

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

California Endangered Species Act



Petition Evaluation for White Sturgeon (*Acipenser Transmontanus*)

Report to the Fish and Game Commission

March 2024



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List of Abbreviations, Acronyms, and Terms

CDFW – California Department of Fish and Wildlife

CESA – California Endangered Species Act

cfs - cubic feet per second

Commission – California Fish and Game Commission

Department – California Department of Fish and Wildlife

e.g. – “for example” (*Latin: exempli gratia*)

ESA – Federal Endangered Species Act

et al. – “and others”

FL - fork length, the length of a fish measured from the tip of the snout to the fork in the tail

Id. – “the same”

i.e. – “that is” (*Latin: id est*)

mtDNA - mitochondrial deoxyribonucleic acid

Executive Summary

San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance submitted a petition (Petition) to the California Fish and Game Commission (Commission) to list White Sturgeon (*Acipenser transmontanus*) as threatened pursuant to the California Endangered Species Act (CESA). White Sturgeon are an anadromous fish native to California, where they primarily reside in San Francisco Bay and the Delta and spawn in the Sacramento and San Joaquin rivers and associated tributaries. They are slow-growing, late maturing, and long-lived, and are able to spawn multiple times during their lives. Historically, abundance estimates for the California population ranged between 175,000-200,000 legal-sized fish; the most recent five-year average abundance estimate indicates there are now approximately 33,000 legal-sized fish in the population.

On December 7, 2023, the Commission referred the Petition to the California Department of Fish and Wildlife (Department) in accordance with Fish and Game Code section 2073 (Cal. Reg. Notice Register 2024, No. 1-Z, p. 26). Pursuant to Fish and Game Code section 2073.5 and California Code of Regulations, title 14, section 670.1, the Department prepared this evaluation report (Petition Evaluation) within 120 days of receiving the Petition. The purpose of the Petition Evaluation is to evaluate the sufficiency of the scientific information contained in the Petition in relation to other relevant information possessed or received by the Department during the evaluation period, and to recommend to the Commission whether the Petition should be accepted and considered.

Summary of the information presented in the petition:

- **Life History, Range, Distribution (including map):** The Petition provides sufficient information regarding the life history, current range, and distribution of White Sturgeon, including a current distribution map.
- **Habitat necessary for survival:** The Petition provides sufficient information regarding the diverse spawning, rearing, holding, and foraging habitats used by White Sturgeon across fresh, estuarine, and ocean waters.
- **Abundance and population trends:** The Petition provides sufficient information regarding current White Sturgeon abundance estimates and population trends based on CDFW monitoring.
- **Factors affecting the ability to survive and reproduce:** The Petition provides sufficient information regarding factors threatening White Sturgeon survival and reproduction. It identifies Central Valley water

management infrastructure and operations, overharvest in the recreational fishery, and harmful algal blooms leading to both direct mortality and impaired water conditions as the three primary concerns. Climate change, vessel strikes, dredging, poaching, and water contaminants are also referenced.

- **Degree and immediacy of threat:** The Petition provides sufficient information to suggest that threats to long-term survival of White Sturgeon will continue or potentially worsen in the future. It identifies the most significant threats as harmful algal blooms, recreational fishing, and water diversions.
- **Impact of existing management efforts:** The Petition contains sufficient information explain concerns that existing and foreseeable regulatory mechanisms and management efforts will not adequately protect White Sturgeon from impacts that threaten their long-term survival. It states concerns that proposed voluntary agreements, updates to the Bay-Delta Water Quality Control Plan, and plans for Sites Reservoir and the Delta Conveyance Project would impair water timing and quality and species recruitment, and states concerns that the levels of harvest targeted in fishing regulations are not consistent with the goal of maintaining or restoring a stable population.
- **Suggestions for future management:** The Petition provides sufficient recommendations of management actions that would reduce key stressors, improving water flows and timing, water quality, reduce export and harvest mortality, and improve monitoring efforts.
- **Availability and sources of information.** The Petition references 68 peer-reviewed or public documents, including numerous documents authored by the Department. The references are current and appropriate.

