

Glossary

abiotic—Pertaining to nonliving things.

accessible—Pertaining to physical access to areas and activities for people of different abilities, especially those with physical impairments.

adaptive resource management—The rigorous application of management, research, and monitoring programs to gain information and experience necessary to assess and change management activities; a process that uses feedback from research, monitoring programs, and evaluation of management actions to support or change objectives and strategies at all planning levels; a process in which policy decisions are carried out within a framework of scientifically driven experiments to test predictions and assumptions inherent in management plan. Analysis of results helps managers decide whether current management should continue as is or whether it should be modified to achieve desired conditions.

Administration Act—National Wildlife Refuge System Administration Act of 1966.

alternative—A reasonable way to solve an identified problem or satisfy the stated need (40 CFR 1500.2); one of several different means of accomplishing refuge purposes and goals and contributing to the Refuge System mission (Draft Service Manual 602 FW 1.5).

amphibian—A class of cold-blooded vertebrates including frogs, toads or salamanders.

annual—A plant that flowers and dies within 1 year of germination.

ATV—All-terrain vehicle.

baseline—A set of essential observations, data, or information used for comparison or a control.

biological control—The use of organisms or viruses to control invasive plants or other pests.

biological diversity, also biodiversity—The variety of life and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur (Service Manual 052 FW 1.12B). The National Wildlife Refuge System's focus is on indigenous species, biotic communities, and ecological processes.

biotic—Pertaining to life or living organisms; caused, produced by, or comprising living organisms.

canopy—A layer of foliage, generally the uppermost layer, in a vegetative stand; mid-level or understory vegetation in multilayered stands. Canopy closure (also canopy cover) is an estimate of the amount of overhead vegetative cover.

CCC—See Civilian Conservation Corps.

CCP—See comprehensive conservation plan.

CFR—See Code of Federal Regulations.

cfs—Cubic feet per second.

Civilian Conservation Corps (CCC)—Peacetime civilian “army” established by President Franklin D. Roosevelt to perform conservation activities from 1933–42. Activities included erosion control; fire-fighting; tree planting; habitat protection; stream improvement; and building of fire towers, roads, recreation facilities, and drainage systems.

Code of Federal Regulations (CFR)—The codification of the general and permanent rules published in the Federal Register by the executive departments and agencies of the Federal Government. Each volume of the CFR is updated once each calendar year.

compatibility determination—See compatible use.

compatible use—A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director of the U.S. Fish and Wildlife Service, will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge (Draft Service Manual 603 FW 3.6). A compatibility determination supports the choice of compatible uses and identified stipulations or limits necessary to make sure that there is compatibility.

comprehensive conservation plan (CCP)—A document that describes the desired future conditions of the refuge and provides long-range guidance and management direction for the refuge manager to accomplish the purposes of the refuge, contribute to the mission of the Refuge System, and to meet other relevant mandates (Draft Service Manual 602 FW 1.5).

concern—See issue.

conspecific—An individual belonging to the same species as another.

cool-season grasses—Grasses that begin growth earlier in the season and often become dormant in the summer. These grasses will germinate at

- lower temperatures. Examples of cool-season grasses at the refuge are western wheatgrass, needle and thread, and green needlegrass.
- coteau**—A hilly upland including the divide between two valleys; a divide; the side of a valley.
- cover, also cover type, canopy cover**—Present vegetation of an area.
- cultural resources**—The remains of sites, structures, or objects used by people in the past.
- depredation**—Destruction or consumption of eggs, broods, or individual wildlife because of a predatory animal; damage inflicted on agricultural crops or ornamental plants by wildlife.
- drawdown**—The act of manipulating water levels in an impoundment to allow for the natural, cyclical drying out of a wetland.
- EA**—See environmental assessment.
- ecosystem**—A dynamic and interrelating complex of plant and animal communities and their associated nonliving environment; a biological community, with its environment, functioning as a unit. For administrative purposes, the Service has designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries and their sizes and ecological complexity vary.
- EIS**—Environmental impact statement.
- emergent**—A plant rooted in shallow water and having most of the vegetative growth above water such as cattail and hardstem bulrush.
- endangered species, Federal**—A plant or animal species listed under the Endangered Species Act of 1973, as amended, that is in danger of extinction throughout all or a substantial part of its range.
- endangered species, State**—A plant or animal species in danger of becoming extinct or extirpated in a particular state within the near future if factors contributing to its decline continue. Populations of these species are at critically low levels or their habitats have been degraded or depleted to a substantial degree.
- endemic species**—Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.
- environmental assessment (EA)**—A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action and alternatives to such action, and provides sufficient evidence and analysis of effects to decide whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).
- EPA**—Environmental Protection Agency.
- extinction**—The complete disappearance of a species from the earth; no longer existing.
- extirpation**—The extinction of a population; complete eradication of a species within a specified area.
- fauna**—All the vertebrate and invertebrate animals of an area.
- Federal trust resource**—A trust is something managed by one entity for another who holds the ownership. The Service holds in trust many natural resources for the people of the United States of America as a result of Federal acts and treaties. Examples are species listed under the Endangered Species Act, migratory birds protected by international treaties, and native plant or wildlife species found on a national wildlife refuge.
- Federal trust species**—All species where the Federal Government has primary jurisdiction including federally endangered or threatened species, migratory birds, anadromous fish, and certain marine mammals.
- flora**—All the plant species of an area.
- FMP**—fire management plan.
- forb**—A broad-leaved, herbaceous plant; a seed-producing annual, biennial, or perennial plant that does not develop persistent woody tissue but dies down at the end of the growing season.
- fragmentation**—The alteration of a large block of habitat that creates isolated patches of the original habitat that are interspersed with a variety of other habitat types; the process of reducing the size and connectivity of habitat patches, making movement of individuals or genetic information between parcels difficult or impossible.
- Friends group**—Any formal organization whose mission is to support the goals and purposes of its associated refuge and the National Wildlife Refuge Association overall; Friends organizations and cooperative and interpretive associations.
- General Schedule**—Pay rate schedule for certain Federal positions. Sometimes “GS.”
- geographic information system (GIS)**—A computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (such as points, lines and polygons) with nongeographic attributes such as species and age.
- GIS**—See geographic information system.
- goal**—Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).
- grassland tract**—A contiguous area of grassland without fragmentation.
- habitat**—Suite of existing environmental conditions required by an organism for survival and reproduction; the place where an organism typically lives and grows.
- habitat disturbance**—Substantial alteration of habitat structure or composition; may be natural (for

- example, wildland fire) or human-caused events (for example, timber harvest and disking).
- habitat type, also vegetation type, cover type**—A land classification system based on the concept of distinct plant associations.
- herbivory**—The state or condition of feeding on plants or plant parts.
- herptile**—A reptile or an amphibian.
- HMP**—Habitat management plan.
- HUA**—Hydrologic unit area.
- hydroperiod**—The seasonal pattern of the water level of a wetland that is often used to characterize wetland types. Examples of seasonal patterns include flood frequency, duration, and depth.
- impoundment**—A body of water created by collection and confinement within a series of levees or dikes, creating separate management units although not always independent of one another.
- Improvement Act**—National Wildlife Refuge System Improvement Act of 1997.
- indigenous**—Originating or occurring naturally in a particular place.
- integrated pest management (IPM)**—Methods of managing undesirable species such as invasive plants; education, prevention, physical or mechanical methods of control, biological control, responsible chemical use, and cultural methods.
- introduced species**—A species present in an area because of intentional or unintentional escape, release, dissemination, or placement into an ecosystem as a result of human activity.
- invasive plant, also noxious weed**—A species that is nonnative to the ecosystem under consideration and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.
- inviolate sanctuary**—A place of refuge or protection where animals and birds may not be hunted.
- IPM**—See integrated pest management.
- issue**—Any unsettled matter that requires a management decision; for example, a Service initiative, opportunity, resource management problem, a threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition (Draft Service Manual 602 FW 1.5).
- Kansas Department of Wildlife, Parks and Tourism (KDWPT)**—A State agency responsible for overseeing the conservation of game and nongame species in Kansas.
- management alternative**—See alternative.
- migration**—Regular extensive, seasonal movements of birds between their breeding regions and their wintering regions; to pass usually periodically from one region or climate to another for feeding or breeding.
- migratory birds**—Birds that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.
- mission**—Succinct statement of purpose or reason for being.
- mitigation**—Measure designed to counteract an environmental effect or to make an effect less severe.
- mixed-grass prairie**—A transition zone between the tallgrass prairie and the shortgrass prairie dominated by grasses of medium height that are approximately 2–4 feet tall. Soils are not as rich as the tallgrass prairie and moisture levels are less.
- monitoring**—The process of collecting information to track changes of selected parameters over time.
- national wildlife refuge**—A designated area of land, water, or an interest in land or water within the National Wildlife Refuge System, but does not include coordination areas; a complete listing of all units of the Refuge System is in the current “Annual Report of Lands Under Control of the U.S. Fish and Wildlife Service.”
- National Wildlife Refuge System (Refuge System)**—Various categories of areas administered by the Secretary of the Department of the Interior for the conservation of fish and wildlife including species threatened with extinction, all lands, waters, and interests therein administered by the Secretary as wildlife refuges, areas for the protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas.
- National Wildlife Refuge System Improvement Act of 1997 (Improvement Act)**—Sets the mission and the administrative policy for all refuges in the National Wildlife Refuge System; defines a unifying mission for the Refuge System; establishes the legitimacy and appropriateness of the six priority public uses (hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation); establishes a formal process for determining appropriateness and compatibility; establish the responsibilities of the Secretary of the Department of the Interior for managing and protecting the Refuge System; requires a comprehensive conservation plan for each refuge by the year 2012. This Act amended parts of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.
- native species**—A species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

Neotropical migrant—A bird species that breeds north of the United States and Mexican border and winters primarily south of this border.

NEPA—National Environmental Policy Act of 1969.

nest success—The percentage of nests that successfully hatch one or more eggs of the total number of nests started in an area.

NOA—Notice of availability.

nongovernmental organization—Any group that is not comprised of Federal, State, tribal, county, city, town, local, or other governmental entities.

noxious weed, also invasive plant—Any living stage (including seeds and reproductive parts) of a parasitic or other plant of a kind that is of foreign origin (new to or not widely prevalent in the United States) and can directly or indirectly injure crops, other useful plants, livestock, poultry, other interests of agriculture, including irrigation, navigation, fish and wildlife resources, or public health. According to the Federal Noxious Weed Act (PL 93–639), a noxious weed (such as invasive plant) is one that causes disease or has adverse effects on humans or the human environment and, therefore, is detrimental to the agriculture and commerce of the United States and to public health.

NRCS—Natural Resources Conservation Service of the U.S. Department of Agriculture.

objective—An objective is a concise target statement of what will be achieved, how much will be achieved, when and where it will be achieved, and who is responsible for the work; derived from goals and provide the basis for determining management strategies. Objectives should be achievable and time specific and should be stated quantitatively to the extent possible. If objectives cannot be stated quantitatively, they may be stated qualitatively (Draft Service Manual 602 FW 1.5).

overwater species—nesting species such as diving ducks and many colonial-nesting birds that build nests within dense stands of water-dependent plants, primarily cattail, or that build floating nests of vegetation that rest on the water.

OWLS—Outdoor wildlife learning site.

passerine—Pertaining to an order of birds, Passeriformes, that comprises more than half of all birds and that typically has feet adapted for perching.

patch—An area distinct from that around it; an area distinguished from its surroundings by environmental conditions.

perennial—Lasting or active through the year or through many years; a plant species that has a lifespan of more than 2 years.

plant community—An assemblage of plant species unique in its composition; occurs in particular locations under particular influences; a reflection or integration of the environmental influences on

the site such as soil, temperature, elevation, solar radiation, slope, aspect, and rainfall; denotes a general kind of climax plant community, such as ponderosa pine or bunchgrass.

prescribed fire—The skillful application of fire to natural fuels under conditions such as weather, fuel moisture, and soil moisture that allow confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of habitat management, wildlife management, or hazard reduction.

priority public use—One of six uses authorized by the National Wildlife Refuge System Improvement Act of 1997 to have priority if found to be compatible with a refuge's purposes. This includes hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation.

proposed action—The alternative proposed to best achieve the purpose, vision, and goals of a refuge (contributes to the Refuge System mission, addresses the significant issues, and is consistent with principles of sound fish and wildlife management).

public—Individuals, organizations, and groups; officials of Federal, State, and local government agencies; American Indian tribes; and foreign nations. It may include anyone outside the core planning team. It includes those who may or may not have shown an interest in Service issues and those who do or do not realize that Service decisions may affect them.

public involvement—A process that offers affected and interested individuals and organizations an opportunity to become informed about, and to express their opinions on, Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

purpose of the refuge—The purpose of a refuge is specified in or derived from the law, proclamation, Executive order, agreement, public land order, donation document, or administrative memorandum establishing authorization or expanding a refuge, refuge unit, or refuge subunit (Draft Service Manual 602 FW 1.5).

raptor—A carnivorous bird such as a hawk, a falcon, or a vulture that feeds wholly or chiefly on meat taken by hunting or on carrion (dead carcasses).

Reclamation—Bureau of Reclamation of the U.S. Department of the Interior.

refuge operations needs system (RONS)—A national database that contains the operational needs of each refuge that need money. Projects included

- are those required to carry out approved plans and meet goals, objectives, and legal mandates.
- refuge purpose**—See purpose of the refuge.
- Refuge System**—See National Wildlife Refuge System.
- refuge use**—Any activity on a refuge, except administrative or law enforcement activity, carried out by or under the direction of an authorized Service employee.
- resident species**—A species inhabiting a given locality throughout the year; nonmigratory species.
- rest**—Free from biological, mechanical, or chemical manipulation, in reference to refuge lands.
- restoration**—Management emphasis designed to move ecosystems to desired conditions and processes, such as healthy upland habitats and aquatic systems.
- riparian area or riparian zone**—An area or habitat that is transitional from terrestrial to aquatic ecosystems including streams, lakes, wet areas, and adjacent plant communities and their associated soils that have free water at or near the surface; an area whose parts are directly or indirectly attributed to the influence of water; of or relating to a river; specifically applied to ecology, “riparian” describes the land immediately adjoining and directly influenced by streams. For example, riparian vegetation includes all plant life growing on the land adjoining a stream and directly influenced by the stream.
- RONs**—See refuge operations needs system.
- rough fish**—A fish that is neither a sport fish nor an important food fish.
- SAMMS**—See Service Asset Maintenance Management System.
- scoping**—The process of obtaining information from the public for input into the planning process.
- seasonally flooded**—Surface water is present for extended periods in the growing season, but is absent by the end of the season in most years.
- sediment**—Material deposited by water, wind, and glaciers.
- Service**—See U.S. Fish and Wildlife Service.
- Service Asset Maintenance Management System (SAMMS)**—A national database that contains maintenance projects for each refuge that need money; projects include those required to keep existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.
- sheet flow**—The overland flow of water, typically from precipitation to lower elevation areas.
- shelterbelt**—Single to multiple rows of trees and shrubs planted around cropland or buildings to block or slow down the wind.
- shorebird**—Any of a suborder (Charadrii) of birds such as a plover or a snipe that frequent the seashore or mudflat areas.
- spatial**—Relating to, occupying, or having the character of space.
- special status species**—Plants or animals that have been identified through Federal law, State law, or agency policy as requiring special protection of monitoring programs. Examples include federally listed endangered, threatened, proposed, or candidate species; State-listed endangered, threatened, candidate, or monitor species; Service’s species of management concern; species identified by the PIF program as being of extreme or moderately high conservation concern.
- special use permit**—A permit for special authorization from the refuge manager required for any refuge service, facility, privilege, or product of the soil provided at refuge expense and not usually available to the public through authorizations in Title 50 CFR or other public regulations (Refuge Manual 5 RM 17.6).
- species of concern**—Those plant and animal species, while not falling under the definition of special status species, that are of management interest by virtue of being Federal trust species such as migratory birds, important game species, or significant keystone species; species that have documented or apparent populations declines, small or restricted populations, or dependence on restricted or vulnerable habitats.
- stepdown management plan**—A plan that provides the details necessary to carry out management strategies identified in the comprehensive conservation plan (Draft Service Manual 602 FW 1.5).
- strategy**—A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).
- submergent**—A vascular or nonvascular hydrophyte, either rooted or nonrooted, that lies entirely beneath the water surface, except for flowering parts in some species.
- surrogate species**—A species used as an indicator of landscape habitat and system conditions. It represents multiple species and habitats within a defined landscape or geographic area.
- threatened species, Federal**—Species listed under the Endangered Species Act of 1973, as amended, that are likely to become endangered in the future throughout all, or a substantial part, of their range.
- threatened species, State**—A plant or animal species likely to become endangered in a particular state within the near future if factors contributing to population decline or habitat degradation or loss continue.

travel corridor—A landscape feature that facilitates the biologically effective transport of animals between larger patches of habitat dedicated to conservation functions. Such corridors may facilitate several kinds of traffic including frequent foraging movement, seasonal migration, or the once in a lifetime dispersal of juvenile animals. These are transition habitats and need not contain all the habitat elements required for long-term survival or reproduction of its migrants.

trust resource—See Federal trust resource.

trust species—See Federal trust species.

USDA—U.S. Department of Agriculture.

U.S. Fish and Wildlife Service (Service, USFWS)—The principal Federal agency responsible for conserving, protecting, and enhancing fish and wildlife and their habitats for the continuing benefit of the American people. The Service manages the 93-million-acre National Wildlife Refuge System comprised of more than 530 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological service field stations, the agency enforces Federal wildlife laws, manages migratory bird populations, restores national significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal aid program that distributes millions of dollars in excise taxes on fishing and hunting equipment to State wildlife agencies.

USFWS—See U.S. Fish and Wildlife Service.

U.S. Geological Survey (USGS)—A Federal agency whose mission is to provide reliable scientific information to describe and understand the earth; decrease loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.

USGS—See U.S. Geological Survey.

vision statement—A concise statement of the desired future condition of the planning unit, based primarily on the Refuge System mission, specific refuge purposes, and other relevant mandates (Draft Service Manual 602 FW 1.5).

visual obstruction—Pertaining to the density of a plant community; the height of vegetation that blocks the view of predators and conspecifics to a nest.

visual obstruction reading (VOR)—A method of visually quantifying vegetative structure and composition.

VOR—See visual obstruction reading.

wading birds—Birds having long legs that enable them to wade in shallow water including egrets,

great blue herons, black-crowned night-herons, and bitterns.

Wage Grade Schedule—Pay rate schedule for certain Federal positions. Sometimes “WG.”

waterfowl—A category of birds that includes ducks, geese, and swans.

watershed—The region draining into a river, a river system, or a body of water.

wetland management district (WMD)—Land that the Refuge System acquires with Federal Duck Stamp money for restoration and management primarily as prairie wetland habitat critical to waterfowl and other wetland birds.

wildland fire—A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

wildlife-dependent recreational use—Use of a refuge involving hunting, fishing, wildlife observation, wildlife photography, environmental education, or interpretation. The National Wildlife Refuge System Improvement Act of 1997 specifies that these are the six priority public uses of the Refuge System.

woodland—Habitats dominated by trees.

Appendix A

Key Legislation and Policy

This appendix briefly describes the guidance for the National Wildlife Refuge System and other policies and key legislation that guide the management of the Quivira National Wildlife Refuge.

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

(National Wildlife Refuge System Improvement Act of 1997)

Goals

- A. Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- B. Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- C. Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or under-represented in existing protection efforts.
- D. Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fish, wildlife observation and photography, and environmental education and interpretation).
- E. Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

Guiding Principles

There are four guiding principles for management and general public use of the Refuge System established by Executive Order 12996 (1996):

- *Public Use*—The Refuge System provides important opportunities for compatible wildlife-dependent recreational activities involving hunting, fishing, wildlife observation, photography, environmental education, and interpretation.
- *Habitat*—Fish and wildlife will not prosper without quality habitat and without fish and wildlife, traditional uses of refuges cannot be sustained. The Refuge System will continue to conserve and enhance the quality and diversity of fish and wildlife habitat within refuges.
- *Partnerships*—America’s sportsmen and women were the first partners who insisted on protecting valuable wildlife habitat within wildlife refuges. Conservation partnerships with other Federal agencies, State agencies, tribes, organizations, industry, and the general public can make significant contributions to the growth and management of the Refuge System.
- *Public Involvement*—The public should be given a full and open opportunity to participate in decisions regarding acquisition and

management of our national wildlife refuges.



Management actions on national wildlife refuges are circumscribed by many mandates including laws and Executive orders.

American Indian Religious Freedom Act (1978)—Directs agencies to consult with native traditional religious leaders to figure out proper policy changes necessary to protect and preserve Native American religious cultural rights and practices.

Americans with Disabilities Act (1992)—Prohibits discrimination in public accommodations and services.

Antiquities Act (1906)—Authorizes the scientific investigation of antiquities on Federal land and provides penalties for unauthorized removal of objects taken or collected without a permit.

Archaeological and Historic Preservation Act (1974)—Directs the preservation of historic and archaeological data in Federal construction projects.

Archaeological Resources Protection Act (1979), as amended—Protects materials of archaeological interest from unauthorized removal or destruction and requires Federal managers to develop plans and schedules to locate archaeological resources.

