This document is scheduled to be published in the
Federal Register on 07/22/2025 and available online at
https://federalregister.gov/d/2025-13702, and on **https://govinfo.gov**

Billin

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R5–ES–2023–0181; FXES11130900000–234–FF09E22000]

RIN 1018–BH61

Endangered and Threatened Wildlife and Plants; Removal of Roanoke Logperch From the List of Endangered and Threatened Wildlife

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), are removing the Roanoke logperch (*Percina rex*), a freshwater fish in the perch family (Percidae), from the Federal List of Endangered and Threatened Wildlife. After a review of the best scientific and commercial data available, we find that delisting the species is warranted. Our review indicates that the threats to the Roanoke logperch have been eliminated or reduced to the point that the species no longer meets the definition of an endangered or threatened species under the Endangered Species Act of 1973, as amended (Act). Accordingly, the prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, will no longer apply to the Roanoke logperch.

DATES: This rule is effective [**INSERT DATE 30 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER***].

ADDRESSES: This final rule is available on the internet at https://www.regulations.gov. Comments and materials we received are available for public inspection at https://www.regulations.gov at Docket No. FWS–R5–ES–2023–0181.

Availability of supporting materials: This rule and supporting documents, including the 5-year review, the recovery plan, and the species status assessment (SSA) report, are available at https://www.regulations.gov under Docket No. FWS–R5–ES–2023–0181.

FOR FURTHER INFORMATION CONTACT: Troy Andersen, Fish and Wildlife Biologist, U.S. Fish and Wildlife Service, Virginia Ecological Services Field Office; telephone 804–728–0695; e-mail address: troy_andersen@fws.gov. Individuals in the United States who are deaf, deafblind, hard of hearing, or have a speech disability may dial 711 (TTY, TDD, or TeleBraille) to access telecommunications relay services. Individuals outside the United States should use the relay services offered within their country to make international calls to the point-of-contact in the United States.

SUPPLEMENTARY INFORMATION

Previous Federal Actions

Please refer to the proposed rule to delist the Roanoke logperch published on April 2, 2024 (89 FR 22649), for a detailed description of previous Federal actions concerning this species.

Peer Review

A species status assessment (SSA) team prepared an SSA report for the Roanoke logperch. The SSA team was composed of Service biologists, in consultation with other species experts. The SSA report represents a compilation of the best scientific and commercial data available concerning the status of the species, including the impacts of past, present, and future factors (both negative and beneficial) affecting the species.

In accordance with our joint policy on peer review published in the *Federal Register* on July 1, 1994 (59 FR 34270), and our August 22, 2016, memorandum updating and clarifying the role of peer review in listing and recovery actions under the Act (https://www.fws.gov/sites/default/files/documents/peer-review-policy-directors-memo-2016-08-22.pdf), we solicited independent scientific review of the information contained in the Roanoke logperch SSA report. As discussed in the proposed rule, we sent the SSA report to nine independent peer reviewers and received three responses. The peer reviews can be found at https://www.regulations.gov. In preparing the proposed rule, we incorporated the results of these reviews, as appropriate, into the SSA report, which was the foundation for the proposed rule and this final rule. A summary of the peer review comments and our responses can be found in the proposed rule (89 FR 22649; April 2, 2024).

Summary of Changes From the Proposed Rule

In preparing this final rule, we reviewed and fully considered all public comments received during the comment period, and we make no substantive changes from the April 2, 2024, proposed rule (89 FR 22649).

Summary of Comments and Recommendations

In the proposed rule published on April 2, 2024 (89 FR 22649), we requested that all interested parties submit written comments on the proposal by June 3, 2024. We also contacted appropriate Federal and State agencies, Tribal entities, scientific experts and organizations, and other interested parties and invited them to comment on the proposal. A newspaper notice inviting general public comment was published in the Roanoke Times on April 12, 2024, and in the Greensboro News on April 17, 2024. We did not receive any requests for a public hearing. All substantive information received during comment periods has either been incorporated directly into this final determination or is addressed below.

Comments From States

(1) Comment: The North Carolina Wildlife Resources Commission expressed their continued commitment to propagation, field survey, and eDNA work in the Dan River basin. However, they expressed concern about the availability of Federal funding mechanisms to support the post-delisting monitoring plan for Roanoke logperch.

Our response: The Service appreciates the continued commitment of the North Carolina Wildlife Resources Commission to Roanoke logperch conservation. There are no specific Federal funds to support post-delisting monitoring plans; however, funding from a wide variety of sources may be used to support this work.

Public Comments

(2) Comment: Multiple comments were received stating that the Service failed to consider the impacts of the Mountain Valley Pipeline (MVP) project on the species, that the pipeline threatened the species, that we needed to reassess the populations based on the commenters' observations of impacts they reported to be from the MVP project, or that we needed to incorporate impacts from the MVP project into model simulations specifically.

Our response: The impacts of the MVP project, such as sedimentation and vegetation removal, on the recovery of the Roanoke logperch were assessed in the jeopardy analysis of the Service's biological opinion for the MVP (Service, 2023, p. 52) which included sedimentation modeling, and in the SSA (Service 2022a, pp. 27-28). The Service's jeopardy analysis concluded that the MVP project is not anticipated to reduce appreciably the suitable habitat available for recovery or the recovery potential for the species. Additionally, one commenter requesting reassessment based on their observations did not provide adequate information to allow us to respond specifically to the data available in the vicinity of their location.

(3) Comment: One commenter stated that they believe there was a perceived increase in Roanoke logperch distribution and abundance due to increases in our ability to sample these ecosystems.

Our response: As stated in the SSA report, "The known geographic distribution of RLP [Roanoke logperch] has expanded dramatically over time, from 4 streams by the end of the 1940s to 14 streams by the time of its ESA [the Act] listing in 1989 to 31 streams currently. Because survey effort also increased dramatically over this time, we cannot determine whether RLP's [Roanoke logperch's] range increased because of true range expansion via dispersal, new discovery of existing but undiscovered populations, or both" (Service 2022a, p. 1). The species' present-day distribution was evaluated in making our determination that the Roanoke logperch is recovered and no longer needs protections provided by the Act. Nevertheless, the listing of the species spurred not only greater survey effort (an action identified in the 1992 recovery plan (Service 1992, pp. 12–13)). but also increased habitat restoration – inextricably linking these efforts to recovery.

(4) Comment: Two commenters mentioned dams as an obstacle to Roanoke logperch recovery, including one commenter who mentioned the lack of dam removals.

Our response: Dams are known to be a threat to Roanoke logperch, and the presumed effects to Roanoke logperch from these barriers were analyzed in the SSA report and evaluated in determining if the species is recovered. Multiple dams have been removed within the range of the Roanoke logperch between 2009 and 2020, as detailed in table 4 (p. 25) and figure 6 (p. 24) in the SSA report. Some dams present within the range of the Roanoke logperch provide one-way passage downstream for the species.

(5) Comment: One commenter stated that they disagreed with the delisting, as they believe the Roanoke logperch still faces significant conservation challenges pertaining to the quality and connectivity of the habitat and the resiliency of the reproductive population.

Our response: The threats facing the Roanoke logperch identified in the SSA report were evaluated in determining the species is recovered. It is not necessary for all threats to a species to be eliminated to delist a species; a determination of whether a species should be delisted is made solely on the question of whether it meets the Act's definition of an "endangered species" or a "threatened species." We have determined that Roanoke logperch no longer meets the definition of a threatened or endangered species.

(6) Comment: One commenter stated that all age classes of Roanoke logperch are likely to be harmed by unpredictable stream conditions resulting from climate change impacts.

Our response: Effects of climate change on the Roanoke logperch were evaluated in the SSA report in the discussion of future scenarios (Service 2022a, pp. 41–60). Effects of climate change, along with impacts to the species from other threats, were evaluated in determining that the species is recovered. The effects evaluated include altered hydrology and sediment delivery by increased flood magnitudes and flow variability in general, reduced flow predictability, decreased summer/fall base flows, and increased erosion and runoff of sediment, potentially reducing habitat suitability for all age-classes of RLP and increasing direct mortality of vulnerable juveniles during spring floods. As noted above, it is not necessary for all threats to a species to be removed for a species to be recovered under the Act.

