Environmental Assessment for Fishing Program at Marin Islands National Wildlife Refuge

August 2019

This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposed action and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (43 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment.

Proposed Action

The U.S. Fish and Wildlife Service (Service) is proposing to open fishing opportunities on the 80 acres of Service owned tidelands on the Marin Islands National Wildlife Refuge (NWR or Refuge). In 2006, the U.S. Fish and Wildlife Service (Service) prepared a final Comprehensive Conservation Plan and Environmental Assessment (CCP/EA) for the Refuge. This Draft EA is tiered from the 2006 CCP/EA and focuses specifically on opening the Service owned tidelands surrounding the Marin Islands to sport fishing. Sport fishing would be permitted by boat in accordance with State Saltwater Fishing Regulations. East and West Marin Islands would remain closed to public access.

This proposed action is often iterative and evolves over time during the process as the agency refines its proposal and learns more from the public, tribes, and other agencies. Therefore, the final proposed action may be different from the original. The final decision on the proposed action will be made at the conclusion of the public comment period for the EA and the Draft 2019-2020 Refuge-Specific Hunting and Sport Fishing Regulations.

Background

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purpose(s) of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The refuge was established pursuant to authority of the Fish and Wildlife Act of 1956 and the Migratory Bird Conservation Act. The primary purposes of the refuge are:

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources…" 16 USC 742f (a)(4) and "...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude…" 16 USC 742f (b)(1) (Fish and Wildlife Act of 1956).

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is to:

"... 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"

The NWRSAA mandates the Secretary of the Interior in administering the System to (16 U.S.C. 668dd (a)(4):

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
- Ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans;
- Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;
- Ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the States in which the units of the NWRS are located;
- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the NWRS and the purposes of each refuge;
- Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife;
- Ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses; and
- Monitor the status and trends of fish, wildlife, and plants in each refuge.

Therefore, it is a priority of the Service to provide for wildlife-dependent recreation opportunities, including hunting and fishing, when those opportunities are compatible with the purposes for which the refuge was established and the mission of the National Wildlife Refuge System.

The Refuge is also within the North American Bird Conservation Initiative's Coastal California Region. The area surrounding the Refuge is heavily urbanized and the nearby waters attract recreational and commercial boating. The islands of the Refuge are officially closed to the public in order to protect sensitive resources such as nesting heron and egret rookeries, despite occasional illegal trespassing by some recreational boaters.

Purpose and Need for the Proposed Action

The purpose and need for this proposed action is to provide compatible wildlife-dependent recreational opportunities on Marin Islands NWR. The need of the proposed action is to meet the Service's priorities and mandates as outlined by the NWRSAA to "recognize compatible wildlife-dependent recreational uses as the priority general uses of the NWRS" and "ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses." 16 U.S.C. 668dd (a)(4)). The purpose and need for the action is tied to the management direction adopted in the 2006 CCP/EA. Goal 2 of the CCP/EA is to provide visitors with compatible wildlife-dependent recreation and educational opportunities to foster an understanding and appreciation of San Francisco Bay native wildlife and plant communities (USFWS 2006).

Alternatives Considered

Alternative A – Proposed Action Alternative:

The refuge has prepared a fishing plan (Appendix I), which is presented in this document as the Proposed Action Alternative.

Under the Proposed Action Alternative, sport fishing would be permitted from a boat on designated areas of the Refuge, specifically on the 80 acres of tidelands owned by the Service, consistent with State Regulations (see Figure 1). Sport fishing would be allowed year round in accordance with State and Federal regulations. Fishing would be permitted by motorized, wind, or human-powered boats. Fishing brochures would be provided at local marinas specifying restrictions and the sensitive nature of the islands and restrictions.

Refuge-specific regulations will be published in the Federal Register as part of the 2019-2020 Refuge-Specific Hunting and Sport Fishing Regulations.

Mitigation Measures to Avoid Conflicts:

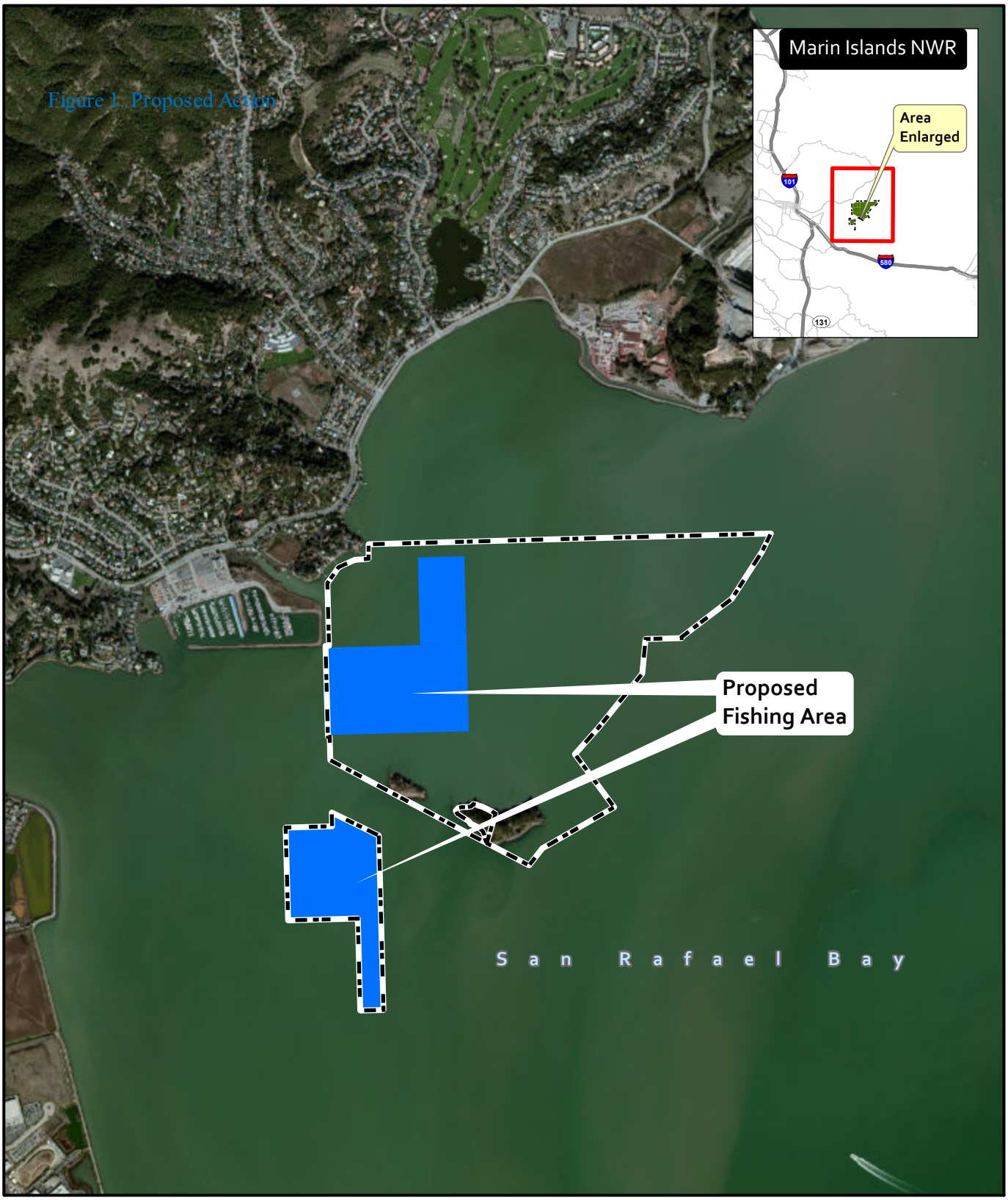
- No mitigation measures are needed to avoid conflicts to other biological resources on the refuge. The Proposed Action restricts fishing on the tidelands to boat only. Both East and West Marin Islands are closed to the public to protect wildlife that use these islands. Signage is posted along the shoreline of both islands noting this restriction.

This alternative offers increased opportunities for public hunting/fishing and fulfills the Service's mandate under the National Wildlife Refuge System Improvement Act of 1997. The Service has determined that the fishing plan is compatible with the purposes of the Marin Islands NWR and the mission of the NWRS.

Alternative B – No Action Alternative:

Under the No Action alternative the Service would not open 80 acres of Service owned tidelands to sport fishing. Public access to the Refuge is limited to staff-led tours on East Marin Island (no more than six times per year) and to native plant restoration work parties led by a non-profit group. The Refuge is closed to the public to minimize disturbance to wildlife. It should be noted that fishing from boats

Figure 1. Proposed Sport Fishing Area



Produced in the Division of Natural Resources
Saramento, California
Produced: February 5, 2019
Basemap: ESRI World Imagery (Clarity):

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existed in the area prior to the Refuge's establishment and continues today, although the Service did not formally open the Refuge to fishing.

Affected Environment

The discussion of the affected environment and the impact analysis that follows, focuses specifically on opening the Refuge owned tidelands to sport fishing. Because the Proposed Action would not physically alter the landscape of East or West Marin Islands and because fishing is an activity that occurred prior to Refuge establishment and continues today, the following resources were not evaluated in this EA: Hydrology; Water Quality and Contaminants; Geology and Soils; Air Quality; Hazardous Materials; Vegetation; Cultural Resources; Social and Economic Environment. For information related to the Refuge environment in general please see Chapter 3 of the Final CCP for the Marin Islands CCP (USFWS 2006) (https://www.fws.gov/refuge/Marin_Islands/planning.html)

Marin Islands NWR is located in the San Rafael Bay, within the city limits of San Rafael, Marin County, California. The Refuge boundary encompasses 339.29 acres of submerged tidelands and two islands. East Marin Island is 10.28 acres and West Marin Island is 2.8 acres. West Marin Island is home to one of the largest heron and egret colonies in northern California. The Service took ownership of the eastern portion of East Marin Island and approximately 80 acres of tidelands. The California State Land Commission took ownership of the remaining tidelands within the approved refuge boundary. The California Department of Fish and Wildlife (CDFW) owns West Marin Island and the western portion of East Marin Island.

The Refuge was established to provide wintering habitat for migratory birds and nesting habitat for waterbirds. It was established as a joint NWR and State Ecological Reserve (SER) with day-to-day management provided by the Service under a memorandum of understanding with the California Department of Fish and Wildlife (CDFW).

The Refuge's two islands and surrounding tidelands are located in San Rafael Bay near the city of San Rafael, which is the closest mainland location. The Refuge is also within the coastal California North American Bird Conservation Region. The area surrounding the Refuge is heavily urbanized and the nearby waters attract recreational and commercial boating. Access to the islands is limited to staff-led tours and native plant restoration work parties led by a non-profit group. However, occasional illegal trespassing does occur by some recreational boaters.

The Marin Islands NWR are located in the San Rafael Bay which is within the larger San Francisco Estuary. The San Francisco Estuary encompasses the San Francisco Bay and the Delta of the Sacramento and San Joaquin rivers in California. The Estuary waters and wetlands provide critical winter feeding habitat for over a million migratory birds, a productive nursery for many species of juvenile fish and shellfish, and a year-round home for a vast diversity of plants and animals (San Francisco Estuary Partnership 2019).

Fish and Wildlife:

The San Francisco Bay is important habitat for more than 100 fish species, including commercially important Chinook salmon, popular sport fishes like striped bass and white sturgeon, and estuary-dependent species like the delta smelt. These fishes variously use the estuary for spawning, nursery and rearing habitat, and as a migration pathway between the Pacific Ocean and the rivers of the estuary's watersheds (Swanson et al 2015). The San Francisco Bay consists of the following four smaller bays: Suisun Bay; San Pablo Bay (also referred to as the North Bay); Central Bay; and South Bay. The San Rafael Bay is in the northern portion of the Central Bay which is the deepest and saltiest of the four bays.

The conditions and trends of the Bay fish community differ among the four sub-regions. According to the 2015 State of the Estuary Report (Swanson et al 2015), abundance, diversity, species composition and distribution are all highest in the Central and South Bays, where overall conditions (as expressed through the regional Fish Index) were consistently classified as "good." Within the San Rafael Bay, a variety of fish species have been sampled including striped bass (*Morone saxatilis*), starry flounder (*Platichthys stellatus*), and white sturgeon (*Acipenser Transmontanus*). A list of fish species that can be found in the San Rafael Bay is provided in Appendix E of the 2006 CCP/EA (USFWS 2006). Sensitive fish species are described in section 3.2.

The striped bass is a popular sport fish that was introduced to the San Francisco Bay Estuary over 125 years ago (USFWS 2011). Striped bass move readily between salt and freshwater spending most of their lives in estuaries. Bass spawn in rivers and juveniles rear in fresh and brackish waters. The CDFW conducts a Fall Midwater Trawl and the 2017 Fall Season Report indicates that the Striped Bass 2017 index was the highest since 2001 (IEP 2017). Striped bass are mostly collected in Suisun Bay and, to a lesser extent, San Pablo Bay and rarely found in the Central and South Bays (Swanson et al 2015).

The starry flounder is an estuary-dependent species that spawns in the ocean but rears in brackish and freshwater areas (USFWS 2011). Throughout their time in the San Francisco Bay, juvenile starry flounder are commonly found in shallow water, including shoals, intertidal areas, and tidal marshes (USFWS 2011). Starry flounder is one of the most consistently collected flatfishes in the San Francisco Estuary (Swanson et al 2015). Within the Bay sub-regions, starry flounder are most abundant in the San Pablo, Suisun, and Central Bays (Swanson et al 2015).

Like the striped bass, the white sturgeon is an anadromous fish, spending most of its life within an estuary, usually returning to freshwater only to spawn. White sturgeon have a long life span that may have exceeded 100 years historically (UCD 2019). White sturgeon is a species whose numbers increased in 2017 relative to recent years. According to the CDFW, the catch per unit effort for this species was the highest since 2009 (IEP 2017).

At Refuge establishment, one of the most notable features of the Marin Islands was the heron and egret colony on West Marin Island. The Audubon Canyon Ranch has monitored the number of nesting herons and egrets on the Refuge since 1979, and the annual reproductive success of great egrets and great blue herons since 1993. While the number of active heron and egret nests on the Refuge has fluctuated over the years, since 2016, no herons or egrets nested on West

Marin Island (Kelly, J.P., and Fischer, B 2018). However, in 2016, 2017, and 2018, great blue heron nests were established on East Marin Island (Kelly, J.P., and Fischer, B 2018).

In the tidal and sub-tidal environments surrounding the islands, several waterfowl and waterbird species are present during breeding, migratory, or wintering periods. Diving waterfowl commonly observed include the surf scoter, scaup (*Athya spp.*), canvasback (*Athya valisineria*), western grebe (*Aechmophorus occidentalis*), ruddy duck (*Oxyura jamaicensis*), and bufflehead (*Bucephala olbeola*).

Other bird species that are known to breed at Marin Islands include the western gull (*Larus occidentalis*), black oystercatcher (*Haematopus bachmani*), common raven (*Corvus corax*), and Canada goose (*Branta Canadensis*) (USFWS 2006). For additional information on wildlife, see Chapter 3 in the 2006 CCP/EA.

Threatened and Endangered Species:

Several sensitive fish species may occur within the vicinity of the San Rafael Bay including the Sacramento splittail minnow (*Pogonichthys macrolepidotus*), the delta smelt (*Hypomesus transpacificus*), green sturgeon (*Acipenser medirostris*), and Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*Oncorhynchus mykiss irideus*).

The Sacramento splittail minnow (*Pogonichthys macrolepidotus*) is primarily a freshwater fish that is largely confined to the Sacramento San Joaquin Delta, Suisun Bay, Suisun Marsh, and the Napa and Petaluma rivers (USFWS 1996). In 2003, the Service removed the Sacramento splittail from the list of threatened and endangered species. Subsequent review by the Service in 2010 (USFWS 2010a), found that this species did not warrant protection under the Endangered Species Act (ESA). The San Rafael Bay is likely just outside of this species' range.

The delta smelt (*Hypomesus transpacificus*), is listed as threatened under the Federal ESA, and as endangered under the California ESA. The delta smelt are restricted to the San Francisco Bay and Sacramento-San Joaquin Delta and found only from the San Pablo Bay upstream through the Delta (USFWS 2010b). As such this species is unlikely to be found in the San Rafael Bay which is south of the San Pablo Bay.

The green sturgeon (*Acipenser medirostris*) can also be found within the San Rafael Bay. Adult green sturgeon enter the San Francisco Bay in late winter through early spring and spawn in the upper main stem of the Sacramento River from April to early July (NMFS 2012). The San Francisco Bay Delta Estuary provides year-round rearing habitat for juveniles, as well as foraging habitat for non-spawning adults and subadults in the summer months (NMFS 2018). In 2006, the Southern distinct population segment of the green sturgeon was listed as threatened under the Federal ESA (NMFS 2006). The green sturgeon is not listed under the California ESA. In 2009, the National Marine Fisheries Service (NMFS) published a final rule designating critical habitat for the Southern distinct population segment. The San Francisco Bay is among the locations designated as critical habitat for this species (NMFS 2009).

The Chinook salmon is the most abundant salmon in California. Both the State of California and the federal government list the Sacramento winter-run salmon (*Oncorhynchus tshawytscha*) as

endangered. The Marin Island NWR is within the area designated critical habitat for the winter-run salmon (NMFS 1993). The Central Valley spring-run salmon (*Oncorhynchus tshawytscha*) is listed by the state and federal governments as a threatened species. In 2005 NMFS designated critical habitat for this species (NMFS 2005).

The Central California Coast (*Oncorhynchus mykiss*) distinct population segments is found in the San Francisco Estuary and its tributaries. It is federally listed as threatened. Steelhead fish are the anadromous form of resident rainbow trout.

The Marin Islands NWR is located within the migratory corridor for anadromous fish such as green sturgeon, Chinook salmon, and steelhead. All of these species migrate through the Central and San Pablo Bays on their way up to freshwater spawning habitat in the Sacramento River. Juveniles migrating to the ocean may rear in the vicinity of the Marin Islands NWR. The Marin Islands NWR is located west of the main migratory pathway, therefore it is unlikely that listed anadromous fish would be present in large numbers although some may migrate through the submerged tidelands of the Refuge (USFWS/CDFW 2012).

Recreation:

Public access to the Refuge is limited to staff-led tours on East Marin Island no more than six times per year and to native plant restoration work parties led by a non-profit group. The Refuge is closed to the public because nesting egrets and herons are sensitive to disturbance. Fishing from boats has existed in the area prior to the Refuge's establishment and continues today.

Environmental Consequences of the Action

This section analyzes the direct and indirect environmental consequences of the action on each affected resource. Cumulative effects are addressed in a separate section.

Impact Types:

- *Direct effects* are those which are caused by the action and occur at the same time and place.
- *Indirect effects* are those which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.
- *Cumulative impacts* result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions.

Fish and Wildlife:

Proposed Action

Direct and indirect effects of the Proposed Action are related to fish mortality. Fishing has a direct, lethal effects on individual fish, the target game species. The number of mortalities

depends on the angling pressure (for example, the number of anglers, days of effort, catch success, etc.). To the extent the anglers engage in catch-and-release practices, the number of individual fish taken per angler would be reduced, but some percentage of mortality would remain. While fish mortality will occur from this recreational use, the harvest levels are set by the CDFW and are low enough that population-level effects on fisheries are not expected. Non-native game species such as the striped bass are often targeted by anglers, reducing impacts on native fish species. Anglers are required to adhere to all CDFW regulations and these regulations are designed to protect sport fish as well as sensitive fish species from impacts due to fishing.

Migratory birds would not be directly affected by fishing and indirect effects from disturbance are minor. Anglers could disturb waterfowl and waterbird species in the tidal and sub-tidal environments. The Service owned tidelands that would be opened to fishing under this alternative are several hundred feet away from East and West Marin Islands where herons and egrets may be found. Waterfowl and waterbirds in the Refuge owned tidelands that are disturbed by anglers would be able to relocate to other areas within the San Rafael Bay. Fishing, when practiced as a solitary and stationary activity, tends to be less disturbing to wildlife than hunting or motorized boating (Tuite et al. 1983). In addition, the level of angler use in this area is relatively low. In 2006, local marina staff estimated that 10 to 15 people fished the area regularly (USFWS 2006). For these reasons, disturbance related effects to migratory birds are negligible.

No Action

The effects of the No Action alternative are largely similar to the Proposed Action. Fishing from boats existed in the area prior to the Refuge's establishment and continues today.

Threatened and Endangered Species:

Proposed Action

Opening Service owned tidelands on the Refuge to fishing is unlikely to have adverse direct or indirect impacts to listed fish species. As described in the Affected Environment section, neither the Delta smelt nor the Sacramento splittail is likely to be found within the Marin Islands NWR and the small size of the smelt prevents it from being caught by anglers (USFWS 1996). In California, all water bodies are closed to the take of salmon or steelhead unless otherwise noted under Special Regulations (CDFW 2018b).

