



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
650 Capitol Mall, Suite 5-100
Sacramento, California 95814-4700

Refer to NMFS ECO #: WCR-2023-02521

October 16, 2023

Mr. Robert Chase
Department of the Army
United States Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814-2922

Re: Endangered Species Act Section 7(a)(2) Biological Opinion for the Green Sturgeon monitoring associated with the Sacramento River Bank Protection Project Post-Authorization Change Report Program Reinitiation 2023.

Dear Mr. Chase:

Thank you for your email of October 2, 2023, requesting reinitiation of consultation with NOAA's National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq.*) for monitoring associated with the Sacramento River Bank Protection Project Post-Authorization Change Report Program. The Program was previously analyzed in a Framework Programmatic Biological Opinion (WCRO-2019-01893).

The enclosed biological opinion, based on the best available scientific and commercial information, concludes that the proposed monitoring is not likely to jeopardize the continued existence of the federally-listed threatened southern distinct population segment of the North American green sturgeon (*Acipenser medirostris*).

Please contact Lyla Pirkola in the NMFS West Coast Region's California Central Valley Office at (916) 591-4030 or via email at Lyla.Pirkola@noaa.gov if you have any questions concerning this consultation, or if you require additional information.

Sincerely,

Cathy Marcinkevage
Assistant Regional Administrator for
California Central Valley Office

Enclosure

cc: ARN: 151422-WCR2017-SA00268





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Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion

Monitoring associated with the Sacramento River Bank Protection Project Post-Authorization
Change Report Program Reinitiation 2023

NMFS Consultation ECO Number: WCR2023-02521

Action Agency: U.S. Army Corps of Engineers

Affected Species and NMFS' Determinations:

ESA-Listed Species	Status	Is Action Likely to Adversely Affect Species?	Is Action Likely to Jeopardize the Species?
Southern DPS of North American green sturgeon (<i>A. medirostris</i>)	Threatened	Yes	No

Consultation Conducted By: National Marine Fisheries Service, West Coast Region

Issued By: *A. Catharine Marcinkevage*
Cathy Marcinkevage
Assistant Regional Administrator for California Central Valley Office

Date: October 16, 2023



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1. INTRODUCTION

This Introduction section provides information relevant to the other sections of this document and is incorporated by reference into Sections 2 and 3, below.

1.1. Background

The National Marine Fisheries Service (NMFS) prepared the biological opinion (opinion) and incidental take statement (ITS) portions of this document in accordance with section 7(b) of the Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq.*), as amended, and implementing regulations at 50 CFR part 402.

We completed pre-dissemination review of this document using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (DQA) (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The document will be available within 2 weeks at the NOAA Library Institutional Repository (<https://repository.library.noaa.gov/welcome>). A complete record of this consultation is on file at the Sacramento NMFS Office.

1.2. Consultation History

- **8 September, 2015** – U.S. Army Corps of Engineers (USACE) proposed the development of a Green Sturgeon Habitat Mitigation and Monitoring Plan (HMMP) in multiple bank repair projects in the Central Valley, including the Sacramento River Bank Protection Project Post-Authorization Change Report (SRBPP PACR) Program. USACE’s goal for developing the HMMP is to ensure that adverse effects to southern Distinct Population Segment (sDPS) green sturgeon as a result of future bank repair actions are sufficiently offset, to allow for the growth, survival, and recovery of the species in the areas affected. The HMMP is currently in draft form and has been developed in coordination with NMFS. The finalized version is expected in 2021. As described in the SRBPP PACR Program opinion, in-river monitoring will be implemented pre-construction to reflect any changes to species using the repair areas. Monitoring is also to occur during construction, and will continue post-construction. Construction is anticipated begin in 2021 or 2022.
- **30 August, 2019** – NMFS issued the SRBPP PACR Program Opinion (NMFS 2019).
- **31 August, 2020** – USACE informed NMFS of their “No Effect” determinations for sDPS green sturgeon designated critical habitat, and for Essential Fish Habitat Response under Magnuson-Stevens Fishery Conservation and Management Act.
- **31 August, 2020** – NMFS received the request for ESA section 7 consultation for proposed monitoring associated with actions taken under the USACE’s 2019 SRBPP PACR Program OPINION, and consultation was initiated
- **October 2, 2023**– USACE informed NMFS of intentions to tag an additional six individuals in the 2023 sampling season. USACE provided sufficient information regarding this action so consultation was reinitiated.

