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 management—Rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities; a process that uses feedback from research, monitoring, and evaluation of management actions to support or modify objectives and strategies at all planning levels; a process in which policy decisions are implemented within a framework of scientifically driven experiments to test predictions and assumptions inherent in a management plan. Analysis of results helps managers determine 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.

alternatives—Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission and resolving issues.

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

animal unit month (AUM)—Measure of the quantity of livestock forage. Equivalent to the amount of forage needed to support a 1,000-pound animal (or one cow/calf pair) for one month.

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

approved acquisition boundary—Project boundary that the director of the U.S. Fish and Wildlife Service approves on completion of the detailed planning and environmental compliance process.

ATV—All-terrain vehicle.

AUM—See *animal unit month.*

baseline—Set of critical observations, data, or information used for comparison or a control.

biological control, *also* **biocontrol**—Reduction in numbers or elimination of unwanted species by the introduction of natural predators, parasites, or diseases.

biological diversity, *also* **biodiversity**—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 ("U.S. Fish and Wildlife Service Manual" 052 FW 1.12B). The National Wildlife Refuge System's focus is on endemic species, biotic communities, and ecological processes.

biological integrity—Composition, structure, and function at the genetic, organism, and community levels consistent with natural conditions and the biological processes that shape genomes, organisms, and communities.

biomass—Total amount of living material, plants and animals, above and below the ground in a particular habitat or area.

biota—Animals and plants of a given region.

biotic—Pertaining to life or living organisms.

breeding habitat—Habitat used by migratory birds or other animals during the breeding season.

buffer zone or buffer strip—Protective land borders around critical habitats or water bodies that reduce runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals and plants and their habitats.

canopy—Layer of foliage, generally the uppermost layer, in a vegetative stand; midlevel 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; firefighting; tree planting; habitat protection; stream improvement; and building of fire towers, roads, recreation facilities, and drainage systems.

climax—Community that has reached a steady state under a particular set of environmental conditions; a relatively stable plant community; the final stage in ecological succession.

Code of Federal Regulations (CFR)—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.

community—Area or locality in which a group of people resides and shares the same government.

compatible use—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 U.S. Fish and Wildlife Service Manual" 603 FW 3.6). A compatibility determination supports the selection of compatible uses and identified stipulations or limits necessary to ensure compatibility.

complex—See *refuge complex.*

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 U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

concern—See *issue.*

conservation—Management of natural resources to prevent loss or waste. Management actions may include preservation, restoration, and enhancement.

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

cool-season grass—Grass that begins growth earlier in the season and often become dormant in the summer; will germinate at lower temperatures (65–85°F). Examples are western wheatgrass, needle and thread, and green needlegrass.

cooperative agreement—Legal instrument used when the principal purpose of the transaction is the transfer of money, property, services or anything of value to a recipient in order to accomplish a public purpose authorized by federal statute and substantial involvement between the Service and the recipient is anticipated.

coordination area—Wildlife management area made available to a state, by "(A) cooperative agreement between the United States Fish and Wildlife Service and the state fish and game agency pursuant to Section 4 of the Fish and Wildlife Coordination Act (16 U.S.C. 664); of (B) by long-term leases or agreements pursuant to the Bankhead–Jones Farm Tenant Act (50 Stat. 525; 7 U.S.C. 1010 et seq.)." States manage coordination areas, but they are part of the Refuge System. CCPs are not required for coordination areas.

coteau—A hilly upland including the divide between two valleys; a divide; the side of a valley.

coulee—A deep ravine or gulch with sloping sides, often dry, that has been formed by running water.

cover, *also* **cover type, canopy cover**—Present vegetation of an area.

CRP—Conservation Reserve Program.

cryptogamic crust—A thin, dry, somewhat flaky assemblage of algae, lichens, mosses, and fungi, plus byproducts of these organisms mixed with soil particles. Crusts influence processes at the soil–air interface. For example, they can prevent soil erosion, help facilitate nitrogen fixation, slow evaporation, and provide a hospitable environment for germinating plants. Although a somewhat inconspicuous component of the semi-arid northern prairie, these crusts are absent in areas disturbed by cultivation in the region.

cultivar—A plant variety that has been produced in cultivation by selective breeding.

cultural resources—Remains of sites, structures, or objects used by people in the past.

cultural resource inventory—Professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined area. Inventories may involve various levels including background literature search (class I), sample inventory of project site distribution and density over a larger area (class II), or comprehensive field examination to identify all exposed physical manifestation of cultural resources (class III).

database—Collection of data arranged for ease and speed of analysis and retrieval, usually computerized.

deciduous—Pertaining to any plant organ or group of organs that is shed annually; perennial plants that are leafless for sometime during the year.

defoliation—Removing of vegetative parts; to strip vegetation of leaves; removal can be caused by weather, mechanical, animals, and fire.

demography—Quantitative analysis of population structure and trend.

dense nesting cover (DNC)—Composition of grasses and forbs that allows for a dense stand of vegetation that protects nesting birds from the view of predators, usually consisting of one to two species of wheatgrass, alfalfa, and sweetclover.

disturbance—Significant alteration of habitat structure or composition. May be natural (for example, fire) or human-caused events (for example, timber harvest).

DNC—See *dense nesting cover.*

drawdown—Manipulating water levels in an impoundment to allow for the natural drying-out cycle of a wetland.

EA—See *environmental assessment.*

early seral stage—Area that is in the primary stages of ecological succession.

easement—Agreement by which a landowner gives up or sells one of the rights on his/her property.

ecological succession—Orderly progression of an area through time from one vegetative community to another in the absence of disturbance. For example, an area may proceed from grass–forb through aspen forest to mixed-conifer forest.

ecological triage— Ecological triage is the assignment of priority order to habitats or habitat types on the basis of where funds and resources can be best used, are most needed, or are most likely to achieve success in meeting stated goals and objectives.

ecosystem—Dynamic and interrelating complex of plant and animal communities and their associated nonliving environment; a biological community, together 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.

ecotourism—Tourism that maintains and preserves natural resources as a basis for promoting economic growth and development resulting from visitation to an area.

emergent—Plant rooted in shallow water and having most of the vegetative growth above water such as cattail and hardstem bulrush.

endangered species, federal—Plant or animal species listed under the Endangered Species Act of 1973, as amended, that is in danger of extinction throughout all or a significant portion of its range.

endangered species, state—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 significant 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)—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 impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

environmental education—Education aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.

environmental health—Natural composition, structure, and functioning of the physical, chemical, and other abiotic elements, and the abiotic processes that shape the physical environment.

EO—Executive order.

EPA—Environmental Protection Agency.

extinction—Complete disappearance of a species from the earth; no longer existing.

extirpation—Extinction of a population; complete eradication of a species within a specified area.

fauna—All the vertebrate and invertebrate animals of an area.

federal land—Public land owned by the federal government, including lands such as national forests, national parks, and national wildlife refuges.

federally listed species—Species listed under the federal Endangered Species Act of 1973, as amended, either as endangered, threatened, or species at risk (formerly candidate species).

fee title—Acquisition of most or all of the rights to a tract of land.

fen, *also* **alkaline bog**—Wetland that is primarily organic soil material (peat or muck) that took thousands of years to develop.

FERC—Federal Energy Regulatory Commission.

finding of no significant impact (FONSI)—Document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a federal action will have no significant effects on the human environment and for which an environmental impact statement will not be prepared (40 CFR 1508.13).

fire regime—Description of the frequency, severity, and extent of fire that typically occurs in an area or vegetative type.

flora—All the plant species of an area.

fluvial—Regarding flowing water, usually rivers and streams. Important fluvial processes include erosion, downcutting of channels, and suspension and transport of sediments.

FMP—Fire management plan.

FONSI—See *finding of no significant impact.*

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.

forest—Group of trees with their crown overlapping (generally forming 60–100% cover).

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.

FTE—Full-time equivalent employee.

geographic information system (GIS)—Computer system capable of storing and manipulating spatial data; a set of computer hardware and software for analyzing and displaying spatially referenced features (points, lines and polygons) with nongeographic attributes such as species and age.

geomorphology—The study of the physical features of the surface of the earth and their underlying geological structure.

GIS—See *geographic information system.*

global positioning system (GPS)—System that, by using satellite telemetry, can pinpoint exact locations of places on the ground.

goal—Descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units ("Draft U.S. Fish and Wildlife Service Manual" 620 FW 1.5).

"go-back" prairie—Previously cultivated cropland that has been allowed to revert to herbaceous cover.

GPS—See *global positioning system.*

GS—General schedule (pay rate schedule for certain federal positions).

guild—A group of species that use a common resource base in a similar fasion within an ecological community. A guild can be generally defined (for example, grassland birds) or specifically defined (for example, seed-eating small mammals).

habitat—Suite of existing environmental conditions required by an organism for survival and reproduction; the place where an organism typically lives and grows.

habitat conservation—Protection of animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced.

habitat disturbance—Significant 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**—Land classification system based on the concept of distinct plant associations.

hemi-marsh—The emergent phase of a seasonal or semipermanent wetland where the ratio of open water area to emergent vegetation cover is about 50:50, and vegetation and open water areas are highly interspersed.

herbivore—Animal feeding on plants.

herbivory—The eating of plants, especially ones that are still living.

herptile—A reptile or amphibian.

hydrography—Graph of the water level or rate of flow of a body of water as a function of time, showing seasonal change.

hydroperiod—The seasonal and cyclical pattern of water in a wetland or river.

IBA—"Important Bird Area," as designated by the American Bird Conservancy.

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.

integrated pest management—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.

"interseed"—Mechanical seeding of one or several plant species into existing stands of established vegetation.

introduced species—A nonnative plant or animal species that is intentionally or accidentally released into an ecosystem where it was not previously adapted.

introduction—Intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

invasive plant, *also* **noxious weed—**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—Place of refuge or protection where animals and birds may not be hunted.

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 U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

lentic—Associated with standing fresh water.

lacustrine—Relating to, formed in, living in, or growing in lakes.

lek—A physical area where males of a certain animal species gather to demonstrate their prowess and compete for females before or during the mating season.

local agencies—Municipal governments, regional planning commissions, or conservation groups.

lotic—Relating to, or living in, flowing fresh water.

low-head dam—A human-constructed, wall-like structure that is typically built to back up water in a reservoir. The dam pools water as it flows over the crest or through control structures and drops to the lower water level downstream of the dam.

macrophyte—Plant, especially a marine plant, that is large enough to be visible to the naked eye.

management alternatives—See *alternatives.*

management plan—Plan that guides future land management practices on a tract of land. See *cooperative agreement.*

mean sea level—The sea level halfway between average levels of high and low water.

mechanical control—Reduction in numbers or elimination of unwanted species through the use of mechanical equipment such as mowers and clippers.

mesic—Characterized by, relating to, or requiring a moderate amount of moisture; having a moderate rainfall.

microhabitat—Habitat features at a fine scale; often identifies a unique set of local habitat features.

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 bird—Bird species that follow a seasonal movement from their breeding grounds to their wintering grounds. Waterfowl, shorebirds, raptors, and songbirds are all migratory birds.

migratory game bird—Bird species, regulated under the Migratory Bird Treaty Act and state laws (legally hunted, including ducks, geese, woodcock, and rails).

mission—Succinct statement of purpose or reason for being.

mitigation—Measure designed to counteract an environmental impact or to make an impact less severe.

mixed-grass prairie—Transition zone between the tall-grass prairie and the short-grass prairie dominated by grasses of medium height that are approximately 2–4 feet tall. Soils are not as rich as the tall-grass prairie and moisture levels are less.

monitoring—Process of collecting information to track changes of selected parameters over time.

monotypic—Having only one type or representative.

moraine—Mass of earth and rock debris carried by an advancing glacier and left at its front and side edges as it retreats.

national wildlife refuge (NWR)—Designated area of land, water, or an interest in land or water within the 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 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 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 Interior for managing and protecting the Refuge System; requires a comprehensive conservation plan for each refuge by the year 2012. This Act amended portions of the Refuge Recreation Act and National Wildlife Refuge System Administration Act of 1966.

native species—Species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

NAWMP—See *North American Waterfowl Management Plan.*

Neotropical migrant, *also* **Neotropical migratory bird**—Bird species that breeds north of the United States–Mexico border and winters primarily south of this border.

NEPA—National Environmental Policy Act.

nest success—Percentage of nests that successfully hatch one or more eggs of the total number of nests initiated in an area.

NOI—See *notice of intent.*

nongovernmental organization—Any group that does not include federal, state, tribal, county, city, town, local, or other governmental entities.

North American Waterfowl Management Plan (NAWMP)—North American Waterfowl Management Plan, signed in 1986, recognizes that the recovery and perpetuation of waterfowl populations depends on restoring wetlands and associated ecosystems throughout the United States and Canada. It established cooperative international efforts and joint ventures composed of individuals; corporations; conservation organizations; and local, state, provincial, and federal agencies drawn together by common conservation objectives. The Souris River basin refuges are included in the "Prairie Pothole Joint Venture."

notice of intent (NOI)—Notice that an environmental impact statement will be prepared and considered (40 CFR 1508.22); published in the "Federal Register."

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 U.S.) 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 (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.

NWI—National wetland inventory.

NWR—See *national wildlife refuge.*

NWRS—See *National Wildlife Refuge System.*

objective—Concise statement of what is to be achieved, when and where it is to be achieved, and who is responsible for the work. Objectives are derived from goals and provide the basis for determining management strategies. Objectives should be attainable, time-specific, and measurable.

palustrine—Refers to a nontidal wetland dominated by trees, shrubs, persistent emergents, and emergent mosses or lichens; or a wetland in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand.

paradigm—An example, view, or philosophy serving as a pattern or model.

Partners in Flight—Western Hemisphere program designed to conserve Neotropical migratory birds and officially endorsed by numerous federal and state agencies and nongovernmental organizations; also known as the Neotropical Migratory Bird Conservation Program.

partnership—Contract or agreement entered into by two or more individuals, groups of individuals, organizations or agencies in which each agrees to furnish a part of the capital or some in-kind service, such as labor, for a mutually beneficial enterprise.

patch—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 life span of more than 2 years.

phenology—The relationship between plant or animal development and climatic conditions.

PL—Public law.

planning team—Team that prepares the comprehensive conservation plan. Planning teams are interdisciplinary in membership and function. A team generally consists of a planning team leader; refuge manager and staff biologist; staff specialists or other representatives of Service programs, ecosystems or regional offices; and state partnering wildlife agencies as appropriate.

planning team leader—Typically a professional planner or natural resource specialist knowledgeable of the requirements of National Environmental Policy Act and who has planning experience. The planning team leader manages the refuge planning process and ensures compliance with applicable regulatory and policy requirements.

planning unit—Single refuge, an ecologically or administratively related refuge complex, or distinct unit of a refuge. The planning unit also may include lands currently outside refuge boundaries.

plant association—Classification of plant communities based on the similarity in dominants of all layers of vascular species in a climax community.

plant community—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 (ponderosa pine or bunchgrass).

population sink—A demographic deficit (deaths + immigration > births + emigration) that leads to local species extinction, without immigration from sources.

PPJV—"Prairie Pothole Joint Venture."

predation—Mode of life in which food is primarily obtained by the killing or consuming of animals.

prescribed fire—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—See *wildlife-dependent recreational use*.

pristine—Typical of original conditions.

private land—Land that is owned by a private individual, a group of individuals, or a nongovernmental organization.

private landowner—Any individual, group of individuals, or nongovernmental organization that owns land.

private organization—Any nongovernmental organization.

propagule—Any part of a plant (such as a bud, sucker, spore, or other offshoot) that aids in dispersal of the species and from which a new individual may develop.

proposed action—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). The draft comprehensive conservation plan.

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

public involvement—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.

public involvement plan—Broad long-term guidance for involving the public in the comprehensive planning process.

public land—Land that is owned by the local, state, or federal government.

purpose of the refuge—Purpose 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 U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

refuge complex—A grouping of two or more Service units (for example, national wildlife refuge, wetland management district) that is administered by staff at one of the units.

refuge lands—Lands in which the Service holds full interest in fee title, or partial interest such as limited-interest refuges.

"Refuge Operations Needs System" (RONS)—National database that contains the unfunded operational needs of each refuge. 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.*

region 6—"Mountain–Prairie Region" of the U.S. Fish and Wildlife Service, which administers Service programs in Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Wyoming, and Utah.

rest—Free from biological, mechanical, or chemical manipulation, in reference to refuge lands.

restoration—Artificial manipulation of a habitat to restore it to something close to its natural state. Involves taking a degraded grassland and reestablishing habitat for native plants and animals. Restoration usually involves the planting of native grasses and forbs, and may include shrub removal and prescribed burning.

rhizomatous—A plant having rhizomes.

rhizome—A continuously growing, horizontal, underground stem that produces roots and sends shoots upward at intervals (for example, many iris species).

riparian area *or* **riparian zone**—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 components 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.

riprap—Loose rock used in water or on soft ground to form an embankment or foundation for a structure.

RONS—See *Refuge Operations Needs System.*

rootstock—A root or part of a root used as a stock for reproduction.

runoff —Water from rain, melted snow, or agricultural or landscape irrigation that flows over the land surface into a water body.

SAMMS—See *Service Asset Maintenance Management System.*

sandhills—Sand dunes created by wind and wave action following the melting of large glaciers about 8,000–10,000 years ago. Soils are sand and silt. Local relief exceeds 80 feet in some places.

scarp—A line of low, steep-sloped cliffs or beaches caused by wind or wave erosion.

scoping—Process of obtaining information from the public for input into the planning process.

sediment—Material deposited by water, wind, and glaciers.

seral stage—Any plant community whose plant composition is changing in a predictable way; characterized by a group of species or plant community that will eventually be replaced by a different group of species or plant community, for example, an aspen community changing to a coniferous forest community.

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

"Service Asset Maintenance Management System" (SAMMS) —National database that contains the unfunded maintenance needs of each refuge; projects include those required to maintain existing equipment and buildings, correct safety deficiencies for the implementation of approved plans, and meet goals, objectives, and legal mandates.

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 mud flat areas.

snag—Standing dead tree from which the leaves or needles and most of the branches have fallen. Many species of wildlife and some plants rely on snags for food and cover.

sound professional judgment—Finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the National Wildlife Refuge System Administration Act and other applicable laws.

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. Examples include federally listed endangered, threatened, proposed, or candidate species; state-listed endangered, threatened, candidate, or monitor species; the Service's species of management concern; and species identified by the Partners in Flight program as being of extreme or moderately high conservation concern.

special use permit—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 general public through authorizations in Title 50 CFR or other public regulations ("National Wildlife Refuge System 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. Species that: (1) are documented or have apparent population declines; (2) are small or restricted populations; or (3) depend on restricted or vulnerable habitats.

stand—Any homogenous area of vegetation with more or less uniform soils, landform, and vegetation. Typically used to refer to forested areas.

step-down management plan—Plan that provides the details necessary to carry out management strategies identified in the comprehensive conservation plan ("Draft U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

strategy—Specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives ("Draft U.S. Fish and Wildlife Service Manual" 602 FW 1.5).

submergent—Vascular or nonvascular hydrophyte, either rooted or nonrooted, that lies entirely beneath the water surface, except for flowering parts in some species.

SUP—Special use permit.

surficial—Relating to or occurring on the surface.

tansy ragwort—*Senecio jacobaea* is an Eurasian invasive plant in the sunflower family (Asteraceae). It spreads primarily by seed—a single tansy ragwort plant may produce up to 150,000 seeds, which may remain viable for up to 15 years. All parts of this plant are poisonous. It causes liver damage to cattle and horses, while sheep are affected to a lesser extent. (http://www.oneplan.org/index.htm)

temporarily flooded—Surface water is present for brief periods during the growing season.

threatened species, federal—Species listed under the Endangered Species Act of 1973, as amended, that are

likely to become endangered within the foreseeable future throughout all or a significant portion of their range.

threatened species, state—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.

triage—See *ecological triage.*

trust resource—Resource that, through law or administrative act, is held in trust for the people by the government. A federal trust resource is one for which trust responsibility is given in part to the federal government through federal legislation or administrative act. Generally, federal trust resources are those considered to be of national or international importance no matter where they occur, such as endangered species and species such as migratory birds and fish that regularly move across state lines. In addition to species, trust resources include cultural resources protected through federal historic preservation laws, nationally important and threatened habitats, notably wetlands, navigable waters, and public lands such as state parks and national wildlife refuges.

trust species—See *trust resource.*

understory—Any vegetation whose canopy (foliage) is below, or closer to the ground than canopies of other plants.

upland—Dry ground; other than wetlands.

USACE—U.S. Army Corps of Engineers.

USDA—U.S. Department of Agriculture.

U.S. Fish and Wildlife Service (Service, USFWS)—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 composed 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.

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

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

U.S. Geological Survey (USGS)—Federal agency whose mission is to provide reliable scientific information to describe and understand the earth; minimize 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—Concise statement of what the planning unit should be, or what the Service hopes to do, based primarily on the Refuge System mission, specific refuge purposes, and other mandates. In addition, the vision statement is tied to the maintenance and restoration of biological integrity, diversity, and environmental health of each refuge and the Refuge System.

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)—Measurement of the density of a plant community; the height of vegetation that blocks the view of predators to a nest.

VOR—See *visual obstruction reading.*

wading birds—Birds having long legs that enable them to wade in shallow water. Includes egrets, great blue herons, black-crowned night-herons, and bitterns.

warm-season grass—Grass that begins growth later in the season (early June); require warmer soil temperatures to germinate and actively grow when temperatures are warmer (85–95°F). Examples are Indiangrass, switchgrass, and big bluestem.

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

watershed—Geographic area within which water drains into a particular river, stream or body of water. A watershed includes both the land and the body of water into which the land drains.

wetland—Land transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.

wetland easement—Perpetual agreement entered into by a landowner and the Service. The easement covers only the wetlands specified in the agreement. In return for a single lump-sum payment, the landowner agrees not to drain, burn, level, or fill wetlands covered by the easement.

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

WG—Wage grade schedule (pay rate schedule for certain federal positions).

wilderness—"A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain" (Wilderness Act of 1964 Section 2c [PL 88-577)]). This legal definition places wilderness in the "untrammeled" or "primeval" end of the environmental modification spectrum. Wilderness is roadless lands, legally classified as component areas of the National Wilderness Preservation System, and managed to protect its qualities of naturalness, solitude, and opportunity for primitive types of recreation.

wilderness, recommended—Area studied and found suitable for wilderness designation by both the Director and Secretary, and recommended for designation by the President to Congress. These areas await only legislative action by Congress in order to become part of the Wilderness System. Such areas are also referred to as "pending in Congress" ("Draft U.S. Fish and Wildlife Service Manual" 610 FW 1.5).

wilderness, study area—Lands and waters identified through inventory as meeting the definition of wilderness and undergoing evaluation for recommendation for inclusion in the Wilderness System. A study area must meet the following criteria: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least 5,000 contiguous roadless acres or is sufficient in size as to make practicable its preservation and use in an unimpaired condition ("Draft U.S. Fish and Wildlife Service Manual" 610 FW 1.5).

wildfire—Free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs in wildlands ("U.S. Fish and Wildlife Service Manual" 621 FW 1.7).

wildland fire—Every wildland fire is either a wildfire or a prescribed fire ("U.S. Fish and Wildlife Service Manual" 621 FW 1.3).

wildlife-dependent recreational use—Use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation. These are the six priority public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife.

wildlife management—Practice of manipulating wildlife populations either directly through regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors.

WMD—See *wetland management district.*

woodland—Open stands of trees with crowns not usually touching, generally forming 25–60% cover.

WUI—Wildland–urban interface.

xerophytic—Pertaining to a plant that needs very little water (adapted to growing in dry habitat).

Appendix A
Key Legislation and Policies

In alphabetical order of the name of the act, order, or regulation.

American Indian Religious Freedom Act (1978): Directs agencies to consult with native traditional religious leaders to determine appropriate 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 (16 U.S.C. 431–433): The act of June 8, 1906 (34 Stat. 225) authorizes the president to designate as national monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The act required that a permit be obtained for examination of ruins, excavation of archaeological sites, and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archaeological Resources Protection Act (16 U.S.C. 470aa–470ll): Public Law (PL) 96-95, approved October 31, 1979 (93 Stat. 721): Largely supplants the resource protection provisions of the Antiquities Act for archaeological items. This act establishes detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from federal or Indian lands. It also establishes civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from federal or Indian land in violation of any provision of federal law; and for interstate and foreign commerce in such resources acquired, transported, or received in violation of any state or local law.

> *PL 100-588, approved November 3, 1988 (102 Stat. 2983):* Lowers the threshold value of artifacts triggering the felony provisions of the act from $5,000 to $500; makes attempting to commit an action prohibited by the act a violation; and requires the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the nation.

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

Archeological and Historic Preservation Act (16 U.S.C. 469–469c): PL 86-523, approved June 27, 1960 (74 Stat. 220) as amended by PL 93291, approved May 24, 1974 (88 Stat. 174) to carry out the policy established by the "Historic Sites Act" (see below), directed federal agencies to notify the Secretary of the Interior whenever they find a federal or federally assisted, licensed, or permitted project may cause loss or destruction of significant scientific, prehistoric, or archaeological data. The act authorizes use of appropriated, donated, and transferred funds for the recovery, protection, and preservation of such data.