Although much less abundant that white sturgeon, the green sturgeon may occasionally be caught by anglers fishing for white sturgeon. Fishing is regulated by the CDFW and the 2018 fishing regulations regarding green sturgeon state that: (1) green sturgeon may not be taken or possessed in California; (2) green sturgeon may not be removed from the water and shall be released immediately; and (3) green sturgeon taken and released incidentally to white sturgeon fishing shall be reported on a Sturgeon Fishing Report Card issued by the department, in accordance with procedures defined in CCR Sections 1.74 and 5.79 (CDFW 2018a). In addition, the Marin Islands NWR is located south of popular sturgeon fishing areas in the San Pablo Bay

(USFWS/CDFW 2012). Therefore, opening the Refuge to fishing is not likely to adversely affect any listed species.

No Action

The effects of the No Action alternative are largely the same as under the Proposed Action. Fishing from boats has existed in the area prior to the Refuge's establishment and continues today.

Recreation:

Proposed Action

Under the Proposed Action, the Service would formally open the Refuge to sport fishing from boats. This action would be consistent with Secretarial Order 3356 which directs Departmental agencies to support and expand hunting and fishing, enhance conservation stewardship, improve wildlife management, and increase outdoor recreation opportunities for all Americans. It is also consistent with the lease from the State Lands Commission which encourages the Service to permit sport fishing unless it is determined after consultation with the CDFW that the area should be closed because of public safety, waterfowl resource protection, or administrative purposes.

Wildlife dependent recreation on the Marin Islands NWR is very limited. Both islands would remain closed to the general public. Opening the Refuge to sport fishing would not impact the staff-led tours that are offered no more than six times per year or the native plant restoration work parties. Opening the Refuge to fishing would not have any direct or indirect effects to wildlife-dependent recreation.

No Action

Taking no action would not reduce sport fishing on the Refuge because fishing existed in the area prior to the Refuge's establishment and continues today.

Cumulative Impact Analysis:

Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7).

For more information on the national cumulative impacts of the Service's hunting and fishing program on the National Wildlife Refuge System, see Cumulative Impacts Report, 2019-2020 National Wildlife Refuge and National Fish Hatchery Proposed Hunting and Sport Fishing Openings (Appendix III).

This cumulative impact analysis focuses on fisheries. As described in the Environmental Consequences section, opening the Refuge to sport fishing would not directly affect migratory birds and indirect effects to migratory birds would be negligible. Opening the Refuge to sport fishing would not impact any other recreational activities in the area. Therefore, there would be no incremental impacts to migratory birds or recreation from the Proposed Action that would contribute to cumulative impacts.

Significant historical and current threats to fisheries include intensified land use, physical habitat and hydrological modification, chemical contaminants, eutrophication and hypoxia, overfishing, and introductions of invasive non-native species (including hatchery fish) and disease (Hughes 2015). In the vicinity of the project area, the early development of San Francisco was due in no small part to the abundance of fish and wildlife resources so close at hand. By the1870s there were extensive commercial fisheries of soles, founders, sardines, and anchovies, as well as crab, oysters, and shrimp. The North Bay, including San Pablo Bay, was the primary shrimping grounds. Sturgeon were taken chiefly in the shallow flats on the north side of San Pablo Bay, in the bend west of Pinole Point and in the bay from Pinole Point to Point San Pablo. Flounders were taken all over the bay, but principally in the San Pablo Bay (Skinner 1962). Between 1870 and 1915, fisheries in the San Francisco Bay were heavily exploited and by 1900 the quantity of fisheries products from the San Francisco Bay began to decline. This decline was probably due mainly to overfishing, but pollution, siltation and ship wastes hastened the decline and prevented recovery (Skinner 1962). Commercial fisheries, affected by regulations and environmental changes as well as market demand and resource availability, have undergone drastic changes in the quantity and types of fisheries harvested from the San Francisco Bay (Smith and Kato 1979). By 2013, herring were the last commercial fishery in the San Francisco Bay (Mercury News 2013). Recreational fisheries have fared somewhat better, due primarily to legislation which has restricted commercial fishing for certain species and outlawed some fishing gear detrimental to stocks of incidentally caught fishes. Striped bass and sturgeon are now reserved exclusively for sport fishery within the San Francisco Bay (Smith and Kato 1979).

Future fishing programs in the San Francisco Bay will be dependent on decisions made by fishery management agencies in relation to ongoing environmental impacts that affect fish stocks. For example, it is likely that reduction in duration and frequency of fresh-water flows into and out of the San Francisco Bay, caused by increasing demands for water for agricultural, industrial, and domestic use will further affect anadromous fish stocks. A description of general fishery is provided below, followed by a summary of ongoing and future goals to restore habitats in the San Francisco Bay.

Fisheries Management:

Fisheries are managed at both state and federal levels. State fish and wildlife agencies manage inland (freshwater) and near-coastal (within 5 km of the shoreline) fisheries. The National Marine Fisheries Service manages marine fisheries outside the state management limits and regulates anadromous and marine species listed by the federal government as threatened or endangered. The Service regulates fishing of listed freshwater species (Hughes 2015).

The CDFW is California's lead agency for the management of fish, wildlife, and native plants - collectively called "wildlife." CDFW has trustee responsibility for the conservation and management

of wildlife for the benefit and enjoyment of the public. The CDFW has responsibility for managing fisheries in California and is guided by State law and regulations set by the California Fish and Game Commission.

Chinook salmon - Each year, the CDFW recommends new Chinook salmon bag and possession limits for consideration by the Fish and Game Commission to align the fishing limits with up-to-date management goals set by the Pacific Fishery Management Council (PFMC). The PFMC is one of eight regional fishery management councils established by the Magnuson Fishery Conservation and Management Act of 1976. The PFMC manages fisheries for about 119 species of salmon, groundfish, coastal pelagic species, and highly migratory species. Fishery management measures developed by the PFMC are recommended to the Secretary of Commerce through the National Marine Fisheries Service. When approved by the Secretary of Commerce, these recommendations are implemented as ocean salmon fishing regulations by the National Marine Fisheries Service. Based on the recommendations issued by the PFMC, the CDFW recommends specific gag and possession limit regulations to the Fish and Game Commission. The Fish and Game Commission then considers adopting the Central Valley salmon sport fishing regulations.

Habitat Restoration:

Local, regional, and national planning efforts are underway to restore and protect Bay habitats. The San Francisco Bay Plan was prepared to guide the future protection and use of the San Francisco Bay and its shoreline (San Francisco Bay Conservation and Development Commission 1969). The federal Coastal Zone Management Act of 1972 encourages states to voluntarily develop coastal management plans (CMPs) to preserve and protect the unique features of each coastal area. The San Francisco Bay Conservation and Development Commission is the state coastal management agency for the San Francisco Bay segment of the coastal zone, and its laws and policies constitute the federally approved state coastal management program for the Bay.

The San Francisco Estuary Partnership was established through the National Estuary Program by the U.S. Environmental Protection Agency and the State of California. This partnership promotes consensus on how wetlands should be protected, regulated, and restored throughout the San Francisco Bay Estuary region. The first Comprehensive Conservation and Management Plan (CCMP) was completed in 1993 and provided a comprehensive implementation strategy describing various actions to protect the Estuary. In 2016, the San Francisco Estuary Partnership published an updated CCMP (also known as the Estuary Blueprint). The 2016 CCMP reflects the changing context of Estuary management over the last several decades. While the 2016 CCMP incorporates many of the original CCMP goals, it has a new focus on the need to plan and adapt to climate change. In addition, the actions in the 2016 CCMP address the results of the 2015 State of the Estuary assessment.

The San Francisco Estuary Baylands Ecosystem Goals Project was a 5-year volunteer collaborative effort completed in 1998. The Goals Project proposed scientifically based recommendation for regional wetland restoration and management actions providing specific guidance to public and private stakeholders interested in restoring and enhancing the wetlands and related habitats of the San Francisco Bay Estuary. A Science Update of the Goals Project was issued in 2015 to address the challenges of rising sea levels and more extreme weather

events while continuing to address the challenges posed by the demands of a growing urban population (Goals Project 2015).

The San Francisco Bay Subtidal Habitat Goals Project was issued in 2010, to address the subtidal component of the Bay ecosystem. Along with the Baylands Ecosystem Habitat Goals Project and the Uplands Habitat Goals Project, the Subtidal Goals Project represents a milestone in regional habitat planning for San Francisco Bay and its watersheds. None of the Goals Project reports are policy or regulatory documents. Rather they were designed to give resource managers, regulatory agencies, environmental groups, researchers, or industry the basic information they need to plan conservation, restoration, research, and protection activities related to habitats of the San Francisco Estuary. For example, the Service used the Baylands Goals Project in planning tidal marsh restoration at Sears Point in the San Pablo Bay (USFWS/CDFW 2012), as well as the South Bay Salt Pond Restoration Project (USFWS/CDFW 2007; USFWS/CSCC 2016).

Cumulative Assessment of Fisheries

The Proposed Action consists of opening the Service owned tidelands on Marin Islands NWR to sport fishing. The context of impacts from sport fishing at Marin Islands NWR in relation to fisheries in the San Francisco Bay are extremely minor. While individual fish will be taken through this activity, fishing is a regulated activity as described above. Ongoing and future restoration actions guided by regional plans may improve fish stocks and related fishing opportunities within the Refuge.

Mitigation Measures and Conditions

Opening the Marin Islands NWR to sport fishing will have minimal effects. No mitigation is proposed. Avoidance measures to minimize impacts to biological resources are already included in the Proposed Action; therefore, mitigation is not needed.

Monitoring

Opening the Marin Islands NWR to sport fishing will have minimal effects. No monitoring specific to sport fishing is proposed. However, the Service will continue to conduct monitor habitat restoration activities, wildlife, and public use activities as described in the 2006 CCP/EA (USFWS 2006).

Summary of Analysis

The purpose of this EA is to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

Alternative A – Proposed Action Alternative

As described above, the Proposed Action would have minor effects to fish and wildlife and other recreational uses of the Refuge. Threatened and endangered fish species would not be adversely affected

by opening the Refuge to sport fishing. The Proposed Action would be implemented with restrictions in place to minimize impacts. For example, shoreline fishing will not be allowed on the East and West Marin Islands to minimize disturbance to migratory birds and fishing. Fishing would only be allowed during daylight hours and in accordance with CDFW fishing regulations. The Proposed Action would not affect other wildlife-dependent recreation on the Refuge because visitation is limited to staff-led tours and native plant restoration work parties.

This alternative helps meet the purpose and needs of the Service as described above, because it opens the Refuge to fishing which is a wildlife-dependent recreational opportunity. The Service has determined that the proposed action is compatible with the purposes of the Marin Islands NWR and the mission of the NWRS. The Compatibility Determination is attached (Appendix II).

Alternative B – No Action Alternative

As described above, under the No Action Alternative the Service would not open the Marin Islands NWR to sport fishing. Public access to the Refuge is limited to staff-led tours and native plant restoration work. The No Action Alternative would not meet the purpose and need described above.

List of Sources, Agencies and Persons Consulted:

CDFW - Karen Taylor
Federated Indians of Graton Rancheria - Buffy McQuillen

References:

California Department of Fish and Wildlife. (CDFW) 2018a. Green sturgeon, webpage accessed 12/18/2018, at: http://www.eregulations.com/california/fishing/freshwater/sturgeon-regulations/

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List of Preparers:

Patricia Roberson, U.S. Fish and Wildlife Service

State Coordination:

In January 2019, informed the CDFW through email that the Service was proposing to open fishing in Refuge owned tidelands. No response from CDFW was received.

Tribal Consultation:

Buffy McQuillen, Tribal Heritage Preservation Officer
Federated Indians of Graton Rancheria

Public Outreach:

The draft Environmental Assessment was available to the public and interested agencies for review from June 13, 2019 through July 13, 2019. We did not receive any comments.

Determination:

This section will be filled out upon completion of any public comment period and at the time of finalization of the Environmental Assessment.

☒ The Service's action will not result in a significant impact on the quality of the human environment. See the attached **"Finding of No Significant Impact".**

☐ The Service's action **may significantly affect** the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Preparer Signature: Patricia Roberson Date: 8/19/2019

Name/Title/Organization: Patricia Roberson, NEPA/Policy Coordinator Pacific Southwest Region

Reviewer Signature: Mark Pelz Date: 8/20/2019

Name/Title: Mark Pelz Chief, Natural Resources Div.

Marin Islands National Wildlife Refuge
Sport Fishing Plan

August 2019

U.S. Fish and Wildlife Service
Pacific Southwest Region
San Francisco Bay National Wildlife Refuge Complex
Marin Islands National Wildlife Refuge
7718 Lakeville Highway, Petaluma, CA 94954

Submitted By:
Project Leader

ANNE MORKILL Digitally signed by ANNE MORKILL Date: 2019.08.29 11:27:06 -07'00'

Signature _____ Date _____

Concurrence:

Refuge
Supervisor

Signature _____ Date 8/29/19

Approved:

Regional Chief,
National Wildlife
Refuge System

Signature _____ Date 8.31.19

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MARIN ISLANDS NATIONAL WILDLIFE REFUGE

SPORT FISHING PLAN

1. Introduction

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The Marin Islands National Wildlife Refuge was established in 1992 under the authority of the Fish and Wildlife Act of 1956 and the Migratory Bird Conservation Act.

The primary purposes of the refuge are:
"...for the development, advancement, management, conservation, and protection of fish and wildlife resources…" 16 USC 742f (a)(4) and "...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude…" 16 USC 742f (b)(1) (Fish and Wildlife Act of 1956).

Marin Islands National Wildlife Refuge (Refuge) consists of 326 acres of open bay waters and 13 acres of upland (2 islands) in San Rafael Bay; north of San Francisco Bay. Lands purchased for the Refuge were permanently transferred to the California Department of Fish and Wildlife (CDFW), U.S. Fish and Wildlife Service (Service) and the California State Lands Commission (SLC). The Service took ownership of the eastern portion of East Marin Island and approximately 80 acres of tidelands (see Figure 1). The SLC took ownership of the remaining tidelands within the approved refuge boundary and the CDFW took ownership of West Marin Island and the western portion of East Marin Island. Regardless of specific ownership, the entire area of islands and tidelands is designated as the Marin Islands NWR and as a State Ecological Reserve with day-to-day management provided by the Service under a memorandum of understanding with the CDFW. The National Wildlife Refuge System Improvement Act of 1997, encourages consideration of fishing as "priority public uses" when found compatible with the purposes for which that Refuge was established. Sport fishing is proposed because the tidelands surrounding the islands are navigable waters that are already used by anglers, but was never formally established as a use by the Service.

The Refuge is also within the North American Bird Conservation Initiative's Coastal California Region. The area surrounding the Refuge is heavily urbanized and the nearby waters attract recreational and commercial boating. The islands of the Refuge are officially closed to the public in order to protect sensitive resources such as nesting heron and egret rookeries, though

occasional illegal trespassing occurs by some recreational boaters.

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSAA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is to:

"... 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."

The NWRSAA mandates the Secretary of the Interior in administering the System to (16 U.S.C. 668dd(a)(4):

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
- Ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans;
- Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;
- Ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the States in which the units of the NWRS are located;
- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the NWRS and the purposes of each refuge;
- Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the NWRS through which the American public can develop an appreciation for fish and wildlife;
- Ensure that opportunities are provided within the NWRS for compatible wildlife-dependent recreational uses; and
- Monitor the status and trends of fish, wildlife, and plants in each refuge.

Therefore, it is a priority of the Service to provide for wildlife-dependent recreation opportunities, including hunting and fishing, when those opportunities are compatible with the purposes for which the refuge was established and the mission of the National Wildlife Refuge System.

2. Statement of Objectives

In 2006, the Service completed a Comprehensive Conservation Plan (USFWS 2006) to guide wildlife and other natural resource management with consideration for compatible public use on the Refuge over the 15-year lifetime of the CCP. The 2006 Final CCP included a step-down management plan for recreational sport fishing but the Service did not complete the formal opening process. The Service now proposes to complete the formal opening process for sport fishing on Service-owned tidelands. The step-down plan for sport fishing has been reviewed and revised as appropriate, but is still consistent with the 2006 Final CCP.

The objectives of the fishing program on Marin Islands NWR are to provide:

- An understanding and appreciation of fish and wildlife ecology and human's role in their environment and to provide refuge visitors with high quality, safe, wholesome and enjoyable recreational experiences oriented toward wildlife to the extent these activities are compatible with the purposes for which the refuge was established. Fishing has been identified as a priority public use for the National Wildlife Refuge System and will be encouraged on the Refuge.
- Sport fishing is consistent with Goal 2 of the Comprehensive Conservation Plan for Marin Islands NWR, as well as Objective 2.1. Goal 2 focuses on providing visitors with compatible wildlife-dependent recreational and educational opportunities to foster an understanding and appreciation of San Francisco Bay native wildlife and plant communities. Objective 2.1 is a commitment by the Service to establish environmental education, interpretation and recreation opportunities for visitors and the local community.

3. Description of the Fishing Program

A. Area to be Opened to Fishing

Sport fishing would be permitted from a boat on designated areas of the Refuge, specifically on the 80 acres of tidelands owned by the Service (see Figure 1).

B. Species to be Taken, Fishing periods, Fishing Access

The San Francisco and San Rafael Bays have the potential to provide habitat for harvestable fish allowed for legal take include species listed in the California Ocean Sport Fishing Regulations for San Francisco Bay such as white sturgeon, striped bass, and starry flounder. Other legally harvestable species may be available depending on the season and tides, per State of California Regulations.

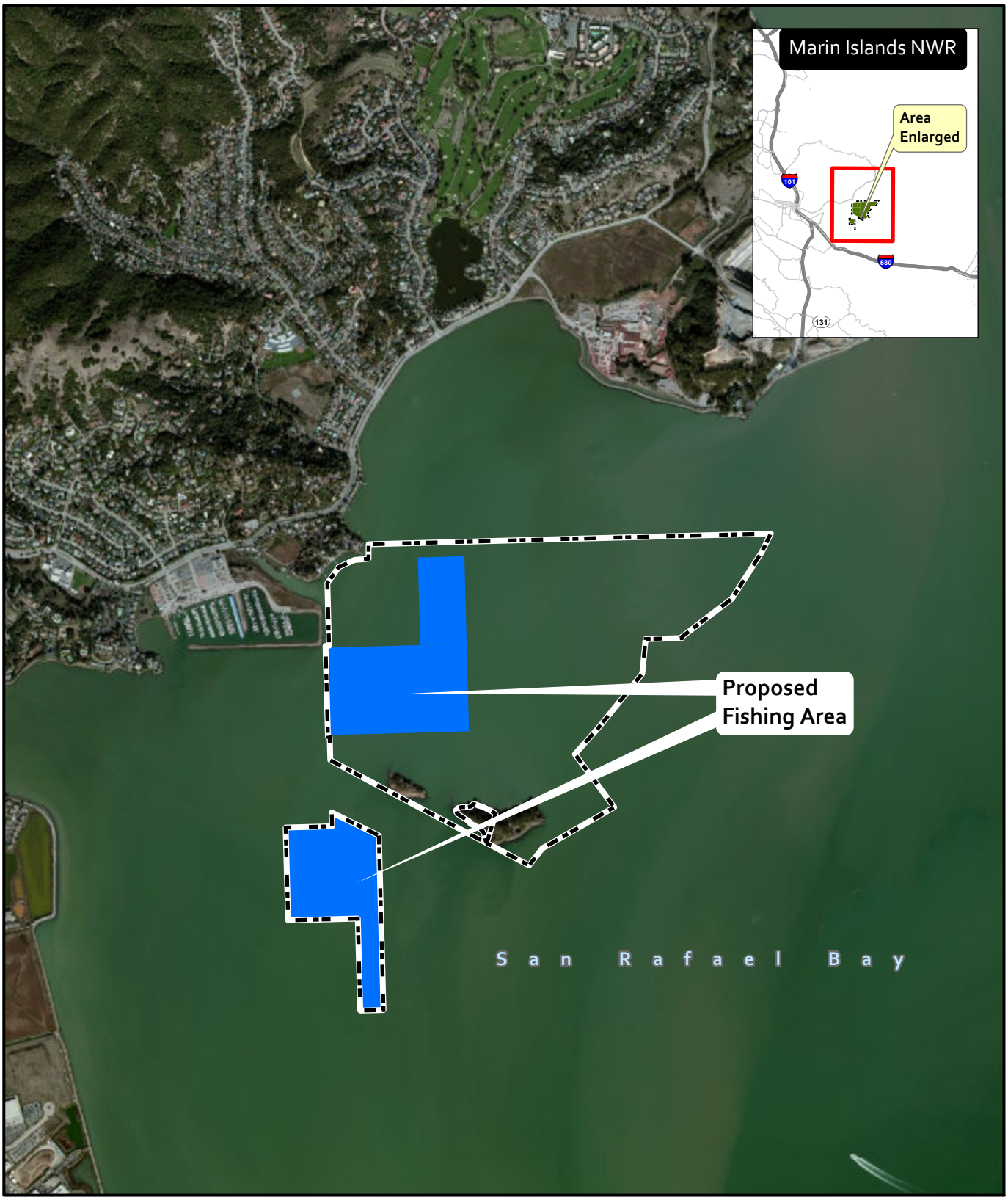
Several sensitive fish species occur within the general area of the San Rafael Bay including the Sacramento splittail minnow (*Pogonichthys macrolepidotus*), the delta smelt (*Hypomesus transpacificus*), green sturgeon (*Acipenser medirostris*), and Chinook salmon (*Oncorhynchus tshawytscha*), and steelhead (*Oncorhynchus mykiss irideus*).