(7) Comment: One commenter expressed concern that livestock fences and conservation easements are not particularly impactful, and solutions need to be applied to urban and agricultural centers where runoff and sediment originate.

Our response: The Service's Partners for Fish and Wildlife Program has completed extensive work in cooperation with agricultural landowners to install livestock fencing and reestablish riparian buffers on their properties. This program has made improvements in habitat quality along stretches of rivers and tributaries that are occupied by Roanoke logperch. We agree that additional efforts to minimize impacts from non-point source pollution would continue to benefit the Roanoke logperch.

(8) Comment: One commenter stated that existing regulatory mechanisms are insufficient to safeguard the Roanoke logperch's habitat and that it is disingenuous to assert that monitoring and augmentation will offset the ongoing threats to the species.

They also stated that existing regulatory mechanisms did not prevent habitat degradation resulting from the MVP project.

Our response: As discussed in the SSA report, “Over time, [Roanoke logperch] has likely benefitted from the protections and resources provided by State and Federal laws and regulations” (Service 2022a, p. 29). It is not necessary for all threats to a species, including those to the species’ habitat, to be eliminated for a species to be considered as recovered under the Act. Existing regulatory mechanisms are not designed to prevent all habitat impacts from affecting listed species. Instead, impacts to habitat are avoided and minimized specific to the proposed action being evaluated. Roanoke logperch habitat impacts resulting from the MVP project were analyzed and addressed in the 2023 biological opinion issued by the Service. Additionally, the intent of monitoring is not to offset threats to the Roanoke logperch but instead to help track the status of the species following delisting. Likewise, as discussed below (*Conservation Efforts: Management and Restoration* section), augmentation or reintroduction is intended to bolster resiliency by increasing vital rates, total population size, and genetic diversity. The Service, North Carolina Wildlife Resources Commission (NCWRC), Conservation Fisheries, Inc., and the Virginia Department of Wildlife Resources have partnered since 2019 to propagate Roanoke logperch and reintroduce them to areas where they occurred historically. Reintroduction was conducted in the Upper Mayo River in Rockingham County, NC in October 2023 and November 2024 (394 fish total) and monitoring began in June 2024 (CFI 2024, pp. 1-9; NCWRC 2023, pp. 1-5).

(9) Comment: One commenter felt that in making a delisting decision, the Service relied too heavily on individual States keeping the species on their State endangered species lists.

Our response: Existing regulatory mechanisms are taken into account when considering a species’ current condition (Service 2022a, pp. 29–30), but they are not a singular driver of the decision to delist the Roanoke logperch. The species' future viability is assessed using the 3Rs (resiliency, representation, and redundancy, see *Analytical Framework*, below). In assessing future viability of the species, the SSA looked at (1) watershed urbanization, (2) climate change, (3) population restoration via propagation, augmentation, reintroduction, translocation, and introduction (PARTI), and (4) connectivity restoration via barrier removal (Service 2022a, p. 41).

Background

A thorough review of the biological information on the Roanoke logperch, including taxonomy, life history, ecology, and conservation activities, as well as threats facing the species and its habitat, is presented in our SSA report (Service 2022a, entire), which is available at https://www.regulations.gov under Docket No. FWS–R5–ES–2023–0181. Please refer to the SSA report for additional discussion and background information.

The Roanoke logperch is a large-bodied member of the darters (Etheostomatinae), a diverse subfamily of freshwater fishes in the perch family (Percidae) endemic to the Roanoke, Dan, and Chowan River basins in Virginia and North Carolina. The Roanoke logperch occupies medium to large warm-water streams and rivers of moderate gradient and silt-free substrates (Service 1992, p. 3). Every major riverine habitat with unembedded stream substrates with low silt cover is exploited by the Roanoke logperch during different phases of life history and season (Jenkins and Burkhead 1994, p. 786).

The overwhelming majority of our knowledge on the Roanoke logperch's biology and habitat needs is based on research conducted in the upper Roanoke River (see Burkhead 1983, entire; Roberts and Angermeier 2006, entire) and comparative studies of Roanoke logperch in the Nottaway River (see Rosenberger and Angermeier 2003, entire). Roanoke logperch feed and spawn over clean gravel, pebble, and cobble substrates in large creeks to medium rivers. They spawn in spring, depositing eggs on the substrate with no subsequent parental care. Newly hatched larvae drift downstream on river currents until they settle out in calm backwaters and pool margins. By their first fall, juveniles begin shifting into the deeper, main-channel habitats occupied by older juveniles and adults. Individuals mature by age 2–3 and live up to 6.5 years. Adults appear to undertake extensive upstream spawning migrations, followed by cumulatively downstream migration over the rest of the fish's lifespan.

All age classes of Roanoke logperch are intolerant of heavy silt cover and embeddedness, both because silt smothers eggs and because the species feeds primarily by flipping over unembedded substrate particles with its snout. The species is more often found in habitats with silt-free substrate, forested watersheds, and large enough stream size to complete its life history. It avoids heavily silted runs and pools, very small creeks, hydrologically unstable tailwaters below dams, and lentic lakes and reservoirs.

As detailed in the 2022 5-year review (Service 2022b, entire), the known geographic distribution of the Roanoke logperch has expanded since the species was listed in 1989. The Roanoke logperch was first collected in the 1880s. State databases contain data collected only since 1940, resulting in an information gap from 1890 to 1940. However, since 1940, the number of streams where the Roanoke logperch has been observed has increased from 4 streams in the 1940s, to 14 streams at the time of listing in 1989, to 31 streams in 2019. In terms of river basins, the Roanoke logperch was known in Virginia from the Roanoke basin in the 1880s and the Chowan basin in the 1940s. The first Roanoke logperch location (Town Creek) in the Dan basin was in the 1970s in Virginia, then the upper Smith River in the 1980s. In the 1990s and 2000s, observations in the Dan basin expanded, including into North Carolina. The first observation of Roanoke logperch in North Carolina was in the Dan River in 2007. No population extirpations are known.

The U.S. Geological Survey delineates watersheds using a nationwide system based on surface hydrologic features. This system divides the country into six levels of classification: regions, subregions, basins, subbasins, watersheds, and sub-watersheds. A hierarchical hydrologic unit code (HUC) is used to identify any hydrologic area. The HUC system includes two additional digits for each classification level. Therefore, each hydrologic unit is assigned a 2-digit to 12-digit number that uniquely identifies each of the six levels of classification within six 2-digit fields. The system includes 22 regions (2-digit), 245 subregions (4-digit), 405 basins (6-digit), ~2,400 subbasins (8-digit), ~19,000 watersheds (10-digit), and ~105,000 subwatersheds (12-digit).

The number of 12-digit hydrologic unit codes (HUCs, also known as watersheds) in which the Roanoke logperch has been observed has increased from a total of 27 HUCs in 1989 to 55 HUCs in 2019. A detailed description of the Roanoke logperch's geographic distribution is presented in section 2.3 of the SSA report (Service 2022a, pp. 14–19).

Methodologies for identifying what constitutes a population have varied; therefore, our analysis uses management units (MUs) to assess the current condition and potential future conditions of the species. At the smallest spatial grain, we define an MU as a group of individuals occupying a discrete, local geographic area in which demographic exchange is common and habitat conditions are relatively homogeneous. At a larger grain, we define a metapopulation as a group of MUs located in an evolutionarily similar setting and in close-enough proximity that some dispersal and gene flow among MUs within that metapopulation likely has occurred in recent ecological time, at least prior to anthropogenic habitat alteration. The species as a whole is the sum of all metapopulations (Service 2022a, p. 20).

There are four identified Roanoke logperch metapopulations: Roanoke Mountain, Roanoke Piedmont, Dan, and Chowan. A total of 18 MUs were delineated from these metapopulations. Eleven of these MUs are currently occupied (Upper Roanoke, Pigg, Goose, Otter, Middle Roanoke, Upper Smith, Middle Smith, Lower Smith, Lower Mayo, Middle Dan, Nottoway) and 7 are currently unoccupied (Blackwater, Falling, Upper Mayo, Upper Dan, Lower Dan, Banister, Meherrin) (see table 1 below; Service 2022a, p. 23). For potential future introductions, currently unoccupied MUs were delineated in waterways deemed good candidates for future populations based on suitable habitat conditions. Currently unoccupied "potential" MUs were not used in assessing current condition. However, the possibility for these potential MUs to become occupied was considered for analysis of future condition. Additional details on past delineation of populations and spatial associations of the MUs are presented in section 3.2 of the SSA report (Service 2022a, pp. 20–25). We provide a summary of the species' current and future conditions under **Summary of Biological Status and Threats**, below.