After reviewing the Petition and other relevant information, the Department has determined that the Petition meets the requirements in Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1). In completing its Petition Evaluation, the Department has determined that there is sufficient scientific information to indicate that the petitioned action to list White Sturgeon as threatened under CESA may be warranted. Therefore, the Department recommends that the Commission accept the petition for further consideration pursuant to CESA.

Introduction

Candidacy Evaluation

The Commission has the authority to list certain species or subspecies as endangered or threatened under CESA (Fish & G. Code, §§ 2062, 2067, & 2070). The listing process is the same for species and subspecies (Fish & G. Code, §§ 2070-2079.1). CESA defines the “species” eligible for listing to include “species or subspecies” (Fish & G. Code, §§ 2062, 2067, & 2068), and courts have held that the term “species or subspecies” includes “evolutionarily significant units” (*Central Coast Forest Assn. v. Fish & Game Com.* (2018) 18 Cal.App.5th 1191, 1236, citing *Cal. Forestry Assn., supra*, 156 Cal.App.4th at pp. 1542 and 1549). The range of a species for the Department’s petition evaluation and recommendation is the species’ California range only (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal.App.4th 1535, 1551).

CESA sets forth a two-step process for listing a species as threatened or endangered. First, the Commission determines whether to designate a species as a candidate for listing by evaluating whether the petition provides “sufficient information to indicate that the petitioned action may be warranted” (Fish & G. Code, § 2074.2, subd. (e)(2)). If the petition is accepted for consideration, the second step requires the Department to produce, within 12 months (18 months with extension) of the Commission’s acceptance of the petition, a peer-reviewed report based upon the best scientific information available that advises the Commission on whether the petitioned action is warranted (Fish & G. Code, § 2074.6). Finally, the Commission, based on that report and other information in the administrative record, determines whether the petitioned action to list the species as threatened is warranted (Fish & G. Code, § 2075.5).

A petition to list a species under CESA must include “information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant” (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)).

Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation (Fish & G. Code, § 2073). The Commission must

also publish notice of receipt of the petition in the California Regulatory Notice Register (Fish & G. Code, § 2073.3). Within 90 days of receipt of the petition (or 120 days if the Commission grants an extension), the Department must evaluate the petition on its face and in relation to other relevant information the Department possesses and submit to the Commission a written evaluation report with one of the following recommendations (Fish & G. Code, § 2073.5, subds. (a)-(b)):

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

The Department's candidacy recommendation to the Commission is based on an evaluation of whether the petition provides sufficient scientific information relevant to the petition components set forth in Fish and Game Code section 2072.3 and the California Code of Regulations, title 14, section 670.1, subdivision (d)(1) to indicate that the petitioned action to list White Sturgeon as threatened may be warranted.

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's determination of whether a petitioned action should be accepted for consideration pursuant to Fish and Game Code section 2074.2, subdivision (e), resulting in the species being listed as a candidate species. The court began its discussion by describing the standard for accepting a petition for consideration previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104:

As we explained in *Natural Resources Defense Council*, "the term 'sufficient information' in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity, supra*, 166 Cal.App.4th at pp. 609-10 [internal citations omitted]). The court acknowledged that “the Commission is the finder of fact in the first instance in evaluating the information in the record” (*Id.* at p. 611). However, the court clarified:

[T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under [Fish and Game Code] section 2074.6.

(*Ibid.*)

CESA Petition History

On November 29, 2023, the Commission received the Petition from San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance to list White Sturgeon (*Acipenser transmontanus*) as threatened under CESA. On December 6, 2023, the Commission referred the Petition to the Department for evaluation. At its meeting on December 14, 2023, the Commission officially received the Petition. At its meeting on February 15, 2024, the Commission granted the Department’s request for a 30-day extension of the period to review the Petition and prepare this Petition Evaluation.

Federal ESA Petition History

On November 29, 2023, pursuant to Section 4(b) of the Endangered Species Act, 16 U.S.C. § 1533(b); Section 553(e) of the Administrative Procedure Act, 5 U.S.C. § 553(e); and 50 C.F.R. § 424.14(a), San Francisco Baykeeper, The Bay Institute, Restore the Delta, and California Sportfishing Protection Alliance provided notice in accordance with 50 C.F.R. § 424.14(b) and (c)(9) that they intended to petition the Secretary of Commerce, through the National Marine Fisheries Service, to protect the San Francisco Estuary White Sturgeon (*Acipenser transmontanus*) Distinct Population Segment as a threatened species.