Clean Water Act (1977): Requires consultation with the USACE for major wetland modifications.

Criminal Code of Provisions of 1940, as amended, (18 U.S.C. 41): States the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds. Provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any such wildlife, or willfully injures, molests, or destroys any property of the United States on such land or water, shall be fined up to $500 or imprisoned for not more than 6 months or both.

Emergency Wetland Resources Act of 1986: Authorizes the purchase of wetlands from Land and Water Conservation Fund monies, removing a prior prohibition on such acquisitions. The act also requires the Secretary to establish a national wetlands priority conservation plan, requires the states to include wetlands in their comprehensive outdoor recreation plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 and recent amendments (16 U.S.C. 1531–1543; 87 Stat. 884), as amended: This establishing legislation provides for conservation of threatened and endangered species of fish, wildlife, and plants by federal action and by encouraging state programs. Specific provisions include

> the listing and determination of critical habitat for endangered and threatened species and consultation with the Service on any federally funded or licensed project that could affect any of these agencies;
>
> prohibition of unauthorized taking, possession, sale, transport, etc., of endangered species;
>
> an expanded program of habitat acquisition;
>
> establishment of cooperative agreements and grants-in-aid to states that establish and

maintain an active, adequate program for endangered and threatened species;

assessment of civil and criminal penalties for violating the act or regulations.

Environmental Education Act of 1990 (20 U.S.C. 5501–5510; 104 Stat. 3325): PL 101-619, signed November 16, 1990, established the Office of Environmental Education within the U.S. Environmental Protection Agency (EPA) to develop and administer a federal environmental education program. Responsibilities of the office include developing and supporting programs to improve understanding of the natural and developed environment, and the relationships between humans and their environment; supporting the dissemination of educational materials; developing and supporting training programs and environmental education seminars; managing a federal grant program; and administering an environmental internship and fellowship program. The office is required to develop and support environmental programs in consultation with other federal natural resource management agencies, including the Service.

EO 11644—Use of Off-road Vehicles on Public Lands (1972): Provides policy and procedures for regulating off-road vehicles.

EO 11988—Floodplain Management: This executive order, signed May 24, 1977, prevents federal agencies from contributing to the "adverse impacts associated with occupancy and modification of floodplains" and the "direct or indirect support of floodplain development." In the course of fulfilling their respective authorities, federal agencies "shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by floodplains."

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

EO 13007—Indian Sacred Sites (1996): Directs federal land management agencies to accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, avoid adversely affecting the physical integrity of such sacred sites, and where appropriate, maintain 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.

Federal Water Pollution Control Act of 1972, Section 401 (PL 92-500; 86 Stat. 816, 33 U.S.C. 1411): Requires any applicant for a federal license or permit to conduct any activity that may result in a discharge into navigable waters to obtain a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over navigable waters at the point where the discharge originates or will originate, that the discharge will comply with applicable effluent limitations and water quality standards. A certification obtained for construction of any facility must also pertain to subsequent operation of the facility.

Federal Water Pollution Control Act of 1972, Section 404 (PL 92-500, 86 Stat. 816): Authorizes the Secretary of the Army, acting through the Chief of Engineers, to issue permits, after notice and opportunity for public hearing, for discharge of dredged or fill material into navigable waters of the United States, including wetlands, at specified disposal sites. Selection of disposal sites will be in accordance with guidelines developed by the Administrator of the EPA in conjunction with the Secretary of the Army. Furthermore, the Administrator can prohibit or restrict use of any defined area as a disposal site whenever she/he determines, after notice and opportunity for public hearings, that discharge of such materials into such areas will have an unacceptable adverse effect on municipal water supplies, shellfish beds, fishery areas, wildlife, or recreational areas.

Fish and Wildlife Act of 1956 (70 Stat. 1119; 16 U.S.C. 742a–742j), as amended: Establishes a comprehensive fish and wildlife policy and directs the Secretary of the Interior to provide continuing research; and extension and conservation of fish and wildlife resources.

Fish and Wildlife Conservation Act of 1980 (PL 96-366, September 29, 1980, 16 U.S.C. 2901–2911, as amended 1986, 1988, 1990, and 1992): Creates a mechanism for federal matching funding of the development of state conservation plans for nongame fish and wildlife. Subsequent amendments to this law require that the Secretary monitor and assess migratory nongame birds, determine the effects of environmental changes and human activities, identify birds likely to be candidates for endangered species listing, and identify conservation actions that would prevent this from being necessary. In 1989, Congress also directed the Secretary to identify lands and waters in the Western Hemisphere, the protection, management, or acquisition of which would foster conservation of migratory nongame birds. All of these activities are intended to assist the Secretary in fulfilling the Secretary's responsibilities under the Migratory Bird Treaty Act and the Migratory Bird

Conservation Act, and provisions of the Endangered Species Act implementing the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere.

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.

Fish and Wildlife Improvement Act of 1978: Improves the administration of fish and wildlife programs and amends several earlier laws including the Refuge Recreation Act, the National Wildlife Refuge System Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the Secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers for Service projects and appropriations to carry out volunteer programs.

Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461–462, 464–467): The act of August 21, 1935 (49 Stat. 666), popularly known as the "Historic Sites Act," as amended by PL 89-249, approved October 9, 1965 (79 Stat. 971), declares it a national policy to preserve historic sites and objects of national significance, including those located at refuges. It provides procedures for designation, acquisition, administration, and protection of such sites. Among other things, National Historic and Natural Landmarks are designated under authority of this act. As of January 1989, 31 national wildlife refuges contained such sites.

Land and Water Conservation Fund Act of 1965: Provides funds from leasing bonuses, production royalties, and rental revenues for offshore oil, gas, and sulphur extraction to the Bureau of Land Management, the USDA Forest Service, the U.S. Fish and Wildlife Service, and state and local agencies for purchase of lands for parks, open space, and outdoor recreation.

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715–715d, 715e, 715f–715r): Establishes the Migratory Bird Conservation Commission, which consists of the Secretaries of the Interior (chair), Agriculture, and Transportation; two members from the House of Representatives; and an ex-officio member from the state in which a project is located. The commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary of the Interior for sanctuaries or for other management purposes. Under this act, to acquire lands or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715s, 45 Stat. 1222), as amended: Authorizes acquisition, development, and maintenance of migratory bird refuges; cooperation with other agencies in conservation; and investigations and publications on North American birds. Authorizes payment of 25% of net receipts from administration of national wildlife refuges to the country or counties in which such refuges are located.

Migratory Bird Hunting and Conservation Stamp Act of 1934 (16 U.S.C. 718–718h; 48 Stat. 51), as amended: The "Duck Stamp Act," as this March 16, 1934 authority is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid federal hunting stamp. The act authorized the requirement of an annual stamp for the hunting of waterfowl. Proceeds go towards the purchase of habitat for waterfowl and other wildlife. Duck stamps are also purchased: (1) for entry into some refuges; (2) by conservationists; and (3) for stamp collections. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703–711; 50 CFR subchapter B), as amended: Implements treaties with Great Britain (for Canada) and Mexico for protection of migratory birds whose welfare is a federal responsibility. The act provides for regulations to control taking, possession, selling, transporting, and importing of migratory birds and provides penalties for violations. This act enables the setting of seasons and other regulations (including the closing of areas, federal or nonfederal) related to the hunting of migratory birds.

National and Community Service Act of 1990 (42 U.S.C. 12401; 104 Stat. 3127): PL 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the United States in full and part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. The act will make grants to states for the creation of programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive postemployment benefits of up to $1,000 per year for part-time and $2,500 for full-time participants.

Several provisions are of particular interest to the Service:

American Conservation and Youth Service Corps: As a federal grant program established under subtitle C of the law, the corps offers an opportunity for young adults between the ages of 16 and 25, or in the case of summer programs, between 15 and 21, to engage in approved human and natural resources projects that benefit the public or are carried out on federal or Indian lands. To be eligible for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery

assistance, erosion, wetlands protection, pollution control, and similar projects. A stipend of not more than 100% of the poverty level will be paid to participants. A commission established to administer the Youth Service Corps will make grants to states, the Secretaries of Agriculture and Interior, and the Director of ACTION to carry out these responsibilities.

Thousand Points of Light: Creates a nonprofit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer to solve critical social issues, discover new leaders, and develop institutions committed to serving others.

National Environmental Policy Act of 1969 (PL 91-190, 42 U.S.C. 4321–4347, January 1, 1970, 83 Stat. 852) as amended by PL 94-52, July 3, 1975, 89 Stat. 258, and PL 94-83, August 9, 1975, 89 Stat. 424: 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 the implementation of all actions, federal agencies must integrate the act with other planning requirements, and to prepare appropriate documents to facilitate better environmental decision making (40 CFR 1500). The act declares national policy to encourage a productive and enjoyable harmony between humans and their environment.

Section 102 of that act directs that "to the fullest extent possible

> the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this act, and
>
> all agencies of the Federal Government shall ... insure that presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic technical considerations."

Section 102(2)c of the NEPA requires all federal agencies, with respect to major federal actions significantly affecting the quality the quality of the human environment, to submit to the Council on Environmental Quality a detailed statement of

> the environmental impact of the proposed action;
>
> any adverse environmental effect that cannot be avoided should the proposal be implemented;
>
> alternatives to the proposed action;
>
> the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity;
>
> any irreversible and irretrievable commitments of resources that would be involved in the proposed action, should it be implemented.

National Historic Preservation Act of 1966 (16 U.S.C. 470–470b, 470c–470n): PL 89-665, approved October 15, 1966 (80 Stat. 915), and repeatedly amended, provides for preservation of significant historical features (buildings, objects, and sites) through a grants-in-aid program to the states. It establishes the National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468–468d). The act establishes the Advisory Council on Historic Preservation, which was made a permanent independent agency in PL 94-422, approved September 28, 1976 (90 Stat. 1319). That act also creates the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register. As of January 1989, 91 historic sites at national wildlife refuges have been placed on the National Register.

National Wildlife Refuge System Administration Act of 1966 (PL 89-669; 80 Stat. 929; 16 U.S.C. 668dd–668ee), as amended: This act defines the Refuge System as including wildlife refuges, areas for protection and conservation of fish and wildlife that are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. The Secretary is authorized to permit any use of an area provided such use is compatible with the major purposes for which such area was established. The purchase considerations for rights-of-way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40% of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40% of such area would be beneficial to the species. The act requires an act of Congress for the divestiture of lands in the system, except for (1) lands acquired with Migratory Bird Conservation Commission funds, and (2) lands that can be removed from the system by land exchange, or if brought into the system by a cooperative agreement, then pursuant to the terms of the agreement.

National Wildlife Refuge System Improvement Act of 1997 (PL 105-57, October 9, 1997, Amendment to the National Wildlife Refuge System Administration Act of 1966): Sets the mission and the administrative policy for all refuges in the Refuge System. Clearly 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; establishes the responsibilities of the Secretary of the Interior for managing and protecting the Refuge System; and requires a CCP for each refuge by the

year 2012. This act amended portions of the Refuge Recreation Act and the National Wildlife Refuge System Administration Act of 1966.

Key provisions include the following:

a requirement that the Secretary of the Interior ensures maintenance of the biological integrity, diversity, and environmental health of the Refuge System;

the definition of compatible wildlife-dependent recreation as "legitimate and appropriate general public use of the [National Wildlife Refuge] System";

the establishment of hunting, fishing, wildlife observation, wildlife photography, environmental education, and interpretation as "priority public uses" where compatible with the mission and purpose of individual national wildlife refuges;

the refuge managers' authority to use sound professional judgment in determining which public uses are compatible at national wildlife refuges and whether or not they will be allowed (a formal process for determining "compatible use"" is currently being developed);

the requirement of open public involvement in decisions to allow new uses of national wildlife refuges and renew existing ones, as well as in the development of CCPs for national wildlife refuges.

National Wildlife Refuge Regulations (50 CFR 25-35, 43 CFR 3103.2 and 3120.3–3): Provides regulations for administration and management of national wildlife refuges including mineral leasing, exploration, and development.

Rights-of-way General Regulations (50 CFR 29.21; 34 FR 19907, December 19, 1969): Provides for procedures for filing applications. Provides terms and conditions under which rights-of-way over, above, and across lands administered by the Service may be granted.

Wilderness Preservation and Management (50 CFR 35; 78 Stat. 890; 16 U.S.C. 1131-1136; 43 U.S.C. 1201): Provides procedures for establishing wilderness units under the Wilderness Act of 1964 at units of the Refuge System.

National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998: The purposes of this act are: (1) to encourage the use of volunteers to assist the Service in the management of refuges within the Refuge System; (2) to facilitate partnerships between the Refuge System and nonfederal entities to promote public awareness of the resources of the Refuge System and public participation in the conservation of those resources; and (3) to encourage donations and other contributions by persons and organizations to the Refuge System (PL 105-242; 112 Stat. 1575).

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

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401–4412): PL 101-233, enacted December 13, 1989: An act to conserve North American wetland ecosystems, waterfowl and other migratory birds, fish, and wildlife that depend on such habitats. The act established a council to review project proposals and provided funding for the projects. The act provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, United States, and Mexico. The act converts the Pittman–Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the act, along with an authorization for annual appropriation of $15 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act. Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50% of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100% of the cost of projects on federal lands). At least 50% and no more than 70% of the funds received are to go to Canada and Mexico each year.

Refuge Recreation Act of 1962: Authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the areas' primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Refuge Recreation Act of 1966 (PL 87-714; 76 Stat. 653–654; 16 U.S.C. 460k et seq.): Authorizes appropriate, incidental, or secondary recreational use at conservation areas administered by the Secretary of the Interior for fish and wildlife purposes.

Refuge Revenue Sharing Act (16 U.S.C. 715s): Section 401 of the act of June 15, 1935 (49 Stat. 383) provides for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges.

PL 88-523, approved August 30, 1964 (78 Stat. 701): Makes major revisions by requiring that all revenues received from refuge products such as animals, timber and minerals, or from leases or other privileges, be deposited in a

special Treasury account and net receipts distributed to counties for public schools and roads.

PL 93-509, approved December 3, 1974 (88 Stat. 1603): Requires that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

PL 95-469, approved October 17, 1978 (92 Stat. 1319): Expands the revenue-sharing system to include national fish hatcheries and Service research stations. It also includes in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as follows:

> On acquired land, the greatest amount calculated on the basis of 75 cents per acre, ¾ of 1% of the appraised value, or 25% of the net receipts produced from the land.
>
> On land withdrawn from the public domain, 25% of net receipts and basic payments under PL 94-565 (31 U.S.C. 1601–1607, 90 Stat. 2662), payment in lieu of taxes on public lands.
>
> This amendment also authorizes appropriations to make up any difference between the amount in the fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county that suffer losses in revenues due to the establishment of Service areas.

Refuge Revenue Sharing Act of 1978 [PL 95-469, October 17, 1978, (amended 16 U.S.C. 715s); 50 CFR, part 34]: Changes the provisions for sharing revenues with counties in a number of ways. It makes revenue sharing applicable to all lands administered by the Service, whereas previously it was applicable only to areas in the Refuge System. The new law makes payments available for any governmental purpose, whereas the old law restricted the use of payments to roads and schools. For lands acquired in fee simple, the new law provides a payment of 75 cents per acre, ¾ of 1% of fair market value or 25% of net receipts, whichever is greatest, whereas the old law provided a payment of ¾ of 1% adjustment cost or 25% of net receipts, whichever was greater. The new law makes reserve (public domain) lands entitlement lands under PL 94-565 (16 U.S.C. 1601–1607, and provides for a payment of 25% of net receipts. The new law authorizes appropriations to make up any shortfall in net receipts, to make payments in the full amount for which counties are eligible. The old law provided that if net receipts were insufficient to make full payment, payment to each county would be reduced proportionality.

Refuge Trespass Act of June 28, 1906 (18 U.S.C. 41; 43 Stat. 98, 18 U.S.C. 145): Provides the first federal protection for wildlife at national wildlife refuges. This act makes it unlawful to hunt, trap, capture, willfully disturb, or kill any bird or wild animal, or take or destroy the eggs of any such birds, on any lands of the United States set apart or reserved as refuges or breeding grounds for such birds or animals by any law, proclamation, or executive order, except under rules and regulations of the Secretary. The act also protects government property on such lands.

Refuge Trespass Act of June 25, 1948 (18 U.S.C. 41. Stat 686), section 41 of the Criminal Code, title 18: Consolidates the penalty provisions of various acts from January 24, 1905 (16 U.S.C. 684–687; 33 Stat. 614), through March 10, 1934 (16 U.S.C. 694–694b; 48 Stat. 400) and restates the intent of Congress to protect all wildlife within federal sanctuaries, refuges, fish hatcheries, and breeding grounds.

The act provides that anyone (except in compliance with rules and regulations promulgated by authority of law) who hunts, traps, or willfully disturbs any wildlife on such areas, or willfully injures, molests, or destroys any property of the United States on such lands or waters, shall be fined, imprisoned, or both.

Rehabilitation Act of 1973 (29 U.S.C. 794), as amended: Title 5 of PL 93-112 (87 Stat. 355), signed October 1, 1973, prohibits discrimination on the basis of handicap under any program or activity receiving federal financial assistance.

Rivers and Harbors Act (1899): Section 10 of this act requires the authorization of USACE prior to any work in, on, over, or under navigable waters of the United States.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948: Provides that, upon determination by the Administrator of the General Services Administration, real property no longer needed by a federal agency can be transferred without reimbursement to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.

Wilderness Act of 1964 [PL 88-577, September 3, 1964]: Directs the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within the Refuge System and National Park Service for inclusion in the National Wilderness Preservation System.

Laws and Executive Orders that Regulate Recreational Use on the Refuge System

Alaska National Interest Lands Conservation Act of 1980 [16 U.S.C. 410 hh3233] [43 U.S.C. 1602–1784]

Alaska Native Claims Settlement Act [43 U.S.C. 1601–1624]

Antiques Act of 1906 [16 U.S.C. 431–433]

Archaeological and Historic Preservation Act of 1960 [16 U.S.C. 469–469c], as amended

Archaeological Resources Protection Act of 1979 [16 U.S.C. 470aa–470mm]

Comprehensive Environmental Responses, Compensation and Liability Act of 1980

Endangered Species Act of 1973 [16 U.S.C. 1531–1544], as amended

The Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)], as amended

Fish and Wildlife Conservation Act [16 U.S.C. 2901–2911], as amended

The Fish and Wildlife Coordination Act [16 U.S.C. 661(1)–662(c)]

Fish and Wildlife Improvement Act of 1978 [16 U.S.C. 7421]

Historic Sites, Building and Antiquities Act of 1935 [16 U.S.C. 461–462, 464–467]

Land and Water Conservation Fund [16 U.S.C. 460(l–4)–(l–11)], as amended.

Migratory Bird Conservation Act of 1929 [16 U.S.C. 715–715d, 715e, 715f–715r], as amended

National Wildlife Refuge System Administration Act of 1966 [16 U.S.C. 668dd–669ee], as amended

National Wildlife Refuge System Improvement Act of 1997

Natural Historic Preservation Act of 1966 [16 U.S.C. 470–470b, 470c–470n], as amended

Refuge Recreation Act of 1962 [16 U.S.C. 460k–460k4], as amended

Refuge Recreation Act of 1969 [16 U.S.C. 460k–460k4], as amended

Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended

Wild and Scenic Rivers Act [16 U.S.C. 1271–1287], as amended

Wilderness Act of 1964 [16 U.S.C. 1131–1136]

EO 11593—Protection and Enhancement of the Cultural Environment; Protection of Historical, Archaeological, and Scientific Properties

EO 11644—Use of Off-road Vehicles on Public Lands

EO 11988—Floodplain Management

EO 11990—Protection of Wetlands

EO 12372—Intergovernmental Review of Federal Program

Laws and Executive Orders that Regulate Recreational Use on the Refuge System
EO 12962—Recreational Fisheries
EO 12996—Management and General Public Use of the National Wildlife Refuge System
EO 13006—Locating Federal Facilities On Historic Properties In Our Nation's Central Cities
EO 13007—Indian Sacred Sites
EO 13287—Preserve America

Appendix B
Contributors

This draft CCP and EA is the result of extensive, collaborative, and enthusiastic efforts by the 18 members of the Souris River basin refuges planning team below. Many others contributed insight and support.

Planning Team

Name	*Title*	*Agency*
Lee Albright	*Former* WMD manager, J. Clark Salyer NWR	USFWS
Duane Anderson	Biological science technician, Upper Souris NWR	USFWS
Mark Ely	GIS specialist	USFWS
Gary Erickson	Refuge manager, J. Clark Salyer NWR	USFWS
Fred Giese	*Former* project leader, Des Lacs NWR	USFWS
Todd Grant	Wildlife biologist, Souris River Basin Complex	USFWS
Toni Griffin	Planning team leader	USFWS
Tedd Gutzke	Project leader, Souris River Basin Complex	USFWS
Robert Howard	*Former* project leader, J. Clark Salyer NWR	USFWS
Dean Knauer	*Former* project leader, Upper Souris NWR	USFWS
Randy Kreil	Division chief, wildlife division	NDGF
Darla Leslie	Administrative assistant, Upper Souris NWR	USFWS
Chase Marshall	Fire management officer, J. Clark Salyer NWR	USFWS
Robert Murphy	*Former* wildlife biologist, Des Lacs NWR	USFWS
Tom Pabian	Refuge manager, Upper Souris NWR	USFWS
Scott Peterson	Wildlife resource management supervisor	NDGF
Dan Severson	Refuge manager, Des Lacs NWR	USFWS

Bob Murphy and Todd Grant (wildlife biologists for Des Lacs NWR Complex and J. Clark Salyer NWR Complex, respectively) were principle authors of the biological portions of this draft CCP and EA, in addition to their overall team participation.

Contributors

The Service would like to acknowledge the efforts of the following individuals toward the completion of this draft CCP and EA. The diversity, talents, and knowledge contributed by these individuals dramatically improved the vision and completeness of this document.

Name	*Title*	*Agency*
Bob Barrett	Deputy refuge supervisor; North Dakota, South Dakota	USFWS
Elgin Crows Breast	Cultural preservation officer	Three Affiliated Tribes
Rick Coleman	Assistant regional director, NWRS	USFWS

Name	*Title*	*Agency*
Megan Estep	Regional hydrologist	USFWS
Larry Gamble	Environmental contaminants coordinator	USFWS
Galen Green	Fire ecologist, *retired*	USFWS
Lloyd Jones	Regional compatibility coordinator	USFWS
Linda Kelly	*Former* branch chief, comprehensive conservation planning	USFWS
Jim Kelton	Regional fire management specialist	USFWS
Wayne King	Regional biologist	USFWS
Lynne Koontz	Economist	USGS, Fort Collins Science Center
Rod Krey	Refuge supervisor; North Dakota, South Dakota	USFWS
Murray Laubhan	Biologist	USGS, Northern Prairie Wildlife Research Center
Rachael Laubhan	Biologist	USFWS
Johnida Martin	*Former* wildlife biologist, Upper Souris NWR	USFWS
Rich Meyer	Tribal member	Three Affiliated Tribes
Bruce Nadeau	Tribal member	Turtle Mountain Band of Chippewa
Steve Odegaard	Resource manager	USACE
Deb Parker	Writer-editor	USFWS
Davis Redhorse	Native American liaison	USFWS
Cory Rubin	*Former* wildlife biologist, Upper Souris NWR	USFWS
Natalie Sexton	Wildlife biologist	USGS, Fort Collins Science Center
Michael Spratt	Division chief, division of refuge planning	USFWS
Jeffery Towner	Field supervisor, ecological services, Bismarck, ND	USFWS
Connie Young-Dubovsky	Regional NEPA coordinator	USFWS

Appendix C
Public Involvement

Public scoping began January 17, 2003, with publication of an NOI in the Federal Register to prepare comprehensive conservation plans and associated environmental documents for the three Souris River basin refuges.

In March 2003, a planning update was sent to each individual, organization, and government representative on the CCP mailing list (see list below). The planning update provided information on the history of the Refuge System and the CCP process, along with an invitation and schedule to upcoming open houses.

Open houses were announced in local newspapers, radio, and television stations. Flyers were posted at local businesses throughout the region, and announcements were made at meetings of local organizations including Minot City Council, Bottineau County Wildlife Club, and Bottineau Rotary Club.

Six public open houses were held in local communities throughout the Souris River basin area March 24–27, 2003. At the start of each meeting, the CCP planner or refuge personnel gave a presentation on the history of the program, along with an overview of the CCP and NEPA processes. Attendees were encouraged to ask questions and offer comments. The turnout was mixed, from a few attendees to 18 individuals at a single-refuge meeting. In addition to scoping meetings, postage-paid comment forms were sent to everyone on the mailing list.

A second planning update was distributed in November 2003. This update provided information about the on-going public involvement effort and a summary of public comments that were received during the public open houses.

A total of 57 comments were received during the scoping effort. Input obtained from open houses, letters, comment forms, and planning updates was considered in developing this draft CCP. These comments identified biological, social, and economic concerns regarding refuge management.

The planning team's response to public comments will be completed prior to final approval of the CCP.

