U.S. Fish & Wildlife Service

Comprehensive River Management Plan Environmental Assessment

Nowitna Wild and Scenic River

Nowitna National Wildlife Refuge
PO Box 287
Galena, Alaska 99741

September 2025

MISSION STATEMENTS

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people.

The mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

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Photo: Aerial view of vibrant fall foliage in the boreal forest of the Nowitna National Wildlife Refuge. The Yukon River flows along the base of the Kokrine Hills, visible in the background. Photo credit: Keith Ramos, USFWS

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Chapter 1. Introduction

1.1 BACKGROUND

The Nowitna River flows through the Nowitna National Wildlife Refuge (NWR), which was established under the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). National wildlife refuges are guided by the mission and goals of the National Wildlife Refuge System, the purposes of an individual refuge, U.S. Fish and Wildlife Service (Service) policy, and laws and international treaties. Statutory direction comes from the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997; the Refuge Act of 1962; and ANILCA. Additional guidance includes selected portions of the Code of Federal Regulations (CFR) and Service manuals. The Wild and Scenic Rivers Act of 1968 (WSRA) established the National Wild and Scenic Rivers System (NWSRS). ANILCA amended the WSRA, adding the Nowitna Wild and Scenic River (WSR) to the NWSRS and classifying it as a wild river area.

ANILCA sets out specific purposes for each refuge in Alaska; the purposes of the Nowitna NWR are set forth in Section 302 of ANILCA. The purposes identify some of the reasons why Congress established the Nowitna NWR and set the management priorities for the refuge. The purposes are as follows:

> "(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, trumpeter swans, greater white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, martens, wolverines and other furbearers, salmon, sheefish, and northern pike;
>
> (ii) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitats;
>
> (iii) to provide, in a manner consistent with the purposes set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and
>
> (iv) to ensure, to the maximum extent practicable and in a manner consistent with the purposes set forth in paragraph (i), water quality and necessary water quantity within the refuge."

Title VI of ANILCA added river segments to the NWSRS. Part B of Title VI designates selected rivers within the National Wildlife Refuge System, including the Nowitna WSR as follows:

> 602. DESIGNATION.—Section 3(a) of the Wild and Scenic Rivers Act, as amended (16 USC [United States Code] 1274(a)), is further amended by adding the following new paragraphs: …(40) NOWITNA, ALASKA.—That portion from the point where the river crosses the west limit of township 18 south, range 22 east, Kateel River meridian, to its confluence with the Yukon River within the boundaries of the Nowitna National Wildlife Refuge; to be administered by the Secretary of the Interior.

Section 606(a) of ANILCA provided direction for management boundaries to average a maximum of 640 acres per river mile on rivers established by the act that are outside of national parks. These lands are withdrawn from entry, sale, or other disposition under the public land laws of the United States. Section 606(a) further withdraws from federal mining and mineral leasing laws the WSR's bed or its banks and

the area within 0.5 miles of the bank of any river designated a wild river. The language inserted in the WSRA by ANILCA Section 606(a) is as follows:

> SEC. 15. Notwithstanding any other provision to the contrary in sections 3 and 9 of this Act, with respect to components of the National Wild and Scenic Rivers System in Alaska designated by paragraphs (38) through (50) of section 3(a) of this Act—
>
> (1) the boundary of each such river shall include an average of not more than six hundred and forty acres per mile on both sides of the river. Such boundary shall not include any lands owned by the State or a political subdivision of the State nor shall such boundary extend around any private lands adjoining the river in such manner as to surround or effectively surround such private lands; and (2) the withdrawal made by paragraph (iii) of section 9(a) shall apply to the minerals in Federal lands which constitute the bed or bank or are situated within one-half mile of the bank of any river designated a wild river by the Alaska National Interest Lands Conservation Act.

1.2 PROPOSED PROJECT

The Nowitna WSR is a part of the NWSRS. The Service is proposing to establish and implement a comprehensive river management plan (CRMP) for the Nowitna WSR in the Nowitna NWR in accordance with the Revised Comprehensive Conservation Plan for the Koyukuk, Northern Unit Innoko, and Nowitna NWRs (Revised CCP [USFWS 2009]). The primary goal of a CRMP is to provide management direction for protecting and enhancing the river values (the water quality, free-flowing condition, and outstandingly remarkable values [ORVs]). The Service would also amend the Revised CCP (USFWS 2009). Amendments to a CCP constitute changes to the CCP's objectives or strategies, or both, that do not significantly change the management direction of the NWR. The Service prepares step-down management plans when required by policy or when the plans may be necessary to provide more detailed objectives, strategies, and/or implementation schedules for meeting the management direction identified in CCPs. The Service prepared this environmental assessment (EA) to analyze and disclose the effects of implementing a CRMP. By preparing this EA, the Service fulfills agency policy and direction to comply with the National Environmental Policy Act (NEPA) and other relevant federal laws and regulations.[1]

1.3 PURPOSE AND NEED

1.3.1 Purpose

The purpose of this proposal is to develop a CRMP pursuant to the WSRA, as amended by ANILCA, to protect and enhance the river values for which the Nowitna WSR was designated. Also, the purpose is

[1] Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025), and a Presidential Memorandum, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 *et seq.* Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The U.S Fish and Wildlife Service verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum.

to identify data gaps and monitoring opportunities to protect these river values within the Nowitna WSR corridor.

The ORVs for the Nowitna WSR are ecology, fish, cultural, and scenery. In addition, the Nowitna WSR is classified as a wild river area because it is free of impoundments, is generally inaccessible except by trail, has essentially primitive watersheds or shorelines, and has unpolluted waters.

In accordance with the WSRA, the CRMP will protect and enhance the river values of the designated Nowitna WSR for the benefit and enjoyment of present and future generations. Based on the baseline conditions (at the time of designation) and existing management direction, the CRMP will do the following:

- Clearly identify and describe the river's ORVs.
- Describe existing resource conditions with a focus on the river values.
- Identify threats to ORVs and strategies to protect river values.
- Define goals with desired future conditions and objectives that are specific, measurable, achievable, results oriented, time fixed, and spatially explicit.
- Identify potential development of lands and facilities consistent with the wild classification.
- Identify user capacities by monitoring and maintaining environmental and experiential criteria compatible with the river values, desired conditions, and other management directions.
- Identify water quality concerns and instream flow requirements.
- Develop management strategies, actions, and practices to support river values.
- Establish collaborative roles between the Service, the State of Alaska, Tribes, and members of the public.
- Establish corridor boundaries consistent with Section 3(b) of the WSRA. The corridor boundary will adhere to ANILCA, which stipulates that boundaries shall include an average of not more than 640 acres per mile on both sides of the river, and mineral withdrawals shall be situated within one-half mile of each bank of the river.
- Identify regulatory authorities to assist in the protection of river values.
- Develop a monitoring strategy to document current and future conditions and/or effectiveness of management actions.

1.3.2 Need

The underlying need for the CRMP is to address the requirements in the WSRA for federal agencies to prepare a comprehensive management plan that protects the river values for each designated river segment. The Wild River Plan that was included in the Nowitna NWR Final Comprehensive Conservation Plan (Nowitna CCP) (USFWS 1987a), as required by ANILCA 605(d), did not meet all the WSRA requirements for the development of a CRMP.

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Chapter 2. Involvement, Consultation, and Coordination

2.1 PUBLIC INVOLVEMENT

2.1.1 Scoping

Scoping occurs early in the NEPA process. The scoping process provides an opportunity for interested parties to provide input on the range of issues to be addressed. Although scoping for an EA is not required (43 CFR 46.235 and 46.305), the Service felt scoping was important for this CRMP. Prior to preparing the CRMP, the Service requested input from interested parties during scoping to guide the preparation of the CRMP. The Service deemed the involvement vital to understanding existing conditions, issues of concern, and where quality watershed conditions should continue to be supported. The Service distributed scoping letters and created a project website to inform interested parties about the CRMP's development. The Service invited interested parties to share their thoughts and perspectives about what is important to consider in the CRMP planning process.

The Service CRMP project website announced a scoping period from July 11 to August 10, 2023. The announcement was accompanied by a scoping newsletter that was included on the website. The Service advertised the scoping period and newsletter over public radio and in a local newspaper. The announcement was run in the *Fairbanks Daily News-Miner* on July 11, 2023. The Service posted the announcement on the Yukon Wireless (on KIYU Public Radio) on July 11, 2023, and the announcement ran during the entire scoping period.

The Service collected preliminary information and identified issues that should be analyzed in the CRMP and EA. During the 30-day scoping period, interested parties could provide input via the project website, email, mail, hand delivery, fax, or a recorded voicemail at:

- Email: Nowitna_CRMP@fws.gov
- Project website: https://www.fws.gov/refuge/nowitna
- Mail:
  Attention: Nowitna WSR CRMP/EA
  PO Box 287
  Galena, AK 99741
- Hand delivery:
  Attention: Nowitna WSR CRMP/EA
  101 Front Street
  Galena, AK 99741-0287
- Telephone voicemail: (907) 656-1231
- Fax: (907) 656-1708

The Service received three unique written submissions during the public scoping period; the number of substantive comments extracted from these submissions varied between all submissions. The Service

categorized all submissions received by the commenter's affiliation. The unique submissions by affiliation are as follows:

- **Government (federal, state, tribal, and local)**—Three commenters:
  - State of Alaska
  - Bureau of Indian Affairs
  - Bureau of Land Management (BLM)

While scoping comments regarding Alaska Native interests were not received from Tribes or Alaska Native corporations (ANCs),[2] the Bureau of Indian Affairs and State of Alaska identified the following concerns regarding Alaska Native interests during the scoping process:

- The Service should ensure continued access for tribal subsistence users.
- The Service should incorporate Secretarial Order 3403 (Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters) in the CRMP preparation process.
- The CRMP should include a discussion of special access provisions for traditional activities under ANILCA and how ANILCA will apply to the Nowitna WSR corridor.
- The Service should incorporate Section 1110(a) of ANILCA (43 CFR 36).
- The CRMP should consider how ORVs may conflict with each other in the context of subsistence and cultural resources.
- The Service should utilize the established State of Alaska Board of Game and Board of Fisheries and the Federal Subsistence Board.

Table 2-1, below, shows the number of substantive comments received by issue category. The 48 substantive comments were categorized into 20 issue categories.

Table 2-1. Number of Substantive Comments by Issue Category

Issue Category	Number of Substantive Comments
Access	1
ANILCA	2
Best available information	2
Climate change	1
Coordination	3
Designation	4
Ecology	2
Fire	1
Fisheries	4
Instream flow requirements	1
Management	1
Mapping	1
Monitoring	6

[2] Alaska Native Claims Settlement Act (ANCSA) established 13 regional corporations and 195 village corporations. ANCs manage their lands and resources for the benefit of Alaska Native shareholders.

Issue Category	Number of Substantive Comments
Navigable waters	2
Purpose and need	3
Recreation	3
Subsistence and cultural resources	6
User capacity	2
Water quality	2
Wilderness	1
Total	**48**

The scoping summary report for the Nowitna WSR CRMP and EA (USFWS 2024a) provides additional details about the method of comment collection and analysis and a summary of public comments.

2.1.2 Public Comment

The Service CRMP project website announced a 30-day public comment period for the Nowitna WSR Draft CRMP and EA beginning October 16, 2024. The announcement was accompanied by the Service's Nowitna Wild and Scenic River Values report (USFWS 2024b) that was included on the website. The Service advertised the public comment period over public radio and in a local newspaper. The announcement was run in the *Fairbanks Daily News-Miner* on October 16, 2024. The Service also posted the announcement on the Yukon Wireless (on KIYU Public Radio), and the announcement ran during the entire comment period.

During the 30-day comment period, interested parties could provide input via the project website, email, mail, hand delivery, fax, or a recorded voicemail using the same contact information outlined above for the scoping period.

The Service received three unique written submissions during the public comment period; substantive comments were only identified and addressed from one submission from the State of Alaska. The State of Alaska's comments focused on the purpose and need for the CRMP, river corridor boundary, wilderness terminology, navigability, and ANILCA. Refer to **Section 2.4**, Changes Between Draft and Final CRMP and EA, for a summary of changes made by the Service because of comments on the Nowitna WSR Draft CRMP and EA.

2.2 COOPERATING AGENCIES

A cooperating agency is any federal, tribal, state, or local government agency that enters into formal agreement with the lead federal agency to help develop an environmental analysis. The Service held a meeting with potentially interested Tribes, ANCs, and agencies on March 15, 2023, to provide information about what a CRMP is, the timeline for preparing the CRMP, and the various roles and responsibilities of Tribes, ANCs, and agencies. Letters were sent to the following entities to attend the meeting:

- Tozitna, Limited
- Doyon, Limited
- Dineega Corporation
- Gana-A'Yoo, Limited

- BLM
- Bureau of Indian Affairs
- State of Alaska Department of Natural Resources
- Ruby City Council
- Galena City Council
- Tanana City Council
- Louden Tribal Council
- Tanana Tribal Council
- Ruby Tribal Council

After the meeting, entities that intended to participate as a cooperating agency were provided a memorandum of understanding to be signed and returned to the Service. The Bureau of Indian Affairs and State of Alaska signed memoranda of understanding.

The Service held workshops on October 3 and 4, 2023, in Fairbanks, Alaska, to gather input on the preparation of the CRMP and EA from cooperating agencies and subject matter experts. In addition to Service staff, the workshops were also attended by staff from the following entities:

- Alaska Department of Environmental Conservation
- Alaska Department of Fish and Game (ADFG)
- Alaska Department of Natural Resources
- BLM
- Louden Tribe

Workshop discussions focused on issues affecting the Nowitna WSR that were identified during internal scoping and external scoping as well as river values, current management, and proposed management. As a result of the October workshops, additional follow-up workshops on November 16 and 17, 2023 focused on cultural resources, fish, and water quality. In addition to Service staff, the workshops were attended by staff from the following entities:

- Cultural resources workshop – ADFG, Alaska Department of Natural Resources, and the State Historic Preservation Office[3]
- Fish workshop – ADFG, Alaska Department of Natural Resources, and BLM
- Water quality workshop – Alaska Department of Environmental Conservation and Alaska Department of Natural Resources

Workshop discussions involved an overview of information about each resource, sources of additional information, gaps in information, and what is needed to understand conditions long term. Also discussed were a need to preserve cultural components for current and future generations (during the cultural

[3] The Service determined that consultation with the State Historic Preservation Office on the CRMP and EA was not required under 36 CFR 800.4, but the State Historic Preservation Office participated in the cultural resources workshop to provide technical assistance during the planning process.

resources workshop), species to be included in the fish ORV (during the fish workshop), and the reliability of current data (during the water quality workshop).

2.3 TRIBAL CONSULTATION

The Service conducts government-to-government consultation with federally recognized Tribes in accordance with Executive Order 13175, Consultation and Coordination with Indian Tribal Governments; the President's memorandum of April 29, 1994, Government-to-Government Relations with Native American Tribal Governments; the Department of the Interior's Alaska Policy on Government-to-Government Relations with Alaska Native Tribes, dated January 18, 2001; the Service's Native American Policy (510 FW 1); and the Service's Alaska Native Relations policy (510 FW 2).[4]

The Service also coordinates and engages with Tribes, Alaska Native organizations,[5] and ANCs in accordance with the following presidential memoranda, secretarial orders, and federal board policies:

- Presidential Memorandum: Tribal Consultations and Strengthening Nation-to-Nation Relationships; January 26, 2021
- Secretarial Order 3342, Identifying Opportunities for Cooperative and Collaborative Partnerships with Federally Recognized Indian Tribes in the Management of Federal Lands and Resources; October 21, 2016
- Joint Secretarial Order 3403, Joint Secretarial Order on Fulfilling the Trust Responsibility to Indian Tribes in the Stewardship of Federal Lands and Waters; November 15, 2021
- Secretarial Order 3342, Identifying Opportunities for Cooperative and Collaborative Partnerships with Federally Recognized Indian Tribes in the Management of Federal Lands and Resources; November 2021
- Executive Order 13175: Consultation and Coordination with Indian Tribal Governments; November 6, 2000
- Federal Subsistence Board Government-to-Government Tribal Consultation Policy
- Federal Subsistence Board Policy on Consultation with ANCs

Under Executive Order 13175, the federal government also consults with ANCs on the same basis as Tribes. As a matter of practice, the Service coordinates with all tribal governments, associated Native communities, Native organizations, and tribal individuals whose interests might be directly and substantially affected by activities on public lands.

Section 106 of the National Historic Preservation Act requires federal agencies to consult with Tribes for undertakings on tribal lands and that may affect historic properties of significance to the Tribes (36 CFR 800.2(c)(2)). Executive Order 13175 stipulates that during the NEPA process, federal agencies must consult with Tribes identified as being directly and substantially affected. Tribes, ANCs, and agencies work with the Service by sharing knowledge and resources to achieve desired outcomes for public lands and communities within statutory and regulatory frameworks.

[4] The Service's Alaska Native Relations policy (510 FW 2 or Chapter 2) supplements the Service's Native American Policy (510 FW 1).

[5] Alaska Native organizations are tribally controlled nonprofit organizations that act on behalf and for the benefit of their member Tribes.

In February 2023, the Service mailed letters regarding this EA effort to interested Tribes, ANCs, and potential cooperating agencies. The Service reached out to village councils (Tanana, Louden, and Ruby), city councils (Tanana, Galena, and Ruby), and the following ANCs: Dineega Corporation; Gana-A'Yoo Corporation; Tozitna, Limited; and Doyon, Limited. Government-to-government consultation was extended to the village councils and ANCs. None of the Tribes elected to participate as cooperating agencies.

The Service conducted a scoping meeting in Ruby on November 3, 2023, at the Tribal Office. One-on-one conversations with village residents also occurred in Tanana on October 18 and 19, 2023, and in Ruby on November 2 through 4, 2023. A summary of the discussions involving river values is as follows:

- Tanana:
  - Upstream users of the Nowitna River create water quality problems.
  - Water testing of the Nowitna River is wanted.
  - Wildfires should be put out everywhere.
  - More research should be allowed.
  - There should be more documentation of historic and prehistoric history of the area.
  - Temporary camps along the Nowitna River should not become permanent.
  - There should be mandatory moose hunter check stations in the villages.
  - Agates are collected from the Nowitna River.
  - Moose population decline is a threat to food security.
- Ruby:
  - All the wildlife species should be included in the ORVs.
  - It makes sense to keep fish as a separate ORV because of their uniqueness and importance, especially with tributaries going outside the refuge.
  - Fishing opportunities should be maintained.
  - Agates should be included in the scenery ORV.
  - Spruce bark beetles should be addressed in the CRMP. A lot of spruce are dying between Ruby and Galena.
  - There are concerns about people coming from other parts of the state and bringing drugs (particularly in the context of the state's plan to open a road between Ruby and McGrath).
  - Traditional ecological knowledge was mentioned with respect to the cultural ORV.

2.4 CHANGES BETWEEN DRAFT AND FINAL CRMP AND EA

Substantive comments during the public comment period for the Nowitna WSR Draft CRMP and EA were only identified in one submission, which came from the State of Alaska. Technical corrections and many of the editorial suggestions provided by the State of Alaska were incorporated. These revisions and additional internal review resulted in the following noteworthy changes between the draft and final CRMP and EA:

- **Section 2.1.2**, Public Comment, was added to describe the public comment period.

- The BLM approved the Central Yukon Resource Management Plan in November 2024. The Nowitna WSR EA **Chapter 4**, Affected Environment and Environmental Consequences were updated to include more detailed cumulative analyses.
- Clarification was added to the corridor boundary delineation for both alternatives. Revisions help clarify that the WSR corridor in Alternative B is being delineated according to the requirements of the WSRA to encompass all river-related values, to the extent possible, while adhering to the acreage limit stipulated by ANILCA Section 606(a). The WSR corridor in Alternative A would not change and does not meet the requirements of the WSRA or ANILCA.
- The Nowitna WSR Draft CRMP and EA **Section 4.17**, Air Quality, analyzed impacts on air quality. There would be no new impacts from Alternative A. No impacts were identified under Alternative B that were significant enough to merit analysis, so the section was removed. Because of the negligible impacts, this resource was dismissed from the final EA. Also, Alternative B has no management actions designed to manage air quality.
- The Nowitna WSR Draft CRMP and EA **Section 4.16**, Environmental Justice, was removed to comply with Executive Order 14154, *Unleashing American Energy* (Jan. 20, 2025) and a Presidential Memorandum, *Ending Illegal Discrimination and Restoring Merit-Based Opportunity* (Jan. 21, 2025). The Order and Memorandum further repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023), which had directed agencies to consider non-legislated "environmental justice" considerations when undertaking environmental analysis.
- Resource harvest data were added to the Nowitna WSR CRMP **Section 4.2.1**, Recreational and Subsistence Hunting, and **Section 4.2.5**, Trapping.
- Clarifications were made in **Section 3.2.1,** Planning Issues and Opportunities, **Section 4.2** Methodology and Assumptions, **Section 4.9** Vegetation, and **Section 4.16** Climate regarding the influence of abiotic conditions on Nowitna WSR values.

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Chapter 3. Alternatives

3.1 Decision Framework

The Alaska Region Refuge Chief must decide which management actions to include in the CRMP (as required by the WSRA). To help inform that decision, this EA analyzes the effects of a reasonable range of alternatives on the river values within the area. The CRMP will be the result of the Nowitna NWR manager's coordination with communities, staff, and subject matter experts. The Nowitna WSR is only a 220-mile portion of the Nowitna River, and the CRMP management direction only applies to the Nowitna WSR corridor, which is administered by the Service.

3.2 Comparison of Alternatives

3.2.1 Planning Issues and Opportunities

Planning issues define opportunities, conflicts, or problems regarding the use or management of the Nowitna WSR. The CRMP focuses on protecting and enhancing river values, including the free-flowing condition, water quality, and ORVs. The ORVs for the Nowitna WSR are ecology, fish, cultural, and scenery. All river values apply to the entire river corridor, are treated equally, and retain the same status for protection under the CRMP.

Planning issues were identified by the public; Service staff; local, state, and federal agencies; and organizations during scoping (internally and externally). **Chapter 2**, Involvement, Consultation, and Coordination, identifies coordination that the Service conducted with the public and with subject matter experts to identify issues. The Water Resources Inventory and Assessment for Koyukuk, Nowitna, and Innoko National Wildlife Refuges (Burkart et al. 2023) was also reviewed to identify potential conservation issues related to the Nowitna WSR.

The alternatives address issues that may adversely affect river values (the water quality, free-flowing condition, and ORVs) and identifies management strategies for protecting and enhancing river values. The CRMP also presents decisions about recreational and other public uses and associated visitor capacity for the river corridor. There are no anticipated impacts or issues related to the free-flowing condition of the Nowitna WSR. Planning issues relevant to the Nowitna WSR values are summarized below.

Water Quality

- Changing precipitation regimes and warmer air temperatures could lead to increased water temperatures and influence rates of permafrost thaw. Permafrost dynamics in the Nowitna WSR watershed affect the river's flow regimes and water chemistry which can impact water quality.
- Drought that decreases streamflow could result in changes to water chemistry that would affect water quality. Extreme precipitation events can impact water chemistry and flood frequency.
- Increased fire frequency and intensity may result in increased erosion, which in turn could cause higher sediment loading, increased turbidity, and debris in river systems.
- Increased fire suppression efforts could result in a chemical influx from fire suppression materials (aerially applied fire retardant).
- Improperly mitigated or unpermitted mining may impact water quality within the Nowitna WSR and downstream communities.

- The presence of access roads near the Nowitna WSR or its tributaries could result in changes in water quality and flow regimes in the Nowitna WSR.

Ecology ORV

- Changes in weather patterns (air and water temperature, rain and snow regimes, and seasonal phenology) could affect the type and quality of habitats and species found in the Nowitna WSR.
- Changing precipitation regimes and warmer air temperatures can lead to increased water temperatures and influence rates of permafrost thaw. Resulting changes in landcover, flow regimes, and water chemistry could impact plant and wildlife communities.
- Drought could decrease streamflow, change habitat suitability, and impact plant and wildlife species in the Nowitna WSR.
- Increased fire frequency and intensity could result in direct impacts on vegetation and distribution of plant communities. Increased erosion resulting from high-severity fires could cause higher sediment loading, increased turbidity, and debris in river systems, which could impact riparian vegetation and instream habitat for aquatic species.
- Fire suppression efforts (mechanical vegetation removal and aerially applied fire retardant) could affect instream habitat and/or directly impact terrestrial habitat through vegetation disturbance and the introduction of invasive species.
- The community diversity and assemblage of wildlife found in the Nowitna WSR is very dynamic; the community is supported by a diversity of habitats. Wildlife species associated with the Nowitna River seasonally use areas outside the Nowitna WSR. These populations are potentially affected by issues impacting essential habitat outside the corridor.
- Incomplete understanding of the natural variability of high-quality habitats and species found within the Nowitna WSR, including larch and old-growth white spruce forest, reduces habitat management capabilities.
- Improperly mitigated or unpermitted mining may cause direct impacts on the habitat and species found in the Nowitna River.
- Invasive species, pest, and pathogen introduction and spread could result in habitat loss and alteration or direct impacts on wildlife populations.
- Visitor use patterns may change and cause impacts on the habitat and species found within the Nowitna WSR.
- The presence of access roads near the Nowitna WSR or its tributaries could result in changes in water quality and flow regimes in the Nowitna WSR.

Fish ORV

- Permafrost thaw could change flow regimes and water chemistry, which would affect water quality. This could impact instream habitat conditions for aquatic species.
- Changes in the snow regime could impact seasonal flow dynamics and instream habitat conditions for aquatic species.
- Increasing air and water temperatures could decrease habitat quality and/or result in fish mortality and susceptibility to disease.
- Drought could result in decreased streamflow and decreased habitat suitability as well as in fish stranding and mortality.

- Increased fire frequency and intensity could result in increased erosion, which in turn could cause higher sediment loading, increased turbidity, and debris in river systems. These could impact instream habitat for aquatic species. Extreme events could result in a reduction of oxygen in the river and fish mortality.
- The lack of understanding and quantification of the natural range of flows and water quality found in the Nowitna WSR could hamper fish conservation efforts.
- The fish community uses areas within and outside the Nowitna WSR, depending on the life cycle stages. Therefore, issues affecting the fish community could derive from both inside and outside the Nowitna WSR.
- Improperly mitigated or unpermitted mining may cause direct impacts on the fish community and habitats.
- Introduction of invasive species could result in habitat loss and alteration (by invasive plants) or changes in ecosystem dynamics (caused by invasive aquatic organisms).
- Visitor use patterns may change and cause impacts on the habitat and fish community.
- The presence of access roads near the Nowitna WSR or its tributaries could result in changes in water quality and flow regimes which could affect fish habitat in the Nowitna WSR.

Cultural ORV

- A lack of documentation of archaeological and paleontological resources, historic place-names, community practices, and traditional skills can limit efforts to preserve or protect these cultural elements.
- Riverbank erosion caused by river meandering, permafrost thaw, wildland fire, changes in hydrology, or extreme weather events could expose or destroy archaeological sites along the river.
- Changes in abiotic conditions could directly affect human activities on the Nowitna WSR and could influence fish and wildlife populations that support those activities. Key factors include changes in temperature and precipitation patterns, drought, permafrost thaw, fire frequency and intensity, and extreme weather events. These abiotic changes can impact human access to and safety on the river, while also affecting terrestrial and aquatic habitats and the distribution and abundance of fish and wildlife important to cultural use.
- Visitor use patterns may change and cause direct impacts on cultural resources and visitor experiences.

Scenery ORV

- The presence of roads, towers, and other human infrastructure developed outside the corridor but within the viewshed could impact the Nowitna WSR's scenic quality.
- Improperly mitigated or unpermitted mining may cause direct impacts on the scenic quality of the Nowitna WSR.
- Visitor use patterns may change and cause direct impacts on the visitor experience of the river's scenic quality.
- Introductions of invasive species could result in habitat loss and alteration and impact the scenic quality of the Nowitna WSR.

- Changes in abiotic conditions could affect scenery through alterations in water quality and shifts in vegetation communities, driven by changes in temperature and precipitation regimes, permafrost thaw, drought, increased fire frequency and intensity, and fire suppression efforts.

Corridor Boundary

The WSRA requires that each federally administered river in the NWSRS has a legally established boundary. Establishing a WSR boundary that includes identified river-related values is essential as a basis from which to provide necessary protection. ANILCA Section 606(a) states the boundary shall include an average of not more than 640 acres per mile on both sides of the river (measured from the ordinary high-water mark). The boundary shall not include any lands owned by the State or a political subdivision of the State, nor shall such boundary extend around any private lands adjoining the river in such manner as to surround or effectively surround such private lands. Section 3(b) of the WSRA requires that "notice of the availability of the boundaries and classification, and of subsequent boundary amendments shall be published in the Federal Register and shall not become effective until ninety days after they have been forwarded to the President of the Senate and the Speaker of the House of Representatives."

ANILCA defines the Nowitna WSR as "that portion from the point where the river crosses the west limit of township 18 south, range 22 east, Kateel River Meridian, to its confluence with the Yukon River within the boundaries of the Nowitna National Wildlife Refuge." The length of this section of river was calculated to be 223 river miles in the 1987 Nowitna CCP (USFWS 1987a). A corridor boundary was described in the plan based on the Public Land Survey System (PLSS), whereby sections (1 square mile) and townships (aggregation of 36 sections) provide a foundation for legal descriptions of public and private lands. Because the Nowitna WSR corridor was described in terms of townships, sections, and aliquot parts (subdivisions of a section), the resulting boundary was depicted as a 'stair-step' polygon composed of straight lines oriented in north–south and east–west directions (**Figure 3-1**). This corridor was roughly centered on the centerline of the Nowitna River and was of variable width with respect to the centerline. Some portions of the corridor boundary were a mile or more away from the centerline, and other portions of the corridor boundary were less than 0.5 miles from the centerline. The estimated size of the corridor was 142,400 acres, or an average of 638.6 acres per river mile.

The Revised CCP (USFWS 2009) also recognized a 223-mile river length for the Nowitna WSR. The WSR corridor was not changed at that time, but a more accurate calculation of the area within the corridor showed it to be 159,838 acres, which averages 766.8 acres per river mile. The most recent (2024) calculation of the area of the corridor depicted in the CCPs shows it to be just under 159,150 acres, mainly due to updates such as the removal of acreage belonging to Native allotments. As such, the Nowitna CCP description of the Nowitna WSR corridor yielded an average of 713.7 acres per river mile, which is larger than the maximum of 640 acres per river mile allowed by ANILCA Section 606(a).