Species Taxonomy

Analysis of multiple mitochondrial gene sequences indicates that the closest relatives of White Sturgeon are derived from Asia, including *A. schrenckii*, *A. sinensis*, and *A. dabryanus* (Krieger et al. 2008; Hildebrand et al. 2016). Analysis of multiple mtDNA sequences suggested that White Sturgeon last shared a common ancestor with *A. schrenckii* (Amur Sturgeon) approximately 46 million years ago (Hildebrand et al. 2016 citing Peng et al. 2007). There are multiple populations of White Sturgeon found on the west coast of North America with one genetically identifiable group found in California (Schreier et al. 2013).

Species Overview

White Sturgeon (*A. transmontanus*) are one of two sturgeon species native to California (along with Green Sturgeon, *A. medirostris*, which is listed as “threatened” on the federal ESA list, but not listed under CESA [Cal. Code Regs., tit 14, § 670.5]). There are listed populations (ESA or Canadian SARA) of White Sturgeon in the upper Columbia River (above Grand Coulee Dam), Kootenai River, lower, middle and, upper Fraser River, and Nechako River; unlisted populations are found in the Sacramento-San Joaquin rivers, Columbia River (below Grand Coulee Dam), and Snake River (Hildebrand et al. 2016). White Sturgeon can live in excess of 100 years, and historically grew to sizes of approximately 20 feet and 1300 pounds (Moyle 2002). The species is anadromous and is capable of coastal movements, although this appears to be uncommon and most adults in the Central Valley watershed population reside in San Francisco Bay and the Delta (Miller et al. 2020). Recent studies indicate that there are several different residence strategies in the population, with some fish remaining in the freshwater Delta for most of their lives and a larger proportion residing in the saline areas of the bay (Sellheim et al. 2022).

Adult White Sturgeon make seasonal migrations starting in November to spawn in the major rivers of the Central Valley (Miller et al. 2020). Historically, White Sturgeon likely spawned as far upstream in the Sacramento River watershed as the Pitt River and well into the San Joaquin River (Beamesderfer et al. 2004). Dams and anthropogenic water alterations have reduced access to spawning habitat (Hildebrand et al. 2016). Currently, the majority of spawning is thought to occur on the Sacramento River between river kilometers 127–248 (Schaffter 1997; CDFW 2021, 2022, 2023a), with a lesser amount of spawning on the lower San Joaquin River between river kilometers 115–138 (Jackson et al. 2016). Some additional spawning may occur on major tributaries such as the Feather, Bear,

Yuba, and Tuolumne rivers. White Sturgeon are observed in these rivers, but spawning has not been documented with captured eggs or larvae.

A small proportion of White Sturgeon start to mature at approximately 10 years with males maturing earlier than females; however, the majority of the population can take 14–19 years or more to mature to first reproduction (Chapman et al. 1996; Hildebrand et al. 2016; CDFW 2023b). Once mature, males are believed to spawn every 1–2 years and females every 2–4 years (Chapman et al. 1996). The species is a broadcast spawner, releasing large adhesive eggs into the water column, usually over coarse gravel and small cobble substrate (Moyle 2002). Eggs hatch in 4–12 days (Wang et al. 1985) and larvae rear in the river before moving down to the freshwater Delta where they are detected in the CDFW 20-mm tow-net survey¹. Successful recruitment to the juvenile population is infrequent, occurring approximately every 6–7 years. Large year classes and successful recruitment are highly correlated with above normal water years as measured by high mean daily Delta outflow (Fish 2010; Gingras et al. 2013).

CDFW began monitoring the abundance of legal-sized sturgeon in the fishery in 1954 using mark-recapture tagging. Estimates were made of the abundance of fish that were “legal sized” based on the regulations at the time. Sampling effort was intermittent and then occurred annually after Green Sturgeon received federal ESA protection in 2006 (CDFW 2023b). Historically, the estimates of 40–60-inch FL White Sturgeon ranged around 125,000–150,000 fish. The most recent CDFW five-year average abundance estimate suggests there are approximately 33,000 40–60-inch FL fish in the population (CDFW 2023b).