The following list of recipients was developed for this draft CCP.

Federal Officials

U.S. Representative Earl Pomeroy, Washington DC
Rep. Pomeroy's Area Director, Bismarck, ND

U.S. Senator Kent Conrad, Washington DC
Sen. Conrad's Area Director, Minot, ND

U.S. Senator Byron Dorgan, Washington DC
Sen. Dorgan's Area Director, Minot, ND

Federal Agencies

USACE, Fargo, ND

U.S. Fish and Wildlife Service, Bismarck, ND

U.S. Fish and Wildlife Service, Ecological Services, Bismarck, ND

U.S. Fish and Wildlife Service, Region 6 Missouri River Fish and Wildlife Management Office, Bismarck, ND

USGS, Northern Prairie Wildlife Research Center, Jamestown, ND

USGS, Fort Collins Science Center, Fort Collins, CO

Tribal Officials

Fort Peck Tribal Executive Board, Popular, MT

Sisseton–Wahpeton Sioux Tribe, Agency Village, SD

Spirit Lake Tribal Council, Fort Totten, ND

Standing Rock Sioux Tribe, Fort Yates, ND

Three Affiliated Tribes, New Town, ND

Turtle Mountain Band of Chippewa, Belcourt, ND

State Officials

Governor John Hoeven, Bismarck, ND

Representative Glen Froseth, Kenmare, ND

Representative Bob Hunskor, Newburg, ND

Senator David O'Connell, Lansford, ND

State Agencies

NDGF, Bismarck, ND

NDGF, Minot, ND

NDGF, Riverdale, ND

North Dakota State Water Commission, Bismarck, ND

Local Government

Callahan Township Chairman, Carpio, ND

Council Chair, Carpio, ND

Grassland Township Chairman, Lansford, ND

Grover Township Chairman, Tolley, ND

Hamlet Township Chairman, Mohall, ND

Lockwood Township Chairman, Lansford, ND

Mayland Township Chairman, Carpio, ND

Mayor of Berthold, ND

Mayor of Burlington, ND

Mayor of Carpio, ND

Mayor of Des Lacs, ND

Mayor of Donnybrook, ND

Mayor of Glenburn, ND

Mayor of Grano, ND

Mayor of Kenmare, ND

Mayor of Lansford, ND

Mayor of Minot, ND

Mayor of Mohall, ND

Mayor of Tolley, ND

Mayor of Sherwood, ND

McKinney Township Chairman, Tolley, ND

Mouse River Park Board, Sherwood and Tolley, ND

Muskego Township Chairman, Lansford, ND

Plain Township Chairman, Carpio, ND

Renville County Agent, Mohall, ND

Renville County Auditor, Mohall, ND

Renville County Commissioners, Mohall, ND

Renville County District Conservationist, Mohall, ND

Renville County Historical Society, Sherwood, ND

Renville County Sheriff's Office, Mohall, ND

Renville County Soil Conservation Technician, Mohall, ND

Renville County Water Board Chairman, Mohall, ND

Renville County Water Board, Glenburn and Kenmare, ND

Renville County Weed Board Chairman, Kenmare, ND

Roosevelt Township Chairman, Sherwood, ND

St. Mary's Township Chairman, Berthold, ND

Ward County Commissioners, Minot, ND

Ward County Engineer, Minot, ND

Ward County Historical Society, Minot, ND

Ward County Sheriff's Office, Minot, ND

Ward County Water Resource Board, Minot, ND

Ward County Weed Control Officer, Minot, ND

Local Fire Departments

Carpio Rural Fire District, Carpio, ND

Lansford Rural Fire District, Lansford, ND

Mohall Rural Fire District, Mohall, ND

Tolley Fire Department, Kenmare, ND

Universities, Schools, and Libraries

Glenburn School Board President, Glenburn, ND

Kenmare School Board President, Kenmare, ND

Mohall, Lansford, and Sherwood (MLS) School District #1, Mohall, ND

United School District Board President, Des Lacs, ND

Organizations

Berthold Sportsman Club, Berthold, ND

Hooterville Flying Lions, Minot, ND

The Humane Society of the United States, Washington, DC

Kenmare Chamber of Commerce, Kenmare, ND

Kenmare Goosefest, Kenmare, ND

Minot Area Chamber of Commerce, Minot, ND

Minot Convention and Visitors Bureau, Minot, ND

Minot Pheasants for the Future, Minot, ND

Mouse River Basin Longbeards, Granville, ND

Mouse River Pheasants, Mohall, ND

North Dakota Wildlife Federation, Minot, ND

Rolling Plains Sportsman Club, Stanley, ND

Roosevelt Park Zoo, Minot, ND

Souris Valley Bird Club, Minot, ND

Theodore Roosevelt Nature and History Association, Medora, ND

Vets Gaming Board, Kenmare, ND

The Wilderness Society, Washington DC

Newspapers

Renville County Farmer, Mohall, ND

Minot Daily News, Minot, ND

Radio and Television Stations

KCJB Radio, Minot, ND

KMOT TV, Minot, ND

KXMC TV, Minot, ND

North Dakota Public Radio, Bismarck, ND

Individuals

141 persons

Appendix D

Plants of the Souris River Basin Refuges

This list includes 410 plant species for which specimens were collected from the Souris River basin refuges during 1998–2005. For each, at least one specimen was mounted, its taxonomy was verified by expert botanists, and specimen(s) were permanently stored in a herbarium at one or more of the three refuges. This is not an exhaustive list of plant species found in the Souris River basin refuges and some omissions are likely.

Nomenclature follows that of the Great Plains Flora Association (1986).

Polypodiacaeae *(True Fern Family)*

Cystopteris fragilis—fragile fern

Equisetaceae *(Horsetail Family)*

Equisetum arvense—common horsetail
Equisetum laevigatum—smooth scouring rush

Selaginellaceae *(Spikemoss Family)*

Selaginella densa—clubmoss

Cupressaceae *(Cypress Family)*

Juniperus scopulorum—Rocky Mountain juniper

Alismataceae *(Waterplantain Family)*

Alisma gramineum—grass water plantain
Alisma plantago-aquatica—water plantain
Sagittaria cuneata—arrowhead

Juncaginaceae *(Arrowgrass Family)*

Triglochin maritima—arrowgrass
Triglochin palustris—arrowgrass

Potamogetonaceae *(Pondweed Family)*

Potamogeton pectinatus—sago pondweed
Potamogeton richardsonii—claspingleaf pondweed

Zannichelliaceae *(Horned Pondweed Family)*

Zannichellia palustris—horned pondweed

Juncaceae *(Rush Family)*

Juncus balticus—Baltic rush
Juncus interior—inland rush
Juncus torreyi—Torrey's rush

Cyperaceae *(Sedge Family)*

Carex atherodes—slough sedge
Carex brevior—fescue sedge
Carex douglassii—Douglas's sedge
Carex duriuscula (+*Carex eleocharis*)—needleleaf sedge
Carex emoryi—Emory's sedge
Carex filifolia—threadleaf sedge
Carex gravida—heavy sedge
Carex hallii—Hall's sedge
Carex inops subsp. *heliophila* (+*Carex heliophilia*)—sun sedge
Carex lacustris—unnamed sedge
Carex laeviconica—glabrous sedge
Carex lanuginosa—woolly sedge
Carex obtusata—unnamed sedge
Carex pellita—woolly sedge
Carex praegracilis—clustered field sedge
Carex rosea—unnamed sedge
Carex sartwellii—Sartwell's sedge
Carex sprengelii—long-beaked sedge
Carex sychnocephala—dense long-beaked sedge
Carex tetanica—unnamed sedge
Cyperus schweinitzii—Schweinitz's flatsedge
Eleocharis acicularis—needle spikesedge
Eleocharis erythropoda—spikesedge
Eleocharis obtusata—blunt spikesedge
Elocharis palustris—common spikerush
Schoenoplectus acutus (+*Scirpus acutus*)—hardstem bulrush
Scirpus americanus—three-square
Scirpus fluviatilis—river bulrush
Scirpus heterochaetus—slender bulrush
Scirpus maritimus var. *paludosus*—prairie bulrush
Scirpus nevadensis—Nevada bulrush
Scirpus tabernaemontani—softstem bulrush

Poaceae *(Grass Family)*

Agropyron caninum—slender wheatgrass
Agropyron caninum subsp. *majus* var. *unilaterale*—bearded wheatgrass
Agropyron cristatum—crested wheatgrass
Agropyron repens—quackgrass
Agropyron smithii—western wheatgrass
Agrostis scabra—ticklegrass
Alopecurus aequalis—short-awn foxtail

Alopecurus arundinaceus—creeping foxtail
Andropogon gerardii—big bluestem
Andropogon hallii—sand bluestem
Andropogon scoparius—little bluestem
Aristida purpurea—three-awn
Beckmannia syzigachne—American sloughgrass
Bouteloua curtipendula—sideoats grama
Bouteloua gracilis—blue gramma
Bromus inermis—smooth brome
Buchloe dactyloides—buffalo grass
Calamovilfa longifolia—prairie sandreed
Dichanthelium wilcoxianum—Wilcox dichanthelium
Distichlis spicata var. *stricta*—inland saltgrass
Echinochloa muricata—barnyard grass
Elymus canadensis—Canada wild rye
Eragrostis cilianensis—stinkgrass
Festuca ovina—sheep's fescue
Glyceria grandis—American mannagrass
Glyceria striata—fowl mannagrass
Helictotrichon hookeri—spike oat
Hierochloe odorata—sweetgrass, vanilla grass
Hordeu jubatum—foxtail barley
Koeleria pyramidata—Junegrass
Muhlenbergia asperifolia—scratchgrass
Muhlenbergia cuspidate—plains muhly
Panicum capillare—witchgrass
Panicum virgatum—switchgrass
Phalaris arundinacea—canarygrass
Phleum pratense—timothy
Phragmites australis—common reed
Poa arida—plains bluegrass
Poa cusickii—early bluegrass
Poa juncifolia—bluegrass
Poa pratensis—Kentucky bluegrass
Poa sandbergii—Sandberg bluegrass
Puccinellia nuttalliana—Nuttall's alkaligrass
Schizachne purpurascens—false melic
Scholochloa festucacea—whitetop
Setaria viridis—green foxtail
Spartina gracilis—alkali cordgrass
Spartina pectinata—prairie cordgrass
Sporobolus cryptandrus—sand dropseed
Sporobolus heterolepis—prairie dropseed
Stipa comata—needle and thread
Stipa spartea—porcupine grass
Stipa viridula—green needlegrass

Sparganiaceae *(Bur-reed Family)*
Sparganium eurycarpum—giant bur-reed

Typhaceae *(Cattail Family)*
Typha angustifolia—narrowleaf cattail
Typha anqustifolia × *latifolia*—hybrid cattail
Typha latifolia—common cattail

Lemnaceae *(Duckweed Family)*
Lemna trisulca—star duckweed
Lemna turionifera—duckweed

Commelinaceae *(Spiderwort Family)*
Tradescantia bracteata—spiderwort

Liliaceae *(Lily Family)*
Allium stellatum—pink wild onion
Allium textile—white wild onion, textile onion
Asparagus officinalis—asparagus
Hypoxis hirsuta—yellow stargrass
Lilium philadelphicum—wild lily
Maianthemum canadense—lily-of-the-valley
Smilacina stellata—spikenard
Zigadenus elegans—white camas

Smilacaceae *(Catbrier Family)*
Smilax herbacea—carrion flower

Iridaceae *(Iris Family)*
Sisyrinchium montanum—blue-eyed grass

Orchidaceae *(Orchid Family)*
Cypripedium calceolus—yellow ladyslipper

Salicaceae *(Willow Family)*
Populus balsamifera—balsam poplar
Populus deltoides—cottonwood
Populus tremuloides—aspen
Salix amygaloides—peachleaf willow
Salix bebbiana—beaked willow
Salix discolor—pussy willow
Salix eriocephala—diamond willow
Salixexigua subsp. i*nterior*—sandbar willow
Salix humilis var. *microphylla*—prairie willow
Salix lutea—yellow willow
Salix petiolaris—meadow willow

Fagaceae *(Beech/Oak Family)*
Quercus macrocarpa—bur oak

Ulmaceae *(Elm Family)*
Ulmus americana—American elm

Cannabaceae *(Hemp Family)*
Humulus lupulus—common hops

Urticaceae *(Nettle Family)*
Laportea canadensis—wood nettle
Urtica dioica—stinging nettle

Santalaceae *(Sandalwood Family)*
Commandra umbellata—bastard toadflax

Polygonaceae *(Buckwheat Family)*
Eriogonum flavum—yellow wild buckwheat
Polygala alba—white milkwort
Polygonum amphibium var. *emursum*—marsh smartweed
Polygonum amphibium var. *stipulaceum*—water smartweed
Polygonum coccineum—marsh smartweed
Polygonum lapathifolium—pale smartweed
Polygonum ramosissimum—knotweed
Rumex crispus—curled dock
Rumex maritimus—golden dock
R*umex stenophyllus*—dock

Chenopodiaceae *(Goosefoot Family)*
Atriplex nuttallii—moundscale
Atriplex subspicata—spearscale
Chenopodium album—lamb's quarters
Chenopodium leptophyllum—narrow-leaved goosefoot
Kochia scoparia—kochia, fireweed
Salsola iberica—Russian thistle

Amaranthaceae *(Amaranth Family)*
Amaranthus retroflexus—pigweed

Nyctaginaceae *(Four O'clock Family)*
Mirabilis nyctaginea—wild four o'clock

Portulacaceae *(Purslane Family)*
Portulaca oleracea—common purslane

Caryophyllaceae *(Pink Family)*
Cerastium arvense—prairie chickweed
Cerastium nutans—nodding chickweed
Gypsophila paniculata—baby's breath
Silene pratensis—white campion
Stellaria crassifolia—fleshy stichwort

Ceratophyllaceae *(Hornwort Family)*
Ceratophyllum demersum—coontail

Ranunculaceae *(Buttercup Family)*
Actea rubra—baneberry
Anemone canadensis—Canada anemone, meadow anemone
Anemone cylindrica—candle anemone
Anemone patens—pasqueflower
Ranunculus abortivus—early wood buttercup
Ranunculus cymbalaria—shore buttercup
Ranunculus flabellaris—yellow water-crowfoot
Ranunculus longirostris—white water-crowfoot
Ranunculus macounii—Macoun's buttercup
Ranunculus pensylvanicus—bristly crowfoot
Ranunculus sceleratus—cursed crowfoot
Ranunculus subrigidus—white water-crowfoot
Thalictrum venulosum—early meadowrue

Menispermaceae *(Moonseed Family)*
Menispermum canadense—moonseed

Brassicaceae *(Mustard Family)*
Arabis divaricarpa—rock cress
Arabis holboellii—rock cress
Berteroa incana—hoary false alyssum
Brassica kaber—charlock
Capsella bursa-pastoris—shepherd's purse
Descurainia sophia—flixweed
Draba nemorosa—yellow whitlowort
Erysimum asperum—western wallflower
Lepidium densiflorum—peppergrass
Lesquerella ludoviciana—bladderpod
Rorripa plaustris—bog yellow cress
Sisymbrium altissimum—tumble mustard
Sisymbrium loeselli—tall hedge mustard
Thlaspi arvense—field pennycress

Capparidaceae *(Caper Family)*
Cleome serrulata—Rocky Mountain bee plant

Saxifragaceae *(Saxifrage Family)*
Heuchera richardsonii—alumroot
Ribes americanum—wild black current

Rosaceae *(Rose Family)*
Agrimonia striata—striate agrimony
Amelanchier alnifolia—Saskatoon serviceberry
Chamaerhodos erecta—little ground rose
Crataegus rotundifolia—northern hawthorn
Frageria virginiana—wild strawberry
Geum triflorum—torch flower
Potentilla anserina—silverweed
Potentilla arguta—tall cinquefoil
Potentilla norvegica—Norwegian cinquefoil
Potentilla paradoxa—bushy cinquefoil
Potentilla pensylvanica—cinquefoil
Prunus americana—wild plum
Prunus pensylvanica—pin cherry
Prunus virginiana—chokecherry
Rosa arkansana—prairie wild rose

Rosa woodsii—western wild rose, Woods' rose
Rubus idaeus—red raspberry
Spirea alba—meadow-sweet

Fabaceae *(Bean Family)*
Amorpha canescens—leadplant
Amorpha nana—dwarf wild indigo
Astragalus adsurgens var. *robustior*—standing milk-vetch
Astragalus agrestis—field milkvetch
Astragalus bisulcatus—two-grooved vetch
Astragalus canadensis—Canada milkvetch
Astragalus crassicarpus—ground-plum
Astragalus flexuosus—pliant mildvetch
Astragalus missouriensis—Missouri milkvetch
Astragalus pectinatus—narrow-leaved poinsonvetch
Astragalus tenellus—pulse milkvetch
Caragana araborescens—Siberian pea-shrub
Dalea candida—white prairie clover
Dalea purpurea—purple prairie clover
Dalea villosa—silky prairie clover
Glycyrrhiza lepidota—wild licorice
Lathyrus ochroleucus—yellow vetchling
Lathyrus venosus—bushy vetchling
Medicago lupulina—black medic
Medicago sativa—alfalfa
Melilotus alba—white sweetclover
Melilotus officianalis—yellow sweetclover
Oxytropis campestris—plains loco
Oxytropis campestris var. *gracilis*—slender locoweed
Oxytropis lambertii—purple locoweed
Oxytropis splendens—showy locoweed
Psoralea argophylla—silver-leaf scurf pea
Psoralea esculenta—breadroot scurf-pea
Thermopsis rhombifolia—prairie buckbean
Vicia americana minor—American vetch

Oxalidaceae *(Woodsorrel Family)*
Oxalis stricta—yellow wood sorrel

Linaceae *(Flax Family)*
Linum perenne—blue flax
Linum rigidum var. *compactum*—compact stiffstem flax
Linum rigidum var. *rigidum*—stiffstem flax
Linum sulcatum—grooved flax

Euphorbiaceae *(Spurge Family)*
Euphorbia esula—leafy spurge
Euphorbia glyptosperma—ridge-seeded spurge

Rhamnaceae *(Buckthorn Family)*
Rhamnus cathartica—common buckthorn

Callitrichaceae *(Water Starwort Family)*
Callitriche hermaphroditica—water starwort

Anacardiaceae *(Sumac Family)*
Rhus glabra—smooth sumac
Toxicodendron radicans—poison ivy

Aceraceae *(Maple Family)*
Acer negundo—boxelder

Balsaminaceae *(Balsam Family)*
Impatiens capensis—spotted touch-me-not

Vitaceae *(Grape Family)*
Parthenocissus quinquefolia—Virginia creeper
Vitis riparia—river-bank grape

Malvaceae *(Mallow Family)*
Sphaeralcea coccinea—red false mallow

Violaceae *(Violet Family)*
Viola adunca—hook-spurred violet
Viola canadensis—tall white violet
Viola nuttallii—Nuttall's violet
Viola pedatifida—prairie violet
Viola rugulosa—tall white violet

Cactaceae *(Cactus Family)*
Coryphantha vivipara—pincushion cactus
Opuntia fragilis—little prickly pear
Opuntia polycantha—plains prickly pear

Elaeagnaceae *(Oleaster Family)*
Elaeagnus angustifolia—Russian olive
Elaeagnus commutata—silverberry
Shepherdia argentea—buffaloberry

Onagraceae *(Evening Primrose Family)*
Calylophus serrulatus—plains yellow primrose
Epilobium angustifolium—fireweed
Epilobium ciliatum subsp. *glandulosum*—willow herb
Gaura coccinea—scarlet gaura
Oenothera biennis—common evening primrose
Oenothera nuttallii—white-stemmed evening primrose

Haloragaceae *(Water Milfoil Family)*
Myriophyllum exalbescens—water milfoil

Araliaceae *(Ginseng Family)*
Aralia nudicaulis—wild sarsaparilla

Apiaceae *(Parsley Family)*
Cicuta maculata—common water hemlock
Heracleum sphondylium—cow parsnip
Musineon divaricatum—wild parsley
Osmorhiza longistylis—anise root
Sanicula marilandica—black snakeroot
Sium suave—water parsnip
Zizia aptera—meadow parsnip

Cornaceae *(Dogwood Family)*
Cornus stolonifera—redosier dogwood

Ericaceae *(Heath Family)*
Arctostaphylos uva-ursi—bearberry

Primulaceae *(Primrose Family)*
Androsace occidentalis—western rock jasmine
Dodecatheon pulchellum—shooting star
Lysimachia ciliata—fringed loosestrife
Lysimachia hybrida—loosestrife
Lysimachia thyrsiflora—tufted loosestrife

Oleaceae *(Olive Family)*
Fraxinus pennsylvanica—green ash
Syringa vulgarus—lilac

Gentianaceae *(Gentian Family)*
Gentiana affinis—northern gentian

Apocynaceae *(Dogbane Family)*
Apocynum androsaemifolium—spreading dogbane

Asclepiadaceae *(Milkweed Family)*
Asclepias incarnata—swamp milkweed
Asclepias involucrate—dwarf milkweed
Asclepias ovalifolia—ovalleaf milkweed
Asclepias syriaca—common milkweed
Asclepias verticillata—whorled milkweed
Asclepias viridiflora—green milkweed

Convolvulaceae *(Morning-glory Family)*
Convolvulus arvensis—field bindweed
Calystegia sepium subsp. *angulata*—hedge bindweed

Cuscutaceae *(Dodder Family)*
Cuscuta gronovii—Gronovius' dodder

Polemoniaceae *(Phlox Family)*
Collomia linearis—collomia
Phlox hoodii—Hood's phlox

Boraginaceae *(Borage Family)*
Hackelia deflexa—stickseed
Lithospermum canescens—hoary puccoon
Lithospermum incisum—narrow leaved puccoon
Mertensia lanceolata—lungwort, wild forget-me-not
Onosmodium molle var. *occidentale*—false gromwell

Verbenaceae *(Verbena Family)*
Verbena bracteata—prostrate vervain
Verbena hastate—swamp vervain

Lamiaceae *(Mint Family)*
Agastache foeniculum—lavender hyssop
Hedeoma hispida—rough false pennyroyal
Lycopus americanus—American bugleweed
Lycopus asper—rough bugleweed
Mentha arvensis—field mint
Monarda fistulosa—wild bergamot
Nepeta cataria—catnip
Physostegia parviflora—obedient plant
Scutellaria galericulata—marsh skullcap
Scutellaria lateriflora—blue skullcap
Stachys palustris—hedge nettle
Teucrium canadense—American germander

Hippuridaceae *(Mare's-tail Family)*
Hippuris vulgaris—common mare's-tail

Solanaceae *(Nightshade Family)*
Physalis virginiana—Virginia ground cherry
Solanum triflorum—cut-leaved nightshade

Scrophulariaceae *(Figwort Family)*
Castilleja sessiliflora—downy paintbrush
Limmosella aquatica—mudwort
Linaria vulgaris—butter and eggs
Orthocarpus luteus—owl clover
Penstemnon albidus—white beardtongue
Penstemon angustifolius—narrow beardtongue
Penstemon gracilis—slender beardtongue

Lentibulariaceae *(Bladderwort Family)*
Utricularia vulgaris—common bladderwort

Plantaginaceae *(Plantain Family)*

Plantago major—common plantain
Plantago rugelii—Rugel's plantain

Rubiaceae *(Madder Family)*

Galium boreale—northern bedstraw
Hedyotis longifolia—slender-leaved bluet

Caprifoliaceae *(Honeysuckle Family)*

Lonicera dioica—limber honeysuckle
Lonicera tatarica—tartarian honeysuckle
Symphoricarpos occidentalis—western snowberry
Viburnum lentago—nannyberry

Cucurbitaceae *(Gourd Family)*

Echinocystis lobata—wild cucumber

Campanulaceae *(Bluebell Family)*

Campanula rotundifolia—harebell
Lobelia kalmii—Kalm's lobelia

Asteraceae *(Aster Family)*

Achillea millefolium—yarrow
Agoseris glauca—false dandelion
Ambrosia psilostachya—western ragweed
Antennaria microphylla—pink pussy-toes
Antennaria neglecta—field pussytoes
Antennaria parvifolia—pussy-toes
Arctium minus—common burdock
Artemisia absinthium—wormwood
Artemisia cana—dwarf sagebrush
Artemisia dracunculus—silky wormwood
Artemisia frigida—fringed sage
Artemisia longifolia—long-leaved sage
Artemisia ludoviciana—white sage
Aster ericoides—white aster
Aster falcatus—smallflower aster
Aster hesperius—marsh aster
Aster laevis—smooth blue aster
Aster oblongifolia—aromatic aster
Aster simplex—panicled aster
Bidens comosa—beggar-ticks
Bidens frondosa—beggar-ticks
Bidens vulgate—beggar-ticks
Centaurea maculosa—spotted knapweed
Chrysopsis villosa—golden aster
Chrysothamnus nauseosus—rabbit brush
Cirsium arvense—Canada thistle
Cirsium flodmanii—Floodman's thistle
Cirsium undulatum—wavy-leaf thistle
Cirsium vulgare—bull thistle
Conyza Canadensis—horse-weed
Crepis runcinata—hawksbeard
Echinacea angustifolia—purple coneflower
Erigeron strigosus—daisy fleabane
Euthamia graminifolia—narrow-leaved goldenrod
Gaillardia aristata—blanket flower
Grindelia squarrosa—curly-top gumweed
Gutierrezia sarothrae—snakeweed
Haplopappus spinulosus—ironplant
Helianthus annus—common sunflower
Helianthus maximilianii –Maximilian sunflower
Helianthus nuttallii subsp. *rydbergii*—Nuttall's sunflower
Helianthus petiolaris—plains sunflower
Helianthus rigidus—stiff sunflower
Iva xanthifolia—marsh elder
Lactuca oblongifolia—blue lettuce
Liatris ligulistylis—gay-feather
Liatris punctata—blazing star
Lygodsmia juncea—skeletonweed
Matricaria chamomile—false chamomile
Matricaria maritime—wild chamomile
Matricaria matricarioides—pineapple weed
Ratibida columnifera—prairie coneflower
Rudbeckia hirta—black-eyed susan
Senecio canus—gray ragwort
Senecio integerrimus—lambstongue groundsel
Senecio platensis—prairie ragwort
Solidago canadensis—Canada goldenrod
Solidago gigantea—late goldenrod
Solidago missouriensis—prairie goldenrod
Solidago mollis—soft goldenrod
Solidago nemoralis—gray goldenrod
Solidago ptarmicoides—sneezewort aster
Solidago rigida—rigid goldenrod
Sonchus arvensis—field sow thistle
Tanacetum vulgare – common tansy
Taraxacum officinale—dandelion
Tragopogon dubius—goat's beard, western salsify
Vernonia fasciculate—ironweed

Appendix E

Plant Group Types of Upland Vegetation at the Souris River Basin Refuges

This appendix describes the hierarchical listing of plant group types (modified from Grant et al. 2004b) used for belt transect surveys of upland vegetation that occurs at the Souris River basin refuges and surrounding areas in North Dakota. One of the below types is recorded for each 0.3 x 1.5-foot segment along an outstretched measuring tape, based on >50% dominance by canopy cover unless otherwise indicated. Scientific names are listed in appendix D.