Table 1—Roanoke Logperch Geographic Information

Metapopulation	Basin	Primary ecoregion(s)	MU	Presumed status	Constituent waterbodies where Roanoke logperch have been observed
Roanoke Mountain	Roanoke basin	Ridge and Valley/Blue Ridge ecoregions	Upper Roanoke	Occupied	Roanoke River, South Fork Roanoke River, North Fork Roanoke River, Elliott Creek, Mason Creek, Tinker Creek, Glade Creek, Smith Mountain Lake
Roanoke Piedmont	Roanoke basin	Piedmont	Blackwater	Unoccupied	None (never observed)
			Pigg	Occupied	Pigg River, Big Chestnut Creek, Snow Creek, Leesville Lake
			Goose	Occupied	Goose Creek
			Otter	Occupied	Big Otter River, Little Otter River
			Middle Roanoke	Occupied	Roanoke (Staunton) River
			Falling	Unoccupied	None (never observed)
Dan	Dan basin	Piedmont/ Blue Ridge ecoregions	Upper Smith	Occupied	Smith River, Rock Castle Creek, Otter Creek, Runnett Bag Creek
			Middle Smith	Occupied	Smith River, Town Creek

			Lower Smith	Occupied	Smith River
			Upper Mayo	Unoccupied	None (never observed)
			Lower Mayo	Occupied	Mayo River
			Upper Dan	Unoccupied	None (never observed)
			Middle Dan	Occupied	Dan River, Cascade Creek, Wolf Island Creek, Big Beaver Island Creek
			Lower Dan	Unoccupied	None (never observed)
			Banister	Unoccupied	None (never observed)
Chowan	Chowan basin	Piedmont/ Southeastern Plains	Meherrin	Unoccupied	None (never observed)
			Nottoway	Occupied	Nottoway River, Stony Creek, Sappony Creek, Waqua Creek, Butterwood Creek

Recovery Criteria

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. Under section 4(f)(1)(B)(ii), recovery plans must, to the maximum extent practicable, include objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of section 4 of the Act, that the species be removed from the Lists of Endangered and Threatened Wildlife and Plants.

Recovery plans provide a roadmap for us and our partners on methods of enhancing conservation and minimizing threats to listed species, as well as measurable criteria against which to evaluate progress towards recovery and assess the species' likely future condition. However, they are not regulatory documents and do not substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. A decision to revise the status of a species or to delist a species is ultimately based on an analysis of the best scientific and commercial data available to determine whether a species is no longer an endangered species or a threatened species, regardless of whether that information differs from the recovery plan.

There are many paths to accomplishing recovery of a species, and recovery may be achieved without all of the criteria in a recovery plan being fully met. For example, one or more criteria may be exceeded while other criteria may not yet be accomplished. In that instance, we may determine that the threats are minimized sufficiently and that the species is robust enough that it no longer meets the definition of an endangered species or a threatened species. In other cases, we may discover new recovery opportunities after having finalized the recovery plan. Parties seeking to conserve the species may use these opportunities instead of methods identified in the recovery plan. Likewise, we may learn new information about the species after we finalize the recovery plan. The new information may change the extent to which existing criteria are appropriate for identifying recovery of the species. The recovery of a species is a dynamic process requiring adaptive management that may, or may not, follow all of the guidance provided in a recovery plan.

In 1992, the objectives of the Roanoke logperch recovery plan were to first reclassify the species from endangered to threatened, then to delist the species (Service 1992, pp. 12–13). The recovery plan states that reclassification to threatened would be initiated when:

(1) Populations of Roanoke logperch are shown to be stable or expanding and reproducing (as evidenced by sustained recruitment) in each of the following river systems: Upper Roanoke River, Pigg River, Smith River, and Nottoway River. Achievement of this criterion will be determined by population monitoring over at least a 10-year period. The overall current resiliency is highest in these river systems based on Roanoke logperch population density and effective population size, habitat quality, and genetic conditions (Service 2022a, pp. 38-40); and

(2) Each of the known populations is protected from present and foreseeable threats that may interfere with the species' survival.

Additionally, the 1992 Roanoke logperch recovery plan states that delisting would be considered when, in addition to meeting the two criteria above, habitat improvement measures have been developed and successfully implemented, as evidenced by a sustained increase in Roanoke logperch population size and/or length of river reach inhabited within the upper Roanoke River drainage and a similar increase in at least two of the other three Roanoke logperch populations (Pigg River, Smith River, or Nottoway River).

As indicated in the most recent 5-year review (Service 2022b, entire), the current recovery plan for the species is 30 years old, thus requiring a reexamination of the adequacy of recovery criteria. The reclassification and delisting criteria in the 1992 plan do not mention North Carolina populations because Roanoke logperch were not known to occur in that State at that time. Additionally, benchmarks in the plan criteria focus on the health and protection of Roanoke logperch populations; however, identifying what constitutes a population is unclear. For example, the recovery plan, 2007 5-year status review, and associated literature used different methods to identify Roanoke logperch populations. Due to the outdated nature of this recovery plan, we rely on the information on the current and future conditions presented in the SSA report (Service 2022a, entire) to inform the status determination for the species. See **Summary of Biological Status and Threats**, below, for a discussion of the status of and threats to this species.

Regulatory and Analytical Framework

Regulatory Framework

Section 4 of the Act (16 U.S.C. 1533) and the implementing regulations in title 50 of the Code of Federal Regulations set forth the procedures for determining whether a species is an endangered species or a threatened species, issuing protective regulations for threatened species, and designating critical habitat for endangered and species. On April 5, 2024, jointly with the National Marine Fisheries Service, the Service issued a final rule that revised the regulations in 50 CFR part 424 regarding how we add, remove, and reclassify endangered and threatened species and what criteria we apply when designating listed species' critical habitat (89 FR 23919). This final rule is now in effect and is incorporated into the current regulations. Our analysis for this decision applied our current regulations. Given that we proposed delisting this species under our prior regulations (revised in 2019), we have also undertaken an analysis of whether the decision would be different if we had continued to apply the 2019 regulations, and we concluded that the decision would be the same. The analyses under both the regulations currently in effect and the 2019 regulations are available on https://www.regulations.gov.

The Act defines an "endangered species" as a species that is in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether any species is an endangered species or a threatened species because of any of the following factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

These factors represent broad categories of natural or human-caused actions or conditions that could have an effect on a species' continued existence. In evaluating these actions and conditions, we look for those that may have a negative effect on individuals of the species, as well as other actions or conditions that may ameliorate any negative effects or may have positive effects. The determination to delist a species must be based on an analysis of the same five factors.

We use the term “threat” to refer in general to actions or conditions that are known to or are reasonably likely to negatively affect individuals of a species. The term “threat” includes actions or conditions that have a direct impact on individuals (direct impacts), as well as those that affect individuals through alteration of their habitat or required resources (stressors). The term “threat” may encompass—either together or separately—the source of the action or condition or the action or condition itself.

However, the mere identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an “endangered species” or a “threatened species.” In determining whether a species meets either definition, we must evaluate all identified threats by considering the species’ expected response and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Secretary determines whether the species meets the definition of an “endangered species” or a “threatened species” only after conducting this cumulative analysis and describing the expected effect on the species.

