in-river tribal trusts and recreational fisheries; support for the Klamath Fishery Management Council in development of harvest regulation recommendations that would provide for viable fisheries and escapements; recommendations to Congress, state legislatures, and local governments on the actions each must take to protect the fish and their habitats in the basin; inform the public about the value of anadromous fish to the Klamath River region and gain their support for the Restoration Program; and promote cooperative relationships between lawful users of the basin's land and water resources and those who are primarily concerned with the implementation of the Restoration Plan and Program. The Task Force members are appointed by (and represent) the Governors of California and Oregon; the U.S. Secretaries of Interior, Commerce, and Agriculture; the California counties of Del Norte, Humboldt, Siskiyou and Trinity; Hoopa Valley, Karuk and Yurok tribal fishers and anglers and commercial fishers. The Act also created an 11-member Klamath Fishery Management Council to "establish a comprehensive long-term plan and policy... for the management of the in-river and ocean harvesting that affects or may affect Klamath and Trinity River basin anadromous salmon populations." The Council is composed of

essentially the same interests as the Task Force, except that the four county representatives hold seats only on the Task Force.

SALMON, STEELHEAD TROUT, AND ANADROMOUS FISHERIES PROGRAM ACT (SENATE BILL 2261)

34. In 1988, the California State legislature passed the Salmon, Steelhead Trout, and Anadromous Fisheries Restoration Act (Chapter 1545/88/Senate Bill 2261), which established the long-term goal of doubling anadromous fish populations from their 1988 abundance levels by the end of the century. This Act precipitated several plans for restoring Central Valley anadromous fisheries populations and their habitat: the Central Valley Salmon and Steelhead Restoration and Enhancement Plan, and Restoring Central Valley Streams. In general, these planning documents have outlined efforts to restore chinook salmon populations. Restoration activities currently being implemented as a result of these plans and California Senate Bill 1086 (described below) include: a pilot pumping project to improve fish passage at Red Bluff Diversion Dam, installing water temperature control devices at Shasta dam and Whiskeytown reservoir, correcting fish passage problems on several Sacramento River tributaries, and acquiring riparian woodland areas along Butte Creek and the Sacramento River.

35. As part of the Salmon, Steelhead Trout, and Anadromous Fisheries Program, the Steelhead Management and Restoration Project was also established in 1991. The CDFG has produced a draft plan which outlines management activities for the restoration and maintenance of California's steelhead populations. In the Central Valley, the CDFG's focus for steelhead restoration is on recovering wild populations, and restoring hatchery-maintained runs. As an example, the draft plan outlines measures for the Sacramento River including correcting fish passage and screening problems, agricultural drainage and heavy metal pollution from the Iron Mountain Mine Superfund Site. Within the Sacramento River system, the plan recommends improved flows in the lower reaches by exchanging groundwater for surface flows. A monitoring program has also recently been established to assess adult steelhead numbers in Mill and Deer creeks. In addition, the CDFG plan recommends temperature and flow regimes for the Yuba River; adequate minimum flows, flow fluctuation standards, and water temperatures in the American River as well as storage levels in Folsom Reservoir. The CDFG has developed several other fishery management plans for Central Valley streams including: the Lower Yuba River fishery management plan, the Lower Mokelumne River Fisheries Management Plan, and the Steelhead Restoration Plan for the American River.

KEENE-NIELSEN FISHERIES RESTORATION ACT OF 1985

36. This Act states that California intends to “make reasonable efforts to prevent further declines in fish and wildlife, intends to restore fish and wildlife to historic levels where possible, and intends to enhance fish and wildlife resources where possible. Just over $15 million were initially authorized in approved legislation, however, only $11.3 million were actually appropriated between 1985 and 1987. The Act was reworded through 1990 legislation to closely tie expenditures from this account to projects called for under the

Salmon, Steelhead Trout, and Anadromous Fisheries Program Act of 1988. However, the legislation provided no funding to the Keene-Nelson account, nor have the budgets of subsequent governors.