Shrub and Tree Types

Low Shrub (generally <5 feet tall except in one to few postdisturbance years)

11 snowberry dense (other low shrub species total 0–25%); other plants few or none

12 snowberry (and other low shrub species); remainder mostly native grass–forb types

13 snowberry (and other low shrub species); remainder mostly Kentucky bluegrass

14 snowberry (and other low shrub species); remainder mostly smooth brome (or quackgrass)

15 silverberry prominent, remainder mostly native or invaded native grass-forb types

16 silverberry prominent; remainder mostly Kentucky bluegrass

17 silverberry prominent; remainder mostly smooth brome (or quackgrass)

Tall Shrub (generally 5–16 feet tall) or tree (>16 feet tall)

21 chokecherry, Juneberry, hawthorn, willow, dogwood

22 shrub-stage aspen

23 exotic shrub (for example, caragana, honeysuckle, Russian olive)

31 aspen tree

32 burned-over aspen tree (dead or dying postfire snags)

33 shade-tolerant woodland tree (green ash, boxelder, elm)

Native Grass–Forb and Forb Types

(>95% dominance by native herbaceous plants)*

41 dry cool-season plants (sedges, green needlegrass, needle and thread, wheatgrass species, prairie Junegrass, forbs; often blue grama and some other warm-season plant species)

42 dry warm-season plants (little bluestem, prairie sandreed, plains muhly, fescue species, blue grama, forbs)

43 mesic warm–cool mix (big bluestem, switchgrass, little bluestem, porcupine grass; mat muhly, prairie dropseed, forbs)

46 subirrigated wet meadow microsite within upland (fowl bluegrass, foxtail barley, northern reedgrass, coarse sedge species, baltic rush, dock, prairie cordgrass)

47 cactus

48 clubmoss

**Prairie rose is considered a native forb in this classification.*

Exotic and Invaded Native Grass–Forb Types

51 Kentucky bluegrass >95%

52 Kentucky bluegrass and native grass-forbs, bluegrass 50–95%

53 native grass-forbs and Kentucky bluegrass, bluegrass 5–50%

61 smooth brome (or quackgrass) >95%

62 smooth brome (or quackgrass) and native grass-forbs, brome 50–95%

63 native grass-forbs and smooth brome (or quackgrass), brome 5–50%

71 crested wheatgrass >95%

72 crested wheatgrass and native grass-forbs, crested wheatgrass 50–95%

73 native grass-forbs and crested wheatgrass, crested wheatgrass 5–50%

78 tall, intermediate, or pubescent wheatgrass

Noxious Weed Types

81 leafy spurge

85 Canada thistle

88 other noxious weeds (user defined)

Other

91 barren, unvegetated (for example, rock, anthill, bare soil)

98 tall exotic legume (sweetclover or alfalfa)

00 wetland basin (temporary, seasonal, or semipermanent wetland [Stewart and Kantrud 1971])

Appendix F

Birds of the Souris River Basin Refuges

Bird species found at the three Souris River basin refuges since 1935 total 308 , of which 30 are "accidentals" and 1 is extirpated. About 170 species are known to have nested at the refuges, and 150 of these nest regularly. The following list is adapted from that produced for the refuges by G. Berkey and R. Martin, updated January 2001, as published in the Service publication "National Wildlife Refuges, Along the Souris River Loop, Bird List."

Seasons of Occurrence

- ***Sp*** spring (March–May)
- ***S*** summer (June–July)
- ***F*** fall (August–November)
- ***W*** winter (December–February)

Abundance Categories

The following abundance categories indicate the peak daily and seasonal totals of birds that may be seen by an active, experienced observer spending at least 8 hours per week sampling all types of habitat at a refuge.

a	abundant=	>125 per day, >600 per season
c	common=	25–125 per day, 125–600 per season
f	fairly common=	5–25 per day, 25–125 per season
u	uncommon=	1–5 per day, 5–25 per season
r	rare=	1–5 per season
o	occasional=	small numbers seen at intervals of 2–10 years
•	nested=	species that have nested
(i)	irregular=	indicates a species that is irregular; the abundance category indicates the numbers expected in peak years

(1) extirpated as a breeding species

(2) last observed 1956

Loons	***Sp***	***S***	***F***	***W***
common loon	*r*	*o*	*r*	—
Grebes	***Sp***	***S***	***F***	***W***
pied-billed grebe•	*f*	*f*	*f*	—
horned grebe•	*f*	*r*	*u*	—
red-necked grebe•	*o*	*o*	*o*	—
eared grebe•	*a*	*a*	*a*	—
western grebe•	*c*	*c*	*c*	—
Clark's grebe	*r*	*r*	*r*	—
Pelicans and Cormorants	***Sp***	***S***	***F***	***W***
American white pelican	*c*	*c*	*c*	—
double-crested cormorant	*c*	*c*	*c*	—
Bitterns, Herons, and Egrets	***Sp***	***S***	***F***	***W***
American bittern•	*u*	*u*	*u*	—
least bittern	*o*	*o*	*o*	—
great blue heron•	*f*	*f*	*f*	—
great egret	*o*	*o*	*o*	—
snowy egret•	*o*	*o*	*o*	—
little blue heron•	*o*	*o*	*o*	—
cattle egret•*(i)*	*f*	*f*	*f*	—
black-crowned night-heron•	*f*	*f*	*f*	—
Ibises and Spoonbills	***Sp***	***S***	***F***	***W***
white-faced ibis	*o*	*o*	*o*	—
New World Vultures	***Sp***	***S***	***F***	***W***
turkey vulture	*r*	—	*r*	—
Swans, Geese, and Ducks	***Sp***	***S***	***F***	***W***
greater white-fronted goose	*f*	—	*f*	—
snow goose	*a*	*o*	*a*	*o*
Ross' goose	*u*	—	*u*	—
Canada goose•	*a*	*c*	*a*	*o*
trumpeter swan*(1)*	—	*o*	*o*	—
tundra swan	*c*	*o*	*a*	—
wood duck•	*f*	*f*	*f*	—
gadwall•	*a*	*c*	*a*	—
American wigeon•	*c*	*u*	*c*	—
American black duck•	*o*	*o*	*r*	—
mallard•	*a*	*c*	*a*	*o*
blue-winged teal•	*a*	*c*	*a*	—
cinnamon teal	*o*	*o*	—	—
northern shoveler•	*a*	*c*	*a*	—
northern pintail•	*a*	*c*	*c*	*o*

Swans, Geese, and Ducks (continued)	Sp	S	F	W
green-winged teal•	*f*	*u*	*c*	*o*
canvasback•	*c*	*f*	*c*	—
redhead•	*c*	*f*	*a*	—
ring-necked duck•	*f*	*r*	*f*	—
greater scaup	*r*	—	*r*	—
lesser scaup•	*a*	*u*	*a*	*o*
surf scoter	—	—	*r*	—
white-winged scoter	—	—	*r*	—
black scoter	—	—	*o*	—
long-tailed duck	—	—	*r*	—
bufflehead•	*c*	*r*	*c*	—
common goldeneye	*c*	—	*c*	—
hooded merganser•	*f*	*f*	*f*	—
common merganser	*c*	—	*f*	—
red-breasted merganser	*o*	—	*o*	—
ruddy duck•	*a*	*c*	*a*	—

Osprey, Kites, Hawks, and Eagles	Sp	S	F	W
osprey	*r*	—	*r*	—
bald eagle	*f*	*o*	*f*	*r*
northern harrier•	*c*	*f*	*c*	*o*
sharp-shinned hawk•	*f*	*f*	*f*	*r*
Cooper's hawk•	*u*	*u*	*u*	—
northern goshawk	*o*	—	*r*	*r*
broad-winged hawk•	*u*	*o*	*u*	—
Swainson's hawk•	*f*	*u*	*f*	—
red-tailed hawk•	*c*	*f*	*c*	*o*
ferruginous hawk•	*r*	*o*	*r*	—
rough-legged hawk	*u*	—	*u*	*r*
golden eagle	*r*	—	*r*	*r*

Falcons and Caracaras	Sp	S	F	W
American kestrel•	*f*	*u*	*f*	—
merlin	*r*	—	*u*	*u*
gyrfalcon	—	—	*o*	*o*
peregrine falcon	*r*	*o*	*r*	*o*
prairie falcon	*o*	—	*r*	*r*

Gallinaceous Birds	Sp	S	F	W
gray partridge•	*u*	*u*	*u*	*u*
ring-necked pheasant•	*f*	*f*	*f*	*f*
ruffed grouse•	*u*	*u*	*u*	*u*
sharp-tailed grouse•	*f*	*f*	*f*	*f*
greater prairie-chicken*(1)(2)*	—	—	—	—
wild turkey•	*u*	*u*	*u*	*u*

Rails	Sp	S	F	W
yellow rail•	*r*	*o*	*r*	—
Virginia rail•	*u*	*u*	*u*	—
sora•	*c*	*c*	*c*	—
American coot•	*a*	*a*	*a*	—

Cranes	Sp	S	F	W
sandhill crane•	*a*	*r*	*a*	—
whooping crane	*o*	—	*o*	—

Plovers	Sp	S	F	W
black-bellied plover	*f*	—	*f*	—
American golden-plover	*f*	—	*f*	—
semipalmated plover	*u*	*u*	*u*	—
piping plover•	*o*	*o*	*o*	—
killdeer•	*c*	*c*	*c*	—

Stilts and Avocets	Sp	S	F	W
American avocet•	*c*	*f*	*c*	—

Sandpipers and Phalaropes	Sp	S	F	W
greater yellowlegs	*f*	*f*	*f*	—
lesser yellowlegs	*c*	*c*	*c*	—
solitary sandpiper	*u*	*u*	*u*	—
willet•	*f*	*f*	*f*	—
spotted sandpiper•	*f*	*f*	*f*	—
upland sandpiper•	*f*	*f*	*u*	—
Hudsonian godwit	*u*	*o*	*o*	—
marbled godwit•	*f*	*f*	*f*	—
ruddy turnstone	*r*	*o*	*o*	—
red knot	*o*	*o*	*o*	—
sanderling	*u*	*u*	*u*	—
semipalmated sandpiper	*a*	*c*	*a*	—
western sandpiper	*o*	*o*	*o*	—
least sandpiper	*c*	*f*	*c*	—
white-rumped sandpiper	*a*	*f*	*o*	—
Baird's sandpiper	*c*	*f*	*c*	—
pectoral sandpiper	*c*	*f*	*c*	—
dunlin	*u*	—	*o*	—
stilt sandpiper	*f*	*c*	*c*	—
buff-breasted sandpiper	*o*	—	*o*	—
short-billed dowitcher	*f*	*f*	*f*	—
long-billed dowitcher	*c*	*c*	*a*	—
common snipe•	*f*	*u*	*c*	—
Wilson's phalarope•	*c*	*a*	*a*	—
red-necked phalarope	*a*	*a*	*a*	—

Skuas, Jaegers, Gulls, and Terns	Sp	S	F	W
Franklin's gull•	*a*	*a*	*a*	—
Bonaparte's gull	*r*	*r*	*u*	—
ring-billed gull•	*a*	*c*	*a*	—
California gull•	*u*	*r*	*u*	—
herring gull	*u*	—	*u*	—
common tern•	*f*	*r*	*f*	—
Forster's tern•	*f*	*f*	*f*	—
black tern•	*a*	*c*	*a*	—

Pigeons and Doves	Sp	S	F	W
rock dove•	*u*	*u*	*u*	*u*
mourning dove•	*c*	*c*	*a*	*o*

Cuckoos and Anis	Sp	S	F	W
black-billed cuckoo•	*u*	*u*	*r*	—
yellow-billed cuckoo	*o*	—	—	—

Typical Owls	***Sp***	***S***	***F***	***W***
eastern screech-owl•	*r*	*r*	*r*	*r*
great horned owl•	*f*	*f*	*f*	*f*
snowy owl	*r*	—	*r*	*r*
burrowing owl•	*o*	*o*	*o*	—
long-eared owl•*(i)*	*u*	*u*	*r*	*o*
short-eared owl•*(i)*	*u*	*u*	*u*	*r*
boreal owl	—	—	—	*o*
northern saw-whet owl	*o*	—	*o*	*o*

Goatsuckers	***Sp***	***S***	***F***	***W***
common nighthawk•	*u*	*r*	*u*	—
common poorwill•	*o*	*o*	*o*	—
whip-poor-will	*o*	*o*	—	—

Swifts	***Sp***	***S***	***F***	***W***
chimney swift	*o*	—	*o*	—

Hummingbirds	***Sp***	***S***	***F***	***W***
ruby-throated hummingbird•	*r*	*r*	*r*	—

Kingfishers	***Sp***	***S***	***F***	***W***
belted kingfisher•	*u*	*u*	*u*	*o*

Woodpeckers	***Sp***	***S***	***F***	***W***
red-headed woodpecker•	*r*	*o*	*r*	—
yellow-bellied sapsucker•	*u*	*u*	*u*	—
downy woodpecker•	*u*	*u*	*u*	*u*
hairy woodpecker•	*u*	*u*	*u*	*u*
northern flicker•	*f*	*f*	*f*	*o*

Tyrant Flycatchers	***Sp***	***S***	***F***	***W***
olive-sided flycatcher	*r*	*r*	*r*	—
western wood-pewee	*o*	*o*	*o*	—
eastern wood-pewee•	*f*	*f*	*f*	—
yellow-bellied flycatcher	*o*	—	*o*	—
alder flycatcher•	*u*	*r*	*r*	—
willow flycatcher•	*f*	*f*	*f*	—
least flycatcher•	*c*	*c*	*c*	—
eastern phoebe•	*r*	*r*	*r*	—
Say's phoebe•	*r*	*r*	*r*	—
great crested flycatcher•	*f*	*f*	*u*	—
western kingbird•	*c*	*c*	*c*	—
eastern kingbird•	*c*	*c*	*c*	—

Shrikes	***Sp***	***S***	***F***	***W***
loggerhead shrike•	*r*	*r*	*r*	*o*
northern shrike	*u*	—	*u*	*u*

Vireos	***Sp***	***S***	***F***	***W***
yellow-throated vireo•	*u*	*u*	*u*	—
blue-headed vireo	*u*	—	*u*	—
warbling vireo•	*f*	*f*	*f*	—
Philadelphia vireo	*r*	*o*	*r*	—
red-eyed vireo•	*c*	*c*	*c*	—

Crows, Jays, and Magpies	***Sp***	***S***	***F***	***W***
blue jay•	*f*	*u*	*f*	*u*
black-billed magpie•	*f*	*f*	*f*	*f*
American crow•	*a*	*f*	*a*	*u*
common raven•	*r*	*r*	*o*	*o*

Larks	***Sp***	***S***	***F***	***W***
horned lark•	*a*	*f*	*a*	*f*

Swallows	***Sp***	***S***	***F***	***W***
purple martin•	*f*	*f*	*f*	—
tree swallow•	*c*	*f*	*u*	—
northern rough-winged swallow•	*f*	*f*	*r*	—
bank swallow•	*a*	*c*	*a*	—
cliff swallow•	*a*	*a*	*a*	—
barn swallow•	*a*	*c*	*a*	—

Titmice and Chickadees	***Sp***	***S***	***F***	***W***
black-capped chickadee•	*f*	*f*	*f*	*f*

Nuthatches	***Sp***	***S***	***F***	***W***
red-breasted nuthatch•*(i)*	*u*	*r*	*u*	*r*
white-breasted nuthatch•	*u*	*u*	*u*	*u*

Creepers	***Sp***	***S***	***F***	***W***
brown creeper	*u*	—	*u*	*r*

Wrens	***Sp***	***S***	***F***	***W***
rock wren•	*r*	*r*	*r*	—
house wren•	*c*	*c*	*c*	—
winter wren	—	—	*o*	—
sedge wren•*(i)*	*c*	*c*	*c*	—
marsh wren•	*c*	*c*	*c*	—

Kinglets	***Sp***	***S***	***F***	***W***
golden-crowned kinglet	*f*	—	*f*	*r*
ruby-crowned kinglet	*f*	—	*f*	—

Thrushes	***Sp***	***S***	***F***	***W***
eastern bluebird•	*u*	*u*	*u*	—
mountain bluebird•	*u*	*u*	*u*	—
Townsend's solitaire	*o*	—	*o*	*o*
veery•	*f*	*f*	*u*	—
gray-cheeked thrush	*f*	—	*r*	—
Swainson's thrush	*c*	—	*f*	—
hermit thrush	*u*	—	*u*	—
American robin•	*a*	*c*	*a*	*r*

Mimic Thrushes	***Sp***	***S***	***F***	***W***
gray catbird•	*f*	*f*	*f*	—
northern mockingbird	*o*	*o*	*o*	—
brown thrasher•	*f*	*f*	*f*	—

Starlings	***Sp***	***S***	***F***	***W***
European starling•	*c*	*f*	*a*	*u*

Wagtails and Pipits	Sp	S	F	W
American pipit	*u*	—	*f*	—
Sprague's pipit•	*f*	*f*	*u*	—

Waxwings	Sp	S	F	W
Bohemian waxwing*(i)*	*c*	—	*c*	*c*
cedar waxwing•	*f*	*c*	*c*	*u*

Wood Warblers	Sp	S	F	W
Tennessee warbler	*c*	*r*	*f*	—
orange-crowned warbler•	*f*	*r*	*c*	—
Nashville warbler	*u*	—	*u*	—
northern parula	*o*	—	*o*	—
yellow warbler•	*c*	*c*	*c*	—
chestnut-sided warbler	*o*	—	*r*	—
magnolia warbler	*u*	—	*u*	—
Cape May warbler	*o*	—	*o*	—
black-throated blue warbler	*o*	—	*o*	—
yellow-rumped warbler	*a*	*o*	*a*	—
black-throated green warbler	*o*	—	*r*	—
Blackburnian warbler	*o*	—	*r*	—
palm warbler	*u*	—	*u*	—
bay-breasted warbler	*o*	—	*r*	—
blackpoll warbler	*c*	—	*f*	—
black-and-white warbler•	*f*	*u*	*f*	—
American redstart•	*f*	*u*	*f*	—
ovenbird•	*f*	*f*	*u*	—
northern waterthrush•	*f*	*r*	*u*	—
Connecticut warbler	*r*	*o*	*o*	—
mourning warbler	*u*	*o*	*r*	—
MacGillivray's warbler	*o*	—	*o*	—
common yellowthroat•	*c*	*c*	*c*	—
Wilson's warbler	*u*	—	*f*	—
Canada warbler	*r*	—	*r*	—
yellow-breasted chat•	*r*	*r*	*o*	—

Tanagers	Sp	S	F	W
scarlet tanager•	*o*	*o*	—	—
western tanager	—	—	*o*	—

Towhees and Sparrows	Sp	S	F	W
spotted towhee•	*f*	*f*	*f*	—
eastern towhee	*o*	—	*o*	—
American tree sparrow	*a*	—	*a*	*u*
chipping sparrow•	*c*	*u*	*c*	—
clay-colored sparrow•	*a*	*a*	*a*	—
field sparrow•	*r*	*r*	*r*	—
vesper sparrow•	*c*	*c*	*c*	—
lark sparrow•	*u*	*u*	*r*	—
lark bunting•*(i)*	*u*	*u*	*u*	—
Savannah sparrow•	*a*	*c*	*a*	—
grasshopper sparrow•*(i)*	*c*	*c*	*c*	—
Baird's sparrow•*(i)*	*f*	*f*	*f*	—
Le Conte's sparrow•*(i)*	*f*	*f*	*f*	—

Towhees and Sparrows (continued)	Sp	S	F	W
song sparrow•	*c*	*f*	*c*	*o*
Lincoln's sparrow	*f*	—	*f*	—
swamp sparrow•	*f*	*r*	*f*	—
white-throated sparrow	*c*	—	*c*	*o*
Harris' sparrow	*c*	—	*c*	*o*
white-crowned sparrow	*f*	—	*f*	—
dark-eyed junco	*a*	*o*	*a*	*r*
McCown's longspur•	*o*	*o*	*o*	—
Lapland longspur	*a*	—	*a*	*u*
Smith's longspur	*r*	—	*r*	—
chestnut-collared longspur•	*u*	*u*	*u*	—
snow bunting	*c*	—	*a*	*c*
Nelson's sharp-tailed sparrow•	*f*	*f*	*f*	—
fox sparrow	*r*	—	*u*	—

Cardinals, Grosbeaks, and Allies	Sp	S	F	W
rose-breasted grosbeak•	*f*	*f*	*f*	—
black-headed grosbeak•	*r*	*r*	*o*	—
lazuli bunting•	*r*	*r*	*r*	—
indigo bunting•	*r*	*r*	*r*	—
dickcissel•	*o*	*o*	*o*	—

Blackbirds and Orioles	Sp	S	F	W
bobolink•	*c*	*c*	*f*	—
red-winged blackbird•	*a*	*a*	*a*	*o*
western meadowlark•	*a*	*a*	*a*	*o*
yellow-headed blackbird•	*a*	*a*	*a*	*o*
rusty blackbird	*r*	—	*f*	*o*
Brewer's blackbird•	*c*	*f*	*a*	*o*
common grackle•	*a*	*c*	*a*	*o*
brown-headed cowbird•	*a*	*a*	*u*	—
orchard oriole•	*f*	*f*	*o*	—
northern oriole•	*f*	*f*	*f*	—

Finches	Sp	S	F	W
pine grosbeak*(i)*	*u*	—	*u*	*f*
purple finch	*u*	—	*u*	*r*
house finch•	*u*	*u*	*u*	*f*
red crossbill•*(i)*	*u*	*o*	*u*	*f*
white-winged crossbill*(i)*	*o*	—	*o*	*o*
common redpoll*(i)*	*a*	—	*c*	*a*
hoary redpoll	*o*	—	—	*o*
pine siskin•*(i)*	*c*	*o*	*c*	*f*
American goldfinch•	*c*	*c*	*c*	*u*
evening grosbeak	*o*	—	*o*	*o*

Old World Sparrows	Sp	S	F	W
house sparrow•	*f*	*f*	*f*	*f*

The following birds are rarely seen at the refuges and are out of their normal ranges:

Pacific loon
brown pelican
tricolored heron
green heron
yellow-crowned night-heron
white ibis
fulvous whistling-duck
Eurasian wigeon
harlequin duck
red-shouldered hawk
black-necked stilt
whimbrel
long-billed curlew
American woodcock
glaucous gull
black-legged kittiwake
barn owl
barred owl
scissor-tailed flycatcher
violet-green swallow
sage thrasher
Townsend's warbler
prothonotary warbler
hooded warbler
Henslow's sparrow
golden-crowned sparrow
Bullock's oriole
lesser goldfinch

Appendix G

Birds of Conservation Concern in the United States Prairie Pothole Region

The following bird species occur in "Bird Conservation Region Number 11" (prairie potholes–U.S. portion only), as listed in "Birds of Conservation Concern: the 2002 List" (USFWS 2002).

An asterisk (*) denotes species that currently breed in the Souris River basin in North Dakota. Others migrate through the area.