U.S. Fish & Wildlife Service

Marin Islands National Wildlife Refuge

Proposed Sport Fishing Area

Figure 1. Proposed Sport Fishing Area



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Saramento, California
Produced: February 5, 2019
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Datum: NAD 83

The Marin Islands NWR is located within the migratory corridor for anadromous fish such as green sturgeon, Chinook salmon, and steelhead. All of these species migrate through the Central and San Pablo Bays on their way up to freshwater spawning habitat in the Sacramento River. Juveniles migrating to the ocean may rear in the vicinity of the Marin Islands NWR. The Marin Islands NWR is located west of the main migratory pathway, therefore it is unlikely that listed anadromous fish would be present in large numbers although some may migrate through the submerged tidelands of the Refuge (USFWS/CDFW 2012).

Sport fishing will be permitted on open waters from boats only, during daylight hours. The proposed use would be year round in accordance with State and Federal regulations.

Anglers use the Loch Lomond Marina or other facilities located throughout the San Pablo Bay to launch their boats or kayaks into the bay waters. There are no fishing facilities or boat launching facilities on the Refuge and none are planned. East and West Marin Islands would remain closed to the public.

C. Fishing Permit Requirements

Anglers must comply with all applicable State and Federal regulations while fishing. Anglers are required to fish only from a boat on the open waters surrounding the Marin Islands. Within California, any person who is 16 years of age or older must have a sport fishing license to take any kind of fish, mollusk, invertebrate, amphibian or crustacean, except when taken from a public pier in ocean or bay waters.

D. Consultation and Coordination with the State

Fishing will be permitted within the framework of applicable State and Federal regulations. A joint meeting of the CDFW and refuge staff will occur annually to review these regulations. The CDFW will be consulted if any changes are planned in the Refuge's fishing program.

E. Law Enforcement

The Refuge will maintain an active law enforcement presence by the San Francisco Bay NWR Complex Federal Wildlife Officers and through an agreement with CDFW to ensure public compliance with fishing regulations. In addition, the San Rafael Police Department also patrols the area around the Refuge and reports violations to the Refuge. The Refuge will increase law enforcement patrols using its own staff or partner agencies during known migrations and movements of harvestable fish species and egret breeding seasons.

The following methods are used to control and enforce fishing regulations:

- The Refuge will provide a brochure that shows fishing areas. Regulatory information will be available at the Loch Lomond Marina in San Rafael for the public. Fishing

information and applicable regulations will be provided to the public as a simple one-page fishing flyer.
- Refuge Complex Federal Wildlife Officers will randomly check anglers for compliance with Federal and State Laws.

F. Funding and Staffing Requirements

The fishing program will be implemented through the Refuge law enforcement program with patrols during the entire year. Patrols are already conducted on the San Pablo Bay NWR and conducting patrols on Marin Islands NWR will not increase the law enforcement program significantly. The total cost of the fishing program is expected to be approximately $5,000 per year.

4. Conduct of the Fishing Program

A. Permit Application, Selection, and/or Registration Procedures (if applicable)

The Refuge will not regulate fishing quotas and defers to quotas set by the California Department of Fish and Wildlife. Anglers are required to have a State fishing license, but would not need to obtain a refuge fishing permit or pay a user fee for fishing in the bay waters surrounding Marin Islands NWR.

B. Refuge-Specific Fishing Regulations

Listed below are refuge-specific regulations that pertain to fishing in the Service owned tidelands within the Marin Islands NWR as of the date of this plan. These regulations may be modified as necessary.

50 CFR 32.24 California (Refuge-specific regulations; Sport Fishing). Marin Islands National Wildlife Refuge and State Ecological Reserve

Sport Fishing. We allow fishing from boats on designated areas of the Refuge.

C. Relevant State Regulations

Please see the State of California Sport Fishing Regulations at:

https://www.wildlife.ca.gov/Fishing/Ocean/Regulations/Sport-Fishing/General-Ocean-Fishing-Regs

D. Other Refuge Rules and Regulations for Sport Fishing

- None.

5. Public Engagement

A. Outreach for Announcing and Publicizing the Fishing Program

The Refuge maintains a mailing list, for news release purposes, to local newspapers, radio, and websites. Special announcements and articles may be released in conjunction with opening the Refuge to fishing. In addition, information about fishing will be available at the San Pablo Bay NWR headquarters or on the Marin Islands NWR website.

B. Anticipated Public Reaction to the Fishing Program

Very little reaction by the angling public may be expected regarding the prohibition of landing on or fishing from the shore of either island. The islands are currently closed to entry and the public is aware of the restriction. In addition, Refuge and State law enforcement officers, refuge personnel, the news media, and other public information systems will be used to convey the reasons for these restrictions related to the opening of fishing on the surrounding waters.

C. How Anglers Will Be Informed of Relevant Rules and Regulations

General information regarding fishing and other wildlife-dependent public uses can be obtained at San Pablo Bay NWR headquarters at 7718 Lakeville Highway, Petaluma, CA 94954; by calling (707)-769-4200; or by accessing the Refuge website at https://www.fws.gov/refuge/marin_islands/.

6. Compatibility Determination

Fishing and all associated program activities proposed in this plan are compatible with the purposes of the refuge. See attached Marin Islands NWR Compatibility Determination for Sport Fishing.

7. Literature Cited

National Oceanic and Atmospheric Administration (NOAA). 1993. Designated Critical Habitat; Sacramento River Winter-Run Chinook Salmon; Final Rule. Federal Register, 58, p. 33212-33219.

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Appendix II

Compatibility Determination

Title: Sport Fishing

Use Category: Fishing Use Type: non-commercial

Refuge Name: Marin Islands National Wildlife Refuge

Establishing and Acquisition Authority(ies):

Fish and Wildlife Act 1956, Migratory Bird Conservation Act

Refuge Purpose(s):

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. § 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. § 742f(b)(1) (Fish and Wildlife Act of 1956).

National Wildlife Refuge System Mission:

"The mission of the 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" (National Wildlife Refuge System Administration Act of 1966, as amended [16 USC 668dd-668ee]).

Description of Use:

Sport fishing by boat is an existing use of the waters surrounding the Marin Islands. Fishing is one of the six priority uses that, when compatible, fulfill the goals and mission of the National Wildlife Refuge System and National Wildlife Refuge System Improvement Act of 1997. Recreational fishing will be permitted consistent with State regulations. According to local marina staff an estimated

10 to 15 people fish the area regularly. Anglers use the Loch Lomond marina or other facilities located throughout the bay to launch their boats or kayaks into the bay waters. No facilities on the Refuge are required to allow this use.

The use will be permitted by boat only. Angling would be permitted by motorized, wind or human-powered boats. Because facilities are already available in the area, no facilities or structures will be provided on the Refuge to support fishing. Fishing brochures will be provided at the local marinas specifying restrictions and the sensitive nature of the islands and restrictions. The proposed use would be year round in accordance with State and Federal regulations.

The use is proposed because the tidelands surrounding the islands are designated navigable waters that are already used by anglers, but sport fishing was never formally established as a use by the Refuge.

Game fish species allowed for legal take in the San Francisco Bay Area include species listed in the California Ocean Recreation Fishing Regulations (e.g., surfperch, sturgeon, and striped bass). These fish species occur in the tidal waters of the Refuge. The Refuge will not regulate fishing quotas and defers to quotas set by the California Department of Fish and Wildlife. Anglers are required to have a State fishing license, but would not need to obtain a refuge fishing permit or pay a user fee.

Availability of Resources:

The estimated annual maintenance costs for Sport Fishing on the Refuge are $5,000. Annual maintenance costs would consist of: administration, $1,000; law enforcement, $2,000; boat maintenance and fuel, $1,000, and fishing and wildlife brochures, $1,000.

Anticipated Impacts of the Use:

Fishing on the Refuge owned tidelands would affect fish species and may cause some disturbance related effects to wildlife. The Refuge was established to provide wintering habitat for migratory birds and nesting habitat for waterbirds. Vegetation and nesting habitat are limited to East and West Marin Islands which have supported heron and egret colonies. At Refuge establishment, the heron and egret colony on West Marin was one of the most notable features of

the Refuge. The Audubon Canyon Ranch has monitored the number of nesting herons and egrets on the Refuge since 1979, and the annual reproductive success of great egrets and great blue herons since 1993. While the number of active heron and egret nests on the Refuge has fluctuated over the years, since 2016, no herons or egrets nested on West Marin Island (Kelly, J.P., and Fischer, B 2018).

In the tidal and sub-tidal environments, several waterfowl and waterbird species are present during breeding, migratory, or wintering periods. Migratory birds would not be directly affected by fishing and indirect effects from disturbance are minor. Anglers could disturb waterfowl and waterbird species in the tidal and sub-tidal environments. The Service owned tidelands that would be opened to fishing under this alternative are several hundred feet away from East and West Marin Islands where herons and egrets may be found. Waterfowl and waterbirds in the Refuge owned tidelands that are disturbed by anglers would be able to relocate to other areas within the San Rafael Bay.

Several sensitive fish species occur within the vicinity of the San Rafael Bay including the Sacramento splittail minnow (*Pogonichthys macrolepidotus*), the delta smelt (*Hypomesus transpacificus*), green sturgeon (*Acipenser medirostris*), winter-run and Central Valley spring-run chinook salmon (*Oncorhynchus tshawytscha*), as well as the Central California Coast and Central Valley steelhead (*Oncorhynchus mykiss*).

The Sacramento splittail minnow is primarily a freshwater fish that is largely confined to the Sacramento San Joaquin Delta, Suisun Bay, Suisun Marsh, and the Napa and Petaluma rivers (USFWS 2010a). The San Rafael Bay is likely just outside of this species' range. The delta smelt are restricted to the San Francisco Bay and Sacramento-San Joaquin Delta and found only from the San Pablo Bay upstream through the Delta (USFWS 2010b). As such this species is unlikely to be found in the San Rafael Bay which is south of the San Pablo Bay.

The green sturgeon (*Acipenser medirostris*) can also be found within the San Pablo Bay. In 2006, the Southern distinct segment population of the green sturgeon was listed as threatened under the Federal ESA (NOAA 2006). In 2009, the National Marine Fisheries Service published a final rule designating critical habitat for the Southern distinct population segment. The San Francisco Bay is among the locations designated as critical habitat for this species (NOAA 2009). The green sturgeon is not listed under the California ESA. Although much less abundant that white sturgeon, the green sturgeon may occasionally be caught by anglers fishing for white sturgeon. The CDFW 2018 fishing regulations state that: (1) green sturgeon may not be taken or possessed in California; (2) green sturgeon may not be removed from the water and shall be

released immediately; and (3) green sturgeon taken and released incidentally to white sturgeon fishing shall be reported on a Sturgeon Fishing Report Card issued by the department, in accordance with procedures defined in CCR Sections 1.74 and 5.79 (CDFW 2018).

The Refuge is located within the migratory corridor for the green sturgeon, Chinook salmon, and steelhead. All of these species migrate through the Central and San Pablo Bays on their way up to freshwater spawning habitat in the Sacramento River. Juveniles migrating to the ocean may rear in the vicinity of the Marin Islands NWR. However, the Refuge is located west of the main migratory pathway, therefore it is unlikely that listed anadromous fish would be present in large numbers although some may migrate through the submerged tidelands of the Refuge (USFWS/CDFW 2012).

Recreational fishing would result in minimal public use conflicts. Anglers will only be allowed to fish from a boat. Public access to the Refuge is limited to staff-led tours and native plant restoration work parties led by a non-profit group.

Direct cumulative impacts would likely include increased staffing to patrol and monitor this activity. Non-breeding wildlife may be disturbed by this activity, but not more than the level that is currently occurring. Fishing information will be provided at the local marinas in order to mitigate wildlife disturbance by recreational fishing. Signage will also educate sport fishermen near the Refuge in order to reduce or limit disturbances to wildlife.

Public Review and Comment:

Public review of this compatibility determination is concurrent with the public review of the Environmental Assessment. Public comments will be considered prior to making a final determination.

Determination:

___ Use is Not Compatible

_X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Fishing will be permitted in accordance with CDFW sport fishing regulations on the open waters from a boat only.

Justification:

The National Wildlife Refuge System Improvement Act of 1997 identifies six legitimate and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Where these uses have been determined compatible, they are to receive enhanced consideration over other uses in planning and management.

Fishing is an appropriate wildlife-dependent recreational activity. Based on the impacts described above, we have determined that fishing will not materially interfere with or detract from the purposes for which the Refuge was established or mission of the National Wildlife Refuge System. The program as described is determined to be compatible and will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the Refuge.

Mandatory Re-Evaluation Date:

__X____ Mandatory 15-year Re-Evaluation Date (for priority public uses)
_____ Mandatory 10-year Re-Evaluation Date (for all uses other than priority public uses)

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Refuge Determination

Refuge Manager/
Project Leader
Approval:

ANNE MORKILL

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Date: 2019.08.29 11:26:21 -07'00'

(Signature) (Date)

Concurrence

Refuge Supervisor:

(Signature) 8/29/19
(Date)

Regional Chief,
National Wildlife
Refuge System:

(Signature) 8.29.19
(Date)

Appendix III
Cumulative Impacts Report
2019-2020 National Wildlife Refuge and National Fish Hatchery Proposed Hunting and Sport Fishing Openings
U.S. Fish and Wildlife Service

I. INTRODUCTION

Purpose and Scope

The headquarters of the National Wildlife Refuge System (Refuge System) and National Fish Hatchery System (Hatchery System), U.S. Fish and Wildlife Service (Service), conducted a national-level review of station-specific Environmental Assessments (EAs) and Categorical Exclusions (CatExs) developed for the proposed expansion of hunting and/or sport fishing activities on 74 national wildlife refuges (NWRs) and 15 national fish hatcheries (NFHs) (stations) from the 2019-2020 proposed rule. This proposed rule includes the opening of five refuges to hunting, the opening of five refuges to sport fishing, the opening of 13 hatcheries to sport fishing, the opening of three hatcheries to hunting, and the expansion of hunting and/or sport fishing activities at 67 refuges. We reviewed the station-specific EAs and CatExs for the 89 stations to identify and assess the direct, indirect, and cumulative impacts of the proposed hunting and/or sport fishing activities on hunted populations of migratory birds and resident wildlife; non-hunted migratory and resident wildlife; Threatened and Endangered (T&E) Species; plant and habitat resources; other wildlife-dependent recreational uses; physical resources including air, soil and water; cultural resources; station facilities; solitude; and socioeconomics. We also assessed impacts of the proposed opening or expansion of hunting and/or sport fishing activities on the 74 refuges by evaluating Compatibility Determinations (CDs) prepared by each refuge for their respective hunting and/or sport fishing programs (16 U.S.C. 668dd(a)(3), 50 C.F.R. 32) and on the 15 hatcheries by determining that their respective hunting and/or sport fishing programs were not detrimental to the propagation and distribution of fish or other aquatic wildlife (16 U.S.C. 460k, 50 C.F.R. 71) . Intra-Service consultations on the effects of hunting and/or sport fishing on Threatened and Endangered Species were conducted for each refuge and hatchery hunting and/or sport fishing program as required by Section 7 of the Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884).

We provide an overview of hunting and sport fishing on NWRs and NFHs in the context of federal management for migratory birds and state management of resident wildlife in Section II of this report. We document the detailed findings of the national level review and assessment of impacts, including cumulative impacts, in Section III, and provide discussion and conclusions in Sections IV and V.

This report covers the proposed seven new hunting and sport fishing openings on NWRs and 15 new hunting and sport fishing openings on NFHs in 2019-2020 and the expansion or redesign of programs on 67 other NWRs:

- At Bandon Marsh NWR in the State of Oregon, we are expanding existing sport fishing to new acres.
- At Bill Williams River NWR in the State of Arizona, we are expanding method of take for existing migratory game bird hunting and upland game hunting to further align with state regulations.
- At Billy Frank Jr. Nisqually NWR in the State of Washington, we are expanding existing waterfowl hunting to new acres.
- At Bitter Lake NWR in the State of New Mexico, we are expanding method of take and season date ranges for existing migratory game bird hunting and method of take for existing upland game hunting to further align with state regulations.
- At Bond Swamp NWR in the State of Georgia, we are expanding season date ranges for existing upland game hunting to further align with state regulations and expanding existing big game hunting by increasing quota numbers to increase access.
- At Bosque del Apache NWR in the State of New Mexico, we are expanding method of take and hunting hours for existing migratory game bird hunting and existing upland game hunting to further align with state regulations, and expanding number of tags for existing youth turkey hunting to increase access.
- At Boyer Chute NWR in the State of Nebraska, we are opening wild turkey hunting for the first time on acres already open to other hunting. We are also expanding existing migratory game bird hunting to acres already open to other hunting and expanding season dates for existing big game hunting.
- At Buenos Aires NWR in the State of Arizona, we are expanding method of take and season date ranges for existing upland game hunting and existing big game hunting to further align with state regulations.
- At Cedar Point NWR in the State of Ohio, we are expanding existing sport fishing to new acres.
- At Cherry Valley NWR in the State of Pennsylvania, we are opening sport fishing for the first time on acres already open to other activities.
- At Cibola NWR in the State of Arizona, we are expanding method of take and hunting hours for existing migratory game bird hunting and expanding method of take for existing upland game hunting to further align with state regulations, and expanding existing big game hunting to new units already open to other activities.
- At Clarks River NWR in the State of Kentucky, we are expanding season date range for existing coyote hunting to align with state regulations.
- At Colusa NWR in the State of California, we are opening to wild turkey hunting for the first time on acres already open to other hunting.
- At Crab Orchard NWR in the State of Illinois, we are opening coot, snipe, rail, woodcock, crow, mourning and white-winged dove, bobcat, skunk, woodchuck, Hungarian partridge, and pheasant for the first time on acres already open to hunting. We are also expanding existing migratory game bird, upland game, big game hunting to

further align with state regulations and offer special opportunities for targeted demographics.

- At Craig Brook NFH in the State of Maine, we are formally opening to sport fishing for the first time.
- At Crane Meadows NWR in the State of Minnesota, we are opening migratory game bird hunting (duck, geese, coot, merganser, moorhen, rail, snipe, mourning dove, and crow) and upland game hunting (rabbit, squirrel, raccoon, fox, badger, pheasant, opossum, weasel, bobcat, grouse, coyote, and skunk) for the first time in alignment with state regulations on new acres and acres already open to hunting. We are also expanding existing big game hunting to new acres.
- At Cross Creeks NWR in the State of Tennessee, we are opening coyote and beaver hunting for the first time on acres already open to other hunting. We are also expanding method of take and season date ranges for existing big game hunting to further align with state regulations.
- At Currituck NWR in the State of North Carolina, we are expanding hunting hours for existing migratory game bird hunting and expanding method of take and bag limits for existing big game hunting to further align with state regulations.
- At Cypress Creek NWR in the State of Illinois, we are opening rail, crow, bobcat, skunk, woodchuck, Hungarian partridge, and pheasant hunting for the first time on new acres and acres already open to hunting. We are also expanding existing migratory game bird, upland game, and existing big game hunting to new acres.
- At Deep Fork NWR in the State of Oklahoma, we are opening geese, coot, and merganser hunting for the first time on acres already open to other hunting. We are also expanding season date ranges for existing big game hunting to further align with state regulations.
- At Delevan NWR in the State of California, we are opening to wild turkey hunting for the first time on acres already open to other hunting.
- At Desoto NWR in the States of Iowa and Nebraska, we are expanding season date ranges for existing big game hunting to further align with state regulations.
- At Dexter NFH in the State of New Mexico, we are formally opening to migratory game bird (duck, coot, sandhill crane, and dove) and upland game hunting (Eurasian-collared dove and band-tailed pigeon) for the first time.
- At Edenton NFH in the State of North Carolina, we are formally opening to sport fishing for the first time.
- At Entiat NFH in the State of Washington, we are formally opening to sport fishing for the first time.
- At Grand Bay NWR in the States of Mississippi and Alabama, we are expanding season date ranges for existing migratory game bird hunting to align with state regulations.
- At Great Bay NWR in the State of New Hampshire, we are opening turkey hunting for the first time on acres already open to other hunting. We are also expanding method of take and season date ranges for existing white-tailed deer hunting to further align with state regulations.