Architectural Barriers Act (1968)—Requires federally owned, leased, or financed buildings and facilities to be accessible to persons with disabilities.

Clean Water Act (1977)—Requires consultation with the U.S. Army Corps of Engineers (404 permits) for major wetland modifications.

Dingell–Johnson Act (1950)—Authorized the Secretary of the Department of the Interior to provide financial help for State fish restoration and management plans and projects. Financed by excise taxes paid by manufacturers of rods, reels, and other fishing tackle. Known as the Federal Aid in Sport Fish Restoration Act.

Endangered Species Act (1973)—Requires all Federal agencies to carry out programs for the conservation of endangered and threatened species.

Executive Order No. 7168 (1935)—Establishes Arrowwood Migratory Waterfowl Refuge “as a refuge and breeding ground for migratory birds and other wild life... to effectuate further the purposes of the Migratory Bird Conservation Act...”

Executive Order 11988 (1977)—Requires Federal agencies to provide leadership and take action to reduce the risk of flood loss, decrease the effect of floods on human safety, and preserve the natural and beneficial values served by the floodplains.

Executive Order 12996, Management and General Public Use of the National Wildlife Refuge System (1996)—Defines the mission, purpose, and priority public uses of the National Wildlife Refuge System. It also presents four principles to guide management of the Refuge System.

Executive Order 13007, Indian Sacred Sites (1996)—Directs Federal land management agencies to accommodate access to and ceremonial uses of American Indian sacred sites by American Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where proper, keep the confidentiality of sacred sites.

Federal Noxious Weed Act (1990)—Requires the use of integrated management systems to control or contain undesirable plant species and an interdisciplinary approach with the cooperation of other Federal and State agencies.

Federal Records Act (1950)—Requires the preservation of evidence of the Government’s organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information.

Fish and Wildlife Coordination Act (1958)—Allows the U.S. Fish and Wildlife Service to enter into agreements with private landowners for wildlife management purposes.

Migratory Bird Conservation Act (1929)—Establishes procedures for acquisition by purchase, rental, or gifts of areas approved by the Migratory Bird Conservation Commission.

Migratory Bird Hunting and Conservation Stamp Act (1934)—Authorizes the opening of part of a refuge to waterfowl hunting.

Migratory Bird Treaty Act (1918)—Designates the protection of migratory birds as a Federal responsibility; and enables the setting of seasons and other

regulations, including the closing of areas, Federal or non-Federal, to the hunting of migratory birds.

National Environmental Policy Act (1969)—Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate this Act with other planning requirements, and prepare proper documents to facilitate better environmental decisionmaking. [From the Code of Federal Regulations (CFR), 40 CFR 1500]

National Historic Preservation Act (1966), as amended—Establishes as policy that the Federal Government is to provide leadership in the preservation of the Nation's prehistoric and historic resources.

National Wildlife Refuge System Administration Act (1966)—Defines the National Wildlife Refuge System and authorizes the Secretary of the Department of the Interior to allow any use of a refuge, provided such use is compatible with the major purposes for which the refuge was established.

National Wildlife Refuge System Improvement Act of 1997—Sets the mission and administrative policy for all refuges in the National Wildlife Refuge System; mandates comprehensive conservation planning for all units of the Refuge System.

Native American Graves Protection and Repatriation Act (1990)—Requires Federal agencies and museums to inventory, find ownership of, and repatriate cultural items under their control or possession.

Refuge Recreation Act (1962)—Allows the use of refuges for recreation when such uses are compatible with the refuge's primary purposes and when sufficient money is available to manage the uses.

Rehabilitation Act (1973)—Requires programmatic accessibility and physical accessibility for all facilities and programs paid for by the Federal Government to make sure that any person can take part in any program.

Rivers and Harbors Act (1899)—Section 10 of this Act requires the authorization of U.S. Army Corps of Engineers before any work in, on, over, or under navigable waters of the United States.

Volunteer and Community Partnership Enhancement Act (1998)—Encourages the use of volunteers to help in the management of refuges within the Refuge System; facilitates partnerships between the Refuge

System and non-Federal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of the resources; and encourages donations and other contributions.

Appendix B

List of Preparers and Contributors

This CCP and EA is the result of extensive, collaborative, and enthusiastic efforts by the members of our planning team, listed below.

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Bill Waln	Fire management specialist	USFWS, Quivira Refuge
Brent Waters	Maintenance worker	USFWS, Quivira Refuge

Many organizations, agencies, and individuals provided help with the preparation of this CCP and EA. We acknowledge the efforts of the following individuals and groups. The diversity, talent, and knowledge contributed dramatically improved the vision and completeness of this document.

U.S. Geological Survey, Policy Analysis and Science Assistance Branch (socioeconomic impact studies)

Matt Hogan (Assistant Regional Director, Refuge System, USFWS, Region 6)

Sheri Fetherman (chief, Division of Education and Visitor Services, USFWS, Region 6)

Mickey Heitmeyer (wetlands ecologist, contractor)

Wayne King (biologist, Refuge System, USFWS, Region 6)

Mitch Werner (writer–editor, Division of Refuge Planning, USFWS, Region 6)

David Lucas (chief, Division of Refuge Planning, USFWS, Region 6)

Meg Van Ness (regional archaeologist, USFWS, Region 6)

Appendix C

Public Involvement

C.1 Public Involvement

We started public scoping Quivira Refuge in a notice of intent published in the Federal Register on February 24, 2010. The notice of intent announced our intent to prepare a CCP and EA document for the refuge and to obtain suggestions and information on the scope of issues to be considered in the planning process. Written comments were accepted through March 26, 2010.

On February 2010 a planning update was sent to each individual, organization, and government representative on the CCP mailing list, see below. The planning update provided information on the history of the Refuge System and on the CCP process, along with an invitation to, and schedule of, upcoming open houses.

Open houses were announced to local newspapers, radio, and television stations. Flyers were posted, and announcements were made via email and at the meetings of local organizations.

Three public open houses were held from March 8–10, 2010, in the local communities of Stafford, Great Bend, and Wichita, Kansas. At the meetings informational posters, maps, and handouts, along with a PowerPoint presentation provided a history of the Refuge System, an orientation of the planning area, and an overview of the CCP and NEPA processes. The draft vision statement developed for the refuge was also presented at the meetings. Our staff was available to answer questions on a variety of topics about refuge management and the CCP process. Attendees were encouraged to ask questions and offer comments. The turnout was moderate, with 5–15 people attending each meeting.

More than 80 comments were received orally and in writing during the scoping process. We received letters from three organizations—the National Wild Turkey Federation, Defenders of Wildlife, and the Great Bend Convention and Visitors Bureau—and from 12 individuals. Input obtained from public meetings, letters, emails, and comment forms was considered in developing this draft CCP and EA. These comments identified biological, social, and economic concerns about our refuge management. Our planning team's response to public comments will be completed before the final approval of this CCP.

C.2 Public Mailing List

What follows is the mailing list for Quivira Refuge CCP and EA.

Federal Officials

U.S. Senator Pat Roberts, Washington, DC
U.S. Senator Jerry Moran, Washington, DC
U.S. Congresswoman Lynn Jenkins, Topeka, KS
U.S. Congresswoman Lynn Jenkins, Washington, DC
U.S. Congressman Tim Huelskamp, Hutchinson, KS
U.S. Congressman Tim Huelskamp, Washington, DC
U.S. Congressman Kevin Yoder, Overland Park, KS
U.S. Congressman Kevin Yoder, Washington, DC
U.S. Congressman Mike Pompeo, Wichita, KS
U.S. Congressman Mike Pompeo, Washington, DC

Federal Agencies

USFWS—Atlanta, GA, Anchorage, AK, Sacramento, CA, Arlington, VA, Shepherdstown, WV, Portland, OR, Hadley, MA, Albuquerque, NM, Washington, DC, Fort Snelling, MN
USGS—Fort Collins, CO
National Park Service—Denver, CO, Omaha, NE
NRCS—Saint John, KS

Tribal Officials

Osage Nation Tribal Council, Pawhuska, OK

State Officials

Governor Sam Brownback, Topeka, KS
Representative Mitch Holmes, Saint John, KS
Representative Michael O’Neal, Hutchinson, KS
Representative Janice Pauls, Hutchinson, KS
Representative Joe Seiwert, Pretty Prairie, KS
Senator Terry Bruce, Hutchinson, KS
Senator Jay Emler, Lindsborg, KS
Senator Ruth Teichman, Stafford, KS

State Agencies

Kansas Department of Wildlife, Parks and Tourism—Great Bend, KS, Pratt, KS, Topeka, KS

Local Government

Big Bend Groundwater Management District 5—Haviland, KS, Macksville, KS
City Manager, Sterling, KS
Clerk Bell Township, Rice County, Raymond, KS
Clerk Stafford County, Saint John, KS
Commissioner Reno County, District 2, Hutchinson, KS
Commissioner Rice County, District 2, Sterling, KS
Commissioner Stafford County, District 2, Macksville, KS
Commissioner Stafford County, District 3, Saint John, KS
Mayor, Great Bend, KS
Mayor, Hudson, KS
Mayor, Saint John, KS
Mayor, Stafford, KS
Treasurer Bell Township, Rice County, Raymond, KS
Trustee, Putnam Township, Stafford County, Ellinwood, KS

Local Businesses

Alden State Bank, Sterling, KS
ANR Pipeline Co., Alden, KS
Cole Body Shop, Great Bend, KS
Hoisington Main Street Inc., Hoisington, KS
Jayhawk Pipeline, McPherson, KS
White Eagle Resources Corporation, Louisville, KS

Organizations

American Bird Conservancy, The Plains, VA
Audubon Society, Washington, DC
Defenders of Wildlife, Washington, DC
Ducks Unlimited, Memphis, TN
Friends of Great Plains Nature Center, Wichita, KS
Friends of Quivira—Hudson, KS, Larned, KS, Saint John, KS, Stafford, KS, Sterling, KS
Great Bend Convention and Visitors Bureau, Great Bend, KS
Izaak Walton League, Gaithersburg, MD
Kansas Herpetological Society, Wakarusa, KS
Kansas Ornithological Society, Prairie Village, KS
National Trappers Association, New Martinsville, WV
National Wildlife Federation, Reston, VA
National Wildlife Refuge Association, Washington, DC
Quail Unlimited, Wichita, KS
Sierra Club, San Francisco, CA
Sierra Club Southwind Group, Wichita, KS
Smokey Hills Audubon Society, Salina, KS
Stafford County Ducks Unlimited, Saint John, KS
The Nature Conservancy, Ellinwood, KS
The U.S. Humane Society, Washington, DC
The Wilderness Society, Washington, DC
Wichita Audubon Society, Wichita, KS

Universities and Schools

Colorado State University, Fort Collins, CO

Media

Great Bend Tribune, Great Bend, KS
Hays Daily News, Hays, KS
Saint John News, Saint John, KS
Wichita Eagle, Wichita, KS

Individuals

55 private individuals

Appendix D

Draft Compatibility Determinations

[REDACTED]

Quivira National Wildlife Refuge.

[REDACTED]

May 3, 1955.

[REDACTED]

Migratory Bird Conservation Act (16 U.S.C. § 715d)
Fish and Wildlife Act of 1956 (16 U.S.C. § 742f(a)4)
Fish and Wildlife Act of 1956 (16 U.S.C. § 742f(b)1)

[REDACTED]

The establishing and acquisition authorities set out the purposes for the refuge, as described below:

- For use as an inviolate sanctuary, or for any other management purpose, for migratory birds.
- For the development, advancement, management, conservation, and protection of fish and wildlife resources.
- For the benefit of the United States Fish and Wildlife Service, in performing its activities and services.

[REDACTED]

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

[REDACTED]

The following uses are evaluated for compatibility within the Quivira National Wildlife Refuge:

- hunting
- fishing
- wildlife observation and photography, including bicycling, horseback riding, and commercial birding tours via special use permit
- environmental education and interpretation
- cooperative farming, haying, and grazing
- commercial filming, audio recording, and still photography
- research and monitoring
- dog training
- firewood cutting

Hunting

The refuge's hunting program would be driven by its compatibility with wildlife population objectives. Besides the site-specific regulations mentioned below, the State hunting regulations would apply to the lands we own. Hunters may only possess and use our approved, nontoxic shot loads on our owned lands, and vehicle travel and parking is restricted to public roads, pullouts, and parking areas. The refuge Web site and public use brochures would provide guidance on site-specific regulations. The general hunting regulations are available from the KDWPT.

This draft CCP proposes the hunting uses described below. Also, we would increase regulatory hunting signage, such as more "closed to hunting area" and "nontoxic shot required" signs, and interpretive materials, like an updated, and more comprehensive refuge hunting leaflet or tearsheet, in an effort to reduce unintentional hunting violations on the refuge.

Hunting of migratory gamebirds, including three dove species, duck, goose, snipe, Virginia and sora rail, and coot would continue in designated areas of the refuge on approximately 7,606 acres. Sandhill crane hunting would be prohibited. Hunting of upland game, including pheasant, bobwhite quail, and prairie-chicken, would be allowed in designated areas of the refuge on approximately 9,289 acres of upland and wetland habitat. Big game hunting would be allowed for white-tailed deer and turkey on up to 15,239 acres. Small game hunting would include rabbits and squirrels only. Furbearer trapping by special use permit would be allowed on the same area as big game hunting.

A universally accessible hunting blind is located in Unit 30 and may be reserved through the refuge office.

Availability of Resources

Existing programs, such as current refuge directional signs and brochures, could be updated with available resources. Maintenance of access roads, parking, hunting and information kiosks, and public use signs, is closely tied to our Asset Maintenance Management System. The refuge's base budget would pay for the update and printing of existing and new brochures.

More law enforcement staff time and resources would be required to manage substantial changes to the hunting program. Additions would be (1) to start a deer and turkey hunting program; (2) to change hunt area boundaries and parking areas including signage and hunt brochures; and (3) to check compliance with this new public use and manage whooping

crane unit closures as necessary. Existing law enforcement staff is sufficient to manage the new programs.

Anticipated Effects of Use

The hunting program would continue to provide ample quality hunting opportunities without materially detracting from the mission of the Refuge System and the goals or establishing purposes of refuge lands. Public use brochures and the refuge Web site would be kept up to date and made readily available to hunters. Hunter success and satisfaction would be checked with random contacts with hunters in the field and at refuge headquarters.

Hunting is considered by many to be a legitimate, traditional, recreational use of renewable natural resources. The Administration Act, the Improvement Act, other laws, and our policy allow hunting on a national wildlife refuge when it is compatible with the purposes for which the refuge was established and acquired. National wildlife refuges exist primarily to safeguard wildlife populations through habitat preservation.

The word "refuge" includes the idea of providing a haven of safety for wildlife, and, as such, hunting might seem to be inconsistent with the National Wildlife Refuge System. However, habitat that normally supports healthy wildlife populations produces harvestable surpluses that are a renewable resource. As practiced on Quivira Refuge, hunting does not pose a threat to the wildlife populations and, in some instances, is actually necessary for sound wildlife management.

By its nature, hunting creates a disturbance to wildlife and directly affects the individual animals being hunted. However, it is well recognized that this activity has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving their habitat, which has ultimately contributed to the Refuge System mission.

Furthermore, despite the potential effects of hunting, a goal of the refuge is to provide opportunities for quality wildlife-dependent recreation. The hunting program would be designed and watched closely for safety and quality. A substantial change in the hunting program would be to only close parts of the refuge to hunting when whooping cranes are present on the refuge, instead of closing the entire refuge. This poses a slightly increased risk to whooping cranes. However, sandhill crane hunting, which could lead to the misidentification of the two bird species during a hunt, is not allowed on the refuge, and whooping cranes are actually at higher risk of being accidental shot during hunting season off refuge when they go out to feed where sandhill crane hunting is allowed.

Although hunting directly affects the hunted species and may indirectly disturb other species, limits on harvest and access for recreational hunting would make sure that populations do not fall to unsustainable levels. Closed areas on the refuge provide sanctuary to migratory birds during the hunting season. In some cases, hunting can be used as a management tool to control elevated populations that are having a negative effect on wildlife habitat.

Added effects from hunting activity include conflicts with individuals participating in wildlife-dependent public uses such as wildlife observation and photography. This could decrease visitors' satisfaction during the hunting season if all users are restricted to the same parts of the refuge.

Determination

Recreational hunting would be a compatible use on the Quivira Refuge in accordance with State regulations.

Stipulations Necessary to Make Sure that There is Compatibility

Visitors participating in recreational hunting would follow our public use regulations, including site-specific regulations, and the State's hunting regulations.

- Hunters would continue to use approved nontoxic shot for migratory and upland gamebird hunting and turkey hunting on the lands we own.
- Vehicles would be restricted to county and public roads and parking areas on the refuge.
- Signage, brochures, and our Web site would be used to provide hunters information on where, and how, to hunt on the refuge to make sure that we have their compliance with public use regulations.

Justification

Hunting is identified as a priority public use in the Improvement Act of 1997 and would help meet Refuge System goals with only minimal conflicts. Recreational hunting can instill, in citizens of all ages, a greater appreciation for wildlife and its habitat. This appreciation may extend to the Refuge System and other conservation agencies.

In *Conserving the Future*, Recommendation 17 states: "The Service will work closely with State fish and wildlife agencies to conduct a review of its current hunting and fishing opportunities, especially opportunities offered for youth and people with disabilities. Based on this review, the Service and states will work cooperatively to prepare a strategy for increasing quality hunting and fishing opportunities on national wildlife refuges." (Refuge System 2011)

Based on the anticipated biological effects described above and in the EA, we have found that recreational hunting on the refuge would not interfere with our habitat goals and objectives or purposes for which the refuge was established. Limiting access and checking the use could help limit any adverse effects.

Mandatory 15-year Reevaluation Date: 2028

Fishing

Fishing is defined as wildlife-dependent recreation under the Improvement Act. As one of the six priority recreational activities noted therein, fishing provides a traditional recreational activity on the refuge with no definable adverse effects to biological resources.

National wildlife refuges may be opened to sportfishing only after a determination is made that this activity is compatible with the purposes for which the refuge was established. In addition, the sportfishing program must be consistent with principles of sound fishery management and otherwise be in the public interest.

This draft CCP and EA includes continued recreational fishing and allows for a new program for frogging. Fishing would continue on the following units of the refuge in accordance with State regulations:

Availability of Resources

The fishing program could be administered using current resources.

Anticipated Effects of Use

Fishing and other human activities cause disturbance to wildlife and the trampling of vegetation along the bank of rivers and streams. Littering can also become a problem.

Determination

Fishing would be a compatible use on Quivira Refuge in accordance with State regulations.

Stipulations Necessary to Make Sure that There is Compatibility

- Visitors participating in recreational fishing would follow our public use regulations and State fishing regulations and limits.
- No bait collecting and no live fish bait use except for night crawlers would be allowed.
- Vehicles would be restricted to county and public roads and parking areas on the refuge.
- The use of motorized boats would be prohibited.
- Boats, fishing equipment, and all other personal property must be removed at the end of each day.
- Fish stocking would only occur in the Kid's Fishing Pond as necessary.

Justification

Fishing is listed as a priority public use in the Improvement Act. Based on the biological effects addressed above and in the environmental assessment, we have found that recreational fishing would not interfere with the habitat goals and objectives of the refuge or with the purposes for which the refuge was established.

Mandatory 15-year Reevaluation Date: 2028

Wildlife Observation and Photography

As two of the six priority recreational uses identified in the National Wildlife Refuge System Improvement Act of 1997, wildlife observation and photography provide recreational activities on the

refuge with no definable adverse effects to biological resources.

Wildlife observation and photography opportunities would continue to be provided on the refuge, and would be supported by providing observation towers and blinds, keeping an up-to-date bird species list for the refuge, and allowing the opportunity to use portable viewing and photography blinds through the issuance of special use permits. Facilities exist to support these activities by bringing people closer to wildlife.

The auto tour and Wildlife Drive will provide year-round opportunities for wildlife viewing and photography via auto, foot, dog walking, bicycling, and horseback. Hazardous road conditions, such as the flooding of emergency spillways on the route may occasionally require closures for safety. The Wildlife Drive area may also occasionally close because of whooping crane use to avoid disturbance.

All roads and trails are open for foot traffic year round, from sunrise to sunset, unless short-term closures are enacted to prevent wildlife disturbance or maintenance. All refuge lands are open to foot traffic except for periodic closures during the nesting season. Two areas are routinely closed during nesting season on the salt flats for interior least tern nesting and in the South Big Salt Marsh unit around the bald eagle nest site. The observation tower road and photo blind on the LSM have been occasionally closed because of whooping crane use near the blind and tower. Other areas may be closed in the future depending on changes in wildlife use.

Facilities providing more opportunities for wildlife observation and photography include the LSM photo and observation blind and observation tower, the trail between the observation tower and the Kid's Fishing Pond, and the Migrants Mile hiking trail and photo and observation blind. Spotting scopes are available at the LSM observation tower and on the Wildlife Drive. A binocular loan program is also available for checkout at refuge headquarters.

More observation opportunities would be available through the proposed tower-mounted, remote camera at the BSM and bald eagle nest site. The movable tower camera would be installed near the bald eagle nest. It would allow Internet viewing of the nesting activity and would also provide viewing of wildlife on the BSM year round.