The Act does not define the term “foreseeable future,” which appears in the statutory definition of “threatened species.” Our implementing regulations at 50 CFR 424.11(d) set forth a framework for evaluating the foreseeable future on a case-by-case basis which is further described in the 2009 Memorandum Opinion on the foreseeable future from the Department of the Interior, Office of the Solicitor (M–37021, January 16, 2009; “M- Opinion,” available online at https://www.doi.gov/sites/doi.opengov.ibmcloud.com/files/uploads/M-37021.pdf). The foreseeable future extends as far into the future as the U.S. Fish and Wildlife Service and National Marine Fisheries Service (hereafter, the Services) can make reasonably reliable predictions about the threats to the species and the species’ responses to those threats. We need not identify the foreseeable future in terms of a specific period of time. We will describe the foreseeable future on a case-by-case basis, using the best scientific and commercial data available and taking into account considerations such as the species’ life-history characteristics, threat-projection timeframes, and environmental variability. In other words, the foreseeable future is the period of time over which we can make reasonably reliable predictions. “Reliable” does not mean “certain”; it means sufficient to provide a reasonable degree of confidence in the prediction, in light of the conservation purposes of the Act.

Analytical Framework

The SSA report documents the results of our comprehensive biological review of the best scientific and commercial data available regarding the status of the species, including an assessment of the potential threats to the species. The SSA report does not represent our decision on whether the species should be delisted. However, it does provide the scientific basis that informs our regulatory decisions, which involve the further application of standards within the Act and its implementing regulations and policies.

To assess Roanoke logperch viability, we used the three conservation biology principles of resiliency, redundancy, and representation (Shaffer and Stein 2000, pp. 306–310). Briefly, resiliency is the ability of the species to withstand environmental and demographic stochasticity (for example, wet or dry, warm or cold years); redundancy is the ability of the species to withstand catastrophic events (for example, droughts, large pollution events), and representation is the ability of the species to adapt to both near-term and long-term changes in its physical and biological environment (for example, climate conditions, pathogen). In general, species viability will increase with increases in resiliency, redundancy, and representation (Smith et al. 2018, p. 306). Using these principles, we identified the species' ecological requirements for survival and reproduction at the individual, population, and species levels, and described the beneficial and risk factors influencing the species' viability.

The SSA process can be categorized into three sequential stages. During the first stage, we evaluated individual species' life-history needs. The next stage involved an assessment of the historical and current condition of the species' demographics and habitat characteristics, including an explanation of how the species arrived at its current condition. The final stage of the SSA involved making predictions about the species' future condition, including responses to positive and negative environmental and anthropogenic influences. Throughout all of these stages, we used the best scientific and commercial data available to characterize viability as the ability of a species to sustain populations in the wild over time, which we then used to inform our regulatory decision.

The following is a summary of the key results and conclusions from the SSA report; the full SSA report can be found at Docket No. FWS–R5–ES–2023–0181 on https://www.regulations.gov.

Summary of Biological Status and Threats

In this discussion, we review the biological condition of the species and its resources, and the threats that influence the species' current and future condition, in order to assess the species' overall viability and the risks to that viability. In addition, the SSA report (Service 2022a, entire) and 5-year review (Service 2022b, entire) document our comprehensive biological status review for the species, including an assessment of the potential threats to the species.

The following is a summary of this status review and the best scientific and commercial data available gathered since that time that have informed this decision.

We identified six factors that may influence Roanoke logperch viability: fine sediment deposition (Factor A), chronic chemical pollution (Factor A), dams and other barriers (Factor A), climate change (Factor E), management/restoration activities aimed at improving habitat quality (Factor A), and existing legal and regulatory mechanisms (Factor D). These factors align with many of the threats discussed in the 2007 5-year review: large dams and reservoirs, small dams/barriers, channelization that will lead to increased sedimentation, agricultural and silvicultural activities (non-point source pollution in the form of fine sediment), and toxic spills (Service 2007b, entire). An additional threat to the Roanoke logperch identified since the 2007 5-year review is changing climate. Climate change is anticipated to affect precipitation, runoff patterns, and stream hydrology, and may introduce fine sediment into Roanoke logperch habitat (Service 2022a, p. 29). The complex relationship between the numerous environmental and anthropogenic factors and their influence on the habitat conditions and ultimately on the condition of the Roanoke logperch is presented in more detail in the SSA report (see figure 7 in Service 2022a, p. 33). The Service is not aware of any evidence that overutilization, competition, predation, disease, or other manmade factors are significant threats to the Roanoke logperch.

Fine Sediment Deposition

Fine sediment is produced through erosion and enters streams and rivers through runoff, especially during storm events (Waters 1995, entire). A variety of human activities accelerate erosion and thereby increase sediment inputs to streams, but urbanization and agriculture are the two most prominent of these activities in the Roanoke logperch's range.

Fine sediments originating from the watershed or channel of a stream remain suspended until they reach a low-velocity area and deposit on the stream substrate. Although suspended sediment can reduce feeding efficiency for a sight feeder like the Roanoke logperch, it likely has a greater negative impact once it deposits on the stream bottom. Deposition of fine sediments like silt and clay on the stream substrate likely reduces the fitness and survival of Roanoke logperch adults and the survival and recruitment of age-0 juveniles. Roanoke logperch are invertivores that feed almost exclusively on the stream bottom; they require substrate particles (for example, pebbles, leaves, sticks) to be mostly unembedded by fine sediment so that they can flip over these particles and access food underneath. Heavily embedded substrates contain lower benthic macroinvertebrate densities and fewer benthic invertivorous fishes (Berkman and Rabeni 1987, entire).

Although uninvestigated to date, we assume that as deposition and embeddedness increase, Roanoke logperch food intake at all life stages will decrease and individual growth and survival rates will decrease. Moreover, silt coverage could smother eggs and reduce their hatching rate, particularly for a gravel spawner like the Roanoke logperch (Berkman and Rabeni 1987, entire). Reduced egg-to-larva survival, along with reduced benthic feeding efficiency for age-0 juveniles, could translate to overall lower recruitment rates for Roanoke logperch populations. However, negative impacts from deposition of fine sediments on Roanoke logperch growth, recruitment, and survival have not been quantified or shown to have population-level effects.

Chemical Pollution

By definition, water pollution is anthropogenic in origin and alters the chemical composition of a receiving waterbody (U.S. Environmental Protection Agency (USEPA)

2022, entire). Pollutants include organic nutrients such as fertilizer, livestock manure, and human sewage effluent, along with myriad natural and synthetic chemicals including heavy metals, pesticides, cleaners, solvents, pharmaceuticals, and petroleum products, among others.

The population dynamics of the Roanoke logperch are particularly sensitive to acute pollution events that cause substantial one-time reductions in population size (Roberts et al. 2016a, entire). In the upper Roanoke River watershed, seven pollution events resulting in Roanoke logperch mortality occurred over a 35-year period, an average of once every 5 years. The most recent spill event with a known mortality occurred in 2007. These events involved a variety of different pollutants and affected anywhere from 2 to 19 kilometers (km) (1.2 to 11.8 miles (mi)) of river. Such catastrophic events presumably act by temporarily reducing survival of all age classes until the chemical has dissipated, which may take up to a year (Ensign et al. 1997, entire). However, if fish kills occur frequently enough, affect a large enough area, or happen to an already small population, they could potentially threaten the viability of an entire population.

Like fine sediment, water pollution emanates from a variety of sources, including urban, mining, or agricultural runoff, and transportation of chemicals by road, rail, or pipeline. Notably, some fish-kill events impacting the Roanoke logperch stemmed from nonurban causes, such as a liquid manure spill in 1991 and a golf course fungicide spill in 2007 (Roberts et al. 2016a, entire) (table 2, below).

Table 2—Known Fish Kills in the Upper Roanoke River Watershed (Virginia) Occupied by Roanoke Logperch (1970–1982 and 1991–2013)
(Roberts et al. 2016a, p. 56)

Date of fish kill	Water body	Substance	Stream length affected (km)	Source
October 1970	Roanoke River near Salem	Ethyl benzene-creosote	11.3	Burkhead (1983)
June 1975	Roanoke River near Salem	Unidentified	12.1	Burkhead (1983)

July 1975	Roanoke River near Roanoke	Toluene	Unknown	Burkhead (1983)
June 1976	Roanoke River near Roanoke	Sodium cyanide	12.1	Burkhead (1983)
October 1991	Elliot Creek and South Fork Roanoke River new Shawsville	Liquid manure	19.0	Ensign et al. (1997)
August 2003	Roanoke River new Salem	Various chlorine derivatives	3.8	Kimberly Smith, USFWS
July 2007	North Fork Roanoke River near Blacksburg	Fungicide	2.3	Michael Pinder, VDGIF

In general, we expect the risk of a pollution event to be higher in a watershed with greater urbanization, because with urbanization we expect a greater concentration of manufacturing chemicals, industrial and municipal chemical effluents, and chemical transportation via roads, rails, and pipelines. Thus, we expect urbanization to be a primary indicator of the potential risk of pollution events impacting Roanoke logperch populations.

