Bull Trout
(*Salvelinus confluentus*)

5-Year Status Review:
Summary and Evaluation

Emily Weidner, USFWS

U.S. Fish and Wildlife Service

Pacific Region
Idaho Fish and Wildlife Office
Boise, Idaho

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5-YEAR STATUS REVIEW
Coterminous United States Population of Bull Trout (*Salvelinus confluentus*)

GENERAL INFORMATION

Current Classification: Threatened

Lead Field Office: Idaho Fish and Wildlife Office, Boise, ID

Review Author(s):

Dan Nolfi, Fish and Wildlife Biologist (daniel_nolfi@fws.gov)
Tracy Melbihess, Idaho Assistant State Supervisor (tracy_melbihess@fws.gov)
Sandi Fisher, Deputy Idaho State Supervisor (sandi_fisher@fws.gov)
Lisa Ellis, Idaho State Supervisor (lisa_ellis@fws.gov)

Reviewers:

Lead Regional Office:

Pacific Region, Portland, OR

Cooperating Field Office(s):

Klamath Falls Fish and Wildlife Office
Montana Fish and Wildlife Office
Nevada Fish and Wildlife Office
Oregon Fish and Wildlife Office
Washington Fish and Wildlife Office

Cooperating Regional Office(s):

Mountain-Prairie Region, Denver, CO
Pacific Southwest Region, Sacramento, CA

Date of original listing:

- December 1, 1999 (64 FR 58910; November 1, 1999) Bull trout in the coterminous United States as Threatened

Critical Habitat/4(d) rule/Experimental population designation/Similarity of appearance listing:

- 4(d) final rule: December 1, 1999 (64 FR 58910; November 1, 1999)
- Similarity of appearance listing**:** December 1, 1999 (64 FR 58910; November 1, 1999)
- Critical habitat final rule: November 17, 2010 (75 FR 63898; October 18, 2010)
- Recovery Plan notice of availability: September 30, 2015 (80 FR 58767; September 30, 2015)
- Nonessential experimental population: Clackamas River - June 21, 2011 (76 FR 35979; June 21, 2011)

Methodology used to complete the review:

In accordance with section 4(c)(2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a status review is to assess each threatened species or endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants (50 CFR 424.11). The U.S. Fish and Wildlife Service (Service) evaluated the best available information about the bull trout's biology, habitat, and threats to inform this status review.

Information summarized in this review includes information from a Species Status Assessment Report (SSA) (USFWS 2024, entire) that was developed by the Service and species experts, as well as the final listing and critical habitat rules, bull trout recovery plan, published and unpublished reports and research, field observations, and personal communications from recognized experts in the field.

A completed draft of this 5-year status review was reviewed by other Service offices across the range of bull trout. All comments received were evaluated and incorporated into this final document as appropriate. The status recommendation and the recommendations for future activities in this review are the result of a thorough review of the best available information on bull trout.

Federal Register Notice citation announcing the species is under active review:
[USFWS] U.S. Fish and Wildlife Service. 2020. Initiation of 5-year status reviews for 129 species in Oregon, Washington, Idaho, Hawaii, Montana, California, and Nevada. Federal Register 85:14240-14243. March 11, 2020.

Species' Recovery Priority Number at start of 5-year review:
9C (See 48 FR 43098 [September 21, 1983] for description of recovery priority numbering system). Bull trout have a moderate degree of threat with low to moderate recovery potential, as well as rangewide conflict with construction or other economic activities.

Review History:
Previous 5-year reviews recommending no change in listing status for bull trout were published on April 25, 2008, and November 13, 2015 (USFWS 2008, entire; USFWS 2015a, entire).

REVIEW ANALYSIS

Listed Entity

Taxonomy and nomenclature
We are not aware of any changes to the taxonomy of bull trout, and the species is still considered valid by the Service.

Distinct Population Segment (DPS) (61 FR 4722**)**
The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This species was listed as a DPS (the coterminous United States) in 1999 (64 FR 58910), and we have no new information that would

indicate the species should not be listed as a DPS under the Service's 1996 DPS Policy (61 FR 4722, pp. 4722-4725). Unless referring to bull trout elsewhere within North America, references to "bull trout" in this document are to the listed DPS.

Recovery Criteria

Recovery Plan

Recovery Plan for the Coterminous United States Population of Bull Trout *(Salvelinus confluentus),* September 28, 2015

Recovery plans are not regulatory documents; they are intended to provide guidance to the Service, States, Tribes, and other partners on methods of lessening or alleviating threats to listed species and on criteria that may be used to determine when recovery is achieved. Achieving recovery criteria can indicate that the species no longer requires protections under the Act. However, when proposing to delist a species due to recovery, the Service must review the species' status by applying the five factors in section 4(a)(1) of the Act (50 CFR 424.11).