Commercial birding would be allowed with a special use permit obtained at the refuge headquarters.

Availability of Resources

The only money required for a new facility would go toward buying and installing an Internet-connected tower camera at the BSM. Money would be acquired from various sources, such as the Friends of

Quivira, outside donations, local utilities, grants, and refuge sources. Other refuge money for visitor facilities are received as visitor facility enhancement projects through our Asset Maintenance Management System and through Visitor Facility Enhancement grants. Existing programs, such as current directional signs and brochures, can be updated with available resources.

More staff time would be required to manage the tower camera and for maintenance.

Anticipated Effects of the Use

Effects associated with the wildlife observation and photography uses of the refuge resources. These uses are ongoing, and potential disturbances are being managed with temporary closures without issue. Law enforcement is available to enforce closures, and the Internet and temporary signage at headquarters and closed areas announce closures.

Sanctuary would be provided for migrating waterfowl and other waterbirds during the waterfowl hunting season at Quivira Refuge. Changes to the waterfowl hunt boundary would reduce any conflicts between hunters and nonhunters in the Marsh Road and Wildlife Drive area, as those areas become nonhunting sanctuary, but they may increase in other parts of the auto tour route when hunting is allowed in units next to the tour route. Much of the area already sees hunting activity on the Hunter Access Road, but units 26, 49, 62, and 63 have been closed to hunting.

Determination

Wildlife observation and photography would be compatible uses on Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

- Visitors participating in wildlife observation and photography would follow all public use regulations.
- Seasonal closures to protect sensitive wildlife areas and reduce disturbance to fish and wildlife would be kept.
- Commercial photography would require a special use permit.
- Non-Service vehicles would be restricted to county and public access roads on the refuge.
- ATV or UTV use on the refuge would be compatible with State and county regulations on county roads. ATV or UTV use by the public is prohibited off public roads, unless allowed under a special use permit.
- Viewing areas would be designed to decrease disturbance effects to wildlife and all refuge resources while providing a good opportunity to view wildlife in their natural environments. Visitors using the refuge's permanent blinds or their own portable observation and photography blinds would be provided with information on their proper use and on the etiquette of these structures to decrease disturbance to wildlife and their natural environments and to other refuge visitors.
- Horseback riding and biking would be prohibited on hiking trails, off roads, or in closed areas.
- Dogs must be under owner's control, but leashed during the nesting season of April 1 to August 15.

Justification

Wildlife observation and photography are identified as priority public uses in the Improvement Act and would help meet Refuge System goals with only minimal conflict. Wildlife observation and photography can instill, in citizens of all ages, a greater appreciation for wildlife and its habitat. This appreciation may extend to the Refuge System and other conservation agencies.

Based on anticipated biological effects described above and in the EA, we have found that wildlife observation and photography on the refuge would not interfere with our habitat goals and objectives or with the purposes for which the refuge was established. Limiting access and watching use closely could help limit any adverse effects.

***Mandatory 15-year Reevaluation Date:
2028***

Environmental Education and Interpretation

As two of the six priority recreational uses identified in the Improvement Act, environmental education and interpretive activities on the refuge and offsite programming and events at schools, fairs, and expo centers provide activities with no definable adverse effects to biological resources.

- Interpretive panels and auto tour brochures provide information about habitat, wildlife, management actions, and activities. Interpretation is passive in nature, from self-guided opportunities to interpretive panels, brochures, Web sites, and tearsheets. We would continue to offer binocular and Let's Go Outside! backpack loan programs at the refuge and at the GPNC. We would continue to use social media, and update it weekly, to increase contact with, and exposure to, the refuge.
- We would continue to provide interpretive programs at Quivira Refuge and the GPNC on a variety of refuge management and wildlife-oriented subjects, both by request and as scheduled activities, and we would increase programs as staff and time allow.
- We would continually evaluate our interpretive media, such as brochures, signs, and displays, for relevancy, effectiveness, and timeliness, and we would update them as needed, provided we have the money to do it.

This CCP proposes to continue environmental education and interpretation and add the following to improve these programs:

- Replace the refuge environmental education classroom with a new one near the headquarters. The location already has several facilities nearby that would be used in conjunction with the classroom, including trails, an observation tower, a pavilion, restrooms, wetlands, sand prairie uplands, meadows and other habitats.
- We would expand the opportunities for environmental education and interpretation to foster appreciation and understanding of the National Wildlife Refuge System and the resources of Quivira Refuge. More interpretive

panels would be developed for the refuge, and accessible observation sites would be developed on the refuge. The mammal, reptile and amphibian lists would be updated for the refuge, and a brochure would be developed.

- We would interpret the cultural history of the Quivira Refuge area, including tribal uses, and early settlement.
- Refuge staff would continue to take part in offsite special events and activities to bring the refuge message to many people, including at-risk youth. Participation in these events would occur as staff and time allow.
- Environmental education programs would be provided to teach curriculum-based programs for all grade levels that meet State educational standards.
- We would encourage the use of both Quivira Refuge and GPNC facilities by educational organizations as outdoor classrooms.
- We would continue to support the GPNC through its partnership with the City of Wichita Department of Park and Recreation and the KDWPT. We would use educational kits and discovery boxes, and continue to promote current and future national initiatives, such as America's Great Outdoors and Let's Go Outside!
- Participation by teachers and students in the Junior Federal Duck Stamp program will continue to increase through more outreach and marketing efforts. Artwork will be displayed throughout the year at various locations—at least 10 venues per year, including the Kansas State Fair—to further promote interest in wildlife and art.
- We would encourage virtual geocaching to enhance the appreciation of refuge resources.

Availability of Resources

Payment for environmental education and interpretation activities, directional signs, and brochures would come from annual operations and maintenance money. Other sources, such as grants, regional project proposals, challenge cost-share agreements, deferred maintenance and others would also be sought and used as they became available.

Requests to pay for new facilities would be submitted as visitor facility enhancement projects through our Asset Maintenance Management System.

Anticipated Effects of the Use

The use of the refuge for onsite activities by groups of teachers and students for environmental education or interpretation may minimally affect the immediate and surrounding areas in the short term. Effects may include the trampling of vegetation and temporary disturbance to nearby wildlife species.

Refuge brochures, interpretive panels, and other educational materials would continue to be updated as needed to meet our needs. Features such as the auto tour route and accessible observation sites would continue to provide access to the refuge.

A new, relocated environmental education classroom would have a small effect on lands near the Kid's Fishing Pond, but this would be offset by a reduction of the footprint area where the existing environmental education classroom is located. All facilities at the current location except for the public restrooms and area of the parking lot would be removed, including the bunkhouse and trailer pads, which would be relocated at the headquarters administrative site, and the area would be restored to upland habitat.

We would continue to promote a greater public understanding and appreciation of refuge resources, programs, and issues through interpretive, outreach, and environmental educational programs. Working with our Friends groups and other local groups, we would continue to provide environmental education and interpretation both on and off the lands we own. Presentations, both on and off our lands, would be provided to refuge visitors, school groups, and organizations, allowing us to reach a broader audience. Onsite presentations would be managed to decrease disturbance to wildlife, habitat, and cultural resources. Environmental education and interpretation activities taking place at the GPNC and offsite by GPNC staff would not affect wildlife or habitat in the urban setting.

Determination

Environmental education and interpretation would be a compatible use on Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

- Visitors participating in environmental education and interpretation programs would follow all of our regulations. Onsite activities would be held where minimal effect to wildlife and habitats would occur.
- We would review new environmental education and interpretation activities to make sure that these activities meet program objectives and are compatible.

Justification

Environmental education and interpretation are identified as priority public uses in the Improvement Act and would help meet Refuge System goals with only minimal conflicts. Environmental education and interpretation would be used to encourage an understanding in citizens of all ages to act responsibly to protect wildlife and their habitats. These are tools used in building a land ethic, developing support of the refuge, and decreasing wildlife violations.

Environmental education is an important tool for the refuge to provide visitors with an awareness of its purposes, values, and specific issues such as wetland ecology, water quality, effects of nonnative species, and migratory bird management. This tool would also provide visitors and students a greater understanding of the mission of the Refuge System and its importance to the American people.

Based on anticipated biological effects described above and in the EA, we have found that environmental education and interpretation on the refuge would not interfere with our habitat goals and objectives or with the purposes for which the refuge was established. Limiting access during certain times of the year and checking the uses would limit any adverse effects.

Mandatory 15-year Reevaluation Date: 2028

Cooperative Farming, Haying, and Grazing

We would continue to use cooperative farming and prescriptive livestock grazing and haying as management tools on the refuge. These tools would be used to meet habitat objectives, control vegetative litter, promote native plant production and diversity, control the spread of invasive plant species, and help convert disturbed grasslands back to native plant species.

The refuge uses cooperative farming and haying as tools to manage habitats, including the control of invasive plant species, grassland reconstruction and wet meadow management. We would enter into an agreement with a local landowner to (1) help restore cropland and poor quality habitat to quality native grassland or wetland habitat for wildlife or (2) cut grasslands to promote native seed harvest the following growing season and to rejuvenate vegetation growth. A farming cooperator would be issued a cooperative farming agreement or special use permit by the refuge manager and would be allowed to till seed, harvest small grain, control invasive plants, or harvest hay on the lands we own. The choice is reserved to use genetically modified crops only for the reconstruction of native prairie plants to create more weed-free seedbeds and has been approved through an environmental assessment. The agreement generally would be issued for a 1- to 4-year management prescription.

Cooperative farming of our lands is usually done on a share basis where we and the cooperator each receive a share of the crop. We would keep our share as standing cover for wildlife forage or in exchange for more work from the cooperator, such as seed harvesting, invasive plant control, grass seeding, or for supplies such as herbicides and fence materials for habitat protection and improvement on the management unit. Any fees or cash received by us would be deposited into the Refuge Revenue Sharing Account.

This draft CCP proposes to continue using cooperative farming and haying to manage habitats. Farming will gradually be phased out as those lands are planted back into native species. Furthermore, this draft CCP establishes goals and objectives for specific habitat types where cooperative farming and haying may be used. In addition, we have identified focal wildlife species, such as eastern meadowlark and dickcissel, and their habitat needs. This has resulted in objectives that would guide management to achieve the habitat needs of these species. The refuge would improve monitoring and research programs for vegetation and wildlife to assess habitat

and wildlife population responses to cooperative farming and haying.

The refuge uses prescriptive livestock grazing as a tool to manage a variety of uplands and wetlands. Grazing by livestock has been a preferred management tool because the effect on habitat is controllable and measurable. Livestock grazing has been used in a variety of ways including high intensity and short duration, rest rotation, and complete rest. Grazing may occur throughout the year our management needs dictate. Where applicable, a rotation schedule using multiple grazing units is used to manage intensity.

Fencing and controlling livestock is the responsibility of the cooperating rancher. We provide instruction and guidance in the special use permit for the placement of fences, water tanks, and livestock supplements to make sure that sensitive habitats and refuge assets are protected. A temporary electric fence is used where there is not an existing fence. Current forage conditions, habitat objectives, and available water would determine stocking rates in each grazing unit.

This draft CCP proposes to continue using prescriptive livestock grazing to meet habitat objectives. Furthermore, the draft CCP establishes goals and objectives for specific habitat types where prescriptive livestock grazing may be used. In addition, the Service has identified focal wildlife species and their habitat needs, which has resulted in objectives that would guide the prescriptive grazing program to achieve the habitat needs of these species while helping many others. The refuge would improve the monitoring and research programs for vegetation to assess habitat responses to prescriptive livestock grazing. Different grazing rates and management strategies would be investigated to decide on the best methods for meeting habitat goals and objectives.

Availability of Resources

Existing resources would be sufficient to administer the farming, haying, and grazing programs at current levels. These programs would continue to be conducted through special use permits or cooperative farming agreements, which decrease the need for staff time and our assets to complete the work. A refuge biologist would be needed to plan and oversee monitoring and research programs to assess the effects and effectiveness of these management programs. One or two temporary biological technicians likely will be necessary to help with on-the-ground monitoring programs.

Rehabilitation of existing stock water wells and the drilling of more wells in strategic locations would increase the effectiveness of the grazing program by spreading out grazing use and reducing the effects

caused by livestock watering in wetlands and canals and by cooperators hauling water to grazing cells on a daily basis.

Anticipated Effects of the Use

The cooperative farming and haying program and prescriptive livestock grazing program would be used to meet habitat goals and objectives identified in the draft CCP. These programs are intended to support and enhance habitat conditions for the benefit of a wide variety of migratory birds and other wildlife that use the refuge. Minimal negative effects are expected through the use of these tools. Control of invasive plant species through these programs would be a long-term benefit.

Some wildlife disturbance would occur during operation of noisy farming equipment and some animals may be temporarily displaced. Wildlife would receive the short-term benefit of standing crops or stubble for food and shelter and the long-term benefit of having cropland or other poor-quality habitat converted to native prairie plants. In addition, the restoration of cropland to grassland cover would prevent soil erosion, improve water quality, and reduce the need for chemical use.

Some trampling of areas by livestock may occur around watering areas, mineral licks or trees and wood lots. Cattle congregating under the shade of trees would increase invasive cheatgrass establishment. If fences are not kept up, it may be difficult to meet habitat objectives. It is anticipated that grazing would be in a mosaic pattern, with some areas being more intensively grazed than others in certain years. Grazing, like fire, is known to increase the nutrient cycling of nitrogen and phosphorous (Hauer and Spencer 1998, McEachern et al. 2000). Hoof action may improve conditions to allow native plant seeds to become established. However, cattle grazing would also increase the risk of invasive plants getting established. Grazing in the spring could have adverse effects on grassland bird nests because of trampling and the loss of vegetation. In addition, the presence of livestock would be disturbing to some wildlife species and some visitors. The long-term benefits of this habitat management tool should outweigh the short-term negative effects.

Determination

Cooperative farming, haying, and grazing as habitat management tools would be compatible uses on the Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

For consistency with management objectives, we would require general, and specific conditions, for each farming, haying, or grazing permit.

Only areas that have a prior crop history would be included in the farming and haying program. To decrease effects to nesting birds and other wildlife, the refuge manager would decide on, and incorporate, any needed timing constraints on the permitted activity into the cooperative farming agreement or special use permit. For example, haying would not be permitted on our lands until after August 1 to avoid destroying bird nests on the management unit unless the refuge manager deems it necessary to hay earlier to control invasive plants or restore grasslands.

The cooperative farming agreement or special use permit would specify the type of crop to be planted. Farming permittees would be required to use our approved chemicals that are less detrimental to wildlife and the environment.

Control and confinement of livestock are the responsibility of the permittee, but we would decide where fences, water tanks, and livestock supplements would be placed within the management unit. Temporary electric fence would be used to keep livestock within grazing cells as well as to protect sensitive habitat areas and refuge assets such as water control structures or public use areas. Cooperators would be required to remove fences at the end of the permit.

Grazing fees would be based on the current-year USDA Statistics Board publication for Grazing Fee Rates for Cattle by Selected States and Regions, as provided annually by the regional office, or would be established by bid. Standard deductions for labor associated with the grazing permit would be included on the special use permit.

The refuge would carry out a vegetation monitoring program to assess if habitat needs of focal species are being met. A minimum of one temporary biological technician would be necessary to check and document these activities. A biologist would be necessary to plan and oversee the monitoring program and to assess the effects of these management programs.

Justification

Some habitat management needs to occur to keep and enhance habitat for migratory birds and other wildlife. When properly managed and checked, prescriptive farming and haying are options that can be used to improve wildlife cover and to restore disturbed habitats to desirable grassland cover. Prescriptive livestock grazing can rejuvenate native grasses and help control the spread of some invasive

plant species. Each of these tools can be controlled, and the results would be watched closely, as with vegetation monitoring programs, so that adjustments can be made to meet habitat goals and objectives.

Using local cooperators to accomplish the work is a cost-effective method to accomplish the habitat objectives. The long-term benefits of habitat restoration and management far outweigh the short-term effects caused by cooperative farming, haying, and grazing.

Mandatory 10-year Reevaluation Date: 2023

Commercial Filming, Audio Recording, and Still Photography

Commercial filming is the digital, or film, recording of a visual image or of a sound—and commercial still photography is the capture of a still image on film or in a digital format—by a person, business, or other entity for a market audience such as for a documentary, television, feature film, advertisement, or similar project. It does not include news coverage or visitor use.

Quivira Refuge provides tremendous opportunities for commercial filming and still photography of migratory birds and other wildlife. Each year, the refuge staff receives requests to conduct commercial filming or photography on our lands. Our staff would continue to evaluate each request on an individual basis, and, if the use is allowed, the requesting individual or group would be issued a special use permit. The permit would designate what areas may be accessed and what activities are, and are not, allowed, to decrease the possibility of damage to cultural or natural resources or to limit interference with other visitors.

Permittees would be able to access all areas of the refuge that are open to the public and must abide by all public use regulations. In rare cases, and through the special use permit process, we may allow access to areas closed to the public.

Availability of Resources

The commercial filming, audio recording, and still photography uses could be administered with current resources. Administrative costs for review of applications, issuance of special use permits, and staff time to conduct compliance checks may be offset

by a fee system designated for the agencies within the DOI.

Anticipated Effects of Use

Wildlife filmmakers and photographers tend to create the greatest disturbance of all wildlife observers (Dobb 1998, Klein 1993, Morton 1995). While observers frequently stop to view wildlife, photographers are more likely to approach the animals (Klein 1993). Even a slow approach by photographers tends to cause behavioral consequences with wildlife (Klein 1993). Photographers often remain close to wildlife for extended periods of time in an attempt to habituate the subject to their presence (Dobb 1998). Furthermore, photographers with low-power lenses tend to get much closer to their subjects (Morton 1995). This usually results in increased disturbance to wildlife, as well as habitat, including the trampling of plants. Handling of animals and disturbing cultural artifacts or vegetation, such as cutting plants and removing flowers, is prohibited on our lands.

The issuance of special use permits with strict guidelines and close checking by our refuge staff for compliance could help decrease or avoid these effects. Permittees who do not follow the stipulations of their special use permits could have their permits revoked, and further applications for filming or photographing on refuge lands would be denied.

Determination

Commercial filming, audio recording, and still photography would be compatible uses on Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

Commercial filming or still photography must (1) show a means to extend public appreciation and understanding of wildlife or natural habitats; (2) enhance education, appreciation, and understanding of the Refuge System; or (3) facilitate the outreach and education goals of the refuge. Failure to show any of these criteria would result in a special use permit being denied.

All commercial filming would require a special use permit that would (1) name conditions that protect the refuge's values, purposes, resources, and public health and safety and (2) prevent unreasonable disruption of the public's use and enjoyment of the refuge. Such conditions may be, but are not limited to, specifying road conditions when access would not be allowed, establishing time limitations, and finding routes of access. These conditions would be identified

to prevent excessive disturbance to wildlife, damage to habitat or refuge infrastructure, or conflicts with other visitor services or management activities.

The special use permit would stipulate that imagery produced on refuge lands would be made available for use in environmental education and interpretation, outreach, internal documents, or other suitable uses. In addition, any commercial products must include credits to the Quivira National Wildlife Refuge, the National Wildlife Refuge System, and the U.S. Fish and Wildlife Service.

Still photography requires a special use permit, with specific conditions as outlined above, if one or more of the following would occur:

- It takes place at locations where, or when, members of the public are not allowed.
- It uses models, sets, or props that are not part of the location's natural or cultural resources or administrative facilities.
- We would incur more administrative costs to check the activity.
- We would need to provide management and oversight to avoid the impairment of the resources and values of the site, limit resource damage, or to decrease health and safety risks to the visiting public.
- The photographer intends to intentionally manipulate vegetation to create a shot, such as cutting vegetation to create a blind.

To decrease the effect on our lands and resources, our refuge staff would make sure that all commercial filmmakers and commercial still photographers, regardless of whether or not a special use permit is issued, comply with policies, rules, and regulations. Our staff would check and assess the activities of all filmmakers, audio recorders, and still photographers.

Justification

Commercial filming, audio recording, and still photography are economic uses that must contribute to the achievement of the refuge purposes, the mission of the Refuge System, or the mission of the USFWS. Providing opportunities for these uses should result in increased public awareness of the refuge's ecological importance as well as in advancing the public's knowledge and support for the Refuge System and the Service. The stipulations outlined above and conditions imposed in the special use permits issued to commercial filmmakers, audio record-

ers, and still photographers would make sure that these wildlife-dependent activities occur with minimal adverse effects to resources or visitors.

Mandatory 10-year reevaluation date: 2023

Research and Monitoring

The Quivira Refuge receives 5 to 10 requests each year to conduct scientific research or monitoring programs on our lands. Priority is given to studies that contribute to the enhancement, protection, preservation, and management of the refuge's native plant, fish, and wildlife populations and their habitats. Applicants who are not employees of ours must submit a proposal that outlines the following:

- objectives of the study
- justification for the study
- detailed method and schedule
- potential effects on wildlife and habitat including short- and long-term disturbance, injury, or mortality
- description of measures the researcher would take to reduce disturbances or effects
- staff required and their qualifications and experience
- status of necessary permits, such as scientific collection permits and endangered species permits
- costs to the Service, including staff time requested, if any
- anticipated progress reports and end products, such as reports or publications

Our refuge staff or others would review research proposals case by case and issue special use permits if approved. Criteria for evaluation would include, but would not be limited to, the following:

- Research that would contribute to specific refuge management issues would be given higher priority over other requests.