Dams and Other Barriers

European settlers began constructing milldams and other low-head dams on rivers upon arrival to the Atlantic States (Walter and Merritts 2008, entire). These barriers may have affected connectivity and habitat conditions for the Roanoke logperch historically, but we lack distribution and abundance data for the Roanoke logperch before 1940. Between the 1920s and 1960s, large hydroelectric dams were installed on several large rivers in the Roanoke logperch's range. Although none of these dams were equipped with fish passage technologies, some are short enough in height and have a modest-enough spillway drop that they may allow for one-way fish movement (from upstream to downstream) over the spillway. For example, one study found that Martinsville Dam on the Smith River does not form a genetic population boundary between Roanoke logperch upstream and downstream of the dam, so the study's authors hypothesized that the dam allows one-way gene flow (Roberts et al. 2013, entire).

However, many of the dams present in the Roanoke, Dan, and Chowan River basins are much larger than the Martinsville Dam, forming an extensive impoundment that would not be suitable habitat for the species, and each of these larger dams probably constitutes a complete two-way barrier to Roanoke logperch movement. Roanoke logperch have a migratory life history and, in the absence of movement barriers, utilize multiple sections of a watershed over a lifetime. Although genetic data indicate that Roanoke logperch populations currently have sharp, discrete boundaries (Roberts et al. 2013, entire), these boundaries mostly coincide with dams. Before construction of these dams, population structure might have been more continuous, with more frequent dispersal occurring among now-disconnected streams (Burkhead 1983, entire). Thus, the barrier effect created by dams has potentially fragmented a once more-continuous range into a series of geographically smaller, more isolated populations. This fragmentation reduces resiliency because a declining population cannot be naturally demographically or genetically "rescued" by another population. However, in many cases, barrier removal, introduction of fish passage technology, and reintroduction and translocation efforts can increase the effective area of adjacent populations and allow increased dispersal among populations, thereby increasing population resiliency (Gido et al. 2016, entire).

In addition to movement barriers, dams can create habitat degradation and loss for Roanoke logperch. Impoundments upstream of dams convert formerly riverine, potentially suitable habitat to lacustrine habitat (relating to or associated with lakes) that is not suitable for Roanoke logperch. Although the species has been observed occasionally in Smith Mountain Lake and Leesville Reservoir, these occurrences have been interpreted as waifs attempting dispersal through the reservoirs, rather than resident fish (Jenkins and Burkhead 1994, p. 787).

Habitat conditions downstream of hydroelectric dams may be unsuitable for Roanoke logperch as well. For example, hydro-peaking discharges (i.e., the practice of releasing pulses of water to increase power production) from Leesville Dam have rendered habitat conditions immediately downstream in the middle Roanoke River unstable and relatively poor for Roanoke logperch. Population density at this MU is relatively low (Smith 2011, pers. comm.). The practice of hydro-peaking, combined with a cold hypolimnetic release (i.e., release of water that lies below the thermocline and is perpetually cold), has likewise rendered the middle Smith River immediately downstream from Philpott Dam unsuitable for Roanoke logperch. Roanoke logperch are apparently absent from this reach (Krause et al. 2005, entire). The cold, unsuitable tailwater acts as a movement barrier between Town Creek, an occupied tributary that flows into the unoccupied reach, and the occupied section of middle Smith River located 4 km (2.5 mi) downstream (Roberts et al. 2013, p. 2060). The hypolimnetic pulsed release from Philpott dam produces year-round cold water temperatures (~46.4 °F) that apparently exclude Roanoke logperch from the mainstem Smith River from the dam to about 4 km downstream of the mouth of Town Creek (Krause, Newcomb and Orth, 2005). This theoretically would deter dispersal between Town Creek and Smith River during all but the coldest months, when stream temperatures are similar across these reaches.

Climate Change

Changes to the climate of the Roanoke logperch's geographic range can affect precipitation, runoff patterns, and stream hydrology in ways that negatively affect the species' vital rates and resiliency. In the coming decades, the changes to the climate within the Roanoke logperch's range is expected to average 5 to 8 degrees Fahrenheit (2.8 to 4.4 degrees Celsius) warmer with around 1 more inch (2.5 centimeters) of rain per year (see section 4.2.1 of SSA report (Service 2022a, pp. 50–53)). Although a modest increase in total rainfall, this rain is expected to come in less predictable, less frequent, more intense storm events (Ingram et al. 2013, entire; Burt et al. 2016, entire). Increased air temperature has the potential to increase evapotranspiration rates, decrease groundwater recharge into streams, and reduce the magnitude of summer baseflows (Ingram et al. 2013, entire; Lynch et al. 2016, pp. 349–350). Increased storm intensity may likewise reduce summer baseflows by raising the runoff to infiltration ratio. More irregular but intense rainfall means “flashier” stream flows overall, with higher high flows, lower low flows, and steeper rising and falling limbs of the hydrograph, a situation exacerbated by urbanization and watershed imperviousness (Roy et al. 2010, entire). Stronger storm events also increase the probability that fine sediment will be mobilized in runoff and carried into streams.

Relationships between hydrology and the Roanoke logperch’s habitat suitability or vital rates have not been thoroughly investigated. However, in the upper Roanoke River, one study found that age-0 logperch abundance in the fall of their first year was negatively related to the standard deviation of stream flows during the spring (April–June) of that year (Roberts and Angermeier 2007, p. 43). Highly variable flows may directly increase mortality of vulnerable larvae and small juveniles. They also may reduce habitat quality and availability. Age-0 Roanoke logperch have very specific habitat needs during their first summer, requiring unembedded, shallow, and very low-velocity microhabitats, often in the margins of pools (Roberts and Angermeier 2006, p. 4). These microhabitat conditions change rapidly with stream flows; the drying of shallow areas forces Roanoke logperch into deeper areas where they are more vulnerable to aquatic predators, while elevated flows increase velocity beyond the swimming abilities of small fish. Given that storm intensity and stream flashiness are expected to increase, we predict that it may be more difficult for age-0 Roanoke logperch to locate and track suitable microhabitat configurations, resulting in reduced survival and recruitment. Further, reduced baseflow magnitude may crowd adult Roanoke logperch into smaller areas of suitable habitat within riffle-runs, resulting in increased competition for resources, and potentially reduced fitness and survival of adults. Additionally, the higher erosion and sediment transport rates likely to result from predicted greater storm intensity could negatively affect growth, recruitment, and survival of Roanoke logperch.

Conservation Efforts: Management and Restoration

Three types of restoration activities have positively benefited Roanoke logperch habitat and population conditions to date: (1) habitat restoration, (2) habitat connectivity restoration, and (3) population restoration. Habitat restoration activities for the Roanoke logperch primarily seek to reduce erosion potential and fine sediment inputs to streams. Projects include reestablishing the riparian zone, fencing livestock out of streams, and placing lands in conservation easements to prevent deforestation. The end goal of all these projects is to reduce new inputs of fine sediment into Roanoke logperch habitats. These activities have occurred, and as discussed below, we expect them to continue in watersheds harboring Roanoke logperch, regardless of the Federal listing status of the species.

Unfortunately, there is no efficient or cost-effective way to remove existing deposited sediment, which has accumulated in some cases over the course of centuries and can be removed only very gradually through downstream transport during flushing flow events (Walter and Merritts 2008, entire). Since the positive effects of Roanoke logperch habitat restoration may not be apparent for decades, the near-term resiliency of Roanoke logperch populations is not as strongly affected by these management activities as by connectivity and population restoration activities.