July 5, 2022, the U.S. District Court for the Northern District of California issued an order vacating the 2019 regulations that were revised or added to 50 CFR part 402 in 2019 (“2019

Regulations,” see 84 FR 44976, August 27, 2019) without making a finding on the merits. On September 21, 2022, the U.S. Court of Appeals for the Ninth Circuit granted a temporary stay of the district court’s July 5 order. On November 14, 2022, the Northern District of California issued an order granting the government’s request for voluntary remand without vacating the 2019 regulations. The District Court issued a slightly amended order two days later on November 16, 2022. As a result, the 2019 regulations remain in effect, and we are applying the 2019 regulations here. For purposes of this consultation and in an abundance of caution, we considered whether the substantive analysis and conclusions articulated in the biological opinion and incidental take statement would be any different under the pre-2019 regulations. We have determined that our analysis and conclusions would not be any different.

1.3. Proposed Federal Action

Under the ESA, “action” means all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies (see 50 CFR 402.02). We considered, under the ESA, whether or not the proposed action would cause any other activities and determined that it would not. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur.

Future actions associated with the SRBPP PACR Program include bank repair projects that would occur within the SRBPP PACR Program area, which encompasses the levees and weirs of various basins within the Sacramento River Flood Control Project (SRFCP). The SRBPP PACR Program encompasses over 1,000 miles of levees and weirs. This area extends north to south along the Sacramento River, upstream from Chico at RM 184 to the Town of Collinsville at river mile (RM) zero. The SRBPP PACR Program also includes Cache Creek, the lower reaches of Elder and Deer Creeks, the lower reaches of the American River (RM 0–23), Feather River (RM 0–61), Yuba River (RM 0–11), and Bear River (RM 0–17), portions of Three Mile, Steamboat, Sutter, Miner, Georgiana, and Cache Sloughs, as well as a number of flood bypasses and distributaries. For the purposes of the framework programmatic consultation, there was no limit to the number of erosion sites, but a limit of 30,000 linear feet (LF) of repairs. Additional details of the SRBPP PACR Program OPINION are incorporated here by reference (NMFS 2019).

The proposed monitoring includes capture and tagging of up to 85 sDPS adult green sturgeon between the years 2020-2025. Monitoring and tagging activities may be performed by staff from USACE, California Department of Fish and Wildlife (CDFW), and California Department of Water Resources (DWR).

Methods

sDPS green sturgeon will be captured using angling with a baited hook-and-line. Hooks will be circular or octopus-style with a size ranging from 5/0 to 9/0. Fishing line will consist of 80- or 100-pound braided test line with a 100-pound plastic-coated steel leader with 6-10 ounces of weight. Various types of live bait will be used, depending upon availability, including species of shrimp, crustaceans, lamprey, or salmon roe. Captured fish will be reeled to the boat immediately and secured in a vinyl tagging stretcher, ventral side up to induce tonic immobility. The sturgeon will be brought to shore, if possible, for handling; however, tagging may also take place on the boat, if that is safer for the fish or faster. Upon capture, the fish will be scanned for existing

acoustic and passive integrated transponder (PIT) tags using a Vemco VR100 receiver and PIT tag reader (respectively), measured for total length, fork length, and girth (+/- 1.0 centimeters). Fish with existing (functional) acoustic and PIT tags will be examined for signs of infection, incision closure, and healing. Tags will be able to be read by existing acoustic arrays throughout the project area. The tag numbers and physical data will be entered into the BARD database (as described in the BA; NMFS 2019), and will also be sent to NMFS, CDFW, and the Oregon, and Washington Departments of Fish Wildlife. Fish that lack tags will be tagged as described below and then released.