- Research that would conflict with other ongoing research, monitoring programs, or management programs would not be approved.
- Research that would cause undue disturbance or would be intrusive would likely not be approved. The degree and type of disturbance would be carefully weighed when evaluating a research request.
- Proposals would be evaluated to decide if any effort was made to decrease disturbance through study design, including adjusting the location, timing, number of permittees, study methods, and the number of study sites.
- The length of the project would be considered, and agreed on, before approval.
- Research proposals involving threatened and endangered species would require concurrence and Section 7 Endangered Species Act review before approval.

Availability of Resources

Current resources would be adequate to administer research and monitoring programs on a limited basis. A refuge biologist would be necessary to administer large and long-term projects, which generally require more indepth evaluation of applications, management of permits, and oversight of research projects. The biologist would name research and monitoring needs and work with our other staff, universities, and scientists to develop studies that would help the refuge and address the goals and objectives in this draft CCP.

Anticipated Effects of Use

Some degree of disturbance would be expected with all research activities because researchers may use our roads or enter areas that are closed to the public. In addition, some research may require the collection of samples or the handling of wildlife. However, research studies would be expected to minimally affect wildlife and habitats because special use permits would include conditions on their effects.

Determination

Research and monitoring would be compatible uses on Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

Extremely sensitive wildlife habitats and species would be sufficiently protected from disturbance by limiting research activities in these areas. All refuge rules and regulations would be followed unless otherwise exempted by our refuge management. Projects would be reviewed annually.

Our refuge staff would use the above criteria for evaluating and determining whether to approve a proposed study. If research methods were found to have potential effects on habitat or wildlife, it must be shown that the research is necessary for the conservation management of resources on the refuge. Measures to decrease potential effects would need to be developed and included as part of the study design; these measures would be conditions on the special use permit.

Our refuge staff would watch research activities for compliance with conditions of the special use permit. At any time, staff may accompany the researchers to look for potential effects. They may find that research that was approved for special use permits before is terminated because of observed effects. Our refuge manager would also have the ability to cancel a special use permit if the researcher was out of compliance or for wildlife and habitat protection.

Justification

Potential effects of research activities on refuge resources would be decreased through restrictions included as part of the study design, and research activities would be checked by our refuge staff. Results of research projects would contribute to the understanding, enhancement, protection, preservation, and management of the refuge's wildlife populations and their habitats.

Mandatory 10-year reevaluation date: 2023

Dog Training

Dog training during the nonnesting season by noncommercial dog owners is an existing use at Quivira Refuge. The use of dogs for hunting is encouraged. Depending on future demand and conflicts, dog training on the refuge may require a special use permit.

Availability of Resources

Sufficient staff exists to issue the required permits, and oversee this periodic use. Facilities and staff are now available to provide access, support roads, parking lots, and secondary access roads.

Anticipated Effects of Use

There would be minimal disturbance to wildlife as a result of the activity, and effects would be temporary.

Public Review and Comment

This compatibility determination is presented for public review and comment as part of the 30-day public comment period for the draft comprehensive conservation plan and environmental assessment for the Quivira National Wildlife Refuge.

Determination

Dog training would be a compatible use on the Quivira National Wildlife Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

- Depending on future demand and conflicts, dog training on the refuge may require a special use permit.
- Immediately before training activity, trainers must check in with refuge staff at the headquarters for permitted opportunities to decrease disturbances to wildlife and other public uses and to maximize trainer safety.
- Training would be allowed when most bird breeding activities do not occur: September 1–March 1.
- Training would only be allowed in wetland areas along public use roads and where disturbance to wildlife can be decreased. For instance, we would encourage the use of wetland areas that do not provide foraging or resting habitat for waterbirds at that time.
- Training would not be allowed in the Kids' Fishing Pond area.

- Training would use areas in a way that avoids or decreases unwanted, direct interactions with visitors, such as with those who are allergic or uncomfortable with dogs. Training would also use areas in a way that decreases potential conflict with visitor use activities that may be occurring in the area before training activities begin.
- Only artificial props, such as canvas or plastic dummies, may be used in training.

Justification

This activity encourages people to get outside and promotes quality and responsible hunting and the appreciation of natural resources. There is little other public land available, particularly during the non-nesting season when hunting is allowed. Use of private land with water for training dogs is difficult to find, as most is either cropland or rangeland. Most adjacent land is private farm ground that is not available to the public for this activity. The use is proposed only for individuals doing noncommercial dog training. Commercial dog training would not be allowed because of the overwhelming demand and its potential for too many dogs, trainers and vehicles on the refuge. Dog training may occur with minimal, temporary disturbance, and no permanent effect to the refuge is anticipated. The use will not materially detract from the National Wildlife Refuge System mission or purposes of the refuge.

Mandatory 10-year Reevaluation Date: 2023

Firewood Cutting

Firewood cutting would be a new use at Quivira Refuge. Firewood cutting would be an economic use of the refuge's natural resources. The use would facilitate and aid with habitat management and grassland restoration through the removal of undesirable invasive woody vegetation. The public would be permitted to cut and collect firewood on the refuge. The timber could either be removed as cut wood or as whole trees. The public would acquire a permit and a map with designated areas on the refuge to cut firewood. Unlimited permits would be available with a \$25 annual fee. The public would be allowed to remove only trees that have been marked for removal, that had been chemically treated earlier by refuge staff, or that are dead timber. All cutting

would be required to be at ground level. Access would be limited to areas along roads and trails to prevent habitat destruction and wildlife disturbance.

The use would occur potentially on all wooded upland and partially wooded upland acres of the refuge, totaling approximately 15,000 acres. Specific areas would be chosen by the refuge manager to not interfere with habitat management or threatened and endangered species, and areas on the refuge would not be open to firewood cutting when threatened or endangered species are present. Affected wildlife could include deer, small mammals, raptors such as bald and golden eagles and various hawks, upland gamebirds, quail and pheasants, and other upland migratory birds. Migratory waterfowl using the wetlands and marshes of the refuge might also be affected.

Firewood cutting would be permitted from August 1 to April 30 to prevent effects to migrating bird nesting. Firewood cutting would be permitted seven days a week from sunrise to sunset. Areas would be designated by the refuge manager and subject to closure at any time. Firewood cutting would not be permitted during periods of fire danger reaching red flag warnings as issued by the National Weather Service.

The public would be required to obtain a special use permit. Power chainsaws, handsaws, or axes would be the only means permitted to cut trees and firewood. All permittees would be required to have spark arrestors on power chainsaws and have a shovel or fire extinguisher available to aid with extinguishing fire. The public would be permitted to pull trailers or vehicles on established roads, trails, and designated areas with refuge manager approval with exact locations stated on permit and map. All firewood and equipment would be removed daily.

The use would facilitate and aid with habitat management and grassland restoration by removing undesirable invasive woody vegetation. Removal of invasive tree species would prevent further seed distribution, reduce fuel load, restore native prairie, clean up fallen and cut tree piles, and provide an economic benefit to the public. Most adjacent land is private farm ground that is not available to the public.

Availability of Resources

- Resources involved in the administration and management of the use: minimal administrative costs for the issuance of permits and maps.

- Special equipment, facilities, or improvements necessary to support the use: none.
- Maintenance costs: held to a minimum. Expected costs include installing signs when necessary to inform the public on temporary closures.
- Monitoring costs: held to a minimum. Expected costs include 1–2 hours per week by the refuge manager to monitor the woodcutting progress and potential wildlife disturbance. Monitoring would be done while conducting routine management monitoring. Refuge Law Enforcement officer could spend three to four hours per week monitoring illegal activity or noncompliance with the special use permits. This activity would be done while conducting routine refuge law enforcement.
- Offsetting revenues: an annual fee of \$25 would be assessed for a special use permit to cover administrative costs and maps.

Anticipated Effects of Use

- Short-term effects: the use would support the refuge mission by restoring grassland acres, increasing the nesting habitat of migratory grassland species, reducing invasive tree species, reducing hazardous fuel, and reducing labor hours and equipment use for mechanical tree removal resulting in cost savings for the Service. Through the management of the activity, negative direct or indirect effects would be reduced. The disturbance activity would not be any greater than what would be conducted by refuge staff conducting the same activity. Short term activity may increase as the public learns about the availability of firewood.
- Long-term effects: the use would be applied primarily in the short term, 3–10 years, until invasive tree populations have been eradicated or are at manageable levels. The duration and frequency of firewood cutting would be reduced over time and may be phased out completely. Long-term beneficial effects would include increasing the nesting habitat for migratory grassland species, controlling invasive tree species, and increasing native plant diversity.

- Cumulative effects: the use would provide beneficial effects by increasing nesting habitat of migratory grassland species, eradicating invasive tree species, and increasing native plant diversity. The combustion of the wood would be required to allow for restoration of the native plant communities on the Refuge. The activity of burning the wood can either be performed by the Refuge or by the public. The benefit of allowing the public to cut and use the firewood would help reduce the amount of petroleum products required to heat their homes.

Determination

Firewood cutting would be a compatible use on Quivira Refuge.

Stipulations Necessary to Make Sure that There is Compatibility

Refuge staff would mark trees or spray trees in designated areas before firewood cutting. The refuge manager would monitor the use and close areas during red flag fire danger, when threatened or endangered species are present, or when it would interfere with management activities such as grazing or prescribed fire. Woodcutting equipment would be limited to power chainsaws with spark arrestors, axes, and hand saws. Heavy equipment and tractors owned by the public would not be permitted to aid with firewood cutting. Monitoring the activity would be performed by refuge staff on a regular basis. Law enforcement staff would visit sites regularly during routine patrols to monitor that activities are conducted within special use permit guidelines and refuge regulations.

Justification

Firewood cutting would help us reach and meet the overall goal of managing habitat for migratory birds. It would aid refuge staff and provide a cost savings to the Government by reducing labor, equipment, and fuel costs to remove trees. It would help reduce hazardous fuel and fuel load to help prevent or manage wildfires. By managing locations, firewood cutting would not interfere with other wildlife-dependent uses. Temporary disturbance of the

wooded areas may cause minimal disturbance to wildlife in the area but would be necessary to increase quality habitat for migratory birds and other refuge species. It would help promote diverse grass stands, may increase water reserves on the refuge through tree reduction, and provide enhanced nesting habitat for upland birds.

**Mandatory 10-year reevaluation date:
2023**

D.7 Signatures

Submitted by:

Michael Oldham, Project Leader
Quivira National Wildlife Refuge
Stafford, Kansas

Date

Reviewed by:

Barbara Boyle, Refuge Supervisor
U.S. Fish and Wildlife Service, Region 6
National Wildlife Refuge System
Lakewood, Colorado

Date

Approved by:

Matt Hogan, Assistant Regional Director
U.S. Fish and Wildlife Service, Region 6
National Wildlife Refuge System
Lakewood, Colorado

Date

Appendix E

Grassland Fragmentation Assessment

To figure out the optimal distribution and area of grasslands on Quivira National Wildlife Refuge, a quantitative analysis comparing the benefits of current versus potential future grassland area and distribution was conducted on refuge lands and private lands within 2 miles of the refuge boundary using GIS. The analysis was based on the spatial needs of area-sensitive grassland birds reported in the literature and the digital NVCS map of the refuge. Species considered in the analysis are known to occur on the refuge and included upland sandpiper, grasshopper sparrow, bobolink, western meadowlark, and dickcissel (Helzer and Jelinski 1999). It is assumed that meeting the area needs of these species also would result in sufficient area to support other grassland-dependent birds. Further, similar landscape factors such as connectedness (tree cover), road density, and isolation, have been shown to affect certain wetland birds as well (Whited et al. 2000). To assess current benefits, three separate maps were created from the 2008 NVCS data: (1) a coverage of suitable breeding habitats that included all NVCS associations dominated by upland and facultative upland grasses, including areas that now support plum that could be removed by management; (2) neutral habitats that do not provide suitable habitat but are not avoided, which included areas dominated by saltgrass and sedge meadows; and (3) hostile habitats that species avoid, which included trees, roads, croplands, buildings, wetlands greater than 437.45 yards (400 meters) wide, and tall dense plum stands that are expected to persist on the refuge. Roads and trees were buffered by 54.68 yards (50 meters) to account for edge effects (nest parasitism and predation) that negatively affect breeding success (Johnson and Temple 1990, Winter et al. 2000, Herkert et al. 2003). The 54.68-yard (50-meter) buffer may actually be conservative as edge and patch effects vary temporally, spatially, and among species (Bakker et al. 2002; Winter et al. 2006a, 2006b) and some research suggest greater buffer distances (Bollinger and Gavin 2004). The maps of suitable and neutral habitats were combined and intersected with the hostile habitat map to find the area and perimeter-to-area ratio of individual grassland tracts (patches, for example). These metrics were compared to those reported for area-sensitive species to determine the suitability of individual patches.

To determine potential future benefits, the same analysis was conducted with the exception that the planning team identified hostile habitats that could be realistically restored to increase the area of suitable grassland habitat. Treed areas and cropland were the only habitats that met this criterion. County roads and existing buildings could not be removed because of legal and budgetary constraints, respectively, and wetlands greater than 437.45 yards (400 meters) wide and tall dense plum stands could not be removed because they provide important habitats for other species and could not be restored to grasslands. A 54.68-yard (50-meter) buffer was placed around those features that could not be removed or restored, and all trees and agricultural fields that did not occur within the buffer area were removed from the map of hostile habitats. Trees within the buffer were kept because removal would not increase the area of grassland habitat. In addition, treed areas on the perimeter of the refuge were evaluated relative to adjacent habitats on private lands. Treed areas on the refuge that extended onto private land were kept because removal would not substantially increase area of grassland tracts; all other perimeter woody vegetation was removed. A map of historical vegetation that was developed based on ecological site descriptions and historical botanical information (Heitmeyer et al. 2012) was used to assign new habitat types to treed areas and croplands that were slated for removal. These habitat types were then reclassified as either suitable or neutral before the analysis.

The results of the current habitat analysis show the refuge has 41 patches of suitable or neutral habitat that encompass 9,770 acres (44 percent) of grassland. Of these, 11 patches are of sufficient size and have suitable perimeter-to-area ratios necessary to support the area-sensitive species based on measures used in the analysis. However, the composition of most suitable patches are dominated (less than 50 percent) by neutral habitat, suggesting that suitable breeding habitat may be limited within these patches. For example, some patches considered to be of suitable size were dominated by saltgrass, which does not provide the plant height or litter depth necessary for nesting species in the analysis.

In comparison, the analysis of potential future habitats shows appropriate management could dra-

matically improve grassland habitats for area-sensitive grassland species and, therefore, other grassland-dependent birds. Restoration of designated treed areas (about 850 acres) and agricultural fields (about 866 acres) to historical habitat types would result in 12 grassland patches, 9 of which would be more than 500 acres and 6 more than 1,000 acres with lower perimeter-to-area ratios (less edge) that exceed the needs for the species considered in the analysis. Furthermore, 5 of the 6 patches that are greater than 1,000 acres would have more than 50 percent of the habitat area suitable for breeding grassland birds.

E.1 Current Conditions: 54.68-Yard Analysis

Black areas in figure 22 are hostile to grassland birds, as defined by: area within 54.68 yards (50 meters) of all tress, agricultural fields, primary roads, wetlands greater than 437.45 yards (400 meters) across, and plum stands not expected to change because of various management constraints. Total acres are 9,770, or about 44 percent of the refuge.

Current suitable habitat for grassland birds includes: grasslands, including meadows and sandhills, and plum. Total acres are 5,633, or about 25 percent of the refuge.

Current nonsuitable habitat for grassland birds includes tall emergents, saltgrass, water, salt flats and bare areas, secondary roads, and prairie dog towns. Total acres are 6,739, or about 30 percent of the refuge.

Black areas in figure 22 are hostile to grassland birds, as defined by: area within 54.68 yards (50 meters) around remaining trees, primary roads, wetlands greater than 437.45 yards (400 meters) across, and plum stands not expected to change because of various management constraints. Total acres are 4,138, or about 18.6 percent of the refuge.

Future, suitable, habitat for grassland birds by removing trees and restoring agricultural fields totals 9,780 acres, or about 40 percent of the refuge.

Current nonsuitable habitat for grassland birds includes: tall emergents, saltgrass, water salt flats and bare areas, secondary roads, and prairie dog towns. Total acres are 8,222, or about 37 percent of the refuge.

E.3 Current Conditions: 54.68-Yard Analysis of Patches Greater Than 1 Acre

Current patches of nonhostile habitats were created by dissolving features labeled as suitable or nonsuitable. Forty one patches greater than one acre are shown on figure 23. Perimeter-to-area ratios were computed for each patch. White space is area hostile to grassland birds.

E.4 Future Conditions: 54.68-Yard Analysis of Patches Greater Than 1 Acre

Future patches of nonhostile habitats were created by dissolving features labeled as suitable or nonsuitable. Patches were expanded from current conditions by restoring agricultural fields and removing most, but not all, trees. The result is twelve patches greater than one acre. Perimeter-to-area ratios were computed for each patch. White space is remaining area hostile to grassland birds.

E.5 Summary

If we choose to remove 850 acres of trees and restore 886 acres of agricultural fields to native habitats at Quivira Refuge over the next 15 years, the resulting gain in suitable grassland bird habitat would be approximately 4,163 acres—3,845 acres of grassland and 318 acres of plum. We propose to leave 125 acres of trees in 13 patches ranging in size from less than 1 acre to 21 acres.

Even after restoration activities, approximately 19 percent of the refuge would remain hostile to grassland birds, primarily because of the Big Salt Marsh, the Little Salt Marsh, and the presence of primary roads, which would not change.

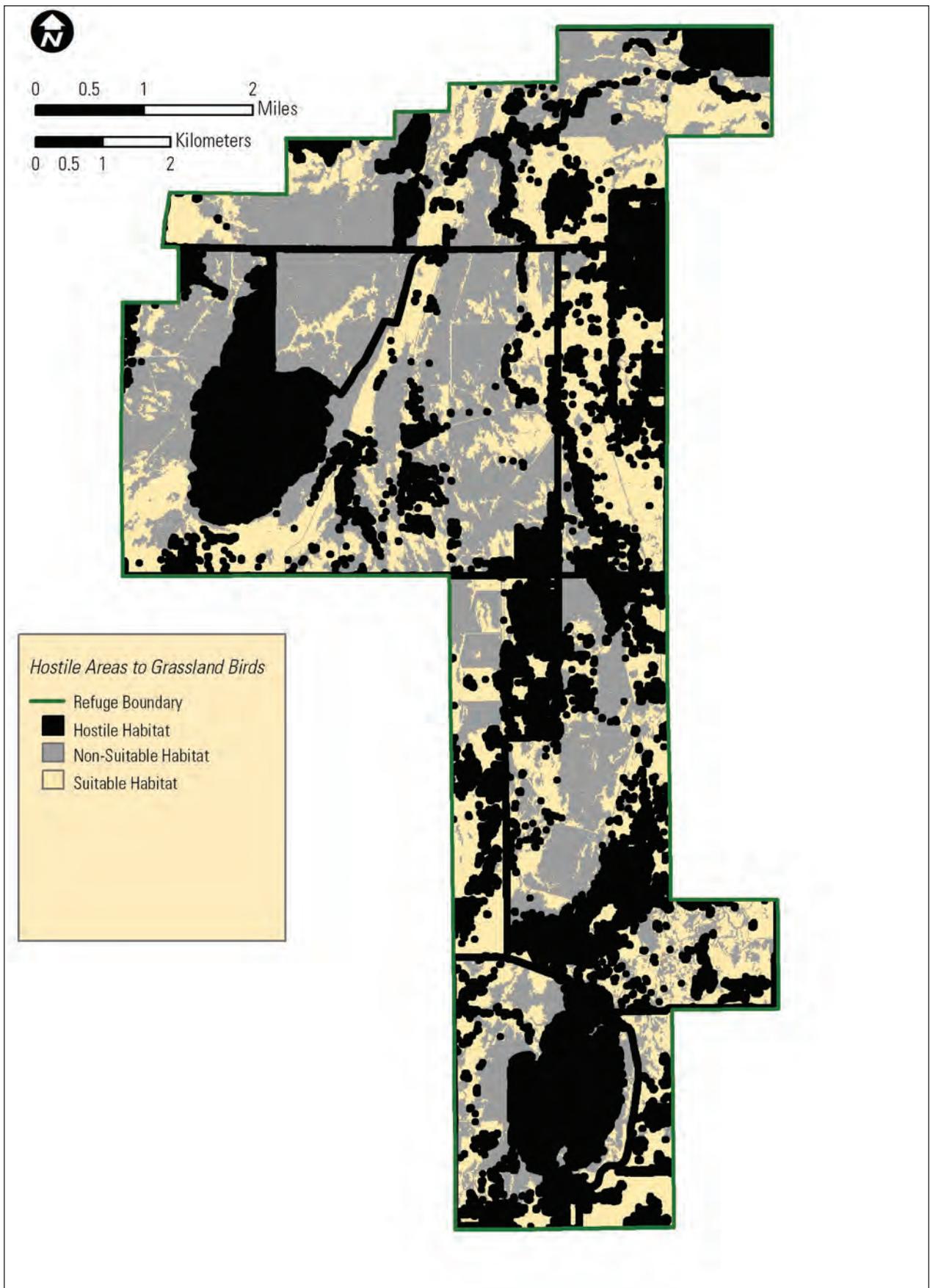


Figure 21. Current grassland conditions at Quivira National Wildlife Refuge, Kansas.