The bull trout recovery plan (recovery plan) identifies six recovery units that are biologically important to the rangewide conservation of bull trout and provides recovery criteria for each unit. These six recovery units encompass 110 core areas that were occupied at the time of listing, 7 historical core areas, and 1 Research Needs Area (RNA), and comprise over 600 local populations. Historical habitat loss and fragmentation, interaction with nonnative species, fish passage issues, and changing climate are the most significant threats affecting bull trout. The magnitude of those threats and their potential synergistic effects vary greatly across recovery units, core areas and among local populations. These threats are described in greater detail in the Recovery Unit Implementation Plans (RUIPs) for each of the six recovery units (USFWS 2015b and 2015c, entire).

The goal of the recovery plan is to lessen or alleviate threats and ensure sufficient distribution and abundance to improve the status of bull trout throughout their extant range in the coterminous United States so that protection under the Act is no longer necessary. When this is achieved, we expect that:

- Bull trout will be geographically widespread across representative habitats and demographically stable in each recovery unit.
- The genetic diversity and diverse life history forms of bull trout will be conserved to the maximum extent possible.
- Cold water habitats essential to bull trout will be conserved and connected.

The recovery plan outlines actions necessary to effectively manage and ameliorate threats, work collaboratively with partners to implement recovery actions, and adaptively manage the recovery program. Despite our best conservation efforts identified in the recovery plan, we expect that some existing bull trout core areas may become extirpated due to the threats they face. We seek to ensure adequate conservation of genetic diversity, life history features, and broad geographical representation of the remaining bull trout populations.

Additionally, while the recovery plan recognizes that all existing bull trout core areas within the six recovery units contribute to the overall conservation of the species, as noted in the recovery plan, we do not intend that all currently occupied core areas must be resilient and persist in order to meet the recovery criteria for the listed entity (USFWS 2024, entire). Collectively, the recovery criteria address all significant threats to bull trout based on our current understanding as reflected in the SSA report.

Recovery criteria are as follows:

- For the Coastal, Mid-Columbia, and Upper Snake Recovery Units: Primary threats are effectively managed in at least 75 percent of all core areas, representing 75 percent or more of bull trout local populations within each of these three recovery units.

- For the Columbia Headwaters Recovery Unit: Primary threats are effectively managed in 75 percent of simple core areas and 75 percent of complex core areas, representing 75 percent or more of bull trout local populations in both simple and complex core areas.
- For the Klamath and Saint Mary Recovery Units, all primary threats are being effectively managed in all existing core areas, representing all existing local populations. In addition, in the Klamath Recovery Unit, because 9 of 17 known local populations have already been extirpated and the remainder are significantly imperiled and require active management of threats, effective threat management is necessary in 100 percent of core areas, and the geographic range of bull trout within this recovery unit will need to be expanded through reestablishment of extirpated local populations.
- In recovery units where shared feeding, migrating, and overwintering (FMO) habitat outside core areas has been identified, connectivity and FMO habitat should be maintained in a condition sufficient for regular bull trout use and successful dispersal among the connecting core areas for those core areas to meet the criterion.

If threats are effectively managed (i.e., 75 percent threshold in the Coastal, Mid-Columbia, Upper Snake, and Columbia Headwaters Recovery Units, and 100 percent for the Klamath and Saint Mary Recovery Units), we expect that bull trout viability, assessed using the biodiversity principles of resiliency, redundancy, and representation, will respond accordingly.

Biology and Habitat Summary

Initially described as *Salmo confluentus* in 1859, bull trout are a native North American char in the family Salmonidae (Cavender 1978, pp.146-147). Prior to 1978, bull trout and Dolly Varden (*Salvelinus malma)* were considered a single species. Subsequent work demonstrated species distinction as well as little to no interbreeding where the two species

overlap (Cavender 1978, entire; Crane et al. 1994, pp. 182-183; Leary and Allendorf 1997, p. 715). In the coterminous U.S., Dolly Varden only occurs in western Washington, overlapping somewhat with the current bull trout distribution.

Bull trout are distributed from coastal Alaska and western Canada, south to the Pacific Northwest, and east to portions of the middle and northern Rocky Mountains. Within the coterminous United States portion of the range, bull trout are currently known to occur in the Columbia and Snake River basins, the Puget Sound and Olympic Peninsula coastal basins, and the Saint Mary and Upper Klamath River basins. At the time of listing in 1999, bull trout in the coterminous United States, although still widely distributed in portions of Washington, Oregon, Idaho, Montana, and Nevada, were considered to be in widespread decline (Quigley and Arbelbide 1997, p. 1177). Bull trout formerly (prior to 1975) occurred in the Sacramento River basin in California, specifically the McCloud River (Behnke 2002, pp. 296–297).