- At Great River NWR in the States of Illinois and Missouri, we are expanding season date ranges and method of take for existing big game hunting and expanding season date ranges for existing upland game hunting to align with state regulations.
- At Green Bay NWR in the State of Wisconsin, we are opening big game hunting (white-tailed deer) and sport fishing for the first time.
- At Hackmatack NWR in the States of Illinois and Wisconsin, we are opening sport fishing for the first time on acres already open to other activities.
- At Hagerman NWR in the State of Texas, we are expanding existing migratory game bird, upland game, and big game hunting to new acres.
- At Harrison Lake NFH in the State of Virginia, we are formally opening to sport fishing for the first time.
- At Havasu NWR in the State of Arizona, we are expanding hours and season date ranges for existing migratory game bird hunting to further align with state regulations.
- At Hotchkiss NFH in the State of Colorado, we are formally opening to sport fishing for the first time.
- At Hutton Lake NWR in the State of Wyoming, we are opening to migratory game bird hunting (duck, mergansers, geese, and coot) for the first time.
- At Imperial NWR in the State of Arizona, we are expanding method of take for existing migratory game bird hunting and expanding method of take and season date ranges for existing upland game hunting to further align with state regulations.
- At Inks Dam NFH in the State of Texas, we are formally opening to sport fishing for the first time.
- At Iron River NFH in the State of Wisconsin, we are formally opening to migratory game bird (duck, geese, coot, mourning dove, snipe, woodcock, rail, and crow), upland game (rabbit, grouse, squirrel, fox, raccoon, pheasant, Hungarian partridge, quail, bobcat, and coyote), and big game (white-tailed deer, black bear, and turkey) hunting for the first time.
- At Key Cave NWR in the State of Alabama, we are opening snipe, woodcock, crow, fox, bobcat, coyote, white-tailed deer, and feral hog hunting for the first time on acres already open to other hunting.
- At Kirwin NWR in the State of Kansas, we are expanding existing migratory game bird hunting to acres already open to other hunting.
- At Kofa NWR in the State of Arizona, we are expanding method of take and season date ranges for existing upland game hunting to further align with state regulations.
- At Laguna Atascosa NWR in the State of Texas, we are expanding method of take for existing big game hunting to further align with state regulations.
- At Las Vegas NWR in the State of New Mexico, we are expanding the bag limit for existing migratory game bird hunting to further align with the state.
- At Leadville NFH in the State of Colorado, we are formally opening to migratory game bird (duck), upland game (grouse), and big game (mule deer and elk) hunting for the first time and we are formally opening to sport fishing for the first time.
- At Leavenworth NFH in the State of Washington, we are formally opening to sport fishing for the first time.

- At Little River NWR in the State of Oklahoma, we are opening coyote hunting for the first time on acres already open to other hunting. We are also expanding existing turkey hunting to include youth turkey hunting opportunities.
- At Little White Salmon NFH in the State of Washington, we are formally opening to sport fishing for the first time.
- At Lower Rio Grande Valley NWR in the State of Texas, we are expanding method of take for existing big game hunting to further align with state regulations.
- At Marin Islands NWR in the State of California, we are opening to sport fishing for the first time.
- At Mashpee NWR in the State of Massachusetts, we are opening to migratory game bird (duck, geese, coot, snipe, rail, woodcock, and crow), upland game (squirrel, pheasant, quail, grouse, fox, coyote, raccoon, and opossum), and big game (white-tailed deer and wild turkey) hunting for the first time.
- At Mattamuskeet NWR in the State of North Carolina, we are expanding season date ranges for existing big game hunting to further align with state regulations and offer youth hunt.
- At McKay Creek NWR in the State of Oregon, we are opening mourning dove, wild turkey, and big game (elk, white-tailed deer, and mule deer) hunting for the first time on acres already open to other hunting.
- At Medicine Lake NWR in the State of Montana, we are opening coot, crane, and tundra swan hunting on acres already open to other hunting. We are also expanding season date range for existing sport fishing to further align with state regulations.
- At Middle Mississippi River NWR in the States of Illinois and Missouri, we are expanding existing upland game hunting and existing sport fishing to new acres. We are also expanding method of take for existing big game hunting to further align to state regulations.
- At Minidoka NWR in the State of Idaho, we are opening big game hunting (elk) for the first time on acres already open to other hunting. We are also expanding existing sport fishing by extending the boating season.
- At Monomoy NWR in the State of Massachusetts, we are opening to migratory game bird (duck, geese, and coot) and upland game (coyote) hunting for the first time.
- At Neal Smith NWR in the State of Iowa, we are expanding existing migratory game bird, upland game, and big game hunting to new acres.
- At Nestucca Bay NWR in the State of Oregon, we are opening sport fishing for the first time on acres already open to other activities.
- At Northern Tallgrass Prairie NWR in the States of Iowa and Minnesota, we are opening sport fishing for the first time on new acres and acres already open to other activities. We are also expanding existing migratory game bird, upland game, and big game hunting to new acres.
- At Okefenokee NWR in the State of Georgia, we are expanding method of take and season date ranges for existing big game hunting to further align with state regulations.
- At Orangeburg NFH in the State of South Carolina, we are formally opening to sport fishing for the first time.

- At Ottawa NWR in the State of Ohio, we are expanding existing sport fishing to new acres.
- At Ozark Plateau NWR in the State of Oklahoma, we are opening to upland game (squirrel and rabbit) and big game (white-tailed deer and feral hog) hunting for the first time.
- At Parker River NWR in the State of Massachusetts, we are opening to upland game hunting (squirrel, rabbit, pheasant, turkey, grouse, fox, coyote, raccoon, and opossum) for the first time on new acres and acres already open to other hunting. We are also expanding existing migratory game bird hunting to new acres and expanding season dates for existing big game hunting on new acres and acres already open to hunting.
- At Patoka River NWR in the State of Indiana, we are expanding existing migratory game bird, upland game, and big game hunting and sport fishing to new acres.
- At Patuxent Research Refuge in the State of Maryland, we are expanding existing big game hunting to new acres.
- At Piedmont NWR in the State of Georgia, we are expanding season date range for existing raccoon, opossum, and big game hunting to further align with state regulations.
- At Sacramento NWR in the State of California, we are opening to wild turkey hunting for the first time on acres already open to other hunting.
- At Salt Plains NWR in the State of Oklahoma, we are opening coot, white-winged dove, beaver, Eurasian-collared and rock dove, wild turkey, and feral hog hunting for the first time. We are also expanding existing migratory game bird, upland game, and big game hunting to new acres.
- At San Bernardino NWR in the State of Arizona, we are expanding method of take for existing migratory game bird hunting to further align with state regulations.
- At Sand Lake NWR in the State of South Dakota, we are expanding season date range for existing big game hunting to further align with state regulations.
- At San Juan Islands NWR in the State of Washington, we are opening sport fishing for the first time on acres already open to other activities.
- At San Pablo Bay NWR in the State of California, we are expanding season date ranges and method of take for existing migratory game bird hunting to further align with state regulations.
- At Seedskadee NWR in the State of Wyoming, we are opening white-tailed deer and elk hunting for the first time on acres already open to other hunting.
- At Sequoyah NWR in the State of Oklahoma, we are opening wild turkey and feral hog hunting for the first time on acres already open to other hunting.
- At Silvio O. Conte NWR in the States of Massachusetts and Connecticut, we are formally opening migratory game bird (duck, geese, woodcock, snipe, rail, and crow), upland game (squirrel, rabbit, pheasant, grouse, bobcat, fox, coyote, raccoon, and opossum), big game (white-tailed deer, black bear, turkey) hunting, and sport fishing for the first time.
- At Spring Creek NFH in the State of Washington, we are formally opening to sport fishing for the first time.

- At St. Marks NWR in the State of Florida, we are expanding existing upland game and big game hunting to new acres.
- At Stone Lakes NWR in the State of California, we are opening sport fishing for the first time on acres already open to other activities.
- At Sutter NWR in the State of California, we are opening to wild turkey hunting for the first time on acres already open to other hunting.
- At Tamarac NWR in the State of Minnesota, we are opening rail, crow, mourning dove, wild turkey, and bobcat hunting on acres already open to other hunting.
- At Tishomingo NWR in the State of Oklahoma, we are opening to migratory game bird (duck, geese, and coot), wild turkey, and feral hog hunting for the first time on acres already open to other hunting and new acres. We are also expanding existing white-tailed deer hunting to new acres.
- At Tishomingo NFH in the State of Oklahoma, we are formally opening to sport fishing for the first time.
- At Trinity River NWR in the State of Texas, we are expanding method of take for existing upland game hunting and season date ranges for existing big game hunting to further align with state regulations. We are also moving all refuge hunts including existing migratory game bird hunting to State lottery system.
- At Valentine NWR in the State of Nebraska, we are expanding the season date range for existing coyote hunting to further align with state regulations.
- At Valley City NFH in the State of North Dakota, we are formally opening to sport fishing for the first time.
- At Washita NWR in the State of Oklahoma, we are opening mourning and white-winged hunting for the first time on new acres and acres already open to hunting, and Eurasian-collared dove hunting on acres already open to hunting. We are also expanding existing migratory game bird hunting to new acres.
- At Whittlesey Creek NWR in the State of Wisconsin, we are opening sport fishing for the first time on acres already open to other activities.
- At Wichita Mountains NWR in the State of Oklahoma, we are opening to migratory game bird (duck, geese, coot, and merganser), upland game (coyote), wild turkey, and feral hog hunting for the first time on acres already open to other hunting.

II. Overview of Hunting on National Wildlife Refuges

1. Migratory Bird Hunting

Migratory game birds are those bird species so designated in conventions between the United States and several foreign nations for the protection and management of these birds. Under the Migratory Bird Treaty Act (16 U.S.C. 703–712), the Secretary of the Interior is authorized to determine when "hunting, taking, capture, killing, possession, sale, purchase, shipment, transportation, carriage, or export of any * * * bird, or any part, nest, or egg" of migratory game birds can take place, and to adopt regulations for this purpose. These regulations are written after

giving due regard to "the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds" and are updated annually (16 U.S.C. 704(a)). This responsibility has been delegated to the Service as the lead Federal agency for managing and conserving migratory birds in the United States. Migratory game bird management is a cooperative effort of State, Tribal, and Federal governments.

The Service develops migratory game bird hunting regulations by establishing the frameworks, or outside limits, for season lengths, bag limits, and areas for migratory game bird hunting. Acknowledging regional differences in hunting conditions, the Service has administratively divided the Nation into four Flyways for the primary purpose of managing migratory game birds. Each Flyway (Atlantic, Mississippi, Central, and Pacific) has a Flyway Council, a formal organization generally composed of one member from each State and Province in that Flyway. The Flyway Councils, established through the Association of Fish and Wildlife Agencies (AFWA), also assist in researching and providing migratory game bird management information for Federal, State, and Provincial governments, as well as private conservation entities and the general public.

The process for adopting migratory game bird hunting regulations, located at 50 CFR part 20, is constrained by three primary factors. Legal and administrative considerations dictate how long the rulemaking process will last. Most importantly, however, the biological cycle of migratory game birds controls the timing of data-gathering activities and thus the dates on which these results are available for consideration and deliberation.

For the regulatory cycle, Service biologists gather, analyze, and interpret biological survey data and provide this information to all those involved in the process through a series of published status reports and presentations to Flyway Councils and other interested parties. Because the Service is required to take abundance of migratory game birds and other factors into consideration, the Service undertakes a number of surveys throughout the year in conjunction with Service Regional Offices, the Canadian Wildlife Service, and State and Provincial wildlife-management agencies. To determine the appropriate frameworks for each species, we consider factors such as population size and trend, geographical distribution, annual breeding effort, the condition of breeding and wintering habitat, the number of hunters, and the anticipated harvest. After frameworks are established for season lengths, bag limits, and areas for migratory game bird hunting, States may select season dates, bag limits, and other regulatory options for the hunting seasons. States may always be more conservative in their selections than the Federal frameworks, but never more liberal.

The programmatic document, "Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (FSES 88–14)," filed with the Environmental Protection Agency (EPA) on June 9, 1988, addresses National Environmental Policy Act (NEPA) compliance by the Service for issuance of the annual framework regulations for hunting of migratory game bird species. We published a Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582), and our Record of Decision on August 18, 1988 (53 FR 31341). We also address NEPA compliance for waterfowl hunting frameworks through the

annual preparation of separate Environmental Assessments, as in the "Duck Hunting Regulations for 2012-13" with its corresponding August 23, 2012 Finding of No Significant Impact.

Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53376), the Service announced its intent to develop a new Supplemental Environmental Impact Statement for the migratory bird hunting program. We held public scoping meetings in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216). We published the 2010 Draft Supplemental Environmental Impact Statement in the Federal Register on July 9, 2010 (73 FR 39577). The public comment period closed on March 26, 2011. On May 31, 2013, we published a Notice of Availability in the Federal Register (78 FR 32686) announcing a Second Final Supplemental Environmental Impact Statement for the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds. The programmatic document was filed with the EPA on May 24, 2013, pursuant to the NEPA. The public review period ended July 1, 2013.

We allow migratory bird hunting on refuges and hatcheries on designated areas only if we have determined such activity to be compatible with the establishment purpose(s) of the refuge and the mission of the (Refuge System), as required by the National Wildlife Refuge System Administration Act (NWRSAA, 16 U.S.C. 668dd-668ee).

2. Hunting and Sport Fishing of Resident Wildlife

Individual states regulate hunting and sport fishing of resident wildlife, including upland game, big game, and fish. On a state-by-state basis, they annually establish hunting and sport fishing regulations with a goal of providing the public recreational opportunities while maintaining harvests at sustainable levels. Many states manage big game populations on a zonal basis (typically called Game Management Units), recognizing that discrete populations of resident big game species typically exist within a given state. States typically also manage resident small game and upland game on a statewide or zonal basis. States are generally responsible for fishery management within their borders, and coastal states have management authority that extend out to three miles beyond their coastline.

We allow hunting and sport fishing of resident wildlife on NWRs only if we have determined such activity compatible with the establishment purpose(s) of the refuge and the mission of the Refuge System, as required by the NWRSAA. We allow hunting and sport fishing of resident wildlife on NFHs only if we have determined such activity is not detrimental to the propagation and distribution of fish or other aquatic wildlife. Hunting and sport fishing on NWRs and NFHs generally occur consistent with state regulations, including seasons and bag limits. Station-specific hunting and sport fishing regulations can be more restrictive (but not more liberal) than state regulations - and often are.

III. DESCRIPTION AND EVALUATION OF CUMULATIVE IMPACTS

A cumulative impact is defined as an impact on the environment that results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time. Sometimes different actions counterbalance one another, partially canceling out each other's effects on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource.

All uses of Service lands and waters result in impacts to refuge wildlife and habitats, to other uses of the stations, and to other station resources. As we initiate or expand wildlife-dependent recreational activities for the public on NWRs and NFHs, there is an increased potential for adverse cumulative impacts to occur on individual refuges and hatcheries, and on Service lands as a whole. There are currently 340 NWRs and approximately 7,000 waterfowl production areas in 37 wetland management districts open to hunting of migratory birds, upland game and/or big game wildlife species. For the 2019-2020 season, the Service proposes to open and/or expand hunting and/or sport fishing opportunities on 74 NWRs and 15 NFHs.

Through the station-specific EAs for the respective proposed actions, we identified and analyzed the direct, indirect, and cumulative impacts of the proposed actions on populations of hunted (migratory birds, upland game, big game) and fished wildlife, non-hunted migratory and resident wildlife, habitats and plant resources, other wildlife-dependent recreational programs, refuge and hatchery users, station environment (air and water resources, soils, cultural resources and solitude), and station infrastructure and facilities. This national-level review and assessment evaluates the cumulative impacts of the proposed actions to the aforementioned components for all 74 refuges and 15 hatcheries combined and for Service lands as a whole.

Some of the proposed or expanded refuge and hatchery hunting and sport fishing programs examined in this review were more restrictive than the hunting seasons allowed on nearby lands by State regulation. For the remaining refuges and hatcheries in the rulemaking, we operate in accordance with state regulations. Station-specific regulations proposing hunting and sport fishing of resident wildlife included restrictions on the number of days we allowed hunting and sport fishing within the state season, restricting the use of trailing dogs, specifying which equipment is permissible (e.g. bow and arrow, muzzle-loading rifles, rod and reel), and shortening the daily hunting and sport fishing hours. We would expect all of these restrictions to result in fewer animals being harvested, and by inference, would be well within sustainable harvest levels of resident and migratory wildlife populations.

The conclusions in the refuge-specific EAs that there would not be any significant adverse direct, indirect, or cumulative impacts on wildlife populations, other recreational uses, other refuge

resources, and other aspects of the human environment were further supported by the Compatibility Determinations (CDs) and Section 7 evaluations. The CD process examines the anticipated impacts of a proposed activity on biological resources, and considers impacts to other wildlife-dependent recreational programs and other refuge resources. All CDs we reviewed determined that the hunting and sport fishing programs were compatible with refuge establishment purposes and the mission of the Refuge System. Hatcheries follow the same regulations and policies as refuges for opening to hunting or sport fishing. However, instead of a Compatibility Determination, hatcheries must only make a determination that the hunting or sport fishing opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife" or that sport fishing "...is not detrimental to the propagation and distribution of fish or other animal life" (50 CFR 71) for the activity to be allowed. All of the Section 7 consultations determined that the proposed activities would have "No Effect" or were "Not Likely to Adversely Affect" T&E species.

Many of the EAs specifically stated that changes in station conditions, such as sizeable increases in refuge or hatchery acreage or public uses, would trigger new hunt planning, NEPA, CD, and Section 7 evaluation processes. Many of the EAs also noted that the Service may reevaluate compatibility at any time if conditions warrant. These required planning processes ensure that adverse cumulative impacts will not accumulate over time.

1. Cumulative Impacts to Migratory Birds – Hunted Species

For some stations, the projected harvest as a result of the proposed action results in no, or minim, harvest. For these refuges and hatcheries, we estimate that expansion of a hunting program will result in no, or minimal, harvest. In many areas, numbers of hunters have been steadily decreasing, and we estimate that the additional hunting opportunity will not result in an additional number of hunters, or additional harvest of the species being analyzed.

Six of the stations proposing to open or expand migratory game bird hunting (Currituck, Mashpee, Monomoy, Silvio O. Conte, Great Bay, and Parker River NWRs) lie within the Atlantic Flyway. For the period of 2016-2017, annual duck harvests for the Atlantic Flyway averaged 1,572,500 (±8%) ducks and during the same period, annual goose harvests for the Atlantic Flyway averaged 663,400 (±7%) geese (Raftovich et al. 2018). Projected harvests of migratory waterfowl resulting from the proposed actions at the six stations are as follows: Currituck NWR- 0 ducks and 0 geese; Mashpee NWR- 20ducks and 5 geese; Monomoy NWR- 150 ducks and 6 geese; Silvio O. Conte NWR- 75 ducks and 50 geese; Great Bay NWR- 0 ducks and 0 geese; and Parker River NWR- 50 ducks and 12 geese.
One station in the Atlantic Flyway is opening to dove hunting (Mashpee NWR). Projected harvests of dove resulting from the proposed action is 0 doves. For the period of 2016-2017, average annual mourning dove harvests for Massachusetts was 142,900 (±37%) doves. During the same period, averages for the Atlantic Flyway were 4,606,000 (±9%) doves for the Eastern Unit (Raftovich et al. 2018).

Five stations in the Atlantic Flyway are expanding coot hunting (Currituck, Mashpee, Monomoy,

Great Bay, and Parker River NWRs). Projected harvests of coots resulting from the proposed actions are as follows: Currituck NWR- 0 coots; Mashpee- 0 coots; Monomoy NWR- 22 coots; Great Bay NWR- 0 coots; and Parker River NWR- 0 coots. For the period of 2016-2017, average annual coot harvest for North Carolina (Currituck NWR) was 8,800 (± 196%), for Massachusetts (Mashpee, Monomoy, and Parker River NWRs) was <50 (±174%), and for New Hampshire (Great Bay NWR) was 100 (± 195%). The average for the Atlantic Flyway was 16,700 (± 112%) coots (Raftovich et al. 2018).

Three stations in the Atlantic Flyway are expanding woodcock hunting (Mashpee, Silvio O. Conte, and Parker River NWRs). Projected harvests of woodcock resulting from the proposed actions are as follows: Mashpee NWR- 10 woodcocks; Silvio O. Conte NWR- 10 woodcocks; and Parker River NWR- 5 woodcocks. For the period of 2016-2017, average annual woodcock harvest for Massachusetts (Mashpee, Silvio O. Conte and Parker River NWRs) was 1,900 (± 46%), and for Connecticut (Silvio O. Conte NWR) was 1,600 (± 69%). The average for the Eastern Region was 62,700 (± 24%) woodcocks (Raftovich et al. 2018).

Three stations in the Atlantic Flyway are expanding snipe hunting (Mashpee, Silvio O. Conte, and Parker River NWRs). Projected harvests of snipe resulting from the proposed actions are as follows: Mashpee NWR- 1 snipe; Silvio O. Conte NWR- 4 snipe; and Parker River NWR- 2 snipe. For the period of 2016-2017, average annual snipe harvest for Massachusetts (Mashpee, Silvio O. Conte and Parker River NWRs) was 100 (± 174%), and for Connecticut was <50 (±164%) snipe. The average for the Atlantic Flyway was 28,500 (± 82%) snipe (Raftovich et al. 2018).

Three stations in the Atlantic Flyway are expanding rail hunting ((Mashpee, Silvio O. Conte, and Parker River NWRs). Projected harvests of rail resulting from the proposed actions are as follows: Mashpee NWR- 1 rails; Silvio O. Conte NWR- 4 rails; and Parker River NWR- 2 rails. For the period of 2016-2017, average annual rail harvest for Massachusetts (Mashpee, Silvio O. Conte, and Parker River NWRs) was <50 (±176), and for Connecticut was 100 (± 114%) rail. The averages for the Atlantic Flyway were 11,800 (± 42%) rails (Raftovich et al. 2018).