During acoustic tagging, ambient river water will be pumped gently over the gills of the sturgeon. The tags used in this effort will be Vemco V16-6x transmitters with a 60 – 90 second pulse interval and a battery life of ten years. The transmitters are 95 millimeters (mm) long and have a diameter of 16 mm. Tags will be surgically implanted by making an incision approximately 20 – 35 mm long with a sterilized surgical scalpel, just off-center of the ventral line, approximately 50 – 70 mm anterior to the insertion of the pelvic fin. Surgical tools will be initially sterilized within a forced air sterilization oven at 160 – 170 degrees Celsius (°C) for 2 – 4 hours and then disinfected between each surgery with 70 percent (%) or greater ethyl alcohol and a 10% iodine solution. The area where the tagging incision is to be located will be disinfected with a betadine or iodine solution prior to the surgical procedure. Tags will be immersed in a Nolvasan solution prior to insertion and allowed to dry thoroughly. The incision will be closed using four or five interrupted sutures using 2-0 or 3-0 absorbable PDS II violet monofilament suture with a model NCT-1 or CP-2 cutting edge needle. After the surgical procedure is complete, an iodine solution will then be applied externally to the incision site prior to releasing the fish.

If the captured sturgeon lacks a PIT tag, one will be inserted at that time. A 23 mm HDX PIT tag will be placed either inside the peritoneal cavity during the acoustic tagging surgery already described, or a 12 mm HDX PIT tag will be injected intramuscularly on the left side, just posterior to the bony plates of the dermatocranium using a 12-gauge needle. These are the same tagging locations currently used for other similar research activities, ensuring consistency among the various sturgeon tagging efforts throughout the Central Valley. If an adult is caught with an existing PIT tag, but no acoustic tag is detected, one will be implanted as described above. A genetic sample (approximately 1 square centimeter) will be taken from one of the pectoral fins of all sturgeon captured and sent to a designated location, as recommended by NMFS and CDFW. Total handling time is anticipated to be less than 15 minutes. USACE does not anticipate capturing any other protected fish species with this method of hook and line capture, as the method of angling specifically targets benthic feeding fish, and salmonids would not be feeding at the depths the bait will be fished. Tag information and meta-data will be shared amongst the research community for collaborative transparency. Tagging metadata will also be sent to the Interagency Telemetry Advisory Group. USACE proposes to provide annual reports, in coordination with DWR and CDFW, to NMFS, no later than January 30th of the year following sampling.

Minimizations to sDPS green sturgeon during capture and tagging include:

1. Reduce handling time to the maximum extent possible.

2. Sturgeon will be placed in tonic immobility during handling/tagging to minimize stress.
3. Targeted benthic fishing methods will be used to minimize bycatch.
4. USACE, CDFW, and DWR will ensure all taggers will be appropriately trained.
5. Only post-spawn adults will be targeted to eliminate risk of stress to spawning fish.

2. ENDANGERED SPECIES ACT: BIOLOGICAL OPINION AND INCIDENTAL TAKE STATEMENT

The ESA establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat upon which they depend. As required by section 7(a)(2) of the ESA, each Federal agency must ensure that its actions are not likely to jeopardize the continued existence of endangered or threatened species or to adversely modify or destroy their designated critical habitat. Per the requirements of the ESA, Federal action agencies consult with NMFS, and section 7(b)(3) requires that, at the conclusion of consultation, NMFS provide an opinion stating how the agency's actions would affect listed species and their critical habitats. If incidental take is reasonably certain to occur, section 7(b)(4) requires NMFS to provide an ITS that specifies the impact of any incidental taking and includes reasonable and prudent measures (RPMs) and terms and conditions to minimize such impacts.

2.1. Analytical Approach

This biological opinion includes both a jeopardy analysis and an adverse modification analysis. The jeopardy analysis relies upon the regulatory definition of "jeopardize the continued existence of" a listed species, which is "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02). Therefore, the jeopardy analysis considers both survival and recovery of the species.

The ESA Section 7 implementing regulations define effects of the action using the term "consequences" (50 CFR 402.02). As explained in the preamble to the final rule revising the definition and adding this term (84 FR 44976, 44977; August 27, 2019), that revision does not change the scope of our analysis, and in this opinion, we use the terms "effects" and "consequences" interchangeably.

We use the following approach to determine whether a proposed action is likely to jeopardize listed species or destroy or adversely modify critical habitat:

- Evaluate the rangewide status of the species and critical habitat expected to be adversely affected by the proposed action.
- Evaluate the environmental baseline of the species and critical habitat.
- Evaluate the effects of the proposed action on species and their critical habitat using an exposure–response approach.
- Evaluate cumulative effects.