3.2.2 Description of Alternatives

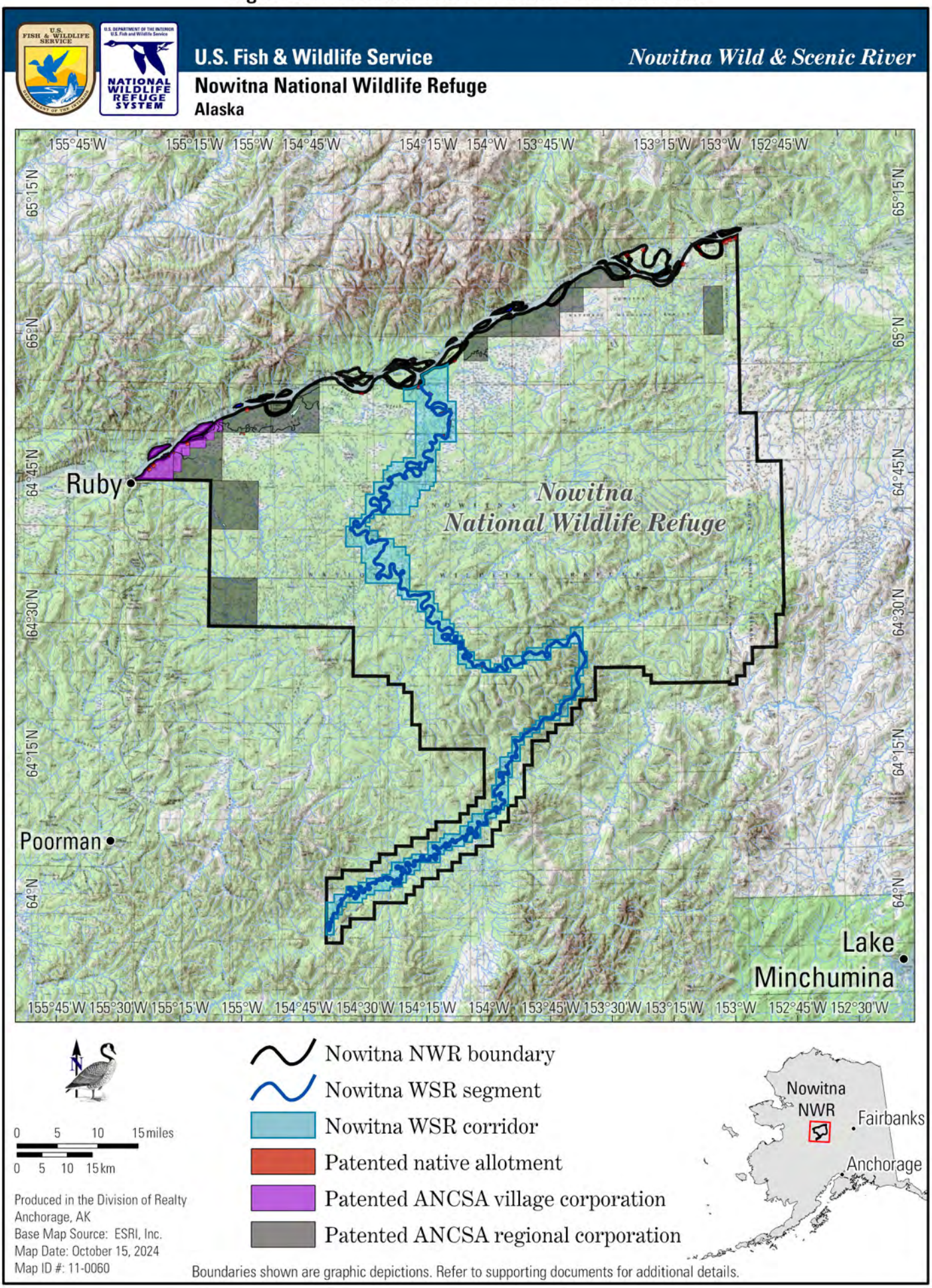
Alternative A—No Action Alternative

Alternative A is the No Action Alternative and would continue existing management direction. "No action" does not mean that no actions would be taken; rather, it is a continuation of what is currently happening or not happening in the Nowitna WSR corridor. The No Action Alternative is the benchmark used to compare effects of an action alternative. Existing management from the Revised CCP (USFWS 2009) that is relevant to the Nowitna WSR corridor is consolidated in Appendix C of the Nowitna WSR CRMP.

Corridor Boundary

Management of the Nowitna WSR corridor is currently guided by the Revised CCP (USFWS 2009) and the overall footprint of the Nowitna WSR corridor would remain unchanged under Alternative A (**Figure 3-1**). As such, the management corridor would continue to remain larger than what is allowed under the WSRA and ANILCA.

Figure 3-1: Nowitna WSR Overview - Alternative A



Alternative B—Preferred Action Alternative

Alternative B is the preferred action alternative (a CRMP). All existing management for the Nowitna NWR from the Revised CCP (USFWS 2009) would continue under this alternative. Further, Alternative B would implement (not replace) existing management direction contained in the Revised CCP (USFWS 2009). The CRMP contains the additional step-down management direction, actions, and monitoring that would be implemented to protect and enhance the river values. River values, which are the core of the CRMP, refer to the free-flowing condition, water quality, and ORVs. Specifically, the CRMP (1) establishes a detailed river corridor boundary using enhanced mapping tools; (2) clearly identifies and describes the river's ORVs; (3) describes existing resource conditions, with a focus on the river values; (4) identifies threats and defines goals and desired conditions for protecting river values; (5) addresses development of lands and facilities; (6) addresses user capacities; (7) addresses water quality and sets the stage for determining flow requirements for the river values; (8) reflects a collaborative approach with stakeholders; (9) identifies regulatory authorities of other governmental agencies that assist in protecting river values; and (10) includes a monitoring and adaptive management strategy to maintain or make progress toward desired conditions.

Corridor Boundary

Alternative B proposes to establish a corridor as required by Section 3(b) of the WSRA using mapping capabilities that were not available when the Nowitna WSR was designated or at the time of CCP develoment (USFWS 1987a, 2009). The corridor was delineated using geographic information system (GIS) software to create a digital representation of the Nowitna WSR corridor that encompasses all river-related values, to the extent possible, while adhering to the acreage limit stipulated by ANILCA Section 606(a).

For the purposes of delineating the WSR corridor, the length of the Nowitna WSR was measured to be 220 river miles using a centerline generated in GIS using the ordinary high-water mark visible in high-resolution satellite imagery on both sides of the river. This is a few miles shorter than the previous measurement due in part to channel changes on the meandering river. Since the last river measurement, several cut-throughs have occurred, creating large oxbow lakes that no longer receive continuous river flow. Some change in the river length measurement may also be attributed to an increase in accuracy because the Service used high-resolution satellite imagery and GIS software to create the digital representation of the river's centerline.

The accuracy of the PLSS in unsurveyed townships (including the Nowitna River region) is considered very low, as it relies on projected estimations and mathematical calculations rather than actual on-the-ground measurements, making the location of property boundaries within these areas highly uncertain; essentially, it provides a theoretical grid but not precise property lines. The Service determined that, due to the ambulatory nature of the Nowitna WSR, it is more accurate and efficient to use a GIS-based buffer width method to identify the WSR corridor than the PLSS method. The multistage process is detailed in Appendix B of the Nowitna WSR CRMP and outlined in the steps below:

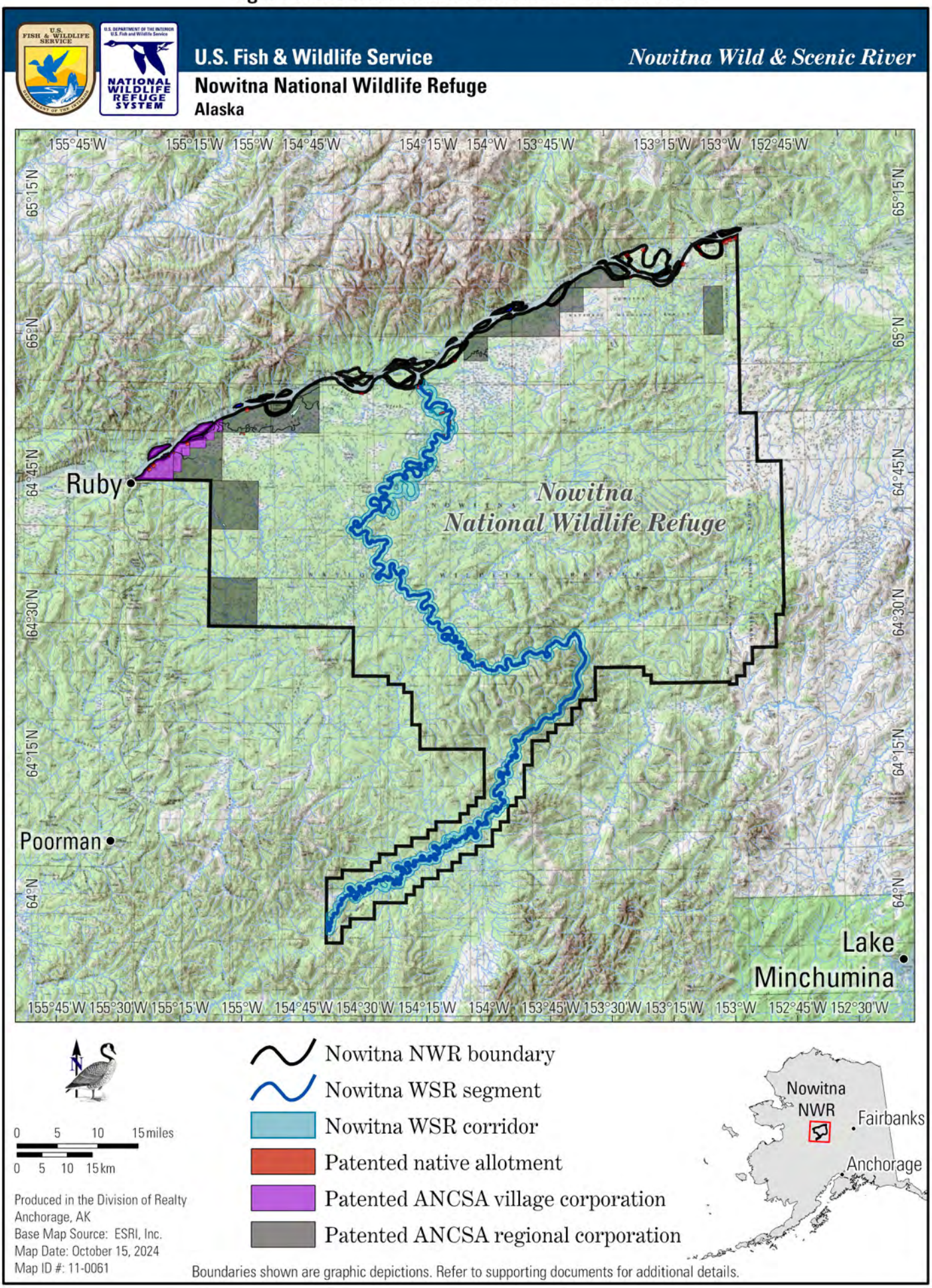
1) Create a polygon that follows the ordinary high-water mark of the extreme left and right banks of the Nowitna River.
2) From the polygon created in Step 1, generate a line that represents the centerline of the main channel of the Nowitna River.
3) From the polygon created in Step 1, generate buffer zones extending 0.5 miles outward from the extreme left and right banks of the Nowitna River. These 0.5-mile buffer zones represent an area of 320 acres per linear river mile on each bank of the river, for an aggregate of no more than 640 acres per linear river mile.
4) From the buffer zones created in Step 3, remove privately owned land and any land necessary to prevent privately owned land from being effectively surrounded.
5) Use the polygon created in Step 1 (river polygon) to remove the river from the polygon created in Step 4 (corridor polygon). Islands (or portions of islands) that are below the ordinary high-water mark remain in the river polygon while those above the ordinary high-water mark are digitized and included in the corridor.

The corridor under Alternative B (**Figure 3-2**) represents a uniform corridor that extends one-half-mile outward from the ordinary high-water mark of the extreme left and right banks of the Nowitna River and excludes private land parcels and the area of the river itself (IWSRCC 2017). The corridor encompasses all river-related values, to the extent possible, while adhering to the acreage limit stipulated by ANILCA Section 606(a).

Revised CCP Amendment

Service Manual Part 602 FW Chapters 1–4 outline policy and procedures for revising CCPs and step-down management plans. In compliance with the Service's process to amend CCPs, the Revised CCP (USFWS 2009) would be modified to update the Nowitna WSR corridor to conform with ANILCA requirements. Other updates would include changing the "Nowitna Wild River" to the "Nowitna Wild and Scenic River," as required by Service policy (611 FW 3), and updating the ORVs to those identified in the CRMP. These and other updates are explained in the CCP amendment memorandum (**Appendix A**).

Figure 3-2: Nowitna WSR Overview - Alternative B



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Chapter 4. Affected Environment and Environmental Consequences

4.1 Introduction

This chapter describes the environment of the designated Nowitna WSR corridor. The intent is not to provide an exhaustive description of resources and other relevant factors, but to provide sufficient detail to reasonably assess and compare the effects of implementing the management alternatives described in **Chapter 3**, Alternatives. Topics were selected based on federal laws, Service expertise, and the concerns expressed by other agencies or members of the public during scoping. Information provided in this affected environment establishes the conditions for analyzing impacts (direct, indirect, and cumulative), which are also presented in this chapter. Unless described differently, the analysis area for identifying direct and indirect impacts is the Nowitna WSR corridor.

The year a WSR is designated represents the baseline condition against which subsequent conditions of river values are assessed (IWSRCC 2018). The baseline condition serves as the basis on which the degree or intensity of any existing impacts can be measured, and future impacts assessed, should they occur. All future activities are to be measured from this baseline to ensure continued high-quality conditions and, with respect to river values, to eliminate adverse effects (protect) or improve conditions (enhance) within the river corridor.

The remote and often inaccessible nature of the rivers in Alaska being studied for potential WSR designation during the 1970s presented challenges. Limited information was available about many resource values in these remote regions, making it difficult to provide detailed descriptions of the baseline conditions. Often, existing conditions are relied on to represent the condition against which subsequent conditions of river values are assessed. This chapter describes baseline conditions, if known, and existing conditions for river values and other relevant resources.

NEPA mandates that an EA disclose the environmental impacts of proposed federal actions. In this case, the proposed federal action is the implementation of the Nowitna WSR CRMP analyzed in this EA. Consistent with the provisions of NEPA, Service managers would determine whether more detailed planning, environmental compliance, or other documentation (for example, Section 7 evaluations) is required before undertaking specific actions that may arise from implementation of the approved CRMP.

4.2 Methodology and Assumptions

To assess current conditions and potential impacts, the Service gathered site-specific information from GIS data sets, historical data, and recent planning documents. Data on visitor use patterns and visitor preferences were gathered from historical records, moose hunter check station reports, and conversations with communities. The Service used this background information to communicate its analysis of resource impacts. The planning team based the impact analyses in this chapter on professional judgment, research of existing studies and literature, opinions from experts within the Service and other agencies, and the study of other projects that had similar effects.

For this analysis, the Service assumes the action alternative would not substantially increase the frequency or intensity of visitor use. This assumption is based on the remote location, rugged terrain, and lack of accessibility within the Nowitna WSR corridor.

Cumulative effects are addressed for those resources directly or indirectly impacted by an alternative. If an alternative has no direct or indirect impacts, then there would be no contribution to cumulative impacts discussed. Similarly, if there are no reasonably foreseeable future actions that would contribute to similar direct or indirect impacts for a resource, then there would be no cumulative impacts. The effects of past and present actions on specific resources are described in the affected environment discussions, and they are considered in the environmental consequences discussions. For example, these actions would include actions inside the corridor and actions in the watershed (such as improperly mitigated or unpermitted mining) that affect the Nowitna WSR corridor.

Both the temporal and geographic scope of the cumulative impact analysis could vary according to the resource under consideration. Generally, the appropriate time frame for the cumulative impacts analysis spans from the 1990s through the life of the CRMP. A larger temporal scale may be necessary for long term trends in abiotic conditions to be detected. The geographic scope generally encompasses the Nowitna River watershed but could extend beyond for some resources (for example, climate).

Past, Present, and Reasonably Foreseeable Future Actions

The cumulative analysis must consider past, present, and reasonably foreseeable future actions in the analysis. Relevant past and present actions are those that have influenced the condition of the resource. Past actions were identified using agency documentation, NEPA analyses, reports and resource studies, peer-reviewed literature, and best professional judgment.

The DOI NEPA implementing regulations define reasonably foreseeable future actions as "sufficiently likely to occur, that a Responsible Official of ordinary prudence would take such activities into account in reaching a decision" (43 CFR 46.30). Typically, reasonably foreseeable future actions are based on such documents as plans, permit applications, and fiscal appropriations. Reasonably foreseeable future actions considered in the cumulative effects analysis consist of projects, actions, or developments that can be projected, with a reasonable degree of confidence, to occur over the life of the CRMP. Recent environmental reports, surveys, research plans, NEPA compliance documents, and other source documents were evaluated to identify these actions.

Reasonably foreseeable future actions were assessed to determine whether they were speculative and would occur within the CRMP's analytical time frame. Any actions that fall outside the past, present, or reasonably foreseeable categories are speculative and are not evaluated as part of the cumulative impacts analysis.

Projects and activities considered in the cumulative effects analysis are summarized in **Table 4-1** and described further below. Most of these actions occur within the Nowitna River watershed, which covers 1,419,005 acres in the Nowitna NWR and 3,166,188 acres outside the Nowitna NWR at the hydrologic unit code 8 level, according to the U.S. Geological Survey National Hydrography Dataset.

Table 4-1. Past, Present, and Reasonably Foreseeable Future Actions Considered in the Cumulative Effects Analysis

Action	Action Description
Vegetation clearing	Brush and tree clearing are implemented to ensure the Nowitna NWR administrative cabin complies with FireWise requirements. The coordinates are N 64°40'27", W 154°30'52", World Geodetic System 84. Work is expected to begin in 2025 and be repeated every 5 years, depending on funding.
Cultural resource surveys	In 2023, a cultural resource survey at the confluence with the Yukon River was conducted in accordance with the National Historic Preservation Act Section 110, including using metal detectors and subsurface testing, as warranted, over a 1-week period to identify any remains of a former historic village site. 2025–2030: Additional annual reconnaissance cultural and paleontological resource surveys will be conducted upstream in high-probability areas as they become identified, and funding allows.
Operation of Nowitna River moose hunter check station	An annual moose hunter check station is operated from approximately late August to October 1. This voluntary check-in has occurred most years since 1988 and documents the number of hunters, the residence of hunters, and harvest reports for moose, bears, and wolves. The coordinates are N 64°54'35.07", W 154°16'48.22", World Geodetic System 84.
Hunting and other activities	Refuge records indicate that moose hunters camp on the riverbanks or near adjacent sloughs, and the duration of stay ranges from 3 days to 3 or 4 weeks (USFWS 1982). During the 1987 fall moose hunting season, 26 hunting groups were recorded along 223 miles of the Nowitna River (USFWS 1987b). In 2023, 30 separate hunting parties were recorded (USFWS 2023) during the hunting season. The number of fall moose hunters using the Nowitna WSR has remained relatively stable over that time period (USFWS 2023). However, growth in visitation for moose hunting or other activities could occur, potentially increasing impacts related to trespass, litter, noise, and invasive species spread.
Central Yukon Resource Management Plan update	The BLM updated the Central Yukon Resource Management Plan in November 2024 (BLM 2024). It designates areas of critical environmental concern along two tributaries of the Nowitna River designed to protect resources related to Nowitna WSR values (described further below). It also covers land management that affects opportunities for mining and other upstream activities in the upper Nowitna River watershed that may impact downstream conditions, including Nowitna WSR river values. It describes the potential transfer of selected land to the State of Alaska, which would result in a change of management and possible increases in activities in the upper Nowitna River watershed that could impact Nowitna WSR values.
Abiotic Shifts	Observed changes in temperature and precipitation regimes have led to shifts in ice and snow phenology, permafrost thaw dynamics, and ecosystem composition and have potential to impact population size and distribution of plant animal species. Continued changes in weather patterns and storm intensity are also likely to affect ecosystems and human activities.

Action	Action Description
Wildland fire regime change	Wildfires in black spruce-dominated boreal forest tend to be large and frequent due to the dry continental climate, the flammable nature of fuels, and the continuity of fuels, which commonly extend from the ground layer to the tree canopy layer. Evidence of fire can be found throughout most of the Nowitna NWR. Historically, fire has strongly influenced the distribution and diversity of interior Alaska plant and animal communities. Most fires are lightning caused. There is no evidence of anthropogenic fire on the refuge. The estimated fire return interval is 192 years for the Nowitna NWR, based on the past 50 years of fire records (USFWS 2009). Such a short data timeframe can only yield an approximation of the Nowitna NWR's fire return interval. The estimated mean fire interval for other interior Alaska black and white spruce forest locations ranges from 25–130 years for black spruce to 50–240 years for white spruce. A trend toward warmer, drier summers is expected to result in increases in landscape flammability (DeWilde and Chapin 2006; USFWS 2009).
Introduction and spread of invasive species and disease	The presence and spread of invasive species and disease can have deleterious effects on native populations of fish, wildlife, and plants, and are an emerging concern for the Nowitna WSR, where intact ecosystems have historically remained largely free of non-native species. Invasive species are spreading in more developed parts of Alaska, particularly along road systems and waterways, in part due to ecological changes that are creating more suitable conditions for their establishment. Early detection, monitoring, and management efforts are critical to preventing the establishment and spread of invasive species in the sensitive boreal environments of the Nowitna WSR. The Alaska Department of Natural Resources reported that invasive species management cost $29 million from 2007 to 2011 (Schwörer et al. 2014).

The Central Yukon Resource Management Plan designated two Areas of Critical Environmental Concern in the Nowitna River watershed (along the Sulukna River and Sethkokna River drainages) in part to protect water quality in the Nowitna River and stocks of salmon and whitefish that also occur in the Nowitna River (BLM 2024). The 398,000-acre Sulukna River Area of Critical Environmental Concern was designated to protect crucial spawning and rearing habitat for sheefish (*Stenodus leucichthys nelma*, also known as inconnu) and other whitefish and salmon species in the Sulukna River drainage. The 299,000-acre Sethkokna River Area of Critical Environmental Concern was designated to protect crucial Chinook salmon (*Oncorhynchus tshawytscha*) spawning habitat, soil, and water in the Sethkokna River drainage.

Most of the land in the Nowitna River watershed is either managed by the Service or BLM. The BLM Central Yukon Resource Management Plan provides guidelines for mining and other upstream activities in many areas of the upper Nowitna River watershed that may affect downstream conditions, including Nowitna WSR fisheries, hydrology, and water quality (BLM 2024).

BLM-administered lands in the Nowitna River watershed are currently withdrawn under ANCSA 17(d)(1), which generally closes these lands from all forms of appropriation under public laws, including mining and mineral leasing. However, most BLM-administered lands in the Nowitna River watershed are open to commercial forestry development, right-of-way allocations, locatable mineral entry, metalliferous mineral entry, mineral materials disposal, and limited off-highway vehicle travel. Most Nowitna River tributaries that flow through BLM-administered lands are open to these activities with some exceptions in the Sulukna River, Sethkokna River, and Titna River drainages. If ANCSA 17(d)(1) withdrawals are revoked through secretarial action, all top-filings in the Nowitna River watershed, which become effective State selections, would be segregated and unavailable to mineral entry and leasing. The State has high priority Statehood Act selections at the headwaters of the Titna River, Sethkokna River,

Sulukna River, and several creeks, which feed into the Nowitna River. Those lands are expected to be conveyed to the State within 10 years and would change from management by the BLM to State management. After conveyance, these lands would likely become open to mineral entry and mineral leasing, as well as other land uses not allowed under current federal management.

Lands in the Nowitna River watershed that are not managed by the Service or BLM are primarily managed by the State of Alaska. The majority of historic mines, current placer mine authorizations, and State mining claims in the Nowitna River watershed are located on State land along the Ruby-Poorman Road in the Sulatna River drainage (Burkart et al. 2023).

4.3 LAND USE

4.3.1 Affected Environment

The region of influence, or geographic scope, for this land use analysis is the Nowitna WSR corridor (**Figure 4-1.1** through **Figure 4-1.8**). The Nowitna WSR is in a remote and undeveloped area of Alaska. Landownership within the Nowitna WSR corridor is almost entirely federal. However, portions of the existing corridor include private inholdings.

All uses of an NWR over which the Service has jurisdiction must be determined to be appropriate uses under the Appropriate Refuge Uses policy (USFWS 2006). Land uses that were found appropriate for the Nowitna NWR, including the Nowitna WSR, in the Revised CCP (USFWS 2009) are the following:

- ADFG management and Bureau of Wildlife Enforcement activities
- Commercial big game hunting guide services
- Subsistence and trapping cabins
- Commercial recreational fishing guide services
- Fishing (general and other)
- Helicopter landings to support authorized activities by other federal, tribal, state, and local governments; universities; etc.
- Subsistence harvest of house logs
- Recreational hunting
- Non-wildlife-dependent recreation
- Wildlife observation and photography, and environmental education and interpretation
- Reburial of archaeological human remains per State and federal guidelines
- Commercial recreational guide services
- Research and surveys
- Subsistence activities
- Native allotment surveys
- Commercial transporter services
- Trapping

These types of land uses in the Nowitna WSR corridor occur at various times.

4.3.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, land uses would continue as authorized and outlined in the Revised CCP (USFWS 2009). New land use authorizations would continue to be approved, provided they are consistent with the management direction, goals, and objectives in the Revised CCP (USFWS 2009). There would be no new impacts on land uses and designations. Landownership within the Nowitna WSR corridor would continue to be almost entirely federal (**Figure 4-1.1** through **Figure 4-1.8** and **Table 4-2**).

Table 4-2. Landownership within the Nowitna WSR Corridor—Alternative A

Landownership	Area (acres)
Service	159,150
Patented Native allotments[7]	780
Patented village corporation	80

Source: USFWS 2024d

Federal agencies charged with the administration of the NWSRS are required to implement a CRMP for designated river segments (WSRA, Section 3(d)(1)). Under Alternative A, the Service would continue to rely on the Revised CCP (USFWS 2009) to manage the Nowitna WSR corridor and would not develop and implement a CRMP. Therefore, Alternative A would not comply with the WSRA's CRMP requirement.

Section 3(b) of the WSRA provides specific direction to river administering agencies to develop legally established WSR corridor boundaries. ANILCA further stipulates that WSR corridor boundaries in Alaska shall include an average of not more than 640 acres per mile on both sides of the river. A corridor boundary of the Nowitna WSR was described in the Nowitna CCP (USFWS 1987a). However, this boundary is larger than the maximum allowed by ANILCA Section 606(a).

[7] Alaska Native allotment is defined as a parcel or parcels of land totaling up to 160 acres, conveyed by restricted deed to an Alaska Native under the terms and conditions of the Alaska Native Allotment Act of 1906 (and 1956 amendment) and the Alaska Native Veteran Allotment Act of 1998 (43 USC 357, 357a, and 357b).

Figure 4-1.1: Nowitna WSR Series - Alternative A (1 of 8)

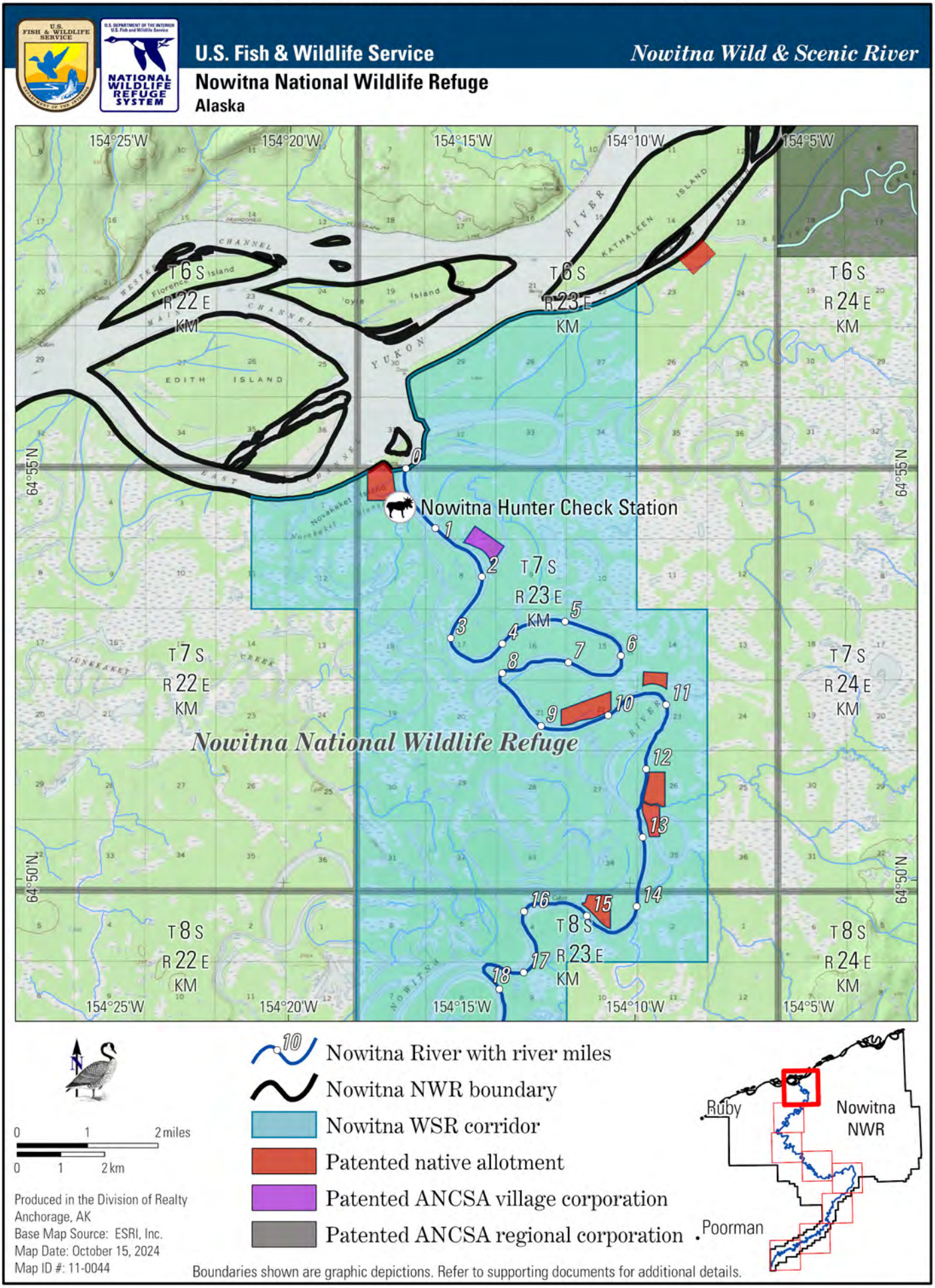


Figure 4-1.2: Nowitna WSR Series - Alternative A (2 of 8)

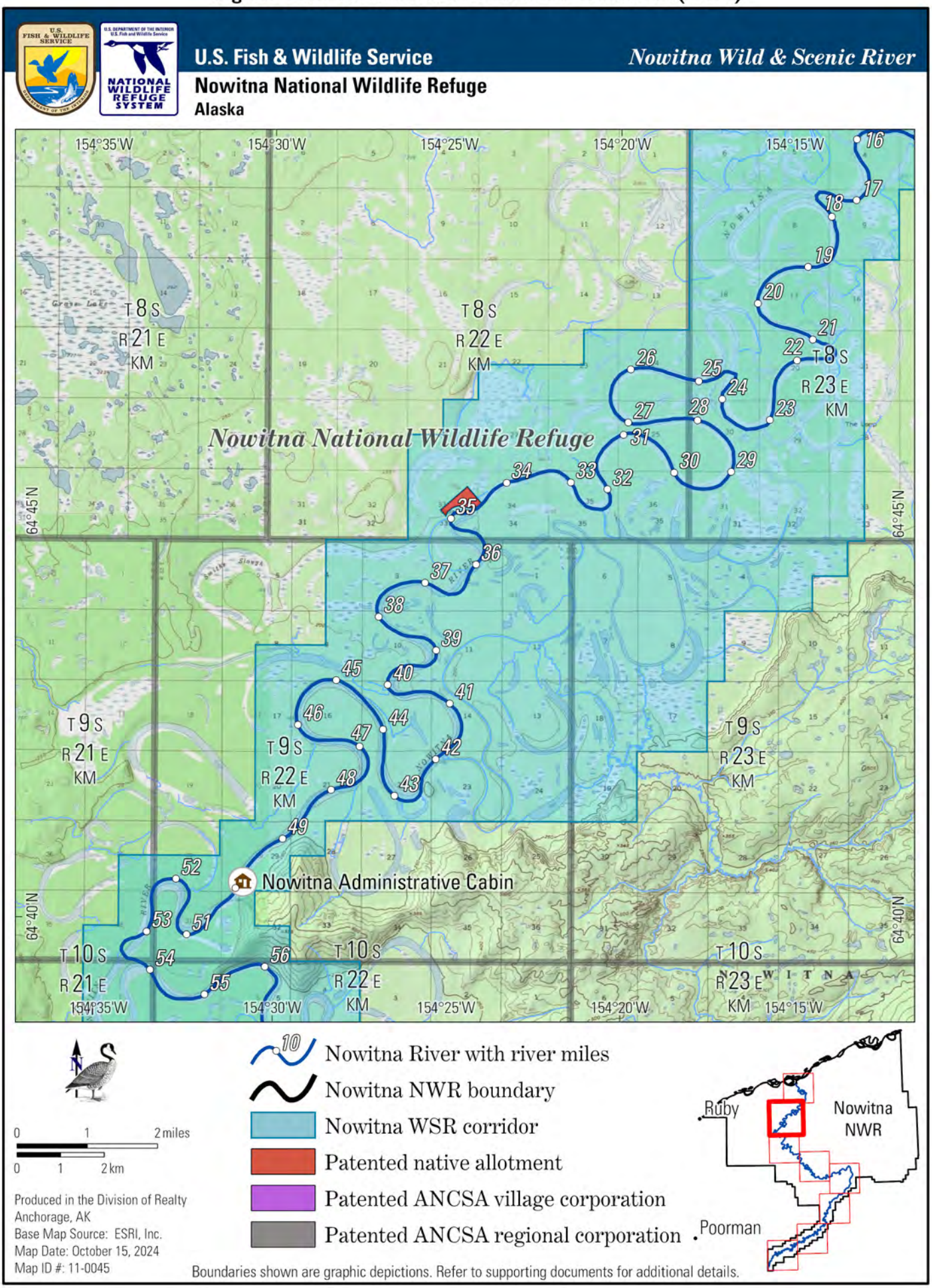


Figure 4-1.3: Nowitna WSR Series - Alternative A (3 of 8)