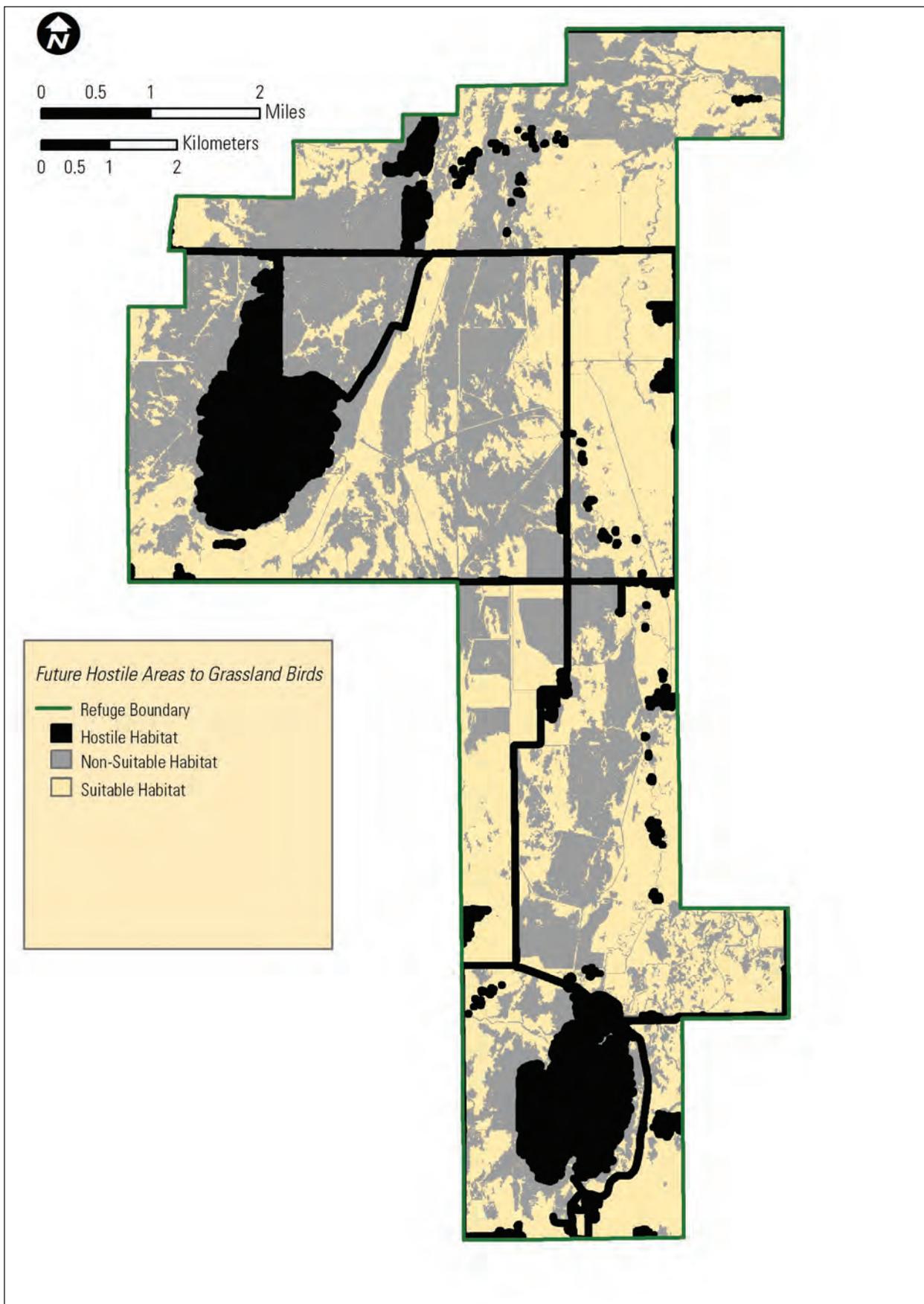


Figure 22. Future grassland conditions at Quivira National Wildlife Refuge, Kansas.

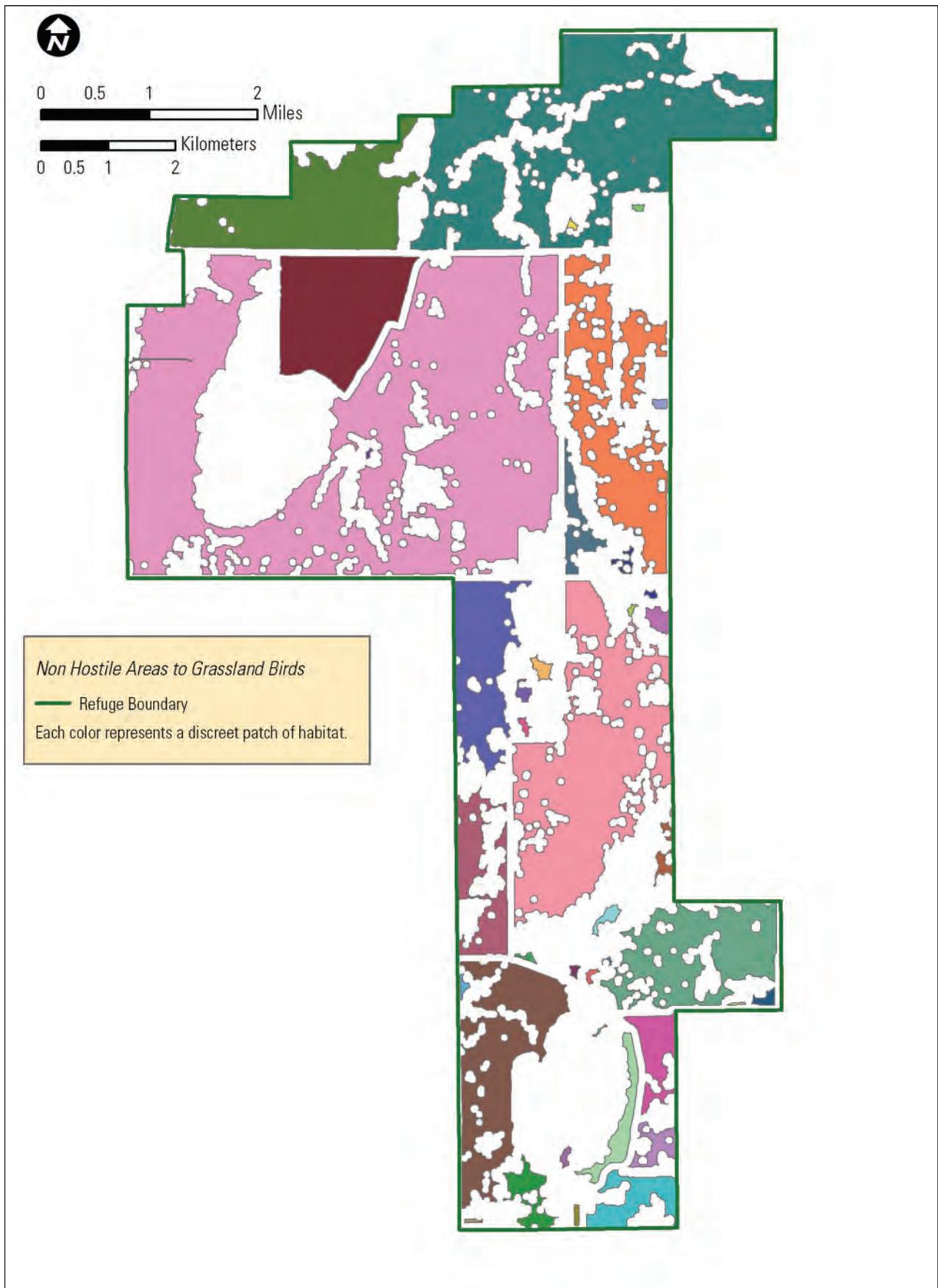


Figure 23. Current nonhostile grassland conditions at Quivira National Wildlife Refuge, Kansas.

Appendix F

Species Lists

This appendix contains the common and scientific names of animals and plants of the Quivira National Wildlife Refuge.

F.1 List of Bird Species

These are the bird species found on Quivira Refuge.

Common name	Scientific name	Spring March– May	Summer June– August	Fall September– November	Winter December– February
Ducks, Geese, and Swans					
Black-bellied Whistling-Duck	<i>Dendrocygna autumnalis</i>		accidental		
Fulvous Whistling-Duck	<i>Dendrocygna bicolor</i>		accidental		
Greater White-fronted Goose	<i>Anser albifrons</i>	common	rare	common	common
Snow Goose	<i>Chen caerulescens</i>	common	rare	common	common
Ross's Goose	<i>Chen rossii</i>	uncommon		uncommon	uncommon
Brant	<i>Branta bernicla</i>	accidental			
Cackling Goose	<i>Branta hutchinsii</i>	common	rare	common	common
Canada Goose*	<i>Branta canadensis</i>	common	common	common	common
Trumpeter Swan	<i>Cygnus buccinator</i>	occasional		occasional	occasional
Tundra Swan	<i>Cygnus columbianus</i>	occasional		occasional	occasional
Wood Duck*	<i>Aix sponsa</i>	common	common	common	occasional
Gadwall*	<i>Anas strepera</i>	common	uncommon	common	occasional
Eurasian Wigeon	<i>Anas penelope</i>	accidental			
American Wigeon*	<i>Anas americana</i>	common	uncommon	common	occasional
American Black Duck	<i>Anas rubripes</i>	rare	rare	rare	rare
Mallard*	<i>Anas platyrhynchos</i>	common	common	common	common
Mottled Duck	<i>Anas fulvigula</i>	rare	rare	rare	
Blue-winged Teal*	<i>Anas discors</i>	common	common	common	
Cinnamon Teal	<i>Anas cyanoptera</i>	uncommon	rare	occasional	rare
Northern Shoveler*	<i>Anas clypeata</i>	common	uncommon	common	uncommon
Northern Pintail*	<i>Anas acuta</i>	common	uncommon	common	common
Green-winged Teal*	<i>Anas crecca</i>	common	occasional	common	uncommon
Canvasback*	<i>Aythya valisineria</i>	common	occasional	common	uncommon
Redhead*	<i>Aythya americana</i>	common	occasional	common	uncommon
Ring-necked Duck	<i>Aythya collaris</i>	common	occasional	common	uncommon
Greater Scaup	<i>Aythya marila</i>	occasional		occasional	occasional
Lesser Scaup*	<i>Aythya affinis</i>	common	occasional	common	uncommon
Surf Scoter	<i>Melanitta perspicillata</i>	accidental			

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White-winged Scoter	<i>Melanitta fusca</i>	accidental			
Black Scoter	<i>Melanitta Americana</i>	accidental			
Long-tailed Duck	<i>Clangula hyemalis</i>	rare		rare	rare
Bufflehead	<i>Bucephala albeola</i>	uncommon		common	common
Common Goldeneye	<i>Bucephala clangula</i>	common		common	common
Barrow's Goldeneye	<i>Bucephala ialandica</i>	accidental			
Hooded Merganser*	<i>Laphodytes cucullatus</i>	uncommon	rare	uncommon	uncommon
Common Merganser	<i>Mergus merganser</i>	uncommon		rare	common
Red-breasted Merganser	<i>Mergus serrator</i>	rare		occasional	rare
Ruddy Duck*	<i>Oxyura jamaicensis</i>	common	uncommon	common	uncommon
Grouse and Quail					
Ring-necked Pheasant*	<i>Phasianus colchicus</i>	common	common	common	common
Greater Prairie-Chicken*	<i>Tympanuchus cupido</i>	rare	rare	rare	rare
Wild Turkey*	<i>Melagris gallopavo</i>	common	common	common	common
Northern Bobwhite*	<i>Colinus virginianus</i>	uncommon	uncommon	uncommon	uncommon
Loons and Grebes					
Common Loon	<i>Gavia immer</i>	occasional	rare	occasional	rare
Pied-billed Grebe*	<i>Podilymbus podiceps</i>	common	common	common	occasional
Horned Grebe	<i>Podiceps auritus</i>	uncommon		uncommon	occasional
Red-necked Grebe	<i>Podiceps grisegena</i>	accidental			
Eared Grebe*	<i>Podiceps nigricollis</i>	common	occasional	common	rare
Western Grebe	<i>Aechmophorus occidentalis</i>	occasional	rare	occasional	rare
Clark's Grebe	<i>Aechmophorus clarkii</i>	accidental			
Pelicans and Miscellaneous					
American Flamingo	<i>Phoenicopterus ruber</i>	accidental			
Neotropic Cormorant	<i>Phalacrocorax brasilianus</i>	occasional	occasional	rare	
Double-crested Cormorant*	<i>Phalacrocorax auritus</i>	common	common	common	occasional
American White Pelican	<i>Pelecanus erythrorhynchos</i>	common	common	common	occasional
Brown Pelican	<i>Pelecanus accidentalis</i>	accidental			
Hérons, Egrets, and Ibis					
American Bittern*	<i>Botaurus lentiginosus</i>	uncommon	uncommon	uncommon	occasional
Least Bittern*	<i>Ixobrychus exilis</i>	occasional	uncommon	occasional	
Great Blue Heron*	<i>Ardea herodias</i>	common	common	common	uncommon
Great Egret*	<i>Ardea alba</i>	common	common	common	
Snowy Egret*	<i>Egretta thula</i>	common	common	common	
Little Blue Heron*	<i>Egretta caerulea</i>	uncommon	uncommon	occasional	
Tricolored Heron*	<i>Egretta tricolor</i>	rare	rare		
Reddish Egret	<i>Egretta rufescens</i>	accidental			
Cattle Egret*	<i>Bubulcus ibis</i>	common	common	common	
Green Heron*	<i>Butorides virescens</i>	uncommon	uncommon	occasional	
Black-crowned Night-Heron*	<i>Nycticorax nycticorax</i>	common	common	common	rare

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Yellow-crowned Night-Heron*	<i>Nyctanassa violacea</i>	uncommon	uncommon	occasional	
White Ibis	<i>Eudocimus albus</i>	rare	rare		
Glossy Ibis	<i>Plegadis falcinellus</i>	rare	rare	rare	
White-faced Ibis*	<i>Plegadis chihi</i>	common	common	common	rare
Roseate Spoonbill	<i>Platalea ajaja</i>	accidental			
Wood Stork	<i>Mycteria americana</i>	accidental			
Birds of Prey					
Turkey Vulture*	<i>Cathartes aura</i>	uncommon	uncommon	uncommon	
Osprey	<i>Pandion haliaetus</i>	occasional	rare	occasional	
Mississippi Kite*	<i>Ictinia mississippiensis</i>	uncommon	uncommon	occasional	
Bald Eagle*	<i>Haliaeetus leucocephalus</i>	uncommon	uncommon	uncommon	common
Northern Harrier*	<i>Circus cyaneus</i>	common	occasional	common	common
Sharp-shinned Hawk	<i>Accipiter striatus</i>	uncommon		occasional	uncommon
Cooper's Hawk*	<i>Accipiter cooperii</i>	uncommon	occasional	uncommon	uncommon
Northern Goshawk	<i>Accipiter gentilis</i>			rare	rare
Red-shouldered Hawk	<i>Buteo lineatus</i>			rare	
Broad-winged Hawk	<i>Buteo platypterus</i>			rare	
Swainson's Hawk*	<i>Buteo swainsoni</i>	common	common	occasional	
Red-tailed Hawk*	<i>Buteo jamaicensis</i>	common	common	common	common
Ferruginous Hawk	<i>Buteo regalis</i>	occasional		rare	occasional
Rough-legged Hawk	<i>Buteo lagopus</i>	uncommon		rare	uncommon
Golden Eagle	<i>Aquila chrysaetos</i>	occasional		occasional	occasional
American Kestrel*	<i>Falco sparverius</i>	common	uncommon	common	uncommon
Merlin	<i>Falco columbarius</i>	occasional	rare	uncommon	uncommon
Peregrine Falcon	<i>Falco peregrinus</i>	occasional	occasional	occasional	occasional
Prairie Falcon	<i>Falco mexicanus</i>	rare	rare	occasional	occasional
Rails and Cranes					
Yellow Rail	<i>Coturnicops noveboracensis</i>	accidental			
Black Rail*	<i>Laterallus jamailaris</i>	uncommon	uncommon	rare	
King Rail*	<i>Rallus elegans</i>	uncommon	uncommon	rare	rare
Virginia Rail*	<i>Rallus limicola</i>	common	common	uncommon	occasional
Sora*	<i>Prozana carolina</i>	common	uncommon	common	
Common Moorhen*	<i>Gallinula chloropus</i>	uncommon	uncommon	occasional	
American Coot*	<i>Fulica americana</i>	common	common	common	uncommon
Sandhill Crane	<i>Grus canadensis</i>	common		common	occasional
Common Crane	<i>Grus grus</i>	accidental			
Whooping Crane	<i>Grus americana</i>	occasional		occasional	rare
Shorebirds					
Black-bellied Plover	<i>Pluvialis squatarola</i>	uncommon	uncommon	uncommon	rare
American Golden-Plover	<i>Pluvialis dominica</i>	uncommon	occasional	uncommon	
Snowy Plover*	<i>Charadrius alexandrinus</i>	common	common	common	
Wilson's Plover	<i>Charadrius wilsonia</i>	accidental			

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Semipalmated Plover	<i>Charadrius semipalmatus</i>	common	uncommon	common	
Piping Plover	<i>Charadrius melodus</i>	uncommon	occasional	occasional	
Killdeer*	<i>Charadrius vociferis</i>	common	common	common	occasional
Mountain Plover	<i>Charadrius montanus</i>	rare		rare	
Black-Necked Stilt*	<i>Himantopus mexicanus</i>	common	common	uncommon	
American Avocet*	<i>Recurvirostra americana</i>	common	common	common	
Spotted Sandpiper*	<i>Actitis macularius</i>	common	uncommon	common	
Solitary Sandpiper	<i>Tringa solitaria</i>	uncommon	uncommon	occasional	
Greater Yellowlegs	<i>Tringa melanoleuca</i>	common	common	common	occasional
Willet	<i>Tringa semipalmata</i>	uncommon	uncommon	uncommon	
Lesser Yellowlegs	<i>Tringa flavipes</i>	common	common	common	rare
Upland Sandpiper*	<i>Bartramia longicauda</i>	common	occasional	occasional	
Whimbrel	<i>Numenius phaeopus</i>	occasional	occasional	occasional	
Long-billed Curlew	<i>Numenius americanus</i>	occasional	occasional	occasional	
Hudsonian Godwit	<i>Limosa haemastica</i>	uncommon	rare	uncommon	
Marbled Godwit	<i>Limosa fedoa</i>	uncommon	uncommon	uncommon	
Ruddy Turnstone	<i>Arenaria interpres</i>	occasional	occasional	occasional	
Red Knot	<i>Calidris canutus</i>	rare	rare	rare	
Sanderling	<i>Calidris alba</i>	occasional	occasional	occasional	
Semipalmated Sandpiper	<i>Calidris pusilla</i>	common	common	common	
Western Sandpiper	<i>Calidris mauri</i>	common	common	common	
Least Sandpiper	<i>Calidris minutilla</i>	common	common	common	
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	common	common	uncommon	
Baird's Sandpiper	<i>Calidris bairdii</i>	common	common	common	
Red-necked Stint	<i>Calidris ruficollis</i>	accidental			
Pectoral Sandpiper	<i>Calidris melantos</i>	uncommon	uncommon	uncommon	
Dunlin	<i>Calidris alpina</i>	uncommon	occasional	uncommon	rare
Curlew Sandpiper	<i>Calidris ferruginea</i>	accidental			
Stilt Sandpiper	<i>Calidris himantopus</i>	common	common	common	
Buff-breasted Sandpiper	<i>Tryngites subruficollis</i>	occasional	rare	uncommon	
Ruff	<i>Philmachus pugnax</i>	rare	rare		
Short-billed Dowitcher	<i>Limnodromus griseus</i>	uncommon	uncommon	occasional	
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	common	common	common	
Wilson's Snipe	<i>Gallinago delicata</i>	uncommon	rare	uncommon	occasional
American Woodcock	<i>Scolopax minor</i>	rare		rare	
Wilson's Phalarope*	<i>Phalaropus tricolor</i>	common	common	common	
Red-necked Phalarope	<i>Phalaropus lobatus</i>	occasional	rare	occasional	
Red Phalarope	<i>Phalaropus fulicarius</i>	rare		rare	
Gulls and Terns					
Black-legged Kittiwake	<i>Rissa tridactyla</i>	accidental			
Sabine's Gull	<i>Xema sabini</i>	rare	rare	rare	
Bonaparte's Gull	<i>Chroicocephalus philadelphia</i>	occasional	rare	occasional	occasional
Laughing Gull	<i>Leucophaeus atricilla</i>	rare	occasional	rare	