Bull trout have both resident and migratory life history strategies (Rieman and McIntyre 1993, p. 2). The size and age of bull trout at maturity depends upon habitat capacity and subsequent life history strategy. Resident fish tend to be smaller at maturity than migratory fish and produce fewer eggs (Fraley and Shepard 1989, pp. 135-137; Al-Chokhachy and Budy 2008, pp. 1716-1717). Bull trout normally reach sexual maturity in 4 to 7 years (Johnston et al. 2007, pp. 14-16). They frequently live for 10 years, and occasionally for 20 years or more (McPhail and Baxter 1996, pp. 14-15; Al-Chokhachy and Budy 2008, entire).

Of native salmonids in the Pacific Northwest of the United States, bull trout have the most specific habitat requirements (Rieman and McIntyre 1993, p. 4), which are often referred to as "the four Cs": cold, clean, complex, and connected habitat. Habitat components that influence bull trout distribution and abundance include water temperature, in-stream and stream-bank cover, channel form and stability, valley form, spawning and rearing substrate, and unobstructed migratory corridors (Fraley and Shepard 1989, entire; Hoelscher and Bjornn 1989, entire; Sedell and Everest 1991, entire; Howell and Buchanan 1992, entire; Pratt 1992, entire; Rieman and McIntyre 1993 pp. 4-7, 1995 entire; Rich 1996, pp. 1-9; Watson and Hillman 1997, entire; Shellberg 2002, entire; Al- Chokhachy et al. 2010, entire). Juveniles remain in the substrate after hatching; the time from egg deposition to emergence of fry can exceed 200 days. During the relatively long incubation period in the gravel, bull trout eggs are especially vulnerable to fine sediments, streambed scour, and water quality degradation (Fraley and Shepard 1989, p. 141; Shellberg et al. 2010, p. 636-637, Bowerman et al. 2014, pp. 1065-1067).

Species Viability

We assessed bull trout viability using the SSA process (USFWS 2016, entire; Smith et al. 2018). The SSA (USFWS 2024) documents our review of the life history, ecology, threats, and viability for bull trout throughout its range in the coterminous U.S. Viability is defined as the ability of bull trout to sustain populations in natural ecosystems over a biologically meaningful timeframe. We assessed information across a hierarchy of geographic scales, progressing from individuals to local populations, core areas, representation units (equivalent to the recovery units identified in

the recovery plan), and the coterminous level, in order to characterize current and future viability (i.e., from today through approximately 2080). The SSA uses the conservation biology principles of resiliency, redundancy, and representation, collectively known as the "3 Rs", as a lens to evaluate the current and future condition of the species (USFWS 2016, p. 6). To assess future condition, we developed five scenarios for the next 60 years, representing different plausible futures in terms of climate conditions and associated environmental variability and the level of implementation of conservation efforts. The scenarios range from "substantially improved conservation in a warmer climate" (scenario 1), to "substantially decreased conservation in a hotter and drier climate" (scenario 5). A "continuation of current conservation with a hotter and slightly wetter climate" is captured in scenario 3. Each scenario represents a plausible, yet simplified representation of the climatic stressors and conservation efforts likely to influence species viability either directly or indirectly (USFWS 2024, pp 113-122). Table 1 summarizes current and future bull trout viability with respect to resiliency, redundancy, and representation.

Assessment of Resiliency

Resiliency was assessed at a core area scale using condition scores based on demographic and habitat factors, informed by core area threats assessments and with input from numerous researchers, species experts and working groups throughout the range of the species. Bull trout require specific habitat characteristics for breeding, rearing, feeding, sheltering, and dispersal. Habitats required to fulfill the life cycle of bull trout are categorized into spawning and rearing (S&R), and feeding, migration, and overwintering (FMO). Beyond the needs of individual bull trout, core area populations also require specific conditions to withstand stochastic events that disturb the species or its habitat. The habitat and demographic needs for bull trout are based on life history and ecology and together can be assessed to determine habitat and population resiliency.

Bull trout need the following core area habitat factors in sufficient condition to successfully complete all stages of their life cycle:

- **Water Quality** – enough clean and cold water to support breeding and feeding, and provide shelter for each life stage to survive.
- **FMO Habitat Access** – connectivity for subadults and adults between spawning and rearing habitats and feeding, migrating and overwintering habitats that provide diverse resources.
- **Fish Community Quality** – habitat for all life stages with limited interaction with deleterious nonnative species.
- **Instream Quality** – in-water habitat with complex substrates, stream morphology, and structure to meet the needs of each life stage.
- **Riparian Quality** – intact habitat for all bull trout life stages within the riparian corridor, which provides shade, channel complexities, insect communities, and allochthonous inputs leading to higher quality instream habitat and water quality.
- **Spawning and Rearing Habitat Quantity** –sufficient amount and quality of habitat to allow for individual adults to spawn and juveniles to rear.