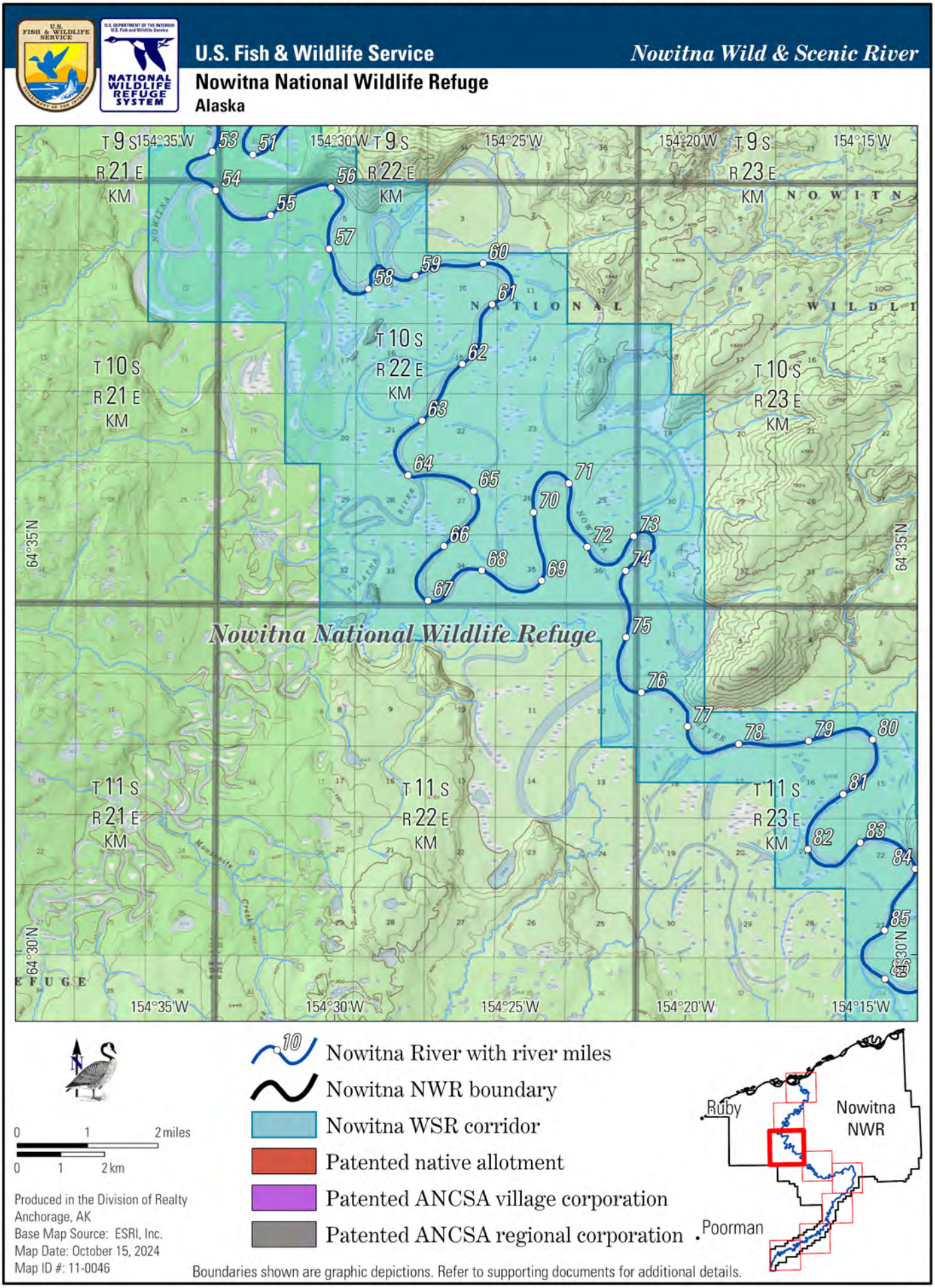


Figure 4-1.4: Nowitna WSR Series - Alternative A (4 of 8)

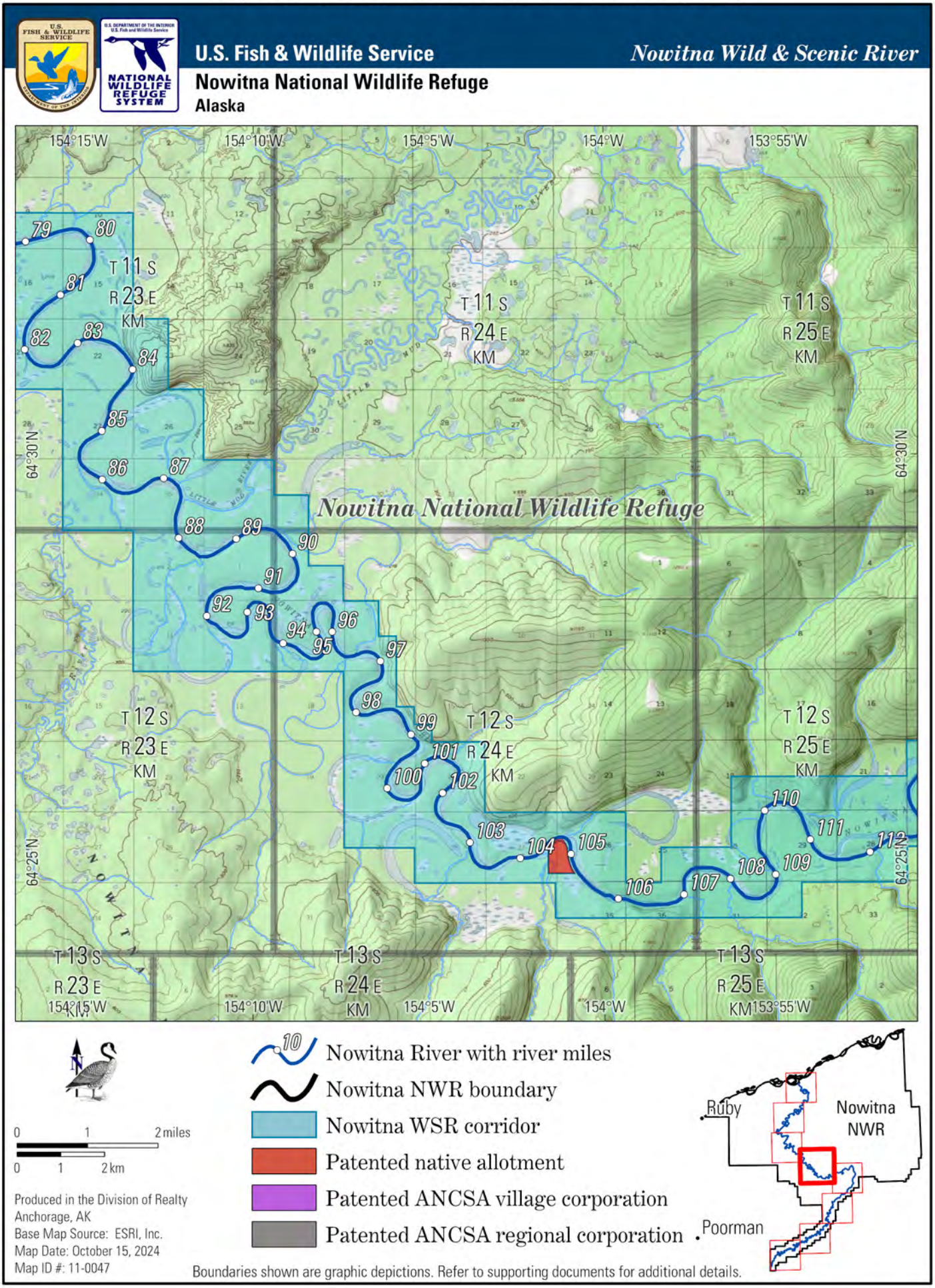


Figure 4-1.5: Nowitna WSR Series - Alternative A (5 of 8)

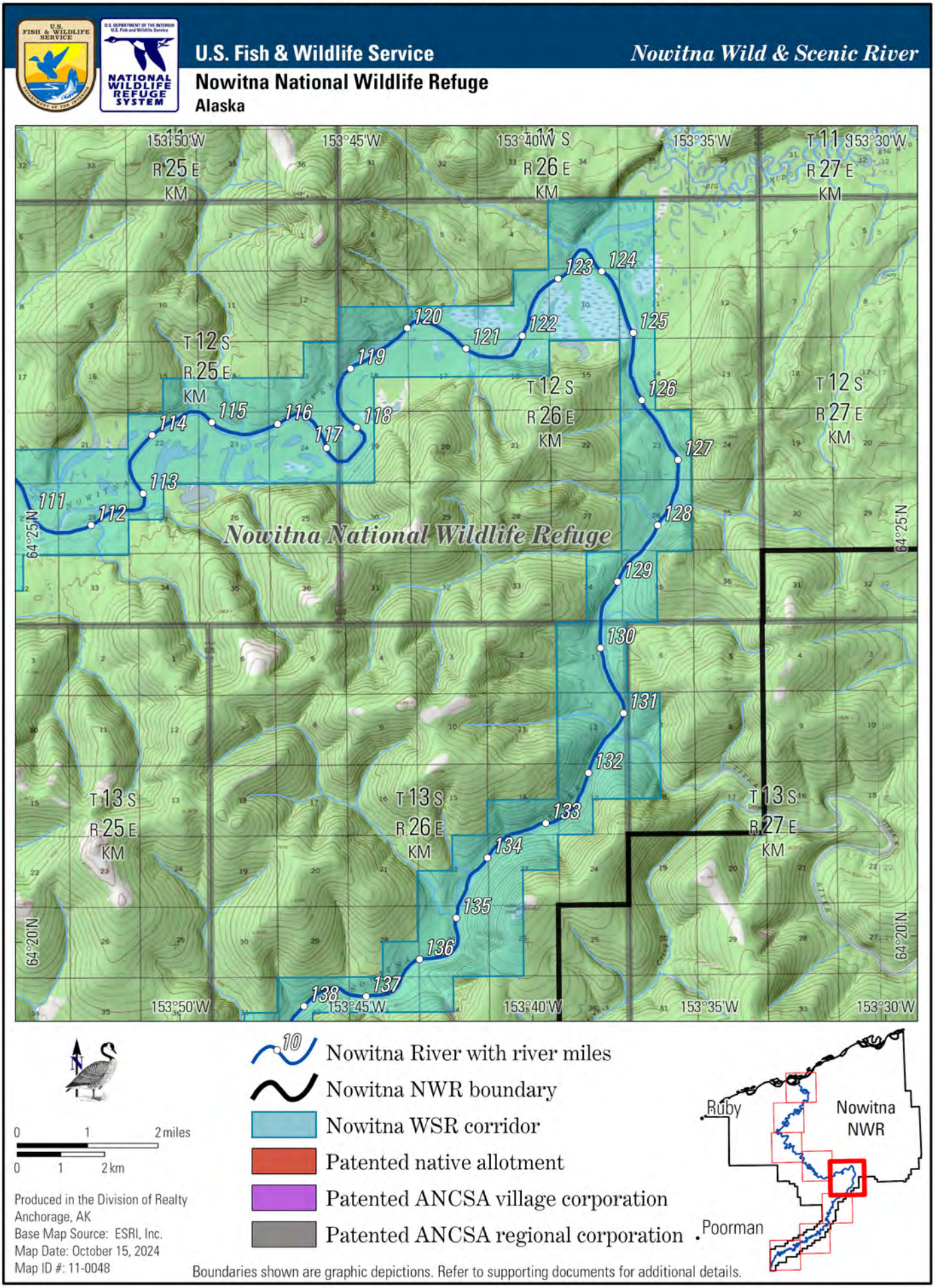


Figure 4-1.6: Nowitna WSR Series - Alternative A (6 of 8)

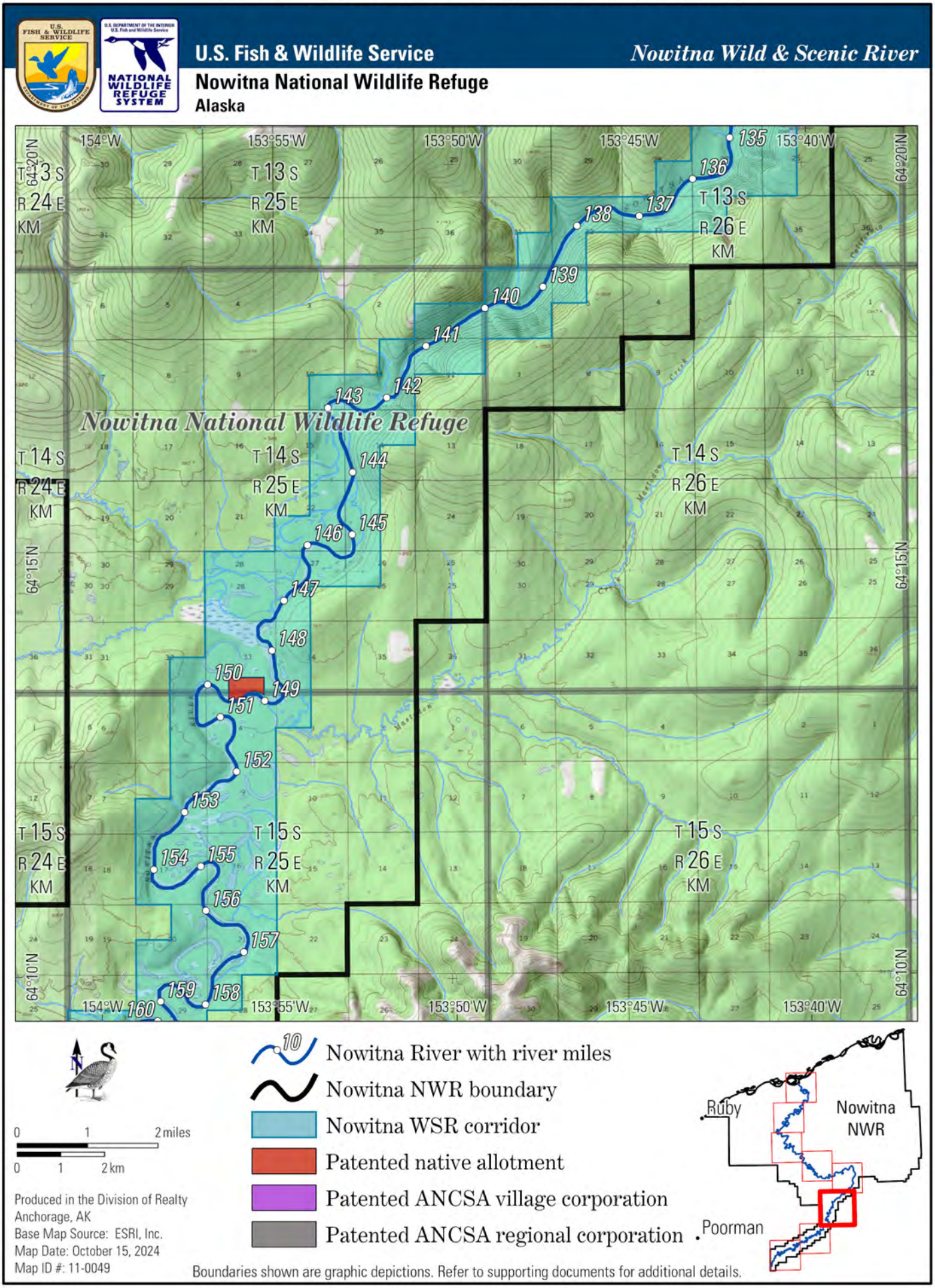


Figure 4-1.7: Nowitna WSR Series - Alternative A (7 of 8)

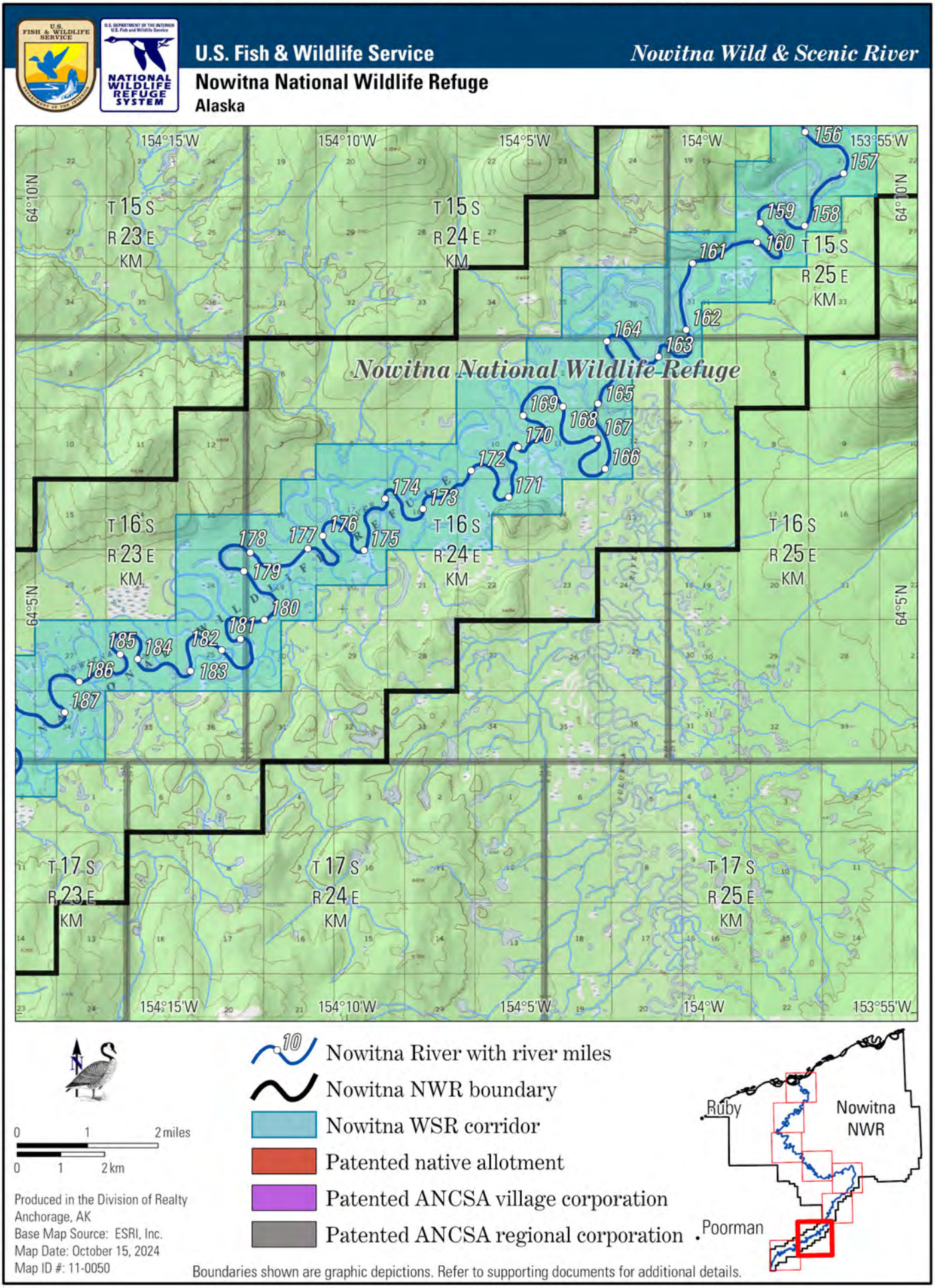
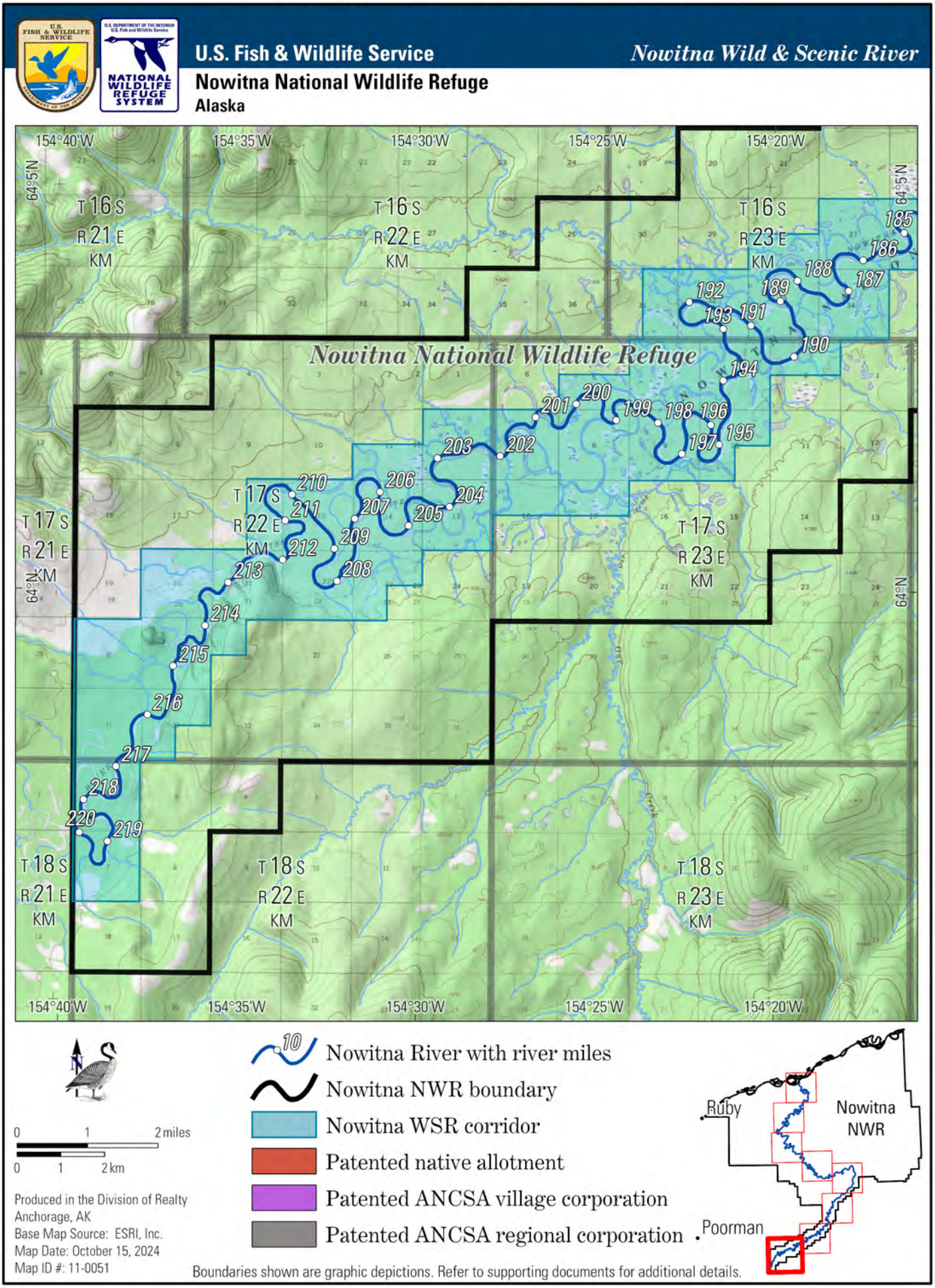


Figure 4-1.8: Nowitna WSR Series - Alternative A (8 of 8)



Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, land uses would generally be similar to uses under Alternative A to protect the ORVs and achieve the goals and objectives outlined in **Chapter 3**, Alternatives. Landownership within the Nowitna WSR corridor would continue to be almost entirely federal (**Figure 4-2.1** through **Figure 4-2.8** and **Table 4-3**).

Table 4-3. Landownership within the Nowitna WSR Corridor—Alternative B

Landownership	Area (acres)
Service	122,330
Patented Native allotments	780
Patented village corporation	80

Source: USFWS 2024d

In addition to the implementation of the CRMP, an amendment to the Revised CCP (USFWS 2009) would occur under Alternative B. The Service is required to prepare step-down management plans typically when more detailed objectives, strategies, and/or implementation are needed to meet the management direction set forth in CCPs. In this case, the CRMP would be a step-down management plan that expands on CCP Goal 8 and Objective 1. The number of total acres in the minimal and wild and scenic river management categories in the CCP would be updated for those occurring within the WSR, since the boundary would be amended through the CRMP.

Under Alternative B, the Service would establish the WSR corridor to comply with the corridor acreage requirements stipulated by ANILCA Section 606(a) while continuing to protect the river values. Changes in land status would occur in some areas due to the corridor boundary revision, but no impacts would be expected given the current management structure provided in the Revised CCP (USFWS 2009). Land that is outside of the corridor would be placed in the Minimal Management category for refuge management, which is land designated to maintain the natural environment with little human-caused change. Under the Revised CCP (USFWS 2009), management restrictions related to activities, public uses, commercial uses, and facilities are nearly identical for land within the Minimal Management and WSR categories, with the Minimal Management category being slightly more restrictive. Changes in the existing land management structure are not likely to occur over the life of the CRMP and would require a revision of the Revised CCP (USFWS 2009).

The additional collection of environmental data under Alternative B would be conducted in a manner that complies with land uses and designations. This would not impact land uses and designations.

Scoping revealed concerns about trespassing on allotments in the area. Trespassing on allotments in the area would likely continue to be a concern.

Cumulative Effects

Because there would be no new direct or indirect impacts, there would be no new cumulative impacts.

Figure 4-2.1: Nowitna WSR Series - Alternative B (1 of 8)

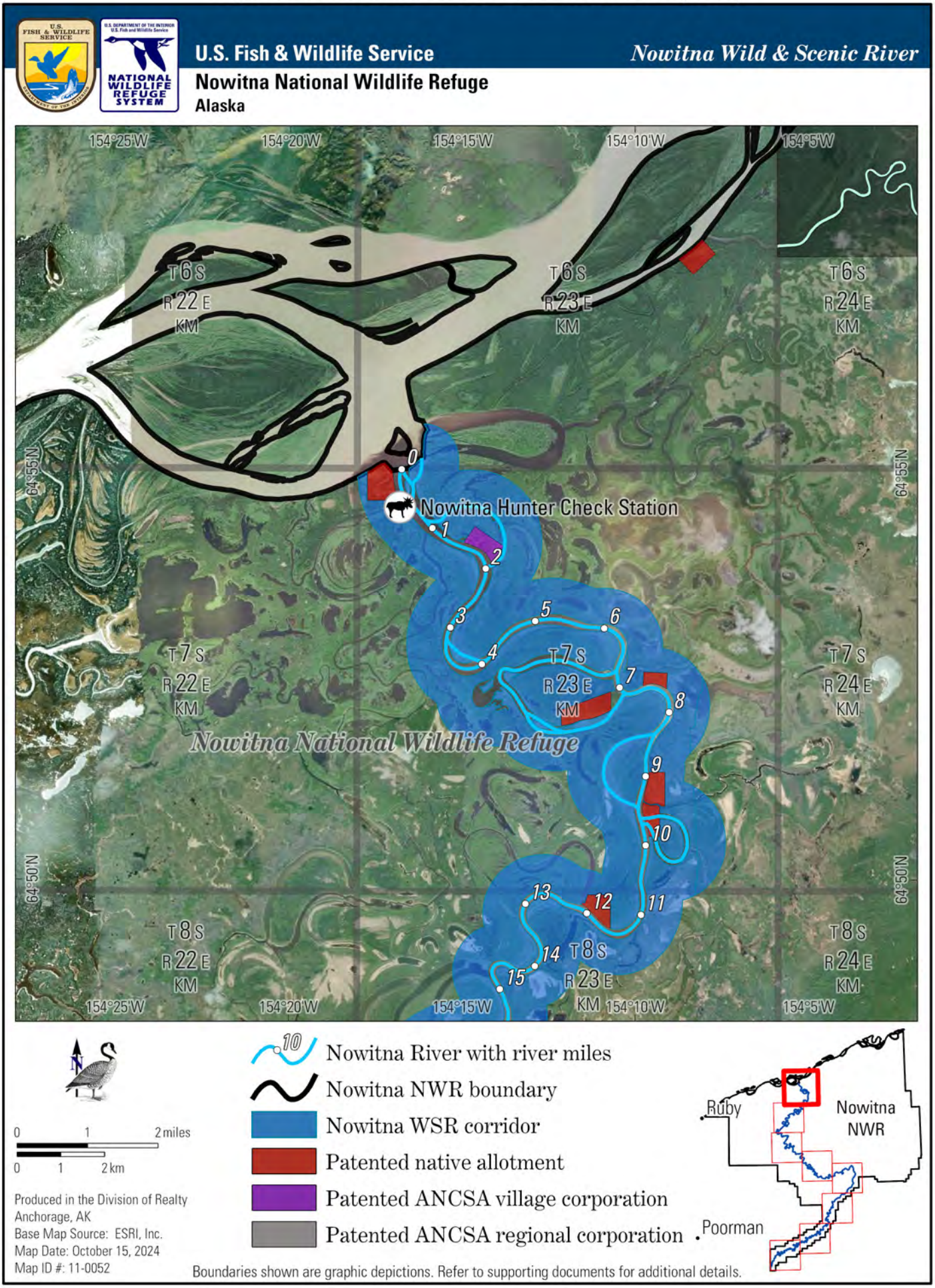


Figure 4-2.2: Nowitna WSR Series - Alternative B (2 of 8)

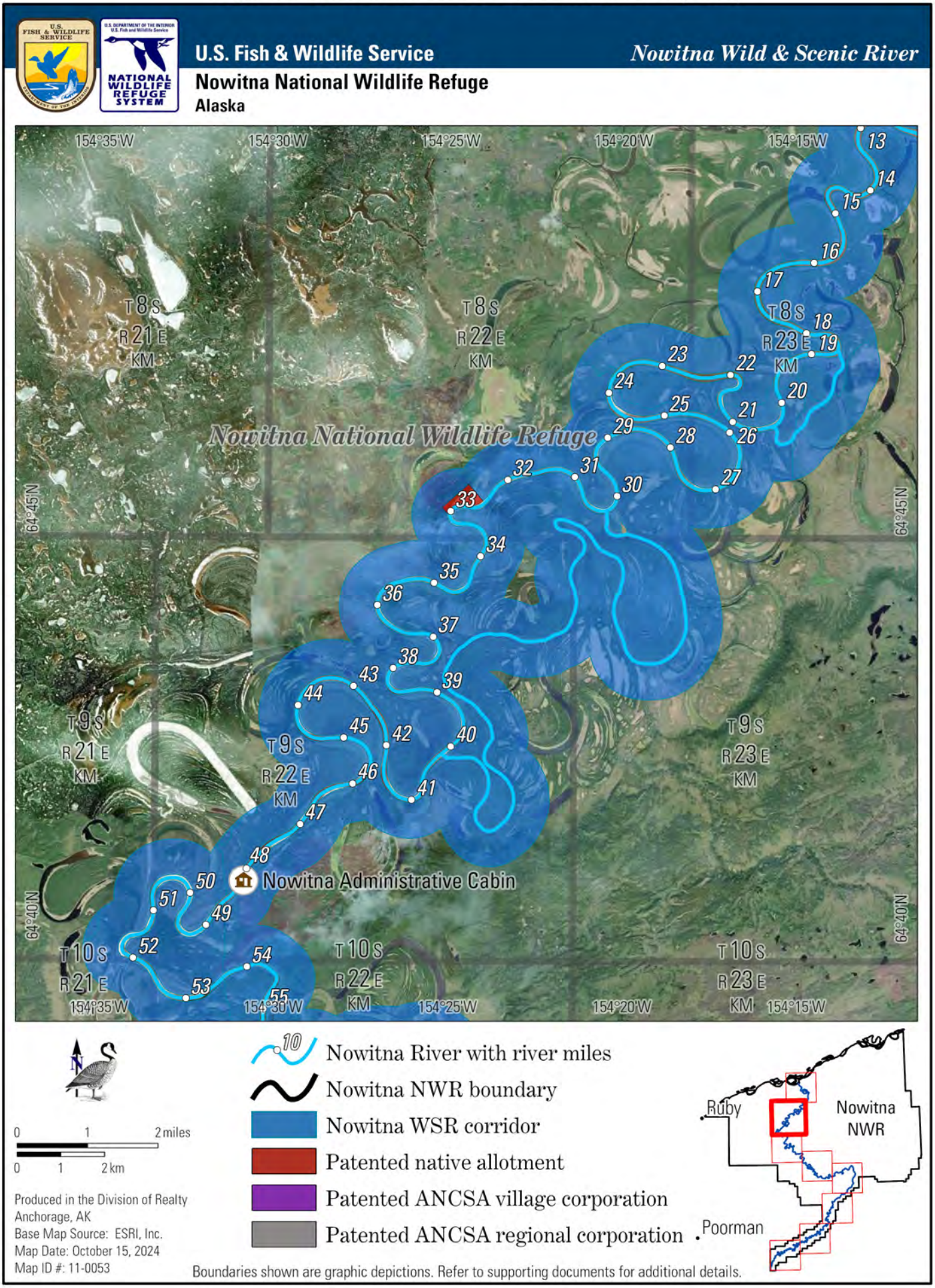


Figure 4-2.3: Nowitna WSR Series - Alternative B (3 of 8)