- In the integration and synthesis, add the effects of the action and cumulative effects to the environmental baseline, and, in light of the status of the species and critical habitat, analyze whether the proposed action is likely to: (1) directly or indirectly reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species; or (2) directly or indirectly result in an alteration that appreciably diminishes the value of critical habitat as a whole for the conservation of a listed species.
- If necessary, suggest a reasonable and prudent alternative to the proposed action.

2.2. Rangewide Status of the Species and Critical Habitat

This opinion examines the status of each species that is likely to be adversely affected by the proposed action. The status is determined by the level of extinction risk that the listed species face, based on parameters considered in documents such as recovery plans, status reviews, and listing decisions. This informs the description of the species' likelihood of both survival and recovery. The species status section also helps to inform the description of the species' "reproduction, numbers, or distribution" for the jeopardy analysis.

For the rangewide status of the species, we adopt by reference here the entire section 2.2 of the SRBPP PACR Program opinion (NMFS 2019).

In addition to the information being adopted by reference, more specific adult return data is included as follows: according to Mora *et al.* (2018), sDPS green sturgeon average run size was estimated at 571 for the returns documented between 2010 and 2015. Adult green sturgeon demonstrated an average spawning interval of 2 to 6 years within the Central Valley. Mean spawning periodicity was 3.69 years, meaning on average, adults would return to spawn every 3 to 4 years. In 2021 NMFS' Southwest Fisheries Science Center (Dudley, 2021) updated the total population estimate to 17,723. This survey estimated the abundance of sDPS green sturgeon adults at 2,106 individuals.

2.3. Action Area

"Action area" means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

For the Action Area, we adopt by reference here the entire section 2.3 of the SRBPP PACR Program opinion (NMFS 2019).

On a more specific level, the action area includes the locations capture and tagging is anticipated to occur. Activities will occur between river miles 205 to 209 of the Sacramento River, within the Feather and Yuba Rivers within Butte, Sutter, Yuba, and Nevada Counties, and in the San Francisco Bay-Delta region (including Suisun and San Pablo Bays).

2.4. Environmental Baseline

The "environmental baseline" refers to the condition of the listed species or its designated critical habitat in the action area, without the consequences to the listed species or designated critical

habitat caused by the proposed action. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultations, and the impact of State or private actions which are contemporaneous with the consultation in process. The consequences to listed species or designated critical habitat from ongoing agency activities or existing agency facilities that are not within the agency's discretion to modify are part of the environmental baseline (50 CFR 402.02).

For the Environmental Baseline, we adopt by reference here the entire section 2.4 of the NMFS 2019 SRBPP PACR opinion. For the purposes of the sDPS sturgeon tagging activities proposed, it is also important to highlight existing monitoring activities currently occurring that will be utilized for this action. Within the action area, there are extensive existing acoustic arrays intended to track tagged fish throughout the Sacramento watershed and its tributaries (which entirely encompass the action area and extend well beyond it). These existing acoustic arrays have been placed into the system by a variety of other state, federal, and private organizations and are used to monitor multiple species of fish that utilize the same tag types.

There is an existing recreational fishery within the action area for other sport fish that share habitat and feeding styles with sDPS green sturgeon. The action area is frequented by boaters, recreational fishing, and other scientific collection methods. Any sDPS green sturgeon within the action area are likely to already encounter noise from boat traffic, and exposure to fishing gear on a regular basis.

2.5. Effects of the Action

Under the ESA, "effects of the action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action (see 50 CFR 402.02). A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (see 50 CFR 402.17). In our analysis, which describes the effects of the proposed action, we considered the factors set forth in 50 CFR 402.17(a) and (b).