American bittern*
northern harrier*
Swainson's hawk*
ferruginous hawk*
peregrine falcon
yellow rail*
solitary sandpiper
willet*
upland sandpiper*
long-billed curlew
Hudsonian godwit
marbled godwit*
sanderling
white-rumped sandpiper
buff-breasted sandpiper
Wilson's phalarope*
black-billed cuckoo*
burrowing owl*
short-eared owl*
red-headed woodpecker*
loggerhead shrike*
Sprague's pipit*
grasshopper sparrow*
Baird's sparrow*
Henslow's sparrow
Le Conte's sparrow*
Nelson's Sharp-tailed sparrow*
McCown's longspur
chestnut-collared longspur*

Appendix H

Mammals of the Souris River Basin Refuges

Mammal species that have been documented at the Souris River basin refuges, before and after establishment of the refuges, total 62 species including 6 that have been largely extirpated from the area (Jones et al. 1983, Kadrmas 2005). Some species likely have been overlooked, especially secretive, rare, or nocturnal species such as some species of bats. Voucher specimens of most small mammal species are stored at the University of North Dakota's biology department.

ORDER INSECTIVORA

Family Soricidae

Sorex cinereus—masked shrew
Sorex arcticus—Arctic shrew
Microsorex hoyi—pigmy shrew
Blarina brevicauda—short-tailed shrew

ORDER CHIROPTERA

Family Vespertilionidae

Myotis lucifugus—little brown myotis
Myotis septentrionalis—northern myotis
Myotis evotis—long-eared myotis
Lasionycteris noctivagans—silver-haired bat
Eptesicus fuscus—big brown bat
Lasiurus borealis—red bat
Lasiurus cinereus—hoary bat

ORDER LAGOMORPHA

Family Leporidae

Sylvilagus floridanus—eastern cottontail
Sylvilagus audubonii—desert cottontail
Lepus americanus—snowshoe hare
Lepus townsendii—white-tailed jackrabbit

ORDER RODENTIA

Family Sciuridae

Eutamius minimus—least chipmunk
Marmota monax—woodchuck
Spermophilus richardsonii—Richardson's ground squirrel
Spermophilus tridecemlineatus—thirteen-lined ground squirrel
Spermophilus franklinii—Franklin's ground squirrel
Sciurus carolinensis—gray squirrel
Sciurus niger—fox squirrel
Tamiasciurus hudsonicus—red squirrel

Family Geomyidae

Thomomys talpoides—northern pocket gopher

Family Heteromyidae

Perognathus fasciatus—olived-backed pocket mouse
Perognathus flavescens—plains pocket mouse

Family Heteromyidae

Castor canadensis—beaver

Family Cricetidae

Peromyscus maniculatus—deer mouse
Peromyscus leucopus—white-footed mouse
Onychomys leucogaster—northern grasshopper mouse
Clethrionomys gapperi—southern red-backed vole
Microtus pennsylvanicus—meadow vole
Microtus ochrogaster—prairie vole
Ondatra zibethicus—muskrat

Family Muridae

Rattus norvegius—Norway rat
Mus musculus—house mouse

Family Zapodidae

Zapus hudsonius—meadow jumping mouse
Zapus princeps—western jumping mouse

Family Erethizontidae

Erethizon dorsatum—porcupine

ORDER CARNIVORA

Family Canidae

Canis latrans—coyote
Canis lupus—gray wolf*
Vulpes vulpes—red fox
Vulpes velox—swift fox*

Family Ursidae

Ursus americanus—black bear

Family Procyonidae

Procyon lotor—raccoon

**Largely extirpated from the area.*

Family Mustelidae

Mustela erminea—ermine
Mustela nivalis—least weasel
Mustela frenata—long-tailed weasel
Mustela vison—mink
Taxidea taxus—badger
Mephitis mephitis—striped skunk
Lutra canadensis—river otter*

Family Felidae

Felis concolor—mountain lion*
Felis lynx—lynx*
Felis rufus—bobcat

ORDER ARTIODACTYLA

Family Cervidae

Cervus elaphus—elk*
Odocoileus hemionus—mule deer
Odocoileus virginianus—white-tailed deer
Alces alces—moose

Family Antilocapridae

Antilocapridae americana—pronghorn

Family Bovidae

Bison bison—bison*

**Largely extirpated from the area.*

Appendix I
Reptiles and Amphibians of the Souris River Basin Refuges

Reptile and amphibian species that have been documented in the Souris River basin include at least the 16 species listed here (Beachy, unpublished data; Wheeler and Wheeler 1966).

CLASS REPTILIA

ORDER CHELONIA

Family Chelydridae

Chelydra serpentina—common snapping turtle

Family Emydidae

Chrysemys picta belli—western painted turtle

ORDER SQUAMATA

Family Colubridae

Pituophis catenifer—bullsnake
Thamnophis sirtalis (subsp. *parietalis*)—red-sided garter snake
Thamnophis radix—plains garter snake
Storeria occipitomaculata—redbelly snake
Opheodrys vernalis—smooth green snake
Heterdon nasicus—western hognose snake

CLASS AMPHIBIA

ORDER CAUDATA

Family Ambystomidae

Ambystoma tigrinum—tiger salamander

ORDER SALIENTIA

Family Pelobatidae

Scaphiopus bombifrons—plains spadefoot

Family Bufonidae

Bufo hemiophrys—Canadian toad
Bufo cognatus—Great Plains toad
Bufo woodhousei—Woodhouse's toad

Family Hylidae

Pseudacris triseriata—western chorus frog

Family Ranidae

Rana pipiens—northern leopard frog
Rana sylvatica—wood frog

Appendix J

Fishes of the Souris River Basin Refuges

Fishes include about 26 species that occurred in the Souris River basin system circa the 1980s. Most of these species probably still occur at the three Souris River basin refuges, but several may be extirpated from the river system. The following list was compiled by Wade King, USFWS–Bismarck, North Dakota (personal communication), based on unpublished data (sampling records).

Family Esocidae

Esox lucius—northern pike

Family Cyprinidae

Hybognathus hankinsoni—brassy minnow
Notemigonus crysoleucas—golden shiner
Notropis blennius—river shiner
Notropis cornutus—common shiner
Notropis atherinoides—emerald shiner
Notropis dorsalis—bigmouth shiner
Notropis hudsonius—spottail shiner
Notropis stramineus—sand shiner
Pimephales promelas—fathead minnow
Rhinichthys atratulus—blacknose dace
Rhinichthys cataractae—longnose dace
Semotilus atromaculatus—creek chub

Family Catostomidae

Catostomus catostomus—longnose sucker
Catostomus commersoni—white sucker
Moxostoma anisurum—silver redhorse

Family Ictaluridae

Ictalurus melas—black bullhead
Noturus gyrinus—tadpole madtom

Family Percopsidae

Percopsis omiscomaycus—trout-perch

Family Gasterosteidae

Culaea inconstans—brook stickleback

Family Percidae

Etheostoma exile—Iowa darter
Etheostoma nigrum—Johnny darter
Perca flavescens—yellow perch
Percina maculata—blackside darter
Stizostedion vitreum—walleye

Family Centrarchidae

Micropterus dolomieui—smallmouth bass

At least five other fish species once occurred at the refuges through stocking programs during the 1940s.

Pomoxis nigromaculatus—black crappie
Lepomis macrochirus—bluegill
Micropterus salmoides—largemouth bass
Ictalurus punctatus—channel catfish
Ictalurus natalis—yellow bullhead

Appendix K

Water Management Agreements

AGREEMENT

BETWEEN

THE GOVERNMENT OF CANADA

AND THE GOVERNMENT OF THE UNITED STATES OF AMERICA

FOR WATER SUPPLY AND FLOOD CONTROL

IN THE SOURIS RIVER BASIN

October 26, 1989

Canadian Embassy

Ambassade du Canada

501 Pennsylvania Avenue, N.W.
Washington, D.C. 20001

October 26, 1989

Mr. Robert W. Page
Assistant Secretary of the
Army for Civil Works
The Pentagon
Room 2E570
Washington, D.C.
20310-0103

Dear Mr. Page,

I wish to express formally my Government's satisfaction with the signature today of the Agreement Between the United States of America and Canada for Water Supply and Flood Control in the Souris River Basin. We believe that the Accord will help to satisfy the needs of Basin residents for flood control and assured water supply, as well as encourage closer co-operation among the various interested jurisdictions in dealing with matters of common concern.

Canada and the United States share a mutual objective of ensuring that Souris waters are used fairly and wisely. We look forward to continuing to work with you in pursuit of this goal.

Yours sincerely,

Michael Kergin
Minister

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

26 OCT 1989

Mr. Michael Kergin
Minister
Embassy of Canada
501 Pennsylvania Avenue, N. W.
Washington, D. C. 20001

Dear Mr. Kergin:

On behalf of the Government of the United States of America, I wish to respond to your letter of today's date respecting the Agreement Between the United States of America and Canada for Water Supply and Flood Control in the Souris River Basin. We share your view that the Agreement will contribute to meeting the needs of American and Canadian residents of the Souris Basin and foster closer cooperation among the jurisdictions of both countries in dealing with matters of common concern. That the waters of the Basin are used wisely and fairly is indeed in the best interests of both our nations. We would be pleased to continue our joint endeavors toward this shared objective.

Yours sincerely,

for Robert W. Page
Assistant Secretary of the Army
(Civil Works)

AGREEMENT
BETWEEN
THE GOVERNMENT OF CANADA
AND
THE GOVERNMENT OF THE UNITED STATES OF AMERICA
FOR WATER SUPPLY AND FLOOD CONTROL
IN THE SOURIS RIVER BASIN

The Government of Canada and the Government of the United States of America, hereinafter referred to as "the Parties;"

DESIRING to provide for development of the Souris River Basin to increase the general welfare of the people of the United States and Canada;

NOTING that significant benefits will accrue to the Parties by construction, operation, and maintenance of reservoir projects in the Souris River Basin in Canada for the purposes of flood control in the United States of America and for water supply in Canada;

FURTHER NOTING that the Government of the United States of America and the Government of Canada are parties to the Treaty between the Government of the United States of America and the Government of the United Kingdom Concerning Boundary Waters and Questions Arising Along the Boundary between the United States of America and Canada, signed on January 11, 1909, hereinafter referred to as the "Boundary Waters Treaty", and to the Convention Between the Government of the United States of America and the Government of the United Kingdom for the Protection of Migratory Birds in the United States of America and Canada, signed on August 16, 1916, hereinafter referred to as the "Migratory Birds Convention", and desire in connection with the development contemplated in this Agreement to fulfill their rights and obligations under these instruments, and any agreements or orders which implement them;

INTENDING that the Souris River Basin be developed for flood control benefits in the United States of America and water supply benefits in Canada in a manner that is consistent with the Boundary Waters Treaty and the Migratory Birds Convention;

NOW, THEREFORE, hereby agree to the following plan for development of the Souris River Basin:

ARTICLE I

1. In this Agreement, the term:

a. "Alameda Dam" means the dam which will be constructed on Moose Mountain Creek in the Province of Saskatchewan approximately four kilometers upstream from its confluence with the Souris River;

b. "Boundary Dam" means an existing dam located on Long Creek approximately seven kilometers in a southwesterly direction from the City of Estevan in the Province of Saskatchewan;

c. "Boundary Diversion Channel" means a channel that will be constructed in the Province of Saskatchewan with a maximum capacity of 60 cubic meters per second (2,100 cubic feet per second) to allow the conveyance of water from the Boundary reservoir to the impoundment behind Rafferty Dam;

d. "Boundary Reservoir" means the impoundment of water behind Boundary Dam;

e. "construction costs" means expenditures made by Canada for construction of Rafferty Dam and Alameda Dam and reservoirs. Such costs shall include expenditures for engineering, design, construction, land acquisition, and operation and maintenance prior to completion of construction;

f. "flood control storage" means the volume below the maximum allowable water level in a reservoir to store flood event runoff;

g. "improvement" means a dam, reservoir or related facility to which this Agreement applies;

h. "Lake Darling Dam" means an existing structure which is part of the Upper Souris National Wildlife Refuge located on the Souris River approximately 25 kilometers in a northwesterly direction from the city of Minot in the State of North Dakota;

i. "maintenance curtailment" means an interruption or curtailment of operations under the Operating Plan which is necessary for purposes of repairs, replacements, installation of equipment, performance of other maintenance work, investigations, or inspections;

j. "Operating Plan" means the plan of operation which is attached to this Agreement as Annex A and which is an integral part of this Agreement, for certain dams, reservoirs, and related works on the Souris River;

k. "Rafferty Dam" means the dam which is under construction at a location on the Souris River approximately six kilometers upstream in a northwesterly direction from the City of Estevan in the Province of Saskatchewan;

l. "Reservoir Regulation Manual" means a document which is used as a guide in the day-to-day operation of a reservoir by the agency responsible for the operation of the reservoir. The manual shall contain a description of the project and its history, and discuss watershed characteristics, data collection and communication networks, hydrologic forecasts, the water control plan, and water control management;

m. "substantially destroyed" means when the cost of repairs or rehabilitation to an improvement to rectify damages to that improvement would exceed 50 percent of the replacement value of the improvement at the time the damage is sustained;

n. "uncontrollable force" means any force or cause beyond the control of the party affected, including, but not limited to, war, riot, civil disturbance, sabotage, earthquake, catastrophic storm event, and restraint by court order, which by exercise of due care and foresight, such party could not reasonably have been expected to avoid;

o. "useful life" means the time remaining until an improvement is permanently retired from service because it no longer effectively serves its intended purpose, as defined in this Agreement and the Operating Plan, notwithstanding good maintenance, or because it is substantially destroyed by uncontrollable force;

p. "water quality monitoring" means the collection, analysis and interpretation of water quality conditions, whether obtained through systematic surveys or special studies;

q. "water quality objective" means a concentration level, other measure, or narrative goal which is intended to support the designated uses of water at a specific site; and

r. "water supply in Canada" means the use of reservoir storage in Canada for the purposes of: cooling water for electric generating plants, irrigation, domestic use, municipal and industrial use, agricultural use, recreation, conservation, flood protection in Canada, or such other uses as the Government of Canada shall designate.

2. Both the United States of America system of measurement and the Système international (metric system) are equally valid where used in this Agreement. The conversion table in the Operating Plan shall be used to convert values in one measurement system to values in the other measurement system.

3. The terms defined in this Agreement shall have the same meaning when used in the Operating Plan.

ARTICLE II

1. The Government of Canada shall expeditiously provide the Government of the United States of America with a minimum of 466,000 cubic decameters (377,800 acre-feet) of flood storage by:

   a. Completing construction of Rafferty Dam and including in that improvement a minimum of 327,100 cubic decameters (265,200 acre-feet) of flood control storage; and

   b. Constructing Alameda Dam and including in that improvement a minimum of 138,900 cubic decameters (112,600 acre-feet) of flood control storage.

2. The Government of Canada shall design and construct Rafferty Dam and Alameda Dam in accordance with accepted engineering standards. Before the Government of the United States of America shall make any payment pursuant to Article IV of this Agreement, the Government of Canada shall ensure, to the satisfaction of the Government of the United States of America, that Rafferty Dam and Alameda Dam will be designed to have a 100-year project life, and will be capable of operation in accordance with the Operating Plan.

ARTICLE III

1. The Government of Canada shall operate and maintain Rafferty Dam and Alameda Dam at no cost to the Government of the United States of America, except for those costs referred to in Article IV of the Agreement, in accordance with the Operating Plan or in accordance with any subsequent mutually agreed upon change to the Operating Plan for the term of this Agreement. Operation and maintenance of Rafferty Dam and Alameda Dam in accordance with the Operating Plan shall commence immediately upon completion of construction of each dam.

The Government of Canada shall operate and maintain the Boundary Reservoir at no cost to the Government of the United States of America in accordance with the Operating Plan or in accordance with any subsequent mutually agreed upon change to the Operating Plan for the remainder of the useful life of the Boundary Reservoir. Operation and maintenance of the Boundary Reservoir in accordance with the Operating Plan shall commence immediately upon entry into force of this Agreement.

3. The Government of Canada shall operate the Boundary Diversion Channel and any future water resources development or flood control projects constructed after entry into force of this Agreement for the term of this Agreement at no cost to the Government of the United States of America in a manner which will not adversely affect the stream flow in the Souris River so as to reduce the flood control benefits provided by the Rafferty Dam and Alameda Dam and the Operating Plan;

4. The Government of the United States of America shall operate and maintain the improvements located in the United States for the remainder of their useful life at no cost to the Government of Canada and in accordance with the Operating Plan or any subsequent mutually agreed upon change to the Operating Plan.

5. The Parties shall notify one another of any maintenance curtailment that is proposed at any project addressed in the Operating Plan and the probable duration thereof, and take such action as is appropriate to minimize the effects of such maintenance curtailments on operations under the Operating Plan, to include providing one year's notice of such maintenance curtailments when possible.

ARTICLE IV

1. The Government of the United States of America shall pay the Government of Canada $26.7 million (United States currency, based on October 1985 price levels) for the flood control storage provided at Rafferty Dam.

2. The Government of the United States of America shall pay the Government of Canada an additional $14.4 million (United States currency, based on October 1985 price levels) for the flood control storage provided at Alameda Dam.

3. The amount of the contributions specified in Paragraphs 1 and 2 were determined by an allocation of construction costs based on the proportionate use of the Rafferty Dam and Alameda Dam for flood control in the United States of America and water supply in Canada. Such contributions shall be subject to adjustment for cost changes by the United States of America pursuant to Section 902(2) of Public Law 99-662 and shall fluctuate to reflect changes in the rate of exchange for currency between the United States of America and Canada that occurred between October 1985 and the time such contributions are made.

4. At the end of each calendar month, the Government of Canada shall issue a progress billing to the Government of the United States of America for its share of project construction costs, which shall be determined by an allocation of joint construction costs to flood control and water supply purposes. The Government of the United States of America shall review such billing and, if not disputed, make payment of the amount billed within thirty days of receipt of the bill for the amount due. If the Government of the United States of America disputes any billing or portion of such billing, it shall specify its reasons for disputing the billing and pay any undisputed amount. Disputed billings or disputed portions of billings shall be discussed by the Parties. Disputes concerning amounts billed that are not resolved by discussion may be settled in accordance with Article XII.

5. Records shall be established and maintained to permit identification of the exact nature and amounts of costs of the Rafferty Dam and Alameda Dam. The records established and maintained pursuant to this paragraph shall be subject to audit at the request of the Government of the United States of America at any reasonable time during the construction of the dams and for five years thereafter, following reasonable notice to the Government of Canada.

6. The Government of Canada shall furnish quarterly status reports to the Government of the United States of America on the progress of construction on the Rafferty Dam and Alameda Dam, the total amount of funds expended on the dams at the time of the report, and the anticipated costs to be billed to the United States for the remainder of the United States of America Government fiscal year, which ends on September 30, and for each following United States of America Government fiscal year.

ARTICLE V

1. The Parties shall cooperate and consult on the matters addressed in this Agreement. The Parties shall exchange such information as is appropriate to ensure timely and beneficial fulfillment of obligations under this Agreement.

2. The Parties shall prepare the Reservoir Regulation Manuals required by the Operating Plan. In preparing such Manuals, the Parties shall consult with interested states and provinces.

3. The Parties shall jointly review the Operating Plan at five-year intervals, or as mutually agreed, in an effort to maximize the provision of flood control and water supply benefits that can be provided consistent with the terms of this Agreement. The Parties shall cooperate and consult, as necessary, with interested states, provinces, and agencies on the review of the Operating Plan and recommended changes in the Operating Plan.

4. Subject to the consent of the Government of Canada, officials of the Government of the United States of America may enter on lands in Saskatchewan acquired for construction of Rafferty, Alameda, and Boundary Dams for the purpose of inspection to ensure that such improvements are being constructed, operated, and maintained in accordance with the terms of this Agreement.

5. The Parties shall consult with interested states and provinces upon request, as appropriate, and so far as is practicable, concerning the supply of water throughout the Souris River Basin.

ARTICLE VI

1. The Parties shall ensure that all activities pursued under the terms of this Agreement are consistent with applicable provisions of the Boundary Waters Treaty, particularly those of Article IV paragraph two.

2. The Parties shall establish a Joint Water Quality Monitoring Program ("the Program") in the relevant portions of the Souris River Basin.

3. The Parties shall establish, within six months of the entry into force of this Agreement, a Bilateral Water Quality Monitoring Group ("the Group"). The Group shall be composed of six members, three appointed by each Party, and be co-chaired by a Canadian and a United States of America member. Each Party may also identify advisors to the Group to assist its respective members.

4. The initial United States of America members of the Group shall include a representative of each of the United States Environmental Protection Agency, the North Dakota Department of Health and Consolidated Laboratories, and the United States Geological Survey. A representative of the United States Fish and Wildlife Service, the United States Department of the Army, and the North Dakota State Engineer shall serve as the initial advisors to the United States of America members of the Group.

5. The initial Canadian members of the Group shall include a representative of each of the Government of Canada, the Government of Saskatchewan, and the Government of Manitoba.

6. The Group shall:

a. develop recommendations for the Parties on the Program and on water quality objectives;

b. on a regular basis, exchange data provided by the Program;

c. collate, interpret, and analyze the data provided by the Program;

d. review the Program and the water quality objectives at least every five years and recommend to the Parties, as appropriate, any modifications to improve the Program and the water quality objectives; and

e. prepare an annual report to be submitted to the Parties containing:

i. a summary of the principal activities of the Group during the year;

ii. a summary of the principal activities affecting water quality in the Souris River Basin during the year;

iii. a summary of the collated, interpreted, and analyzed data provided by the Program;

iv. a summary of the water quality of the Souris River at the two locations at which it crosses the International Boundary between Canada and the United States;

v. a section summarizing any definitive changes in the monitored parameters and the possible causes of such changes;

vi. a section discussing whether the water quality objectives as established pursuant to Paragraph 7 have been attained;

vii. a section summarizing other significant water quality changes and the possible causes of such changes; and

viii. recommendations on new water quality objectives or on how existing water quality objectives can be met, including suggestions on water quality as it relates to water quantity during periods of low flow, in the event that the annual report indicates that the water quality objectives have not been attained as a result of activities pursued under this Agreement.

7. The Parties shall, by April 1, 1991, establish water quality objectives for the Souris River at the Saskatchewan/North Dakota boundary and at the North Dakota/Manitoba boundary.

8. The Parties shall make reasonable efforts, consistent with then existing legal authorities, to implement the recommendations of the Group and, where reasonably practicable, to improve water quality in the Souris River Basin.

9. If the annual report of the Group indicates that the water quality objectives are not being attained, the Parties shall commence consultations to determine how the water quality objectives can be met, revised or otherwise addressed. Such consultations shall include participation by interested states, provinces, and agencies.

ARTICLE VII

The Parties agree that paragraph 1 of the 1959 Interim Measures, which were approved by the Government of the United States of America and the Government of Canada, shall be modified as shown in Annex B attached hereto.

ARTICLE VIII

1. Should operation of any improvement result in flood damages in either the United States of America or Canada in excess of the flood damages that would have occurred had the improvement not been in operation, the Parties shall, upon the request of either Party, commence consultations on how such flood damages can be avoided in the future and what mitigation and compensatory measures may be appropriate, including possible changes to the Operating Plan. Such consultations shall include participation by interested states, provinces and agencies.

2. Notwithstanding Article XI, paragraph 2, nothing in this Article shall preclude either Party from asserting any rights it may have against the other Party for flood damages resulting from the actions of the other Party.

ARTICLE IX

All obligations of the Government of the United States of America to be carried out under the terms of this Agreement shall be subject to the laws and regulations of the United States of America. All obligations of the Government of Canada to be carried out under the terms of this Agreement shall be subject to the laws and regulations of Canada.

ARTICLE X

1. The Government of Canada designates the Government of Saskatchewan as the Canadian entity responsible for the construction, operation, and maintenance of the improvements mentioned in this Agreement and located in Canada. Such entity shall issue the progress billings and receive the payments referred to in Article IV.

2. The Government of the United States of America designates the Department of the Army as the entity responsible for receiving billings and making the payments for flood control storage referred to in Article IV and for operating the improvements mentioned in this Agreement and located in the United States of America in accordance with the Operating Plan during periods of flood. The Government of the United States of America designates the Department of the Interior as the entity responsible for operating the improvements mentioned in this Agreement and located in the United States of America in accordance with the Operating Plan during non-flood periods.

ARTICLE XI

1. The Parties shall be liable to each other and, shall make appropriate compensation to each other with respect to any act, failure to act, omission or delay amounting to a breach of this Agreement. For the purposes of this Agreement, any act, failure to act, omission or delay occurring by reason of uncontrollable force shall not constitute a breach of this Agreement.

2. The Parties do not intend to create in this Agreement any private right of action. Except as provided by Paragraph 1 of the Article, neither Party shall be liable to the other or to any person in respect of any injury, damage, or loss occurring in the territory of the other caused by an act, failure to act, omission or delay under this Agreement whether the injury, damage, or loss results from negligence or otherwise.

3. Neither Party shall have any obligation under this Agreement to rebuild or further operate or maintain any improvement to be constructed under this Agreement that is destroyed by uncontrollable force.

4. Neither Party shall have any obligation under this Agreement to take any act to extend the life of any improvement mentioned in this Agreement beyond its normal useful life.