Ten of the stations proposing to open or expand migratory game bird hunting (Tamarac, Neal Smith, Northern Tallgrass Prairie, Crane Meadows, Patoka River, Cypress Creek, Crab Orchard, Key Cave, and Grand Bay NWRs and Iron River NFH) lie within the Mississippi Flyway. For the period of 2016-2017, annual duck harvests for the Mississippi Flyway averaged 5,339,800 (±5%) ducks and during the same period, annual goose harvests for the Mississippi Flyway averaged 1,350,000 (±8%) geese (Raftovich et al. 2018). Projected harvests of migratory waterfowl resulting from the proposed actions at the nine stations are as follows: Tamarac NWR- 0 ducks and 0 geese; Neal Smith NWR- 20 ducks and 10 geese; Northern Tallgrass Prairie NWR- 50 ducks and 25 geese; Crane Meadows NWR- 900 ducks and 105 geese; Patoka River NWR- 100 ducks and 10 geese; Cypress Creek NWR- 0 ducks and 0 geese; Crab Orchard NWR- 0 ducks and 0 geese; Key Cave NWR- 0 ducks and 0 geese; Grand Bay NWR- 12 ducks and 0 geese; and Iron River NFH- 0 ducks and 0 geese.

Five stations in the Mississippi Flyway are expanding dove hunting (Neal Smith, Northern Tallgrass Prairie, Patoka River, Cypress Creek, and Grand Bay NWRs) and four stations in the Mississippi Flyway are opening dove hunting (Tamarac, Crane Meadows, and Crab Orchard NWRs and Iron River NFH). The projected harvest of doves resulting from the proposed actions is as follows: Neal Smith NWR- 50 doves; Northern Tallgrass Prairie NWR- 9 doves; Patoka River NWR- 12 doves; Cypress Creek NWR- 0 doves; Grand Bay NWR- 0 doves; Tamarac NWR- 150 doves; Crane Meadows NWR- 213 doves; Crab Orchard NWR- 450 doves; and Iron River NFH- 0 doves. For the period of 2016-2017, average annual dove harvest for Iowa was 134,900 (±16%), for Indiana was 122,100 (±20%), for Illinois was 344,900 (±29%), for Minnesota was 39,100 (±30%), for Wisconsin was 40,800 (±37%), for Alabama was 483,600 (±30%) doves, and for Mississippi was 316,500 (±25%). The averages for the Eastern Unit was 4,783,300 (±8%) doves (Raftovich et al. 2018).

Four stations in the Mississippi Flyway are expanding coot hunting (Northern Tallgrass Prairie, Patoka River, Cypress Creek, and Grand Bay NWRs) and three stations in the Mississippi Flyway are opening coot hunting (Crane Meadows and Crab Orchard NWRs and Iron River NFH). Projected harvests of coots resulting from the proposed actions are as follows: Northern Tallgrass Prairie NWR- 0 coots; Patoka River NWR- 2 coots; Cypress Creek NWR- 0 coots; Grand Bay NWR- 0 coots; Crane Meadows NWR- 45 coots; Crab Orchard NWR- 0 coots; and Iron River NFH- 0 coots. For the period of 2016-2017, average annual coot harvest for Mississippi was 0, for Indiana was 6,000 (±193%), for Illinois was 1,200 (±195%), for Minnesota was 4,900 (±117%), for Wisconsin was 33,800 (±184%), and for Iowa was 300 (±104%) coots. The average for the Mississippi Flyway was 75,900 (±92%) coots (Raftovich et al. 2018).

Three stations in the Mississippi Flyway are expanding woodcock hunting (Northern Tallgrass Prairie, Patoka River, and Cypress Creek NWRs) and three stations in the Mississippi Flyway are opening woodcock hunting (Crab Orchard and Key Cave NWRs and Iron River NFH). Projected harvests of woodcock resulting from the proposed actions are as follows: Northern Tallgrass Prairie NWR- 0 woodcocks; Patoka River NWR- 2 woodcocks; Cypress Creek NWR- 2 woodcocks; Crab Orchard NWR- 10 woodcocks; Key Cave NWR- 0 woodcocks; and Iron River NFH- 0 woodcocks. For the period of 2016-2017, average annual woodcock harvest for Iowa was 1,900 (±179%), for Indiana was 1,500 (±142%), for Illinois was 400 (±142%), for Minnesota was 26,700 (±37%), for Wisconsin was 31,100 (±29%), and for Alabama was 600 (±90%) woodcocks. The average for the Central Region was 140,900 (±22%) woodcocks (Raftovich et al. 2018).

Three stations in the Mississippi Flyway are expanding snipe hunting (Northern Tallgrass Prairie, Patoka River, and Cypress Creek NWRs) and four stations in the Mississippi Flyway are opening snipe hunting (Crane Meadows, Crab Orchard, and Key Cave NWRs and Iron River NFH). Projected harvests of snipe resulting from the proposed actions are as follows: Northern Tallgrass Prairie NWR- 0 snipe; Patoka River NWR- 2 snipe; Cypress Creek NWR- 0 snipe; Crane Meadows NWR- 1 snipe; Crab Orchard NWR- 4 snipe; Key Cave NWR- 0 snipe; and Iron River NFH- 0 snipe. For the period of 2016-2017, average annual snipe harvest for Iowa was 100

(±116%), for Indiana was 200 (±94%), for Illinois was 800 (±195%), for Minnesota was 100 (±195%), for Wisconsin was 1,100 (±196%), and for Alabama was 200 (±195%) snipe. The average for the Mississippi Flyway was 5,700 (±66%) snipe (Raftovich et al. 2018).

Two stations in the Mississippi Flyway are expanding rail hunting (Northern Tallgrass Prairie and Patoka River NWRs) and five stations in the Mississippi Flyway are opening rail hunting (Tamarac, Crane Meadows, Cypress Creek, and Crab Orchard NWRs and Iron River NFH). Projected harvests of rail resulting from the proposed actions are as follows: Tamarac NWR- 100 rails, Northern Tallgrass Prairie NWR- 0 rails, Patoka River NWR- 2 rails; Crane Meadows NWR- 3 rails, Cypress Creek NWR- 4 rails, Crab Orchard NWR- 4 rails, and Iron River NFH- 0 rails. For the period of 2016-2017, average annual rail harvest for Iowa was 2,700 (±182%), for Minnesota was 0 rails, for Indiana was 0, for Illinois was 0, and for Wisconsin was 0. The averages for the Mississippi Flyway were 2,800 (±176%) rails (Raftovich et al. 2018).

Sixteen of the stations proposing to open or expand migratory game bird hunting (Deep Fork, Wichita Mountains, Hagerman, Bitter Lake, Bosque del Apache, Las Vegas, Trinity River, Tishomingo, Washita, Salt Plains, Boyer Chute, Hutton Lake, Medicine Lake, and Kirwin NWRs and Dexter and Leadville NFHs) lie within the Central Flyway. For the period of 2016-2017, annual duck harvests for the Central Flyway averaged 2,429,000 (±14%) ducks and during the same period, annual goose harvests for the Central Flyway averaged 1,061,500 (±11%) geese (Raftovich et al. 2018). Projected harvests of migratory waterfowl resulting from the proposed actions at the sixteen stations are as follows: Deep Fork NWR- 15 ducks and 32 geese; Wichita Mountains NWR- 150 ducks and 200 geese; Hagerman NWR- 0 ducks and 0 geese; Bitter Lake NWR- 12 ducks and 0 geese; Bosque del Apache NWR- 0 ducks and 0 geese; Las Vegas NWR- 0 ducks and 20 geese; Trinity River NWR- 0 ducks and 0 geese; Tishomingo NWR- 100 ducks and 200 geese; Washita NWR- 0 ducks and 0 geese; Salt Plains NWR- 0 ducks and 0 geese; Boyer Chute NWR- 83 ducks and 128 geese; Hutton Lake NWR- 699 ducks and 174 geese; Medicine Lake NWR- 0 ducks and 0 geese; Kirwin NWR- 1458 ducks and 4800 geese; Dexter NFH- 0 ducks and 0 geese; and Leadville NFH- 0 ducks and 0 geese..

Two stations in the Central Flyway are expanding dove hunting (Hagerman and Bosque del Apache NWRs) and three stations in the Central Flyway are opening dove hunting (Washita and Salt Plains NWRs and Dexter NFH). The projected harvest of doves resulting from the proposed actions is as follows: Hagerman NWR- 200 doves; Bosque del Apache NWR- 150 doves; Washita NWR- 1000 doves; Salt Plains NWR- 100 doves; and Dexter NFH- 0 doves. For the period of 2016-2017, average annual dove harvest for New Mexico was 73,900 (±51%), for Texas was 3,469,500 (±14%), and for Oklahoma was 315,600 (±29%). The average for the Central Unit was 5,462,800 (±10%) doves (Raftovich et al. 2018).

Three stations in the Central Flyway are expanding coot hunting (Bitter Lake, Boyer Chute, and Kirwin NWRs) and seven stations in the Central Flyway are opening coot hunting (Deep Fork, Wichita Mountains, Tishomingo, Salt Plains, Hutton Lake, and Medicine Lake NWRs and Dexter NFH). Projected harvests of coots resulting from the proposed actions are as follows: Bitter Lake NWR- 2 coots; Boyer Chute NWR- 82 coots; Kirwin NWR- 3,645 coots; Deep Fork

NWR- 0 coots; Wichita Mountains NWR- 0 coots; Tishomingo NWR- 0 coots; Salt Plains NWR- 0 coots; Hutton Lake NWR- 216 coots; Medicine Lake NWR- 15 coots; and Dexter NFH- 0 coots. For the period of 2016-2017, average annual coot harvest for New Mexico was 100 (±113%), for Nebraska was 400 (±196%), for Oklahoma was 0, for Wyoming was 300 (±113%), for Kansas was 0, and for Montana was 500 (±180%) coots. The average for the Central Flyway was 6,000 (±78%) coots (Raftovich et al. 2018).

Seven of the stations proposing to open or expand migratory game bird hunting (McKay Creek, Billy Frank Jr. Nisqually, Bill Williams River, Cibola, Havasu, San Bernardino, and San Pablo Bay NWRs) lie within the Pacific Flyway. For the period of 2016-2017, annual duck harvests for the Pacific Flyway averaged 2,720,200 (±10%) ducks and during the same period, annual goose harvests for the Pacific Flyway averaged 518,000 (±10%) geese (Raftovich et al. 2018). Projected harvests of migratory waterfowl resulting from the proposed actions at the seven stations are as follows: McKay Creek NWR- 0 ducks and 0 geese; Billy Frank Jr. Nisqually NWR- 840 ducks and 310 geese; Bill Williams River NWR- 0 ducks and 0 geese; Cibola NWR- 150 ducks and 55 geese; Havasu NWR- 250 ducks and 550 geese; San Bernardino NWR- 0 ducks and 0 geese; and San Pablo Bay NWR- 0 ducks and 0 geese.

Four stations in the Pacific Flyway are expanding dove hunting (Bill Williams River, Cibola, Havasu, and San Bernardino NWRs) and one station in the Pacific Flyway is opening dove hunting (McKay Creek NWR). Projected harvests of doves resulting from the proposed actions are as follows: Bill Williams River NWR- 10 doves; Cibola NWR- 20 doves; Havasu NWR- 900 doves; San Bernardino NWR- 6 doves; and McKay Creek NWR- 100 doves. For the period of 2016-2017, average annual dove harvest for Arizona was 350,700 (±11%) and for Oregon was 19,700 (±47%). The averages for the Western Unit was 1,315,000 (±9%) doves (Raftovich et al. 2018).

Four stations in the Pacific Flyway are expanding coot hunting (Billy Frank Jr. Nisqually, Cibola, Havasu, and San Pablo Bay NWRs). Projected harvests of coots resulting from the proposed actions are as follows: Billy Frank Jr. Nisqually NWR- 100 coots; Cibola NWR- 25 coots; Havasu NWR- 25 coots; and San Pablo Bay NWR- 0 coots. For the period of 2016-2017, average annual coot harvest for California was 10,300 (±66%), for Arizona was 0, and for Washington was 1,800 (±67%) coots. The average for the Pacific Flyway was 18,400 (±41%) coots (Raftovich et al. 2018).

Two stations in the Pacific Flyway are expanding snipe hunting (Cibola and Havasu NWRs). Projected harvests of snipe resulting from the proposed actions are: Cibola NWR- 15 snipe and Havasu NWR- 2 snipe. For the period of 2016-2017, average annual snipe harvest for Arizona was <50 (±193%) snipe. The average for the Pacific Flyway was 4,300 (±64%) snipe (Raftovich et al. 2018).

Total duck and goose harvest in the United States from 2016-2017 was estimated at 12,115,800 (±4%) ducks and 3,602,500 (±5%) geese. For the same period, the estimated average national harvest of coots was 117,100 (±62%), of mourning doves was 11,561,100 (±6%), of rails was

14,600 (±48%), of snipe was 42,400 (±57%), and of woodcocks was 203,500 (±17%) (Raftovich et al. 2018).

Collectively, for the proposed actions on these thirty-six refuges and three hatcheries, our estimates indicate that the proposed harvests of each species will constitute a negligible component of the national harvests.

2. Cumulative Impacts to Resident Wildlife

National wildlife refuges proposing to open or expand hunting or sport fishing programs for resident wildlife occur in Alabama (Key Cave NWR), Arizona (Bill Williams River, Buenos Aires, Cibola, Imperial, and Kofa NWRs), California (Colusa, Delevan, Marin Islands, Sacramento, Stone Lakes, and Sutter NWRs), Florida (St. Marks NWR), Georgia (Bond Swamp, Okefenokee, and Piedmont NWRs), Idaho (Minidoka NWR), Illinois (Crab Orchard, Cypress Creek, Great River, Middle Mississippi River, and Hackmatack NWRs), Indiana (Patoka River NWR), Iowa (Neal Smith, Northern Tallgrass Prairie, and Desoto NWRs), Kentucky (Clarks River NWR), Maryland (Patuxent Research Refuge), Massachusetts (Mashpee, Monomoy, and Parker River NWRs), Minnesota (Crane Meadows and Tamarac NWRs), Montana (Medicine Lake NWR), Nebraska (Boyer Chute and Valentine NWRs), New Hampshire (Great Bay NWR), New Mexico (Bitter Lake and Bosque del Apache NWRs), North Carolina (Currituck and Mattamuskeet NWRs), Ohio (Cedar Point and Ottawa NWRs), Oklahoma (Deep Fork, Little River, Ozark Plateau, Salt Plains, Sequoyah, Tishomingo, Washita, and Wichita Mountains NWRs), Oregon (Bandon Marsh, McKay Creek, and Nestucca Bay NWRs), Pennsylvania (Cherry Valley NWR), South Dakota (Sand Lake NWR), Tennessee (Cross Creeks NWR), Texas (Hagerman, Laguna Atascosa, Lower Rio Grande Valley, and Trinity River NWRs), Washington (San Juan Islands NWR), Wisconsin (Green Bay and Whittlesey Creek NWRs), and Wyoming (Seedskadee NWR). National fish hatcheries proposing to expand hunting or sport fishing programs for resident wildlife occur in Colorado (Hotchkiss and Leadville NFHs), Maine (Craig Brook NFH), New Mexico (Dexter NFH), North Carolina (Edenton NFH), North Dakota (Valley City NFH), Oklahoma (Tishomingo NFH), South Carolina (Orangeburg NFH), Texas (Inks Dam NFH), Virginia (Harrison Lake NFH), Washington (Entiat, Leavenworth, Little White Salmon, and Spring Creek NFHs), and Wisconsin (Iron River NFH). We have considered the cumulative impacts of harvest of resident wildlife species on NWRs and NFHs open to upland game hunting, big game hunting, and sport fishing on a national scale, and have concluded that consideration of cumulative impacts is most relevant at a more local geographic scale because of the discrete nature of these populations.

The proposed actions involve opening or expanding opportunities for hunting resident wildlife at 64 refuges and 3 hatcheries and sport fishing at 16 refuges and 13 hatcheries. Minidoka, Green Bay, Northern Tallgrass Prairie, Patoka River, Silvio O. Conte, and Medicine Lake NWRs are expanding both hunting and sport fishing opportunities. The station-specific EAs and CatExs evaluated impacts of harvest of resident wildlife species on refuge and hatchery populations as well as populations at the appropriate geographic scale which best defines the discrete populations (i.e., state or zone within a state, or body of water).

States have the primary trust responsibility for managing resident wildlife. Each state manages its resident wildlife slightly differently. However, Congress charges all states with managing and perpetuating resident wildlife for the citizens of their respective states. State wildlife agencies provided much of the harvest and population information on resident wildlife contained in the station-specific EAs to the Service. All of the refuges and hatcheries had close working relationships with state wildlife agencies and consulted with them in developing their hunting and sport fishing proposals. Most refuges and hatcheries have annual meetings with state wildlife agencies to review and make adjustments to their hunting and sport fishing programs.

States concurred with and supported all of the proposed hunting and sport fishing seasons for resident wildlife on refuges and hatcheries. Refuge and hatchery hunting and sport fishing seasons may be more restrictive than state-set seasons but never more liberal. Some refuge and hatchery hunting and sport fishing seasons examined in this review were more restrictive than seasons allowed on nearby lands by state regulation. Station-specific regulations on those refuges and hatcheries proposing hunting of resident wildlife included restrictions on the number of days we allowed hunting within the State season, controlling the number and/or age (such as youth-only seasons) of hunters, authorizing the use of hunting dogs, limiting equipment use (such as modern, high-powered rifles, archery or muzzle-loading rifles, use of boats), shortening the daily hunting and sport fishing hours, and placing size-limits on fish catches. We would expect all of these restrictions to result in hunters and anglers harvesting fewer animals.

Most state wildlife agencies subdivide their states into discrete "game management units" (GMUs) as a means to improve the management of big game species. State agencies use several different terms to describe GMUs. These units have population goals as well as harvest goals. Many units have either extended or restricted seasons and/or bag limits depending on the population and management objective of that particular unit. All of the state big-game hunting programs are designed to manage and maintain big-game populations at sustainable levels. Individual refuges and hatcheries generally occupy only a small fraction, or subset, of land area of any state-determined GMU. Big-game populations and harvests on refuges and hatcheries are also subsets of population and harvest goals of that particular GMU. While not all refuges and hatcheries provided numerical harvest estimates for big game, they all coordinated their seasons with state wildlife agencies.

Typically, big-game harvests on refuges and hatcheries were modest, representing a small fraction of the harvest in a GMU. Known, estimated, or projected refuge and hatchery harvests were well within the sustainable harvest levels determined by the states. As they did with big-game seasons, all of the refuges and hatcheries consulted with state wildlife agencies in developing their hunting proposals. State wildlife agencies concurred with, and supported, all of the proposed hunting seasons for resident wildlife on refuges and hatcheries.

Small and upland game seasons are generally, but not always, set on a statewide basis. We also design small and upland game seasons to manage and maintain small and upland game populations at sustainable levels. While not all refuges and hatcheries provided numerical

harvest estimates for small and upland game, they all coordinated their seasons with state wildlife agencies. Those numerical harvest estimates provided indicated that known, estimated, or projected refuge and hatchery harvests were a very minor component of statewide harvests and well within sustainable harvest levels as determined by the states.

The specific species being proposed for hunting varied widely among refuges and hatcheries and will result in low numbers of take for the various species. Therefore, the annual and long-term cumulative impacts to resident wildlife populations of fox (gray and red), coyote, raccoon, squirrel (red, fox, and gray), deer (white-tailed and mule), elk, nilgai antelope, black bear, feral hog, rabbit (cottontail), jackrabbit (black-tailed and white-tailed), snowshoe hare, elk, opossum, beaver, ring-necked pheasant, grouse (ruffed and sharp-tailed), wild turkey (Eastern and Rio Grande), quail (bobwhite and Gambel's), partridge (gray and Hungarian), woodchuck, crow, skunk, porcupine, weasel, coyote, bobcat, and badger from the additional harvest of these species under the proposed actions will be negligible. We anticipate that the impacts of hunting on resident wildlife on any one or combination of refuges and hatcheries will have negligible effect on any or all of the other stations. Resident wildlife proposed for sport fishing included bass (striped, spotted, white, largemouth, and smallmouth), channel catfish, flathead catfish, shiner perch, northern pike, bluegill, sunfish, common carp, pike, trout (brown, cutthroat, and rainbow), black crappie, bullhead, yellow perch, winter steelhead, salmon (coho and chinook), striped surf perch, shellfish, and white sturgeon, among other legal fish species to be harvested in the states of Pennsylvania, Maine, Massachusetts, Virginia, North Carolina, South Carolina, Minnesota, Ohio, Illinois, Indiana, Iowa, Missouri, Wisconsin, Colorado, Montana, North Dakota, Oklahoma, Texas, California, Washington and Oregon.

We did not determine or expect any of the known, estimated, or projected harvests of big game, upland game, or fish species resulting from the proposed activities on refuges and hatcheries to have significant adverse direct, indirect, or cumulative impacts to any hunted or fished wildlife population.