There has been a recreational fishery for White Sturgeon in California since 1954. As of November 16, 2023, the fishery is operating under emergency regulations that permit anglers to take one sturgeon per year between 42–48-inch fork length (FL) and limit the total number of sturgeon taken per vessel per day to two. The fishery is open year-round in the San Francisco Bay and Delta. The Sacramento River and tributaries (upstream of the Highway 50 bridge) and the San Joaquin River and tributaries (upstream of the I-5 bridge) are closed to sturgeon fishing from January 1 through May 31 and open the remaining

¹ <https://wildlife.ca.gov/Conservation/Delta/20mm-Survey>

months. Revised long-term regulations have been under development for implementation in 2025.

Sufficiency of Scientific Information to Indicate the Petitioned Action May Be Warranted

Pursuant to Fish and Game Code section 2072.3 and California Code of Regulations, title 14, section 670.1, subdivision (d)(1), the Department verified that the petition contained information on each of the following petition components:

- Life History;
- Range;
- Distribution;
- Detailed Distribution Map
- Kind of habitat necessary for survival;
- Abundance;
- Population Trend
- Factors affecting the ability to survive and reproduce;
- Degree and immediacy of threat;
- Impact of existing management efforts;
- Suggestions for future management; and
- Availability and sources of information.

The Commission did not receive new information from the public during the Petition Evaluation period (Fish & G. Code, § 2073.4). Pursuant to Fish and Game Code section 2073.5, the Department evaluated based upon the information contained in the petition, whether there is, or is not, sufficient information to indicate that the petitioned action may be warranted. Below is a summary of relevant information from the petition for each of the petition components.

Natural History

Scientific Information in the Petition

The Petition discusses life history of White Sturgeon under “Section 2. Natural History” on pages 6-11 of the Petition, referencing current literature. The petitioners state that recruitment from the egg/larvae stages into the juvenile population is infrequent and correlated with high river flows and Delta Outflow

and discuss the mechanisms underlying this process, referencing Fish 2010, CDFW 2015, Israel et al. 2009 and other sources.

Range and Distribution²

Scientific Information in the Petition



Figure 1. Current distribution of White Sturgeon from CDFW (2023b, page 9). This map was included as Figure 2 in the Petition.

² Summaries of the information provided about range, distribution, and distribution map have all been included in the Range and Distribution Section

The Petition discusses range and distribution for White Sturgeon (including a map, Figure 1) in “Section 3. Range and Distribution” on pages 11–14 of the Petition. Discussion of the species’ range (Section 3.1) addresses river, estuarine, and ocean habitation and includes populations from the Columbia and Fraser river drainages as well as the population in the Central Valley (Hildebrand et al. 2016; CDFW 2015). Distribution is addressed in Section 3.2, focusing on population spatial structure and discussing constraints related to upstream dams and possible threats White Sturgeon may experience in the estuaries.

Kind of Habitat Necessary for Survival

Scientific Information in the Petition

The Petition discusses the kind of habitat necessary for survival for White Sturgeon in California in “Section 5. Habitat Necessary for Species Survival” on pages 22–24 of the Petition. The petitioners address spawning habitat in major Central Valley rivers, dispersal and rearing habitat in the rivers and estuary, foraging and holding habitat in the estuary and Delta for subadults and adults, and infrequent long-distance marine migrations of adults. Critical habitat needs are discussed on page 24.

Abundance

Scientific Information in the Petition

The Petition discusses the abundance of White Sturgeon in California in “Section 4.1. Abundance” on pages 14–17 of the Petition. The references are up to date and rely on Department-authored documents including CDFW 2023b, Fish 2010, and documents presented at Fish and Game Commission meetings. The petitioners also discuss declining trends in both juvenile and adult abundance using data from Department monitoring.

Population Trend

Scientific Information in the Petition

The Petition discusses White Sturgeon population trends in California in “Section 4.2. Population Trends” on pages 17–22 of the Petition. “Subsection 4.2.1. River Flows and Delta Outflow” of the Petition addresses declining trends in juvenile recruitment correlated with low river flows and Delta Outflow (e.g. Fish 2010; CDFW 2015; SWRCB 2017). The petitioners state that monthly average Delta

outflows >37,000 cfs during March–July are sufficiently protective of White Sturgeon (SWRCB 2017), yet flows of this magnitude have only occurred in 4 out of the past 23 years. Subsequent sections discuss mortality due to entrainment of juveniles of water operations (4.2.2), fishing harvest (4.2.3), and recent harmful algal blooms (4.2.3).