ARTICLE XII

1. The Parties shall seek to resolve any dispute concerning the interpretation or application of this Agreement through consultations undertaken in good faith. As part of this consultation process, the Parties may refer any dispute concerning the interpretation or application of this Agreement to the International Joint Commission for advice and recommendations if mutually agreed. In making such a referral, the Parties shall request that the International Joint Commission provide its advice and recommendations within 90 days of the referral.

2. Any dispute concerning the interpretation or application of this Agreement which cannot be resolved through good faith consultations shall, upon the request of either Party, be referred to a neutral tribunal for review and examination and issuance of advice and recommendations. The tribunal shall consist of two members appointed by the Government of Canada, two members appointed by the Government of the United States of America, and a member jointly appointed by the Parties, who shall be chairman of the tribunal.

3. The Parties shall give prompt and sympathetic consideration to the advice and recommendations of the International Joint Commission and the tribunal.

4 The expenses of the International Joint Commission and the tribunal shall be shared equally by the Parties.

5. These procedures may be supplemented or modified by mutual agreement of the Parties.

ARTICLE XIII

1. This Agreement shall enter into force upon signature.

2. This Agreement may be amended by mutual agreement of the Parties.

3. This Agreement shall remain in force for a period of one hundred years or until the Parties agree that the useful life of the Rafferty and Alameda Dams has ended, whichever is first to occur.

4. If either Party fails to receive appropriations or other revenues in amounts sufficient to meet anticipated obligations under this Agreement, that Party shall so notify the other Party. Ninety calendar days after providing such notice, either Party may elect to terminate this Agreement or to defer future performance under this Agreement. Termination or deferral of future performance shall not affect existing obligations of the Parties under this Agreement or relieve the Parties of liability for any obligation previously incurred. In the event that either Party terminates or suspends future performance under this Agreement pursuant to this provision, the Government of the United States of America and the Government of Canada shall make appropriate adjustments in the Operating Plan to maximize the flood control and water supply benefits that can be obtained in the United States of America and Canada from the construction accomplished at the time of termination or suspension.

IN WITNESS WHEREOF the undersigned, duly authorized by their respective Government, have signed this Agreement.

DONE at Washington D.C. in duplicate, this 24th day of October, 1989 in the English and French languages, each text being equally authentic.

For Canada:

For the United States of America:

ANNEX A

OPERATING PLAN

FOR

RAFFERTY, ALAMEDA, BOUNDARY, AND LAKE DARLING RESERVOIRS

OPERATING PLAN FOR
RAFFERTY, ALAMEDA, BOUNDARY, AND LAKE DARLING RESERVOIRS

TABLE OF CONTENTS

List of Tables

List of Figures

List of Plates

INTRODUCTION

Purpose: This Operating Plan was developed pursuant to the Agreement between the Government of the United States of America and the Government of Canada for water supply and flood control in the Souris River Basin (hereinafter referred to as "the subject Agreement.")

It provides for operation of the Souris Basin Project and sets forth a framework for completing project specific Reservoir Regulation Manuals.

Scope: The Operating Plan is limited to the operation of the Souris Basin Project in the Souris River Basin in Saskatchewan, Canada, and North Dakota, United States of America, in accordance with the subject Agreement.

Objectives: The objectives of the Operating Plan are:

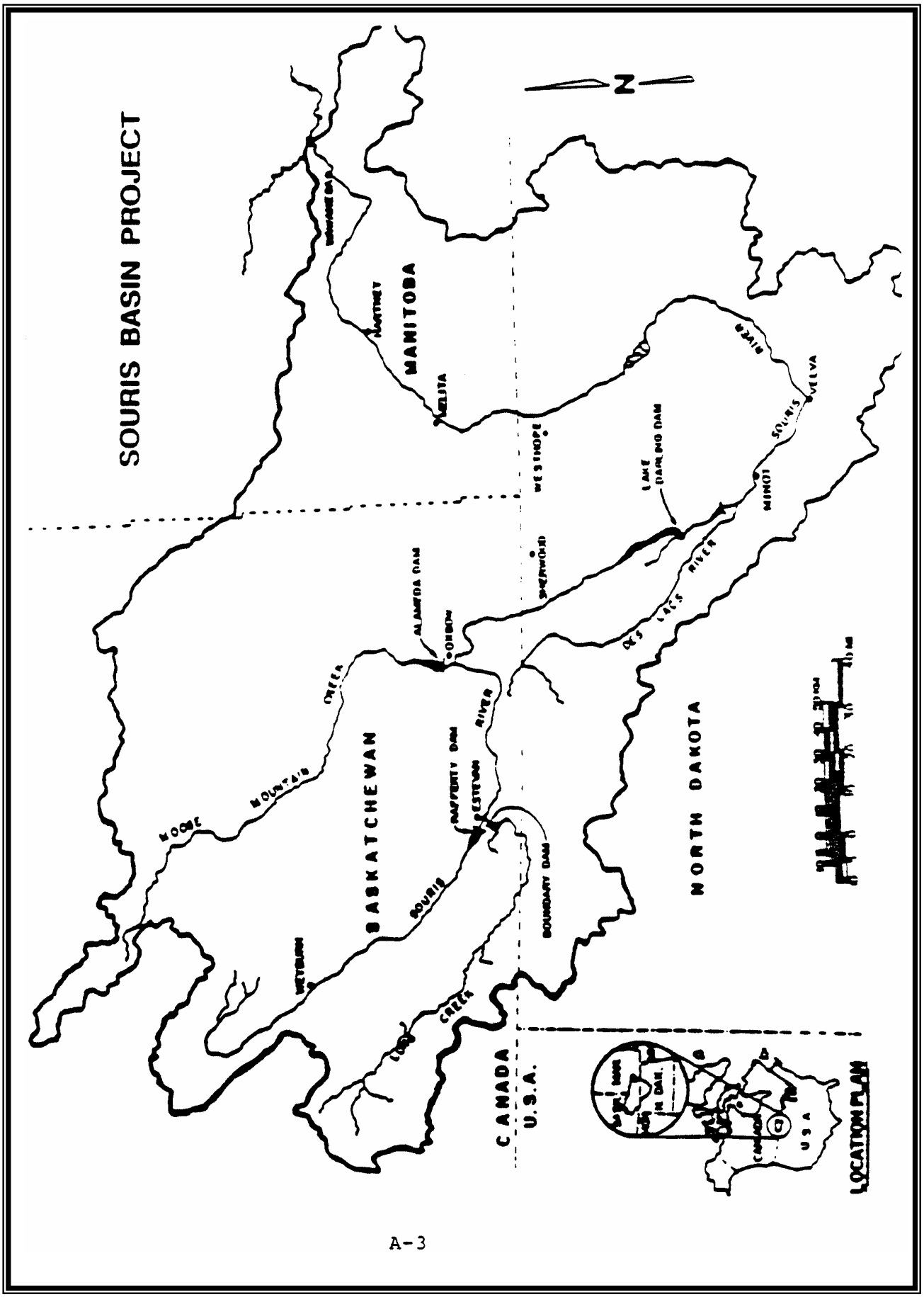
- To provide 1-percent (100-year) flood protection at Minot, North Dakota;

- To provide flood protection to urban and rural areas downstream from Rafferty Dam, Alameda Dam, and Lake Darling Dam;

- To ensure, to the extent possible, that the existing benefits from the supply of water in the Souris River Basin and the supply of water to the Souris Basin Project are not compromised.

Document: This Operating Plan establishes guidelines for operation of the Souris Basin Project. It also includes the following information on the operation of the Souris Basin Project: data on the physical characteristics of the dams and reservoirs, rules for flood and non-flood operation, and procedures for communication and exchange of information. This Operating Plan was developed based on computer simulation of floods having temporal and spatial characteristics of those actually experienced in floods of 1969, 1974, 1975, 1976, 1979, and 1982. It is recognized that this Operating Plan may not cover all possible flood circumstances, and it may be necessary to jointly agree on changes to the Operating Plan. It will be necessary for agencies directly responsible for the daily operation of each improvement covered by this Operating Plan to develop detailed Reservoir Regulation Manuals to operate the reservoirs in accordance with the terms of the subject Agreement. A Basin map is shown in figure A-1.

Forecasting: The ability to provide increased flood protection (including the ability to limit flows at Minot to 5,000 cfs for floods up to the 1-percent event) while optimizing the potential supply of water in the Souris River Basin is dependent upon the accuracy of the estimates of runoff provided to the agencies responsible for the daily operation of each improvement (Section 4.3.1). The runoff estimates used in this Operating Plan are: runoff volume, 30-day; runoff volume, 90-day; Sherwood Crossing uncontrolled runoff volume; and runoff volume, 90-percent, 90-day. Data used to develop the runoff estimates are gathered by Environment Canada and Saskatchewan Water Corporation in Canada and the National Weather Service in the United States. As noted in Section 2.4, new estimating techniques will be developed. If the new estimating techniques cannot be developed for the four items listed above, (with sufficient accuracy to meet the dual objectives of flood control and water conservation), then the Operating Plan will be modified to use existing methods of estimating runoff.


SOURIS BASIN PROJECT
MANITOBA
SASKATCHEWAN
NORTH DAKOTA
CANADA
U.S.A.
MOOSE MOUNTAIN
SOURIS RIVER
LAKE DARLING DAM
ALAMEDA DAM
BOUNDARY DAM
RAFFERTY DAM
ESTEVAN
MINOT
WESTHOPE
LOCATION PLAN

A-3

1.0 TERMINOLOGY

1.1 Glossary of Terms and Definitions

Alameda Dam	The dam which will be constructed on Moose Mountain Creek in the Province of Saskatchewan approximately four kilometres upstream from its confluence with the Souris River.
Authority	The Souris Basin Development Authority.
Bankfull capacity	The maximum flow that a given watercourse can convey in a specified reach without the water level rising above the level of either bank.
Boundary Dam	An existing dam located on Long Creek approximately seven kilometres in a southwesterly direction from the City of Estevan in the Province of Saskatchewan.
Boundary Diversion Channel	A channel that will be constructed in the Province of Saskatchewan with a maximum capacity of 60 m^3/s (2,100 cfs) to allow the conveyance of water from the Boundary Reservoir to the impoundment behind Rafferty Dam.
Canadian reservoirs	A collective term for Rafferty Reservoir, Boundary Reservoir, and Alameda Reservoir.
Control point	A streamflow gaging station or dam which is used to develop operating decisions for Rafferty Reservoir, Alameda Reservoir, Boundary Reservoir, and Lake Darling Reservoir.
Controlled volume	The volume of runoff that can be controlled by using available flood control storage.
Drawdown	The physical act of lowering the pool level of a reservoir through controlled releases.
Estimate	A value based on the best judgment of qualified personnel using all available data.

Flood control storage	The volume below the maximum allowable water level in a reservoir to store flood event runoff.
Full Supply Level	The maximum elevation that the reservoir (FSL) pool is allowed to attain when operations are not directed at achieving flood control benefits.
Lake Darling Dam	An existing structure which is part of the Upper Souris National Wildlife Refuge located on the Souris River approximately 25 kilometres in a northwesterly direction from the City of Minot in the State of North Dakota.
Local flow	The runoff that occurs between two given locations.
Maximum allowable flood level	The highest level a reservoir is allowed to reach while storing water for flood control purposes. When a reservoir reaches this level, any flows into the reservoir must be spilled.
Maximum level prior to spring runoff	The reservoir level which must not be exceeded prior to the spring runoff, regardless of the predicted volume of runoff.
Minimum supply level	The lowest level at which water can be released from a reservoir (invert of conduits).
Natural flow	The volume of runoff determined by the International Souris River Board of Control.
1-percent flood (100-year flood)	A runoff event which is estimated to generate a total 30-day continuous flow volume equal to 721,000 cubic decametres (584,500 acre-feet) as determined at Sherwood Crossing based on data recorded at that station prior to 1986.
Rafferty Dam	The dam which is under construction at a location on the Souris River approximately six kilometres upstream in a northwesterly direction from the City of Estevan in the Province of Saskatchewan.
Releases	The controlled discharge of water from a reservoir other than spills.

Reservoir level	The static water surface elevation of a reservoir.
Reservoir Regulation Manual	A document which is to be used as a guide by the responsible agency in the day to day operation of a reservoir. The manual shall discuss the following topics: description of the project, history of the project, watershed characteristics, data collection and communication networks, hydrologic forecasts, the water control plan, and water control management.
Runoff	The flow of water in a watercourse in response to rainfall or snowmelt or a combination of rainfall and snowmelt.
Runoff volume, 30-day (30-day volume)	Maximum 30-consecutive-day runoff volume that occurs in any water year.
Runoff volume, 90-day (90-day volume)	Maximum 90-consecutive-day runoff volume that occurs in any water year.
Runoff volume, 90-percent, 90-day	The estimated 90-day volume of unregulated runoff with a 90-percent probability of being equalled or exceeded by the actual runoff.
Saskatchewan works	The works described in Article III of the subject Agreement in Saskatchewan, Canada, to include Rafferty Dam, Alameda Dam, and the Boundary Diversion Channel.
Sherwood Crossing	The International gaging station, number 05114000 (05ND007), latitude 48:59:24, longitude 101:57:28, on the Souris River, 0.8 mile downstream of the International boundary.
Sherwood Crossing uncontrolled runoff volume	The uncontrolled volume from the Canadian Reservoirs, if any, and the local flow between the Canadian Reservoirs and Sherwood Crossing.
Souris Basin Project (Project)	The development and operation of the Saskatchewan works in Canada; the operation of the existing Boundary Reservoir in Saskatchewan and the operation of the existing Lake Darling Reservoir in North Dakota in the United States.
Spills	The uncontrolled discharge of water from a reservoir.

Target drawdown level	A pool level to which a reservoir should be lowered in response to estimated spring runoff so that the desired level of flood protection will be provided.
Target flow	The instantaneous flow at a given location that should not be exceeded during a given flood event as a result of releases from a reservoir or reservoirs.
Temporary target flow	A target flow at Sherwood Crossing that has been modified to take into account available storage in Lake Darling.
Uncontrolled volume	The volume of runoff that cannot be controlled by the available flood control storage.
Unregulated flow at Sherwood Crossing	That flow that would occur at Sherwood Crossing if Rafferty Dam and Alameda Dam were not in place.
Water year	October 1 to September 30.
Westhope Crossing	The International gaging station, number 05NF012 (15124000), latitude 48:59:47, longitude 100:57:29, on the Souris River 1.6 kilometres upstream of the International boundary.

1.2 Abbreviations and Symbols

Following is a list of abbreviations and symbols used in this Operating Plan:

ac-ft - acre-feet

cfs - cubic feet per second

dam^3 - cubic decametre

ft - feet

m - metre

m^3/s - cubic metres per second

km - kilometre

1.3 Conversion Factors

As provided in the subject agreement, the following table may be used to convert measurements in the English (United States) system of units to the SI or metric (Canadian) system of units.

Multiply English Units	by	To obtain SI Units
	Length	
inch (in)	25.4	millimetre (mm)
foot (ft)	0.3048	metre (m)
mile (mi)	1.609344	kilometre (km)
	Area	
square mile (mi^2)	2.590	square kilometre (km^2)
acre (ac)	4046.9	square metre (m^2)
	Flow	
cubic foot per second (cfs)	0.02831685	cubic metre per second (m^3/s)
	Volume	
acre-foot (ac-ft)	1.233482	cubic decametre (dam^3)
	Velocity	
foot per second (ft/s)	0.3048	metre per second (m/s)
	Slope	
foot per mile (ft/mi)	0.1894	metre per kilometre (m/km)

1 ha = 10,000 m^2 == ha x 2.471054 = acre

1 dam^3 = 1,000 m^3 == dam^3 x 0.811 = ac-ft

2.0 HYDROMETEOROLOGICAL DATA NETWORK

2.1 General

The collection and distribution of hydrologic and meteorological data in the Souris River basin involves government agencies in the United States and Canada. The data collection network is vital to the successful operation of Rafferty Reservoir, Boundary Reservoir, and Alameda Reservoir in Canada and Lake Darling in the United States. The network may be modified from time to time. The data collection network is operated by the following agencies.

Canada

In Canada, the Water Resources Branch operates and maintains a network of hydrometric stations to record streamflow and water levels and the Atmospheric Environment Service operates and maintains a network of meteorological stations. Both the Water Survey of Canada and the Atmospheric Environment Service are part of Environment Canada, a Federal government agency. In addition, the Saskatchewan Water Corporation, a Provincial Crown Corporation, operates a number of snow course stations in the basin. The purpose of the snow course measurements is to provide additional data for estimating spring runoff.

United States

In the United States, the U.S. Geological Survey operates and maintains a network of hydrometric stations to record streamflow and water levels, and the National Weather Service operates and maintains a network of meteorological stations. Both organizations are Federal agencies. In addition to the meteorological stations, the National Weather Service undertakes aerial gamma surveys to provide additional snow data for estimating spring runoff.

The networks operated by these agencies are shown on the map in figure A-2 and are described in the following section.

2.2 Station Networks

The existing hydrometric station networks are shown on Table 2.1 for Canada and on Table 2.2 for the United States.

The existing meteorological station networks are shown on Table 2.3 for Canada and on Table 2.4 for the United States.

2.3 Additional Stations

Gages and methods will be established to measure inflow, pool levels, and downstream flows for Rafferty Reservoir and for Alameda Reservoir. Additional gaging stations may be added to ensure the appropriate operation of the Project.

2.4 Data Collection, Estimating, and Coordination

Close coordination and exchange of data will be maintained by the Government of the United States and the Government of Canada to facilitate Project operation, with particular reference to pre-flood drawdown. Other items will be detailed in the Reservoir Regulation Manual.

Improved estimating techniques will be developed by the Parties to the subject Agreement. These estimating techniques will be based on the mutual agreement of the Parties and will be included as part of the Reservoir Regulation Manuals, which will be written at a later date.

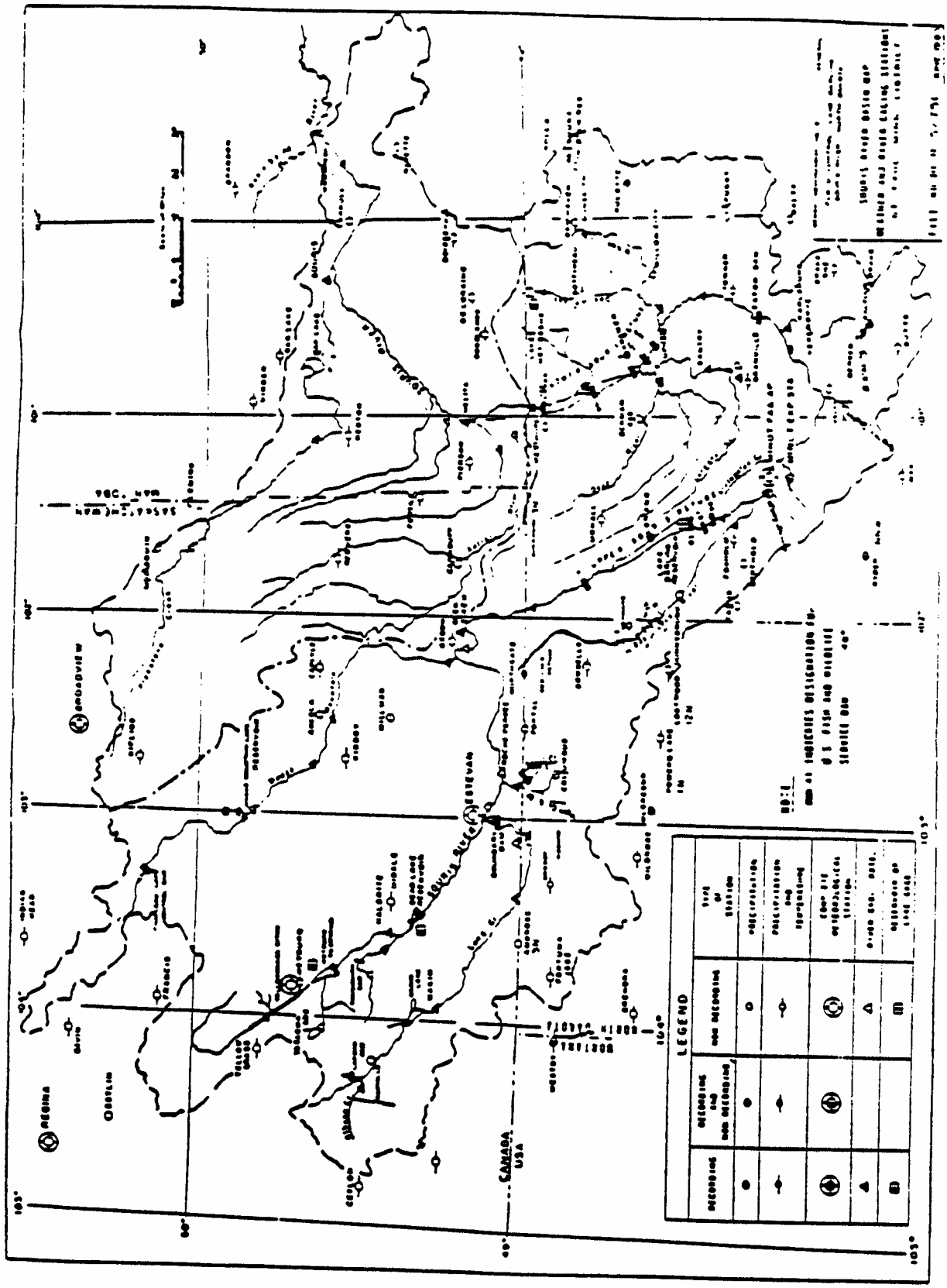


FIGURE A-2

TABLE 2.1
HYDROMETRIC STATION NETWORK FOR SOURIS BASIN IN SASKATCHEWAN

Station No.	Station Name	Location Latitude	Location Longitude	Type
05NA003 (05113360)	Long Creek at Western Crossing	49 00 01	103 21 08	Flow; auto recorder Telemark
05NA004	Long Creek near Maxim	49 15 32	103 57 22	Flow; auto recorder seasonal
05NA005	Gibson Creek near Radville	49 29 02	104 20 11	Flow; auto recorder seasonal
05NA006	Larson Reservoir near Radville	49 28 30	104 16 50	Water level; auto recorder
05NB001	Long Creek near Estevan	49 06 15	103 00 48	Flow; auto recorder
05NB009	Souris River nr. Roche Percee	49 04 34	102 45 53	Flow; auto recorder
05NB011	Yellow Grass ditch near Yellow Grass	49 47 11	104 02 16	Flow; auto recorder seasonal
05NB012	Boundary Res. near Estevan	49 05 49	103 01 28	Water level; auto recorder
05NB014	Jewel Creek nr. Goodwater	49 23 10	103 42 42	Flow; auto recorder seasonal
05NB016	Roughbark Res. near Weyburn	49 30 08	103 43 07	Water level; auto recorder
05NB017	Souris River nr. Halbrite	49 29 37	103 39 44	Flow; auto recorder seasonal
05NB018	Tatagwa Lake Dr. near Weyburn	49 35 58	103 56 50	Flow; auto recorder seasonal
05NB020	Nickle Lake nr. Weyburn	49 36 33	103 47 28	Water level; auto recorder
05NB021 (05113800)	Short Creek nr. Roche Percee	49 01 52	102 50 57	Flow; auto recorder
05NB022	Dead Lake Res. near Midale	49 17 23	103 26 40	Water level; auto recorder
05NB025	Souris River near Lewvan	49 58 37	104 04 33	Flow; auto recorder seasonal

TABLE 2.1 (cont.)
HYDROMETRIC STATION NETWORK FOR SOURIS BASIN IN SASKATCHEWAN

Station	Station Name	Location Latitude	Location Longitude	Type	No.
05NB029	Dead Lake - Souris River	49 17 23	103 26 40	Water level; auto recorder	
05NB030	Souris River near McTaggart	49 46 10	104 00 54	Flow; auto recorder; seasonal	
05NB031	Souris River near Bechard	49 59 20	104 11 24	Flow; auto recorder; seasonal	
05NC001	Moose Mountain Creek below Moose Mountain Lake	49 52 23	103 00 54	Flow; auto recorder; seasonal	
05NC002	Moose Mountain Reservoir nr. Corning	49 53 29	103 01 58	Water level; auto recorder	
05ND001	Souris River nr. Glen Ewen	49 11 02	102 01 42	Flow; auto recorder	
05ND004	Moose Mountain Creek nr. Oxbow	49 13 58	102 13 41	Flow; auto recorder; seasonal	
05NF006	Lightning Creek near Carnduff	49 13 17	101 43 06	Flow; auto recorder; seasonal	
05NF010	Antler River near Wauchope	49 35 03	101 50 52	Flow; auto recorder; seasonal	
05NF013	Gainsborough Creek near Starthoaks	49 24 51	101 31 36	Flow; auto recorder; seasonal	
24-131	Souris River at #18 Highway	49 07 42	103 01 17	Flow; manual recorder; Extreme flow only	
24-132	Souris River at #47 Highway	49 07 11	102 59 32	Flow; manual recorder; Extreme flow only	
24-133	Souris River at Oxbow	49 13 04	102 11 08	Flow; manual recorder; Extreme flow only	
	Souris River at Pulfer's Farm	49 40 50	103 54 09	Flow; manual recorder; Extreme flow only	