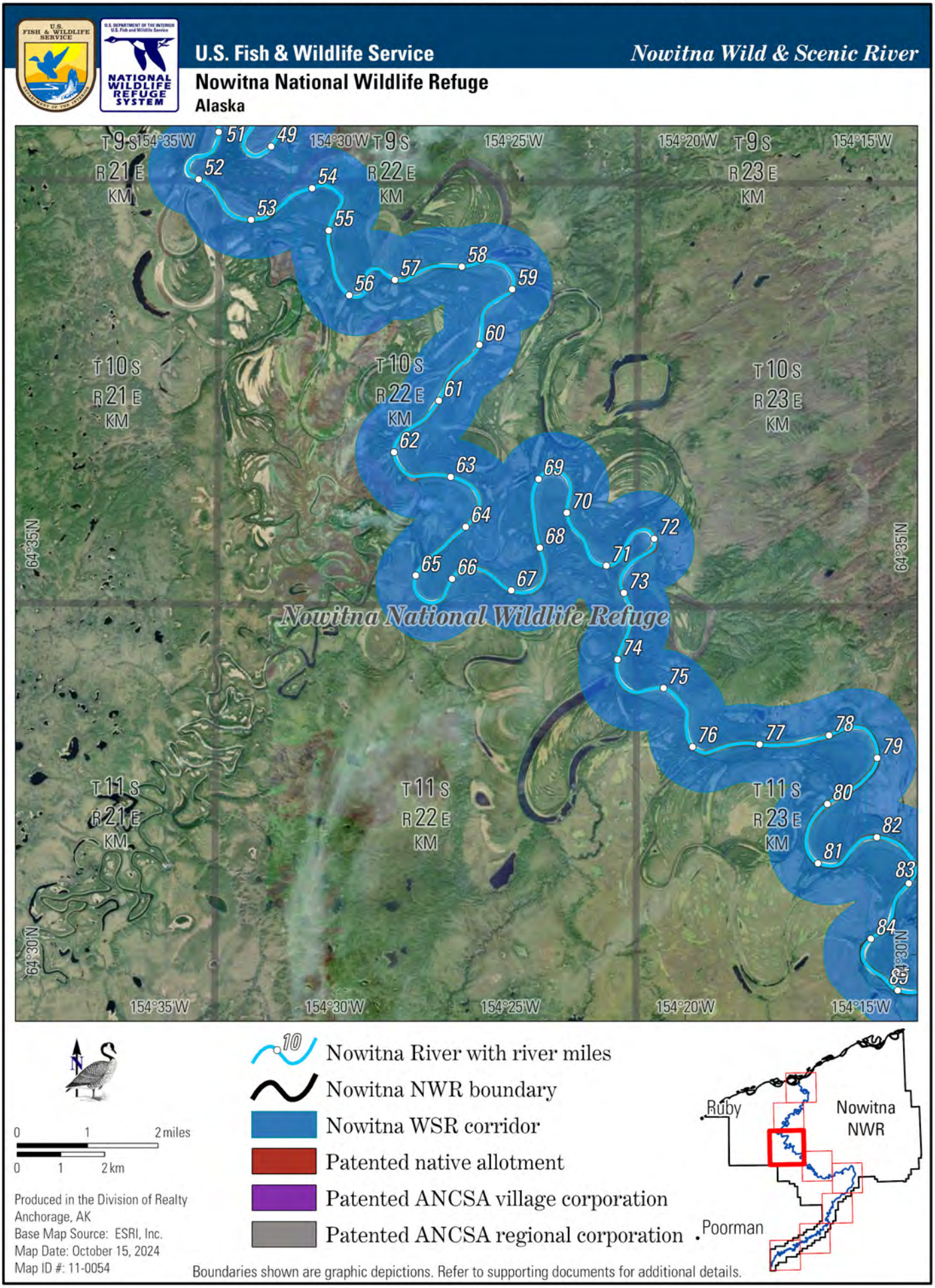


Figure 4-2.4: Nowitna WSR Series - Alternative B (4 of 8)

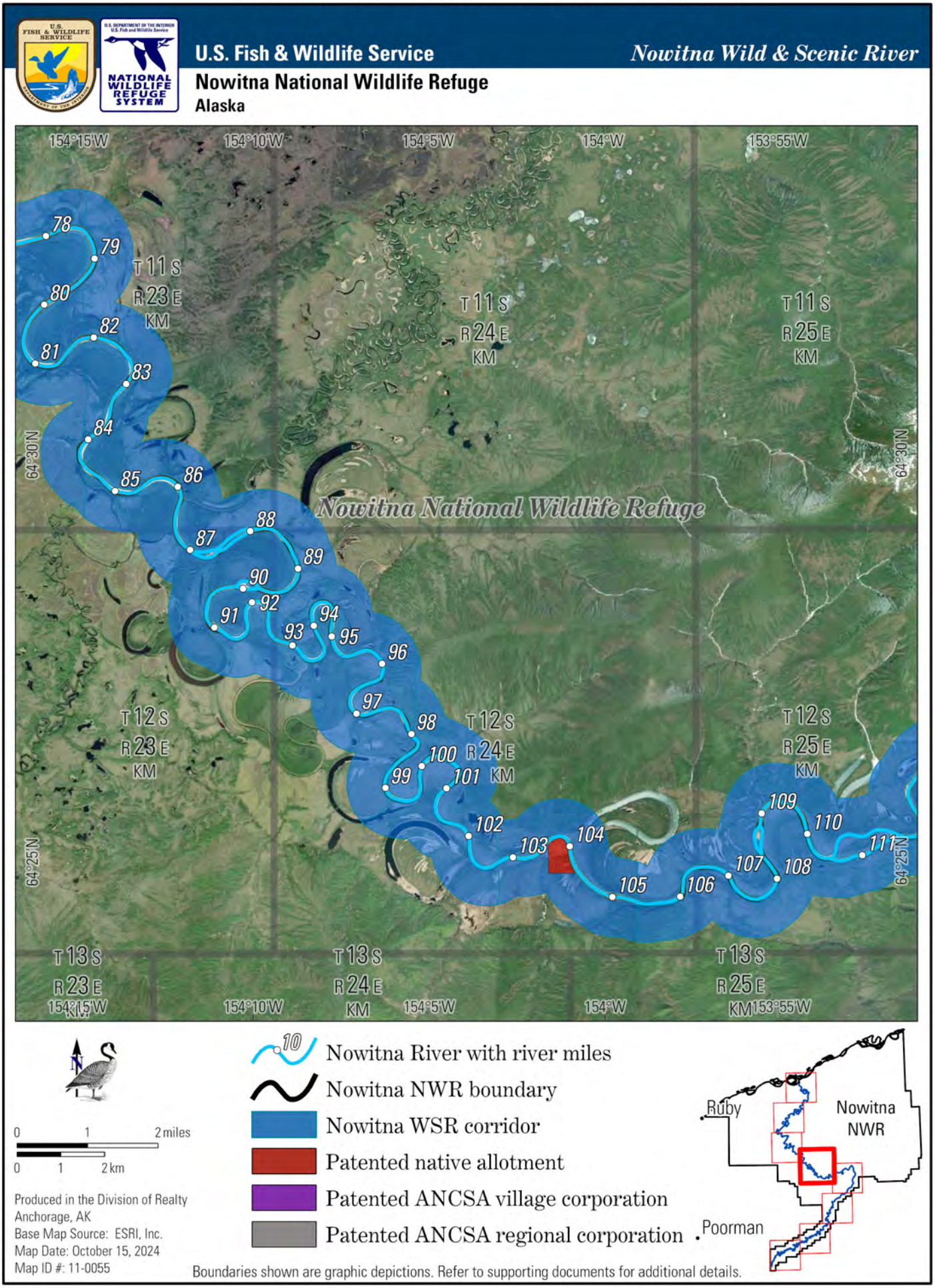


Figure 4-2.5: Nowitna WSR Series - Alternative B (5 of 8)

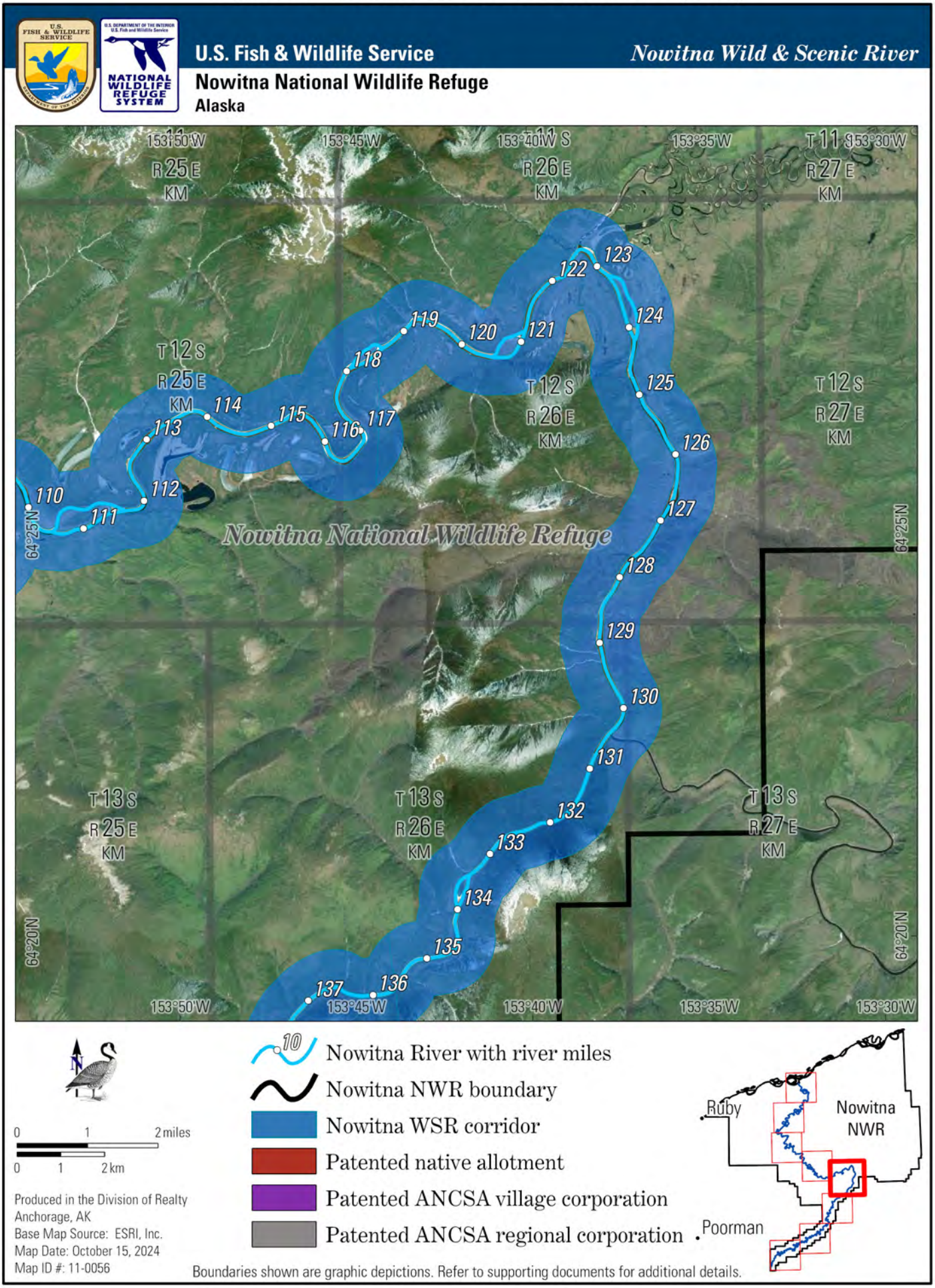


Figure 4-2.6: Nowitna WSR Series - Alternative B (6 of 8)

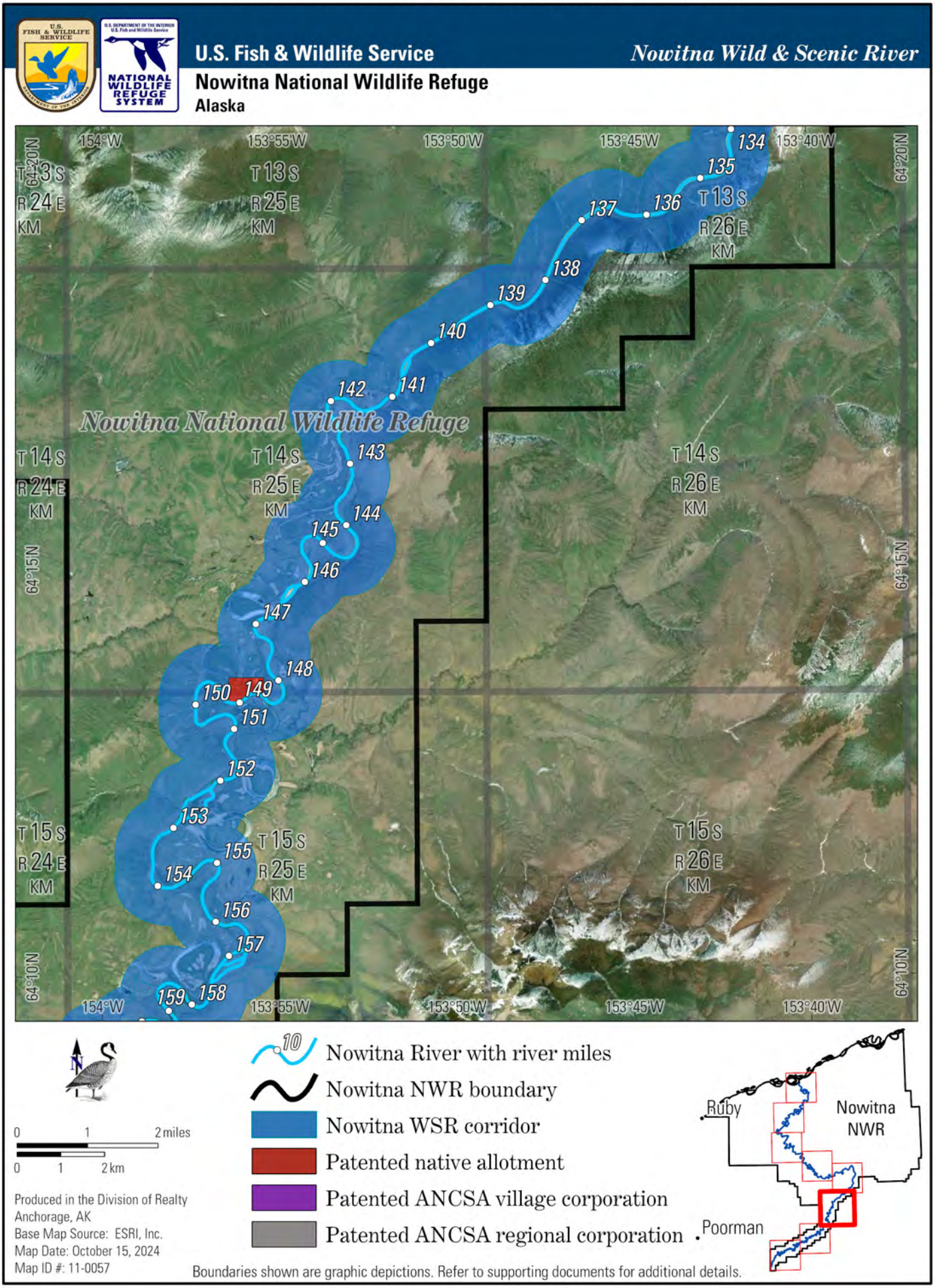
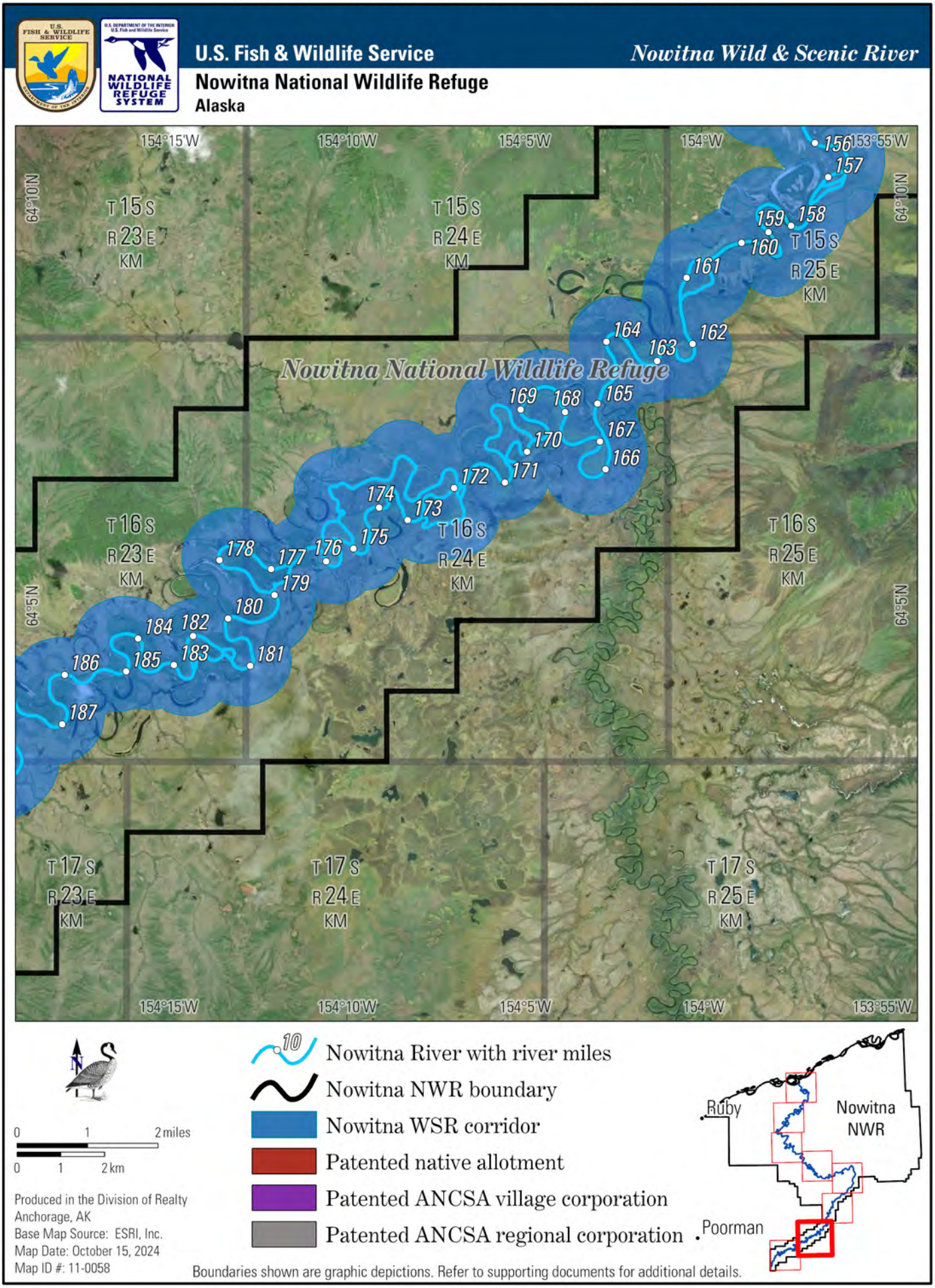


Figure 4-2.7: Nowitna WSR Series - Alternative B (7 of 8)



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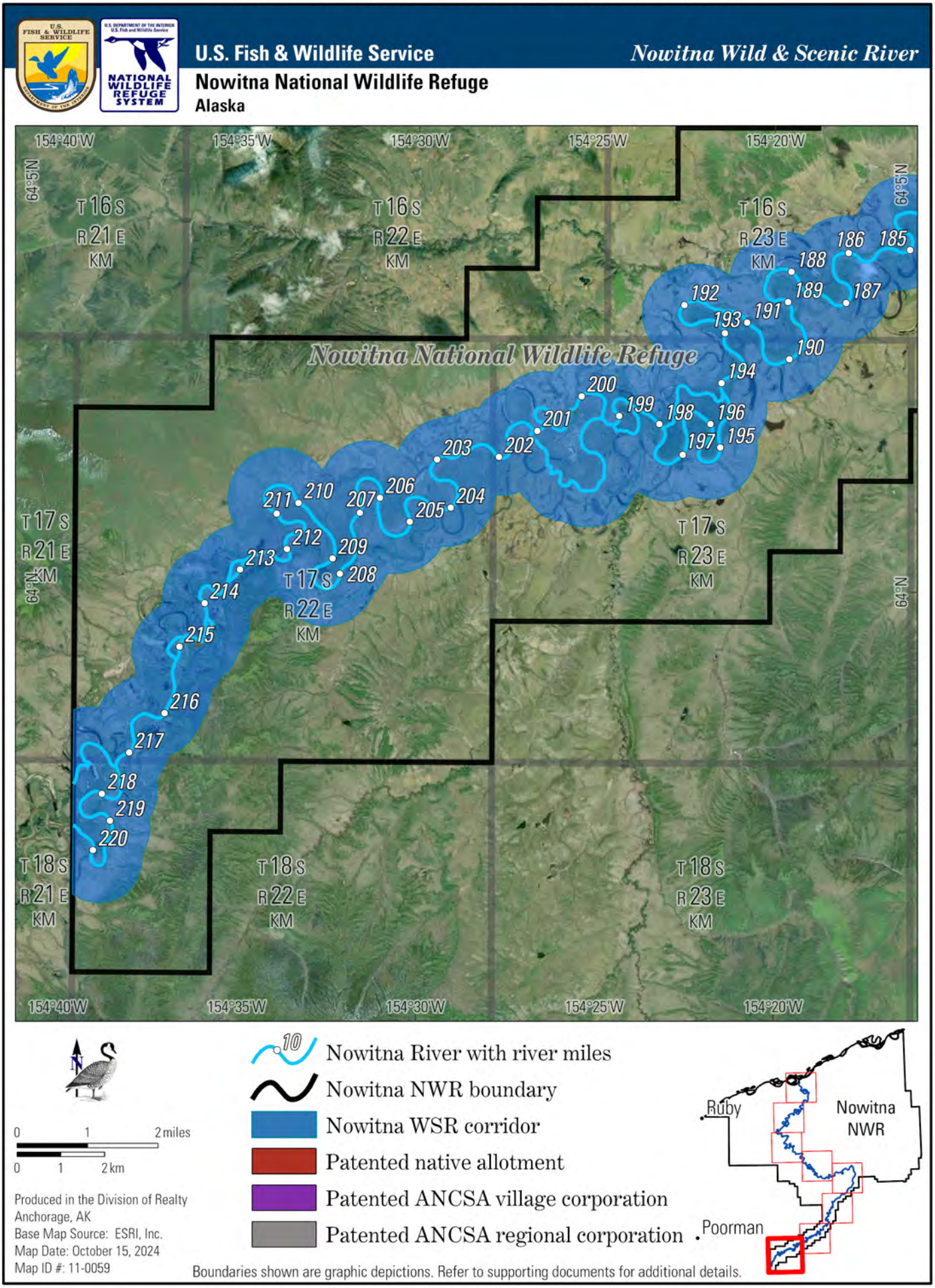
Base Map Source: ESRI, Inc.
Map Date: October 15, 2024
Map ID #: 11-0058

Boundaries shown are graphic depictions. Refer to supporting documents for additional details.

Figure 4-2.8: Nowitna WSR Series - Alternative B (8 of 8)



4.4 WILD AND SCENIC RIVERS

WSRs are streams or segments of streams designated by Congress under the authority of the WSRA of 1968 (Public Law 90-542, as amended; 16 USC 1271–1287) for the purpose of preserving the stream or stream section in its free-flowing condition, preserving water quality, and protecting the river's ORVs. The WSRA defines ORVs as those characteristics that make the river worthy of special protection. ORVs are identified on a segment-specific basis, and they may include scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar values. There are three types of potential classifications for eligible river segments—wild, scenic, and recreational—based on the built environment within the corridor. The potential classifications are based on the degree of human development along a segment, and they are used as a guide for future management activities. Wild means the most primitive, and recreational means the most developed.

The Service administers the Nowitna WSR, which flows through the Nowitna NWR. As required by the WSRA, the Service is responsible for creating a CRMP to provide for the protection of river values (the river's free-flowing condition, water quality, and ORVs). This section will primarily focus on potential impacts on the Nowitna WSR's free-flowing condition and the wild designation. For more detailed information on other river values, refer to **Section 4.5**, Hydrology and Water Quality; **Section 4.6**, Fisheries; **Section 4.7**, Cultural Resources; **Section 4.8**, Scenery; **Section 4.9**, Vegetation; **Section 4.10**, Wildlife; **Section 4.12**, Subsistence; and **Section 4.14**, Visitor Use.

4.4.1 Affected Environment

Deep in interior Alaska flows the Nowitna River, nestled in the heart of the Nowitna NWR, which forms much of the river's watershed. The river is a life-giving force in the region and was selected among 25 Alaska rivers to be added to the NWSRS with the passage of ANILCA in 1980. The Nowitna WSR is a place of abundance and diversity and is one of the finest geological examples in Alaska of a meandering river. From its headwaters in the Kuskokwim Mountains, the Nowitna WSR runs north across the Nowitna NWR for 220 of its 317 river miles before joining the Yukon River. In its upper reaches, the Nowitna WSR's clear waters run swiftly through the narrow channels over colorful gravel as the river winds toward the tundra-capped hills that form its canyon section. Below the canyon, the floodplain broadens and the Nowitna WSR becomes a slowly meandering river typified by cut banks, sandbars, sloughs, and oxbow lakes. The river flows across a rich alluvial plain of lakes, marshes, and meandering streams and provides highly productive fish, waterfowl and moose habitat.

Frequent spring flooding caused by ice damming along the Nowitna WSR during breakup enriches floodplain lakes and sloughs with nutrients, as well as carbonates from the limestone bedrock in the river's headwaters. The carbonates buffer the pH of the naturally acidic wetland waters and make these wetlands less acidic and more productive than many other areas in Alaska. On higher ground in the Nowitna WSR corridor, wetlands give way to a mosaic of spruce and deciduous forests, shaped by a natural regime of wildland fire and providing diverse wildlife habitats. In some areas, uncommonly large stands of old-growth white spruce provide nesting areas for raptors and excellent furbearer habitat. The combination of the Nowitna WSR's diverse abiotic and biotic features, including the geology, hydrology, and biodiversity, creates a unique example of boreal riparian ecosystems.

Within the NWSRS, the Nowitna WSR is classified as a wild river area because it is free of impoundments and is generally inaccessible except by trail. The watersheds and shorelines are essentially primitive. No human facilities or modifications exist to impede the Nowitna River's free-flowing condition, either above or

within the designated portions. The Nowitna WSR flows in a natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway.

The Nowitna WSR's superior qualities that make it stand out among Alaska rivers have been identified and described throughout its management history, both in studies recommending its inclusion in the NWSRS and in subsequent management plans (USBOR 1973; USFWS 1987a; USFWS 2009). However, the Nowitna WSR was designated by ANILCA without comprehensive descriptions and associated baseline conditions of the specific ORVs that made the river eligible for inclusion in the NWSRS. This underscores how WSR management is continually changing and emphasizes the necessity for continuous evaluation and flexible management protocols to safeguard areas like the Nowitna WSR, even with limited data, to enhance conservation strategies.

In 2023, Service staff met with representatives from ADFG, Alaska Department of Environmental Conservation, Alaska Department of Natural Resources, U.S. Bureau of Indian Affairs, and residents of local communities to identify and describe the final ORVs (USFWS 2024b). In addition to the free-flowing condition and water quality, four ORVs were identified: ecology, fish, cultural, and scenery.

Water quality and the free-flowing condition are protected for all rivers in the NWSRS. Flow regimes and water quality in the Nowitna WSR are not well studied but are generally considered to be natural and unimpaired. The river is mainly fed by snowmelt and warm-season precipitation, and maximum streamflow typically occurs in the spring during ice breakup. Ice jams during this time often cause flooding in the lower portion of the WSR. Summer flow levels can be dynamic in response to precipitation events. Water clarity varies seasonally and over the river's course. Clear water flows in the upper section, and the water becomes silty in the lower stretches during the summer months. Some unique aspects of the Nowitna WSR water's chemistry are described above. For more information regarding water in the Nowitna WSR, refer to **Section 4.5**, Hydrology and Water Quality.

The ecology ORV was defined to encompass the Nowitna WSR's unique combination of geology, hydrology, plant communities, and wildlife assemblage and to recognize the interconnectedness of these elements that yields intact, functioning ecosystems in the river corridor. The distinct water chemistry, flood regime, and meandering nature of the river generate diverse and highly productive riparian ecosystems that provide habitat for a broad, interconnected array of boreal plant and wildlife species (USFWS 2024b). For more information on these ecological components, refer to **Section 4.9**, Vegetation, and **Section 4.10**, Wildlife.

The Nowitna WSR's fish community diversity and assemblage are rare in the Arctic-Yukon-Kuskokwim Region and are recognized in the fish ORV. At least 19 fish species have been documented in the Nowitna WSR corridor, surrounding wetlands, and tributaries (USFWS 1990). The assemblage of fish species is dynamic, it supports subsistence and recreational activities, and it is sustained by a unique combination of water features, including swift water underlain by gravel; productive, shallow lakes; and slow-moving (still) water in the lower reaches (USFWS 2024b). For more information on Nowitna WSR fish, refer to **Section 4.6**, Fisheries.

Human relationships to the river and its resources through time are encompassed in the cultural ORV. The Nowitna WSR has undoubtedly provided resources for human use since people first came to the region in the late Pleistocene, and it continues to do so today. As an important location for resource harvest, travel, trade, and recreation, the Nowitna WSR has a long, rich, and unbroken cultural history,

particularly for local Athabascans whose connection to the river goes back countless generations (USFWS 2024b). Today this relationship is expressed though hunting, fishing, recreation, and other activities in the river and corridor. For more information, refer to **Section 4.7**, Cultural Resources; **Section 4.12**, Subsistence; and **Section 4.14**, Visitor Use.

The scenic beauty of the Nowitna WSR both depends on and adds to the value of the river components described above. The diversity and dynamic nature of the area's geomorphology, fish, wildlife, plant communities, natural processes, seasons, and weather combine to create the stunning visual backdrop through which the river flows (USFWS 2024b). Few rivers in Alaska provide such a variety of scenery over a relatively short distance, and some sections of the river are truly awe inspiring. For more information, refer to **Section 4.8**, Scenery.

4.4.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management, which is defined in the Revised CCP (USFWS 2009), of the Nowitna WSR and surrounding areas. The free-flowing condition and the wild designation of the Nowitna WSR would continue as described above. Special values of the Nowitna NWR tied to river conditions, defined in the Revised CCP (USFWS 2009), would not be evaluated for change.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Alternative B would introduce an enhanced inventory and monitoring program. Also, updated vegetation mapping would be used in future management and ultimately improve protection of the ORVs and water quality. While the potential impacts of WSR monitoring techniques remain uncertain, specific project designs and mitigation measures would be implemented to ensure the techniques do not affect the free-flowing condition or the wild designation. If substantial changes to river values through monitoring activities were anticipated, efforts would be made to explore alternative monitoring methods that minimize impacts on the free-flowing condition, wild designation, and other river values.

Cumulative Effects

Because there would be no new direct or indirect impacts, there would be no new cumulative impacts.

4.5 HYDROLOGY AND WATER QUALITY

4.5.1 Affected Environment

Hydrology

Most of the Nowitna NWR drains to the Nowitna River. The river originates in the Kuskokwim Mountains to the south, flows through the entire length of the Nowitna NWR, and forms a wide, meandering floodplain before emptying into the Yukon River in the north. Several sizeable tributaries feed into the Nowitna River, including the Sulukna, Titna, Big Mud, Little Mud, Lost, and Sulatna Rivers. Oxbow lakes and sloughs created by channel migration are common, particularly in the lowlands along the Nowitna River.