3. Cumulative Impacts to Non-hunted Migratory and Resident Wildlife

The primary impact to non-hunted migratory and resident wildlife identified in the station-specific EAs and CatExs was localized, temporary disturbance of individual animals, or groups of animals, caused by the mere presence of hunters and anglers (people), by hunters and anglers traveling to and from their destinations, and by conducting the hunting or sport fishing activity. We identified disturbance related to accessing hunting or sport fishing areas as likely being greater when using motorized vehicles or boats than by walking or using non-motorized means. We also note disturbance caused by the noise of gunshots and the presence and use of hunting dogs.

None of the EAs and CatExs reviewed identified any significant adverse cumulative impacts to non-hunted migratory and resident wildlife due to disturbance related to the proposed hunting or sport fishing activities. We based these findings on localized, temporary nature of the hunting and sport fishing activities, and the fact that we minimize or offset disturbance impacts on

refuges and hatcheries by specific management of the hunting and sport fishing programs on stations:

- Establishing sanctuaries and closed areas. We recognize establishing sanctuaries as the most effective mechanism to minimize disturbance. All of the refuges involved in the review established sanctuaries and closed areas to allow wildlife undisturbed areas to feed and rest. Birds, particularly, are very mobile and will move to areas of little disturbance. In addition, refuge and hatchery areas supporting sensitive species and/or habitats are not opened to hunting or sport fishing.
- Promulgating and enforcing station-specific regulations, such as limited entry regulations, which restrict the number of allowed hunters, restrictions on access modes, designating travel corridors, and restrictions on season length and hours open. For example, waterfowl hunting on refuges often closes at noon, and we allow it only a few days per week.
- Providing educational materials and programs to hunters, anglers, and other refuge and hatchery users to keep them informed on how to minimize impacts to non-hunted wildlife.

We also note other factors related to hunting or sport fishing activities, which minimize disturbance impacts to non-hunted migratory and resident wildlife:

- The home ranges of many species, particularly small mammals, are often restricted. This limits the potential for local disturbance, as well any regional impact that any disturbance may cause.
- Many species are nocturnal and, therefore, would be only minimally impacted by any daytime activity.
- Hunting seasons often take place during the colder months of the year. Many species, such as small mammals, reptiles, and amphibians are hibernating or in torpor states that limits their interactions with hunters.
- Many species are migratory and have already passed through the refuge or hatchery before hunting seasons take place. In northern and mid-latitude refuges and hatcheries, many migratory bird species are no longer in the area when hunting seasons take place.
- The number of hunters or anglers is often self-limited because of difficult access or equipment needs, such as requiring a boat to access an area.
- Some refuge or hatchery hunting and sport fishing programs attract a very small number of participants. Often participation rates decline as a season progresses.
- The habitat may be difficult to traverse, requiring hunters or anglers to avoid areas such as thick vegetation and extensive mudflats, further localizing the disturbance and providing adequate escape cover even within areas open to hunting.

The EAs noted that most of the refuge and hatchery hunting programs would take place outside of the primary nesting and brood-rearing seasons for most migratory and resident non-hunted wildlife, and, therefore, have no or minimal impact on reproduction. However, some of the refuge hunting programs included spring turkey hunting, which does occur during the

reproductive season. We minimized impacts to reproductive success of nesting species from these activities on refuges through station-specific regulations, which limited the number of hunters. We also note that the nature of the hunt itself limits disturbance impacts of turkey hunting. Turkey hunters are particularly stealthy, often wearing camouflage and sitting motionless for long periods of time.

We also note illegal take of protected species as a potential impact of hunting or sport fishing activities on refuges and hatcheries. These are typically classified as rare, isolated, and negligible and not resulting in any significant adverse cumulative impacts to populations of non-hunted resident or migratory wildlife. We reduced the potential for this impact on the refuges and hatcheries through the enforcement of regulations protecting species that are not specifically authorized as being open for hunting or sport fishing from both illegal take and harassment.

On some refuges and hatcheries, we note potential beneficial impacts of hunting to non-hunted wildlife and sport fishing to non-fished wildlife. Reducing populations of overabundant ungulates (deer) and invasive species such as feral hog or common carp resulted in improved habitat conditions for other wildlife species by reducing browsing and grazing pressure on native plant communities. For example, reducing disturbance caused by hog wallowing also diminishes the resulting favorable conditions for the establishment of invasive plants. In addition, we note removal of meso-predators, such as raccoons and opossums, for its potential to increase reproductive success of birds, small mammals, reptiles, and amphibians. Deer, hogs, raccoons, and opossums can also be vectors of wildlife disease, so reducing their populations may reduce disease transmission to other species.

None of the EAs or CatExs reviewed identified any significant adverse cumulative impacts to non-hunted migratory and resident wildlife from any of the proposed hunting or sport fishing programs or significant adverse impacts from past, present, or foreseeable future hunts or sport fishing programs if we allowed impacts from these individual hunts or sport fishing programs to accumulate.

4. Cumulative Impacts to Threatened and Endangered Species

We examined station-specific EAs and CatExs for the 74 refuges and 15 hatcheries opening or expanding hunting and/or sport fishing programs to evaluate the impacts of the proposed hunting or sport fishing activities on federally listed T&E species. The Service also conducted intra-Service consultations on the proposed hunting and/or sport fishing activities, as required under Section 7 of the Endangered Species Act. We also assessed associated Section 7 reviews as part of this report.

The most common impact to T&E species that may have been present on the refuges and hatcheries during the hunting seasons documented in the EAs and CatExs was minor, localized, temporary disturbance of individual animals, or groups of animals caused by the mere presence of hunters (people), by hunters traveling to and from their hunting destinations, and by conducting the hunting activity. Most T&E species were not present in the open areas of the

refuges or hatcheries during the hunting season, because they were aquatic species not found on upland or near-shore areas that were hunted, had migrated off of the station prior to the start of the hunting season, were hibernating or in a torpid state, or were found in habitat types other than that which was going to be hunted. Because hunting seasons typically take place during the fall and winter, T&E plant species are normally in a dormant state that was not likely to be significantly impacted by minor trampling.

The EAs and CatExs reviewed determined that disturbance impacts would not result in significant adverse cumulative impacts to T&E species from any of the proposed hunting programs or significant adverse impacts from past, present or foreseeable future hunts if we allowed impacts from these individual hunts to accumulate. All of the Section 7 consultations determined that the proposed hunting activities would have "No Effect" or were "Not Likely to Adversely Affect" T&E species or designated critical habitat.

5. Cumulative Impacts to Habitats and Plant Resources

We examined the impacts of the proposed hunting activities on habitats and plant resources for the station-specific EAs for the 74 refuges and 15 hatcheries opening or expanding hunting and/or sport fishing programs. Trampling was most prevalent near parking lots and on footpaths leading to hunting and/or sport fishing areas. Most trampling would occur during plant-dormant periods in the fall and winter. Spring turkey seasons resulted in light trampling during the growing season. Local control of access points or limiting hunter numbers minimized these impacts. We prohibit cutting of vegetation on refuges and hatcheries. We found these impacts to be localized and minor, and hunting and/or sport fishing activities did not result in any significant adverse cumulative impacts to vegetation and habitats on any of the stations. We also considered impacts to habitats and plant resources at each refuge through the CD process.

In addition to providing compatible wildlife-dependent recreational opportunities, an objective of hunting and sport fishing resident wildlife and some migratory bird species on NWRs and NFHs and over broader areas is to maintain wildlife populations at levels consistent with the carrying capacity of habitats supporting these populations. Several EAs identified the benefits from hunting and sport fishing that could accrue to the habitats and vegetation as a result of controlling ungulate and invasive species populations through hunting and sport fishing. These benefits include improved vegetative cover, plant regeneration and abundance, particularly of highly preferred food plants (some of which may be rare or species of concern), and habitat structure. While most of these beneficial impacts would be localized, they could have cumulative impacts for ground- and shrub-understory nesting/dependent migratory birds and aquatic wildlife

Overpopulations of resident wildlife species such as white-tailed deer can result in damage to native habitats, reducing the value of these habitats to other wildlife. Nonnative invasive species such as feral hog can be especially damaging to native habitats and native wildlife. Overabundance of some migratory bird species can also adversely impact native habitats and other wildlife species. For example, overabundance of mid-continent snow geese in North America is currently resulting in substantial degradation of wetland habitats in the Arctic.

Overpopulations of wildlife often lead to increased disease outbreaks and excessive die-offs resulting from starvation or malnutrition.

None of the station-specific EAs determined that the effects of vegetation trampling and soil compaction resulting from hunting or sport fishing activities on the refuges or hatcheries would have significant adverse cumulative impacts on habitats and plant resources from any of the proposed hunting or sport fishing programs, or significant adverse impacts from past, present, or foreseeable future hunting or sport fishing programs if we allowed impacts from these individual activities to accumulate.

6. Cumulative Impacts to Other Wildlife-Dependent Recreational Uses

We examined the impacts of the proposed activities on other wildlife-dependent recreational uses for the 74 refuges and 15 hatcheries opening or expanding hunting or sport fishing programs. Hunting activities on some refuges and hatcheries required a closure of areas open to hunting to other uses while we conducted the hunts, resulting in an impact to those users. Another potential impact of hunting activities is that users may choose to not visit the station while the hunt was taking place. This seasonal displacement of refuge and hatchery users would be temporary and would not cause significant adverse cumulative impacts to other recreational users.

Most refuge and hatchery hunt programs have established station-specific regulations to improve the quality of the hunting or sport fishing experience as well as provide for quality wildlife-dependent experiences for other users. We adjust visitor use programs, as needed, to eliminate or minimize conflicts between users. Virtually all of the refuges and hatcheries open to hunting and other wildlife-dependent recreational uses use time and space zoning as an effective method to reduce conflicts between hunting and other uses. Eliminating or restricting overlap between hunt areas and popular areas for other wildlife-dependent recreation allows opportunities for other users to safely enjoy the refuge or hatchery in non-hunted areas during hunting seasons. We also frequently use restrictions on the number of hunters and the time in which they could hunt to minimize conflicts between user groups. We frequently use public outreach accompanying the opening of hunting and/or sport fishing seasons to make other wildlife-dependent recreational users aware of the seasons and minimize conflicts.

None of the station-specific EAs determined that the effects of hunting or sport fishing on the refuges or hatcheries would have significant adverse cumulative impacts on other wildlife-dependent recreational uses from any of the proposed hunting or sport fishing programs, or significant adverse impacts from past, present, or foreseeable future hunting or sport fishing programs if we allowed impacts from these individual activities to accumulate.

7. Cumulative Impacts on Physical Resources (air, water, soils), Cultural Resources, Station Facilities, and Solitude

Potential impacts to air and water quality and soils from the public's use of refuges and hatcheries for recreation include vehicle emissions, dust, runoff from roads and trails, and increased erosion if use is heavy enough to compact soils. Increased visitation to refuges and hatcheries could decrease opportunities for solitude. The station-specific EAs and CatExs analyzed impacts of the proposed actions on air and water quality, soils, cultural resources, and solitude and determined that these impacts were negligible. Refuge or hatchery actions taken to minimize impacts on the station environment include developing regulations which establish designated areas for use and access, controlling use levels, and monitoring of uses and law enforcement. Hunting is generally a dispersed activity that has minimal impact on the environment and causes no significant indirect, direct, or cumulative impacts on air, soil, water, habitats, plants, or other resources.

We identified additional automobile traffic and motorboat usage by hunters as sources of impact to air quality through emissions. We generally confined hunter and fisher vehicles to regularly traveled roads and waterways. Hunters and fishers make up a small portion of refuge and hatchery visitors, and we expect increases in either source of emissions to be minor.

We identified minor soil erosion and potential minimal increase in water turbidity, as a local issue in situations where we allowed hunters to travel on dirt roadways during sustained periods of wet weather and thereby cause rutting in the road surface. Dirt roads are common in many rural areas, including refuges and hatcheries. Any adverse impacts would be localized and would not likely cause any significant adverse cumulative impacts. We would manage these situations on a case-by-case situation by simply closing the road until conditions improved.

We also identified minor temporary soil disturbance from increased foot traffic on trails that hunters use. Any adverse impacts would be localized and would not cause any significant adverse cumulative impacts. These situations would generally self-correct during the next growing season.

We also identified some potential additional water turbidity stemming from the use of motorboats in shallow areas for waterfowl hunting and sport fishing. Any adverse impacts would be localized and would not cause significant adverse cumulative impacts. Hunters and fishers self-manage these situations by paddling their boats when they encounter shallow water.

Per Title 50 §32.2(k) "You may possess only approved nontoxic shot while in the field, which we identify in 50 CFR 20.21(j), while on Waterfowl Production Areas, or on certain other areas of the National Wildlife Refuge System as delineated on maps, leaflets and/or signs, available at each refuge headquarters or posted at each refuge, or as stated in refuge-specific regulations. Where we allow turkey and deer hunting, you may use slugs and shot containing lead to hunt these species unless prohibited by refuge-specific regulations and/or State law." On hatcheries, you also may possess only approved nontoxic shot while in the field as identified in 50 CFR 20.21, or as stated in special notices and/or station-specific regulations. (50 CFR 71.2).

Historically, the principal cause of lead poisoning in waterfowl was the collection of high

densities of lead shot in wetland sediments associated with migratory bird hunting activities (Kendall et al. 1996). In 1991, as a result of high bird mortality, the Service instituted a nationwide ban on the use of lead shot for hunting waterfowl and coots (50 CFR §32.2(k)). The Service requires any new shot types for waterfowl and coot hunting to undergo rigorous testing in a three-tier approval process that involves an ecological risk assessment and an evaluation of the candidate shot's physical and chemical characteristics, short- and long-term effects on reproduction in waterbirds, and potential toxic effects on invertebrates (50 CFR §20.134). Because of this rigorous testing, the *shot* toxicity issue of the past is substantially less of an ecological concern.

However, there remains a concern about the bioavailability of spent lead ammunition (bullets) and sinkers on the environment, endangered and threatened species, birds, mammals and humans or other fish and wildlife susceptible to biomagnification. Each of the hunting and sport fishing openers proposed in this package have carefully evaluated possible effects as part of the NEPA process. In addition, each refuge complied with section 7 of the Endangered Species Act, which requires Federal agencies to ensure that the actions they carry out, fund, or authorize do not jeopardize the continued existence of endangered or threatened species (''listed species'') (50 CFR §402). For each refuge, the Service determined that the proposed action was not likely to affect any listed species.

Non-toxic ammunition is becoming more available as the demand for this ammunition increases (Kelly et al. 2011). Copper ammunition is a good alternative since it is less toxic and frangible than lead ammunition (Hunt et al. 2006).

Although there is not a Service-wide ban on lead ammunition or lead sport fishing tackle, certain refuges have made refuge-specific regulations prohibiting these uses. The Service encourages refuge-State partnerships to reach decisions on usage, and will continue to encourage hunters and fishers to voluntarily use non-toxic ammunition and tackle for all harvest activities. The intent is to reduce the potential of lead poisoning to migratory birds and birds of prey, as well as lower the risk of lead exposure for humans ingesting wild game hunted on refuges.

Several documents identified the benefits from hunting and sport fishing that could accrue to the physical environment as a result of controlling ungulate and invasive species populations through hunting and sport fishing. These benefits include reducing soil erosion from heavily used game trails, improved vegetative cover, improved submerged and emergent aquatic vegetation, and reduced number of wallows caused by feral hogs. Beneficial impacts would also be localized and not likely to be significant at larger geographic scales.

Hunting and sport fishing activities on most refuges and hatcheries required minimal, if any, "facilities" beyond basic infrastructure such as roads, trails, and parking lots. This infrastructure would receive slightly more "wear and tear," but generally not to a significant extent. We created some seasonal, temporary parking lots, but any impacts would be local, and we anticipate no cumulative impacts. Some stations do construct duck blinds and check stations or boat ramps, but these structures tend to be "minimal" in their construction and would not result in any

significant cumulative impacts. We generally prohibit hunters from constructing permanent blinds or stands, prohibiting use of nails, spikes, or screws. Hunters must remove most temporary blinds/stands the end of each hunting day, unless otherwise authorized. Hunting activities did not result in significant adverse cumulative impacts to refuge facilities on any of the refuges or hatcheries.

Hunters and fishers, as well as other refuge and hatchery users, generally seek out solitude. Impact to solitude could arise from the sound of gunfire, but this impact is generally minimal, localized, and temporary. We expected no significant adverse cumulative impacts to solitude.

None of the EAs or CatExs reviewed identified any significant adverse cumulative impacts to physical resources, cultural resources, facilities, and solitude from any of the proposed hunting or sport fishing programs, or significant adverse impacts from past, present, or foreseeable future hunting or sport fishing programs if we allowed impacts from these individual activities to accumulate.

8. Cumulative Socioeconomic Impacts

Hunting seasons often attract people from outside of the immediate refuge or hatchery area. This results in positive economic activity. The magnitude of this activity is highly variable. Most refuges and hatcheries anticipated overall positive impacts on local economies. However, none of the refuge or hatchery hunting programs reviewed anticipated any significant boost in the local economy as a result of their hunting program. We also projected some decrease in economic activity in situations where other station users chose not to use the refuge or hatchery for other recreation during hunting season. We expect these impacts to be minimal. Hunting activities did not result in any significant adverse (or positive) cumulative impacts to local or regional economies.

Refuges and hatcheries reported that they worked closely with State, Federal, and private partners to minimize impacts to adjacent lands and its associated natural resources. We expected no significant adverse cumulative impacts to occur due to the hunting activities.

For example, McKay Creek NWR in Oregon is proposing an emergency elk hunt in coordination with the Oregon Department of Fish and Wildlife (ODFW) to address the negative impacts to McKay Creek NWR wildlife and habitat, address safety concerns of motorists using Highway 395, and reduce elk depredation on surrounding agricultural lands The objective of the proposed hunt would be to assist ODFW in ensuring McKay Creek NWR does not harbor elk during harsh winters, creating safety issues on Highway 395 and depredation on nearby residences and croplands. The number of landowners affected by elk damage is highly variable and dependent on

shows that six to seven landowners are negatively impacted due to elk damage each year. This damage includes impacts to crops such as winter wheat, canola, alfalfa, rangeland pasture grass, and existing fencing. One adjacent landowner estimates crop losses between $70,000 to $80,000 each year from elk damage to winter wheat (Greg Rimbach, ODFW Umatilla District Wildlife Biologist,

pers. comm., December, 2018).Therefore, the proposed emergency elk hunt will result in positive impacts to the agricultural segment of the local economy by reducing agricultural losses.

We occasionally cited wildlife damage to nearby lands from overabundant geese populations. These impacts are local, and we anticipate no significant cumulative impacts.

Some refuges and hatcheries noted potential impacts to public safety as a result of hunting activities. Analyses of these impacts cited low probability of hunting accidents. We determined controlling hunter numbers, restricting equipment (such as the use of modern high-powered rifles), establishing safety zones, area closures, hunting zones, and posting boundaries to be effective measures to minimize any safety concerns. Many areas have concerns regarding deer-auto collisions when the deer populations are higher than recommended. Reducing the deer population on a refuge or hatchery may help alleviate these issues on a local level. Due to these types of efforts put in place at specific stations to protect public safety, hunting activities did not result in any significant adverse cumulative impacts to public safety on any of the refuges or hatcheries.

We found providing affordable public hunting and/or sport fishing opportunities on refuges and hatcheries to have local and regional benefits. In some regions, hunting and sport fishing are important aspects of rural-based culture. We determined perpetuating hunting and sport fishing traditions to be important for cultural and recreational values, as well as having long-term conservation benefits. It is unknown if these benefits will cumulatively accrue beyond the region.

9. Cumulative Climate Change Impacts

Climate change is a change in climate, attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is in addition to natural climate variability observed over comparable time periods (UNFCCC 1992). These changes are expected to impact a variety of natural processes and resources. Using available and emerging science the Service continues to assess predictions of these complex effects. The effect of climate change and its influence on hunting and sport fishing include those national and regional impacts on migratory bird populations, fish and wildlife species pursued by anglers and hunters.

Climate Change effects on Migratory Birds

A serious concern is the impact global climate change will have on the remaining valuable migratory bird habitat. The rate of global climate change is accelerating, and many areas are predicted to experience extensive warming, changing precipitation patterns, shifts in vegetation, rising sea levels, increased frequency and intensity of severe weather events (e.g., fire, flood, drought), increased numbers of pests, pathogens, and invasive species, changes in the timing and length of the seasons, and declining snowpacks (MacCracken et al. 2000; Inkley et al. 2004; IPCC 2007). Climate model predictions, generally given for the year 2100, express that these effects are likely to have a significant impact on migratory bird species, either directly or

indirectly in the next 100 years. The specific effects will depend greatly upon local conditions and the ability of different species to respond to various components of the changing environment.

Predictions forecast climate and habitat changes for nearly every region important to migratory birds in North America. Recent studies suggest that factors such as timing of migration, range distribution, and productivity may all be affected by the changing climate (Crick 2004). For example, the Western Boreal Forest region of Alaska and northwestern Canada support a significant portion of the Nation's breeding waterfowl. This region is projected to be among the habitats most affected by global warming. Consequences of these temperature increases include melting permafrost, rising sea levels, extended ice-free seasons on lakes and rivers, early runoff, and shifts in vegetation (Inkley et al. 2004). The extent to which migratory birds will be able to adapt to these changes is not presently known and complete adaptation by all species is viewed as highly unlikely (Crick 2004).