Effects of Angling

Fish that are caught and released alive may still die as a result of injuries or stress they experience during capture and handling. The likelihood of killing a fish varies widely, based on a number of factors including the gear type used, the species caught, the water conditions, and the care with which the fish is released. Struthers *et al.* (2018) evaluated the response in Shortnose sturgeon after being captured through hook and line angling. Observations indicated that hooking injuries did not influence the sturgeons' ability to respond to a stimulus; however, the odds of impairment did increase with longer intervals of air exposure. Boat-side holding time by anglers led to an increase in stress levels. Assuming that sDPS green sturgeon would have a similar response, this indicates that one of the most important factors to reducing angling effects is to reduce holding times to the maximum extent possible. Effects from angling are expected to

mostly be limited to stress and potential hook injury. Common hook injuries seen on sturgeon from the study were generally small and would not be expected to cause reduced feeding ability, but if a severe injury were to occur, reduced feeding and fitness would follow.

As sDPS green sturgeon have been documented to hold in deep pools together (Heublein *et al.*, 2009), it is possible that other sDPS green sturgeon in the area may be disturbed by the process of bringing a hooked fish into the boat. The methods being proposed would mimic the existing recreational fishery methods already utilized in the action area. This disturbance would cause temporary disruption to normal holding and feeding behavior, but any disturbed fish would be expected to return to normal behaviors almost immediately.

Effects of Handling, Surgical Tagging, and Tissue Sampling

Once the fish is captured, the tagging procedural steps begin (described in the “Methods” section in the project description above). Temporary stress may occur, caused from placing the animal into the stretcher and getting them into a tonic immobility position. As sturgeon can reach fairly large sizes, it is possible that some injury to the fish may occur during movement of the animal from the water into the stretcher, but those potential effects are expected to be minimized with the safe handling procedures proposed in the BA. The use of tonic immobility has been demonstrated to be nearly as effective as anesthetics, but have a much quicker recovery period and require minimal handling time before being released. Increased levels of stress from handling are expected to be temporary, with only small changes in behavior immediately following handling (Henningsen, 1994).

The use of surgical tagging and tissue sampling for monitoring purposes has been rapidly increasing over the last 20 years. Dozens of studies have evaluated the risks and effects posed from the surgical and tissue sampling process to sturgeon (Collins *et al.*, 2002)(Henningsen, 1994)(Frisk 2019). Many studies were performed on juveniles to determine effects to growth and swimming abilities, as juvenile sized fish would be more vulnerable to predators if their swimming capabilities were impacted. Miller *et al.* (2014) evaluated juvenile green sturgeon for growth, swimming performance, and incision healing after being surgically tagged. While 96.8% of fish in the study were seen to have inflammation around their incision, no effect was seen in swimming ability or growth after tagging or tissue sampling. More severe risks with surgical tagging include internal organ injury, surgical site infection, and potentially death. While these effects are higher concerns in smaller (juvenile) sturgeon, the adults being targeted in the proposed action would be less at risk. Studies have documented fewer instances of internal injury to adult sturgeon during tagging procedures, which may be due to their large size (Collins *et al.*, 2002). Effects to adults would be expected to be similar to those of juveniles, though at a lessened degree due to their larger size and lack of predators in freshwater systems.

A similar study done on adult lake sturgeon (Hondrop *et al.* 2015) found no difference in the movement and behavior of fish newly tagged (within 15 days), versus fish tagged years prior. Therefore, it can be assumed that while the proposed action may cause some temporary incision inflammation on tagged fish, it would not be expected to reduce overall animal fitness or significantly change behavior. There is a chance of internal injury or death occurring due to the

surgical tagging procedures, though it is not anticipated. The likelihood of this occurrence is reduced furthermore with the safe handling, tagging, and release methods being proposed.

Beneficial Effects

There is a strong need for additional information about sDPS green sturgeon, especially related to a robust abundance estimate, a greater understanding of their biology, and further information about their movements, distribution patterns, and micro- and macro-habitat ecology. After an intensive period of tagging of adult sDPS green sturgeon from 2009 – 2017, active acoustic tags have decreased over the past several years as the battery life in those tags runs out. It is anticipated that over 75% of the sDPS adult green sturgeon tagged in the past nine years will have expired (non-functioning) acoustic tags by the end of 2020 (USACE 2020). Once the battery life runs out, the acoustic tags will not be recognized by receivers anymore. By tagging 85 adult sDPS sturgeon over 5 years, a portion of each year's returning spawners will be able to be monitored in the future with tags that should last an estimated 10 years. The benefits of tagging fish to allow for continued monitoring of movement and behavior is highly important to expand the knowledge on this poorly understood species. Tagging a fish with a spawning return of every 3 to 4 years on average over a 5-year time frame, it would be expected to have fish with varying spawning strategies included in the tagged population. The tags implanted will provide additional data on the species for another 10 years, which is invaluable. The tags being proposed in the action are compatible with the acoustic arrays already within the area, and will allow for the immediate monitoring of any fish tagged through the proposed action. The benefits of the data to be collected will have a population wide benefit, and will be publicly available to biologists in the Central Valley.