Weather and climate are the main drivers of hydrology in the area. The hydrologic regime varies with changes in the average daily, monthly, and annual flow based on the regional temperature and precipitation. Weather and climate data have been collected at meteorological stations near Tanana,

Alaska, and Galena, Alaska (NOAA 2024). The highest mean monthly precipitation at the Tanana station occurs during the summer. August is typically the wettest month with an average of 2.7 inches of precipitation. Precipitation decreases in October and remains low throughout the winter and spring (Burkart et al. 2023).

The timing, amount, and persistence of snow have major effects on surface and groundwater hydrology. The amount of water in the snowpack prior to melting in the spring and the timing and duration of snowmelt and ice breakup determine the shape and duration of the snowmelt stage peak. Normal monthly snowfall during May through September is less than an inch. The greatest monthly snowfall occurs during October through April. The highest normal monthly snowfall at both Tanana and Galena stations is in December (15.8 inches at Galena and 10.3 inches at Tanana; Burkart et al. 2023). Normal monthly snowfall at the Galena station is typically 2 to 6 inches higher than normal monthly snowfall at the Tanana station.

To supplement snowfall measurements at the Tanana and Galena weather stations, the Service works with the Natural Resources Conservation Service to monitor snow depth at three locations on the Nowitna NWR. Snow depths are recorded from aerial overflights in the first week of December, February, March, April, and May (USFWS 2009). On the Nowitna NWR, from February through April, snow depths range from 2 to 3 feet, with less snowpack in other winter months (Burkart et al. 2023).

The Nowitna River typically runs free of ice in May and freezes over in October. Maximum stream volumes are associated with spring breakup and snow melt. Ice damming during breakup can cause flooding along the Nowitna River, and ice jams on both the Yukon River and the lower Nowitna River can cause flooding of the entire floodplain for a distance of up to 100 miles from the mouth of the Nowitna River (USFWS 1987a). Permafrost conditions in the watershed prevent substantial percolation, and summer rainstorms can result in a rapid stream rise of several feet. Such rain-induced river volumes typically last several hours to a few days (USBOR 1973). Ice begins to form on the Nowitna River and its tributaries in October, and the rivers are typically completely ice-covered by early November. Ice remains in place throughout the winter, and river flows decrease as inputs from surface water sources diminish. The remaining flow transitions to being fed primarily from groundwater. By late winter, ice may reach 6 feet in thickness, with many tributary waters completely freezing. Waterbodies remain ice covered for more than half the year. Discharge in rivers during the winter is typically limited to groundwater-fed base flows. During winter and early spring, rivers and streams are at their lowest flow for the year (Burkart et al. 2023).

The Nowitna WSR flows 220 miles along the entire length of the Nowitna NWR. To date, there have been no stream-gaging efforts to monitor flow in the Nowitna NWR (Burkart et al. 2023). However, in the summer of 2003, 2.3 miles upstream from its confluence with the Yukon River, the Nowitna River was 860 feet wide with a discharge of 17,600 cubic feet per second in June; in August, it was 441 feet wide with a discharge of 8,670 cubic feet per second (U.S. Geological Survey 2024).

Numerous oxbow lakes and sloughs provide excellent fish and wildlife habitat adjacent to the river. Flooding is important ecologically for building and maintaining channel, riparian, and floodplain habitats and the exchange of sediment, organic matter, and nutrients between the floodplain and stream channel (Poff et al. 1997). High water also recharges floodplain ponds and creates pathways for the movement of fish between the stream and floodplain habitats. The timing, duration, and frequency of floods of various

magnitudes are important for the life cycle of fish and riparian vegetation (Poff et al. 1997). Flooding can occur during high flows associated with spring snowmelt and ice jams, and summer and fall rain events.

The importance of groundwater in the Nowitna NWR is not well understood, but it may play an important role in influencing surface water characteristics in the Nowitna WSR (Burkart et al. 2023). Shallow groundwater flow occurs in the upper soil layers and is confined to the unfrozen active layer when permafrost is present (Williams 1970). In shallow groundwater systems, surface water percolates through unfrozen soil layers into shallow aquifers, contributing to groundwater recharge and base flow for rivers and lakes. Additional information on permafrost is included in **Section 4.11**, Soils and Permafrost.

Water Quality

The physical and chemical characteristics of water in aquatic systems, collectively known as water quality parameters, are important measures and indicators of aquatic and terrestrial ecosystem health.

Section 303 of the Clean Water Act directs the establishment of water quality standards and implementation plans by states or authorized Tribes with Environmental Protection Agency (EPA) approval. Core components of water quality standards include (1) identifying designated uses (for example, drinking water, recreation, and propagation of fish, shellfish, and wildlife), (2) establishing qualitative or numeric criteria, and (3) developing antidegradation policies. Alaska's water quality standards are found in regulation promulgated by the Alaska Department of Environmental Conservation (18 Alaska Administrative Code, 70 Water Quality Standards). Section 303(d) of the Clean Water Act further specifies that states identify waters within their jurisdiction that are not meeting water quality standards. Currently, no lakes or rivers in the Nowitna WSR corridor are listed as impaired under Section 303(d) (ADEC 2024).

The only U.S. Geological Survey water quality sampling site on the Nowitna WSR is 2.3 miles above the river's confluence with the Yukon River (gage number 645408154143400) (U.S. Geological Survey 2024). This site was sampled on June 6 and August 27, 2003. Specific conductivity (68 versus 155 microsiemens per centimeter [µS/cm]) and alkalinity (29 versus 64 milligrams per liter [mg/liter]) were approximately twice as high in August compared to June. During June, the suspended sediment concentration was 195 mg/liter. In late August, suspended sediment concentration had dropped to 17 mg/liter (Burkart et al. 2023). This variability in concentration is expected with changing flow with higher suspended sediment loads largely correlated with spring runoff events.

The Service collected physical water quality data at study lakes in the Nowitna NWR from 1984 to 1986 as part of a large-scale fisheries and habitat survey on interior Alaska NWRs (Glesne et al. 2011). Lake types sampled included lowland and oxbow lakes. Many of these lakes are within the WSR corridor and may exchange surface water during floods (Burkart et al. 2023).

Snyder-Conn et al. (1992) conducted water quality and metals sampling of water, sediments, and fish in rivers of the Nowitna NWR during 1985, 1987, and 1988. Sample sites included four sites on the Nowitna River; California Creek above the confluence with the Titna River; the Sulatna River at the Nowitna NWR border; and the Sulatna, Sulukna, and Titna Rivers above or near their confluence with the Nowitna River. While some of these measurements are outside the Nowitna WSR corridor, they represent the best available data and have been included for reference. The pH at the mouth of the

Nowitna WSR was near neutral (averaging 7.4 in 1987 and 7.6 in 1988; Snyder-Conn et al. 1992). The pH was slightly more basic (average of 8.0 in 1987 and 1988) on the upper Nowitna WSR near the southern Nowitna NWR boundary (Snyder-Conn et al. 1992).

Total alkalinity at stream and river sampling sites ranged from moderate to high with values from 51 to 521 mg/liter (Snyder-Conn et al. 1992). Specific conductivity across sites ranged from 78 to 380 µS/cm, depending on the location and year (Snyder-Conn et al. 1992). Specific conductivity was lowest in the upper Nowitna River (averaging 100 µS/cm in 1987 and 78 µS/cm in 1988) near the southern boundary of the Nowitna NWR. Turbidity ranged from low to high (4.7 to 183 nephelometric turbidity units [NTU]) at most sites. The Sulatna River, at a site near the southwestern boundary of the Nowitna NWR, exhibited extremely high values averaging 3,467 NTU in 1987 and 1,183 NTU in 1988 (Snyder-Conn et al. 1992).

In the Nowitna NWR, most trace element concentrations in water and sediment were within the range expected for uncontaminated watersheds with a few exceptions. Total recoverable manganese concentrations in 1985 samples of the Sulatna and Titna Rivers and the Nowitna WSR upstream from the Titna River exceeded the EPA secondary standard for drinking water of 0.05 mg/liter for that year. In 1988 at the Sulatna River site, the measured dissolved concentration of manganese, which is typically lower than the total recoverable concentration, again exceeded this criterion (Snyder-Conn et al. 1992).

In 1985, total recoverable iron concentrations in the Sulatna and Titna Rivers and some sections of the Nowitna WSR exceeded the EPA secondary drinking water standard of 0.3 mg/liter and the Alaska State criterion for protection of freshwater aquatic life from chronic toxicity of 1.0 mg/liter (if these conditions occur on 4 or more consecutive days) (Snyder-Conn et al. 1992). Again in 1987, the sites on the Nowitna River near the mouth and downstream of the southern boundary and the Sulatna River site exceeded the EPA secondary standard; the Sulatna River also again exceeded the Alaska State criterion for protection of freshwater aquatic life.

At the sites sampled, there was a strong positive correlation between turbidity and iron and manganese concentrations in all years measured (Snyder-Conn et al. 1992). Cadmium was measured, but the concentrations detected were very close to the method detection limits, so the results cannot be quantitatively interpreted. Both dissolved and total recoverable concentrations of copper were measured in 1985 and 1987; in most instances, dissolved concentrations exceeded total recoverable concentrations, indicating issues may have occurred in sampling or the laboratory analysis that make interpretation of these results problematic.

In 1985 based on measured hardness, dissolved and total recoverable lead concentrations on the Nowitna WSR just upstream of the Titna River were above the EPA and State criteria for protection of freshwater aquatic life from chronic toxicity (Snyder-Conn et al. 1992). The upper Nowitna River, where reported hardness was low (51 mg/liter as calcium carbonate in 1987 and 45 mg/liter as calcium carbonate in 1988), could be a concern for species sensitive to metals, including cadmium, copper, and lead, where the concentration at which they are considered to be toxic is based on hardness.

In 1987 and 1988, the Sulatna River, which had active placer mining activity upstream, had significantly higher turbidity, iron, and manganese concentrations than sites on the upper, middle, and lower Nowitna River; the Sulukna River; and California Creek. There is no direct evidence that the presence of placer mining was related to these water conditions in the Sulatna River. It is possible to observe

elevated concentrations of contaminants due to natural erosion of highly mineralized areas, events such as flooding and fires (and fire suppression), and atmospheric deposition.

There are currently no active water quality monitoring sites along the Nowitna WSR.

4.5.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management of the Nowitna WSR and the surrounding corridor. The current special values of the Nowitna NWR tied to river conditions, defined in the Revised CCP (USFWS 2009), would not be evaluated for change. Surface and groundwater resources, including water quantity and water quality, would not be evaluated for potential impacts. The Nowitna WSR would continue in its free-flowing condition. The general lack of monitoring would result in no changes to the availability of data or any designations on the 303(d) list, but it could hamper future protection of this resource.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, the Service would implement additional monitoring efforts within the Nowitna WSR corridor. This could lead to more informed management decisions regarding water resources and water quality and protect the river values through efforts to secure instream flow reservation. The Service would work to document the water quantity of rivers and lakes within the corridor to support water reservation applications. The Service would also work with partners to expand water quantity and quality monitoring for the Nowitna WSR. Increasing the monitoring efforts would expand water resources data in the corridor, which would lead to more informed future management decisions.

Under Alternative B, the Service would establish the Nowitna WSR corridor in the manner required by the WSRA. This could change the land status of certain tributaries or oxbow lakes that were previously within the corridor. Management of those areas would still fall under the Revised CCP (USFWS 2009) and would not substantially differ from management under this CRMP. However, no changes would be made to address the lack of monitoring in those areas as a result of this action.

Cumulative Effects

Because there would be no new direct or indirect impacts, there would be no new cumulative impacts on hydrology and water quality. Furthermore, the additional monitoring under Alternative B would allow the Service to make better informed management decisions regarding any potential impacts from reasonably foreseeable future actions. For example, the State has high priority Statehood Act selections at the headwaters of the Titna River, Sethkokna River, Sulukna River, and several creeks, which feed into the Nowitna River. Those lands are expected to be conveyed to the State. After conveyance, these lands would likely become open to mineral entry and mineral leasing, as well as other land uses not allowed under current federal management. Activities such as improperly mitigated or unpermitted mining and transportation could cause runoff that degrades nearby streams that eventually drain into the Nowitna WSR. Monitoring under Alternative B could inform the Service of water quality concerns that may develop from changing land uses in the upper watershed (such as improperly mitigated or unpermitted mining) that affect downstream conditions. Monitoring under Alternative B could also inform the Service of water quantity and water quality concerns that may develop from shifts in abiotic conditions, such as altered patterns in precipitation quantity and timing, or increases in permafrost thaw.

4.6 FISHERIES

4.6.1 Affected Environment

The Nowitna River supports a remarkably diverse assemblage of northern fish species. It is also a migration corridor to one of only six known sheefish spawning areas in Alaska. Thus, the Nowitna River provides fish habitat that is rare in the Arctic-Yukon-Kuskokwim Region. At least 19 fish species have been documented in the Nowitna WSR corridor, surrounding wetlands, and tributaries.

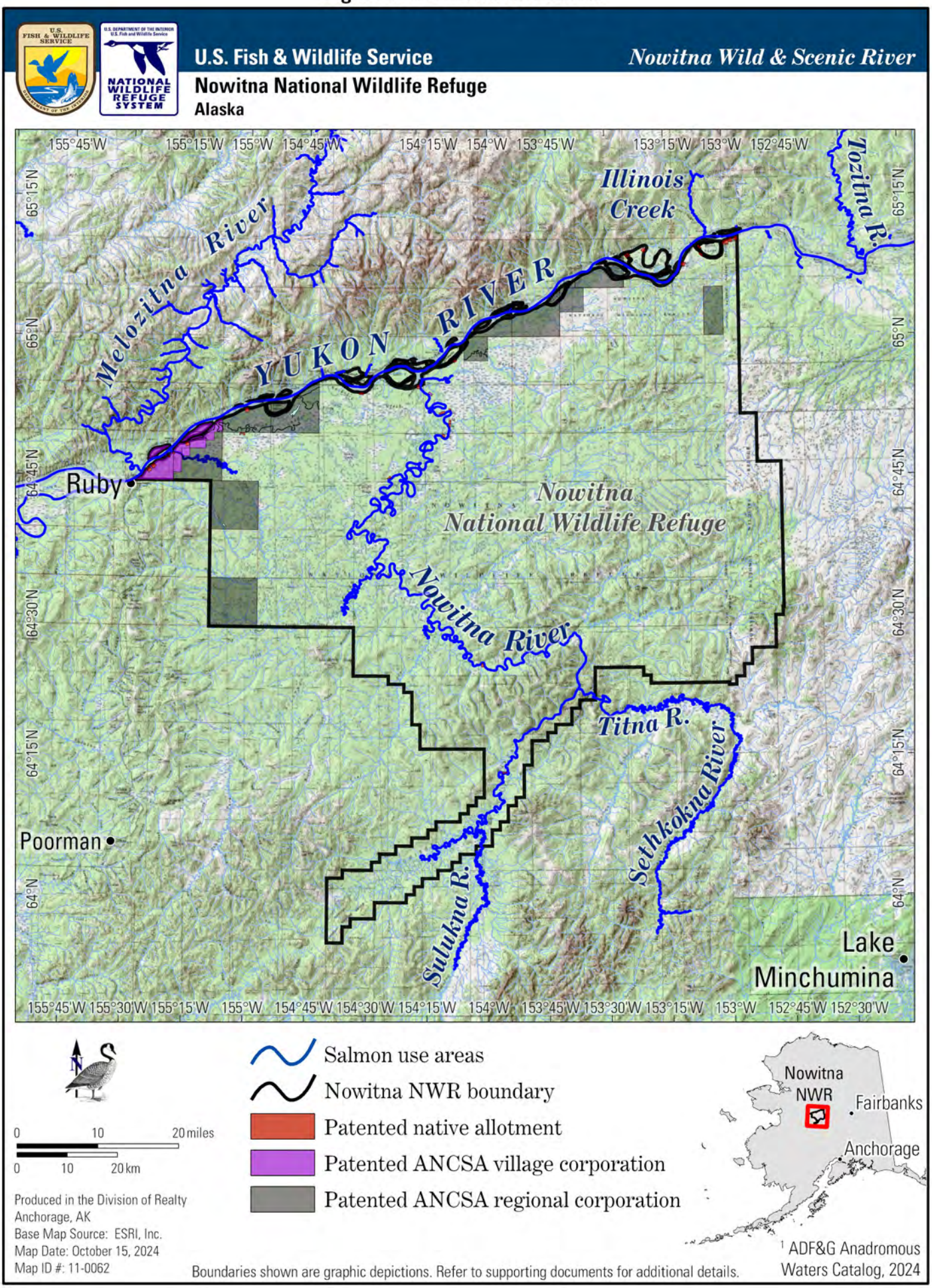
The Nowitna River specifically provides exceptionally high-quality foraging habitat and is a continentally important migration corridor for populations of Chinook salmon, coho salmon (*Oncorhynchus kisutch*), and chum salmon (*O. keta*). Salmon-use areas (migration, rearing, and spawning) are shown in **Figure 4-3**. Chinook salmon populations have significantly declined in recent years in the Nowitna River and elsewhere in Alaska, but it is not entirely known why this is occurring and whether the trend will continue. The Nowitna WSR and its tributaries are also important habitat for sheefish and other species of whitefish (*Coregonus* spp.), as well as resident Dolly Varden (*Salvelinus malma*), Arctic grayling (*Thymallus arcticus*), and northern pike (*Esox lucius*).

The sheefish that migrate up the Nowitna WSR to the Sulukna River are one of only six known spawning populations of sheefish in Alaska's Yukon drainage. Sheefish are among the most targeted subsistence and sport fishing species in the region. Similar to salmon, this species' migratory habits make refuge stocks susceptible to habitat changes and harvest impacts outside the Nowitna NWR (USFWS 2009). The Nowitna WSR also contains five other species of whitefish, including broad whitefish (*C. nasus*), humpback whitefish (*C. pidschian*), round whitefish (*Prosopium cylindraceum*), least cisco (*C. sardinella*), and occasionally, Bering cisco (*C. laurettae*) (USFWS 2024b). The abundant northern pike are also important for recreational sport fishing in the Nowitna NWR.

The use of the Nowitna WSR by various fish species is slightly different upstream and downstream of the Little Mud River confluence. Above the Little Mud River, the headwaters of the Nowitna River and the Nowitna River tributaries (Susulatna, Sulukna, and Titna Rivers) harbor critical spawning and rearing habitat for both anadromous[8] and freshwater fish species. The upper section of the river also provides suitable habitat for resident fish species, including the Arctic grayling and Dolly Varden. Arctic grayling have been found in the main stem of the Nowitna River above the confluence with the Big Mud River (USFWS 2009). Below the Little Mud River, the lower section of the Nowitna WSR supports summer foraging and overwintering habitat for multiple spawning populations of fish, including sheefish. The shallow floodplain lakes, marshes, and oxbows are uniquely important habitats that provide slack water for foraging on smaller prey fish and provide spring spawning lakes for northern pike (USFWS 2009). There are no federally listed, proposed, or candidate fish species in the Nowitna WSR and no critical habitat.

[8] A fish or fish species that spends portions of its life cycle in both fresh and salt waters

Figure 4-3: Salmon-Use Areas[1]



4.6.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management of the Nowitna WSR and surrounding areas. Salmon-use areas would continue in the areas listed in **Table 4-4**. The current special values of the Nowitna NWR tied to river conditions, defined in the Revised CCP (USFWS 2009), would not change. Continuing to recognize fish as a distinct ORV would allow for a focused and specific approach to managing and conserving the river's fish resources while acknowledging the vital role that fish populations and their habitat play in the ecological health and overall value of the Nowitna WSR and the broader region.

Table 4-4. Salmon-Use Areas – Alternative A

River	Distance (Miles)
Lost River	1.953
Nowitna River	212.417
Sulatna River	5.534
Sulukna River	1.249
Titna River	0.953
Unnamed river	4.063
Total:	**226.169**

Source: ADFG 2024c

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, the Service would implement three additional fish ORV goals, each with its associated objectives, to better protect and enhance river values and the fish ORV. The Service would develop and initiate fisheries and habitat surveys and ecological inventories to better understand the diverse fish community of at least 19 anadromous and freshwater fish species in the Nowitna WSR. A more comprehensive understanding would allow the Service to better manage and protect habitats in the face of changing environmental conditions.

The Service would improve the understanding of the unique characteristics that benefit suitable sheefish spawning habitat and support other whitefish species. This would support efforts to ensure that these resident species remain widespread in stable numbers throughout their native habitat. Monitoring the effects of changing conditions would allow the Service to protect and identify any potential management needs of fish species in the Nowitna WSR. There would be no ground disturbances; however, monitoring and surveys could have direct impacts on fish through temporary disturbance from biologists entering the water and from the various survey methods used (for example, electrofishing and netting). These impacts would be on individual fish and would not affect the fish population or fish ORV. The management actions under Alternative B would be focused on better understanding where there is concern over a river value. Over time, these management actions would allow for a diverse population of fish species to continue to thrive in the Nowitna WSR.

Under Alternative B, the Service would establish the Nowitna WSR corridor's boundary to comply with the WSRA and ANILCA. Relative to Alternative A, the WSR corridor boundary would have 11.817 fewer miles of salmon-use area (**Table 4-5**). This administrative boundary adjustment would not be expected to have a discernible impact on the Service's ability to manage the Nowitna WSR's fish ORV. It

also would not be expected to affect the fish ORV itself, such as the habitats and fisheries within the Nowitna River (refer to **Section 4.3.2**).

Table 4-5. Salmon-Use Areas – Alternative B

River	Distance (Miles)
Lost River	1.457
Nowitna River	210.001
Sulatna River	0.790
Sulukna River	1.549
Titna River	0.555
Unnamed river	0.000
Total:	**214.352**

Source: ADFG 2024c

Cumulative Effects

Past, present, and reasonably foreseeable future actions in the Nowitna River watershed may impact fisheries in the Nowitna WSR throughout the lifetime of the CRMP (refer to Cumulative Effects Analysis under **Section 4.2**, Methodology and Assumptions). The State has high priority Statehood Act selections at the headwaters of the Titna River, Sethkokna River, Sulukna River, and several creeks, which feed into the Nowitna River. Those lands are expected to be conveyed to the State. After conveyance, these lands would likely become open to mineral entry and mineral leasing, as well as other land uses not allowed under current federal management. Activities such as improperly mitigated or unpermitted mining and transportation could cause runoff that degrades nearby streams that eventually drain into the Nowitna WSR. Diminished water quality could affect fish and their habitat.

Two Areas of Critical Environmental Concern in the Nowitna River watershed are intended to contribute to the protection of water quality, salmon, and whitefish stocks in the Nowitna River. The Sulukna River Area of Critical Environmental Concern was designated to protect crucial spawning and rearing habitat for sheefish and other whitefish and salmon species in the Sulukna River drainage. The Sethkokna River Area of Critical Environmental Concern was designated to protect crucial Chinook salmon spawning habitat, soil, and water in the Sethkokna River drainage.

Alternative A would have no impacts on fisheries and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on fisheries, because anticipated impacts would be on individual fish and would occur at levels too low to affect fish populations or the fish ORV. Consequently, its contribution to cumulative impacts would be negligible. Furthermore, Alternative B would improve the understanding of river fish values. This would allow the Service to better manage and protect fish species and their habitats from possible effects of changing land uses in the upper watershed, such as improperly mitigated or unpermitted mining. This also would allow the Service to identify concerns that may develop from climate-related changes (such as changes in water temperature or increased disease prevalence) or changes in fish habitat (such as the introduction and spread of aquatic invasive plants). Additionally, it would add to the cumulative impacts of protecting fish and their habitat associated with the Areas of Critical Environmental Concern.

4.7 CULTURAL RESOURCES

4.7.1 Affected Environment

"Cultural resource" is a broad term used to refer to the diverse human record found in sites, structures, objects, and places created and/or used by people. It is inclusive of a wide variety of resources, including, but not limited to, archaeological sites, isolated artifacts, features, records, manuscripts, historic sites, and traditional cultural properties. Traditional cultural properties are resources associated with the cultural practices, traditions, beliefs, arts, crafts, or social institutions of a living community (USFWS 2016a). Traditional cultural properties could be historic properties if they meet the National Register of Historic Places (NRHP) criteria (36 CFR 60.4).

As defined in the National Historic Preservation Act and its implementing regulations found at 36 CFR 800, "historic properties" include, among other properties, cultural resources determined to be eligible for listing on the NRHP. In addition to meeting at least one of the four main NRHP eligibility criteria (association with a significant event, person, distinctive architecture or construction style, or potential for information), cultural resources also must exhibit integrity of at least one of the following to be eligible: location, design, setting, materials, feeling, workmanship, or association.

Cultural resources also include "archaeological resources," as defined in the Archaeological Resources Protection Act of 1979, and other sites, structures, objects, items, and places as addressed in other statutes and regulations (for example, the American Indian Religious Freedom Act of 1978, Antiquities Act of 1906, NEPA, and Native American Graves Protection and Repatriation Act of 1990).

Cultural resources in the Nowitna WSR corridor include traditional cultural properties, historic properties, and archaeological resources. The Service acknowledges that the spiritual, physical, cultural, and historical connections of Alaska Native peoples and their Tribes to land, wildlife, and waters are of cultural significance. Alaska Native peoples' customary and traditional ways of life sustain a Native identity experienced through activities, oral tradition (including place-names), ceremonies, songs, and dances, as well as an economy of sharing (USFWS 2025). Within the Nowitna WSR corridor, traditional activities, such as subsistence harvest (**Section 4.12**, Subsistence), and the settings in which these activities take place are of great importance to local communities. For some locals, there may be no distinction between prehistoric, historic, and modern interactions between people and the Nowitna River's resources; all can be seen as part of a long continuum that extends to future generations (USFWS 2024b).

Research in the Tanana River watershed, part of the larger Yukon River basin within which the Nowitna NWR and WSR are situated, indicates that humans have inhabited the interior of Alaska for over 14,000 years (Holmes 1996, 2001), with some of the earliest dated archaeological sites in the Americas located here. The Nowitna River's location and abundant natural resources have drawn people to its banks, probably since their arrival to the region in the late Pleistocene. The area of interior Alaska around Nowitna WSR was unglaciated during the end of the last ice age, and paleontological remains from prehistoric animals, including mammoths, can be found within the river corridor and along the Yukon River main stem nearby. The presence of these prehistoric animals and the relatively close proximity of the highly valued Batza Tena obsidian source (approximately 70 miles north of the mouth of the Nowitna River) could signal that the Nowitna WSR was a hunting or scavenging ground and corridor to lithic raw material for some of the first inhabitants in the area. Little archaeological work has been conducted in the river corridor to date, but it is possible that archaeological resources dating far back in

time may be located within the WSR corridor (USFWS 2009). Due to the meandering nature of the area's streams, many older sites may already have been destroyed or covered by natural processes. There is a high likelihood of finding more recent sites on present stream banks, but older sites probably remain only on higher ground.

The Nowitna River has been an important hunting area and travel corridor for Athabascan residents for countless generations. In 1867, explorers Whymper and Dall from the Scientific Corps of the Western Union Telegraph Expedition visited an important trading site and settlement called Noghʉykkaakk'et[9] at the mouth of the Nowitna River (de Laguna 2000). At the time, Noghʉykkaakk'et was a substantial village of some 150 residents and was a gathering place for trade among people coming from both the Yukon and Kuskokwim watersheds. Gregory Hakorcins (later changed to Kokrines), a Russian or Creole trader, established a trading post at Fourteen Mile in 1869. Hakorcins subsequently moved his post to the site on the Yukon River currently known as Kokrines. This move resulted in the move of the entire village of Noghʉykkaakk'et (Hart 1981).

Jesuit scholar Father Jules Jetté recorded 212 Koyukon (Denaakk'e) place-names on the Nowitna (Nogheetno') River and its tributaries in the early 1900s when he lived in the area (Jetté 1910). At that time, seasonal residents of the Yukon River communities of Kokrines (or Bek'edeneekk'eze Denh) and Mouse Point (or Deeltsaa' Nooghoyeet) spent the fall and winter months in the Nowitna River region, coming to the Yukon River for fishing in June and July, and for the midwinter feast in December.

The discovery of gold near Ruby in 1907 triggered an influx of outsiders to the area, primarily to mining areas to the west of the Nowitna River (Hart 1981). Residents of Kokrines gradually moved downriver to the village of Ruby as it grew; by the 1950s, Kokrines no longer had year-round residents. Gold mining opportunities around Ruby waned by the 1920s, and many of the miners left the area to fight in World War I. Many remaining residents shifted their focus again to trapping for income. Trappers using the Nowitna River area generally outfitted at Tanana or Ruby and got their supplies to their base camps during open season by poling their boats up the river. They would bring out their furs in the spring by the same means following breakup (USBOR1973). Despite this increase in trapping activities, local use of the Nowitna River resources never again reached the level that existed while people lived in Kokrines.

In more recent years, numerous studies and oral histories have documented the importance of the Nowitna River and its resources to the local Koyukon Athabascan people (for examples, *refer to* Brown et al. 2010 and the Oral History Program at the University of Alaska Fairbanks[10]). Subsistence culture and economies are adaptive by nature; therefore, use patterns have shifted over time, yet the Nowitna WSR remains culturally important to area residents as it has for thousands of years.

The surveyed portion of the Nowitna River contains two documented archaeological resources. One is a historic-aged cabin on a Native allotment. The other is Noghʉykkaakk'et, the settlement and trade center near the confluence of the Nowitna and Yukon Rivers (AHRS 2023). It is likely that many more archaeological sites remain undocumented within the corridor. Based on what is known about the cultural resources present in the corridor (both archaeological resources and those related to

[9] Published spelling variants include: Newicargut, Noghee Kkaakk'et, Noghʉy Kkaakk'et, Novikakat, Nowikakat, Noya-kakat, and Noyokakat.
[10] https://library.uaf.edu/aprca/oral-history

traditional use), there is great potential for locations within the WSR corridor to be determined eligible for inclusion on the NRHP, especially as they are documented further.

4.7.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, the Service would not implement a CRMP, and the Nowitna WSR would continue to be managed under the Revised CCP (USFWS 2009). All future undertakings that could affect cultural resources on federal land or actions that are funded, licensed, or permitted by the federal government would be subject to applicable legal and regulatory authorities related to the cultural resources described in the affected environment above, as well as those described in **Section 4.12**, Subsistence, and **Section 4.13**, Alaska Native Interests. This would continue to offer protection to cultural resources from actions such as ground disturbance or infrastructure development in the Nowitna WSR corridor. This includes protections for historic properties eligible for inclusion on the NRHP, which could include traditional cultural properties.

The potential for accidental impacts, intentional vandalism, or unauthorized collection of cultural resources related to visitation within the WSR corridor would continue as it does currently. Visitation of cultural resources brings the potential for unintentional effects, like those related to recreation, as well as intentional vandalism or unauthorized collection.

Under Alternative A, the potential for direct and indirect impacts on cultural resources within the Nowitna WSR corridor due to natural processes, such as erosion, deposition, and wildfire, would continue. The physical change in sites due to natural processes can result in exposure of previously unknown cultural resources, a loss of artifacts and features, or potentially complete destruction.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, cultural resources within the Nowitna NWR would continue to be subject to the same legal and regulatory authorities as discussed under Alternative A, even if outside the WSR corridor. Impacts on cultural resources within the Nowitna WSR corridor would be similar to those described under Alternative A, except the Nowitna CRMP would be implemented and the Revised CCP (USFWS 2009) would be updated accordingly. The implementation of the CRMP would not involve any ground-disturbing or visually intrusive activities that could result in impacts on cultural resources.

The definition of goals, objectives, and strategies under Alternative B for the Nowitna WSR's cultural ORV would encourage and guide the collection of knowledge related to cultural resources, emphasizing engagement with local communities to a greater degree than it would under Alternative A. The effort made to increase cultural resource–related data gathering and local engagement would foster greater opportunities for stewarding the Nowitna WSR's cultural values than under Alternative A.

Under Alternative B, the potential for accidental impacts, intentional vandalism, or unauthorized collection of cultural resources related to visitation within the WSR corridor would likely decrease, as compared with Alternative A, particularly in the long term. This is due to management mandated by the WSRA that would consider whether user capacity is adversely impacting the ORVs.

Cumulative Effects

Under Alternative A, reasonably foreseeable future actions with the potential to impact cultural resources in the Nowitna WSR corridor include ongoing cultural resource surveys and documentation; these are expected to contribute to information on cultural resources within the WSR corridor. The continued identification of cultural resources would offer opportunities for stewarding the Nowitna WSR's cultural values. Consideration of the future cumulative effects of undertakings on protected cultural resources would continue to be required, and adverse effects would be resolved on a site-by-site or project-by-project basis. Continuation of the current management would not be anticipated to contribute to cumulative adverse effects on cultural resources.