Millions of birds migrate to and from the Arctic each year, but rapid climate change in the High North could strongly affect where species are able to breed, disrupting migratory connections globally. Scientists have modelled the climatically suitable breeding conditions of 24 Arctic specialist shorebirds and projected them to 2070. This study showed that climatically suitable breeding conditions could shift, contract and decline over the next 70 years, with 66–83% of species losing the majority of currently suitable area. Suitable climatic conditions are predicted to decline acutely in the most species rich region, Beringia (western Alaska and eastern Russia), and become concentrated in the Eurasian and Canadian Arctic islands. These predicted spatial shifts of breeding grounds could affect the species composition of the world's major flyways (Wauchope 2017).

Climate change may have an effect on rising sea levels in the future. Regions with coastal habitats that are critical to breeding and migrating bird species include the Pacific Northwest region, the Central California Coast, the Gulf Coastal Prairie, and the Mid-Atlantic Coast. Sea levels in these regions are expected to rise an average of 0.48 meters by the year 2100 (projected range 0.03-0.95 m) (U.S. Global Change Research Program 2000), and will have varying impacts on different coastal habitats. Of concern are the serious negative effects increased seawater levels and saltwater intrusion could have on tidal wetlands and marshes. A majority of these prime waterfowl habitats may be permanently lost, since extensive land development prohibits their reestablishment (U.S. Climate Change Science Program 2009). Of the thirty-six refuges and three hatcheries proposing to open or expand migratory bird hunting, six (Currituck, Mashpee, Monomoy, Silvio O. Conte, Great Bay, and Parker River NWRs) lie within the Atlantic Flyway. On the Atlantic coast, up to 45% of wetland habitat important to waterfowl is projected to be destroyed by rising sea levels by the year 2100 (Yaich and Wentz 2007). A similar scenario is expected on the Pacific coast, which could affect the hunting opportunities at San Pablo Bay NWR in California and Billy Frank Jr. Nisqually NWR in Washington in the future, as they lie within the Pacific Flyway. Regions of the Gulf Coast are projected to be so inundated by seawater that they may only support 1% of current populations by the year 2100 (Yaich and Wentz 2007). Refuges such as Kirwin NWR in Kansas, Patoka River NWR in

Indiana, Cypress Creek NWR in Illinois, Neal Smith NWR in Iowa, Northern Tallgrass Prairie NWR in Iowa and Minnesota, Tamarac Crane Meadows NWRs in Minnesota, and Grand Bay NWR in Missouri, lie in the Mississippi Flyway and these bird species may be affected by future rising sea levels on the Gulf Coast.

Other regions important to breeding, staging and wintering migratory birds, such as the Mississippi Alluvial Valley, Great Basin, southern Great Plains, and the Great Lakes region, are likely to encounter a different range of impacts. The changes in precipitation, higher temperatures, and increased evaporation predicted for these regions are likely to lead to lower water levels in streams, lakes, and in underground aquifers (Milly et al. 2005). Competition among domestic, industrial, and agricultural uses of water could increase, leaving even less water for wildlife related needs. It is estimated that lowering water levels in the Upper Great Lakes area could result in a 39% decrease in regional duck populations by the year 2100 (Yaich and Wentz 2007), which would affect the species at refuges such as Crane Meadows NWR in Minnesota, Patoka River NWR in Indiana, and Crab Orchard and Cypress Creek NWRs in Illinois.

Lastly, the Prairie Pothole Region (PPR) of the north central U.S. is an area of particular importance to waterfowl productivity in North America. A significant percentage of North America's ducks nest and are produced in the PPR. In fact, the PPR provides approximately 50% of the breeding habitat for North American ducks (Linduska 1964). Many waterfowl require 2.5 to 3.5 months of wetland habitat in order to raise their young to fledglings and for adult birds to complete their molt (Baldassarre and Bolen 1994). Climate models predict that increasing temperatures and shifting climate patterns associated with global warming may lead to reductions in water volume and longevity in wetland habitat, as well as changes in wetland vegetation. These changes likely would severely reduce the time available for waterfowl to use wetlands during the breeding season (Glick 2005; Johnson et al. 2010). In the PPR specifically, models indicate that a 4°C increase in temperature is likely to substantially decrease breeding waterfowl abundance in the PPR. This decrease could result as habitat in both the eastern and western prairie potholes becomes too dry to support historical levels of waterfowl (Johnson et al. 2010). The Service offers many hunting opportunities in the PPR, both on Wetland Management Districts and on refuges, which could be impacted by these changes. However, debate continues as to whether such a scenario will occur (Loesch et al. 2012).

Currently, these effects of climate change on migratory bird populations are based on model predictions. There is no definitive information on how exactly these changes in climate will impact species populations. The Service bases migratory bird hunting decisions (e.g., bag limits, season length, framework dates) for hunting seasons on the United States' Adaptive Harvest Management (AHM) program. The AHM approach provides a framework for making objective decisions in the face of incomplete knowledge concerning waterfowl population dynamics and regulatory impacts (USFWS 2016). Though the program was not created with the intent to respond to climate change, this adaptive approach to harvest management will contribute to the Service's ability to respond to future climate change impacts for migratory bird hunting season parameters. Changes in populations will be detected annually, and appropriate hunting season

adjustments will be made yearly based on the anticipated changes in migratory bird populations. If the Service detects early negative population trends, individual refuges may choose to restrict harvest opportunities (e.g., closing certain areas) for the species at issue.

In the station-specific hunt plans, each refuge and hatchery analyzed the harvest data for the hunted migratory bird populations to ensure that the numbers were still healthy and that current and proposed harvest management changes would not result in any adverse impacts to migratory bird populations. Because harvest data analysis will continue to be done on an annual basis, waterfowl hunting on refuges and hatcheries should not contribute to the adverse cumulative impacts of climate change on migratory birds in the United States. Station managers will continue to make adjustments as needed to mitigate for impacts to migratory bird populations from climate change.

Climate Change effects on Resident Game and Fish

A serious concern, but not so easily analyzed at a population level, is the impact climate change will have on resident fish, wildlife and their habitat. Refuge and hatchery ecosystems will respond to climate change in different ways and to varying extents, due in part to the heterogeneous impacts of climate change factors themselves and in part to other factors, such as the amount of stress an ecosystem may already be under and the adaptability of the species within it (Griffith et al. 2009). The ability of a species to adapt will depend on multiple factors such as species mobility, motility, degree of specialty, the extent to which life cycles are timed with natural events, and other characteristics. The rate of adaptation may or may not be enough to keep pace with the current and future rates of climate change (Parmesan 2006).

The complexity of ecological systems means that there is a tremendous amount of uncertainty about the impact climate change will actually have. In particular, the localized effects of climate change are still a matter of much debate. However, some refuges may be experiencing impacts from climate change. For example, sea level rise at Monomoy and Parker River NWRs in Massachusetts is impacting marsh elevation. This is already causing marsh migration, marsh inundation, and increased mortality in forests adjacent to salt marshes. These habitat changes may dramatically reduce the amount and quality of both forest for resident wildlife and salt marsh for migratory birds that are hunted. However, the refuges use an adaptive management approach for its hunt program, reviewing the hunt program annually and revising annually (if necessary), the Service's hunt program can be adjusted to ensure that it does not contribute further to the cumulative impacts on resident wildlife and migratory birds from possible climate change effects. The refuges have determined that their current hunting programs will not significantly add to the cumulative impacts on either resident wildlife or migratory waterfowl. .

Inland freshwater fisheries are also predicted to feel the effects of climate change in the future. A long-term (1973–2010) study of field patterns for Lake Erie yellow perch, *Perca flavescens*, showed that failed annual recruitment events (when a juvenile fish does not survive to be added to a population, by birth or immigration) followed short, warm winters. Subsequent laboratory

experimentation and field investigations revealed this was caused by reduced reproductive success. Following short winters, females spawn at warmer temperatures and produce smaller eggs that both hatch at lower rates and produce smaller larvae than females exposed to long winters. This research suggested that continued climate warming can lead to unanticipated, negative effects on temperate fish populations (Farmer 2015). Similarly, coldwater fish in the western United States could experience stress from the impacts of a changing climate. Drought, fires, and hot summer temperatures are putting stress on these fish, such as cutthroat trout, at an increasing risk (NPS 1995). In Yellowstone National Park, several tributaries critical for spawning native trout are now running dry in late summer, interrupting migration and making trout more vulnerable to predation. By the end of this century, native cutthroat trout across the western United States are expected to lose an additional 58% of their current habitat (Wenger et al. 2011). With coldwater fish species around the country experiencing similar declines, the number of days anglers participate in cold-water sport fishing is projected to decline by more than 1 million days by 2030 and by more than 6 million days by the end of the century (Jones et al. 2013).

Also, climate warming is influencing the cycle of snowmelt and already leading to major changes in arctic ecosystems, including redistributions of vegetation (Pearson et al. 2013) and changes in certain species' breeding habits (Grabowski et al. 2013). These changes can be seen as examples of impacts that may affect resident species of fish and wildlife in other parts of North America. For example, mammal species, such as beaver, American mink, muskrat, northern river otter, and arctic fox are projected to experience habitat losses of 5–33 percent over the century because of expected declines in rare habitat types (specific coastal habitats in the case of arctic fox) or declines in habitats associated with freshwater (wet meadows, lowland lakes, and riverine shrub habitat) (Marcot et. al 2015).

Several refuges and a hatchery are proposing to open or expand wild turkey hunting opportunities. The wild turkey is expected to lose 87% of its current winter range by 2080 (Audubon 2014). Stress caused by drought can affect turkey mating rate, thus hurting the overall population (Israel 2013) and with drought rates expected to increase as the climate warms, turkey populations may be impacted. However, currently these refuges have determined that their wild turkey populations are healthy and can support the increased hunting opportunities. For example, at McKay Creek NWR in Oregon, wild turkey are so overpopulated that they are causing damage to adjacent private property, so the refuge is coordinating with ODFW on proposing the hunt to bring the wild turkey population to a more sustainable level.

Several refuges (Buenos Aires NWR in Arizona; Hagerman, Laguna Atascosa, Lower Rio Grande Valley, and Trinity River NWRs in Texas; Ozark Plateau, Salt Plains, Sequoyah, Tishomingo, and Wichita Mountains NWRs in Oklahoma; Currituck NWR in North Carolina; Key Cave NWR in Alabama; Okefenokee NWR in Georgia; St. Marks NWR in Florida;) are opening or expanding feral hog hunting opportunities. Wild pigs were first brought to the southern United States in the 1500s as a source of food for early explorers and settlers and in the 1900s, the Eurasian or Russian wild boar was introduced for hunting. Today's invasive wild pigs, *Sus scrofa*, are the descendants of introduced wild boar, escaped domestic pigs, and

hybrids of the two. Invasive wild pigs cause substantial damage to property, agriculture and native ecosystems (Bates 2017). A recent study found the average rate of northward expansion increased from 6.5 to 12.6 km per year, suggesting most counties in the continental USA could be inhabited within the next 3–5 decades (Snow et al. 2017). The spread of invasive pigs was primarily associated with expansion into areas with similar environmental characteristics as their previous range, with the exception of spreading into colder regions. Climate change may assist this inconsistent spread into northern regions by generating milder winters with less snow. The rate of expansion places much of the United States and even southern Canada at risk of invasion by the species (Snow et al. 2017).

Global climate change may have an effect on the distribution of parasitic organisms, such as the meningeal worm, *Parel-aphostrongylosis tenuis*, a parasitic nematode commonly found in white-tailed deer in North America that causes damage to the central nervous system (Pickles et. al 2013). Parasite distribution is expected to shift with the overall habitat suitability of the parasite declining in the Great Plains and southeastern USA, but increasing in the Boreal Forest ecoregion, particularly in Alberta, Canada. These results have important implications for wildlife conservation and management due to the known pathogenicity of the "brain worms" to alternate hosts including moose, caribou and elk (Pickles et. al 2013). Increased winter tick infestations, due to higher temperatures and shorter winters that enhance winter tick survival, is the other major threat to North American deer and moose from climate change (Inkley et al. 2015). Severe infestations can cause high moose mortality, particularly in calves (Samuel 2007). Heavily infected moose may starve to death because they eat less when irritated by ticks, lose body heat due to hair loss, become vulnerable to infection, and suffer extensive blood loss to ticks (Cusick 2012). Deer are also susceptible to hemorrhagic disease (HD). Infected deer can rapidly become ill, losing their appetite and natural fear of humans, and develop a fever and extensive internal bleeding, often followed by death (MDNR 2017). HD is expected to thrive with climate change bringing warmer summers, longer droughts, and more intense rain events—the perfect environment for the midges that transmit HD (Diefenbach 2015). However, this information is predictive and there is no definitive information on how exactly these changes in climate will impact resident species populations in North America or on a specific refuge or hatchery.

Each refuge and hatchery analyzed the health of its resident fish and wildlife species to ensure that the populations are healthy and that current harvest management on the station, as well as any proposed changes to harvest management, would not result in any adverse impacts to resident fish or wildlife populations. Additionally, none of the proposed revisions to station-specific hunting and sport fishing regulations would result in a harvest strategy that is not sustainable. The Service will continue to base the annual level of harvest on the observed population size and habitat conditions. As discussed above, if results of monitoring programs indicate that resident fish and wildlife populations are unable to withstand the current harvest management strategies on a station, the regulations will be made more restrictive or seasons will be closed until the population can withstand the harvest pressure. Because monitoring will continue to be done on an annual basis, harvest management of resident game and fish on Service lands should not add to the adverse cumulative impacts of climate change on resident

fish, wildlife and their habitats, but rather be adjusted as needed to mitigate impacts on these species from climate change.

IV. DISCUSSION AND CONCLUSIONS

1. Migratory Birds – Hunted Species

The Service's proposed actions included expanding migratory bird hunting programs on thirty-six NWRs and three NFHs.

Known, estimated or projected harvests of migratory birds resulting from the proposed hunting activities on the refuges and hatcheries constituted a small percentage (all were less than 1% and many were less than a tenth of a percent) of the statewide and flyway-wide harvests of ducks, geese, doves, woodcock, and other migratory birds; and harvests on these refuges and hatcheries are well within sustainable harvest levels for these species' populations. While we determined impacts of the proposed hunting activities on several of the refuges and hatcheries to directly and indirectly affect migratory birds and other wildlife through disturbance and altering of habitat, we considered these impacts to be minor, localized, and temporary and were routinely minimized or offset through a variety of management activities conducted at each station.

We did not determine or expect any of the known, estimated, or projected harvests of migratory birds resulting from the proposed hunting activities on the refuges and hatcheries to have significant adverse direct, indirect, or cumulative impacts to any migratory bird population at local, statewide, flyway-wide, and national scales. Based upon our review of the station-specific EAs and CatExs, and for the following reasons, we conclude that the cumulative impacts of the additional migratory bird harvests on the aforementioned refuges and hatcheries, and combined harvests on all NWRs open to migratory bird hunting, will not negatively impact the short- or long-term viability of continental and Flyway migratory bird populations, Service land-wide migratory bird populations, and/or local migratory bird populations on refuges open to hunting. We also conclude that hunting on these refuges and hatcheries will not result in significant adverse cumulative impacts to migratory bird populations at relevant geographic scales when added to impacts from past refuge hunting and hunting that we reasonably expect will occur in the future. Finally, we anticipate that hunting on any one or combination of refuges and hatcheries will have negligible effect on migratory bird populations on any or all stations open to hunting.

- We annually develop federal regulatory frameworks governing harvest of migratory birds in the United States. We promulgate these regulations using extensive collection and analyses of migratory bird population, habitat, and harvest data. We adjust these annual regulations as needed to ensure sustainable harvests.
- The Service manages hunting of migratory birds on NWRs and NFHs under the federal framework regulations established for each Flyway (specifically, under regulations adopted by states within the flyways under the federal frameworks), and through station-

specific regulations that often are more restrictive than the state-adopted regulations. We adjust station-specific regulations annually, or as needed, to protect refuge and hatchery resources including migratory birds.

- Harvests of migratory birds on these 36 refuges and 3 hatcheries, individually and collectively, constitute a very minor percentage of the statewide, flyway-wide and national harvests, and are well within sustainable harvest levels for these species' populations.
- Before opening a refuge to hunting, we must determine whether the activity will be compatible with (will not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting on biological resources. We determined hunting to be compatible on the 36 refuges.
- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. Compatibility determinations for hunting programs must be completed at least every 15 years even if programs do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting program would trigger a new refuge hunt planning process with associated NEPA compliance.
- Before opening a hatchery to hunting, we must make a determination that the hunting opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the 3 hatcheries. Substantive changes in a hatchery hunting program would trigger a new hunt planning process with associated NEPA compliance.
- We annually conduct refuge and hatchery management activities on NWRs and NFHs that minimize or offset the disturbance and habitat impacts of hunting on migratory birds and other wildlife. These include establishment of non-hunted sanctuary areas, habitat management and restoration activities that increase the value of wetland and upland habitats for migratory birds and other wildlife, enforcement of station-specific hunting regulations, and public education.

2. Resident Wildlife – Hunted or Fished Species

The proposed actions involve opening or expanding opportunities for hunting resident wildlife at 64 refuges and 3 hatcheries and sport fishing at 16 refuges and 13 hatcheries. Resident wildlife species proposed for hunting on these refuges and hatcheries included fox (gray and red), coyote, squirrel (red, fox, and gray), deer (white-tailed, mule, and sika), moose, feral hog, rabbit (cottontail), jackrabbit (black-tailed and white-tailed), snowshoe hare, elk, opossum, beaver, ring-necked pheasant, grouse (ruffed and sharp-tailed), wild turkey (Eastern and Rio Grande), quail (bobwhite and Gambel's), partridge, woodchuck, crow, skunk, porcupine, weasel, coyote, bobcat, and badger. Resident wildlife proposed for sport fishing included bass (striped, spotted, white, largemouth, and smallmouth), channel catfish, flathead catfish, shiner perch, northern pike, bluegill, sunfish, common carp, pike, trout (brown, cutthroat, and rainbow), black crappie, bullhead, yellow perch, winter steelhead, salmon (coho and chinook), striped surf perch, shellfish, and white sturgeon, among other legal fish species to be harvested in the states of

Pennsylvania, Maine, Massachusetts, Virginia, North Carolina, South Carolina, Minnesota, Ohio, Illinois, Indiana, Iowa, Missouri, Wisconsin, Colorado, Montana, North Dakota, Oklahoma, Texas, California, Washington and Oregon.

The station-specific EAs evaluated impacts of refuge and hatchery harvests of resident wildlife species populations at the appropriate geographic scale for resident species, i.e. at statewide or state-designated management units within a state. On all of the refuges and hatcheries, known, estimated, or projected station harvests were a very minor component of overall statewide or zone-wide harvests. While we determined impacts of the proposed hunting or sport fishing activities on several of the refuges and hatcheries to directly and indirectly affect resident and migratory wildlife through disturbance and altering of habitat, we considered these impacts minor, localized and temporary, and routinely minimized or offset them through a variety of management activities conducted at each station.

We expect none of the known, estimated, or projected resident wildlife harvests resulting from these hunting and/or sport fishing activities on any of the refuges or hatcheries to have significant and adverse direct, indirect or cumulative impacts to resident wildlife species populations at relevant geographic scales (management units and/or statewide). Based on our evaluation of the station-specific EAs and for the following reasons, we conclude that hunting and/or sport fishing of resident wildlife on the refuges and hatcheries collectively will not result in significant and adverse cumulative impacts to resident wildlife populations at local, zonal (Game Management Unit, Management Zone, etc.) and statewide scales. We also conclude that hunting and/or sport fishing on these refuges and hatcheries will not result in significant adverse cumulative impacts to resident wildlife populations at relevant geographic scales when added to impacts from past hunting or sport fishing and hunting or sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing of resident wildlife on any one or combination of the refuges and hatcheries will have a negligible effect on resident wildlife populations at any or all other refuges and hatcheries open to hunting or sport fishing.

- The states regulate hunting and sport fishing of resident wildlife populations through an annual regulation setting process. We adjust these annual regulations as needed to ensure sustainable harvests.
- The Service manages hunting and sport fishing of resident wildlife on NWRs and NFHs under state and Federal regulations, and through station-specific regulations that often are more restrictive than the state regulations. Harvests of resident wildlife species on these refuges and hatcheries, individually and collectively within a state, constitute a very minor percentage of the zonal and/or statewide harvests and are well within sustainable harvest levels for these species' populations.
- Before opening a refuge to hunting or sport fishing, we must determine that the activity is compatible with (does not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting on biological resources. We determined hunting and sport fishing to be compatible on all of the refuges.

- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. Compatibility determinations for hunting programs must be completed at least every 15 years, even if programs do not change, and compatibility can be reevaluated at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting program would trigger a new refuge hunt planning process with associated NEPA compliance.
- Before opening a hatchery to hunting, we must make a determination that the hunting opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the hatcheries. Substantive changes in a hatchery hunting program would trigger a new hunt planning process with associated NEPA compliance.
- None of the station-specific EAs determined that disturbance and/or altering of habitats caused by hunting or sport fishing of resident wildlife and/or migratory birds on the 74 refuges and 15 hatcheries would have significant adverse cumulative impacts on hunted or fished resident wildlife populations. We annually conduct management activities on NWRs and NFHs that minimize or offset the disturbance and habitat impacts of hunting and/or sport fishing on resident and migratory wildlife. These include establishment of non-hunted sanctuary areas, habitat management and restoration activities that increase the value of wetland and upland habitats for resident wildlife and migratory birds, enforcement of station-specific hunting regulations, and public education.

3. Non-hunted Resident and Migratory Wildlife Species

Several of the station-specific EAs identified both direct and indirect impacts of migratory bird hunting, resident wildlife hunting and/or sport fishing to non-hunted wildlife. Direct impacts included disturbance, and indirect impacts included alteration of habitats such as vegetation trampling. We considered impacts from disturbance and alteration of habitat to be minor, localized and temporary, and we routinely minimized or offset them through a variety of management activities conducted at each refuge or hatchery. Illegal take is a potential impact associated with refuge and hatchery hunting and/or sport fishing activities. We expect incidences of illegal take of protected species to be rare and isolated and minimized through enforcement of federal, state, and station-specific regulations and public education.

None of the EAs reviewed identified any significant adverse cumulative impacts to non-hunted migratory and resident wildlife from any of the proposed hunting or sport fishing programs or significant adverse impacts from past, present, or foreseeable future programs if we allowed impacts from these individual activities to accumulate. Based upon our review of the station-specific EAs and for the following reasons, we conclude that cumulative impacts of hunting or sport fishing on the aforementioned refuges and hatcheries, including impacts which might accumulate over time, will not negatively impact non-hunted migratory wildlife populations or discrete populations of resident wildlife on these stations.

None of the station-specific EAs determined that the effects of disturbance, altering of habitats,

and/or potential illegal take of protected species associated with hunting and/or sport fishing on the refuges or hatcheries would have significant adverse cumulative impacts on non-hunted or non-fished wildlife populations. Based on our evaluation of the station-specific EAs and for the following reasons, we conclude that hunting and/or sport fishing of resident wildlife and/or migratory birds on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to non-hunted and non-fished wildlife populations on the stations and at larger geographic scales. We also conclude that hunting and/or sport fishing on these refuges and hatcheries will not result in significant adverse cumulative impacts to non-hunted and non-fished wildlife populations when added to impacts from past hunting and/or sport fishing on refuges and hunting and/or sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of the refuges and hatcheries will have negligible effect on non-hunted and non-fished wildlife populations on any or all refuges and hatcheries open to hunting and/or sport fishing.

- We would manage refuge and hatchery hunting and sport fishing programs proposed for opening and/or expansion with provisions in place to prevent significant adverse impacts to non-hunted and non-fished migratory and resident wildlife.
- We annually conduct management activities on NWRs and NFHs which minimize or offset the disturbance and habitat impacts of hunting and/or sport fishing on resident and migratory wildlife. These include establishment of non-hunted sanctuary areas, habitat management and restoration activities that increase the value of wetland and upland habitats for resident wildlife and migratory birds, enforcement of station-specific hunting regulations, and public education. We minimize illegal take of protected species through enforcement of Federal, State, and station-specific regulations and public education.
- Before opening a refuge to hunting or sport fishing, we must determine that the activity is compatible with (does not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting on biological resources. We determined hunting and/or sport fishing to be compatible on the 74 refuges.
- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. We must complete CDs for hunting programs at least every 15 years, even if they do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting or sport fishing program would trigger a new refuge hunt or fish planning process with associated NEPA compliance.
- Before opening a hatchery to hunting and/or sport fishing, we must make a determination that the hunting and/or sport fishing opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting and/or sport fishing would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the 15 hatcheries. Substantive changes in a hatchery hunting and/or sport fishing program would trigger a new hunt or fish planning process with associated NEPA compliance.

4. Threatened and Endangered Species

Several of the station-specific EAs identified both direct and indirect impacts of hunting and/or sport fishing on Threatened and Endangered (T&E) species when those species were present on the refuges or hatcheries during the hunting or sport fishing seasons. Direct impacts included disturbance, and indirect impacts included alteration of habitats such as vegetation trampling. We considered impacts from disturbance and alteration of habitats to be minor, localized, and temporary (short term); and we minimized or offset them through a variety of management activities conducted at each station.

Station managers must consider impacts of allowing hunting and/or sport fishing on a refuge or hatchery on T&E species and/or designated critical habitat(s) prior to opening the station for those activities. The station manager conducts an intra-Service consultation under Section 7 of the Endangered Species Act for any T&E species and/or critical habitat that we may impact. We also consider impacts from hunting and/or sport fishing to T&E species at each refuge through the CD process. For the vast majority of T&E species considered on these refuges and hatcheries, hunting and sport fishing programs did not have any impacts because the T&E species were not present on the station during the hunting or sport fishing seasons or because we prohibited hunting and/or sport fishing in areas that supported the T&E species.

None of the EAs reviewed determined that disturbance impacts would result in significant adverse cumulative impacts to T&E species. Most of the Section 7 consultations determined that the proposed hunting and/or sport fishing activities would have "No Effect" or were "Not Likely to Adversely Affect" T&E species or designated critical habitat. Based on our evaluation of the station-specific EAs and the Section 7 Intra-Service consultations, and for the following reasons, we conclude that hunting and sport fishing programs on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to T&E species on the refuges or hatcheries and at larger geographic scales. We also conclude that hunting and sport fishing programs on these refuges and hatcheries will not result in significant adverse cumulative impacts to T&E species when added to impacts from past refuge hunting and sport fishing and hunting and sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of the refuges and hatcheries will have a negligible effect on any T&E species or designated critical habitat on any or all refuges and hatcheries open to hunting and/or sport fishing.

- The Service prohibits hunting, sport fishing, or any other recreational activities on NWRs and NFHs where such activities could jeopardize a population of T&E species or designated critical habitat.
- We annually conduct management activities on NWRs and NFHs that minimize or offset the disturbance and habitat impacts of hunting and sport fishing on T&E species. These include establishment of non-hunted sanctuary areas, habitat management, and restoration activities that increase the value of wetland and upland habitats for T&E species and other wildlife, emergency closures of hunting and/or sport fishing on refuges or hatcheries when T&E species subject to accidental/illegal harvest are present (as is the

case with whooping cranes migrating through some refuges or hatcheries during the fall), enforcement of station-specific hunting regulations, and public education.

- Before opening a refuge to hunting or sport fishing, we must determine that the activity is compatible with (does not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting and/or sport fishing on biological resources, including T&E species. We determined hunting and/or sport fishing to be compatible on the74 refuges.
- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. We must complete compatibility determinations for hunting and sport fishing programs at least every 15 years even if they do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. We would require a new Section 7 consultation if changes occurred that resulted in a potential impact to a T&E species or designated critical habitat. Substantive changes in a refuge hunting and/or sport fishing program would trigger a new refuge hunt planning process with associated NEPA compliance.
- Before opening a hatchery to hunting and/or sport fishing, we must make a determination that the hunting and/or sport fishing opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting and/or sport fishing would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the 15 hatcheries. We would require a new Section 7 consultation if changes occurred that resulted in a potential impact to a T&E species or designated critical habitat. Substantive changes in a hatchery hunting and/or sport fishing program would trigger a new hunt or fish planning process with associated NEPA compliance.

5. Habitats and Plant Resources

The station-specific EAs identified impacts to habitats and plant resources from hunting and/or sport fishing activities on refuges and hatcheries to include vegetation trampling, spread of invasive species, and damage to trees and other vegetation. Most impacts were associated with accessing hunt or sport fishing areas by motorized vehicle, boat, or by walking, and impacts tended to be most pronounced in areas receiving high visitation. We considered impacts to habitats and plant resources to be minor, localized, and temporary (short term); and we minimized or offset them through a variety of management activities conducted at each station. Some station-specific EAs also identified actual and potential beneficial impacts of hunting and/or sport fishing to habitats and plant resources, particularly if hunting resulted in reducing population levels of some native and nonnative ungulate species.

None of the station-specific EAs determined that the effects of vegetation trampling and soil compaction resulting from hunting and/or sport fishing activities on the refuges or hatcheries would have significant adverse cumulative impacts on habitats and plant resources. Based upon our evaluation of the station-specific EAs and for the following reasons, we conclude that hunting and sport fishing programs on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to habitats and plant resources on the stations.

We also conclude that hunting and/or sport fishing on these refuges and hatcheries will not result in significant adverse cumulative impacts to habitats and plant resources when added to impacts from past refuge hunting and hunting that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of the refuges and hatcheries will have negligible effect on habitats and plant resources on any or all refuges and hatcheries open to hunting.

- We annually conduct management activities on NWRs and NFHs which minimize or offset impacts of hunting and/or sport fishing to plant and habitat resources. These include establishment of non-hunted sanctuary areas, restricting access to designated travel corridors, restricting hunter numbers, habitat management and restoration activities, enforcement of station-specific hunting and sport fishing regulations, and public education.
- Before opening a refuge to hunting or sport fishing, we must determine that the activity is compatible with (does not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting on biological resources. We determined hunting and/or sport fishing to be compatible on the 74 refuges.
- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. We must complete compatibility determinations for hunting programs at least every 15 years even if the programs do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting program would trigger a new refuge hunt planning process with associated NEPA compliance.
- Before opening a hatchery to hunting and/or sport fishing, we must make a determination that the hunting opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the 15 hatcheries. Substantive changes in a hatchery hunting and/or sport fishing program would trigger a new hunt or fish planning process with associated NEPA compliance.

6. Other Wildlife-Dependent Recreational Uses

The National Wildlife Refuge System Administration Act, as amended, (NWRSAA, 16 U.S.C. 668dd-668ee) established that hunting, sport fishing, wildlife observation and photography, environmental education, and interpretation were the six priority wildlife-dependent recreational uses of the Refuge System. Further, the NWRSAA mandated that the Service give these uses enhanced consideration over other uses in planning and management, and facilitate them wherever possible on refuges where the use(s) have been determined to be compatible with the refuge establishment purpose(s) and the Refuge System mission.

Station-specific EAs for some refuge hunting programs identified impacts to other recreational uses including temporary seasonal closures of parts or all of refuges to other public uses while hunts were ongoing, and impacts on perceptions of some refuge users that resulted in them not

visiting the refuges while the hunts were ongoing. We considered these impacts to be minor, and we could minimize or eliminate them through effective management of public use programs.

For this assessment, the Service evaluated the availability of opportunities for the other priority wildlife-dependent recreational uses on the 74 refuges on which we opened or expanded hunting and/or sport fishing programs. The Service provides opportunities for wildlife observation and photography, interpretation, and/or environmental education on the majority of the 74 refuges.

Other public entry and use on National Fish Hatcheries are administered and available under the provisions of 50 CFR Part 26 (50 CFR 70.6). These uses can include, but are not limited to, sightseeing, nature observation and photography, interpretive centers and exhibits, boating, camping, ice skating, and other similar activates.

None of the station-specific EAs determined that the effects of hunting and/or sport fishing on the refuges or hatcheries would have significant adverse cumulative impacts on other wildlife-dependent recreational uses. Based upon our evaluation of the station-specific EAs, we conclude that hunting and sport fishing programs on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to other wildlife-dependent recreational uses on the refuges. We also conclude that hunting and/or sport fishing on these refuges will not result in significant adverse cumulative impacts to other recreational programs when added to impacts from past refuge hunting and sport fishing and hunting and sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of the refuges will have negligible effect on recreational programs on any or all refuges open to hunting and/or sport fishing.

- We would manage all refuge hunting and/or sport fishing programs proposed for opening and/or expansion with provisions in place to prevent significant adverse impacts to other wildlife-dependent recreational uses.
- We annually conduct management activities on NWRs and hatcheries that minimize or offset impacts of hunting to other recreational uses, including establishing designated areas that spatially separate uses, establishing seasonal timeframes for uses, restricting levels of use to reduce potential conflicts, providing educational programs and materials for hunters, anglers, and other users, and conducting law enforcement activities.
- The Service provides opportunities for the other priority wildlife-dependent recreational uses including wildlife observation and photography, interpretation, and environmental education on the majority of the 74 refuges and 15 hatcheries.
- Before opening a refuge to hunting or sport fishing, we must determine that the activity is compatible with (does not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. The CDs must consider the impacts of hunting on other priority recreational uses. We determined hunting and/or sport fishing to be compatible on the 74 refuges.
- Before opening a hatchery to hunting or sport fishing with regard to compatibility, we must determine that such activity is not detrimental to the propagation and distribution of fish or other aquatic wildlife.

- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. We must complete CDs for hunting and sport fishing programs at least every 15 years, even if the programs do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting or sport fishing program would trigger a new refuge hunt planning process with associated NEPA compliance.

7. Refuge Environment – Air, Water, Soils, Cultural Resources, Refuge Facilities, Solitude

Station-specific EAs for refuge and hatchery hunting and/or sport fishing programs identified impacts to physical resources including air, water and soils, including motor emissions, dust, and compaction to surface soils. Impacts from public use of station facilities and infrastructure associated with hunting and/or sport fishing activities occurred on refuge roads, trails, boat ramps, and parking areas. Increased visitation resulting from opening new or expanding existing programs resulted in additional maintenance requirements for infrastructure and facilities. We note no impacts to cultural and historic resources. Increased visitation to refuges and hatcheries in some cases decreased opportunities for solitude. As we similarly manage hunting and sport fishing programs on Service lands and determine these uses compatible, we conclude that the cumulative impacts of these activities to physical resources, cultural resources, facilities, and solitude, including impacts which might accumulate over time, are negligible across Service managed lands and waters.

None of the station-specific EAs determined that the effects of hunting and/or sport fishing on the refuges or hatcheries would have significant adverse cumulative impacts on refuge and hatchery physical and cultural resources, station facilities, and solitude. Based upon our evaluation of the station-specific EAs and for the following reasons, we conclude that hunting programs on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to other refuge or hatchery physical and cultural resources, station facilities, and solitude. We also conclude that hunting and sport fishing on these refuges and hatcheries will not result in significant adverse cumulative impacts to these resources when added to impacts from past refuge hunting and sport fishing and hunting and sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of the refuges and hatcheries will have negligible effect on these resources on any or all refuges and hatcheries open to hunting and/or sport fishing.

- We would manage all refuge and hatchery hunting and/or sport fishing programs proposed for opening and/or expansion with provisions in place to prevent significant adverse impacts to these aspects of the refuge or hatchery and human environment. We annually conduct management activities on NWRs and NFHs which minimize or offset impacts of hunting and/or sport fishing on physical and cultural resources, including establishing designated areas for hunting, restricting levels of use, confining access and travel to designated locations, providing educational programs and materials for hunters,

anglers, and other users, and conducting law enforcement activities.

- Before opening a refuge to hunting or sport fishing, we must determine whether the activity will be compatible with (will not materially interfere with or detract from) accomplishing refuge purposes or the Refuge System mission. We determined hunting and/or sport fishing to be compatible on the 74 refuges.
- The Service's administrative processes serve as a safeguard to prevent the accumulation of adverse impacts over time. We must complete compatibility determinations for hunting and sport fishing programs at least every 15 years even if the programs do not change, and we can reevaluate compatibility at any time if conditions change and new factors warrant reconsideration. Substantive changes in a refuge hunting program would trigger a new refuge hunt planning process with associated NEPA compliance.
- Before opening a hatchery to hunting and/or sport fishing, we must make a determination that the opportunity "...is not detrimental to the propagation and distribution of fish or other aquatic wildlife." We determined hunting and/or sport fishing would not be detrimental to the propagation and distribution of fish or aquatic wildlife on the 15 hatcheries. Substantive changes in a hatchery hunting program would trigger a new hunt planning process with associated NEPA compliance.

8. Socioeconomic Impacts

Station-specific EAs for several of the74 refuges and 15 hatcheries identified minor beneficial impacts to local economies from visitors participating in refuge and hatchery hunting and sport fishing programs. There is the potential for some stations to experience minor adverse impacts to local economies from a temporary reduction in other visitors while hunts are conducted. We would expect that the cumulative economic impact resulting from the increased visitation to these refuges and hatcheries would be beneficial to local and regional economies. Most station-specific EAs noted the beneficial effects of providing hunting and sport fishing for the recreational value they provides. Refuges, hatcheries, and other public lands provide affordable hunting and sport fishing opportunities for the public.

9. Climate Change Impacts

The Service concludes that climate change will have negligible impacts on its hunting or sport fishing program, but refuges and hatcheries will continue to monitor hunted and fished species populations and make adjustments to hunting regulations in response to any declining populations. As analyzed in the cumulative impacts of climate change, none of the refuges or hatcheries proposed revisions to station-specific hunting and sport fishing regulations would result in a harvest strategy that is not sustainable. Climate change remains a major concern for refuge and hatchery species and habitats and recreational hunting and sport fishing opportunities enjoyed by Americans across Service lands and waters. The Service will continue to monitor changes and develop methods to combat climate change and ensure viable habitat for future refuge and hatchery species.

V. SUMMARY CONCLUSIONS

The headquarters of the National Wildlife Refuge System and National Fish Hatchery System, U.S. Fish and Wildlife Service, reviewed and evaluated station-specific Environmental Assessments for hunting and sport fishing programs on the 74 refuges and 15 hatcheries in order to identify the direct, indirect, and cumulative impacts of the proposed hunting and sport fishing activities on hunted populations of migratory birds and resident wildlife, non-hunted migratory and resident wildlife, T&E species, plant and habitat resources, other wildlife-dependent recreational uses, physical resources including air, water, and soils, cultural resources, station facilities, solitude, and socioeconomics.

Based upon our evaluation of the station-specific Environmental Assessments and Categorical Exclusions, we conclude that hunting and/or sport fishing programs on the 74 refuges and 15 hatcheries collectively will not result in significant adverse cumulative impacts to the human environment. We also conclude that hunting and/or sport fishing on these refuges and hatcheries will not result in significant adverse cumulative impacts to the human environment when added to impacts from past refuge hunting and/or sport fishing and hunting and/or sport fishing that we reasonably expect will occur in the future. Finally, we anticipate that the impacts of hunting and/or sport fishing on any one or combination of these refuges and hatcheries will have negligible effects on the human environment on any or all refuges and hatcheries open to hunting and/or sport fishing.

Executive Order 12898 "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" to focus federal attention on the environmental and human health conditions of minority and low-income populations with the goal of achieving environmental protection for all communities. The Order directs federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Order is also intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low-income communities' access to public information and participation in matters relating to human health or the environment.

None of the EAs or CatExs will disproportionately place any adverse environmental, economic, social or health impacts on minority and low income populations. Implementation of the proposed actions is anticipated to be beneficial for the environment over the long-term and people in the surrounding communities.

None of the hunting or sport fishing programs would result in a large commitment of nonrenewable resources.
Implementation would require a moderate commitment of fossil fuels (diesel and gasoline), oils, and lubricants used by heavy equipment and vehicles for road maintenance and general maintenance of the areas to be hunted. Trails will be of little impact or temporary and increased law enforcement activities may become necessary.

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DEFINITION OF TERMS

Sustainable harvest levels means a harvest level which does not exceed net annual recruitment to the population and accounts for all forms of removal from the population, and which considers the status of the population, based on the best available scientific information.

Effects
Direct effects are the impacts that would be caused by the alternative at the same time and place as the action.

Indirect effects are impacts that occur later in time or distance from the triggering action.

Negligible effects result from a specified management action that can be reasonably expected to have no detectable effect on identified refuge resources or recreation opportunities at the identified scale.

Cumulative effects are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.

Impact Type
Beneficial/positive impacts are those resulting from management actions that maintain or enhance the quality and/or quality of identified Refuge resources or recreational opportunities.

Adverse/negative impacts are those resulting from management actions that degrade the quality and/or quantity of identified refuge resources or recreational opportunities.

Significant Adverse impacts take into consideration both the context and intensity of an action. Both short-and long-term effects must be analyzed. The severity of the effect must also be analyzed.

Duration of Impacts
Short-term impacts affect identified refuge resources or recreational opportunities; they occur during implementation of the management action but last no longer.

Medium-term impacts affect identified refuge resources or recreational opportunities that occur

during implementation of the management action; they are expected to persist for some time into the future though not throughout the life of the CCP.

Long-term impacts affect identified refuge resources or recreation opportunities; they occur during implementation of the management action and are expected to persist throughout the life of the Plan and possible longer.

Intensity of Impact
Insignificant/negligible impacts result from management actions that cannot be reasonably expected to affect identified refuge resources or recreational opportunities at the identified scale.

Minor impacts result from a specified management action that can be reasonably expected to have detectable through limited effect on identified refuge resources or recreation opportunities at the identified scale.

Moderate impacts result from a specified management action that can be reasonably expected to have apparent and detectable effects on identified refuge resources or recreation opportunities at the identified scale.

Major impacts result from a specified management action that can be reasonably expected to have readily apparent and substantial effects on identified refuge resources and recreation opportunities at the identified scale.