Effects of Combined Methods

The proposed action incorporates a variety of stressors on 85 individual fish (capture, handle, surgical tag, tissue sample, and release). While each of the proposed methods on their own all have effects that are generally temporary, some carry a small risk of injury or death. When used in combination, those effects have the potential accumulate and cause increased stress, increased risk of injury, and an increased risk of causing death. It is important to consider that the combined effects of angling, handling, surgical tagging, and tissue sampling all add stress and risk in a sequential manner.

Because sDPS green sturgeon can spawn multiple times throughout their lives, the death of a mature adult can have a higher impact to the population. As a very long-lived fish (up to 70 years), that can spawn every 2 to 6 years, sDPS green sturgeon can spawn over a dozen times in a lifetime. Losing a single spawning age adult would also mean the loss of multiple generations of that fish's offspring as well. In order to minimize effects to productivity, only post-spawn adult sturgeon will be targeted to reduce the likelihood of interrupted spawning migrations and aborted spawning.

Sturgeon are generally a very hardy fish and have been documented to have minimal mortality associated with the types of handling and tagging activities proposed (Frisk 2019). With the proposed minimization measures, even a single death is unlikely, but still a possible outcome of tagging 85 fish over a 5-year period.

2.6. Cumulative Effects

“Cumulative effects” are those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation [50 CFR 402.02 and 402.17(a)]. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some continuing non-Federal activities are reasonably certain to contribute to climate effects within the action area. However, it is difficult if not impossible to distinguish between the action area’s future environmental conditions caused by global climate change that are properly part of the environmental baseline *vs.* cumulative effects. Therefore, all relevant future climate-related environmental conditions in the action area are described earlier in the discussion of environmental baseline (Section 2.4).

For the cumulative effects, we adopt by reference here the entire section 2.6 of the SRBPP PACR Program opinion (NMFS 2019).

2.7. Integration and Synthesis

The Integration and Synthesis section is the final step in assessing the risk that the proposed action poses to species. In this section, we add the effects of the action (Section 2.5) to the environmental baseline (Section 2.4) and the cumulative effects (Section 2.6), taking into account the status of the species (Section 2.2), to formulate the agency’s biological opinion as to whether the proposed action is likely to: reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing its numbers, reproduction, or distribution.

The viability of sDPS green sturgeon is constrained by factors such as a small population size, lack of multiple populations, and concentration of spawning sites into just a few locations. The risk of extinction is believed to be moderate because, although threats due to habitat alteration are thought to be high and indirect evidence suggests a decline in abundance, there is much uncertainty regarding the scope of threats and the viability of population abundance indices (NMFS 2015). The recovery potential for this species is likely high, if sources of mortality and activities that decrease habitat quality and quantity, particularly in spawning and rearing habitat, are limited (NMFS 2018).

Although the population structure of sDPS green sturgeon is still being refined, it is currently believed that only one population of sDPS green sturgeon exists. Lindley *et al.* (2007), in discussing winter-run Chinook salmon, states that an ESU represented by a single population at moderate risk of extinction is at high risk of extinction over the long run. This concern applies to any DPS or ESU represented by a single population, and if this were to be applied to sDPS green sturgeon directly, it could be said that sDPS green sturgeon face a high extinction risk. However, the position of NMFS, upon weighing all available information (and lack of information) has stated the extinction risk to be moderate (NMFS 2021).

The expected maximum mortality of 1 adult sDPS green sturgeon as a result of the proposed action would constitute under one percent of the estimated annual spawning abundance.