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Franklin's Gull	<i>Leucophaeus pipixcan</i>	common	uncommon	common	rare
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	accidental			
Ring-billed Gull	<i>Larus delawarensis</i>	common	uncommon	common	uncommon
California Gull	<i>Larus californicus</i>	accidental			
Herring Gull	<i>Larus argentatus</i>	occasional		occasional	occasional
Lesser Black-backed Gull	<i>Larus fuscus</i>	accidental			
Least Tern*	<i>Sternula antillarum</i>	uncommon	uncommon	occasional	
Gull-billed Tern	<i>Gelochelidon nilotica</i>	accidental			
Caspian Tern	<i>Hydroprogne caspia</i>	rare	rare	rare	
Black Tern*	<i>Chidonias niger</i>	common	common	uncommon	
Common Tern	<i>Sterna hirundo</i>	occasional	occasional	occasional	
Arctic Tern	<i>Sterna paradisaea</i>	accidental			
Forster's Tern*	<i>Sterna forsteri</i>	common	common	occasional	
Parasitic Jaeger	<i>Stercorarius parasiticus</i>		rare	rare	
Pigeons and Doves					
Rock Pigeon*	<i>Columba livia</i>	rare	rare	rare	rare
Eurasian Collared-Dove*	<i>Streptopelia decaocto</i>	occasional	occasional	occasional	occasional
White-winged Dove	<i>Zenaidura macroura</i>	accidental			
Mourning Dove*	<i>Zenaidura macroura</i>	common	common	common	occasional
Yellow-billed Cuckoo*	<i>Coccyzus americanus</i>	occasional	uncommon	rare	
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	rare	rare		
Greater Roadrunner	<i>Geococcyx californianus</i>	rare	rare	rare	rare
Owls					
Barn Owl*	<i>Tyto alba</i>	occasional	occasional	occasional	occasional
Eastern Screech-Owl*	<i>Megascops asio</i>	uncommon	uncommon	uncommon	uncommon
Great Horned Owl*	<i>Bubo virginianus</i>	common	common	common	common
Snowy Owl	<i>Bubo scandiacus</i>			rare	rare
Burrowing Owl*	<i>Athene cunicularia</i>	rare	rare	rare	
Barred Owl	<i>Strix varia</i>	occasional	occasional	occasional	occasional
Long-eared Owl*	<i>Asio otus</i>	rare	rare	rare	rare
Short-eared Owl*	<i>Asio flammeus</i>	rare		rare	occasional
Northern Saw-whet Owl	<i>Aegolius acadicus</i>	accidental			
Nightjars and Miscellaneous					
Common Nighthawk*	<i>Chordeiles minor</i>	uncommon	common	uncommon	
Common Poor-will	<i>Phalaenoptilus nuttallii</i>	rare	rare		
Chuck-will's-widow*	<i>Caprimulgus carolinensis</i>	occasional	occasional		
Whip-poor-will	<i>Caprimulgus vociferus</i>	accidental			
Chimney Swift*	<i>Chaetura pelagica</i>	uncommon	uncommon	uncommon	
Ruby-throated Hummingbird	<i>Archilochus colubris</i>	occasional	occasional	occasional	
Belted Kingfisher	<i>Megaceryle alcyon</i>	uncommon	uncommon	uncommon	occasional
Woodpeckers					
Red-headed Woodpecker*	<i>Melanerpes erythrocephalus</i>	common	common	common	

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Red-bellied Woodpecker*	<i>Melanerpes carolines</i>	uncommon	uncommon	uncommon	uncommon
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	rare		rare	rare
Downy Woodpecker*	<i>Picoides pubescens</i>	uncommon	uncommon	uncommon	uncommon
Hairy Woodpecker*	<i>Picoides villosus</i>	uncommon	uncommon	uncommon	uncommon
Northern Flicker*	<i>Colaptes auratus</i>	common	common	common	common
Flycatchers					
Olive-sided Flycatcher	<i>Contopus cooperi</i>	occasional		occasional	
Eastern Wood-Pewee*	<i>Contopus virens</i>	uncommon	uncommon	occasional	
Willow Flycatcher	<i>Empidonax trailli</i>	occasional		occasional	
Least Flycatcher	<i>Empidonax minimus</i>	uncommon		uncommon	
Eastern Phoebe*	<i>Sayornis phoebe</i>	uncommon	uncommon	uncommon	occasional
Say's Phoebe	<i>Sayornis saya</i>	occasional		occasional	
Great Crested Flycatcher*	<i>Myiarchus crinitus</i>	uncommon	uncommon	occasional	
Cassin's Kingbird	<i>Tyrannus vociferans</i>	accidental			
Western Kingbird*	<i>Tyrannus verticalis</i>	common	common	uncommon	
Eastern Kingbird*	<i>Tyrannus tyrannus</i>	common	common	uncommon	
Scissor-tailed Flycatcher*	<i>Tyrannus forficatus</i>	occasional	occasional	occasional	
Shrikes and Vireos					
Loggerhead Shrike*	<i>Lanius ludovicianus</i>	uncommon	uncommon	uncommon	uncommon
Northern Shrike	<i>Lanius excubitor</i>	rare		occasional	occasional
Bell's Vireo*	<i>Vireo bellii</i>	uncommon	uncommon	occasional	
Yellow-throated Vireo	<i>Vireo flavifrons</i>	accidental			
Blue-headed Vireo	<i>Vireo solitarius</i>	accidental			
Warbling Vireo*	<i>Vireo gilvus</i>	uncommon	uncommon	uncommon	
Philadelphia Vireo	<i>Vireo philadelphicus</i>	accidental			
Red-eyed Vireo*	<i>Vireo olivaceus</i>	occasional	occasional	rare	
Corvids					
Blue Jay*	<i>Cyanocitta cristata</i>	common	common	uncommon	occasional
Western Scrub Jay	<i>Aphelocoma californica</i>	accidental			
Black-billed Magpie	<i>Pica hudsonia</i>	rare	rare	rare	rare
American Crow*	<i>Corvus brachyrhynchos</i>	common	occasional	common	occasional
Larks					
Horned Lark*	<i>Eremophila alpestris</i>	occasional	occasional	occasional	occasional
Swallows					
Purple Martin*	<i>Progne subis</i>	occasional	occasional		
Tree Swallow*	<i>Tachycineta bicolor</i>	common	common	uncommon	
Violet-green Swallow	<i>Tachycineta thalassina</i>	accidental			
Northern Rough-winged Swallow*	<i>Stelgidopteryx serripennis</i>	uncommon	occasional	occasional	
Bank Swallow*	<i>Riparia riparia</i>	common	common	uncommon	
Cliff Swallow*	<i>Petrochelidon pyrrhonota</i>	common	common	common	
Barn Swallow*	<i>Hirundo rustica</i>	common	common	common	
Parids, Wrens, and Miscellaneous					

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Carolina Chickadee	<i>Poecile carolinensis</i>	accidental			
Black-capped Chickadee*	<i>Poecile atricapillus</i>	occasional	occasional	occasional	occasional
Tufted Titmouse	<i>Bacolopus bicolor</i>	rare		occasional	occasional
Red-breasted Nuthatch	<i>Sitta canadensis</i>	rare		rare	rare
White-breasted Nuthatch*	<i>Sitta carolinensis</i>	uncommon	uncommon	uncommon	uncommon
Brown Creeper	<i>Certhia americana</i>	rare		occasional	occasional
Rock Wren	<i>Salpinctes obsoletus</i>	occasional		occasional	
Carolina Wren*	<i>Thryothorus ludovicianus</i>	occasional	occasional	occasional	occasional
Bewick's Wren*	<i>Thryomanes bewickii</i>	rare	rare		
House Wren*	<i>Troglodytes aedon</i>	common	common	uncommon	
Winter Wren	<i>Troglodytes hiemalis</i>	rare		occasional	occasional
Sedge Wren	<i>Cistothorus platensis</i>	occasional	occasional	occasional	
Marsh Wren	<i>Cistothorus palustris</i>	uncommon		uncommon	uncommon
Blue-gray Gnatcatcher*	<i>Polioptila caerulea</i>	uncommon	uncommon	occasional	
Golden-crowned Kinglet	<i>Regulus satrapa</i>	uncommon		uncommon	uncommon
Ruby-crowned Kinglet	<i>Regulus calendula</i>	uncommon		uncommon	occasional
Thrushes, Pipits, Waxwings, and Miscellaneous					
Eastern Bluebird*	<i>Sialia sialis</i>	common	common	common	uncommon
Mountain Bluebird	<i>Sialia currucoides</i>	rare		rare	rare
Townsend's Solitaire	<i>Myadestes townsendi</i>	rare		rare	rare
Veery	<i>Catharus fuscescens</i>	accidental			
Gray-cheeked Thrush	<i>Catharus minimus</i>	accidental			
Swainson's Thrush	<i>Catharus ustulatus</i>	occasional		occasional	
Hermit Thrush	<i>Catharus guttatus</i>	accidental			
Wood Thrush	<i>Hylocichla mustelina</i>	rare			
American Robin*	<i>Turdus migratorius</i>	common	common	common	uncommon
Gray Catbird*	<i>Dumetella carolinensis</i>	common	common	occasional	
Northern Mockingbird*	<i>Mimus polyglottos</i>	occasional	occasional	occasional	occasional
Brown Thrasher*	<i>Toxostoma rufum</i>	common	common	occasional	rare
European Starling*	<i>Sturnus vulgaris</i>	common	common	common	common
American Pipit	<i>Anthus rubescens</i>	uncommon		uncommon	
Sprague's Pipit	<i>Anthus spragueii</i>	rare		rare	
Bohemian Waxwing	<i>Bombycilla garrulus</i>	accidental			
Cedar Waxwing	<i>Bombycilla cedrorum</i>	occasional	occasional	occasional	occasional
Longspurs					
McCown's Longspur	<i>Rhynchophanes mccownii</i>	accidental			
Lapland Longspur	<i>Calcarius lapponicus</i>	rare		occasional	uncommon
Smith's Longspur	<i>Calcarius pictus</i>	accidental			
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	rare			rare
Snow Bunting	<i>Plectrophenax nivalis</i>	accidental			
Wood Warblers					
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	accidental			

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Tennessee Warbler	<i>Oreothlypis peregrina</i>	occasional			
Orange-crowned Warbler	<i>Oreothlypis celata</i>	uncommon		uncommon	
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	occasional		occasional	
Northern Parula	<i>Parula pitiayumi</i>	accidental			
Yellow Warbler*	<i>Dendroica petechia</i>	uncommon	uncommon	occasional	
Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	accidental			
Magnolia Warbler	<i>Dendroica magnolia</i>	accidental			
Black-throated Blue Warbler	<i>Dendroica caerulescens</i>	accidental			
Yellow-rumped Warbler	<i>Dendroica coronata</i>	common		common	uncommon
Black-throated Green Warbler	<i>Dendroica virens</i>	rare		rare	
Blackburnian Warbler	<i>Dendroica fusca</i>	accidental			
Palm Warbler	<i>Dendroica palmarum</i>	occasional			
Blackpoll Warbler	<i>Dendroica striata</i>	rare			
Cerulean Warbler	<i>Dendroica cerulea</i>	accidental			
Black-and-White Warbler	<i>Mniotilta varia</i>	rare		rare	
American Redstart	<i>Setophaga ruticilla</i>	occasional		occasional	
Prothonotary Warbler	<i>Protonotaria citrea</i>	accidental			
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	accidental			
Ovenbird	<i>Seiurus aurocapilla</i>	accidental			
Northern Waterthrush	<i>Parkesia novboracensis</i>	occasional			
Mourning Warbler	<i>Oporornis philadelphia</i>	accidental			
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	accidental			
Common Yellowthroat*	<i>Geothlypis trichas</i>	common	common	uncommon	occasional
Wilson's Warbler	<i>Wilsonia pusilla</i>	occasional		occasional	
Canada Warbler	<i>Wilsonia canadensis</i>	accidental			
Painted Redstart	<i>Myioborus pictus</i>	accidental			
Yellow-breasted Chat*	<i>Icteria virens</i>	occasional	rare	rare	
Sparrows and Towhees					
Spotted Towhee	<i>Pipilo maculatus</i>	common		common	rare
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	accidental			
Cassin's Sparrow	<i>Peucaea cassinii</i>	rare			
American Tree Sparrow	<i>Spizella arborea</i>	uncommon		common	common
Chipping Sparrow	<i>Spizella passerina</i>	common	rare	common	
Clay-colored Sparrow	<i>Spizella pallida</i>	common		common	
Field Sparrow*	<i>Spizella pusilla</i>	common	uncommon	common	uncommon
Vesper Sparrow	<i>Poocetes gramineus</i>	common	rare	common	
Lark Sparrow*	<i>Chondestes grammacus</i>	common	uncommon	occasional	
Lark Bunting	<i>Calamospiza melanocrys</i>	occasional	rare	occasional	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	common		common	occasional
Grasshopper Sparrow*	<i>Ammodramus savannarum</i>	uncommon	uncommon	uncommon	
Henslow's Sparrow	<i>Ammodramus henslowii</i>	accidental			
Le Conte's Sparrow	<i>Ammodramus leconteii</i>	occasional		occasional	rare

<i>Common name</i>	<i>Scientific name</i>	<i>Spring March– May</i>	<i>Summer June– August</i>	<i>Fall September– November</i>	<i>Winter December– February</i>
Nelson's Sharp-tailed Sparrow	<i>Ammodramus nelsoni</i>	occasional		occasional	
Fox Sparrow	<i>Passerella iliaca</i>	uncommon		uncommon	uncommon
Song Sparrow	<i>Melospiza melodia</i>	common		common	common
Lincoln's Sparrow	<i>Melospiza lincolni</i>	uncommon		uncommon	rare
Swamp Sparrow	<i>Melospiza georgiana</i>	uncommon		uncommon	uncommon
White-throated Sparrow	<i>Zonotrichia albicollis</i>	uncommon		uncommon	occasional
Harris's Sparrow	<i>Zonotrichia querula</i>	common	rare	common	common
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	uncommon		uncommon	occasional
Golden-crowned Sparrow	<i>Zonotrichia atricapilla</i>	accidental			
Dark-eyed Junco	<i>Junco hyemalis</i>	common		common	common
Summer Tanager	<i>Piranga ruba</i>		rare		
Scarlet Tanager	<i>Piranga olivacea</i>	accidental			
Grosbeaks and Buntings					
Northern Cardinal*	<i>Cardinalis cardinalis</i>	uncommon	uncommon	uncommon	uncommon
Pyrrhuloxia	<i>Cardinalis sinuatus</i>	accidental			
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	occasional			
Black-headed Grosbeak*	<i>Pheucticus melanocephalis</i>	occasional	rare		
Blue Grosbeak*	<i>Passerina caerulea</i>	uncommon	uncommon	rare	
Lazuli Bunting	<i>Passerina ameona</i>	rare			
Indigo Bunting*	<i>Passerina cyanea</i>	uncommon	occasional	rare	
Painted Bunting	<i>Passerina ciris</i>	accidental			
Dickcissel*	<i>Spiza americana</i>	common	common	rare	
Blackbirds and Allies					
Bobolink*	<i>Dolichonyx oryzivorus</i>	uncommon	uncommon		
Red-winged Blackbird*	<i>Agelaius phoeniceus</i>	common	common	common	common
Eastern Meadowlark*	<i>Sturnella magna</i>	common	common	common	common
Western Meadowlark*	<i>Sturnella neglecta</i>	uncommon	occasional	uncommon	common
Yellow-headed Blackbird*	<i>Xanthocephalus xanthocephalus</i>	common	common	uncommon	rare
Rusty Blackbird	<i>Euphagus carolinus</i>	accidental			
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	occasional	occasional	occasional	occasional
Common Grackle*	<i>Quiscalus quiscula</i>	common	occasional	common	occasional
Great-tailed Grackle*	<i>Quiscalus mexicanus</i>	uncommon	uncommon	uncommon	rare
Brown-headed Cowbird*	<i>Molothrus oryzivorus</i>	common	common	uncommon	uncommon
Orchard Oriole*	<i>Icterus spurius</i>	common	common	occasional	
Bullock's Oriole	<i>Icterus bullockii</i>	accidental			
Baltimore Oriole*	<i>Icterus galbula</i>	common	common	occasional	
Finches					
Purple Finch	<i>Carpodacus purpureus</i>	occasional		rare	occasional
House Finch*	<i>Carpodacus mexicanus</i>	occasional	occasional	occasional	occasional
Common Redpoll	<i>Acanthis flammea</i>	accidental			
Pine Siskin	<i>Spinus pinus</i>	occasional		occasional	occasional
American Goldfinch*	<i>Spinus tristis</i>	common	common	common	common

<i>Common name</i>	<i>Scientific name</i>	<i>Spring March– May</i>	<i>Summer June– August</i>	<i>Fall September– November</i>	<i>Winter December– February</i>
Evening Grosbeak	<i>Coccothraustes verpertines</i>	accidental			
House Sparrow*	<i>Passer domesticus</i>	occasional	occasional	occasional	occasional

* Reported nesting on refuge.

NOTE: Abundance is indicated as follows: common (certain to be seen in suitable habitat), uncommon (present, but not certain to be seen), occasional (seen a few times during season), rare (seen every 2–5 years).

F.2 List of Fish Species

These are the fish species found on Quivira Refuge.

<i>Common name</i>	<i>Scientific name</i>
Bass, Largemouth	<i>Micropterus salmoides</i>
Bluegill	<i>Lepomis macrochirus</i>
Bullhead, Black	<i>Ictalurus melas</i>
Bullhead, Yellow	<i>Ictalurus natalis</i>
Carp	<i>Cyrinus carpio</i>
Carp sucker, River	<i>Carpionodes carpio</i>
Catfish, Channel	<i>Ictalurus punctatus</i>
Catfish, Flathead	<i>Pylodictis olivaris</i>
Crappie, Black	<i>Pomoxis nigromaculatus</i>
Crappie, White	<i>Pomoxis annularis</i>
Darter, Arkansas	<i>Etheostoma cragini</i>
Goldfish	<i>Carassius auratus</i>
Killifish, Plains	<i>Fundulus kansae</i>
Minnow, Fathead	<i>Pimephales promelas</i>
Minnow, Plains	<i>Hybognathus placitus</i>
Minnow, Suckermouth	<i>Phenacobius mirabilis</i>
Mosquitofish	<i>Gambusia affinis</i>
Shiner, Red	<i>Notropis lutrensis</i>
Shiner, Sand	<i>Notropis stramineus</i>
Sunfish, Green	<i>Lepomis cyanellus</i>
Sunfish, Orangespotted	<i>Lepomis humilis</i>

F.3 List of Mammal Species

These are the mammal species found on Quivira Refuge.

<i>Common name</i>	<i>Scientific name</i>
Armadillo, Nine-banded	<i>Dasypus novemcinctus</i>
Badger, American	<i>Taxidea taxus</i>
Beaver, American	<i>Castor canadensis</i>
Bobcat	<i>Lynx rufus</i>
Cottontail, Eastern	<i>Sylvilagus floridanus</i>
Coyote	<i>Canis latrans</i>
Deer, Mule	<i>Odocoileus hemionus</i>
Deer, White-tailed	<i>Odocoileus virginianus</i>
Fox, Red	<i>Vulpes vulpes</i>
Gopher, Plains Pocket	<i>Geomys bursarius</i>
Ground Squirrel, Franklin's	<i>Spermophilus franklinii</i>
Ground Squirrel, Thirteen-lined	<i>Spermophilus tridecemlineatus</i>
Jackrabbit, Black-tailed	<i>Lepus californicus</i>
Mink	<i>Mustela vison</i>
Mole, Eastern	<i>Scalopus aquaticus</i>
Muskrat	<i>Ondatra zibethicus</i>
Opossum	<i>Didelphis virginiana</i>
Porcupine	<i>Erthizon dorsatum</i>
Prairie Dog, Black-tailed	<i>Cynomys ludovicianus</i>
Raccoon	<i>Procyon lotor</i>
Rat, Hispid Cotton	<i>Sigmodon hispidus</i>
Rat, Ord's Kangaroo	<i>Dipodomys ordii</i>
Skunk, Eastern Spotted*	<i>Spilogale putorius</i>
Skunk, Striped	<i>Mephitis mephitis</i>
Squirrel, Eastern Fox	<i>Sciurus niger</i>
Wood Rat, Eastern	<i>Neotoma floridana</i>

F.4 List of Amphibian and Reptile Species

These are the amphibian and reptile species found on Quivira Refuge.

<i>Common name</i>	<i>Scientific name</i>
Bullfrog	<i>Rana catesbiana</i>
Frog, Blanchard's Cricket	<i>Acris blanchardi</i>
Frog, Plains Leopard	<i>Rana blairi</i>
Frog, Western Chorus	<i>Pseudacris maculata</i>
Kingsnake, Prairie	<i>Lampropeltis calligaster</i>
Lizard, Prairie (Fence)	<i>Sceloporus undulatus</i>

<i>Common name</i>	<i>Scientific name</i>
Massasauga	<i>Sistrurus catenatus</i>
Racer	<i>Coluber constrictor</i>
Racerunner, Six-lined	<i>Aspidoscelis sexlineata</i>
Salamander, Tiger	<i>Ambystoma tigrinum</i>
Slider, Red-eared	<i>Trachemys scripta</i>
Snake, Brown	<i>Storeria dekayi</i>
Snake, Common Garter	<i>Thamnophis sirtalis</i>
Snake, Glossy	<i>Arizona elegans</i>
Snake, Gopher (Bull)	<i>Pituophis catenifer</i>
Snake, Graham's Crayfish	<i>Regina grahamii</i>
Snake, Plains Garter	<i>Thamnophis radix</i>
Snake, Western Hognose	<i>Heterodon nasicus</i>
Snake, Western Ribbon	<i>Thamnophis proximus</i>
Toad, Woodhouse's	<i>Bufo woodhousei</i>
Turtle, Ornate Box	<i>Terrapene ornata</i>
Turtle, Painted	<i>Chrysemys picta</i>
Turtle, Snapping	<i>Chelydra serpentina</i>
Turtle, Spiny Softshell	<i>Apalone spinifera</i>
Turtle, Yellow Mud	<i>Kinosternon flavescens</i>
Water Snake, Diamondback	<i>Nerodia rhombifer</i>
Water Snake, Northern	<i>Nerodia sipedon</i>

F.5 List of Odonate Species

These are the odonate species found on Quivira Refuge.