CALIFORNIA SENATE BILL 1086

37. The State of California passed Senate Bill 1086 in 1986, calling for a management plan to protect, restore, and enhance the fish and riparian habitat and associated wildlife of the upper Sacramento River. In response to this legislation, the Resources Agency of California prepared the Upper Sacramento River Fishery and Riparian Habitat Management Plan. This plan recommends a variety of habitat restoration measures, including improving spawning gravel, water quality, and passage at dams and diversions. Senate Bill 1086 appropriated $250,000 to prepare this management plan and to develop an inventory of riparian lands.

CAL TRANS ENVIRONMENTAL ENHANCEMENT AND MITIGATION PROGRAM

38. This program was established by the enactment of the Transportation Blueprint Legislation of 1989. This legislation provided for the annual allocation of $10 million that will be distributed through the California Resources Agency to FY 2000-2001. The program provides grants to local, state and Federal agencies and nonprofit entities to mitigate the environmental impact of modified or new public transportation facilities. Eligible projects for funding include the 25 acquisition, restoration or enhancement of resource lands to mitigate the loss of, or the detriment to, resource lands lying within or near the right-of-way acquired for proposed transportation improvements. Resource lands include natural areas, wetlands, forests, woodlands, meadows, streams, or other areas containing fish or wildlife habitat.

CALIFORNIA WILD AND SCENIC RIVERS ACT

39. This Act declares that water is generally not available for appropriation by diversion from or storage in a designated Wild and Scenic River, unless approved by an initiative of the voters or a two-thirds vote of the California Legislature. Recently, Mill and Deer creeks (Sacramento River tributaries) have been proposed for inclusion in the State and National Wild and Scenic River Acts.

AGREEMENT BETWEEN THE DEPARTMENT OF WATER RESOURCES AND THE DEPARTMENT OF FISH AND GAME TO OFFSET DIRECT FISH LOSSES IN RELATION TO THE HARVEY O. BANKS DELTA PUMPING PLANTS (DWR FOUR PUMPS AGREEMENT)

40. The CDFG and the California Department of Water Resources (DWR) entered into an agreement in 1986 to offset the direct losses of striped bass, chinook salmon and steelhead by the diversion of water by the Harvey O. Banks Delta Pumping Plant. Projects funded under this agreement which may benefit green sturgeon include spawning gravel restoration projects on the Sacramento, Merced and Tuolumne rivers and Mill Creek, and installation of fish screens in Suisun Marsh sloughs.

SAN JOAQUIN RIVER MANAGEMENT PROGRAM ADVISORY COUNCIL

41. This Council is charged by the legislature to develop the San Joaquin River Management Program, to identify actions that can be taken to benefit legitimate uses of the San Joaquin River system. The program objectives are to develop compatible solutions to water supply, water quality, flood protection, fisheries, wildlife habitat and recreation needs. The study area covers the river from Friant Dam downstream through the South Delta Water Agency. Actions resulting from implementation of this management program have the potential to benefit green sturgeon.

COLUMBIA RIVER FISH MANAGEMENT PLAN

42. In keeping with an existing court order, the states of Oregon and Washington must work with tribal and Federal authorities to rebuild weak runs and achieve fair sharing of the available salmon harvest between Native American and non-Native American fisheries. Major points of the plan include the commitment to rebuild upriver spring and summer chinook salmon runs to levels that would restore fisheries, management of harvests to insure that wild salmon runs continue to rebuild, and management of inriver and ocean fisheries to insure fair sharing between Native American and non-Native American. The plan also provides for a flexible and dynamic management approach, as well as for creation of a basin-wide Production Advisory Committee to coordinate joint development of subbasin plans that will address habitat protection, fish propagation, and harvest.

NORTHWEST POWER PLANNING COUNCIL - STRATEGY FOR SALMON

43. The Northwest Power Planning Council was established by Congress to develop a plan to protect and enhance the Columbia basin's fish and wildlife and a regional power plan that provides a reliable, low-cost electricity supply. The goal of the plan is to double salmon production in the Columbia River basin and to accomplish this with no appreciable risk to the biological diversity of fish populations. The plan calls for improved passage and screening at Columbia and Snake River dams, predator reductions in the Columbia and Snake Rivers, downstream barging of juvenile salmonids past Columbia River dams, improvement of harvest and hatchery practices to protect wild salmonids, and protection and restoration of fish habitat within the Columbia River basin. The plan also calls for the evaluation of adverse economic effects of salmon recovery and identification of sources of funds to mitigate the adverse effects.