Habitat connectivity restoration involves the removal of, or passage over, barriers to Roanoke logperch movement in stream reaches, most notably dams. Multiple dams have been removed within the species' range in recent decades, including Wasena Dam on the upper Roanoke River near Roanoke, Virginia, in 2009; Veteran's Park Dam on the

Pigg River near Rocky Mount, Virginia, in 2013; and Rocky Mount Power Dam on the Pigg River near Rocky Mount, Virginia, in 2016. Additionally, fish passages were designed and installed for Roanoke logperch past the Lindsey Bridge Dam on the Dan River near Madison, North Carolina, in 2020. Removal of additional dams is plausible, given the current trend toward dam removal in the eastern United States (Bellmore et al. 2017, entire). As stated previously, barrier removal and passage increase the effective area of adjacent populations and allow increased dispersal among populations, both of which increase population resiliency (Gido et al. 2016, entire).

Population restoration involves the intentional anthropogenic movement of fish across movement barriers they otherwise would be unable to cross. The individual fish being stocked could be translocated wild fish or propagules produced in a hatchery. Fish can be stocked into currently occupied habitat to augment the demographic or genetic diversity of that population, reintroduced into a previously occupied habitat that is no longer occupied, or introduced into a habitat that has never been occupied by the species. Augmentation is intended to bolster resiliency by increasing vital rates, total population size, and genetic diversity, whereas introduction and reintroduction are intended to bolster redundancy by increasing the number of populations on the landscape.

Collectively, propagation, augmentation, reintroduction, translocation, and introduction (hereafter PARTI) form a suite of interrelated population restoration tactics that have been successfully used in the recovery of a variety of imperiled fish species (Minckley et al. 2003, entire; Vrijenhoek 1996, entire; Yamamoto et al. 2006, entire). As of 2023, PARTI activities conducted by State, Federal, and nonprofit agencies are beginning for the Roanoke logperch; propagation procedures have been established (Ruble et al. 2009, entire; Ruble et al. 2010, entire), a decision document is in place to provide a scientific basis to PARTI decisions for the Roanoke logperch (Roberts 2018, entire), an online decision-support tool has been developed to guide hatchery and PARTI activities (Gibson 2022, entire), and a Statewide aquatic species safe harbor program in North Carolina will enable the use of PARTI tactics for the continued recovery of Roanoke logperch (see 87 FR 51698; August 23, 2022). As such, there is strong momentum to incorporate PARTI into recovery actions for the Roanoke logperch in the future. As discussed further below, regardless of the Federal listing status of the Roanoke logperch, we expect the States of Virginia and North Carolina to continue to prioritize Roanoke logperch population restoration in the future, as they do with other State-listed fishes and freshwater mussels.

Regulatory Mechanisms

Over time, the Roanoke logperch has benefited from the protections and resources provided by State and Federal laws and regulations. The species has been listed as an endangered species under the Act since 1989. Federal listing status has affected the course of large proposed and completed projects within the geographic range of the species. For example, construction plans for the Roanoke River flood reduction project were adjusted to reduce instream construction traffic, minimize silt runoff, and closely monitor water quality and Roanoke logperch population levels, to minimize incidental take of the species (Roberts et al. 2016c, entire). Coordination for this project spanned multiple years, and a final biological opinion was issued by the Service in 2005. Time-of-year restrictions on construction projects during the species' spawning window (March 15–June 30), recommended by both State and Federal agencies, have reduced streambed and floodplain disturbance and sediment loading during this key time in the species' lifecycle. Federal status also has allowed access to funding mechanisms available only for use on federally listed species, including the funds provided under section 6 of the Act. These funds have been used to restore riparian habitats to reduce sediment inputs, remove barriers to Roanoke logperch movement, and fund a range of research studies that have advanced understanding of the species' basic biology (e.g., Rosenberger and

Angermeier 2003, entire), distribution and abundance (e.g., Roberts 2012b, entire), and genetics and evolution (e.g., Roberts et al. 2013, entire).

In our SSA analysis, we did not consider protections, funding, or other benefits of listed status, including any other Federal, State, or local protections or benefits arising solely as a result of the species being listed under the Act when assessing risks to the Roanoke logperch. Rather, we consider only non-Act-related regulatory mechanisms and restoration activities that are existing or that we are reasonably confident will occur in the future regardless of the species' Federal listing status, such as State-level protection and population management, habitat restoration, and dam removal and passage.

The Roanoke logperch has been listed as endangered by Virginia since 1989, and by North Carolina since its discovery in that State in 2007. The species is given high priority in both States' wildlife action plans, allowing access to funding mechanisms such as State wildlife grants. As with the Act's section 6 funds, State wildlife grants have been used to restore riparian habitats, remove barriers, and fund research studies. These State listings are independent of the species' Federal status. There is no reason to expect a change in Federal status would be followed by the States, both of which are currently increasing Roanoke logperch propagation and translocation capacity. Thus, we expect State-level emphasis on protections and population restoration to continue into the future, regardless of the species' Federal status. Furthermore, there is considerable interest in dam removal in the eastern United States for human safety, fish passage restoration, and river channel restoration. We, therefore, expect removal of dams and other barriers to continue within the range of the Roanoke logperch, regardless of the species' Federal status.

In addition to benefiting from the Act and State-level listings, the Roanoke logperch and other stream fishes benefit from the provisions of the Clean Water Act (CWA; 33 U.S.C. 1251 et seq.). The CWA's National Pollutant Discharge Elimination

System permitting system regulates point sources of water pollution and has reduced some of the most chronic chemical pollution impacts of the early- to mid-20th century. Although controlling non-point source pollution—in particular, runoff of fine sediment, nutrients, and other contaminants—has been more difficult, CWA provisions such as total maximum daily load standards, which States are required to develop and achieve, have helped spur watershed-level management plans aimed at stemming pollutants potentially harmful to the Roanoke logperch, such as nutrients and sediment.

No previous research has directly quantified relationships between the threats to the species and the Roanoke logperch's vital rates, so in assessing current and future conditions, we based our assumptions about the nature of these relationships on a combination of ecological theory, expert judgment, and simulation models (Service 2022a, p. 26). Effects from specific threats such as fine sediment deposition, chemical pollution, dams and other barriers, and climate change are represented in the models but are not explicitly attributed to each threat.

Current Condition

Considering the biology of the species and key factors influencing its current condition, we assessed the current resiliency of occupied Roanoke logperch MUs (see table 1, above, for a list of MUs) based on indices of population density, genetically effective population size, habitat quality, and geographic range complexity. An overall index of current MU resiliency that combines this information is available in the SSA report (see section 3.4 of SSA report (Service 2022a, pp. 34–37)). In summary:

• Higher population density is indicative of a more highly productive habitat, and therefore reflects a population with higher resiliency since the habitat is able to support the needs of the species at a more concentrated scale.

• An important component of resiliency is being able to resist the influence of inbreeding depression on individual fitness, and ultimately, being able to adapt to changing future conditions. A larger value for genetically effective population size is needed over the long term (dozens to hundreds of generations) to maintain adaptive variation in the face of genetic drift; therefore, a higher value is indicative of higher resiliency in a population.

• Current habitat quality was qualitatively assigned as an aggregate assessment of that habitat's ability to support Roanoke logperch population growth, and we considered MUs with high habitat quality to have highest resiliency. Additionally, populations are less likely to become extirpated when they are widely distributed across complex and diverse habitats. Accordingly, having more stream segments is indicative of more refugia and protection from impacts from negative events, and therefore indicative of higher resiliency.

MUs were given scores of low, intermediate, or high for each of the above indices, and then an overall index was calculated. The overall index was the sum of the high scores (max of 4) minus the sum of the low scores (max of 4), plus 3 (to scale the final index to have a minimum of one). Any MU with an overall score equal to or greater than 5 exhibited at least three "high" indices, so we considered these MUs to have highest resiliency. In contrast, any MU with an overall score of 1 exhibited at least two "low" indices and no "high" indices, so we considered these MUs to have the lowest resiliency. MUs with scores of 2–4 were considered intermediately resilient. The overall resiliency index for current condition is highest in the Upper Roanoke, Pigg, Upper Smith, Middle Dan, and Nottoway MUs, and is either high or intermediate in 9 of the 11 currently occupied MUs (Service 2022a, p. 40).