Table 1. Summary of viability for bull trout in terms of resiliency (i.e., the number of core areas in each resiliency category), and redundancy and representation (i.e., total number and distribution of core areas and their genetic, ecological, and life history diversity) across their range in the coterminous U.S, currently and 60 years into the future under 5 plausible future scenarios.

3 Rs	Current Condition	Future Scenario 1: *Significantly increased conservation, warmer climate*	Future Scenario 2: *Increased conservation, warmer climate*	Future Scenario 3: *Current conservation, hotter/wetter climate*	Future Scenario 4: *Decreased conservation, hotter/drier climate*	Future Scenario 5: *Significantly decreased conservation, hotter/drier climate*
Resiliency	18 - Very High 26 - High 45 - Medium 20- Low 0 - Very Low 9 - Extirpated*	49 - Very High 27 - High 38 - Medium 1 - Low 0 - Very Low 3 - Extirpated	26 - Very High 36 - High 41 - Medium 8 - Low 0 - Very Low 7 - Extirpated	12 - Very High 25 - High 42 - Medium 17 - Low 0 - Very Low 22 - Extirpated	0 - Very High 14 - High 30 - Medium 27 - Low 14 - Very Low 33 - Extirpated	0 - Very High 1 - High 23 - Medium 29 - Low 15 - Very Low 50 - Extirpated
Redundancy	109 Core Areas, widely distributed	115 core areas, widely distributed	111 core areas, widely distributed	96 core areas, widely distributed	85 core areas, widely distributed	68 core areas, widely distributed
Representation	Diversity across 109 core areas & 6 representation units	Diversity across 115 core areas & 6 representation units	Diversity across 111 core areas & 6 representation units	Diversity across 96 core areas & 6 representation units	Diversity across 85 core areas & 6 representation units	Diversity across 68 core areas & 6 representation units

** Under current condition, one core area has been extirpated since listing; in addition, bull trout populations were previously extirpated in the 7 historical core areas and 1 Resource Needs Area (USFWS 2024, pp. 104-110), some of which are projected to be reestablished in Scenarios 1 and 2.*

Bull trout need the following demographic factors sufficiently maintained to promote the resiliency of a core area population:

- **Growth rate/population trend** – the trajectory of a population.
- **Life history diversity** – the life history expressions present in a core area, including resident, migratory (fluvial, adfluvial, anadromous), or a combination.
- **Number of populations** – the number of occupied local populations making up the core area.
- **Demographic Connectivity** – the ability of individuals from one local population to be able to access other local populations within a core area to maintain genetic diversity.
- **Abundance** – the number of breeding age adults in the core area.

Understanding the extent to which bull trout habitat and demographic needs are being met is essential to determining current and future core area resiliency. The SSA evaluates these factors for all 118 core areas across the range. Each core area received a resiliency score and associated resiliency category depicted as "Very High, High, Medium, Low, Very Low, and Extirpated" (USFWS 2024, pp. 104-110, 123-133).

Current Resiliency
Based on data complied through December 31, 2023, 9 core areas are extirpated, no core areas rank Very Low, 20 core areas rank Low, 45 core areas rank Medium, 26 core areas rank High, and 18 core areas rank Very High (USFWS 2024, pp. 106-110). Of the 9 extirpated core areas, one (Lake Pend Oreille C) has been extirpated since listing while loss of bull trout populations in the remaining 8 extirpated core areas [7 historical core areas and 1 research needs area] pre-dates listing (Table 1).

Current Redundancy
Bull trout have a high level of redundancy across their range. Currently there are 109 extant core areas, extending across the same major watersheds and spatial area occupied at listing. Extant core areas are resilient in five States within numerous large river and lake systems across the range (USFWS 2024, p. 111). All six recovery units currently contain multiple extant core areas.

Current Representation
Representation describes the ability of a species to adapt to changing environmental conditions and is measured by the genetic, ecological, and life history diversity of bull trout across the 109 extant core areas and the six recovery units (referred to as representation units in the bull trout SSA). Bull trout exhibit ecological plasticity across the range, occupying a variety of ecological regions and utilizing a suite of habitat types depending on life stage and life history expression. Currently, a diverse set of genetic, ecological, and life history components are evident within the species range (USFWS 2024, pp. 111-113).