However, given an annual spawning run estimate of 571 individuals, and a mean sDPS green sturgeon fecundity of 142,000 (Van Eenennaam *et al.* 2006), it can be assumed that 1 post-spawn adult mortality, would represent a small fraction of the annual abundance of that life stage for the DPS. Expanded to 1 single fish over the monitoring timeline of 5 years, the effect of 1 potential mortality is further reduced. When compared to the annual abundance, the amount of adult fish that will be captured, handled, or incidentally killed as a result of this monitoring is a very small proportion of the overall population.

The benefits to be gained by the addition of 85 tagged fish is notable. With a substantial proportion of the adult sDPS green sturgeon acoustic tags running out of battery life in the next 2 years, replacing active tags into the system is extremely important to continue monitoring efforts that have already been in place for over 10 years. NMFS 5-year status review for sDPS green sturgeon recommends continued monitoring of key life history stages and modeling of population abundance including, “increased acoustic tagging and monitoring for all life stages of green sturgeon... especially within the Sacramento River Basin.” (NMFS 2021) Continuing the long-term dataset is incredibly important to developing a more thorough understanding of this species’ life history and movements within their range in order to achieve recovery goals.

Implementation of the proposed activities would be spread out over the species’ entire range over several years, and would be restricted to reductions in the species’ total abundance (that is, the effects on structure and diversity would be minimal). Moreover, the small potential reduction in abundance would be offset to some degree by the information to be gained that in most cases would be directly used to protect sDPS green sturgeon and promote their recovery.

Overall, there would be a very small impact on the species’ abundance, and no measurable effect on their spatial structure or diversity. An effect of the proposed monitoring that cannot be quantified is the conservation benefit to the species resulting from the data and information to be collected. Collection of this data is necessary for understanding potential risks to sDPS green sturgeon resulting from levee repair and bank protection activities. All research findings will be used by NMFS, USACE, DWR, and CDFW to benefit ESA-listed sDPS green sturgeon through improved conservation and management practices.

Combining the minimal, adverse, and beneficial effects associated with the proposed action described above, the environmental baseline, cumulative effects, and status of the species, the proposed project is not expected to reduce appreciably the likelihood of both the survival and recovery of the listed species in the wild by reducing their numbers, reproduction, or distribution.

2.8. Conclusion

After reviewing and analyzing the current status of the listed species, the environmental baseline within the action area, the effects of the proposed action, the effects of other activities caused by the proposed action, and cumulative effects, it is NMFS’ biological opinion that the proposed action is not likely to jeopardize the continued existence of the sDPS of North American green sturgeon.

2.9. Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. “Take” is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. “Harm” is further defined by regulation to include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including breeding, spawning, rearing, migrating, feeding, or sheltering (50 CFR 222.102). “Harass” is further defined by interim guidance as to “create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering.” “Incidental take” is defined by regulation as takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant (50 CFR 402.02). Section 7(b)(4) and section 7(o)(2) provide that taking that is incidental to an otherwise lawful agency action is not considered to be prohibited taking under the ESA if that action is performed in compliance with the terms and conditions of this ITS.

2.9.1. Amount or Extent of Take

In the biological opinion, NMFS determined that incidental take is reasonably certain to occur as follows:

Take in the form of capture and injury of 85 adult sDPS green sturgeon, 1 of which is expected to perish as a result of the monitoring activities. If the numbers captured or the number killed exceeds these amounts, incidental take will have been exceeded, triggering reinitiation.

2.9.2. Effect of the Take

In the biological opinion, NMFS determined that the amount or extent of anticipated take, coupled with other effects of the proposed action, is not likely to result in jeopardy to the species.

2.9.3. Reasonable and Prudent Measures

“Reasonable and prudent measures” are measures that are necessary or appropriate to minimize the impact of the amount or extent of incidental take (50 CFR 402.02).

1. Measures shall be taken to minimize handling time of sDPS green sturgeon by implementing handling and tagging training
2. Measures shall be taken to monitor and reduce incidental take of listed fishes

2.9.4. Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Federal action agency must comply (or must ensure that any applicant complies) with the following terms and conditions. The USACE or any applicant has a continuing duty to monitor the impacts of incidental take and must report the progress of the action and its impact on the species as specified in this ITS (50 CFR 402.14). If the entity to whom a term and condition is directed does not comply with the following terms and conditions, protective coverage for the proposed action would likely lapse.