Under Alternative B, cumulative impacts on cultural resources within the Nowitna WSR corridor would be similar to those described under Alternative A. Over time, the greater emphasis put on knowledge gathering and local involvement and the consideration of user capacity in the CRMP under Alternative B would lead to more and better opportunities for stewarding the Nowitna WSR's cultural values than under Alternative A. This would also increase opportunities to maintain traditional cultural properties, historic properties, and archaeological resources affected by soil erosion, permafrost thaw, or changes in precipitation patterns.

4.8 SCENERY

4.8.1 Affected Environment

This section describes the visual resources associated with the Nowitna WSR, located within the Nowitna NWR. This section is derived from the Service's Nowitna Wild and Scenic River Values report (USFWS 2024b). The visual resources discussed in this section include the scenic landscape viewed from the river and the air, and landscapes viewed while participating in activities such as hunting and fishing. The Nowitna WSR's scenic landscapes include views of the flora, fauna, geological formations, mountains, lowlands, and wetlands during the long daylight hours of summer, as well as the dim of snow-blanketed winter.

The Nowitna WSR's scenery is exceptionally beautiful and diverse and is exemplary of an interior Alaska river. Over the course of 220 miles, the river transforms from a narrow, swift, gravel-bottomed watercourse to a broad, meandering floodplain river before it joins the Yukon River. The region's varied topography, from wetland-dominated lowlands to low, rolling hills and tundra-capped mountains, intensifies this river's scenic beauty while adding to the diversity of views. Seasonal changes weave a tapestry of color, shifting from the stark white of winter to the varied greens of spring and summer. Wildflowers flourish along the river's edge, creating swaths of vibrant hues. In autumn, deciduous foliage takes on gold, orange, and deep-red shades, with bright, golden larches and dark-green spruce standing out in sharp contrast. With the changing light of shifting clouds and dynamic weather, the result is a visual backdrop that is never the same from one moment to the next. The remote qualities of the river and dominance of natural scenery and primitive shorelines contribute to this stunning visual impact.

In the upper portion of the Nowitna WSR, the relatively fast-flowing, narrow waterway skirts the base of low hills and strikes bedrock bluffs. The intimacy of the upper river gives way to the power of swift water flowing in a broader channel in the river's middle portion. The breathtaking backdrop of tundra-capped mountains is a stark reminder that this river is exemplary of the interior Alaskan sub-Arctic, a wild, desolate, and often harsh northern environment. Also in the middle section, arguably the most visually distinct section of the river, lies the majestic Nowitna River Canyon. Here, steep, gravelly

hillsides drop down to flat, grassy banks cut by numerous streams and small waterfalls. In summer, wildflowers line the shore, hinting at a subtle shift in vegetation in the canyon. Colorful pebbles, including numerous agates, are scattered across the gravel bars, adding visual interest for visitors in the area.

Below the Nowitna River Canyon, the Nowitna WSR is ever broadening, with wider river views. Surrounding hills give way to broad, open horizons. The current slows, silt and sand replace gravels, and river meanders create constantly changing cut banks and sandbars, oxbow lakes, and sloughs. The summer vegetation is lush, and the rich productivity of this floodplain is evident on every turn. The mountains of the Kokrine Hills can be seen to the north, and they increasingly dominate the horizon as the river moves toward its confluence with the Yukon River.

The entire Nowitna WSR corridor provides excellent examples of riparian and post-fire succession and a variety of boreal habitats and landscapes. The watershed's remote and pristine qualities contribute to the impact of the visual experience. The presence of such outstanding scenic diversity over a relatively short distance is exceptional.

4.8.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Alternative A would continue the current management direction in the Revised CCP (USFWS 2009). The current management plan—the Revised CCP—does not specify monitoring for scenery for the Nowitna WSR. The Nowitna WSR would continue to provide high-quality scenery with outstanding opportunities for solitude and immersion in a natural environment. Existing management direction would continue to maintain the natural character of the river corridor, and existing guidelines for outstanding river values described in the Revised CCP (USFWS 2009) would be applied.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

The CRMP contains desired conditions, standards, and guidelines related to the protection and enhancement of the scenery ORV. The desired conditions for scenery would instruct the Service to protect the individual natural components that contribute to an outstanding scenic setting. The CRMP's standards and guidelines would operationalize these desired conditions by stating what the Service should and should not do to maintain the scenery ORV.

Construction of future structures is an allowable use in the Nowitna WSR corridor, as defined in the CRMP. If future cabins or other structures such as fish towers, weather stations, or communication towers are constructed, the CRMP requires those structures blend in or be aesthetically compatible with the natural setting. Viewsheds would be considered when constructing new structures or reviewing existing structures.

To better protect the varied, wild, and beautiful scenic experience for river users now and into the future, the CRMP proposes several monitoring actions to resolve any issues that affect scenery in the Nowitna WSR corridor. For each monitoring item, the CRMP prescribes indicators, thresholds, and management actions that would help the Service respond to degradation of the river's scenic resources. In most cases, indicators include data collection, outreach material development, and co-stewardship. The monitoring recognizes that management intervention can have negative impacts on certain river values, including scenery, even if the goal is to reduce impacts on other values.

Cumulative Effects

Past, present, and reasonably foreseeable future actions in the Nowitna River watershed may impact scenery in the Nowitna WSR throughout the lifetime of the CRMP. These include wildfire and wildfire mitigation activities, ecosystem shifts in response to changing abiotic conditions, and the introduction and spread of invasive species and disease, all of which affect the presence and health of vegetation. Alternative A would have no impacts on scenery and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on scenery, because anticipated impacts from vegetation management for wildland fire mitigation would not affect large areas within the Nowitna WSR corridor. Consequently, its contribution to cumulative impacts would be negligible. Furthermore, Alternative B would improve the understanding of all identified river values, which would allow the Service to better manage and protect the scenic value of the river.

4.9 VEGETATION

4.9.1 Affected Environment

The Nowitna NWR consists primarily of black spruce (*Picea mariana*) forests, wetlands, ponds and streams, benchlands, and foothills. Land cover for the Nowitna WSR corridor is shown in **Figure 4-4**.

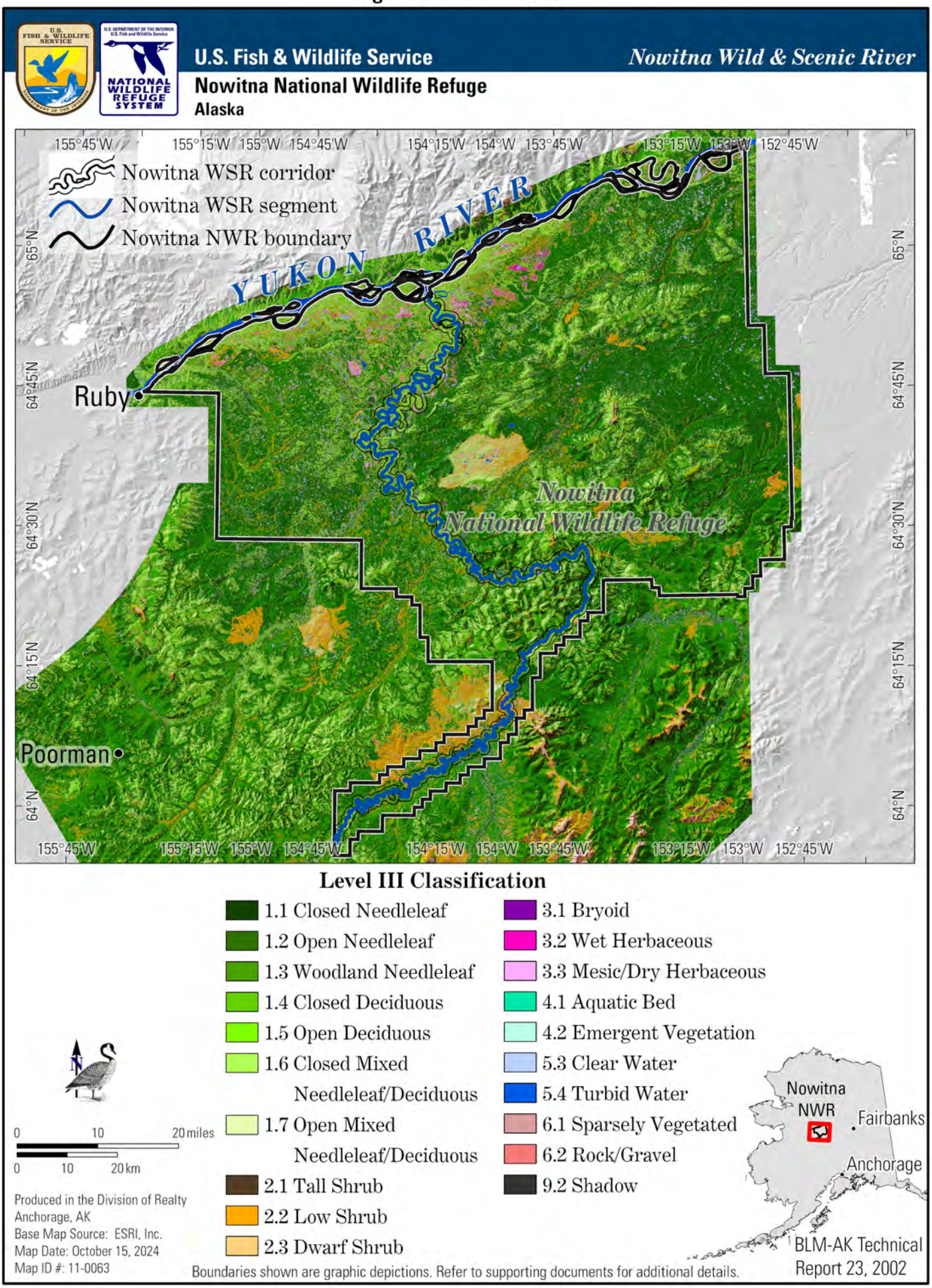
Riparian vegetation is dominated by willow (*Salix* spp.), cottonwood (*Populus balsamifera* ssp. *balsamifera*), and white spruce (*Picea glauca*). Common riparian vegetation includes willow and alder (*Alnus viridis* ssp. *crispa* and *A. incana* ssp. *tenuifolia*) thickets along gravel bars at the water's edge, stands of cottonwood trees higher on the bank, and bands of white spruce varying in width on the higher banks. Stands of paper birch (*Betula alaskana*) and quaking aspen (*Populus tremuloides*) often mix with the white spruce forest along the river corridors. All seral stages of terrestrial and aquatic land cover types are represented where they occur in the Nowitna WSR corridor and Nowitna River floodplain.

Wetland vegetation is site specific and varied. Refuge wetlands include upland basins, ice-formed lakes on the flats, river-flooded lowlands, oxbows, and bog lakes. One or more of 12 species of pondweed (*Potamogeton* spp.) occur in almost all lakes. A variety of forbs grow on recently exposed soils along river shorelines.

Black spruce is the dominant tree species in the corridor, followed by white spruce, paper birch, quaking aspen, and balsam poplar. While there are pure stands dominated by a single tree species, stands typically mix and grade into one another, depending on the underlying soil type, presence of permafrost, elevation, and slope aspect (Burkart et al. 2023).

The herbaceous vegetation type is dominated by grasses, sedges, and flowering plants that are common to interior Alaska ecosystems. The herbaceous communities along steep slopes in the canyon area appear to be unique, but they are not well studied.

Figure 4-4: Land Cover[1]



Unusually dense and extensive stands of larch (*Larix laricina*) occur in areas along the Nowitna River, particularly in the upper and middle portions, where they flourish due to the unique chemistry of the Nowitna River's water. Limestone from bedrock in the river's headwaters is deposited in the floodplain during flood events and fosters the growth of larch. Larch-dominated forest communities such as these are rare statewide. Larch is a species of conservation concern in Alaska due to both the drastic population reductions caused by recent infestations of invasive, nonnative insects (such as larch sawfly [*Pristiphora erichsonii*] and eastern larch beetle [*Dendroctonus simplex*]; Rozell 2007; Holsten et al. 2008) and the geographic and potentially genetic separation of the Alaska population from the North American population (Boggs et al. 2019). The associated Larch Wetland Biophysical Setting is considered rare statewide and is classified as vulnerable (Boggs et al. 2019).

Notable mature white spruce stands are found along the Nowitna WSR, particularly in the lower portions and near its confluence with the Yukon River. White spruce is an ecological specialist that shows evidence of high vulnerability to temperature induced drought stress (Barber et al. 2000). Large stands of mature white spruce, such as those found in the Nowitna WSR corridor, are becoming increasingly less common in Alaska. The species appears to be affected by climate dynamics, including changing temperature and precipitation patterns, fire regimes, and other environmental variables. In interior Alaska, stands of old-growth white spruce growing on well-drained alluvial and riparian soils are relatively rare. The associated White Spruce Floodplain Old-growth Forest Biophysical Setting is considered rare statewide (Boggs et al. 2019). Due to the demand for subsistence harvest of white spruce for house logs, there are additional management issues related to sustaining harvest while protecting ecosystems.

Current trends in temperature and precipitation regimes have the potential to drive large-scale changes in plant communities and ecosystems in part by influencing wildland fire regimes and facilitating the establishment and spread of invasive plant species, diseases, and insect pests. The U.S. Forest Service Forest Health Protection and the Alaska Division of Forestry & Fire Protection partner with others to monitor forest health annually in Alaska and identify damage caused by insects and disease[11]. Wildland fire dynamics may be affected by predicted increases in landscape flammability due to changes in precipitation patterns, vegetative growth, and forest health. During the next 20–30 years, interior Alaska is expected to experience rapid changes in fire activity and associated changes in vegetation dynamics, including a shift from conifer dominance to deciduous dominance across interior Alaska, more frequent large fire seasons, and a decrease in the magnitude and periodicity of small fire seasons (Kurkowski et al. 2008; Rupp and Springsteen 2009).

Invasive, nonnative plant species pose a risk to ecological stability and integrity. The Alaska Center for Conservation Science maintains a database and mapping application (the Alaska Exotic Plants Information Clearinghouse) that provides geospatial information about nonnative plant species occurring in Alaska, as well as detailed information about plants considered to be invasive[12]. The Service collaborates with the State of Alaska and other partners to facilitate rapid response to new detections of invasive species and in efforts to eradicate or prevent the further spread of existing invasive species. The Service has developed strategies for the management of terrestrial invasive plants such as bird vetch

[11] https://www.fs.usda.gov/detailfull/r10/forest-grasslandhealth/?cid=fsbdev2_038884
[12] https://accs.uaa.alaska.edu/invasive-species/non-native-plants/

(*Vicia cracca*) and submersed aquatic invasive plants such as elodea (including *Elodea canadensis, E. nuttallii,* and an *E. canadensis* x *E. nuttalli* hybrid).[13]

Terrestrial nonnative plant species in Alaska have been given invasiveness scores based on ecological impacts, biological characteristics and dispersal ability, distribution, and feasibility of control (Carlson et al. 2008). Many nonnative plant species in Alaska are of limited concern due to their low capacity for rapid expansion in a natural setting. Such is the case for the following nonnative plant species currently known to exist in the Nowitna WSR corridor: lambsquarters (*Chenopodium album*) in two places on the upper river and common plantain (*Plantago major*) in low numbers along both the upper and lower river. Nonnative plant species, including some that are considered highly invasive, occur more commonly in areas of human development, and human activities along the Nowitna WSR have the potential to transport unwanted species into the corridor. Nonnative plants observed in Ruby and/or along the Ruby-Poorman Road include the following species with relatively low invasiveness rank: common dandelion (*Taraxacum officinale*), pineapple-weed (*Matricaria matricariodes*), common plantain, alsike clover (*Trifolium hybridum*), red clover (*Trifolium pratense*), white clover (*T. repens*), meadow foxtail (*Alopecurus pratensis*), timothy (*Phleum pratense*), and lambsquarters.

Species with higher invasiveness rank, such as oxeye daisy (*Leucanthemum vulgare*), chokecherry (*Prunus virginiana*), European bird cherry (*Prunus padus*), and Siberian peashrub (*Caragana arborescens*), occur in Ruby. Bird vetch has been observed along the Ruby-Poorman Road and Long Creek (which flows into the Nowitna WSR via the Sulatna River) about 25 miles south of Ruby and 35 miles west of the Nowitna WSR. Numerous nonnative plants have been observed in Galena, including lambsquarters, common chickweed (*Stellaria media*), pineapple-weed, common plantain, common dandelion, alsike and red clover, timothy, Siberian pea shrub, chokecherry, European bird cherry, white sweet clover (*Melilotus alba*), and bird vetch. Of these, white sweet clover and bird vetch are considered the most invasive (Carlson et al. 2008), and removal efforts are ongoing. Efforts to remove Siberian pea shrub, chokecherry, and European bird cherry are also being considered in Galena. Broadleaf cattails (*Typha latifolia*) are native to some parts of interior Alaska but are not found in this region except in the Galena area, where they may have been introduced for water treatment. They are now spreading to shallow lakes and wetlands near Galena.

The highly invasive plant species mentioned here as well as others are even more common in larger communities across Alaska, including Fairbanks and Anchorage. Also found in other parts of the state, but not yet in this region, is the highly invasive aquatic elodea. Monitoring for the presence of elodea in waterbodies in the Nowitna WSR and surrounding region is ongoing. Public use by visitors from areas with invasive aquatic and terrestrial plant species (source areas) provides a vector for the establishment and spread of invasives in the Nowitna WSR. The risk could increase both through increased visitation and, regardless of changes in public use level, through increased abundance of invasive plants in source areas.

[13] https://www.fws.gov/initiative/invasive-species/invasive-species-alaska

4.9.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management of the Nowitna WSR corridor. Current management of the Nowitna NWR's plant communities, as defined in the Revised CCP (USWFS 2009), would continue.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

The Service would create an updated vegetation map of the Nowitna WSR corridor using remote sensing within 5 years of this CRMP, to be updated every 10 years over the life of the CRMP. The Service would implement a larch and old-growth white spruce distribution survey to monitor the changes in these forest communities. Understanding and monitoring the changes would allow for these communities to be better protected and to distinguish best management practices in the future.

Additionally, the Service would develop inventory and monitoring strategies for priority plants and habitats. This would result in enhanced conservation efforts within the Nowitna WSR and allow for early detection of changes and threats, such as disease or invasive species' infestations.

Another goal throughout the life of this CRMP would be to identify and understand the impact of pathogen presence on plant communities within the Nowitna WSR to develop mitigation options. The effects of this would be beneficial for plant communities by allowing for intervention to mitigate negative impacts.

The impacts under Alternative B would be similar to those described under Alternative A; however, the additional goals and objectives to better understand vegetation distribution and dynamics would aid in maintaining baseline conditions over time.

Cumulative Effects

Alternative A would have no impacts on vegetation and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on vegetation and would not contribute to cumulative impacts. The additional monitoring under Alternative B would allow the Service to make better informed management decisions regarding any potential impacts from reasonably foreseeable future actions. Monitoring under Alternative B could inform the Service of any effects on riparian vegetation caused by changing land uses in the upper watershed (such as improperly mitigated or unpermitted mining) that affect downstream conditions; climate-related changes, such as changes in precipitation or wildland fire regimes; invasive species or disease presence that alters vegetation health or composition; trespass or increased visitor use; or brush and tree clearing that alter vegetation composition.

4.10 WILDLIFE

4.10.1 Affected Environment

The Nowitna River floodplain is the refuge's most biologically productive area. The distinct water chemistry, the flood regime, and the meandering nature of the river generate diverse and highly productive riparian ecosystems that provide habitat for a broad, interconnected array of boreal plants and wildlife species, including moose (*Alces americanus*), black bear (*Ursus americanus*), grizzly bear (*U. arctos horribilis*), wolf (*Canis lupus*), wolverine (*Gulo gulo*), red fox (*Vulpes vulpes*), lynx (*Lynx canadensis*),

marten (*Martes americana*), porcupine (*Erethizon dorsatum*), snowshoe hare (*Lepus americanus*), river otter (*Lontra canadensis*), beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), mink (*Neovison vison*), least weasel (*Mustela nivalis*), red squirrel (*Tamiasciurus hudsonicus*), wood frog (*Lithobates sylvaticus*), waterfowl, raptors, songbirds, and other birds.

Grouse (*Canachites canadensis* and *Bonasa umbellus*), owls (*Strix nebulosi*, *Bubo virginianus*, *Surnia ulula*, and *Aegolius funereus*), woodpeckers (*Dryobates villosus*, *D. pubescens*, *Picoides arcticus*, and *P. dorsalis*), chickadees (*Poecile* spp.), Canada jays (*Perisoreus canadensis*), common ravens (*Corvus corax*), and redpolls (*Acanthis flammea and A. hornemanni*) are year-round residents of the Nowitna NWR. Thousands of migratory birds come to the Nowitna WSR corridor each summer. The grassy margins of the river, surrounding lakes, and waterways provide some of the best breeding habitat in interior Alaska for trumpeter swans (*Cygnus buccinator*), greater white-fronted geese (*Anser albifrons*), canvasbacks (*Aythya valisineria*), sandhill cranes (*Antigone canadensis*), and many other migratory waterfowl and songbirds.

The river corridor contains an uncommon old-growth white spruce (*Picea glauca*) forest community that is nourished by the Nowitna River's productive floodwaters and protected from wildfire by surrounding wetlands. These old-growth forests provide nesting areas for raptors and some of the best marten habitat in Alaska.

The Nowitna NWR contains a mixture of mature forest and early successional plant communities that provide excellent moose habitat. Moose abundance is highest along the river corridor, which in turn sustains increased populations of predators. Beavers are numerous in the river and adjacent oxbow lakes.

At this time, there are no federally listed threatened, endangered, or sensitive plants or animals on the Nowitna NWR. However, the Nowitna NWR has several continental birds of conservation concern, including the lesser yellowlegs (*Tringa flavipes*), short-eared owl (*Asio flammeus*), and olive-sided flycatcher (*Contopus cooperi*) (USFWS 2021). Both the lesser yellowlegs and olive-sided flycatcher are associated with wetlands and riparian areas within the Nowitna WSR corridor. The lesser yellowlegs inhabits open boreal forest interspersed with wetlands, lakes, ponds, and wet meadows. The olive-sided flycatcher exists in mature spruce forests near habitat edges, such as burns and riparian areas. The short-eared owl uses large, open areas such as grass lakes and meadows.

The Nowitna WSR corridor may be home to the rare Alaska tiny shrew (*Sorex minutissimus* or *S. yukonicus*). Four of the first known Alaska specimens of tiny shrew were collected on the Nowitna NWR (Dokuchaev 1997). Weighing under 2 grams, this is among the smallest known mammal species in the world. The Eurasian tiny shrew (*Sorex minutissimus)* is known to be widespread but scarce across Scandinavia and northern Asia to the Bering Strait. A morphological comparison of Alaska specimens to Eurasian tiny shrew from several Russian collections suggest that the Alaska variety may be a distinct species (Dokuchaev 1997). The shrew currently has a statewide conservation priority level of V (orange), indicating "unknown status and either high biological vulnerability or high action need" (Gotthardt et al. 2012).

Monitoring and research related to parasites and disease pathogens affecting Alaska's wildlife are conducted by the U.S. Geological Service Alaska Science Center (https://www.usgs.gov/centers/alaska-science-center/science/wildlife-disease-and-environmental-health-alaska), ADFG (https://www.adfg.alaska.gov/index.cfm?adfg=disease.main), and other partners.

4.10.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management of the Nowitna WSR and surrounding areas. Current management of wildlife populations and habitats of the Nowitna NWR, as defined in the Revised CCP (USFWS 2009), would continue.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

The Service would maintain the natural abundance and diversity of wildlife species found in the Nowitna WSR corridor; these species include moose, black bear, grizzly bear, wolf, wolverine, red fox, lynx, marten, porcupine, hare, river otter, muskrat, mink, weasel, squirrel, wood frog, waterfowl, raptors, songbirds, and others. The maintenance of these species would allow for more resiliency across the WSR from natural and human-caused disturbances.

The Service would maintain a desired diversity of high-quality habitats that support the various life stages of the wildlife species. The Service would monitor habitat conditions and wildlife populations by implementing activities identified in an inventory and monitoring plan. This would maintain wildlife habitat.

Cumulative Effects

Alternative A would have no impacts on wildlife and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on wildlife and would not contribute to cumulative impacts. Furthermore, the additional monitoring under Alternative B would allow the Service to make better informed management decisions regarding any potential impacts from reasonably foreseeable future actions. Monitoring under Alternative B could inform the Service of changes that affect habitat conditions that may develop from changes in precipitation patterns or wildland fire regimes; or impacts to the health of wildlife populations or their habitats caused by the presence and spread of invasive species and disease.

4.11 SOILS AND PERMAFROST

4.11.1 Affected Environment

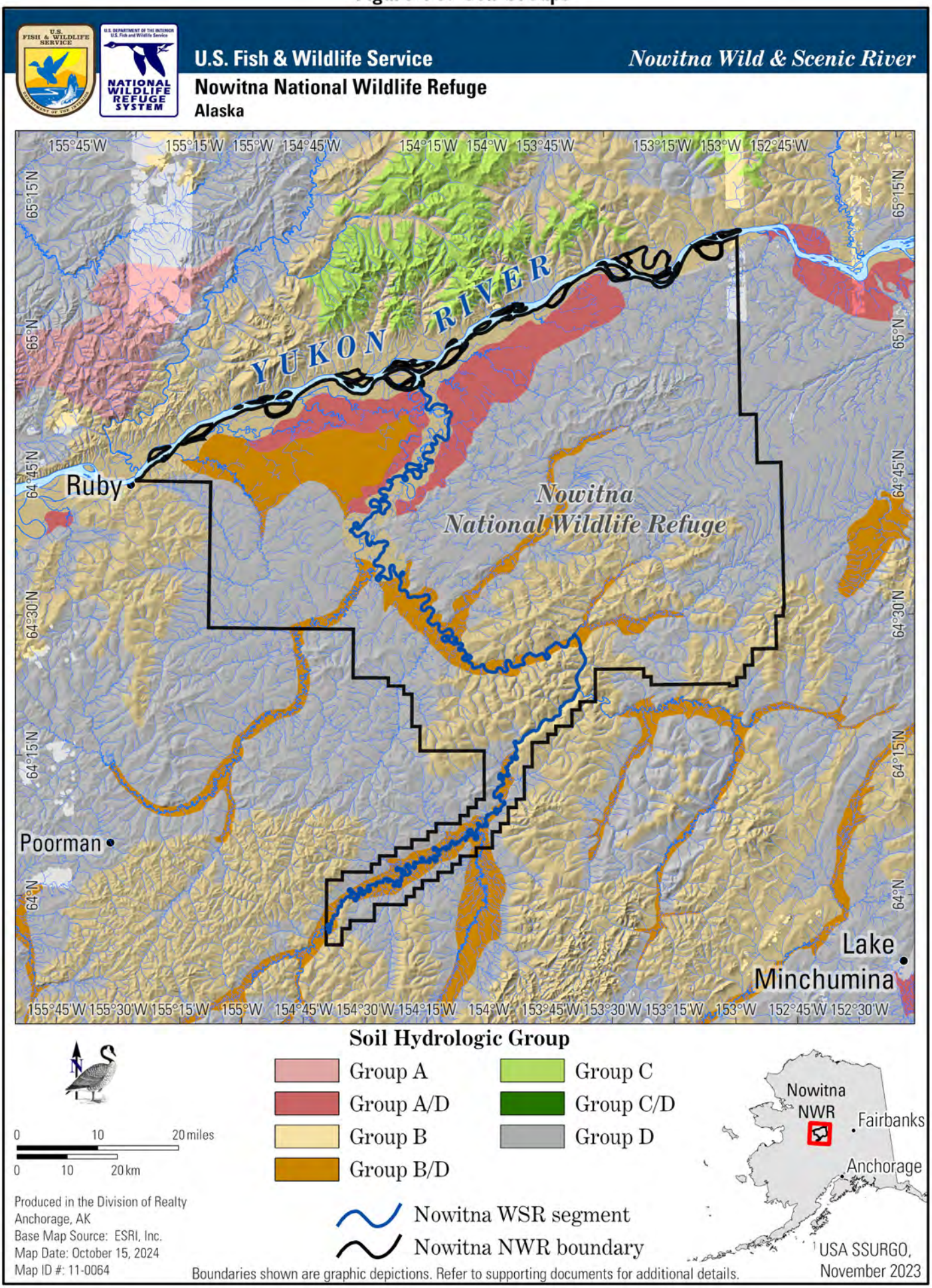
Soils

The Nowitna NWR has loamy, wet to well-drained floodplain soils in river valleys and loamy to very gravelly soils in the lowlands. The uplands in Nowitna NWR include loamy to very gravelly, well- to poorly drained soils at the northern end of the uplands, and very gravelly, well-drained soils at the southern end of the uplands (Burkart et al. 2023).

The Nowitna NWR consists of hydrologic soil groups A/D, B, B/D, and D, as defined by the Natural Resources Conservation Service (NRCS 2025); refer to **Figure 4-5**. Group A/D soils have a very slow infiltration rate due to a high water table, but they have high infiltration and low runoff rates if drained. Group B soils consist of deep, well-drained soils with a moderately fine to moderately coarse texture and a moderate rate of infiltration and runoff. Group B/D soils naturally have a very slow infiltration rate due to a high water table, but they have a moderate rate of infiltration and runoff if drained. Group D consists of soils with a very slow infiltration rate and high runoff potential. This group consists of clays that have a high shrink-swell potential, soils with a high water table, soils that have a clay pan or clay layer at or near the surface, and nearly impervious material overlayed with shallow soils (NRCS 2025).

Soil texture and moisture are important in influencing ecosystem dynamics. Soils interaction with ground and surface water can result in natural changes to the water quality. Soils play a large role in the characteristics of the active permafrost layer. Gravelly soils tend to be well drained with deep, active permafrost layers; organic-rich soils tend to be poorly drained with shallow, active permafrost layers.

Figure 4-5: Soil Groups[1]



Permafrost

Permafrost is a layer of ground that remains frozen (at or below 32 degrees Fahrenheit [0 degrees Celsius]) for 2 years or more (Burn 2023). Permafrost development and persistence rely on a cold climate and are controlled by air temperature, hydrology, soil type, vegetation, disturbance, and snowpack. As such, vast layers of permafrost extend throughout Alaska. In some regions, permafrost tends to be continuous, while in other areas it may be discontinuous or absent. The presence or absence of permafrost in soils strongly controls soil development and hydrology in Alaska (Hinzman et al. 2006; Jorgenson et al. 2013). Thawing of permafrost can have extensive impacts on ecosystems and hydrology, and can result in increased erosion or subsidence, impacting water resources (O'Neill et al. 2023). Thawing can also release previously frozen carbon and methane deposits (O'Neill et al. 2023).

In Alaska, the interaction of hydrology and permafrost plays a large role in ecosystem dynamics. Lakes and wetlands are common in permafrost areas because the frozen ground inhibits seepage and holds water close to or above the surface. In areas with permafrost, wetland vegetation reduces erosion by preventing the warming and thawing of ice-rich soils. Abundant wetlands in the northwest boreal zone of North America result largely from cool, short summers with low evapotranspiration and an impermeable permafrost layer that prevents infiltration and impedes drainage of the upper, unfrozen layer (Ford and Bedford 1987).