Future Resiliency
The SSA projects resiliency for bull trout core areas 60 years into the future using the same methodology and condition category model used to evaluate current condition (USFWS 2024, pp. 123-124). The 60-year time-period accounts for approximately eight bull trout generations, which is adequate time for populations to respond positively or negatively to the changes in stressors or conservation efforts and is also the time frame for which we can reasonably project climate conditions with current models (USFWS 2024, pp. 114).

Future resiliency projections vary widely among the five scenarios. Despite a warmer climate, projections suggest resiliency can improve for most core areas across all six representation units with increased or substantially increased conservation effort. However, with the current level of conservation and less favorable climate conditions, our projections suggest the resiliency of most vulnerable core areas will decline and the likelihood of additional core area extirpations will increase. With the least favorable climate conditions and decreased or substantially decreased conservation efforts, resiliency across all core areas is projected to decline substantially (USFWS 2024, pp. 123-135). Projected future bull trout resiliency is included in Table 1.

Future Redundancy and Representation
As core area resiliency fluctuates among future scenarios, so do redundancy and representation. Retaining resilient core areas spread across representative units (representation) allows for the species to adapt to changing environmental conditions over time, as indicated by genetic and environmental diversity within and among populations. Retaining a widespread distribution of resilient core areas (redundancy) allows the species to withstand large scale catastrophes including, but not limited to, drought, wildfire, and flooding. Redundancy varies among the future scenarios, ranging from a high of 115 extant core areas to a low of 68, with correspondingly varied resiliency. Representation also varies among scenarios, depending on how different core areas across the range are affected by variable climate impacts and on which core areas respond to conservation efforts and how they respond. Bull trout future redundancy and representation are summarized in Table 1.

Threats (Five-Factor Analysis) Summary

The status of a species is determined from an assessment of factors specified in section 4(a)(1) of the Act, including: Factor A: the present or threatened destruction, modification, or curtailment of its habitat or range; Factor B: overutilization for commercial, recreational, scientific, or educational purposes; Factor C: disease or predation; Factor D: the inadequacy of existing regulatory mechanisms; Factor E: other natural or manmade factors affecting its continued existence. The current threats to bull trout are described in the recovery plan and RUIPs (USFWS 2015b and 2015c, entire) and are discussed in greater detail in the SSA (USFWS 2024, pp. 72-86 and Appendices H and I. A summary of our assessment of these factors is provided below.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Most threats described in the recovery plan and RUIPs fall into the category of destruction, modification, or curtailment of habitat. Many of these impacts, such as dewatering, sedimentation, thermal modification, and water quality degradation, are a consequence of specific land and water management activities (USFWS 2024, pp. 75-84). Today, there are increased efforts to mitigate impacts, especially on federal lands where there is a greater conservation emphasis, such as headwater areas where bull trout spawn and rear. For example, improved land management practices, declining timber harvest, and cessation of road building have reduced impacts in riparian habitats. However, legacy effects of past land use continue to degrade bull trout habitat across the range where habitat restoration has not yet occurred, or ecological benefits have not been realized. Loss of connectivity from dams and water diversions continue to isolate and fragment populations, reducing the species' viability today. In the absence of substantially increased conservation effort, these threats are predicted to continue reducing bull trout viability across the range into the future.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

At the time of listing in 1999, illegal harvest and ongoing incidental take (hooking mortality) of bull trout by anglers catching and releasing fish or pursuing other species were identified as factors affecting the species in several areas (63 FR 31647, p. 31663; USFWS 2008, p. 16). Today, angling regulations have been adjusted by the States to minimize impacts to bull trout. Legal, managed bull trout harvest is allowed in a handful of locations with relatively robust bull trout populations, consistent with the special rule under section 4(d) of the Act that exempts take of bull trout from section 9 prohibitions, if angling regulations that were in place at the time of listing allow such take. Current State fishing regulations have generally resolved most pre-listing concerns about overutilization of bull trout by anglers, although incidental bycatch mortality may impact bull trout individuals in some core areas (Fredenberg 2014, pp. 254-262; USFWS 2024, pp. 84-85). Overall, this factor does not limit current bull trout viability and is not expected to reduce it in the future.

Factor C. Disease or Predation

Since the time of listing, we have not become aware of any confirmed disease effects on bull trout populations, although whirling disease has some potential to affect bull trout either directly or indirectly through its effects on prey.