TABLE 2.2
HYDROMETRIC STATION NETWORK FOR SOURIS BASIN IN NORTH DAKOTA

Station No.	Station Name	Location		Type
		Latitude	Longitude	
05114000	Souris River nr. Sherwood	48 59 24	101 57 28	Flow; auto recorder; Telemark
05115500	Lake Darling near Foxholm	48 27 27	101 35 14	Water level; auto recorder
05116000	Souris River near Foxholm	48 22 20	101 30 18	Flow; auto recorder; Telemark
05116500	Des Lacs River near Foxholm	48 22 14	101 34 11	Flow; auto recorder; Telemark
05117500	Souris River above Minot	48 14 45	101 22 15	Flow; auto recorder; Telemark
05120000	Souris River near Verendrye	48 09 35	100 43 45	Flow; auto recorder
05120500	Wintering River near Karlsruhe	48 10 14	100 32 20	Flow; auto recorder
05122000	Souris River near Bantry	48 30 20	100 26 04	Flow; auto recorder; Telemark
05123000	Lake Metigoshe near Bottineau	48 59 05	100 20 52	Water level; auto recorder
05123400	Willow River near Willow City	48 35 20	100 26 30	Flow; auto recorder
05123500	Deep River near Upham	48 35 03	100 51 44	Flow; auto recorder; Telemark
05123900	Boundary Creek near Landa	48 48 46	100 51 46	Flow; auto recorder
05124000	Souris River near Westhope	48 59 47	100 57 29	Flow; auto recorder

TABLE 2.3
METEOROLOGICAL STATION NETWORK FOR SOURIS BASIN IN SASKATCHEWAN

Station Name	Station	Location		Observing Programs *									
		Latitude	Longitude	TE	PR	HW	RR	ST	EV	SU	SS	NS	WS
Alameda		49 24	102 16								X		
Amulet	4010150	49 37	104 44	X	X								
Arcola COA	4010240	49 38	102 32		X								
Bechard	4010540	50 03	104 13	X	X								
Broadview	4010879	50 23	102 35	X	X	X	X	X	X	X	X	X	
Carlyle	4011160	49 38	102 17	X	X								
Carlyle		49 39	102 16								X		
Carlyle C-7		49 39	102 20								X		
Carnduff	4011250	49 13	101 45		X								
Ceylon	4011441	49 24	104 39	X	X								
Davin	4012162	50 24	104 11		X								
Davin	4012165	50 22	104 09		X								
Davin	4012166	50 23	104 10	X	X		X		X				
Estevan		49 05	102 59								X		
Estevan A	4012400	49 04	103 00	X	X	X	X	X	X	X	X	X	
Estevan C-9		49 08	102 56								X		
Fertile	4012485	49 20	101 27	X	X								
Fleming S.	4012525	50 02	101 35		X								
Francis	4012720	50 07	103 55	X	X								
Frobisher		49 13	102 09								X		
Gainsborough	4012790	49 18	101 32		X								
Glenavon		50 12	103 08								X		
Handsworth	4013098	48 51	102 52	X	X								
Handsworth		49 53	103 02								X		
Heward	4013221	49 45	103 09	X	X								
Hitchcock		49 15	103 10								X		
Hume		49 40	103 37								X		
Indian Head CDA	4013480	50 32	103 40	X	X			X				X	
Indian Head PFRA	4013490	50 31	103 41	X	X			X	X	X			X
Kipling	4014040	50 12	102 44	X	X								
Kisbey		49 40	102 45								X		

*TE - Temperature
PR - Precipitation
HW - Hourly Weather
RR - Rate of Rainfall
ST - Soil Temperature
EV - Evaporation
SU - Sunshine
SS - Snow Survey
NS - Nipher Snow Measurements
WS - Windspeed

TABLE 2.3 (cont.)
METEOROLOGICAL STATION NETWORK FOR SOURIS BASIN IN SASKATCHEWAN

Station Name	Station	Location		Observing Programs *									
		Latitude	Longitude	TE	PR	HW	RR	ST	EV	SU	SS	NS	WS
Macoun	4014870	49 14	103 14		X								
Maryfield	4015045	49 50	101 32	X	X								
Maxim		49 19	103 57								X		
Midale	4015160	49 24	103 25	X	X								
Moose Mountain Reservoir	4015344	49 53	103 02	X	X				X				
Moosomin	4015360	50 09	101 40	X	X								
Neptune		49 22	104 06								X		
Neptune S.		49 19	104 02								X		
Noonan N.D.		48 57	103 03								X		
Odessa	4015648	50 20	103 41	X	X								
Oungre		49 09	103 45								X		
Oxbow	4015800	49 19	102 07	X	X								
Oxbow		49 14	102 07								X		
Radville CDA	4016400	49 30	104 17			X							
Redvers	4016522	49 32	101 42	X	X								
Torquay	4018105	49 05	103 30		X								
Trossachs N.E.		49 36	104 11								X		
Trossachs S.		49 34	104 17								X		
Wapella - Newfinland	4018508	50 27	101 56	X	X								
Wawota	4018678	49 56	101 58	X	X			X	X	X			X
Weyburn		49 40	103 53								X		
Weyburn 2	4018762	49 40	103 51		X								
Willmar	4018960	49 25	102 30		X								
Yellow Grass	4019040	49 48	104 10	X	X								

*TE - Temperature
PR - Precipitation
HW - Hourly Weather
RR - Rate of Rainfall
ST - Soil Temperature
EV - Evaporation
SU - Sunshine
SS - Snow Survey
NS - Nipher Snow Measurements
WS - Windspeed

TABLE 2.4
METEOROLOGICAL STATION NETWORK FOR SOURIS BASIN IN NORTH DAKOTA

Station Name	Location		Observing Programs *					
	Latitude	Longitude	PR	TE	SS	HW	SU	EV
Ambrose	49 00	103 28	X		X			
Belcourt	48 50	99 45	X	X	X			
Berthold	48 19	101 44	X		X			
Bottineau	48 50	100 27	X	X	X			
Bowbells	48 48	102 15	X	X	X			
Butte	47 50	100 40	X	X	X			
Columbus	48 55	102 50	X		X			
Crosby	48 54	103 18	X	X	X			
Drake 8NE	48 02	100 17	X	X	X			
Fortuna 1W	48 55	103 49	X	X	X			
Foxholm 7N	48 20	101 33	X	X	X			
Granville	48 16	100 51	X	X	X			
Kenmare	48 40	102 06	X	X	X			
Lake Metigoshe	48 59	100 21	X		X			
Max	47 49	101 18	X	X	X			
Minot FAA	48 16	101 17	X	X	X	X		
Minot Exp. St.	48 11	101 18	X	X	X		X	X
Mohall	48 48	101 31	X	X	X			
Rolla 3NW	48 54	99 40	X	X	X			
Rugby	48 21	100 00	X	X	X			
Sherwood 3N	49 00	101 38	X		X			
Tagus	48 20	101 56	X		X			
Tower NE	48 21	100 24	X	X	X			
Upham 3N	48 37	100 44	X	X	X			
Westhope	48 55	101 22	X	X	X			

*PR - Precipitation
TE - Temperature
SS - Snow Survey
HW - Hourly Weather
SU - Sunshine
EV - Evaporation

3.0 CONTROL POINTS

3.1 Rafferty Dam

The relevant data for this control point are presented on Tables 3.1 and 3.2. The elevation-area-capacity curves are shown on Plate A-7. In the event of a discrepancy, the tabulated values will be used.

Table 3.1
DATA FOR RESERVOIRS

Description	Elevation	Total Storage
<u>Rafferty Reservoir</u>		
Maximum allowable flood level	554.00 m (1817.59 ft)	633,000 dam^3 (513,000 ac-ft)
Full supply level	550.50 m (1806.10 ft)	439,600 dam^3 (356,400 ac-ft)
Normal level prior to spring runoff	549.50 m (1802.82 ft)	394,000 dam^3 (319,000 ac-ft)
Minimum supply level	537.50 m (1763.45 ft)	13,000 dam^3 (10,000 ac-ft)
<u>Boundary Reservoir</u>		
Full supply level	560.83 m (1840.00 ft)	61,500 dam^3 (49,800 ac-ft)
Minimum supply level	553.21 m (1815.00 ft)	24,900 dam^3 (20,800 ac-ft)
<u>Alameda Reservoir</u>		
Maximum allowable flood level	567.00 m (1860.24 ft)	189,600 dam^3 (153,710 ac-ft)
Full supply level	562.00 m (1843.83 ft)	105,500 dam^3 (85,530 ac-ft)
Normal level prior to spring runoff	561.00 m (1840.55 ft)	94,245 dam^3 (76,400 ac-ft)
Minimum supply level	555.85 m (1823.65 ft)	50,700 dam^3 (41,100 ac-ft)
<u>Lake Darling Reservoir</u>		
Maximum allowable flood level	1601.00 ft (487.98 m)	158,600 ac-ft (195,630 dam^3)
Full supply level	1597.00 ft (486.77 m)	110,000 ac-ft (136,000 dam^3)
Minimum supply level	1577.00 ft (480.67 m)	3,500 ac-ft (4,300 dam^3)

Table 3.2
SUMMARY OF RAFFERTY ELEVATION-AREA-CAPACITY DATA

Elevation		Storage		
metres	feet	dam^3	ac-ft	
547.5	1796.26	305287	247500	Maximum required drawdown (1)
549.5	1802.82	392371	318100	Normal drawdown (2)
550.5	1806.10	439613	356400	FSL
554.0	1817.59	632776	513000	Maximum storage level

Elevation		Surface Area		Storage	
metre	feet	ha	acres	dam^3	ac-ft
535.0	1755.25	0	0	0	0
537.0	1761.81	807	1992	4737	3840
538.0	1765.09	1464	3614	16159	13100
540.0	1771.65	2495	6159	56370	45700
545.0	1788.06	3574	8822	209075	169500
546.0	1791.34	3795	9367	245833	199300
547.0	1794.62	4022	9928	284811	230900
547.5	1796.26	4134	10205	305287	247500
549.0	1801.18	4480	11060	369675	299700
549.5	1802.82	4599	11353	392371	318100
550.0	1804.46	4719	11649	416547	337700
550.5	1806.10	4881	12048	439613	356400
551.0	1807.74	5045	12454	464406	376500
551.5	1809.38	5212	12866	490062	397300
552.0	1811.02	5407	13347	516582	418800
552.5	1812.66	5605	13836	543966	441000
553.0	1814.30	5807	14334	572459	464100
553.5	1815.94	6012	14841	602063	488100
554.0	1817.59	6222	15360	632776	513000
555.0	1820.87	6651	16418	697041	565100

1. Assuming starting elevation of 547.5 metres, flood control storage available would be 632,776 (513,000) - 305,287 (247,500) = 327,489 dam^3 (265,500 ac-ft) {FSL = 550.5{.

2. Assuming starting elevation of 549.5 metres, flood control storage available would be 632,776 (513,000) - 392,371 (318,100) = 240,405 dam^3 (194,900 ac-ft) {FSL = 550.5{.

3.2 Boundary Dam

The relevant data for this control point are shown on Tables 3.1 and 3.3.

Table 3.3
SUMMARY OF BOUNDARY ELEVATION-AREA-CAPACITY DATA

Elevation		Storage		
metre	feet	dam^3	ac-ft	
557.8	1830.0	44725	36259	Max required drawdown (1)
560.8	1840.0	61480	49845	FSL, Normal, & Max.

Elevation		Surface Area		Storage	
metre	feet	ha	acres	dam^3	ac-ft
554.7	1820.0	407	1005	30691	24882
555.5	1822.5	425	1049	33970	27540
556.3	1825.0	445	1098	37400	30320
557.0	1827.5	486	1200	41000	33240
557.8	1830.0	506	1249	44725	36259
558.5	1832.5	546	1348	48625	39420
559.3	1835.0	547	1350	52670	42700
560.1	1837.5	607	1498	56910	46140
560.8	1840.0	688	1698	61480	49845

1. At maximum required drawdown level of 557.8 metres (1830 feet), storage available would be 61,480 (49,845) - 44,725 (36,259) = 16,755 dam^3 (13,586 == 13,600 ac-ft). This necessary storage may also be obtained by drawing Rafferty below required levels and diverting the 16,755 dam^3 (13,600 ac-ft) to Rafferty Reservoir.

3.3 Alameda Dam

The relevant data for this control point are shown on Tables 3.1 and 3.4. The elevation-area-capacity curves are shown on Plate A-8.

Table 3.4
SUMMARY OF ALAMEDA ELEVATION-AREA-CAPACITY DATA

Elevation		Storage		
metres	feet	dam^3	ac-ft	
555.85	1823.65	50700	41100	Maximum required drawdown (1)
561.0	1840.55	94245	76400	Normal drawdown (2)
562.0	1843.83	105500	85530	FSL
567.0	1860.24	189600	153710	Maximum storage level

Elevation		Surface Area		Storage	
metres	feet	ha	acres	dam^3	ac-ft
528.0	1732.28	0	0	0	0
530.0	1738.84	11	27	110	90
532.0	1745.41	27	67	490	400
534.0	1751.97	41	101	1170	950
536.0	1758.53	58	143	2160	1750
538.0	1765.09	77	190	3500	2840
540.0	1771.65	93	230	5200	4215
542.0	1778.21	124	306	7370	5975
544.0	1784.78	156	385	10170	8245
546.0	1791.34	200	494	13700	11110
548.0	1797.90	253	625	18260	14805
550.0	1804.46	318	785	23970	19430
552.0	1811.02	386	953	31000	25130
554.0	1817.59	495	1222	39800	32265
555.85	1823.65	624	1540	50700	41100
556.0	1824.15	635	1567	51100	41425
558.0	1830.71	770	1900	65160	52825
560.0	1837.27	1010	2493	82990	67280
561.0	1840.55	1125	2777	94245	76400
562.0	1843.83	1240	3061	105500	85530
564.0	1850.39	1520	3752	133200	107990
566.0	1856.96	1940	4789	167800	136040
567.0	1860.24	2180	5381	189600	153710
568.0	1863.52	2420	5974	211400	171385
569.0	1866.80	2660	6566	236800	191980

1. Assuming starting elevation of 555.85 metres, flood control storage available would be 189,600 (153,710) - 50,700 (41,100) = 138,900 dam 3 (112,608 ac-ft) {FSL = 562.0{.

2. Assuming starting elevation of 561.0 metres, flood control storage available would be dam^3 189,600 (153,710) - 94,245 (76,400) = 95,355 (77,305 ac-ft) {FSL = 562.0{.

3.4 Lake Darling Dam

The relevant data for this control point are shown on Tables 3.2 and 3.5. The elevation-area-capacity curves are shown on Plate A-9.

Table 3.5
SUMMARY OF LAKE DARLING ELEVATION-AREA-CAPACITY DATA

Elevation		Storage		
feet	metres	ac-ft	dam^3	
1591	484.94	53,000	65,375	Maximum drawdown (1)
1596	486.46	99,000	122,115	Normal drawdown (2)
1597	486.77	110,100	135,800	Normal pool
1601	487.98	158,600	195,063	Existing maximum

Elevation		Surface Area		Storage	
feet	metres	acres	ha	ac-ft	dam^3
1591.0	484.94	7,431	3,010	53,000	65,375
1592.0	485.24	8,200	3,322	60,800	75,000
1593.0	485.55	8,910	3,610	69,400	85,600
1594.0	485.85	9,650	3,910	78,600	96,950
1595.0	486.16	10,220	4,140	88,600	109,290
1596.0	486.46	10,800	4,375	99,000	122,115
1597.0	486.77	11,270	4,566	110,100	135,800
1598.0	487.07	11,750	4,760	121,600	150,000
1599.0	487.38	12,150	4,922	133,600	164,790
1600.0	487.68	12,550	5,084	145,900	179,965
1601.0	487.98	12,900	5,226	158,600	195,630

Service spillway crest at 1598.0 feet.

1. Assuming a starting elevation of 1591 feet, flood control storage available would be 158,600 (195,630) - 53,000 (65,375) = 105,600 ac-ft (130,255 dam^3)

2. Assuming a starting elevation of 1596 feet, flood control storage available would be 158,600 (195,630) - 99,000 (122,115) = 59,600 ac-ft (73,515 dam^3)

3.5 Souris River near Sherwood Crossing

This control point is the International gaging station, number 05114000, latitude 48:59:24, longitude 101:57:28, on the Souris River, 0.8 mile downstream of the International boundary.

3.6 Souris River above Minot

The control point, Souris River above Minot, is a flow gaging station operated by the U.S. Geological Survey and maintained by the North Dakota State Water Commission. The station number is 05117500.

The station is located approximately 3.5 miles (5.8 km) west of Minot, North Dakota, and approximately 7 miles (11 km) downstream from the confluence of the Souris and Des Lacs Rivers. The coordinates of the station are latitude 48:14:45, longitude 101:22:15.

3.7 Souris River near Westhope Crossing

This control point is the International gaging station, number 05NF012, latitude 48:59:47, longitude 100:57:29, on the Souris river 1.6 kilometres upstream of the International boundary near Westhope, North Dakota.

3.8 Boundary Diversion Channel

Boundary Diversion Channel may be used for flood control provided that storage is available in Rafferty Reservoir in excess of the amount required to meet United States flood control requirements in that year, by the amount of volume to be diverted.

3.9 Other Considerations

This Operating Plan for the Canadian reservoirs and Lake Darling Reservoir requires that flood protection be provided for urban and rural downstream areas. The operation of the Project for flood

flows will consider the approximate bankfull channel capacities of urban and rural reaches. Release rates will be based on reducing flood damages as much as possible. An indication of the flows at which flooding occurs is provided in Table 3.6, for various reaches of the Souris River, Long Creek and Moose Mountain Creek. These flows should be considered as approximate only.

Table 3.6
APPROXIMATE BANKFULL CHANNEL CAPACITY

Description of Reach	Bankfull Capacity
Long Creek	
Boundary Dam to Souris River	25 m^3/s (900 cfs)
Moose Mountain Creek	
Alameda Dam to Souris River	50 m^3/s (1,800 cfs)
Souris River	
Rafferty Dam to Long Creek	14 m^3/s (500 cfs)*
Long Creek to Shand	85 m^3/s (3,000 cfs)
Shand to Moose Mountain Creek	60 m^3/s (2,000 cfs)
Souris River at Oxbow	90 m^3/s (3,200 cfs)
Souris River at Sherwood Crossing	90 m^3/s (3,200 cfs)
Sherwood to Upper Souris Refuge	60 m^3/s (2,000 cfs)
Upper Souris Refuge to Lake Darling Dam	Reservoir pool
Lake Darling Dam to Minot	2,500 cfs (70 m^3/s)
Souris River at Minot	5,000 cfs (215 m^3/s)
Minot to Logan	2,500 cfs (70 m^3/s)
Logan to Velva	1,400 cfs (40 m^3/s)
Velva to Verendrye	1,400 cfs (40 m^3/s)
Verendrye to Wintering River	1,500 cfs (42 m^3/s)
Wintering River to Towner	600 cfs (17 m^3/s)
Towner to Coulter	200 cfs (6 m^3/s)
Coulter to Melita	600 cfs (17 m^3/s)
Melita to Hartney	1,100 cfs (31 m^3/s)

*With proposed channel improvements.

4.0 PROJECT OPERATION

4.1 Objectives and Procedures

The objectives to be implemented by this Operating Plan include the following: (1) provide 1-percent (100-year) flood protection at Minot, North Dakota; (2) provide flood protection to urban and rural areas downstream from Rafferty Dam, Alameda Dam, and Lake Darling Dam; and (3) ensure, to the extent possible, that the existing benefits from the supply of water in the Souris River Basin and the supply of water to the Souris Basin Project are not compromised.

In order to ensure that these objectives are met, it is necessary to distinguish between flood and nonflood operation. To meet the flood and nonflood Operating Plan objectives, the following procedure will be used to identify the proper mode of operation while complying with the terms of the 1959 Interim Measures as modified.

Flood Operation

If a February 1 or subsequent spring runoff estimate shows a reasonable chance (50 percent) of a runoff volume at Sherwood Crossing being equal to or greater than a 10-percent (1 in 10 years) flood, then operations will proceed on the basis of the flood Operating Plan. Flood operation will cease when flood volumes have been discharged and streamflows are at or below 500 cfs at Minot.

Nonflood Operation

If a February 1 or subsequent spring runoff estimate shows a reasonable chance (50 percent) of a runoff event less than a 10-percent (1 in 10 years) flood, then operations will proceed on the basis of the nonflood Operating Plan.

4.2 Consistency with Interim Measures

As set out in the 1959 Interim Measures as modified, under certain conditions, a portion of the North Dakota share will be in the form of evaporation from Rafferty Reservoir and Alameda Reservoir. During years when these conditions occur, the minimum amount of flow actually passed to North Dakota will be 40 percent of the natural flow at Sherwood Crossing. This lesser amount is in recognition of Saskatchewan's agreement to operate both Rafferty Dam and Alameda Dam for flood control and for evaporation as a result of the Project. Therefore, this is deemed to be in compliance with all applicable obligations. The volume of natural flow will be determined by the International Souris River Board of Control ("the Board").

The following rules determine the percentage of the natural flow at Sherwood Crossing which is to be passed to North Dakota.

a. If the level of Lake Darling Reservoir is below an elevation of 1592.0 feet (485.24 metres) on October 1 in any calendar year, Saskatchewan will pass 50 percent of the natural flow at Sherwood Crossing in that year and in succeeding years until the level of Lake Darling Reservoir is above an elevation of 1593.0 feet (485.55 metres) on October 1.

b. If the natural flow at Sherwood Crossing is equal to or less than 20,000 acre-feet (24,700 cubic decametres) prior to October 1 of that year, then Saskatchewan will pass 50 percent of that natural flow to North Dakota in that calendar year.

c. If the conditions specified in subparagraphs 4.2(a) and 4.2(b) do not appply, then Saskatchewan will pass at least 40 percent of the natural flow at Sherwood Crossing to North Dakota.

d. If releases are delayed, they may be called for at any time before October 1. If they are not called for before October 1, the water may be retained for use in Saskatchewan.

Lake Darling Reservoir and the Canadian reservoirs will be operated (insofar as is compatible with the Project's purposes and consistent with past practices) to ensure that the pool elevations, which determine conditions for sharing evaporation losses, are not artificially altered. The triggering elevation of 1592.0 feet (485.24 metres) for Lake Darling Reservoir is based on existing water uses in North Dakota, including refuges operated by the U.S. Fish and Wildlife Service. Each year, operating plans for the refuges on the Souris River will be presented to the Board. Barring unforeseen circumstances, operations will follow said plans during each given year. Lake Darling Reservoir will not be drawn down for the sole purpose of reaching the elevation of 1592.0 feet (485.24 metres) on October 1.

Late season releases will not be made by Saskatchewan Water Corporation from the Canadian reservoirs for the sole purpose of raising the elevation of Lake Darling Reservoir above 1593.0 feet (485.55 metres) on October 1.

Flow releases to the United States should occur (except in flood years) in the pattern which would have occurred in a state of nature. To the extent possible and in consideration of potential channel losses and operating efficiencies, releases from the Canadian dams will be scheduled to coincide with periods of beneficial use in North Dakota. Normally, the period of beneficial use in North Dakota coincides with the timing of the natural hydrograph, and that timing should be a guide to releases of the United States portion of the natural flow. The flow release to the United States may be delayed when the State of North Dakota determines and notifies Saskatchewan through the Board that the release would not be of benefit to the State at that time. The delayed release may be retained for use in Saskatchewan, notwithstanding the minimum release limits, unless it is called for by the State of North Dakota through the Board before October 1 of each year. The delayed release shall be measured at the point of release and the delivery at Sherwood Crossing shall not be less than the delayed release minus the conveyance losses that would have occurred under natural conditions between the point of release and the Sherwood Crossing. Prior to these releases being made, consultations shall occur between the Saskatchewan Water Corporation, the U.S. Fish and Wildlife Service, and the State of North Dakota. All releases will be within the specified target flows at the control points.

4.3 Flood Operation

General

This section sets forth the Operating Plan for Rafferty Reservoir, Alameda Reservoir, Boundary Reservoir, and Lake Darling Reservoir for flood control. In general, the purpose is as follows: the three reservoirs in Canada are to be operated in such a manner so that, along with Lake Darling Reservoir, it will be possible to obtain 1-percent (100-year) level of protection at Minot. The 1-percent level of protection at Minot allows a maximum discharge of 5,000 cfs. After the spring estimate of streamflow is received, if a 1-percent or greater flood volume is anticipated, it will be necessary to draw Lake Darling Reservoir down to an elevation of 1591.0 feet, to draw Rafferty Reservoir down to an elevation of 547.5 metres, to draw Alameda Reservoir down to an elevation of 555.85 metres, and to draw Boundary Reservoir down to an elevation of 557.8 metres given that the estimated 90-day volume as set forth in Plates A-1 to A-3 and the estimated 30-day volume in Plate A-4 will require the maximum required drawdown levels. As discussed in Section 3.2, additional drawdown in Rafferty Reservoir may be used in lieu of drawdown of Boundary Reservoir. The manner in which this is to be accomplished and the reasons for doing so are presented in the following sections. In those cases where the flood event is greater than a 1-percent (100-year) event, the Project will be operated as set forth in the Reservoir Regulation Manuals to attempt to reduce downstream damages without endangering the structures themselves. This may require flows greater than 5,000 cfs at Minot for the period before June 1, and may also require flows greater than 500 cfs (which could also exceed 5,000 cfs) after June 1.