OTHER STATUTES AND REGULATIONS THAT APPLY TO LAND USE ACTIVITIES

44. While the following statutes and regulations may apply to lands and waters that fall within green sturgeon habitat areas, they are unlikely to provide significant baseline protections and are not considered in the analysis.

- *Fish and Wildlife Conservation Act (16 USC §§ 2901-2911 1980, as amended)* – The FWCA encourages States to develop, revise and implement, in consultation with Federal, State, local and regional agencies, a plan for the conservation of fish and wildlife, particularly species indigenous to the State.

- *Fisheries Restoration and Irrigation Mitigation Act (16 USC § 777 2000)* - The FRIMA directs the Secretary of Interior, in consultation with the heads of other appropriate agencies, to develop and implement projects to mitigate impacts to fisheries resulting from the construction and operation of water diversions by local government entities (including soil and water conservation districts) in the Pacific Ocean drainage area.
- *Water Resources Development Act (33 USC §§ 2201-2330 1986, as amended)* - WRDA authorizes the construction or study of USACE projects and outlines environmental assessment and mitigation requirements.
- *Anadromous Fish Conservation Act (16 USC §§ 757 et seq. 1965)* - The AFCA authorizes the Secretary of the Interior to enter into agreements with States and other non-Federal interests to conserve, develop and enhance the anadromous fish resources of the U.S.
- *Wild and Scenic Rivers Act (16 USC §§ 1271-1287 2001)* - WSRA authorizes the creation of the National Wilderness Preservation System and prohibits extractive activities on specific lands.
- *North American Wetland Conservation Act (16 USC § 4401 et seq. 1989)* - NAWCA encourages partnerships among public agencies and other interests to protect, enhance, restore and manage an appropriate distribution and diversity of wetland ecosystems and other habitats for migratory birds and other fish and wildlife.
- *Federal Land Policy and Management Act (43 USC §§ 1701-1782 1976)* – This Act requires the Bureau of Land Management to employ a land planning process that is based on multiple use and sustained yield principles.
- *Executive Order 11988 and 11990 (1977)* – These Executive Orders require, to the extent possible, prevention of long and short term adverse impacts associated with the occupancy and modification of floodplains and prevention of direct or indirect support of floodplain development wherever there is a practicable alternative.
- *Coastal Zone Management Act (16 USC §§ 1451 et seq. 1972)* - CZMA establishes an extensive Federal grant program to encourage coastal States to develop and implement coastal zone management programs to provide for protection of natural resources, including wetlands, flood plains, estuaries, beaches, dunes, barrier islands, coral reefs, and fish and wildlife and their habitat.
- *Action Plan for the Restoration of the South Fork Trinity River Watershed and its Fisheries.* This action plan was completed for the BOR and Trinity River Task Force in 1994. The plan describes the factors presently limiting anadromous fish restoration, reviews past research and monitoring activities, and lists actions necessary to restore the South Fork Trinity River basin and its anadromous fishes.

- *Trout and Steelhead Conservation and Management Planning Act of 1979*. This Act declares that it is a policy of the State of California to establish and maintain wild trout and steelhead stocks in suitable waters of the state and establishes angling regulations designed to maintain wild trout and steelhead through natural production.
- *California Endangered Species Act (California Fish and Game Code §§ 2050, et seq.)* - The CESA parallels the main provisions of the Federal Endangered Species Act and is administered by the California Department of Fish and Game (DFG). CESA prohibits the "taking" (the California Fish and Game Code defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") of listed species except as otherwise provided in State law. The CESA also applies the take prohibitions to species petitioned for listing ("candidate species").
- *Z'berg-Nejedly Forest Practice Act of 1973 (Cal. Pub. Res. Code §§ 4511 - 4628)* - Also referred to as the California Forest Practice Act, this act regulates all timber harvesting in California on all non-federal land. CDF oversees enforcement of California's forest practice regulations. Under the Forest Practice Act, Timber Harvesting Plans (THPs) are submitted to CDF for commercial timber harvesting on all non-federal timberlands. The Act requires that all private forest land be replanted within five years and that a certain number of dead trees be left in harvest areas for birds and animals that need them.