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Amberwing, Eastern	Libellulidae	<i>Perithemis tenera</i>
Bluet, Familiar	Coenagrionidae	<i>Enallagma civile</i>
Clubtail, Jade	Gomphidae	<i>Arigomphus submedianus</i>
Clubtail, Plains	Gomphidae	<i>Gomphus externus</i>
Darner, Blue-eyed	Aeschnidae	<i>Rhionaeschna multicolor</i>
Darner, Common Blue	Aeschnidae	<i>Anax junius</i>
Dasher, Blue	Libellulidae	<i>Pachydiplax longipennis</i>
Forktail, Black-fronted	Coenagrionidae	<i>Ischnura denticollis</i>
Forktail, Citrine	Coenagrionidae	<i>Ischnura hastata</i>
Forktail, Desert	Coenagrionidae	<i>Ischnura barberi</i>
Forktail, Eastern	Coenagrionidae	<i>Ischnura verticalis</i>
Forktail, Fragile	Coenagrionidae	<i>Ischnura posita</i>
Glider, Spot-wing	Libellulidae	<i>Pantala hymenaea</i>
Glider, Wandering	Libellulidae	<i>Pantala flavescens</i>
Meadowhawk, Band-wing	Libellulidae	<i>Sympetrum semicinctum</i>

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Meadowhawk, Blue-faced	Libellulidae	<i>Sympetrum ambiguum</i>
Meadowhawk, Ruby	Libellulidae	<i>Sympetrum rubicundulum</i>
Meadowhawk, Variegated	Libellulidae	<i>Sympetrum corruptum</i>
Pennant, Halloween	Libellulidae	<i>Celithemis eponina</i>
Pondhawk, Eastern	Libellulidae	<i>Erythemis simplicicollis</i>
Rubyspot, American	Calopterygidae	<i>Hetaerina americana</i>
Saddlebags, Black	Libellulidae	<i>Tramea lacerata</i>
Saddlebags, Red	Libellulidae	<i>Tramea onusta</i>
Skimmer, Twelve-spotted	Libellulidae	<i>Libellula pulchella</i>
Skimmer, Widow	Libellulidae	<i>Libellula luctuosa</i>
Spreadwing	Lestidae	<i>Lestes rectangularis</i>
Spreadwing, Southern	Lestidae	<i>Lestes australis</i>
Whitetail, Common	Libellulidae	<i>Libellula lydia</i>

F.6 List of Butterfly Species

These are the butterfly species found on Quivira Refuge.

<i>Common name</i>	<i>Scientific name</i>
Admiral, Red	<i>Vanessa atalanta</i>
Azure, Summer	<i>Celastrina ladon</i>
Blue, Eastern Tailed	<i>Everes comyntas</i>
Blue, Marine	<i>Leptotes marina</i>
Blue, Reakirt's	<i>Hemiargus isola</i>
Blue, Western Pygmy	<i>Brephidium exile</i>
Buckeye	<i>Junonia coenia</i>
Checkerspot, Gorgone	<i>Chlosyne gorgone</i>
Cloak, Mourning	<i>Nymphalis antiopa</i>
Cloudywing, Southern	<i>Thorybes bathyllus</i>
Comma, Eastern	<i>Polygonia comma</i>
Copper, Bronze	<i>Lycaena hyllus</i>
Copper, Gray	<i>Lycaena dione</i>
Crescent, Painted	<i>Phyciodes picta</i>
Crescent, Pearl	<i>Phyciodes tharos</i>
Crescent, Phaon	<i>Phyciodes phaon</i>
Duskywing, Afranius	<i>Erynnis afranius</i>
Duskywing, Funereal	<i>Erynnis funeralis</i>
Duskywing, Horace's	<i>Erynnis horatius</i>
Duskywing, Juvenalis	<i>Erynnis juvenalis</i>
Duskywing, Wild Indigo	<i>Erynnis baptisiae</i>
Emperor, Hackberry	<i>Asterocampa celtis</i>
Emperor, Tawny	<i>Asterocampa clyton</i>

<i>Common name</i>	<i>Scientific name</i>
Fritillary, Great Spangled	<i>Speyeria cybele</i>
Fritillary, Gulf	<i>Agraulis vanillae</i>
Fritillary, Regal	<i>Speyeria idalia</i>
Fritillary, Variegated	<i>Euptoieta claudia</i>
Hairstreak, Coral	<i>Satyrium titus</i>
Hairstreak, Gray	<i>Strymon melinus</i>
Hairstreak, Juniper	<i>Callophrys gryneus gryneus</i>
Lady, American	<i>Vanessa virginiensis</i>
Lady, Painted	<i>Vanessa cardui</i>
Leafwing, Goatweed	<i>Anaea andrea</i>
Monarch	<i>Danaus plexippus</i>
Orange, Sleepy	<i>Euremia nicippe</i>
Queen	<i>Danaus gilippus</i>
Question Mark	<i>Polygonia interrogationis</i>
Sachem	<i>Atalopedes campestris</i>
Scallopwing, Hayhurst's	<i>Staphylus hayhurstii</i>
Skipper, Common Checkered	<i>Pyrgus communis</i>
Skipper, Delaware	<i>Anatrytone logan</i>
Skipper, Eastern Dun	<i>Euphyes vestris</i>
Skipper, Fiery	<i>Hylephila phyleus</i>
Skipper, Nysa Roadside	<i>Amblyscirtes nysa</i>
Skipper, Silver-spotted	<i>Epargyreus clarus</i>
Snout, Common	<i>Libytheana carinenta</i>
Sootywing, Common	<i>Pholisora catullus</i>
Sulphur, Clouded	<i>Colias philodice</i>
Sulphur, Cloudless	<i>Phoebis sennae</i>
Sulphur, Dainty	<i>Nathalis iole</i>
Sulphur, Orange	<i>Colias eurhytheme</i>
Swallowtail, Black	<i>Papilio polyxenes</i>
Swallowtail, Eastern Tiger	<i>Papilio glaucus</i>
Swallowtail, Pipevine	<i>Battus philenor</i>
Viceroy	<i>Limenitis archippus</i>
White, Cabbage	<i>Pieris rapae</i>
White, Checkered	<i>Pontia protodice</i>
Wood Nymph, Common	<i>Cercyonis pegala</i>
Yellow, Little	<i>Eurema lisa</i>

F.7 List of Plant Species

These are the plant species found on Quivira Refuge.

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Wild Petunia	Acanthaceae	<i>Ruellia humilis</i>
Boxelder	Aceraceae	<i>Acer negundo</i>
Silver Maple	Aceraceae	<i>Acer saccharinum</i>
Soapweed Yucca	Agavaceae	<i>Yucca glauca</i>
Sea Purslane	Aizoaceae	<i>Sesuvium verrucosum</i>
Northern Water Plantain	Alismataceae	<i>Alisma triviale</i>
Grassleaf Arrowhead	Alismataceae	<i>Sagittaria graminea</i> var. <i>graminea</i>
Broadleaf Arrowhead	Alismataceae	<i>Sagittaria latifolia</i>
Sandhill Amaranth	Amaranthaceae	<i>Amaranthus arenicola</i>
Tall Waterhemp	Amaranthaceae	<i>Amaranthus tuberculatus</i>
Snake-cotton	Amaranthaceae	<i>Froelichia floridana</i> var. <i>campestris</i>
Fragrant Sumac	Anacardiaceae	<i>Rhus aromatica</i>
Smooth Sumac	Anacardiaceae	<i>Rhus glabra</i>
Poison Ivy	Anacardiaceae	<i>Toxicodendron rydbergii</i>
Cut-leaf Water Parsnip	Apiaceae	<i>Berula erecta</i> var. <i>incisa</i>
Common Water Hemlock	Apiaceae	<i>Cicuta maculata</i>
Floating Marsh Pennywort	Apiaceae	<i>Hydrocotyle ranunculoides</i>
Red River Scaleseed	Apiaceae	<i>Spermolepis inermis</i>
Indian Hemp	Apocynaceae	<i>Apocynum cannabinum</i>
Blunt-leaved Milkweed	Asclepiadaceae	<i>Asclepias amplexicaulis</i>
Sand Milkweed	Asclepiadaceae	<i>Asclepias arenaria</i>
Swamp Milkweed	Asclepiadaceae	<i>Asclepias incarnata</i> ssp. <i>incarnata</i>
Showy Milkweed	Asclepiadaceae	<i>Asclepias speciosa</i>
Butterfly Milkweed	Asclepiadaceae	<i>Asclepias tuberosa</i> ssp. <i>interior</i>
Whorled Milkweed	Asclepiadaceae	<i>Asclepias verticillata</i>
Green Antelopehorn	Asclepiadaceae	<i>Asclepias viridis</i>
Common Yarrow	Asteraceae	<i>Achillea millefolium</i> ssp. <i>lanulosa</i>
Western Ragweed	Asteraceae	<i>Ambrosia psilostachya</i>
Giant Ragweed	Asteraceae	<i>Ambrosia trifida</i>
Cudweed Sagewort	Asteraceae	<i>Artemisia ludoviciana</i> ssp. <i>ludoviciana</i>
White Panicked Aster	Asteraceae	<i>Aster lanceolatus</i> ssp. <i>lanceolatus</i>
Willow Baccharis	Asteraceae	<i>Baccharis salicina</i>
Spanish Needles	Asteraceae	<i>Bidens bipinnata</i>
Tall Thistle	Asteraceae	<i>Cirsium altissimum</i>
Wavyleaf Thistle	Asteraceae	<i>Cirsium undulatum</i>
Bull Thistle	Asteraceae	<i>Cirsium vulgare</i>
Horseweed	Asteraceae	<i>Conyza canadensis</i>
Plains Coreopsis	Asteraceae	<i>Coreopsis tinctoria</i>
Hooker's Scratchdaisy	Asteraceae	<i>Croptilon hookerianum</i> var. <i>validum</i>
Philadelphia Fleabane	Asteraceae	<i>Erigeron philadelphicus</i>
Daisy Fleabane	Asteraceae	<i>Erigeron strigosus</i>

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Boneset	Asteraceae	<i>Eupatorium perfoliatum</i>
Alkali Yellowtops	Asteraceae	<i>Flaveria campestris</i>
Curly-cup Gumweed	Asteraceae	<i>Grindelia ciliata</i>
Annual Sunflower	Asteraceae	<i>Helianthus annuus</i>
Maximilian Sunflower	Asteraceae	<i>Helianthus maximiliani</i>
Prairie Sunflower	Asteraceae	<i>Helianthus petiolaris</i>
Jerusalem Artichoke	Asteraceae	<i>Helianthus tuberosus</i>
Goldenaster	Asteraceae	<i>Heterotheca latifolia</i>
Camphorweed	Asteraceae	<i>Heterotheca subaxillaris ssp. latifolia</i>
Carolina Woollywhite	Asteraceae	<i>Hymenopappus scabiosaeus</i>
Marshelder	Asteraceae	<i>Iva annua</i>
Prickly Lettuce	Asteraceae	<i>Lactuca serriola</i>
Lanceleaf Blazing Star	Asteraceae	<i>Liatris lancifolia</i>
Prairie Blazing Star	Asteraceae	<i>Liatris pycnostachya</i>
Scaly Blazing Star	Asteraceae	<i>Liatris squarrosa var. glabrata</i>
Marsh Fleabane	Asteraceae	<i>Pluchea odorata</i>
Rabbit-tobacco	Asteraceae	<i>Pseudognaphalium obtusifolium</i>
Tuberous Desert-chicory	Asteraceae	<i>Pyrrhopappus grandiflorus</i>
Prairie Coneflower	Asteraceae	<i>Ratibida columnifera</i>
Viscid Tansyaster	Asteraceae	<i>Rayjacksonia annua</i>
Canada Goldenrod	Asteraceae	<i>Solidago altissima var. altissima</i>
Missouri Goldenrod	Asteraceae	<i>Solidago missouriensis</i>
Downy Goldenrod	Asteraceae	<i>Solidago petiolaris</i>
Sow Thistle	Asteraceae	<i>Sonchus asper</i>
Annual Saltmarsh Aster	Asteraceae	<i>Symphotrichum divaricatum</i>
White Heath Aster	Asteraceae	<i>Symphotrichum ericoides var. ericoides</i>
Red-seed Dandelion	Asteraceae	<i>Taraxacum laevigatum</i>
Common Dandelion	Asteraceae	<i>Taraxacum officinale</i>
Green Threads	Asteraceae	<i>Thelesperma megapotamicum</i>
Common Salsify	Asteraceae	<i>Tragopogon dubius</i>
Prairie Ironweed	Asteraceae	<i>Vernonia fasciculata ssp. corymbosa</i>
Cocklebur	Asteraceae	<i>Xanthium strumarium</i>
Trumpet Creeper	Bignoniaceae	<i>Campsis radicans</i>
Southern Catalpa	Bignoniaceae	<i>Catalpa bignonioides</i>
Northern Catalpa	Bignoniaceae	<i>Catalpa speciosa</i>
Little Catseye	Boraginaceae	<i>Cryptantha minima</i>
Bindweed Heliotrope	Boraginaceae	<i>Heliotropium convolvulaceum</i>
Salt Heliotrope	Boraginaceae	<i>Heliotropium curassavicum var. curassavicum</i>
Seaside Heliotrope	Boraginaceae	<i>Heliotropium curassavicum var. obovatum</i>
Stickseed	Boraginaceae	<i>Lappula redowskii</i>
Fringed Puccoon	Boraginaceae	<i>Lithospermum incisum</i>
Spring Forget-me-not	Boraginaceae	<i>Myosotis verna</i>
Shepherd's Purse	Brassicaceae	<i>Capsella bursa-pastoris</i>
Whitetop	Brassicaceae	<i>Cardaria draba</i>
Western Tansymustard	Brassicaceae	<i>Descurainia pinnata var. brachycarpa</i>

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Common Pepperweed	Brassicaceae	<i>Lepidium densiflorum</i>
Water-cress	Brassicaceae	<i>Nasturtium officinale</i>
Winged Rockcress	Brassicaceae	<i>Sibara virginica</i>
Plains Prickly-pear	Cactaceae	<i>Opuntia phaeacantha</i>
Waterstarwort	Callitrichaceae	<i>Callitriche heterophylla</i>
Cardinal Flower	Campanulaceae	<i>Lobelia cardinalis</i>
Great Blue Lobelia	Campanulaceae	<i>Lobelia siphilitica</i>
Holzinger's Venus' Looking-glass	Campanulaceae	<i>Triodanis holzingeri</i>
Narrowleaf Rombopod	Capparaceae	<i>Cleomella angustifolia</i>
Rocky Mountain Beeplant	Capparaceae	<i>Peritoma serrulata</i>
James' Clammyweed	Capparaceae	<i>Polanisia jamesii</i>
American Elder	Caprifoliaceae	<i>Sambucus canadensis</i>
Coralberry	Caprifoliaceae	<i>Symphoricarpos orbiculatus</i>
Thymeleaf Sandwort	Caryophyllaceae	<i>Arenaria serpyllifolia</i>
Mouse-ear Chickweed	Caryophyllaceae	<i>Cerastium brachypodium</i>
Sleepy Catchfly	Caryophyllaceae	<i>Silene antirrhina</i>
Silverscale	Chenopodiaceae	<i>Atriplex argentea</i>
Saline Saltbush	Chenopodiaceae	<i>Atriplex dioica</i>
Halberd-leaved Orache	Chenopodiaceae	<i>Atriplex patula</i>
Lamb's Quarters	Chenopodiaceae	<i>Chenopodium album</i>
Desert Goosefoot	Chenopodiaceae	<i>Chenopodium pratericola</i>
Red Goosefoot	Chenopodiaceae	<i>Chenopodium rubrum</i>
Winged Pigweed	Chenopodiaceae	<i>Cycloloma atriplicifolium</i>
Kochia, Fireweed	Chenopodiaceae	<i>Kochia scoparia</i>
Red Saltwort	Chenopodiaceae	<i>Salicornia rubra</i>
Russian Thistle	Chenopodiaceae	<i>Salsola iberica</i>
Western Seepweed	Chenopodiaceae	<i>Suaeda calceoliformis</i>
Poison Suckleya	Chenopodiaceae	<i>Suckleya suckleyana</i>
Bee Spiderflower	Cleomaceae	<i>Cleome serrulata</i>
Common Saint John's Wort	Clusiaceae	<i>Hypericum perforatum</i>
Dayflower	Commelinaceae	<i>Commelina erecta</i> var. <i>angustifolia</i>
Prairie Spiderwort	Commelinaceae	<i>Tradescantia occidentalis</i>
Prostrate Evolvulus	Convolvulaceae	<i>Evolvulus nuttallianus</i>
Bush Morning-glory	Convolvulaceae	<i>Ipomoea leptophylla</i>
Pickering's Dawnflower	Convolvulaceae	<i>Stylisma pickeringii</i> var. <i>pattersonii</i>
Roughleaf Dogwood	Cornaceae	<i>Cornus drummondii</i>
Buffalo-gourd	Cucurbitaceae	<i>Cucurbita foetidissima</i>
Eastern Redcedar	Cupressaceae	<i>Juniperus virginiana</i> var. <i>virginiana</i>
Cusp Dodder	Cuscutaceae	<i>Cuscuta cuspidata</i>
Rope Dodder	Cuscutaceae	<i>Cuscuta glomerata</i>
Cosmopolitan Bulrush	Cyperaceae	<i>Bolboschoenus maritimus</i> ssp. <i>paludosus</i>
Southern Sedge	Cyperaceae	<i>Carex australis</i>
Shortbeak Sedge	Cyperaceae	<i>Carex brevior</i>
Buxbaum Sedge	Cyperaceae	<i>Carex buxbaumii</i>
Emory's Sedge	Cyperaceae	<i>Carex emoryi</i>

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Fescue Sedge	Cyperaceae	<i>Carex festucacea</i>
Smooth-cone Sedge	Cyperaceae	<i>Carex laeviconica</i>
Wooly-fruit Sedge	Cyperaceae	<i>Carex lasiocarpa</i>
Mead's Sedge	Cyperaceae	<i>Carex meadii</i>
Wooly Sedge	Cyperaceae	<i>Carex pellita</i>
Clustered Field Sedge	Cyperaceae	<i>Carex praegracilis</i>
Awlfruit Sedge	Cyperaceae	<i>Carex stipata</i> var. <i>stipata</i>
Fox Sedge	Cyperaceae	<i>Carex vulpinoidea</i>
Taperleaf Flatsedge	Cyperaceae	<i>Cyperus acuminatus</i>
Yellow Nutsedge	Cyperaceae	<i>Cyperus esculentus</i>
Great Plains Flatsedge	Cyperaceae	<i>Cyperus lupulinus</i>
Sand Flatsedge	Cyperaceae	<i>Cyperus schweinitzii</i>
Lean Flatsedge	Cyperaceae	<i>Cyperus setigerus</i>
Bald Spikerush	Cyperaceae	<i>Eleocharis erythropoda</i>
Pale Spikerush	Cyperaceae	<i>Eleocharis macrostachya</i>
Sand Spikerush	Cyperaceae	<i>Eleocharis montevidensis</i>
Beaked Spikerush	Cyperaceae	<i>Eleocharis rostellata</i>
Hairy Fimbry	Cyperaceae	<i>Fimbristylis puberula</i> var. <i>interior</i>
Hairy Fimbry	Cyperaceae	<i>Fimbristylis puberula</i> var. <i>puberula</i>
Hardstem Bulrush	Cyperaceae	<i>Schoenoplectus acutus</i> var. <i>acutus</i>
Common Threesquare	Cyperaceae	<i>Schoenoplectus pungens</i>
Common Threesquare	Cyperaceae	<i>Schoenoplectus pungens</i> var. <i>longispicatus</i>
Softstem Bulrush	Cyperaceae	<i>Schoenoplectus tabernaemontani</i> ssp. <i>validus</i>
Pale Bulrush	Cyperaceae	<i>Scirpus pallidus</i>
Hanging Bulrush	Cyperaceae	<i>Scirpus pendulus</i>
Persimmon	Ebenaceae	<i>Diospyros virginiana</i>
Russian Olive	Elaeagnaceae	<i>Elaeagnus angustifolia</i>
Smooth Horsetail	Equisetaceae	<i>Equisetum laevigatum</i>
Geyer's Sandmat	Euphorbiaceae	<i>Chamaesyce geyeri</i>
Rip-seed Sandmat	Euphorbiaceae	<i>Chamaesyce glyptosperma</i>
Sand Spurge	Euphorbiaceae	<i>Chamaesyce missurica</i> var. <i>intermedia</i>
Sand Croton	Euphorbiaceae	<i>Croton glandulosus</i> var. <i>septentrionalis</i>
Texas Croton	Euphorbiaceae	<i>Croton texensis</i>
David's Spurge	Euphorbiaceae	<i>Euphorbia davidii</i>
Snow-on-the-Mountain	Euphorbiaceae	<i>Euphorbia marginata</i>
Roughpod Spurge	Euphorbiaceae	<i>Euphorbia spathulata</i>
False Indigo	Fabaceae	<i>Amorpha fruticosa</i>
Platte Milkvetch	Fabaceae	<i>Astragalus plattensis</i>
Blue Wild Indigo	Fabaceae	<i>Baptisia australis</i> var. <i>minor</i>
Partridge Pea	Fabaceae	<i>Chamaecrista fasciculata</i>
Purple Prairie-clover	Fabaceae	<i>Dalea purpurea</i> var. <i>purpurea</i>
Hairy Prairie-clover	Fabaceae	<i>Dalea villosa</i> var. <i>villosa</i>
Illinois Bundleflower	Fabaceae	<i>Desmanthus illinoensis</i>
Honeylocust	Fabaceae	<i>Gleditsia triacanthos</i>
Wild Licorice	Fabaceae	<i>Glycyrrhiza lepidota</i>