Factors Affecting the Ability to Survive and Reproduce

Scientific Information in the Petition

The Petition discusses factors affecting ability to survive and reproduce in “Section 6. Factors Affecting Ability to Survive and Reproduce” on pages 24–32 of the Petition. The petitioners identify the three primary threats as:

- 1) Central Valley water management infrastructure and operations including dams, altered hydrograph due to water operations, and direct mortality from export operations. Potential impacts of planned projects (e.g. Sites Reservoir, Delta Conveyance Project, Bay-Delta Water Quality Control Plan and Voluntary Agreements) are also addressed.
- 2) Overharvest in the recreational fishery.
- 3) Harmful algal blooms leading to fish kills and impaired water quality.

The petitioners also discuss other factors that may influence the survival of the species including poaching, pollution, dredging, vessel strikes, and climate change.

Degree and Immediacy of Threat

Scientific Information in the Petition

The Petition discusses the degree and immediacy of the threat in “Section 7. Degree and Immediacy of Threat” on page 33 of the Petition with an emphasis on the three primary threats identified in Section 6 of the Petition. The petitioners discuss the role that current reservoir and river water management may have in persistent declines in the population and note that flow conditions may be further impacted by major projects currently in development. They also discuss the impacts of high levels of harvest from recreational fishing and the emerging threat of harmful algal blooms.

Impact of Existing Management Efforts

Scientific Information in the Petition

The Petition discusses the impact of existing management efforts in “Section 8. Impact of Existing Management Efforts” on pages 33–35 of the Petition with an emphasis on the three primary threats identified in Section 6 of the Petition. They discuss river and estuarine flow requirements as minimum standards that are not adequate to protect White Sturgeon and note that existing flows may be further reduced in the future. The petitioners discuss the sufficiency of recent efforts by the Department to review and update recreational fishing regulations in the emergency regulation and long-term regulation processes (e.g. CDFW 2023b) in light of recommendations in the literature (Blackburn et al. 2019). They also address concerns about the role anthropogenic sources of nutrient enrichment have in algal blooms in San Francisco Bay, the Delta, and San Joaquin River, noting that “the Regional Board anticipates requiring load reductions in an updated wastewater nutrient permit, [but] changes in infrastructure and operations required to substantially reduce nutrient loads are likely to take many years to implement.” Additionally, the Petition states concerns with the status of the implementation of flow standards or voluntary agreements for the San Joaquin River, and their potential impacts on the White Sturgeon population.

Suggestions for Future Management

Scientific Information in the Petition

The Petition discusses the impact of existing management efforts in “Section 9. Recommendations for Future Management” on pages 35–42 of the Petition. Recommendations include: a) restoring freshwater flows between March and July to support juvenile recruitment, b) reducing or limiting migratory barriers caused by low water quality in the Delta, c) reducing mortality associated with entrainment in water operations, d) eliminating harvest in the recreational fishery by shifting to a sustainable catch-and-release fishery, e) reducing nutrient input into San Francisco Bay, and f) enhancing monitoring and research efforts on White Sturgeon.

Availability and Sources of Information

Scientific Information in the Petition

The Petition provides a list of 68 references in Section 10, “Availability and Sources of Information” on pages 42–49 of the Petition. The cited information sources range from peer-reviewed literature, reports and technical literature, and presentations and documents presented at public meetings. The information cited is current and is presented in accordance with standard scientific practice.

Summary of Petition Components

The above petition components were evaluated by the Department for sufficiency of information pursuant to Fish and Game Code section 2073.5. The Department finds that sufficient information was provided on the petition components. If the Commission accepts the petition for further consideration under CESA, the Department will commence a review of the status of the species at that time.

Recommendation to the Commission

Pursuant to Fish and Game Code section 2073.5, the Department evaluated the Petition on its face and in relation to other relevant information the Department possesses. In completing its Petition Evaluation, the Department has determined that the Petition and other relevant information provide sufficient scientific information to indicate that the petitioned action to list the White Sturgeon as threatened may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

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