Nonnative fish were identified as a significant threat in the original listing of bull trout (63 FR 31647, pp. 31664 and 31667; 64 FR 58910, pp. 58911-58913 and 58924), and the threat has increased since that time (USFWS 2008, pp. 20-21; USFWS 2024, pp. 85-87). Today, nonnative fishes are a primary threat in many core areas across the six recovery units. Nonnative fish of primary concern include both lake trout (*Salvelinus namaycush*) and brook trout (*Salvelinus fontinalis*). Lake trout, a congeneric species whose niche closely overlaps with adfluvial bull trout, can outcompete and prey upon bull trout in lake environments where they co-occur. Brook trout is also a congeneric species that competes with, and can hybridize with, bull trout. Negative effects of brook trout on bull trout appear to vary substantially between watersheds, being

relatively severe in small, low-gradient streams with resident or small migratory populations of bull trout. Bull trout populations containing robust numbers of large individuals with migratory life histories can often successfully coexist with brook trout, although the long-term impacts from hybridization are unknown (Peterson et al. 2013, p. 119). The presence of either brook trout or lake trout in bull trout waters results in diminished resiliency and ultimately reduced viability. Other piscivorous (fish-eating) species that can prey on bull trout, including brown trout (*Salmo trutta*), northern pike (*Esox lucius*), walleye (*Sander vitreus*), and smallmouth bass (*Micropterus* spp.), can also be found in many bull trout core areas.

The complex species interactions that lead to bull trout decline are often not well understood, and the predation on bull trout by piscivorous nonnative species such as these may play an increasingly large role in reduced viability. At this time, one of the few management options available is direct predator removal through netting, trapping, or angler incentives (largely by State and Tribal managers). Due in part to the high costs and social constraints, application of these techniques has been limited and the necessary broader implementation remains difficult to achieve. Many of the predators are also highly sought-after sport fish species, which may be preferred by the public and even promoted.

Factor D. Inadequacy of Existing Regulatory Mechanisms

Existing regulatory mechanisms were considered mostly inadequate to conserve bull trout in the original listing rule (63 FR 31647, p. 31664). Currently, consultation with other Federal agencies under section 7 of the Act has resulted in proactive implementation of recovery actions as well as provisions to minimize adverse effects to bull trout and its critical habitat where possible (USFWS 2024, pp. 87-91, Appendix B). These actions have reduced some threats in localized areas and have contributed positively to current viability. However, these regulatory benefits would likely diminish without the protections afforded by the Act.

Additionally, state and private lands are now operating under revised forest practice rules across the range and in some cases, landowners have engaged in the Habitat Conservation Plan (HCP) process in support of obtaining incidental take permits (USFWS 2024, pp. 87-91, Appendix B). HCPs must include measures to minimize and mitigate adverse impacts to listed species and play an important role in the conservation of bull trout. This is most notable in Washington where important bull trout habitat exists on large tracts of private land. The development and implementation of HCPs does not eliminate take or the adverse effects of legacy land management practices but helps avoid population level impacts to bull trout by specifying actions that reduce threats and mitigate for the effects of take.

Many regulatory mechanisms on public and private lands are directly linked to protections provided under the Act, either through section 7 consultations or section 10 HCPs, and are not considered permanent.

Factor E. Other Natural or Manmade Factors Affecting its Continued Existence

At the time of the listing in 1999, effects from climate change were not considered a factor affecting bull trout. However, bull trout require cold water habitat and are vulnerable to the effects of warming climates, changing patterns of precipitation, and dynamic instream

hydrologic regimes. Changing climate can also exacerbate other threats such as non-native species and reduced habitat connectivity by supporting the invasion of fish species that prefer warmer water and creating seasonal and permanent thermal and low water fish barriers. Drought, increased wildfire intensity and frequency, reduction of snowpack, and general warming of waterways all have negative impacts on bull trout from reductions in the quality of riparian and instream habitat. In general, all climate scenarios project some degree of warming, although severity and the effects on amount and seasonality of precipitation are scenario-dependent and the impacts on bull trout populations are expected to vary geographically. However, bull trout viability is already being reduced by climate impacts. With further climate change anticipated in the future, bull trout may not be able to adapt quickly enough to avoid population declines (USFWS 2024, pp 72-74, 114-116).

Synthesis

Assessment of the overall status of bull trout requires integrating information across numerous populations, which face diverse site-specific threats over a geographically complex landscape and may adopt various life history strategies. Current resource conditions continue to support multiple bull trout populations that remain widely distributed within their listed range in the coterminous U.S. However, they are fragmented by various dispersal barriers, which reduce connectivity among populations and limit the expression of migratory life history strategies. While only one core area has become extirpated since listing, local populations have been extirpated and many core areas are demographically vulnerable to significant ongoing threats. In particular, these include increasing climate impacts, past and current habitat threats, and expanding distribution of non-native fishes (USFWS 2024, pp. 72-84). Implementation of increased conservation efforts has potential to offset these trends and improve the viability of the species into the future. Without increased conservation implementation these projected impacts are expected to reduce core area resiliency and result in significant negative demographic trends or extirpation in multiple core areas, particularly in scenarios of more severe climate change.