We used MU resiliency to further assess redundancy and representation at the metapopulation and species levels. For each metapopulation, a redundancy index was calculated, with the assumption that each MU's contribution to redundancy is a function of both the resiliency and the geographic complexity of that MU (Service 2022a, pp. 36–

37). The overall current redundancy score is highest in the Dan metapopulation, followed by the Roanoke Mountain and Chowan metapopulations, and is intermediate in the Roanoke Piedmont metapopulation; therefore, overall redundancy is considered intermediate to high across all four metapopulations.

Representation describes the ability of a species to adapt to changing environmental conditions over time. By maximizing representation, a species' adaptive capacity to face unpredictable future changes to its environment is also maximized. Given that all four metapopulations, which are combinations of ecoregion and basin, within the known range of the Roanoke logperch have multiple MUs with intermediate or high effective populations, we deemed that species-level adaptive capacity, or representation, is high for the species. The high estimated resiliency and redundancy of the Chowan metapopulation is particularly important for species-level representation, given that it is the most genetically distinctive metapopulation (Roberts et al. 2013, entire). The Chowan metapopulation occurs in the most ecologically distinct environment (Jenkins and Burkhead 1994, pp. 786–787; Rosenberger and Angermeier 2003, entire) and, therefore, potentially contributes disproportionately to the evolutionary diversity of the species.

Future Condition

We assessed future conditions for the Roanoke logperch using a population viability model that forecasts population size and species' viability approximately 50 years into the future (2070). We determined that a 50-year timeframe was appropriate because it provided a reasonable time period for assessing the threats of urbanization and climate change, while also representing just over 10 logperch generations (assuming a 4.5-year generation time; Roberts 2012a, p. 89) – an adequate timeframe for evaluating species response. As with current condition, future conditions were assessed using the three conservation biology principles of resiliency, redundancy, and representation, with resiliency gauged by assessing MU persistence probability over the 50-year timeframe and metapopulation redundancy and species representation gauged by counts of MUs with intermediate to high resilience.

We forecasted future conditions for the Roanoke logperch under 12 scenarios, featuring 3 management categories contrasted with 4 different assumptions about future environmental conditions including different watershed urbanization levels, climate change scenarios, and conservation management (i.e., Roanoke logperch population restoration efforts and habitat connectivity restoration via barrier removals) (see chapter 4 of the SSA report (Service 2022a, pp. 41–57)). The forecasted future conditions showed 8 of 11 MUs with 99 or 100 percent probability of persistence under all 12 scenarios until 2070. Even under the worst plausible future scenario (increased risk of watershed urbanization, decreased habitat suitability, no population augmentation, and no barrier removal), at least one MU is projected to persist in each of three metapopulations (Roanoke Mountain, Roanoke Piedmont, Chowan), and all of the MUs in the fourth metapopulation, Dan, are projected to maintain resiliency. Redundancy is projected to be consistently high in the Roanoke Mountain, Dan, and Chowan metapopulations. In contrast, redundancy of the Roanoke Piedmont metapopulation depends strongly on future environmental and management conditions. Under declining habitat conditions, the Roanoke Piedmont metapopulation maintains only one MU, whereas with conservation management (i.e., PARTI and barrier removal) it maintains three MUs. Species-level representation is relatively high under scenarios where multiple Roanoke Piedmont MUs maintain resiliency, but only partially achieved in situations where the Roanoke Piedmont metapopulation decreases to one remaining MU.

In summary, owing to a large geographic range that includes at least some numerically large populations in good-quality habitat, we estimate that species-level representation and redundancy for Roanoke logperch currently is relatively high. All four metapopulations exhibit at least some redundancy of MUs in intermediate to high resiliency condition. In the future, under the worst-case scenario of worsening habitat quality, increased risk, and no management, 8 of 11 MUs are projected to remain highly resilient by year 2070. The Roanoke Piedmont metapopulation and its constituent MUs show the lowest resiliency and redundancy, particularly under scenarios involving worsening habitat quality. However, these declines could potentially be offset through restoration measures like PARTI (augmenting weak populations and establishing new ones) and/or barrier removal and passage (allowing natural augmentation and colonization).

We note that, by using the SSA framework to guide our analysis of the scientific information documented in the SSA report, we have analyzed the cumulative effects of identified threats and conservation actions on the species. To assess the current and future condition of the species, we evaluated the effects of all the relevant factors that may be influencing the species, including threats and conservation efforts. Because the SSA framework considers not just the presence of the factors, but to what degree they collectively influence risk to the entire species, our assessment integrates the cumulative effects of the factors and replaces a standalone cumulative effects analysis.

Determination of Roanoke Logperch's Status

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of an endangered species or a threatened species. The Act defines an "endangered species" as a species in danger of extinction throughout all or a significant portion of its range, and a "threatened species" as a species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. The Act requires that we determine whether a species meets the definition of an endangered species or a threatened species because of any of the following factors: (A) The present or threatened destruction, modification, or curtailment of its habitat or range; (B) Overutilization for commercial, recreational, scientific, or educational purposes; (C) Disease or predation; (D) The inadequacy of existing regulatory mechanisms; or (E) Other natural or manmade factors affecting its continued existence.

Status Throughout All of Its Range

When the Roanoke logperch was listed as endangered in 1989, it was thought to be endemic to Virginia and to inhabit only the upper Roanoke, Pigg, Nottoway, and Smith Rivers. Since then, the species' known range has expanded to 31 streams spanning 55 watersheds (HUCs) in both Virginia and North Carolina, and restoration work (such as barrier removal, construction of fish passages, and riparian habitat improvement) has occurred throughout the species' range. Furthermore, no population extirpations are known.

After evaluating threats to the species and assessing the cumulative effect of the threats under the Act's section 4(a)(1) factors, we deemed that six factors influence Roanoke logperch viability:

(1) Fine-sediment deposition from urbanization, agriculture, and other sources smothers eggs and reduces feeding efficiency, potentially resulting in reduced growth, survival, and recruitment.

(2) Chronic chemical pollution reduces habitat suitability for the Roanoke logperch, and acute pollution events reduce survival and population size.

(3) Dams and other barriers inhibit fish movement, fragmenting populations into smaller areas and reducing demographic rescue and gene flow among populations.

(4) Climate change has the potential to alter hydrology and sediment delivery by increasing flood magnitudes and flow variability in general, reducing flow predictability, decreasing summer/fall base flows, and increasing erosion and runoff of sediment,

potentially reducing habitat suitability for all age-classes of Roanoke logperch and increasing direct mortality of vulnerable juveniles during spring floods.

(5) Existing legal and regulatory mechanisms such as protections of the Act, the CWA, and State-level equivalents have benefitted the species through prohibitions on activities that may cause take and by facilitating funding opportunities used for Roanoke logperch research and conservation (note, however, that our assessment of status does not take into account the protections and benefits of the species being listed under the Act).

(6) Management activities aimed at improving habitat quality (e.g., riparian revegetation to reduce silt loading), restoring habitat connectivity (e.g., removing dams and constructing fish passages over barriers), and directly manipulating populations through propagation, augmentation, reintroduction, translocation, and introduction of fish (i.e., PARTI) have increased the resiliency and redundancy of populations.

Based on the species' expanded geographic distribution since the time of listing, the lack of empirical records of watersheds that have become unoccupied or populations that have become extirpated, and our analysis of threats, we conclude that the Roanoke logperch has a very low risk of extinction now or in the foreseeable future. The current number and distribution of intermediate to high resiliency MUs is high across all four metapopulations, species-level adaptive capacity is relatively high, and threats now and in the foreseeable future are low. Thus, after assessing the best scientific and commercial data available, we conclude that Roanoke logperch is not in danger of extinction or likely to become so within the foreseeable future throughout all of its range.

Status Throughout a Significant Portion of Its Range

Under the Act and our implementing regulations, a species may warrant listing if it is in danger of extinction or likely to become so within the foreseeable future throughout all or a significant portion of its range. Having determined that the Roanoke logperch is not in danger of extinction or likely to become so in the foreseeable future throughout all of its range, we now consider whether it may be in danger of extinction (i.e., endangered) or likely to become so in the foreseeable future (i.e., threatened) in a significant portion of its range—that is, whether there is any portion of the species' range for which both (1) the portion is significant; and (2) the species is in danger of extinction or likely to become so in the foreseeable future in that portion. We can choose to address either question first. Regardless of which question we address first, if we reach a negative answer with respect to the first question that we address, we do not need to evaluate the other question for that portion of the species' range.