1. The following terms and conditions implement reasonable and prudent measure 1:
 - (a) All persons handling sDPS sturgeon associated with this proposed action shall be properly trained and use well maintained state-of-the-art equipment. All captured and/or handled fish must be documented.
 - (b) USACE/DWR/CDFW shall annually provide the qualifications of persons performing surgeries for NMFS' review and approval.
 - (c) Any persons who have not had adult sDPS tagging experience within the last 18 months shall be required to have supervision by an experienced biologist until they are deemed able to tag on their own, and approved by NMFS.
 - (d) If any sDPS green sturgeon are killed during monitoring, NMFS shall be notified immediately, and will determine the final disposition of the carcass.

1. The following terms and conditions implement reasonable and prudent measure 2:
 - (a) No sampling shall occur if water temperatures exceed 70° degrees Fahrenheit (21°C).
 - (b) In the event any unexpected capture of other ESA-listed fish occurs, USACE shall immediately (within 24 hours) report to NMFS about the incident.
 - (c) If any sDPS green sturgeon are killed during monitoring, sampling shall cease and the incident shall be reported to NMFS immediately (within 24 hours).
 - (d) USACE/DWR/CDFW shall submit a report to NMFS of any take that occurs as part of the project. This report shall be submitted no later than December 31 of each reporting cycle. The report shall also include an updated list of individuals performing tagging activities.
 - (e) All reports for NMFS shall be sent (preferably by email) to:

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National Marine Fisheries Service
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Sacramento California 95814
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2.10. Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Specifically, “conservation recommendations” are suggestions regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information (50 CFR 402.02).

- 1) USACE/CDFW/DWR should carry and provide educational handouts on sturgeon to interested members of the public while performing proposed activities. Educational information should be targeted at reducing misidentification of sturgeon in the area to reduce the accidental take of sDPS green sturgeon in the white sturgeon recreation fishery.

2.11. Reinitiation of Consultation

This concludes formal consultation for the Green Sturgeon monitoring associated with the Sacramento River Bank Protection Project Post-Authorization Change Report Program Reinitiation 2023.

Under 50 CFR 402.16(a): “Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service where discretionary Federal agency involvement or control over the action has been retained or is authorized by law and: (1) If the amount or extent of taking specified in the incidental take statement is exceeded; (2) If new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion or written concurrence; or (4) If a new species is listed or critical habitat designated that may be affected by the identified action.”

3. DATA QUALITY ACT DOCUMENTATION AND PRE-DISSEMINATION REVIEW

The Data Quality Act (DQA) specifies three components contributing to the quality of a document. They are utility, integrity, and objectivity. This section of the opinion addresses these DQA components, documents compliance with the DQA, and certifies that this opinion has undergone pre-dissemination review.

3.1. Utility

Utility principally refers to ensuring that the information contained in this consultation is helpful, serviceable, and beneficial to the intended users. The intended users of this opinion are USACE. Other interested users could include CDFW and DWR. Individual copies of this opinion were provided to the USACE. The document will be available within 2 weeks at the NOAA Library Institutional Repository (<https://repository.library.noaa.gov/welcome>). The format and naming adhere to conventional standards for style.

3.2. Integrity

This consultation was completed on a computer system managed by NMFS in accordance with relevant information technology security policies and standards set out in Appendix III, 'Security of Automated Information Resources,' Office of Management and Budget Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

3.3. Objectivity

Information Product Category: Natural Resource Plan

Standards: This consultation and supporting documents are clear, concise, complete, and unbiased; and were developed using commonly accepted scientific research methods. They adhere to published standards including the NMFS ESA Consultation Handbook, ESA regulations, 50 CFR 402.01 *et seq.*

Best Available Information: This consultation and supporting documents use the best available information, as referenced in the References section. The analyses in this opinion contain more background on information sources and quality.

Referencing: All supporting materials, information, data and analyses are properly referenced, consistent with standard scientific referencing style.

Review Process: This consultation was drafted by NMFS staff with training in ESA and reviewed in accordance with West Coast Region ESA quality control and assurance processes.

4. REFERENCES

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