A threats assessment was conducted to evaluate threat severity and management effectiveness for primary threats in each core area. This threats assessment process was developed to assess the bull trout recovery criteria (USFWS 2015b, pp. 46-47, 146-163), which as described above identify recovery unit specific thresholds for the percentage of core areas in which threats have been successfully managed. The SSA evaluated the threats assessment results in conjunction with habitat and demographic information to determine core area resiliency categories (USFWS 2024, pp. 100-110, Appendix I). The distribution of core area threats scores and resiliency categories at the recovery unit level indicates that, despite the implementation of many important conservation efforts since listing, recovery criteria (75 percent thresholds in Coastal, Mid-Columbia, Upper Snake, and Columbia Headwaters Recovery Units and 100 percent thresholds in Klamath and St Mary Recovery Units) have not been fully met.

A recommendation team meeting for bull trout, including Service representatives from Regions 1, 6, and 8, was held on February 6th and 7th, 2024. We reviewed the current status and distribution of the species, threats, and projections of future climate and conservation scenarios as described in the SSA. Based on this information, we evaluated whether bull trout meet the definition of a threatened or endangered species under the Act.

We first considered whether bull trout meet the definition of an endangered species. Under the Act, an endangered species is defined as any species that is "in danger of extinction throughout all or a significant portion of its range." We assessed risk of extinction for bull trout both rangewide and within a significant portion of their range.

Based on the current condition of bull trout described in the SSA and our assessment of the five factors affecting status, we conclude that the current risk of bull trout extinction is low, such that the species is not in danger of extinction throughout all of its range. The species currently demonstrates sufficient population resiliency, redundancy, and representation across the range such that all recovery units have at least one Medium-resiliency core area and four of the recovery units have multiple High- or Very High-resiliency core areas (USFWS 2024, pp. 104-113). Currently only 20 of the 109 extant core areas are Low-resiliency and there are no Very Low-resiliency core areas. Since the time of listing only one core area has been extirpated. The current resiliency of the largest core areas in the Upper Snake, Mid-Columbia, Coastal, and Columbia Headwaters Recovery Units decreases the risk to these recovery units from stochastic and catastrophic events, such that the species currently has a low risk of extinction. Therefore, we conclude that bull trout do not meet the definition of an endangered species throughout their range.

To determine whether bull trout are endangered in a significant portion of their range, we considered bull trout within the context of the recovery units (analyzed as representation units in the SSA). Determinations of significance for significant portion of the range (SPR) analyses are species-specific. For bull trout, we have previously identified recovery units as reasonable geographic subdivisions of the listed entity's range, based on genetic substructure, ecological and life history data, and potential for watershed-level connectivity among core areas (USFWS 2024, pp. 111-113). Thus, we considered recovery units to be a biologically appropriate scale for the SPR analysis.

We determined that both the Klamath and the St. Mary Recovery Units express higher likelihood of extinction than the rest of the range, because they have no High- or Very High-resiliency core areas. In addition, the Klamath and St. Mary Recovery Units have fewer core areas and local populations than other recovery units, making them more vulnerable to stochastic and catastrophic risk (USFWS 2024, pp. 104-113).

We asked the following questions to evaluate whether the Klamath and St. Mary Recovery Units, individually or combined, are a significant portion of the range:

- Does the portion constitute a large geographic area relative to the current range?
- Does the portion have unique habitat or threats?
- Do the individual or combined recovery units currently or historically contain a high percentage of the total bull trout that occur throughout the listed range?

Neither the Klamath nor St. Mary Recovery Units represent a large geographic area relative to the current range. Both are small in geographic size and when combined, the Klamath and St. Mary Recovery Units represent less than 5% of the current bull trout range. Even combined, these two units contain a small number of bull trout as compared to the entire range or to any

other single recovery unit. These two recovery units represent similar ecological settings when compared to other recovery units and do not have any unique habitats. The Klamath and St. Mary Recovery Units are geographically isolated from each other and other recovery units, but express similar habitat use and life history types (USFWS 2024, pp. 30-39). In addition, threats in both recovery units are similar to those in other recovery units (USFWS 2024, pp. 68-93). Lastly, even though these two recovery units are not connected to the Columbia River basin, which has long-been considered the historical and current “core of the species range”, they likely originate from various Columbia River tributaries by cross basin transfer during glaciation (Ardren et al. 2011, entire). This suggests that bull trout populations in these two units are ecologically similar to each other and the Columbia River basin populations. We conclude that neither the Klamath or St. Mary Recovery Units, alone or together, are a significant portion of the range.