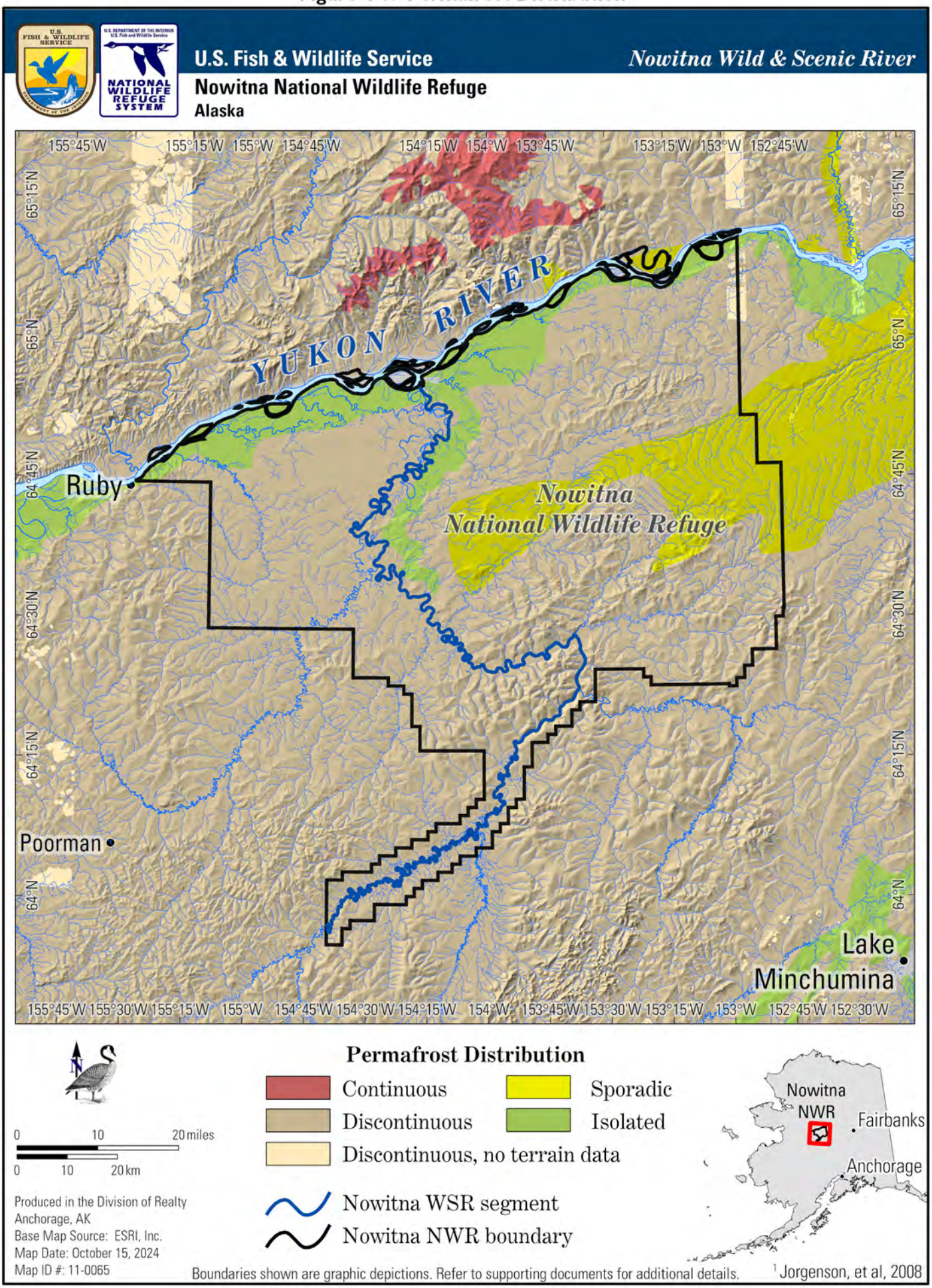
Permafrost can impede water infiltration and limit water flow, often leading to wet or saturated soil in the active layer[14] (Hinzman et al. 2005). In the absence of permafrost, surface soils tend to be well drained and dry. Thawing of near-surface permafrost can deepen the active layer, enhance infiltration, and lead to deeper water-flow paths in soils or below the permafrost (sub-permafrost). In some areas of continuous or discontinuous permafrost, groundwater can flow through taliks[15] in the permafrost.

Permafrost is thought to be discontinuous throughout Nowitna NWR (Jorgenson et al. 2008). As shown in **Figure 4-6**, the permafrost layers are isolated along the Nowitna WSR corridor near the confluence with the Yukon River. The probability of permafrost absence is typically higher along major waterways (Burkart et al. 2023). In the Nowitna WSR corridor described in the Nowitna CCP (USFWS 1987a), there are an estimated 133,737 acres of discontinuous permafrost (84 percent) and 24,332 acres of isolated (5–10 percent frozen) permafrost (15 percent) on Service lands (USFWS 2024c). This includes acreage only within Service lands within the WSR corridor. It does not include acreage within private lands.

[14] Surface layer that thaws during summer

[15] A layer or body of unfrozen ground that occurs in permafrost due to an anomaly in thermal, hydrologic, or hydrochemical conditions

Figure 4-6: Permafrost Distribution[1]



[1] Jorgenson, et al, 2008

4.11.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no change to the current management of the Nowitna WSR and the surrounding corridor. The current special values of Nowitna NWR tied to river conditions, as defined in the Revised CCP (USFWS 2009), would not change. Monitoring of soils in the Nowitna WSR corridor is not a high priority in the CCP, and Alternative A would not increase efforts to collect data, monitor changes in permafrost, or develop a detailed understanding of soils and permafrost within the Nowitna WSR corridor.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, the Service would implement additional monitoring efforts within the Nowitna WSR corridor. This could lead to more informed management decisions regarding soils and permafrost. The Service would work to inventory and map soils and permafrost within 10 years of implementing this CRMP.

Under Alternative B, the Service would establish the Nowitna WSR corridor which could change the management status of some areas. Management of those areas would still fall under the Revised CCP (USFWS 2009) and would not substantially differ from those under this CRMP. However, monitoring efforts could continue to be minimal in areas outside of the corridor.

The proposed WSR corridor would include an estimated 111,863 acres of discontinuous permafrost (91 percent) and 10,467 acres of isolated permafrost (9 percent) (USFWS 2024c). This only includes Service lands within the WSR corridor and excludes acreage within private lands. Permafrost occurring outside of the corridor would continue to be managed according to the Revised CCP (USFWS 2009).

Cumulative Effects

Because there would be no new direct or indirect impacts, there would be no new cumulative impacts.

4.12 SUBSISTENCE

4.12.1 Affected Environment

The meanings of subsistence are based on cultures that have been shaped over many years by family traditions, religion, relationships with particular animals and places, and a preference for natural foods (USFWS 2009). The traditional and customary use of wild resources for subsistence purposes is regarded as a way of life rather than merely a recreational activity. In accordance with federal agency responsibilities under ANILCA, the Service ensures that rural residents engaged in subsistence uses have opportunities for continued subsistence uses on public lands, including within WSR corridors and NWRs. This was the stated intent of Congress for all ANILCA conservation system units when it passed the law in 1980 that established the Nowitna NWR and designated the Nowitna WSR (ANILCA Section 101(c)). Providing the opportunity for continued subsistence uses by local residents is one establishing purpose of the Nowitna NWR (ANILCA Section 302(6)(B)(ii)).

The 1990 Nowitna NWR Fishery Management Plan identified Galena, Ruby, and Tanana as communities on the Yukon River near the Nowitna WSR for whom subsistence use at the refuge may be of great interest (USFWS 1990). While subsistence use area mapping often only captures a portion of the total use at any given time or by a given community, more recent ADFG subsistence use data confirm

subsistence use by Galena (Brown et al. 2015), Ruby, and Tanana residents within and around the Nowitna WSR (ADFG 2021). While Galena, Ruby, and Tanana are communities in the immediate vicinity of the Nowitna WSR, there may be additional communities that use the Nowitna NWR and WSR for subsistence purposes. This section provides an overview of the current level of subsistence use within the Nowitna WSR corridor using best information available directly from potentially affected subsistence communities, state and federal sources, and literature.

Based on studies by the ADFG, a wide variety of fish, wildlife, and vegetation are harvested by subsistence users in these communities for many purposes, including food, fuel, arts and crafts, tools, clothing, and traditional cultural practices. Of note is that the subsistence use areas described in these studies and summarized below represent subsistence use for a segment of the population at the time of the study; subsistence use is also likely to occur outside the mapped subsistence use areas. A brief overview of subsistence use patterns for Galena, Ruby, and Tanana residents is provided below.

Galena is important as a regional service hub and population center and as the site of the Nowitna NWR's headquarters. Residents in Galena rely on the Koyukuk and Nowitna NWRs for subsistence resources (USFWS 2009). Residents in Galena mainly gather subsistence resources along the Koyukuk and Yukon Rivers and their tributaries. Subsistence food sources include salmon, whitefish, pike, waterfowl, moose, and berries. Large mammal hunting by Galena residents focuses mainly on moose, although bear and caribou are taken, when available (USFWS 2009). Comprehensive community surveys indicate that for the community of Galena, moose, Chinook salmon, summer chum salmon, fall chum salmon, and coho salmon accounted for 79 percent of subsistence harvest in 2010. Galena residents harvest fish primarily from the Yukon River (USFWS 2009); however, some subsistence resource use areas for Galena residents lie within with the Nowitna WSR corridor. Subsistence harvests in the Nowitna WSR corridor by Galena residents include moose, fish, berries, and greens (Brown et al. 2015).

Traditional Athabascan culture and subsistence practices are a focal point of life in Ruby (Alaska DCCED 2024b). Residents in Ruby mainly gather subsistence resources along the Yukon River corridor. However, the Nowitna River is also used for subsistence activities (USFWS 2009), and many Ruby residents have ancestral ties to the river (Brown et al. 2010). According to the Revised CCP (USFWS 2009), residents harvest moose, caribou, and black bear from the Koyukuk and Nowitna NWRs. Ruby residents harvest whitefish, sheefish, pike, and salmon from the two NWRs by using fish nets or fish wheels, or both (USFWS 2009). According to 2010 ADFG community harvest data for Ruby, salmon comprised the most pounds harvested, followed by large land mammals, non-salmon fish, plants and berries, small land mammals, and nonmigratory birds (Brown et al. 2015). Areas used for subsistence by residents of Ruby include moose hunting areas along much of the Nowitna WSR corridor. Areas recognized for subsistence harvest of small land mammals, berries, and greens are present in the north end of the Nowitna WSR corridor.

Traditional Athabascan ways of life persist in Tanana, including gathering of subsistence resources. Residents in Tanana mainly harvest these natural resources along the Yukon and Tanana River corridors and their tributaries, including the Nowitna River (USFWS 2009). Residents primarily depend on moose and salmon, but they also harvest bear, caribou, non-salmon fish species, small game, berries, and other plant material, when available (USFWS 2009). According to 2014 ADFG community harvest data, salmon comprised the most pounds harvested for Tanana, followed by non-salmon fish, large land mammals, plants and berries, and migratory birds (Brown et al. 2016). Areas used by Tanana residents for

subsistence include moose hunting areas along much of the Nowitna WSR corridor. Ptarmigan and grouse hunting areas are also present near the Nowitna River. Smaller areas on Nowitna River tributaries have historically been used and continue to be used by Tanana residents to harvest plants and berries.

Changes occurring to subsistence use areas outside the Nowitna WSR corridor could affect the abundance and availability of natural resources that local rural communities rely on. Such changes could foreseeably increase reliance on subsistence resources on federal lands and might increase the importance of the Nowitna WSR corridor to subsistence communities.

4.12.2 Environmental Consequences

Under Title VIII of ANILCA, rural residents engage in subsistence activities on federal public lands, as defined in 50 CFR 100, 100.4(1), and (2). Traditional subsistence activities also take place on lands owned by village and regional Native corporations, as well as State lands. Subsistence activities outside federal public lands are subject to State regulations and landowner permission.

The Service follows existing laws (such as ANILCA, Title VIII) and agency guidance (the Service's Native American Policy [510 FW 1; USFWS 2016b] and the Service's Alaska Native Relations policy [510 FW 2; USFWS 2025][16]) that protect the ability to use public lands for subsistence purposes. An ANILCA Section 810 evaluation is required for any decision to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands under any provision of law authorizing such actions (**Appendix B**). This section considers how the existing condition of subsistence resources would vary by alternative. The analysis considers whether the alternatives would impact the following:

- Abundance and availability of subsistence resources
- Access to subsistence resources

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, the Service would continue to manage the Nowitna WSR according to the existing management outlined in the Revised CCP (USFWS 2009). Under Alternative A, current levels of subsistence access would continue, maintained by the relevant laws and Revised CCP. Under Alternative A, the boundary of the Nowitna WSR corridor would not be adjusted to comply with ANILCA. Subsistence uses would continue in and around the corridor. The availability of subsistence resources would depend on the health of species' populations and the habitats they rely on, as well as changing environmental conditions.

The Service would not identify user capacities for the Nowitna WSR nor establish specific indicators, triggers, thresholds, or monitoring protocols to respond to trends in resource conditions as they relate to visitor use. Current trends and any current level of competition between subsistence users and other visitor uses would be expected to continue.

[16] The Service's Alaska Native Relations policy (510 FW 2 or Chapter 2) supplements the Service's Native American Policy (510 FW 1).

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, legal and regulatory impacts on access to subsistence resources would be identical to those discussed under Alternative A.

Under Alternative B, the Service would implement a CRMP to protect the ecology, fish, cultural, and scenery ORVs for the Nowitna WSR. Implementation of the CRMP would not be anticipated to impact access to subsistence resources. The CRMP outlines goals and strategies for ensuring the Nowitna WSR continues to conserve wildlife, fish, and plant resources for the customary and traditional uses of wild, renewable resources.

Subsistence users have noted trends of declining moose populations in the Nowitna River drainage. Under Alternative B, a CRMP objective to protect the ecology ORV would involve conducting moose population estimates. Subsequently, this alternative would emphasize resource monitoring and therefore improve the potential for early corrective action. Additionally, river management would include strategies for monitoring and responding to changing environmental conditions and populations of fish and wildlife species that are important to subsistence communities. **Section 4.9**, Vegetation, and **Section 4.10**, Wildlife, provide further information analyzed in the EA specific to vegetation and wildlife.

Management in the CRMP also involve goals of improving scientific knowledge and preventing the introduction and impact of invasive species. Such management would also lend support to species that subsistence communities rely on for subsistence uses. Further, implementation of the CRMP would involve data gathering efforts to inform management. Data gathering outlined in Alternative B would not limit access to subsistence resources.

Under Alternative B, to protect the cultural ORV, the CRMP would include objectives and strategies to achieve the following goal: "Ensure the Nowitna WSR continues to conserve wildlife, fish, and plant resources for the customary and traditional uses of wild renewable resources." Strategies would include continuation of an annual moose hunter check station, working with partners to monitor contaminants in fish, monitoring through subsistence harvest surveys, and investigation on changes in berry productivity and harvest. As described above, these strategies would have a potential long-term beneficial impact on subsistence resources by contributing to continued availability and abundance of subsistence resources. These strategies would be compatible with subsistence and traditional use related access, protecting access, and the ability to use public lands for subsistence and travel purposes.

Under Alternative B, the CRMP would include the following goal: "Continue to foster high-quality hunting, fishing, trapping, wildlife observation, and boating opportunities in a relatively natural setting." While additional management would involve documenting the quality of the visitor experience, there are no strategies that specifically focus on creating more recreational opportunities. Current visitor use trends are expected to continue. And as a result, Alternative B would not directly result in increased visitation, competition for resources between subsistence users and recreational users would be similar, to Alternative A.

Cumulative Effects

Alternative A would have no impacts on subsistence and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on subsistence and would not contribute to cumulative impacts. The additional monitoring under Alternative B would allow the Service to make better informed management decisions regarding any potential impacts from reasonably foreseeable future actions. Monitoring under Alternative B could inform the Service of any impacts to subsistence resources caused by changing land uses in the upper watershed (such as improperly mitigated or unpermitted mining) that affect downstream conditions; climate-related changes that impact subsistence resources such as changes in winter snow conditions that affect moose survival and productivity; invasive species and disease that alter wildlife or habitat health or composition; or hunting, trespass, litter, or noise from an increase in visitor use that alter habitat conditions or wildlife behavior and distribution.

4.13 ALASKA NATIVE INTERESTS

4.13.1 Affected Environment

Residents of the communities of Galena,[17] Ruby,[18] and Tanana[19] rely on subsistence resources within the Nowitna NWR and WSR corridor. The community of Tanana is on the north bank of the Yukon River near the confluence of the Yukon and Tanana Rivers and 90 river miles upriver of the Nowitna River confluence. The community of Ruby is on the south bank of the Yukon River about 35 river miles below the confluence of the Nowitna River. The community of Galena is on the north bank of the Yukon River about 85 river miles downstream of the Nowitna River confluence.

Louden Tribe,[20] the Native Village of Ruby, and the Native Village of Tanana are federally recognized Tribes and are represented in part by Doyon, Limited (an ANCSA regional corporation) and the Tanana Chiefs Conference (an ANCSA nonprofit) (Alaska DCCED 2024a, 2024b, 2024c). The village corporation for Galena is the Gana-A'Yoo Village Corporation (Alaska DCCED 2024a). The village corporation for Ruby is the Dineega Corporation (Alaska DCCED 2024b). The village corporation for Tanana is Tozitna, Limited (Alaska DCCED 2024c).

The Alaska Native Allotment Act of 1906 allowed Alaska Natives to receive the title for up to 160 acres of land in Alaska. The Native Allotment Act was repealed in 1971, when the ANCSA became law. Under

[17] The Denaakk'e name for Galena is Notaalee Denh. Denaakk'e is the language of the Koyukon Athabascan people.
[18] The Denaakk'e name for Ruby is Tl'aa'ologhe.
[19] The Denaakk'e name for Tanana is Hohudodetlaatl Denh.
[20] This designation has recently changed from Galena Village.

the ANCSA, in exchange for settling Alaska Native land claims, land and money were distributed to the ANCs established by ANCSA.

Alaska Native-owned lands and Native allotments are present throughout Alaska. There are several Native allotments along the Nowitna River (USFWS 2009). **Figure 4-1.1** through **Figure 4-1.8** display Alaska Native lands and Native allotments within the Nowitna WSR corridor. There are 779.91 acres of patented Native allotments across 9 allotments within the corridor. Dineega Corporation now owns one former Native allotment (79.96 acres), so the land is no longer classified as a Native allotment.

4.13.2 Environmental Consequences

The direct and indirect impact analysis area for Alaska Native interests is the Nowitna WSR corridor and adjacent Alaska Native lands and Native allotments. The effects of each alternative on Alaska Native interests are assessed in terms of management in the CRMP that is likely to impact the topics of concern discussed.

The Service would follow existing laws (such as ANILCA Sections 1110 and 1111) and regulatory guidance (such as 43 CFR 36.10) that address access to inholdings and the ability to use Alaska Native lands and Native allotments. In accordance with ANILCA Section 606(a)(1), where private lands border the river, the lands are not considered effectively surrounded by the WSR. Access will be provided to the entire block via the most commonly used route, which is generally the river. If necessary, a special use permit or right-of-way may be provided to allow adequate and feasible access to private parcels. The Service would also follow existing laws (such as ANILCA Sections 810, 811, and 1110) and agency guidance per the Service's Native American Policy (USFWS 2016b) and the Service's Alaska Native Relations policy (USFWS 2025) that address subsistence and traditional use and access for any government action, protecting access, and the ability to use public lands for subsistence and travel purposes.

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, the Service would continue to manage the Nowitna WSR according to the existing management outlined in the Revised CCP (USFWS 2009). Existing direction is to protect and enhance previously identified ORVs and would continue to offer sound management of and access to subsistence resources of interest to tribal entities. The Service would continue to consult and cooperate with tribal entities regarding current and future concerns over access and use of Native and public lands, and any other issues as they arise. There would be no change in the number of acres of patented Native allotments. However, additional management for monitoring and responding to changing environmental conditions in interior Alaska, in relation to the Nowitna WSR, would not be implemented.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, impacts related to existing management would be similar to those described under Alternative A. There would be no change in the number of acres of patented Native allotments. Additionally, Alternative B includes management direction for the protection of resources that could be of interest to Tribes and tribal entities. Under Alternative B, to protect the cultural ORV, the CRMP would include objectives and strategies to achieve the following desired condition: "The integrity of cultural, historical, archaeological, and ethnographic resources is safeguarded for future generations." Objectives to achieve this goal include coordination with local Tribes to develop a better understanding of cultural resources or sites of cultural significance within the Nowitna WSR corridor and to design and

implement protective and preservation measures. Compared with Alternative A, this additional management would be more protective of Alaska Native interests, such as cultural resources, and it would further encourage coordination between the Service and Alaska Natives. A more comprehensive understanding would allow the Service to better manage and protect resources and resource uses in the face of changing environmental conditions.

Under Alternative B, there would be additional management for monitoring and responding to changing environmental conditions in interior Alaska. Compared with Alternative A, these additional management measures would further contribute to the protection of resources that could be of interest to Tribes and tribal entities. For instance, one CRMP objective involves identifying vulnerabilities and management strategies for wildlife species, which include species of interest to Tribes and tribal entities.

As described in **Section 4.7**, Cultural Resources, under Alternative B, cultural resources within the Nowitna NWR would continue to be subject to the same legal and regulatory authorities as those under Alternative A, even if outside the WSR corridor. Because of this, no impacts are anticipated on cultural resources that are of interest to Tribes.

Under Alternative B, the Service would establish the Nowitna WSR corridor to comply with the WSRA and ANILCA. Establishment of the WSR boundary is expected to have no noticeable impact on the Service's management direction and capacity to protect Alaska Native interests.

Cumulative Effects

Continuation of the current management under Alternative A (including ongoing cultural surveys, documentation efforts, and identification of cultural resources) would not be anticipated to contribute to cumulative adverse effects on cultural resources within the WSR corridor. This would include cultural resources that could be of interest to Tribes and tribal entities within the area.

Cumulative impacts on Alaska Native interests within the Nowitna WSR corridor under Alternative B would be similar to those described under Alternative A. Furthermore, over time, the greater emphasis put on knowledge gathering and local involvement and the consideration of user capacity in the CRMP would lead to more and better opportunities for stewarding the Nowitna WSR's cultural values that could be affected by reasonably foreseeable future actions. This includes those that could be of interest to Tribes and tribal entities. Under Alternative B, data gathering efforts across the Nowitna WSR corridor would, over time, allow the Service to better manage and protect resources and resource uses in the face of changing environmental conditions.

4.14 VISITOR USE

4.14.1 Affected Environment

Recreation and Visitor Access

The Nowitna WSR corridor possesses a combination of high-quality, remote, and undeveloped recreational opportunities. The primary purpose of most recreational visits is moose hunting. Other recreational opportunities include wildlife viewing, motorboating and floating, camping, photography, hiking, environmental education and interpretation, and agate rock hunting (USFWS 2009).

Water levels and river character vary notably along the Nowitna WSR's length and throughout the seasons, adding variety to recreational opportunities and recreational interest. The river's upper portion is fairly swift and narrow (less than 250 feet wide). The coarse, graveled bottom of the upper and middle portions usually averages 1 to 2 feet deep or less along riffles, and up to 6 feet deep in pools, which provides enough volume for nonmotorized boaters, except during dry periods. The middle portion widens slightly (200–250 feet wide) and meanders, with numerous gravel bars but few oxbows, offering high-quality camping opportunities. Here, the Nowitna WSR flows through a recreationally appealing canyon where the channel straightens, and large gravel, cobble, and bedrock are present on the river bottom. Below the canyon, the river slows and widens (200–450 feet wide) and the substrate is primarily sand and silt. The lower river meanders considerably, producing sandbars on the inside of bends, high cut banks on the outside of bends, and numerous sloughs and oxbow lakes. Stream depth in this location is quite variable, ranging from approximately 3 to 12 feet, with maximum depths up to 60 feet; this generally allows for motorized boating even in dry periods.

Summer access to the Nowitna WSR is generally via float plane or motorized boat from the Yukon River. Access by boat from the Alaska Highway System typically starts from the Dalton Highway Bridge located 140 road miles north of Fairbanks on the Dalton Highway, or from Nenana, which is 55 road miles south of Fairbanks on the Parks Highway. There is a boat launch and parking area just north of the Dalton Highway Bridge at milepost 56 of the Dalton Highway. The mouth of the Nowitna River is about 200 river miles downstream (ADFG 2024a). The mouth of the Nowitna River is approximately 250 river miles downstream of Nenana and 90 river miles downstream of the village of Tanana, where the Tanana and Yukon Rivers meet. Boaters typically launch from Nenana or the Dalton Highway Bridge, though in recent years it has become possible to launch from the end of the Tanana (Tofty) Road. The end of the Tanana Road is 50 road miles from Manley Hot Springs and 201 road miles from Fairbanks. The Yukon and Tanana Rivers and lower 40 river miles of the Nowitna River can be run by prop boats, if operated with caution. Winter access to the Nowitna WSR is typically by snowmachine or ski-equipped airplane.

There are no recreational facilities such as trails, roads, or other visitor amenities, within the WSR corridor. There are several Native allotments, trapping cabins, and one administrative cabin located along the Nowitna WSR. However, most of these are not visible and generally do not detract from the river's primitive shorelines and natural character. Outside the moose hunting season and summer boat traffic on the Yukon River, visitors are unlikely to encounter each other (USFWS 2009).

Hunting

Wildlife harvest opportunities in the Nowitna WSR corridor include hunting seasons for moose, wolves, bears, grouse, ptarmigan, and waterfowl under both State and federal regulations. Harvest of furbearers occurs under State regulations. The Nowitna WSR corridor lies entirely within Alaska Game Management Unit 21B. By far the most popular of these harvest opportunities on the Nowitna WSR is fall moose hunting, which is available to both resident and nonresident hunters within the corridor. These hunts are managed through permits that include State registrations, State drawing, and federal registration permits. There are three big game guide-use areas that include portions of the Nowitna WSR corridor. Only one of these guide-use areas currently has a permitted big game guide. Big game guides are required to report the number of clients, moose taken, and areas hunted (USFWS 2009).

Fall hunting activities along the Nowitna River are monitored at the Nowitna River moose hunter check station, which is typically operated between late August and October 1. This voluntary check station has

occurred annually since 1988, and it documents the number of hunters, hunter residence, and harvest of moose, bears, and wolves. Refuge staff and volunteers run the station; in 2010 and 2012, the Friends of Alaska National Wildlife Refuge oversaw volunteer recruitment (FANWR 2010, 2012). Between 1988 and 2023, an annual average of 123 moose hunters checked in to the Nowitna check station, with a minimum of 82 and maximum of 208. The number of moose harvested has averaged 41. The smallest seasonal harvest was 19, and the greatest number harvested was 56. The average hunter success rate has been 32 percent and has ranged between 18 and 44 percent (USFWS 2023).

Between 2003 and 2007, the moose population in Game Management Unit 21B was estimated to be approximately 4,049 ± 1,600 (ADFG 2024b). According to the Moose Trend Survey Summary (Bryant and Scotton 2021), the Nowitna moose population has been stable at a low density. Trend counts in the WSR corridor indicate cow numbers have declined in recent years and are well below average. Bull abundance is also down but considered healthy. Calf production and survival to fall improved in 2021 compared to a poor year in 2020, and are considered average. No additional hunting opportunities are warranted based on moose trend surveys, and a population estimate may be necessary (Bryant and Scotton 2021). In 2023, there was no winter moose hunt in Game Management Unit 21B due to hunting pressure and low population numbers (DOI 2023).

Trapping

Harvest of furbearers in the Nowitna WSR corridor is permitted under State trapping regulations. The Nowitna River corridor has been an important trapping area for centuries and was an important local source of income up until the past few decades. Most trapping is currently conducted by a few families with Native allotments or permitted cabins within or near the Nowitna WSR corridor.

Fishing

The most popular angling activity on the Nowitna WSR is fishing with rod and reel for northern pike and sheefish. Most sport fishing occurs within the lower 30 miles of the river and connected waters. In the past, the Service issued a small number of commercial use permits for guided fishing on the Nowitna WSR. Such permitted guides have primarily advertised opportunities to catch trophy-size northern pike. No permits have been issued since 2013.

4.14.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Alternative A would continue current management direction from the Revised CCP (USFWS 2009). Visitation would continue to be monitored using records from the Nowitna River moose hunter check station as well as from air taxi and guide reports. Under Alternative A, the Nowitna WSR corridor would not change. The WSR corridor would remain larger than what is allowed under the WSRA and ANILCA. The WSR corridor would continue to provide the visitor opportunities discussed above. Existing management direction would continue to protect the natural character of the river corridor. The existing guidelines for recreation described in the Revised CCP (USFWS 2009) would be applied. Hunting and fishing opportunities would depend on the health of moose populations and fisheries in the Nowitna WSR corridor. The condition of hunting and fishing opportunities would likely continue to persist as described under the affected environment.

Under Alternative A, the Service would not identify user capacities for the Nowitna WSR, nor establish specific indicators, triggers, thresholds, or monitoring protocols to respond to trends in resource conditions as they relate to visitor use.

Under Alternative A, compatible visitor uses would continue; these include recreational opportunities such as hunting, fishing, wildlife observation and photography, and environmental education and interpretation (USFWS 2009). Education would be the primary management tool for public use management, using brochures, maps, signs, and personal contacts (USFWS 2009). However, management could also include limiting commercial guiding and outfitting, regulating use and access, and recommending changes in State and/or federal fishing, hunting, and trapping regulations (USFWS 2009). Management and prioritization of public use opportunities in the Nowitna WSR would be subject to Nowitna NWR-level decision-making.

Under Alternative A, existing structures would continue to exist in the Nowitna WSR. Management of existing cabins and review of proposals for construction of new cabins for traditional uses would be in accordance with the Service's cabin regulations and regional cabin policy. Private, recreational-use cabins would not be authorized. The Nowitna WSR would continue to not have any designated trails, roads, or commercial facilities. Public access would continue to be limited to boating and fly-in access.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

The CRMP contains desired conditions, standards, and guidelines related to the protection and enhancement of visitor use on the Nowitna WSR. Desired conditions for public use would instruct the Service to protect the individual natural components that contribute to the outstanding recreational opportunities and a quality experience for visitors to the WSR corridor. The CRMP's standards and guidelines would operationalize these desired conditions by stating what the Service would do to maintain visitor access and public use.

The CRMP would include management direction on the type and amount of visitor use that can occur without adverse impacts on the ORVs, water quality, and the free-flowing condition of river area; the quality of visitor experience; and public health and safety. Since the current use levels in the Nowitna WSR corridor are relatively low and do not appear to be threatening river values, the Service would not take any immediate actions to reduce visitor capacity. Management of user capacity would be implemented after the Service sets up a monitoring program. This would ensure that any impacts that develop over time are detected and mitigated. Overall, Alternative B would not result in any short-term changes to visitor use and visitor services; however, in the longer term, Alternative B would continue to maintain the ORVs that provide for high-quality visitor use and visitor services.

Opportunities for visitor use under the CRMP would be the same as those under Alternative A. The natural character of the Nowitna River would continue to ensure the opportunities are unique and embody the values of the Nowitna WSR. Fishing, hunting, and other allowable uses named in the Revised CCP (USFWS 2009) would remain priority opportunities under the CRMP, as required by the National Wildlife Refuge System Improvement Act of 1997. The CRMP would detail desired conditions related to visitor use and access and develop a system to monitor and manage those opportunities. Because visitor use levels are not currently degrading resources in the Nowitna WSR, management would likely be implemented at the education level.

The CRMP would not negatively impact access to fishing, hunting, or other allowable uses in the Nowitna WSR corridor. The CRMP would result in similar opportunities for visitor use and access as those under Alternative A.

The CRMP would not include the creation of any new commercial or private facilities, access roads, cabins, or structures in the Nowitna WSR corridor. It would encourage the use of existing structures, as permitted. The CRMP would detail allowable uses regarding public facilities, and any changes or additions to facilities would follow a strict permitting process managed by the Service. This would not create any new access opportunities or recreational infrastructure, resulting in similar impacts on public use and visitor services as under Alternative A.

The CRMP would propose several monitoring actions to resolve any issues that affect public use in the Nowitna WSR corridor. These monitoring efforts would better protect the quality of the experience for river users, compared with Alternative A.

Cumulative Effects

Alternative A would have no impacts on visitor use and, therefore, would not contribute to cumulative impacts. Alternative B would not have noteworthy adverse impacts on visitor use and would not contribute to cumulative impacts. Furthermore, the additional monitoring under Alternative B would allow the Service to make better informed management decisions regarding any potential impacts on visitor experience from reasonably foreseeable future actions, including increases in levels of moose hunting or other visitor uses. An increase in visitor use on refuge lands could increase impacts related to trespass, litter, noise, and invasive species spread.

4.15 SOCIOECONOMICS

4.15.1 Affected Environment

The current socioeconomic conditions of the Nowitna NWR are described in terms of population demographics, employment, and economic activity. The socioeconomic region of influence is the Yukon-Koyukuk Census Area portion of the Unorganized Borough of Alaska, within which the Nowitna NWR is contained. More precisely, the boundaries of the Nowitna WSR corridor lie within two census block groups within this larger census area. Data on population demographics, employment, and economic activity were collected at this geographic level. State-level data are provided for comparison. According to recently reported census data on racial and ethnic diversity, which measures diversity by the chance that two randomly chosen people in a state will share the same race and ethnicity (Brooks 2021), Alaska is the twelfth-most diverse state in the country (USCB 2021) with a 62.8 percent chance of randomly selected individuals having different ethnicities, compared to the national percentage of 61.1.