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Kentucky Coffeetree	Fabaceae	<i>Gymnocladus dioica</i>
Round-head Lespedeza	Fabaceae	<i>Lespedeza capitata</i>
American Birdsfoot Trefoil	Fabaceae	<i>Lotus unifoliolatus</i> var. <i>unifoliolatus</i>
White Sweetclover	Fabaceae	<i>Melilotus albus</i>
Yellow Sweetclover	Fabaceae	<i>Melilotus officinalis</i>
Catclaw Sensitive-briar	Fabaceae	<i>Mimosa nuttallii</i>
Palmleaf Indian Breadroot	Fabaceae	<i>Pedimelum digitatum</i>
Dune Scurfpea	Fabaceae	<i>Psoralidium lanceolatum</i>
Black Locust	Fabaceae	<i>Robinia pseudoacacia</i>
Stick-seed Fuzzybean	Fabaceae	<i>Strophostyles leiosperma</i>
Goat's-rue	Fabaceae	<i>Tephrosia virginiana</i>
Hairy Vetch	Fabaceae	<i>Vicia villosa</i> ssp. <i>villosa</i>
Bur Oak	Fagaceae	<i>Quercus macrocarpa</i>
Smallflower Fumewort	Fumariaceae	<i>Corydalis micrantha</i>
Prairie Gentian	Gentianaceae	<i>Eustoma grandiflorum</i>
Carolina Geranium	Geraniaceae	<i>Geranium carolinianum</i>
Golden Currant	Grossulariaceae	<i>Ribes aureum</i> var. <i>villosum</i>
American Watermilfoil	Haloragaceae	<i>Myriophyllum sibiricum</i>
Common Waternymph	Hydrocharitaceae	<i>Najas guadalupensis</i>
Blue-eyed Grass	Iridaceae	<i>Sisyrinchium montanum</i>
Black Walnut	Juglandaceae	<i>Juglans nigra</i>
Tapertip Rush	Juncaceae	<i>Juncus acuminatus</i>
Baltic Rush	Juncaceae	<i>Juncus arcticus</i> var. <i>balticus</i>
Tuftedstem Rush	Juncaceae	<i>Juncus brachyphyllus</i>
Dudley Rush	Juncaceae	<i>Juncus dudleyi</i>
Inland Rush	Juncaceae	<i>Juncus interior</i>
Field Rush	Juncaceae	<i>Juncus tenuis</i>
Torrey Rush	Juncaceae	<i>Juncus torreyi</i>
False Pennyroyal	Lamiaceae	<i>Hedeoma hispida</i>
Henbit	Lamiaceae	<i>Lamium amplexicaule</i>
American Bugleweed	Lamiaceae	<i>Lycopus americanus</i>
Wild Bergamot	Lamiaceae	<i>Monarda punctata</i> ssp. <i>occidentalis</i>
Catnip	Lamiaceae	<i>Nepeta cataria</i>
Blue Sage	Lamiaceae	<i>Salvia azurea</i>
Blue Skullcap	Lamiaceae	<i>Scutellaria lateriflora</i>
American Germander	Lamiaceae	<i>Teucrium canadense</i> var. <i>canadense</i>
Lesser Duckweed	Lemnaceae	<i>Lemna aequinoctialis</i>
Common Duckweed	Lemnaceae	<i>Lemna minor</i>
Minute Duckweed	Lemnaceae	<i>Lemna perpusilla</i>
Turion Duckweed	Lemnaceae	<i>Lemna turionifera</i>
Wild Onion	Liliaceae	<i>Allium canadense</i> var. <i>fraseri</i>
Wild Asparagus	Liliaceae	<i>Asparagus officinalis</i>
False Lily-of-the-Valley	Liliaceae	<i>Maianthemum</i> sp.
False Lily-of-the-Valley	Liliaceae	<i>Maianthemum stellatum</i>
Wild Flax	Linaceae	<i>Linum</i> sp.

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Purple Ammannia	Lythraceae	<i>Ammannia coccinea</i>
Grand Redstem	Lythraceae	<i>Ammannia robusta</i>
California Loosestrife	Lythraceae	<i>Lythrum californicum</i>
Velvetleaf Mallow	Malvaceae	<i>Abutilon theophrasti</i>
Plains Poppymallow	Malvaceae	<i>Callirhoe alcaeoides</i>
Purple Poppymallow	Malvaceae	<i>Callirhoe involucrata</i>
Common Mallow	Malvaceae	<i>Malva neglecta</i>
Hairy Waterclover	Marsileaceae	<i>Marsilea vestita</i>
Moonseed	Menispermaceae	<i>Menispermum canadense</i>
Carpetweed	Molluginaceae	<i>Mollugo verticillata</i>
Osage-orange	Moraceae	<i>Maclura pomifera</i>
White Mulberry	Moraceae	<i>Morus alba</i>
American Lotus	Nelumbonaceae	<i>Nelumbo lutea</i>
Four-o'clock	Nyctaginaceae	<i>Mirabilis exaltata</i>
Smooth Four-o'clock	Nyctaginaceae	<i>Mirabilis glabra</i>
Four-o'clock	Nyctaginaceae	<i>Mirabilis linearis</i>
Heart-leaved Four-o'clock	Nyctaginaceae	<i>Mirabilis nyctaginea</i>
Green Ash	Oleaceae	<i>Fraxinus pennsylvanica</i>
Yellow Sundrops	Onagraceae	<i>Calylophus serrulatus</i>
Velvetweed	Onagraceae	<i>Gaura mollis</i>
Bushy Seedbox	Onagraceae	<i>Ludwigia alternifolia</i>
Hooker's Evening Primrose	Onagraceae	<i>Oenothera elata ssp. hirsutissima</i>
Largeflower Evening Primrose	Onagraceae	<i>Oenothera grandis</i>
Cut-leaf Evening Primrose	Onagraceae	<i>Oenothera laciniata</i>
Four-point Evening Primrose	Onagraceae	<i>Oenothera rhombipetala</i>
Hairy Evening Primrose	Onagraceae	<i>Oenothera villosa ssp. villosa</i>
Great Plains Ladies-tresses	Orchidaceae	<i>Spiranthes magnicamporum</i>
Slender Yellow Woodsorrel	Oxalidaceae	<i>Oxalis dillenii</i>
Yellow Woodsorrel	Oxalidaceae	<i>Oxalis stricta</i>
Prickly-poppy	Papaveraceae	<i>Argemone polyanthemus</i>
Devil's Claw	Pedaliaceae	<i>Proboscidea louisianica</i>
Pokeweed	Phytolaccaceae	<i>Phytolacca americana var. americana</i>
Austrian Pine	Pinaceae	<i>Pinus nigra</i>
Longleaf Plantain	Plantaginaceae	<i>Plantago elongata</i>
Wooly Plantain	Plantaginaceae	<i>Plantago patagonica var. patagonica</i>
Dwarf Plantain	Plantaginaceae	<i>Plantago pusilla</i>
Virginia Plantain	Plantaginaceae	<i>Plantago virginica</i>
Goatgrass	Poaceae	<i>Aegilops cylindrica</i>
Redtop Bent	Poaceae	<i>Agrostis gigantea</i>
Winter Bentgrass	Poaceae	<i>Agrostis hyemalis</i>
Creeping Bentgrass	Poaceae	<i>Agrostis stolonifera</i>
Big Bluestem	Poaceae	<i>Andropogon gerardii</i>
Sand Bluestem	Poaceae	<i>Andropogon hallii</i>
Forked Three-awn	Poaceae	<i>Aristida basiramea</i>
Prairie Three-awn	Poaceae	<i>Aristida oligantha</i>

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Caucasian Bluestem	Poaceae	<i>Bothriochloa bladhii</i>
Silver Bluestem	Poaceae	<i>Bothriochloa saccharoides</i>
Sideoats Grama	Poaceae	<i>Bouteloua curtipendula</i>
Blue Grama	Poaceae	<i>Bouteloua gracilis</i>
Smooth Brome	Poaceae	<i>Bromus inermis</i>
Japanese Brome	Poaceae	<i>Bromus japonicus</i>
Cheatgrass	Poaceae	<i>Bromus tectorum</i>
Buffalograss	Poaceae	<i>Buchloe dactyloides</i>
Bluejoint Reedgrass	Poaceae	<i>Calamagrostis canadensis</i>
Narrowspike Reedgrass	Poaceae	<i>Calamagrostis stricta</i>
Prairie Sandreed	Poaceae	<i>Calamovilfa gigantea</i>
Sandbur	Poaceae	<i>Cenchrus longispinus</i>
Windmill Grass	Poaceae	<i>Chloris verticillata</i>
Bermudagrass	Poaceae	<i>Cynodon dactylon</i>
Orchardgrass	Poaceae	<i>Dactylis glomerata</i>
Hotsprings Panicum	Poaceae	<i>Dichanthelium acuminatum ssp. fasciculatum</i>
Scribner Panicum	Poaceae	<i>Dichanthelium oligosanthes ssp. scribnerianum</i>
Carolina Crabgrass	Poaceae	<i>Digitaria cognata ssp. cognata</i>
Slender Crabgrass	Poaceae	<i>Digitaria filiformis</i>
Hairy Crabgrass	Poaceae	<i>Digitaria sanguinalis</i>
Inland Saltgrass	Poaceae	<i>Distichlis spicata var. stricta</i>
Barnyard Grass, Millet	Poaceae	<i>Echinochloa crus-galli var. crus-galli</i>
Rough Barnyard Grass	Poaceae	<i>Echinochloa muricata var. microstachya</i>
Goosegrass	Poaceae	<i>Eleusine indica</i>
Canada Wildrye	Poaceae	<i>Elymus canadensis</i>
Quackgrass	Poaceae	<i>Elymus repens</i>
Stinkgrass	Poaceae	<i>Eragrostis cilianensis</i>
Weeping Lovegrass	Poaceae	<i>Eragrostis curvula</i>
Tufted Lovegrass	Poaceae	<i>Eragrostis pectinacea</i>
Red Lovegrass	Poaceae	<i>Eragrostis secundiflora ssp. oxylepis</i>
Purple Lovegrass	Poaceae	<i>Eragrostis spectabilis</i>
Sand Lovegrass	Poaceae	<i>Eragrostis trichodes</i>
Prairie Cupgrass	Poaceae	<i>Eriochloa contracta</i>
Tall Fescue	Poaceae	<i>Festuca pratensis</i>
Foxtail Barley	Poaceae	<i>Hordeum jubatum</i>
Little Barley	Poaceae	<i>Hordeum pusillum</i>
Rice Cutgrass	Poaceae	<i>Leersia oryzoides</i>
Sprangletop	Poaceae	<i>Leptochloa fusca</i>
Alkali Muhly	Poaceae	<i>Muhlenbergia asperifolia</i>
Nodding Muhly	Poaceae	<i>Muhlenbergia bushii</i>
Wirestem Muhly	Poaceae	<i>Muhlenbergia racemosa</i>
Witchgrass	Poaceae	<i>Panicum capillare var. barbipulvinatum</i>
Witchgrass	Poaceae	<i>Panicum capillare var. brevifolium</i>
Fall Panicum	Poaceae	<i>Panicum dichotomiflorum</i>
Panic Grass	Poaceae	<i>Panicum praecoxious</i>

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Redtop Panicum	Poaceae	<i>Panicum rigidulum</i>
Panic Grass	Poaceae	<i>Panicum vilosissimum</i>
Switchgrass	Poaceae	<i>Panicum virgatum</i>
Western Wheatgrass	Poaceae	<i>Pascopyrum smithii</i>
Sand Paspalum	Poaceae	<i>Paspalum setaceum</i> var. <i>stramineum</i>
Timothy	Poaceae	<i>Phleum pratense</i>
Common Reed	Poaceae	<i>Phragmites australis</i>
Texas Bluegrass	Poaceae	<i>Poa arachnifera</i>
Plains Bluegrass	Poaceae	<i>Poa arida</i>
Canada Bluegrass	Poaceae	<i>Poa compressa</i>
Kentucky Bluegrass	Poaceae	<i>Poa pratensis</i>
Tumblegrass	Poaceae	<i>Schedonnardus paniculatus</i>
Little Bluestem	Poaceae	<i>Schizachyrium scoparium</i>
Cultivated Rye	Poaceae	<i>Secale cereale</i>
Yellow Foxtail	Poaceae	<i>Setaria glauca</i>
Marsh Foxtail	Poaceae	<i>Setaria parviflora</i>
Green Foxtail	Poaceae	<i>Setaria viridis</i>
Indiangrass	Poaceae	<i>Sorghastrum nutans</i>
Johnsongrass	Poaceae	<i>Sorghum halepense</i>
Alkali Cordgrass	Poaceae	<i>Spartina gracilis</i>
Prairie Cordgrass	Poaceae	<i>Spartina pectinata</i>
Prairie Wedgegrass	Poaceae	<i>Sphenopholis obtusata</i> var. <i>obtusata</i>
Alkali Sacaton	Poaceae	<i>Sporobolus airoides</i>
Composite Dropseed	Poaceae	<i>Sporobolus compositus</i> var. <i>compositus</i>
Sand Dropseed	Poaceae	<i>Sporobolus cryptandrus</i>
Puffsheath Dropseed	Poaceae	<i>Sporobolus neglectus</i>
Texas Dropseed	Poaceae	<i>Sporobolus texanus</i>
Intermediate Wheatgrass	Poaceae	<i>Thinopyrum intermedium</i>
Purpletop	Poaceae	<i>Tridens flavus</i>
Longspike Tridens	Poaceae	<i>Tridens strictus</i>
Purple Sandgrass	Poaceae	<i>Triplasis purpurea</i> var. <i>purpurea</i>
Eastern Gamagrass	Poaceae	<i>Tripsacum dactyloides</i>
Sixweeks Fescue	Poaceae	<i>Vulpia octoflora</i>
Annual Eriogonum	Polygonaceae	<i>Eriogonum annuum</i>
Climbing False Buckwheat	Polygonaceae	<i>Fallopia scandens</i>
Water Knotweed	Polygonaceae	<i>Persicaria amphibia</i>
Pink Smartweed	Polygonaceae	<i>Persicaria bicornis</i>
Swamp Smartweed	Polygonaceae	<i>Persicaria hydropiperoides</i>
Curlytop Knotweed	Polygonaceae	<i>Persicaria lapathifolia</i>
Bushy Knotweed	Polygonaceae	<i>Polygonum ramosissimum</i> ssp. <i>prolificum</i>
Yellow-flowered Knotweed	Polygonaceae	<i>Polygonum ramosissimum</i> ssp. <i>ramosissimum</i>
Curly Dock	Polygonaceae	<i>Rumex crispus</i>
Dock	Polygonaceae	<i>Rumex fueginus</i>
Narrowleaf Dock	Polygonaceae	<i>Rumex stenophyllus</i>
Blue Mudplantain	Pontederiaceae	<i>Heteranthera limosa</i>

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Prairie Fameflower	Portulacaceae	<i>Pthemeranthus rugospermus</i>
Common Purslane	Portulacaceae	<i>Portulaca oleracea</i>
Kiss-me-quick	Portulacaceae	<i>Portulaca pilosa</i>
Long-leaf Pondweed	Potamogetonaceae	<i>Potamogeton nodosus</i>
Pondweed	Potamogetonaceae	<i>Stuckenia pectinatus</i>
Western Rock-jasmine	Primulaceae	<i>Androsace occidentalis</i>
Carolina Anemone	Ranunculaceae	<i>Anemone caroliniana</i>
Prairie Larkspur	Ranunculaceae	<i>Delphinium carolinianum</i> ssp. <i>penardii</i>
Tiny Mousetail	Ranunculaceae	<i>Myosurus minimus</i>
Celeryleaf Buttercup	Ranunculaceae	<i>Ranunculus sceleratus</i> var. <i>sceleratus</i>
New Jersey Tea	Rhamnaceae	<i>Ceanothus herbaceus</i>
Agrimony	Rosaceae	<i>Agrimonia parviflora</i>
White Avens	Rosaceae	<i>Geum canadense</i>
American Plum	Rosaceae	<i>Prunus americana</i>
Sand Plum	Rosaceae	<i>Prunus angustifolia</i>
Chokecherry	Rosaceae	<i>Prunus virginiana</i>
Prairie Rose	Rosaceae	<i>Rosa arkansana</i>
Multiflora Rose	Rosaceae	<i>Rosa multiflora</i>
Buttonbush	Rubiaceae	<i>Cephalanthus occidentalis</i>
Bedstraw	Rubiaceae	<i>Galium aparine</i>
Spiral Ditchgrass	Ruppiaceae	<i>Ruppia cirrhosa</i>
Plains Cottonwood	Salicaceae	<i>Populus deltoides</i> ssp. <i>monilifera</i>
Peachleaf Willow	Salicaceae	<i>Salix amygdaloides</i>
Sandbar Willow	Salicaceae	<i>Salix exigua</i> ssp. <i>interior</i>
Black Willow	Salicaceae	<i>Salix nigra</i>
Western Soapberry	Sapindaceae	<i>Sapindus drummondii</i>
Slenderleaf False-foxglove	Scrophulariaceae	<i>Agalinis tenuifolia</i>
Roundleaf Monkeyflower	Scrophulariaceae	<i>Mimulus glabratus</i> var. <i>fremontii</i>
Texas Toadflax	Scrophulariaceae	<i>Nuttallanthus texanus</i>
Common Mullein	Scrophulariaceae	<i>Verbascum thaspus</i>
Purslane Speedwell	Scrophulariaceae	<i>Veronica peregrina</i> var. <i>xalapensis</i>
Tree-of-Heaven	Simaroubaceae	<i>Ailanthus altissima</i>
Bristly Greenbrier	Smilacaceae	<i>Smilax hispida</i>
Jimsonweed	Solanaceae	<i>Datura stramonium</i>
Groundcherry	Solanaceae	<i>Physalis hispida</i>
Long-leaf Groundcherry	Solanaceae	<i>Physalis longifolia</i> var. <i>longifolia</i>
Horsenettle	Solanaceae	<i>Solanum carolinense</i>
Deadly Nightshade	Solanaceae	<i>Solanum interius</i>
Buffalo-bur	Solanaceae	<i>Solanum rostratum</i>
Saltcedar	Tamaricaceae	<i>Tamarix ramosissima</i>
Southern Cattail	Typhaceae	<i>Typha domingensis</i>
Broadleaf Cattail	Typhaceae	<i>Typha latifolia</i>
Hackberry	Ulmaceae	<i>Celtis occidentalis</i>
Dwarf Hackberry	Ulmaceae	<i>Celtis tenuifolia</i>
American Elm	Ulmaceae	<i>Ulmus americana</i>

<i>Common name</i>	<i>Family</i>	<i>Scientific name</i>
Chinese Elm	Ulmaceae	<i>Ulmus parvifolia</i>
Siberian Elm	Ulmaceae	<i>Ulmus pumila</i>
False Nettle	Urticaceae	<i>Boehmeria cylindrica</i>
Pennsylvania Pellitory	Urticaceae	<i>Parietaria pensylvanica</i>
Fog-fruit	Verbenaceae	<i>Phyla lanceolata</i>
Prostrate Vervain	Verbenaceae	<i>Verbena bracteata</i>
Blue Vervain	Verbenaceae	<i>Verbena hastata</i>
Hoary Vervain	Verbenaceae	<i>Verbena stricta</i>
Field Pansy	Violaceae	<i>Viola bicolor</i>
Common Blue Violet	Violaceae	<i>Viola sororia</i>
Virginia Creeper	Vitaceae	<i>Parthenocissus inserta</i>
Riverbank Grape	Vitaceae	<i>Vitis riparia</i>
Horned Pondweed	Zannichelliaceae	<i>Zannichellia palustris</i>
Puncture-vine	Zygophyllaceae	<i>Tribulus terrestris</i>

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