Having determined that the bull trout is not an endangered species, we next considered the status of the species in the context of the definition of a threatened species under the Act. As defined by the Act, a threatened species is any species which is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range". The foreseeable future refers to the extent to which we can reasonably rely on predictions about the future in making determinations about the future conservation status of the species. The key statutory difference between a threatened species and an endangered species is the timing of when a species may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

Under three of the five future scenarios (3, 4, and 5) presented in the SSA, the species is not adequately resilient, redundant, or represented within the next 60 years (USFWS 2024, pp. 136-139). Viability continues to decline under scenario 3, a continuation of current conservation in a hotter and wetter climate, while viability is predicted to decline more rapidly under scenarios 4 and 5 with hotter and drier climate and moderate to substantial decreases in conservation. These impacts result in geographically widespread declines in resiliency across all recovery units, with many or most of the core areas that are presently classified as Very High or High condition being degraded to Medium or Low condition, and significant numbers of core areas being extirpated. Only under scenarios 1 and 2, which assume increased conservation effort under moderate climate impacts, does bull trout viability increase (Table 1).

Since listing, many partners have implemented successful conservation actions for bull trout. However, with current threats likely to continue to persist or increase, viability is projected to decline into the future given similar conservation effort. Even with a projected increase of viability under scenarios 1 and 2 assuming increased conservation efforts, the challenges of targeting, funding, and executing more conservation across the range and the uncertainty in whether climate change impacts will be limited to moderate levels suggest that it is unlikely that bull trout viability will increase beyond current levels.

Because the projected viability of the species is expected to decline substantially under scenarios 3, 4 and 5, 60 years into the future, and because we expect that significant improvement in bull trout viability with moderate climate impacts in combination with improved conservation implementation consistent with scenarios 1 or 2 are possible but relatively unlikely, we conclude

that the bull trout remains likely to become in danger of extinction in the foreseeable future throughout its range, and thus remains a “threatened” species.

RECOMMENDED FUTURE ACTIVITIES

The goal of the bull trout recovery plan is to adaptively manage threats and ensure sufficient distribution and abundance to improve the status of bull trout throughout their extant range in the coterminous United States so that protection under the Act is no longer necessary.

Strategic, targeted implementation of conservation efforts is necessary to continue to move towards recovery. The following actions have the highest potential to contribute to bull trout recovery in the near future:

- Collaboration between the Service and partners to implement recovery actions identified in the RUIPs, such that bull trout: 1) are geographically widespread across representative habitats and demographically stable; 2) contain genetic diversity and diverse life history forms; and 3) have sufficient connected cold-water habitat free of deleterious non-native species. Where appropriate, these actions may be updated based on new information, or new actions developed as necessary to best address primary threats and boost resiliency to bull trout in specific core areas.
- Collaboration between the Service and partners to regularly assess the status of bull trout through updates of the SSA, specifically focusing on incorporating new data from continuing or expanded monitoring and assessing how core area resiliency responds to conservation efforts.
- Collaboration between the Service and partners to support scientific research that will help to evaluate our assumptions and reduce uncertainties outlined in the SSA. Better understanding of bull trout demography, habitat, population structure, and dispersal would help to more accurately assess bull trout viability in data-poor portions of the species’ range.

RESULTS / SIGNATURES

U.S. Fish and Wildlife Service
Status Review of the Bull Trout

Status Recommendation:

On the basis of this review, we recommend the following status for this species. A 5-year review presents a recommendation of the species status. Any change to the status requires a separate rulemaking process that includes public review and comment, as defined in the Act.

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist:
____ *The species is extinct*
____ *The species does not meet the definition of an endangered or threatened species*
____ *The listed entity does not meet the statutory definition of a species*

X___No change in listing status

After evaluating threats to the species and assessing the cumulative effects of the threats under the section 4(a)(1) factors, we conclude that bull trout are not currently in danger of extinction but are likely to become in danger of extinction within the foreseeable future throughout all of their range. Therefore, with this 5-year status review, we recommend that bull trout retain their status as a threatened species under the Act.

FIELD OFFICE APPROVAL:

Field Supervisor, Idaho Ecological Services Field Office, Fish and Wildlife Service

LISA ELLIS Digitally signed by LISA ELLIS
Date: 2024.09.10 14:00:43 -06'00'

Approve _____

LEAD REGIONAL OFFICE APPROVAL:
Assistant Regional Director – Ecological Services, Fish and Wildlife Service

Digitally signed by KATHERINE NORMAN
Date: 2024.09.11 08:48:38 -07'00'

Approve _____

COOPERATING REGIONAL OFFICE APPROVAL:
We emailed this 5-year review to the Mountain-Prairie and Pacific Southwest Regional Offices for their review and concurrence prior to finalizing the document. We will retain any comments that we received, as well as verification of concurrence from other regions and field offices, in the project file for this 5-year review.

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