Our analysis of the Roanoke logperch identified four MUs occupying a discrete geographical area where habitat conditions are relatively homogenous. We identified two MUs or metapopulations to consider as potentially significant portions of the species' range: (1) the Roanoke Piedmont metapopulation, because it was variable in terms of resiliency and had the lowest redundancy score; and (2) the Chowan metapopulation, because it houses the most genetically unique population of the species. The remaining two portions of the range (Roanoke Mountain and Dan metapopulations) were not considered due to their consistently high resiliency and redundancy, indicating the species is not in danger of extinction or likely to become so within the foreseeable future in those portions. In undertaking this analysis for the Roanoke Piedmont and Chowan metapopulations, we choose to address the significance question first. In the absence of a legal definition of significance in the Act, we determined significance on a case-by-case basis for the Roanoke logperch using a reasonable interpretation of significance and providing a rational basis for our determination. In doing so, we considered what is currently observed about the contributions made by each geographic portion in terms of biological factors, focusing on the importance of each in supporting the continued viability of the species. We also evaluated whether the area occupies relatively large or particularly high-quality or unique habitat.

The Roanoke Piedmont represents one of the four metapopulations in our analysis. It was defined by combining river basin (i.e., Roanoke River Basin) and ecoregion (i.e., upper Piedmont). This metapopulation represents 25 percent of the species' range, which is a small proportion of the Roanoke logperch's range and encompasses a small proportion of the species' overall population. Further, it is not unique in that it shares similar geology, topography, water chemistry, habitat, and climate with another upper Piedmont part of the range, the Dan metapopulation. We conclude that the Roanoke Piedmont is not a significant portion of the range.

In our representation analysis, we note the special nature of the Chowan metapopulation. Intraspecific genetic studies of Roanoke logperch indicate that the Chowan basin houses the most genetically unique population of the species; however, overall levels of intraspecific genetic divergence are relatively minor, such that no major subspecific phylogeographic distinctions (e.g., evolutionarily significant units) are evident. The high estimated resiliency and redundancy of the Chowan metapopulation is particularly important for species-level representation. This evolutionary unit is the most genetically distinctive metapopulation, occurs in the most ecologically distinct environment, and therefore potentially contributes disproportionately to the evolutionary diversity of the species.

Having identified the Chowan as a significant portion of the Roanoke logperch's range, we then focused our analysis on whether this portion of the species' range may meet the Act's definition of an endangered species or a threatened species. We considered whether the threats to, or their effects on, the species are greater in this portion of the species' range than in other portions such that the species is in danger of extinction or likely to become so within the foreseeable future in that portion. We examined the following threats: fine-sediment deposition, pollution, dams/barriers, and climate change, including their cumulative effects.

Our analysis indicates that the primary threats are not acting on the Roanoke logperch in the Chowan Basin such that the Chowan metapopulation would have a different status than other portions of the species' range. The current condition of Roanoke logperch in the Chowan metapopulation consists of a high resiliency MU, indicating that the species has robust population densities, high genetic diversity, adequate available suitable habitat, and security from risks like pollution events. We project that, in the foreseeable future, Roanoke logperch in the Chowan metapopulation would have a 100 percent probability of persistence regardless of future scenario. Therefore, we conclude that the species is not in danger of extinction or likely to become so within the foreseeable future in the Chowan portion of the range.

We found no biologically meaningful portion of the Roanoke logperch's range where the condition of the species differs from its condition elsewhere in its range such that the status of the species in that portion differs from its status in any other portion of the species' range.

Therefore, we find that the species is not in danger of extinction now or likely to become so within the foreseeable future in any significant portion of its range. This finding does not conflict with the courts' holdings in *Desert Survivors* v. *U.S. Department of the Interior*, 321 F. Supp. 3d 1011, 1070-74 (N.D. Cal. 2018) and *Center for Biological Diversity* v. *Jewell*, 248 F. Supp. 3d. 946, 959 (D. Ariz. 2017) because, in reaching this conclusion, we did not apply the aspects of the Final Policy on Interpretation of the Phrase "Significant Portion of Its Range" in the Act's definitions of "Endangered Species" and "Threatened Species" (79 FR 37578; July 1, 2014), including the definition of "significant" that those court decisions held to be invalid.

Determination of Status

Based on the best scientific and commercial data available, we determine that the Roanoke logperch does not meet the definition of an endangered species or a threatened species in accordance with sections 3(6) and 3(20) of the Act. In accordance with our regulations at 50 CFR 424.11(e)(2) currently in effect, the Roanoke logperch has recovered to the point at which it no longer meets the definition of an endangered species or a threatened species. Therefore, we are removing Roanoke logperch from the Federal List of Endangered and Threatened Wildlife.

Effects of This Rule

This rule revises 50 CFR 17.11(h) by removing Roanoke logperch from the Federal List of Endangered and Threatened Wildlife. On the effective date of this rule (see **DATES**, above), the prohibitions and conservation measures provided by the Act, particularly through sections 7 and 9, will no longer apply to this species. Federal agencies will no longer be required to consult with us under section 7 of the Act in the event that activities they authorize, fund, or carry out may affect Roanoke logperch. There is no critical habitat designated for this species, so there will be no effect to 50 CFR 17.95.

Post-delisting Monitoring

Section 4(g)(1) of the Act requires us, in cooperation with the States, to implement a monitoring program for not less than 5 years for all species that have been recovered. Post-delisting monitoring (PDM) refers to activities undertaken to verify that a species delisted due to recovery remains secure from the risk of extinction after the protections of the Act no longer apply. The primary goal of PDM is to monitor the species to ensure that its status does not deteriorate, and if a decline is detected, to take measures to halt the decline so that proposing the Roanoke logperch as an endangered or threatened species is not again needed. If at any time during the monitoring period data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing.

We will coordinate with other Federal agencies, State resource agencies, interested scientific organizations, and others as appropriate to develop and implement an effective PDM plan for the Roanoke logperch. The PDM plan will build upon current research and effective management practices that have improved the status of the species since listing. Ensuring continued implementation of proven management strategies that have been developed to sustain the species will be a fundamental goal for the PDM plan. The PDM plan will identify measurable management thresholds and responses for detecting and reacting to significant changes in Roanoke logperch numbers, distribution, and persistence. If declines are detected equaling or exceeding these thresholds, we will, in combination with other PDM participants, investigate causes of these declines. The investigation will be to determine if the Roanoke logperch warrants expanded monitoring, additional research, additional habitat protection, or resumption of Federal protection under the Act.

Required Determinations

Government-to-Government Relationship with Tribes

In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951, May 4, 1994), Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), the President's memorandum of November 30, 2022 (Uniform Standards for Tribal Consultation; 87 FR 74479, December 5, 2022), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with federally recognized Federal Tribes and Alaska Native Corporations on a government-to-government basis. In accordance with Secretary's Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we readily acknowledge our responsibilities to work directly with Tribes in developing programs for healthy ecosystems, to acknowledge that Tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to Tribes. We have determined that no Tribes will be affected by this final rule because there are no Tribal lands or interests within or adjacent to Roanoke logperch habitat.

References Cited

A complete list of references cited in this rulemaking is available on the internet at https://www.regulations.gov and upon request from the Virginia Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Plants, Reporting and recordkeeping requirements, Transportation, Wildlife.

Regulation Promulgation

Accordingly, we amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—ENDANGERED AND THREATENED WILDLIFE AND PLANTS

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 1531–1544; 4201–4245, unless otherwise noted.

2. In § 17.11, amend paragraph (h) by removing the entry for "Logperch, Roanoke" under FISHES from the List of Endangered and Threatened Wildlife.

Justin J. Shirley,
Principal Deputy Director,
Exercising the Delegated Authority of the Director,
U.S. Fish and Wildlife Service.

[FR Doc. 2025-13702 Filed: 7/21/2025 8:45 am; Publication Date: 7/22/2025]