In 2022, the most recent period for which comprehensive data are available, the census block groups containing the Nowitna NWR had a total population of 1,375, which was 0.19 percent of the total Alaska state population of 733,583 (USCB 2024a). Employment is a key economic indicator because patterns of growth and decline in a region's employment are largely driven by economic cycles and local economic activity. In 2022, the average annual unemployment rate for the Yukon-Koyukuk Census Area was 7.3 percent, which was almost twice the state level of 2.9 percent (USCB 2024b). In 2022, of the 2,358 total jobs in the Yukon-Koyukuk Census Area, employment in educational services, and health care and social assistance accounted for approximately 586 jobs (USCB 2024b), representing a quarter of total employment (25 percent). In 2022, jobs in forestry, fishing, and related activities accounted for

the greatest proportion of private sector employment (156 jobs), followed by retail trade (132 jobs); state and local government employment accounted for more than half of all employment in the Yukon-Koyukuk Census Area (1,471 jobs; BEA 2024).

The communities of Galena, Ruby, and Tanana on the Yukon River have been identified as populations dependent on subsistence use. Refer to **Section 4.12**, Subsistence, for more detailed information regarding subsistence resources and uses in these three communities.

Per capita income—an area's income divided by its population—can be used to compare incomes across geographies. In 2022, per capita income was $29,382 for the Yukon-Koyukuk Census Area, while per capita income for the state was $42,828 (USCB 2024b).

Reasonably foreseeable trends and planned actions within the socioeconomic region of influence include increasing levels of moose hunting (as recorded by entries in the Nowitna NWR moose hunter check station) and continued management of the Nowitna NWR, as well as any other federal and nonfederal activities not yet undertaken but likely to occur. The BLM Central Yukon Resource Management Plan, which was finalized in November 2024, provides management direction for actions related to mining and other upstream activities in the upper Nowitna River watershed that could affect downstream conditions, including Nowitna WSR river values (BLM 2024).

4.15.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Under Alternative A, there would be no direct changes to the socioeconomic conditions. Continued management of the Nowitna WSR corridor according to the Revised CCP (USFWS 2009) and ANILCA would not create changes in local socioeconomic conditions. Although increasing demand for public use may be anticipated, such an increase is not expected to notably contribute to local economies, either through direct spending or indirectly through increased employment in recreation-related supporting industries.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, the implementation of a CRMP is administrative in nature and does not involve any ground-disturbing activities. Therefore, it would not result in direct effects on local economies. Administrative actions to define goals, objectives, and strategies for protecting and enhancing the Nowitna WSR's ORVs would not measurably impact employment, income, or workforce levels.

Effects on local economies from the identification of any threats to and opportunities for stewarding the Nowitna WSR's values, including water quality monitoring, would be minimal. The implementation of a CRMP could contribute indirectly to the local economy through increases and decreases in local area spending associated with visitor use. However, such contributions are expected to be minimal. Similarly, minimal indirect effects on local economic activity would be expected from management that prohibits commercial timber salvage and commercial harvest of special forest products.

Cumulative Effects

Past, present, and reasonably foreseeable future actions that contribute to impacts on socioeconomic conditions include those from continued management of the Nowitna NWR and a potential increase in demand for visitor use of the Nowitna WSR. They also include the future management direction related

to mining and other upstream activities in the upper Nowitna River watershed provided by BLM's Central Yukon Resource Management Plan (BLM 2024).

The State has made high priority Statehood Act selections at the headwaters of the Titna River, Sethkokna River, Sulukna River, and several creeks, which feed into the Nowitna River. Those lands are expected to be conveyed to the State within 10 years and would change from management by the BLM to State management. These lands would likely become open to mineral entry and mineral leasing, as well as other land uses not allowed under current federal management. This could increase the jobs in the region, but Alternatives A and B are unlikely to materially add to this impact.

Recreation and mining are expected to continue as economic drivers, with jobs in forestry, fishing, and related activities continuing to contribute to the region's employment. Alternative B could result in less of a cumulative impact on socioeconomic conditions, relative to Alternative A, because it would emphasize ecological resiliency and resource protection. This emphasis would support the regional economy and local workforce.

4.16 CLIMATE

4.16.1 Affected Environment

The Nowitna WSR corridor experiences extreme seasonal solar radiation variability due to its high-latitude environment. Daylight hours vary from a minimum of about 4 hours in winter to more than 20 hours in summer (University of Alaska Fairbanks 2023). The Nowitna WSR corridor is inland with a continental climate (cut off from the ocean's moderating effects), which is characterized by large temperature variability, long and cold winters, warm and short summers, low humidity, and unpredictable precipitation. Summer maximum temperatures range from the upper 70 degrees Fahrenheit with extreme readings in the 90s. Winter temperatures may be minus 50 degrees Fahrenheit or lower for 2 or 3 weeks at a time. Lowlands experience frequent temperature inversions in winter (University of Alaska Fairbanks 2023). Fairbanks, which is approximately 190 air miles east of the Nowitna WSR corridor, has some of the world's strongest inversions, sometimes 30 to 40 degrees Fahrenheit colder at the ground than at several hundred feet aboveground (Wendler and Nicpon 1975).

Annual precipitation usually varies from about 10 to 30 inches with upland areas receiving more precipitation than lower areas. The seasonal precipitation pattern is normally at a minimum in spring and at a maximum in late summer. Summer thunderstorms are common over the hills and upland areas. Climate also strongly influences fire severity and frequency, with the greatest aerial extent of burning occurring in the hottest, driest years.

Annual average temperatures across Alaska increased at a rate of approximately 0.7 degrees Fahrenheit per decade between the late 1970s and 2016 (Reidmiller et al. 2018), and they have increased by about 3 degrees Fahrenheit since 1925 (NOAA 2023). Statewide average temperatures in Alaska have been increasing at an accelerated rate since 2013, with the warmest and second-warmest years on record being 2019 and 2016, respectively (NOAA 2023). A 2019 summer heatwave brought record-high temperatures to southern and interior Alaska with daily high temperatures exceeding normal by more than 20 degrees Fahrenheit (Huntington et al. 2023). Most of the warming in interior Alaska since 1976 has occurred in winter (approximately 7.7 degrees Fahrenheit) and spring (4.4 degrees Fahrenheit), with the least amount of change (2 degrees Fahrenheit) in the fall (UAF 2023).

In Alaska, annual precipitation has steadily increased since 1970, particularly in Interior Alaska (Grabinski and McFarland 2025). Interior Alaska's nine out of ten driest summers occurred before 1980. However, warmer summer temperatures and a longer growing season tend to increase evapotranspiration enough to outweigh a regional increase in precipitation, potentially resulting in drier conditions (Rupp and Springsteen 2009). Hotter, drier summer conditions have led to a shift toward more frequent large fire seasons in the past 20 years in Alaska (Grabinski and McFarland 2025). These changes may lead to greater dominance of deciduous trees on the landscape (Trainor et al. 2009).

4.16.2 Environmental Consequences

Direct and Indirect Effects from Alternative A—No Action Alternative

Alternative A would maintain the current management approach outlined in the Revised CCP (USFWS 2009). The Revised CCP (USFWS 2009) emphasizes maintaining healthy ecosystems to support resiliency and adaptation to change; however, it does not include targeted measures to improve climate monitoring.

Direct and Indirect Effects from Alternative B—Preferred Action Alternative

Under Alternative B, there would be little change to the climatic conditions experienced under Alternative A. However, through development of a climate monitoring strategy, this alternative would provide the best management option for anticipating and responding to abiotic changes that have the potential to affect river values.

Under Alternative B, the Service would implement additional monitoring efforts within the Nowitna WSR corridor to improve scientific knowledge of permafrost, hydrology, fire ecology, and soils, leading to more informed management decisions (refer to **Section 4.11**, Soils and Permafrost). Alternative B would aim to maintain the natural biological diversity and integrity of plant communities (refer to **Section 4.9**, Vegetation).

Cumulative Effects

Alternative A would have no impacts on climate and, therefore, would not contribute to cumulative impacts. Alternative B would also have no cumulative impacts on climate. Alternative B would emphasize ecological resiliency and resource protection and include additional abiotic monitoring that would allow the Service to make better informed management decisions that maintain natural resources while facilitating continued visitor use.

Chapter 5. List of Preparers and Sources

5.1 List of Preparers

An interdisciplinary team of staff from the Service and AECOM prepared this CRMP and EA. The following tables contain people who prepared or contributed to this CRMP and EA.

Table 5-1. List of Preparers–Service

Team	Name	Role/Responsibility
Management	Karin Bodony	Biologist/environmental educator, ORV background
	Douglas Calvin	Deputy Refuge Manager (former)
	Nicole Gustine	Project manager
	David Zabriskie	Refuge Manager (former)
Interdisciplinary	Jake Adams	Archaeology, cultural
	Randy Brown	Fisheries
	Greta Burkart	Water resources
	Jon Gerken	Fisheries
	Hunter Gravley	Vegetation
	Ray Hander	Fisheries
	Jeremy Havener	Subsistence
	Jeremy Karchut	Archaeology, cultural
	Robbin Lavine	Subsistence
	Andrea Medeiros	Communication strategies
	Scott McGee	GIS, landownership
	Meg Perdue	Water quality
	Jennifer Reed	Visitor use
	Wyatt Snodgrass	Fisheries
	John Trawicki	WSR policy, water resources
	Shane Walker	Refuge planning
	Michael Winfree	Water rights
	Emily Yurcich	Climate, Refuge planning

Table 5-2. List of Preparers–AECOM (Consultant)

Team	Name	Role/Responsibility
Management	Brandt Bates	Deputy project manager, WSR
	Derek Holmgren	Project manager
Interdisciplinary	Jared Baxter	Lands and realty and recreation
	Beth Boatright	Technical editor
	Noelle Crowley	Scenic resources, recreation and visitor services
	Kevin Doyle	Cultural, tribal, and subsistence
	Rob Lavie	GIS specialist
	Perry Lown	Cultural, subsistence, and Alaska Native interests
	Nicole Morris	Wildlife, vegetation, and fisheries
	Kim Murdock	Technical editor
	Allison Piazzoni	Scenic resources, recreation and visitor services
	Shine Roshine	Air quality and climate
	Eddie Sanchez	Decision file
	Cindy Schad	Word processing
	Josh Schnabel	Socioeconomics
	David Scott	Water resources and quality, soils, and permafrost
	Andy Spellmeyer	Section 508 compliance
	Megan Stone	Subsistence and Alaska Native interests
	Morgan Trieger	Wildlife, vegetation, and fisheries

5.2 LIST OF SOURCES CONSULTED

Chapter 2, Involvement, Consultation, and Coordination, describes the Tribes; federal, state, and local agencies; and other individuals consulted during the CRMP and EA drafting and review process, including the individuals in the following table.

Table 5-3. List of Individuals Consulted

Name	Organization
Tirzah Bryant	Louden Tribe
David Esse	BLM – Central Yukon Field Office
Jeff Fisher	State of Alaska – Department of Environmental Conservation
Catherine Heroy	State of Alaska – Department of Natural Resources
Cade Kellam	ADFG
Terri Lomax	State of Alaska – Department of Environmental Conservation
Sarah Meitl	State of Alaska – Office of History and Archaeology
Jennifer Nolanwing	ADFG
Glenn Stout	ADFG
Lisa Stuby	ADFG
Noel Turner	BLM – Central Yukon Field Office

Appendix A

CCP Amendment Memorandum

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United States Department of the Interior
U.S. FISH AND WILDLIFE SERVICE
Koyukuk/Nowitna National Wildlife Refuge
P.O. Box 287
Galena, Alaska 99741

Memorandum

To: Regional Refuge Chief

Through: Refuge Supervisor

From: Project Leader, Koyukuk/Nowitna National Wildlife Refuge; Galena, Alaska

Subject: Amendment to 2009 Revised Comprehensive Conservation Plan for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges

Policy

The U.S. Fish and Wildlife Service (Service) prepares step-down management plans when required by policy (602 FW 4) or when they may be necessary to provide more detailed objectives, strategies, and/or implementation schedules for meeting the management direction identified in a Comprehensive Conservation Plan (CCP). The Service developed a Comprehensive River Management Plan (CRMP) for the Nowitna Wild and Scenic River (WSR) in accordance with the Wild and Scenic Rivers Act and the Alaska National Interest Lands Conservation Act (ANILCA).

The CRMP is a step-down management plan that does not alter the original intent of any part of the CCP and is considered an amendment to the CCP. This is the first Nowitna WSR CRMP, as one was not developed during the original 1987 Nowitna CCP or the Revised CCP for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges (Revised CCP) in 2009, though the designation was recognized, and an attempt was made to identify outstandingly remarkable values (ORVs) in the CCPs.

Revised Comprehensive Conservation Plan Compliance

The CRMP expands on the following in the Revised CCP:

> "*Goal 8: Maintain the special values of the Nowitna Wild River and Koyukuk Wilderness and the wild character of the Refuge.*
>
> *Objective 1: Continue to monitor activities on the Nowitna Wild River and in the Koyukuk Wilderness for compliance with the Wild and Scenic Rivers Act (WSRA) and Wilderness Act and ANILCA. If problems are detected, appropriate actions would be taken."*

The CRMP expands on the above goal and objective to further identify specific goals, desired conditions, objectives, and strategies to protect and enhance river values, including working with partners to increase data collection and address known data gaps to better steward the Nowitna WSR.

Rationale for Changes

1. The name change from the Nowitna Wild River to the Nowitna Wild and Scenic River reflects the nomenclature identified in the Service's Wild and Scenic River policy (611 FW 3). This nomenclature refers to the inclusion of the Nowitna River in the Wild and Scenic Rivers System and does not affect the river's classification, which pertains to the level of development of the river and the land within its corridor.
2. The length of the Nowitna WSR changed from 223 to 220 miles because the Service used high-resolution satellite imagery and geographic information system (GIS) software to create a digital representation of the river's centerline for the CRMP. At the time of designation, the length of the Nowitna was not specified and only the start and end points were identified. It is likely that U.S. Geological Survey topographic maps were used to estimate the river length at 223 miles in the CCP. The mileage change is more accurate and uses current mapping capabilities that were not available when the CCP was developed.
3. The identified ORVs of the Nowitna WSR changed from scenery, geology, hydrology, fish, wildlife and habitats, cultural/historic/prehistoric, subsistence, and recreation to ecology, fish, cultural, and scenery. The changes to the ORVs resulted from using the Interagency Wild and Scenic Rivers Coordinating Council's guidelines and working with cooperating agencies, residents of local communities, and members of local tribal organizations to identify and describe the ORVs.

Revised Comprehensive Conservation Plan Amendment

Through this memorandum, the Service amends the CCP to incorporate the following changes as identified in the Nowitna WSR CRMP. Amendments to the CCP are indicated with strikethrough and re-written in underlined text:

Replace all instances of "Nowitna Wild River" with <u>Nowitna Wild and Scenic River</u>.

1.4 Refuge Purposes (page 1-10)

~~The lower 223 miles of the Nowitna River is managed as a Wild River under the Wild and Scenic Rivers Act. This segment of the river was recognized for its scenic, geologic, wildlife, historic, and recreational values.~~

The lower <u>220</u> miles of the Nowitna <u>Wild and Scenic</u> River are managed as a <u>wild river</u> under the Wild and Scenic Rivers Act. This segment of the river was recognized for its <u>ecology, fish, cultural, and scenery outstandingly remarkable</u> values.

Figure 2-3. Nowitna Management Categories (page 2-19)

Replace map with the wild and scenic river corridor and updated acreage included in the CRMP.

2.3.5 Wild and Scenic Rivers (page 2-22)

~~The lower 223-mile section of the Nowitna River corridor has been designated as a Wild River~~

~~within the Nowitna Refuge. The river contains outstandingly remarkable scenic, geologic, hydrologic, fish and wildlife, cultural, historic, and recreational values identified informally by refuge staff during this planning process:~~

- ~~scenic - forested river corridor, diverse landscape, and different examples of succession;~~
- ~~geologic – agates;~~
- ~~hydrologic - free-flowing state, oxbow lakes, and wetlands;~~
- ~~fisheries – sheefish and whitefish populations;~~
- ~~wildlife and habitats - nationally significant species of migratory waterfowl and large game;~~
- ~~cultural/historic/prehistoric - transportation corridor and abandoned camps;~~
- ~~subsistence - hunting, trapping, house logs, berry picking, and firewood;~~
- ~~recreational - hunting, fishing, wildlife observation and photography, floating, fishing, and camping trips.~~

The lower 220-mile section of the Nowitna Wild and Scenic River corridor was designated as a wild river within the Nowitna Refuge. The outstandingly remarkable values for the Nowitna Wild and Scenic River are:

- Ecology – The ecology ORV recognizes the relationship between the river's geology, hydrology, plant communities, and wildlife and acknowledges that these features are deeply interconnected and together create a unique example of boreal riparian ecology. The Nowitna WSR's notable species richness and abundance are due in part to the river's unique geology. Dissolved carbonates and bicarbonates carried downriver from the limestone bedrock in the river's headwaters are washed into floodplain lakes and sloughs during spring ice-jam flooding. The carbonates buffer the pH of the naturally acidic wetland waters, making them less acidic and more productive than many other areas in Alaska. These conditions contribute to the presence of outstanding habitat for plants and wildlife including waterfowl, moose, furbearers, larch, and white spruce in the Nowitna WSR corridor. Taken as a whole, the diverse and abundant assemblage of boreal species is unique statewide and a defining characteristic of the Nowitna WSR.
- Fish – The Nowitna WSR supports a remarkably diverse assemblage of fish species. At least 19 fish species have been documented in the Nowitna WSR corridor, surrounding wetlands, and tributaries. The river is a migration corridor to one of only six known sheefish spawning areas in Alaska, thus providing fish habitat that is rare in the Arctic-Yukon-Kuskokwim Region. It also provides exceptionally high-quality foraging habitat and is a continentally important migration corridor for populations of Chinook, coho, and chum salmon. Other species of whitefish as well as resident Dolly Varden, Arctic grayling, and northern pike flourish in the Nowitna WSR and its tributaries. The river's role in the life cycles of such a diversity and abundance of fish, particularly sheefish, is exceptional and rare to find anywhere else in Alaska.
- Cultural – The cultural ORV encompasses many aspects of the relationship between humans and the Nowitna WSR in the past, present, and future. This ORV acknowledges the deep heritage and diverse cultural contributions that have developed through human use of the river and that are part of a long continuum extending from the distant past to

future generations. The cultural ORV includes activities such as boating, camping, hunting, and fishing in the river's remote, undeveloped setting. By encompassing the full range of human interactions with the Nowitna WSR and its resources in the past, present, and future, the cultural ORV recognizes an enduring relationship between humans and the environment that is exemplary in the state.

- Scenery – The scenery of the Nowitna WSR is exceptionally beautiful and diverse and is exemplary of an Interior Alaska river. The entire Nowitna WSR corridor provides excellent examples of a variety of boreal habitats and landscapes at many stages of riparian and post-fire succession. Remote and pristine qualities of the watershed contribute to the impact of the visual experience. The presence of such outstanding scenic diversity over relatively short distance is exceptional. The scenic qualities of the Nowitna WSR are a result of the river's diverse course and geologic setting and are considered exemplary in Alaska's boreal region.

3.5.8 Nowitna River Unit (Nowitna) (page 3-82)
~~The dominant feature of this 325,000-acre unit is the 223-mile segment of the Nowitna River that was designated by ANILCA as a Wild River in the National Wild and Scenic River System.~~

The dominant feature of this 325,000-acre unit is the 220-mile segment of the Nowitna Wild and Scenic River that was designated by ANILCA as a wild river in the National Wild and Scenic River System.

Figure 3-13. Nowitna Wild River Corridor (page 3-85)
Replace map and with the final wild and scenic river corridor map included in the CRMP.

Revised Comprehensive Conservation Plan Decision Summary (separate document that summarizes the Revised CCP)

~~*"Goal 8: Maintain the special values of the Nowitna Wild River and Koyukuk Wilderness and the wild character of the Refuge.*~~

~~*Objectives: Continue to monitor activities on the Nowitna Wild River and Koyukuk Wilderness for compliance with the Wild and Scenic Rivers and Wilderness acts and ANILCA; take appropriate action if noncompliance is identified."*~~

"Goal 8: Maintain the special values of the Nowitna Wild and Scenic River, and Koyukuk Wilderness and the wild character of the Refuge.

Objectives: Continue to monitor activities on the Nowitna Wild and Scenic River and Koyukuk Wilderness for compliance with the Wild and Scenic Rivers and Wilderness acts and ANILCA; take appropriate action if noncompliance is identified."

Appendix B

Section 810 Analysis

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Nowitna National Wildlife Refuge Evaluation of the Effects on Subsistence Use and Needs

ANILCA Section 810 Evaluation and Finding for Nowitna WSR Comprehensive River Management Plan and Environmental Assessment

I. Introduction

To comply with Title VIII, Section 810, of the Alaska National Interest Lands Conservation Act (ANILCA), this summary evaluates the potential restrictions to subsistence activities that could result from the proposed action. The proposed action is the preferred alternative (Alternative B), which will implement a Comprehensive River Management Plan (CRMP) for the Nowitna Wild and Scenic River (WSR).

II. Evaluation Process

Section 810 of ANILCA requires an evaluation of the effects on subsistence uses for any action to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands. The evaluation consists of three parts:

- A finding of whether or not a proposed action would have a significant restriction on subsistence uses
- A notice and hearing if an action is found to have a significant restriction on subsistence uses
- A three-part determination prior to authorization of any action, if there is a significant restriction on subsistence uses.

III. Proposed Action on Federal Lands

The proposed action is to implement a CRMP that protects the Nowitna WSR river values in accordance with the Wild and Scenic Rivers Act (WSRA) and ANILCA. Alternative B, the preferred action alternative, would expand on the existing management direction identified in the Revised Comprehensive Conservation Plan for the Koyukuk/Northern Unit Innoko/Nowitna National Wildlife Refuges (Revised CCP; USFWS 2009) to further identify goals, desired conditions, objectives, and strategies to protect and enhance river values. This alternative also identifies opportunities to work with partners to increase data collection and address known data gaps to better steward the Nowitna WSR. More information can be found in Section 3.2.2 of the Nowitna CRMP Environmental Assessment (EA).

IV. Affected Environment

Game Management Unit 21B encompasses the lands managed by the U.S. Fish and Wildlife Service (Service) within the Nowitna WSR corridor except for private inholdings (Native allotments and village corporation lands). Most of the lands within the Nowitna WSR corridor are federal public lands available for subsistence use by qualified rural residents. Subsistence resources including fish, wildlife, and vegetation are harvested by subsistence users for many purposes, including food, fuel, arts and crafts, tools, clothing, and traditional cultural practices.

People most affected by the proposed action live in the communities of Galena, Ruby, and Tanana and use the Nowitna WSR corridor for subsistence resource use (ADFG 2021). Galena residents' subsistence harvests in the Nowitna WSR corridor include moose and fish, as well as berries and greens (Brown et al. 2015). Residents in Ruby mainly gather subsistence resources along the Yukon River corridor; however, the Nowitna WSR is also used for subsistence activities (USFWS 2009) and many Ruby residents have ancestral ties to the river. Subsistence resource use by Ruby residents includes moose hunting along much of the Nowitna WSR corridor (Brown et al. 2015). Areas recognized for subsistence harvest of small land mammals, berries, and greens are present in the north end of the Nowitna WSR corridor. According to 2014 ADFG community harvest data, salmon composed the greatest portion (by weight) of subsistence resources harvested by Tanana residents, followed by non-salmon fish, large land mammals, plants and berries, and migratory birds (Brown et al. 2016). Areas used by Tanana residents for subsistence include moose hunting areas along much of the Nowitna WSR corridor. Ptarmigan and grouse hunting areas are also present near the Nowitna River. Smaller areas located on Nowitna WSR tributaries have historically been used and continue to be used by Tanana residents to harvest plants and berries (Brown et al. 2016).

More information on subsistence resources and uses is described in Chapter 2.4.12 of the Revised CCP for the Koyukuk, Northern Unit Innoko, Nowitna National Wildlife Refuges (USFWS 2009) and Chapter 4.12 of the Nowitna CRMP EA.

V. Subsistence Uses and Needs Evaluation

To determine the potential impact of the proposed Nowitna CRMP on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources that could be impacted. The evaluation criteria are as follows:

- the potential to reduce important subsistence fish and wildlife populations by (a) reductions in numbers, (b) redistribution of subsistence resources, or (c) habitat losses;
- what affect the action might have on subsistence fisher or hunter access; and
- the potential for the action to increase fisher or hunter competition for subsistence resources.

<u>Alternative B (Preferred Action Alternative)</u>

The proposed action is not expected to cause a significant decline of wildlife species or displacement of subsistence resources in the Nowitna WSR corridor. Alternative B would expand on the existing management direction by implementing a plan to protect and enhance the river values of the Nowitna WSR. This includes management direction, actions, and monitoring of fish and wildlife species. The CRMP identifies additional data collection that would increase fish and wildlife scientific information and thereby contribute to a better understanding of subsistence resources abundance and availability.

The proposed action is not expected to significantly restrict current subsistence access. Implementation of the CRMP would not be anticipated to impact access to subsistence resources. The creation and implementation of the Nowitna WSR CRMP would aid the refuge in meeting

its assigned purposes of providing the opportunity for continued subsistence use though its conservation of fish and wildlife populations and habitats in their natural diversity.

The proposed action is not expected to significantly restrict or increase competition for subsistence resources in the Nowitna WSR corridor. Most of the use on the Nowitna WSR occurs during the fall moose hunting season and includes both a State of Alaska hunting season and a federal subsistence season. The Federal Subsistence Board is responsible for managing subsistence hunting and fishing, and the Alaska Board of Game and Alaska Board of Fisheries are responsible for managing general hunting and fish harvest. Since 1988 all moose hunting activities along the Nowitna River have been monitored at the Nowitna River moose hunter check station. An annual average of 19 local resident hunters and 110 nonlocal hunters have checked in during the fall season (1988–2023). In 2023, 15 percent of the hunters were local residents of Galena, Ruby, and Tanana. Of the remaining hunters, 48 percent were from Fairbanks and 37 percent were other residents (from Anchorage, Juneau, Wasilla, etc.) (USFWS 2023). While competition between subsistence users and recreational hunters exists on the Nowitna WSR, the proposed action includes a visitor use management strategy that would monitor use trends, including potential competition for subsistence resources.

VI. Availability of Other Lands

The Nowitna WSR CRMP considers options for management of lands currently designated as a National WSR in compliance with the WSRA and ANILCA. Therefore, no other lands are available for consideration.

VII. Alternatives Considered

The proposed action is to implement a management plan to protect and enhance the river values of a designated WSR. The Nowitna CRMP EA analyzes the management plan's effect on subsistence resources and uses with public input. To date, no Tribal consultation has been requested.

No other alternatives were identified that would reduce or eliminate the need for the proposed action because the management plan is required by the WSRA and ANILCA.

Findings

This analysis concludes that Alternative B will not result in a significant restriction of subsistence uses for the communities of Galena, Ruby, and Tanana.

Supporting Documents

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Appendix C

Acronyms and Abbreviations

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
µS/cm	microsiemens per centimeter
ADFG	Alaska Department of Fish and Game
ANC	Alaska Native corporation
ANCSA	Alaska Native Claims Settlement Act
ANILCA	Alaska National Interest Lands Conservation Act
BLM	Bureau of Land Management
CCP	comprehensive conservation plan
CFR	Code of Federal Regulations
CRMP	comprehensive river management plan
EA	environmental assessment
EPA	Environmental Protection Agency
GIS	geographic information system
mg/liter	milligrams per liter
NEPA	National Environmental Policy Act
Nowitna CCP	Nowitna National Wildlife Refuge Final Comprehensive Conservation Plan
NRHP	National Register of Historic Places
NTU	nephelometric turbidity units
NWR	National Wildlife Refuge
NWSRS	National Wild and Scenic Rivers System
ORV	outstandingly remarkable value
PLSS	Public Land Survey System
Revised CCP	Revised Comprehensive Conservation Plan for the Koyukuk, Northern Unit Innoko, and Nowitna NWRs
Service	United States Fish and Wildlife Service
USC	United States Code

WSR	wild and scenic river
WSRA	Wild and Scenic Rivers Act

Appendix D
Glossary

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Archaeological resources: Any material remains of past human life or activities that are of archaeological interest, including pottery, basketry, bottles, weapons, weapon projectiles, tools, structures or portions of structures, pit houses, rock paintings, rock carvings, intaglios, graves, and human skeletal materials that are at least 100 years of age (as defined in the Archaeological Resources Protection Act of 1979).

Cultural resources: A broad term used to refer to the diverse human record found in sites, structures, objects, and places created and/or used by people. It is inclusive of a wide variety of resources, including, but not limited to, archaeological sites, isolated artifacts, features, records, manuscripts, historical sites, and traditional cultural properties.

Free-flowing: The condition of a river, or section of a river, moving in a natural condition without impoundment, diversion, straightening, riprapping, or other modification of the waterway. A river must be in a free-flowing condition to be eligible for inclusion in the National Wild and Scenic Rivers System.

Historic Property: Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian Tribe or Native Hawaiian organization that meet the National Register criteria (as defined in the National Historic Preservation Act and its implementing regulations found at 36 CFR 800.16(l)(1)).

Monitoring: Evaluation of the condition of river value-related indicators to determine whether they are protected and enhanced or to detect adverse impacts and to inform the need for adaptive management actions.

Objective: A concise statement of what the Service wants to achieve, how much the Service wants to achieve, when and where the Service wants to achieve it, and who is responsible for the work. An objective is derived from goals and provides the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. All objectives must be specific, measurable, achievable, results oriented, and time fixed.

Outstandingly remarkable value (ORV): A scenic, recreational, geological, fish and wildlife, historical, cultural, or other similar river-related value that is a unique, rare, or exemplary feature and is significant when compared with similar values from other rivers at a regional or national scale.

Ordinary high-water mark: That line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (33 CFR Part 328.3(e)).

Public use: Visitor use and WSR-specific administrative use within a WSR corridor.

River corridor: A river and the adjacent area within the boundaries of a designated river, or a river and the adjacent area generally within one-quarter mile of the banks of a congressionally authorized study river. This includes portions of undesignated tributaries within the corridor.

River values: The values for which a river is designated or congressionally authorized for study. These are the river's free-flowing condition, water quality, and ORVs.

Section 7 determination: The official finding of a Section 7 evaluation. The finding either approves or prohibits a project based on the appropriate evaluation standard. A determination is usually documented as the last section of a Section 7 evaluation and is also transmitted in a memorandum or letter to the federal assisting agency.

Section 7 evaluation: An evaluation that determines whether hydropower project works licensed by the Federal Energy Regulatory Commission would be located on or directly affecting a WSR, and which analyzes the effects of proposed federally assisted water resources projects on WSRs. Federal actions may not proceed unless the WSR-administering agency has determined in writing that the proposed project fully meets the requirements of the WSRA.

Subsistence uses defined in ANILCA, Title VIII, Section 803: The "customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Strategy: A specific action, tool, technique, or combination of actions, tools, and techniques used to meet objectives.

Traditional cultural properties: Resources associated with the cultural practices, traditions, beliefs, arts, crafts, or social institutions of a living community (USFWS 2016). Traditional cultural properties are also considered historic properties.

User/visitor capacity: The maximum amounts and kinds of public use that a WSR collectively or by analysis area can accommodate without degrading river values.

Visitor experience: The perceptions, feelings, and reactions that a visitor has before, during, and after a visit to an area.

Visitor use: Human presence in an area for recreational purposes, including education, interpretation, inspiration, and physical and mental health. Visitor use also includes hunting, fishing, and other resource harvest.

Visitor use management: The proactive and adaptive process for managing characteristics of visitor use and the natural and managerial setting using a variety of strategies and tools to achieve and maintain desired resource conditions and visitor experiences.

Wild (WSR classification): Rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These rivers represent vestiges of primitive America.

Wild and scenic river (WSR): A river and the adjacent area within the boundaries of a component of the National Wild and Scenic Rivers System.

WSR-administering agency: One of the four federal land management agencies that may be charged with administration of a component of the National Wild and Scenic Rivers System. These agencies are the Bureau of Land Management, National Park Service, Service, and U.S. Forest Service.

WSR-specific administrative use: Use within a WSR corridor by the river manager, including ranger patrols, maintenance activities, field research, staff visits to administer contracts or facilities, search and rescue, and interpretative programs for the purpose of protection or enhancement of river values.

Appendix E
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