The Canadian reservoirs will be operated for Sherwood Crossing giving due consideration to the level at Lake Darling Reservoir and the flow at Minot. It is not possible to obtain 1-percent (100-year) flood protection at Minot unless Rafferty Reservoir, Alameda Reservoir, Boundary Reservoir, and Lake Darling Reservoir are operated as a complete system.

This section will be used when the estimated 30-day unregulated volume at Sherwood Crossing equals or exceeds a 10-percent (10-year) event, which is equal to 175,200 ac-ft (216,110 dam^3); and/or when the local 30-day volume at Sherwood Crossing is expected to equal or exceed 30,000 acre-feet (37,000 dam^3). From the period of record at Sherwood Crossing, 1930 to 1988, 58 years, the Operating Plan would have been used approximately 6 times, or about 10 percent of the time.

The flood Operating Plan is divided into four separate phases in accordance with the annual hydrograph. These phases relate to:

a. Operations to lower reservoirs prior to spring runoff.
b. Operations during spring runoff.
c. Operations after runoff to restore reservoirs to full supply level.
d. Operations during the summer, fall, and winter.

4.3.1 Drawdown Prior to Spring Runoff

The drawdown of Rafferty Reservoir, Boundary Reservoir, Alameda Reservoir and Lake Darling Reservoir in response to a given predicted flood event is an integral part of the Operating Plan. The extent of drawdown will depend on the estimated spring runoff volume for each as shown on the curves in Plates A-1 to A-4.

Any releases from Lake Darling Reservoir must take into consideration inflows resulting from releases from the Canadian reservoirs and any local inflow between the Canadian reservoirs and Lake Darling Reservoir.

Regardless of the estimated volumes of runoff, the reservoirs will be operated to ensure that each is at or below the following pool levels by February 1.

a. Rafferty Reservoir - 549.50 m. (1802.82 ft.)
b. Alameda Reservoir - 561.00 m. (1840.55 ft.)
c. Lake Darling Reservoir - 1596.00 ft. (486.46 m.)

The reservoirs will be drawn down, as appropriate, over the summer, fall, and winter months, and release rates will take into consideration channel and ice conditions. Release rates will be set to ensure that the maximum controlled flow at Sherwood Crossing will not exceed the following rates, provided Lake Darling Reservoir is at or below full supply level:

a. June 1 to August 31 - 11 m^3/s (400 cfs)
b. September 1 to January 31 - 14 m^3/s (500 cfs)
c. February 1 to March 15 - 60 m^3/s (2,120 cfs)
d. March 16 to May 31 - 90 m^3/s (3,200 cfs; up to 50-yr)
113 m^3/s (4,000 cfs; over 50-yr)

Estimates of spring runoff will be made initially on February 1 and thereafter on the 15th and last day of each month until runoff occurs. The target drawdown levels will be as shown on Plates A-1 through A-4. For the Canadian reservoirs, these levels are based on the 90-percent 90-day spring runoff volume for each reservoir. Using this parameter will ensure that operating the Canadian reservoirs for flood control will not compromise the potential for the supply of water. For Lake Darling Reservoir, the target drawdown level is based on the estimated Sherwood Crossing uncontrolled runoff volume and a sliding scale relating the runoff volume to a Lake Darling Reservoir level as shown on

Plate A-4. As the estimated spring runoff volume is updated during the spring, the Lake Darling Reservoir target level will also change.

Should the level of any reservoir on February 1 be higher than its target drawdown level, releases will be made as described below. Should the level for a reservoir on February 1 be equal to or lower than the target drawdown level, no releases need be made from that reservoir.

Channel Ice Effects

The Reservoir Regulation Manuals will include features that will directly address the ice problems that may occur.

Rafferty Reservoir and Alameda Reservoir

The drawdown of Rafferty Reservoir and Alameda Reservoir will be the responsibility of the Saskatchewan Water Corporation. Releases from each reservoir will be made to achieve its target drawdown level. While the reservoirs are being drawn down, the total flow at Sherwood Crossing should not exceed the peak target flow from Plate A-5.

The release rate will take into consideration ice and channel conditions between the Canadian reservoirs and Lake Darling Reservoir. Such releases will be reviewed and adjusted as necessary on a regular basis, at a minimum after each estimate of the spring runoff volume.

Releases will be established to achieve the target drawdown levels prior to the occurrence of spring runoff to the reservoirs.

Boundary Reservoir and Boundary Diversion Channel

Boundary Reservoir and the Boundary Diversion Channel will be operated within the limits of the drawdown curves. Boundary Reservoir will be drawn down to the elevation shown on Plate A-2 provided that the associated drawdown volume shown on Plate A-2 is equal to the estimated 90-percent 90-day runoff volume. To operate the Boundary Diversion Channel, there must be excess capacity available in Rafferty Reservoir to store the diverted amount. This excess capacity must be in addition to the capacity that would be made available as per Plate A-1. The operation of each will attempt to maximize flood reduction within the constraints of the requirements for water supply in Canada. The operation of each will be such to ensure that the resulting peak flow at Sherwood Crossing during runoff is not greater than the peak that would have occurred without the operation of Boundary Reservoir and Boundary Diversion Channel; and that flood control be provided as set forth above.

Preflood Lake Darling Spring Drawdown

Drawdown of the Lake Darling Reservoir prior to a given flood event is an integral part of the overall Operating Plan. Lake Darling Reservoir drawdown is the first step in the Operating Plan and is important because the extent of drawdown has a direct relationship to the amount of storage available for flood control. Drawdown is dependent upon the runoff volume (uncontrolled) at Sherwood Crossing, the rate of drawdown, and the time available for drawdown between March 1 and spring breakup. In addition, it must include the release of water from the Canadian reservoirs if needed, or it could be reduced based on reservoir levels in Canada lower than what is needed for flood control based on the estimated 30-day volume. The rate of drawdown shall be reviewed and adjusted on a regular schedule, as the winter progresses, to ensure that the Lake Darling Reservoir will be at or below the target elevation by April 1. Any drawdowns required after April 1 shall be made after consultation with Manitoba.

4.3.2. Spring Runoff

If the estimated uncontrolled volume is sufficient to raise Lake Darling Reservoir to its full supply level of 1597.0 feet, then the Canadian dams will store water until they have reached their respective full supply levels of 550.5 metres for Rafferty Reservoir and 562.0 metres for Alameda Reservoir. Once a reservoir has reached its full supply level, excess water will be released at a controlled rate in accordance with the terms of the Operating Plan.

If target drawdown levels for Rafferty Reservoir and Alameda Reservoir were not reached prior to the spring runoff, then the volume in the reservoir above the target drawdown level on February 1 will be released within the specified target flows at control points, and they will be coordinated with the U.S. Fish and Wildlife Service and the State of North Dakota.

Saskatchewan Water Corporation may draw down the level of the Canadian reservoirs below their target drawdown level. Releases resulting from said drawdown shall remain within the specified target flows at control points, however, and will be coordinated with the representatives of the United States Department of the Army.

The U.S. Fish and Wildlife Service may draw down the level of Lake Darling Reservoir below its target drawdown level to meet fish and wildlife needs. Releases resulting from said drawdown will remain within the specified target flows at control points; however, they will be coordinated with the Saskatchewan Water Corporation, Manitoba Department of Natural Resources, and the U.S. Department of the Army.

Sherwood Crossing Target Flow

The Sherwood Crossing target flow is a function of the Lake Darling Reservoir level which is itself a function of the target flow at Minot. To enable the operation of the total system for those objectives set forth in Section 4.1, it is necessary to vary the target flows at Sherwood Crossing as given on Plate A-5.

The maximum target flow at Sherwood Crossing will be as provided in Plate A-5, except that, under certain conditions, the target flow may be temporarily lowered. Once Lake Darling Reservoir levels are lowered to a level which allows the Minot target flow to be maintained, the Sherwood Crossing target flow can be increased to the starting value as was determined from Plate A-5. If releases from the Canadian reservoirs are not increased, then the Lake Darling Dam operator must be notified immediately and releases from Lake Darling Reservoir reduced accordingly. The maximum target flow will continue while water remains above FSL in either Rafferty Reservoir or Alameda Reservoir and Lake Darling Reservoir is below 1597 feet. By having a varying target flow at Sherwood Crossing, the summer release period would decrease, as well as the problems which occur with long summer releases.

Lake Darling Level

The release of the maximum target flow at Sherwood Crossing will allow Lake Darling Reservoir to release water at the Minot target level which may be above the Sherwood Crossing maximum target level resulting in the lowering of the Lake Darling Reservoir below 1597 feet. The need to draw Lake Darling Reservoir below 1597 feet will only occur when there is sufficient water in Rafferty Reservoir and Alameda Reservoir above their FSL's to fill Lake Darling Reservoir back to 1597 feet and will enable releases of excess water during the period before May 15 and at reduced levels before June 1. The drawing of Lake Darling Reservoir below 1597 feet will allow the summer release period to be shortened and in some cases it will not be needed.

4.3.3 Drawdown after Spring Runoff

If any of the reservoirs are above full supply level after the spring runoff has occurred, the reservoir or reservoirs will be brought down to full supply level using the methods outlined in Section 4.3.2. It should be noted that at no time will releases from the Canadian reservoirs cause the flows at Sherwood

Crossing to exceed the target flow from Plate A-5 unless the flow cannot be controlled by the reservoirs.

Post-Peak Flood Storage Release

After the peak stage has been reached in Lake Darling Reservoir, target releases are maintained until the pool has returned to full supply level, with the following exceptions:

a. After June 1, 500 cfs or less is maintained.

b. After May 15, but before June 1, the target flow at Minot is maintained at a level not to exceed 2,500 cfs until pool levels reach FSL, unless the 5,000 cfs target must be extended to enable the desired reservoir levels to be reached by February 1 of the following year.

4.3.4 Significant Spring and Summer Rainfall

If significant rainfall occurs during the spring or summer flood recession, the Reservoir Regulation Manual will provide for discharging the rainfall runoff based on following the unregulated flow recession. All rainfall inflow to Lake Darling Reservoir above FSL is discharged until the unregulated flow recession at Minot reaches 500 cfs. All rainfall runoff upstream of Lake Darling Reservoir which would cause flows in excess of 500 cfs at Minot would be stored, but not to exceed a reservoir elevation of 1598 feet. (Des Lacs flow could at times cause flows higher than 500 cfs at Minot.)

4.3.5 Flood System Operation Steps

The following operating steps would be used when the February 1 flow estimate exceeds the limits as set forth in Section 4.3.

OPERATING PLAN STEPS

These steps use English Units only to avoid confusion.

I. PRE-FLOOD (February 1 to start of runoff)

A. Determine Sherwood Crossing 30-day volume

B. Determine Rafferty Reservoir 30-day volume

C. Determine Alameda Reservoir 30-day volume

D. Determine local Sherwood Crossing 30-day volume:

1. Subtract Rafferty Reservoir 30-day volume from Sherwood Crossing 30-day volume (I.A - I.B = I.D.1(

2. Subtract Alameda Reservoir 30-day volume from result of above (I.D.1 - I.C = I.D.3(

3. This result is the Sherwood Crossing local 30-day volume

E. Determine 30-day volume not controlled by Rafferty Dam and Alameda Dam

1. Determine Rafferty Reservoir starting storage value in ac-ft

Based on the estimated runoff volume and Plate A-1, determine what level Rafferty Reservoir should be at or below.

a. If the actual reservoir level is below that level required, use the actual level in the following steps.

b. If the actual reservoir level is above the level required, use the level shown on Plate A-1 in the following steps.

2. Subtract starting storage from 513,000 ac-ft (513,000 - I.E.1=I.E.2)

3. Determine if 30-day volume is controlled:

a. if result from E.2 above is larger than 30-day volume, there is no excess (I.E.2 I.B).

b. if not, subtract E.2 amount from 30-day value, this is the Rafferty Reservoir excess (I.B - I.E.2 I.E.3b)

4. Determine Alameda Reservoir starting storage value in ac-ft

Based on the estimated runoff volume and Plate A-3, determine what level Alameda Reservoir should be at or below.

a. If the actual reservoir level is below that level required, use the actual level in the following steps.

b. If the actual reservoir level is above the level required, use the level shown on Plate A-3 in the following steps.

5. Subtract starting storage from 153,710 ac-ft (153,710 - I.E.4 = I.E.5)

6. Determine if 30-day volume is controlled:

a. if result from E.5 above is larger than 30-day volume, there is no excess (I.E.5 I.C)

b. if not, subtract E.5 amount from 30-day value; this is the Alameda Reservoir excess (I.C - I.E.5 = I.E.6b)

7. If it is determined that the estimated 30-day volumes from Rafferty Reservoir and Alameda Reservoir will not exceed their FSL's and therefore minimum releases are

expected, the Lake Darling Dam operator MUST be informed, so that Lake Darling Reservoir can be at full supply level after flood

(If (I.B - (356,400 - I.E.1)) 0 and
(I.C - (85,530 - I.E.4)) 0, then call)

F. Determine the uncontrolled 30-day volume at Sherwood Crossing by adding the Rafferty Reservoir and Alameda Reservoir excesses, if any, to the Sherwood Crossing local 30-day volume found above (I.D.3 + I.E.3.b + I.E.6.b = I.F)

G. Using result from "F" above, determine Lake Darling Reservoir starting level from Plate A-4 (I.F + Plate A-4 == I.G)

H. Determine starting Sherwood Crossing target flow by using Plate A-5 and the total Sherwood Crossing 30-day volume from "A" above (I.A + Plate A-5 == I.I)

I. Determine Minot target flow by using Plate A-6 and the total Sherwood Crossing 30-day volume from "A" above (I.A - Plate A-6 == I.H)

J. Determine Boundary Reservoir 30-day volume

K. Determine if Boundary Reservoir storage must be used from Plate A-2

L. Determine if Boundary Diversion Channel will be used

M. Adjust estimate of 30-day volume at Sherwood Crossing based on use of Boundary Reservoir and Boundary Diversion Channel

II. DURING FLOOD (March 16 to May 31)

A. Using data as is available from within basin, estimate the peak discharge to be expected at Sherwood Crossing:

1. if discharge is less than target flow at Sherwood Crossing, releases can be made from Rafferty Reservoir and Alameda Reservoir which increase the peak to, but not greater than, target

2. if discharge is greater than target flow at Sherwood Crossing, releases are not to be made from Rafferty Reservoir and Alameda Reservoir which will add to the peak flow at Sherwood Crossing

B. Sherwood Crossing Target (After peak at Sherwood Crossing)

After the peak flow has occurred at Sherwood Crossing, estimate the average daily flows expected at Sherwood Crossing from the uncontrolled areas. Using this flow, the current Lake Darling Reservoir elevation, and the local flows at Minot, estimate future Lake Darling Reservoir elevations. Using this data, to include the Sherwood Crossing target flows, make releases to drawdown Rafferty Reservoir and Alameda Reservoir within the target flows in Plate A-5. Plate A-9 contains storage data for Lake Darling Reservoir to aid in the estimates.

Repeat this operation as needed to reduce reservoir levels to FSL.

Note: The same starting Sherwood Crossing target flow is used for the entire flood event, UNLESS, the estimated 30-day volume at Sherwood Crossing is adjusted based on updated data.

C. To aid in the operation of ALL reservoirs ALL operators must communicate on a regular basis.

D. Based on reservoir levels, determine if the Minot target date of May 15 must be extended so that the 500 cfs maximum at Minot after June 1 will not be exceeded.

III. POST FLOOD (June 1 to January 31)

A. Following the operating guidelines, release allowable flows to bring the reservoirs to their FSL's.

B. Review actions taken during flood and note problems which occurred.

C. If flood was a large event, prepare a Post Flood Report.

4.4 Nonflood Operation

Primary emphasis is given to operations during years of flood runoff; i.e., when the spring runoff volume exceeds a 10-percent flood. Nonflood operations are guided primarily by the Board. This Operating Plan sets forth the understanding between the Parties regarding flows in nonflood years, and provides guidance on the implementation of that understanding. It is recognized, however, that the actual implementation of the Operating Plan will be dependent upon the close coordination of the Parties during the hydrologic year.

4.4.1. Nonflood Project Operation Steps

1. The flow passed to North Dakota shall be either 40 percent or 50 percent of the natural flow at Sherwood Crossing according to the 1959 Interim Measures as modified.

2. An apportionment balance will be estimated at the spring meeting of the Board.

3. If additional releases are needed to meet the apportionment balance, North Dakota will assess its needs. If the releases would not be of benefit at that time, they may be delayed.

4. If releases are delayed, they may be called for by North Dakota at any time before October 1. If they are not called for before October 1, the water may be retained for use in Saskatchewan.

5. If delayed releases are called for, the delayed release shall be measured at the point of release and the delivery at Sherwood Crossing shall not be less than the delayed release minus the conveyance losses that would have occurred under natural conditions between the point of release and the Sherwood Crossing.

6. On October 1, a final apportionment balance will be determined. Any portion of the North Dakota apportionment remaining in Saskatchewan on October 1 shall be added arithmetically to the storage in Lake Darling Reservoir on October 1 to determine the October 1 level of Lake Darling Reservoir for purposes of Section 4.2.a.

4.5 Operating Provisions During Construction and Filling

The Parties agree to use their best efforts to provide flood protection during construction of the Project.

5.0 REPORTS

Reports will be prepared each year on behalf of the United States and Canada by both the Saskatchewan Water Corporation and the U.S. Fish and Wildlife Service describing the operation of the Project. The reports will be issued to the Board and at a minimum will include a description of the operation of the reservoirs including any problems encountered, a summary of water levels, inflows and releases from each reservoir, and an estimate of reservoir levels, inflows and releases for the remainder of the calendar year. In any year in which flood operations occur, the U.S. Army Corps of Engineers will prepare a post-flood report. This report will then become a part of the U.S. Fish and Wildlife Service report.

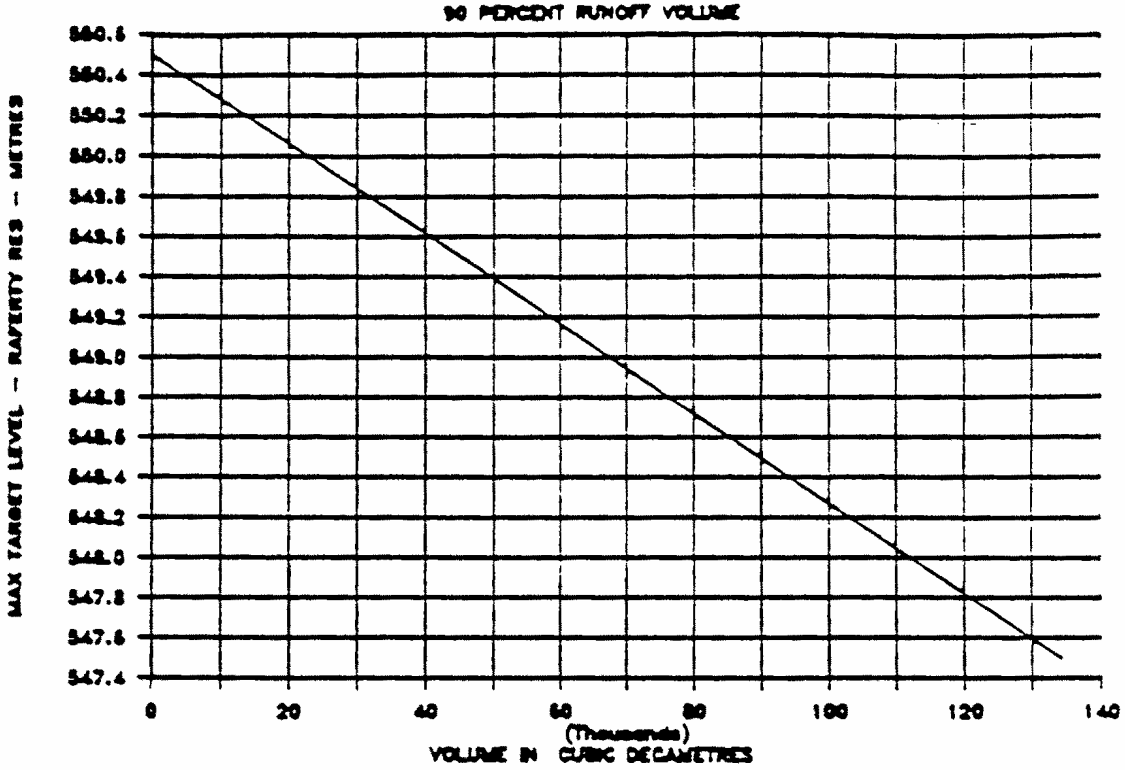
6.0 LIAISON

The Government of Saskatchewan, the Department of the Army, and the U.S. Fish and Wildlife Service within the Department of the Interior shall appoint a liaison person with whom interested States, Provinces, and Agencies may consult from time to time as to the operation of the improvements constructed and operated under the terms of the subject Agreement.

Representatives of the U.S. Department of the Army, Saskatchewan Water Corporation, U.S. Fish and Wildlife Service, and the North Dakota State Engineer will be responsible for monitoring the Operating Plan. It is expected that the reservoir operations will need to be closely monitored for the first several years after the project goes into operation.

7.0 DATA AND COMMUNICATION

The Parties shall exchange all desired data collected with respect to the management of water in the Souris River Basin and will use their best efforts to keep all interested States, Provinces, and Agencies adequately informed of all activities related to this Operating Plan.


TARGET DRAWDOWN LEVELS – RAFFERTY RES
90 PERCENT RUNOFF VOLUME
MAX TARGET LEVEL – RAFFERTY RES – METRES
550.6
550.4
550.2
550.0
549.8
549.6
549.4
549.2
549.0
548.8
548.6
548.4
548.2
548.0
547.8
547.6
547.4
0
20
40
60
80
100
120
140
(Thousands)
VOLUME IN CUBIC DECAMETRES

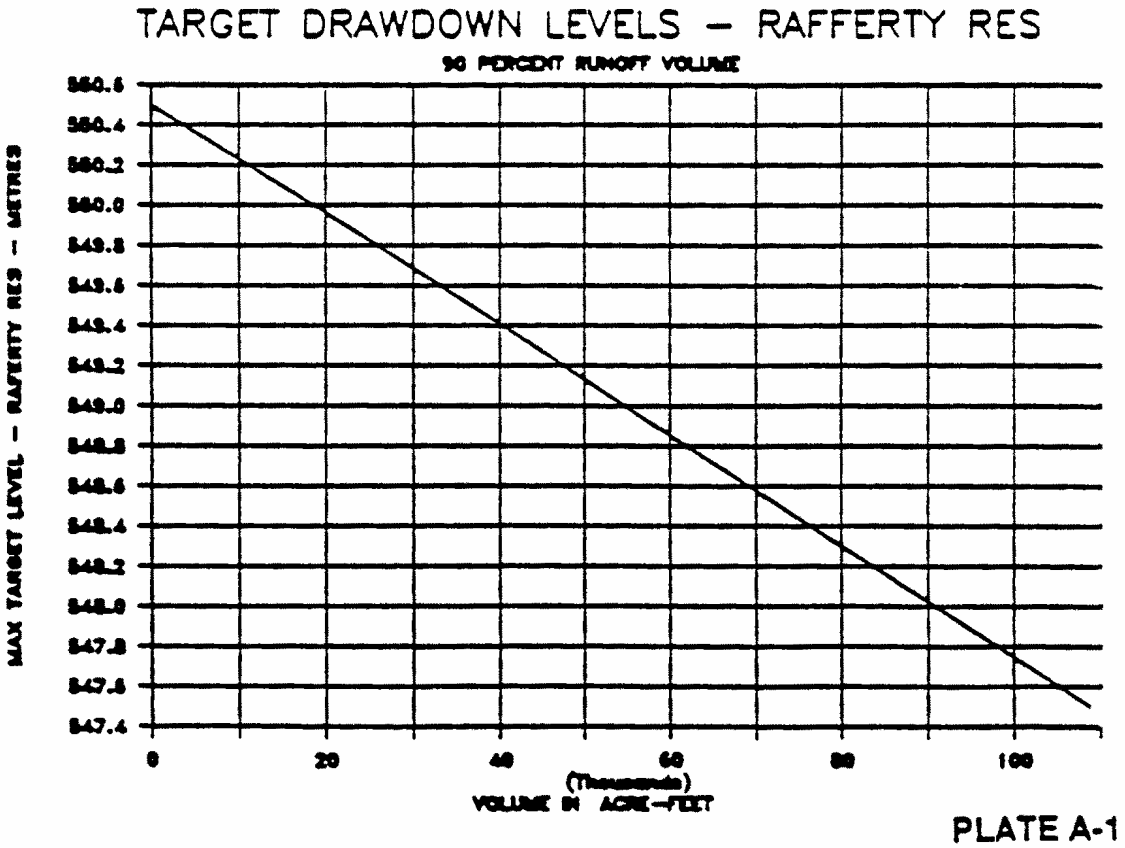
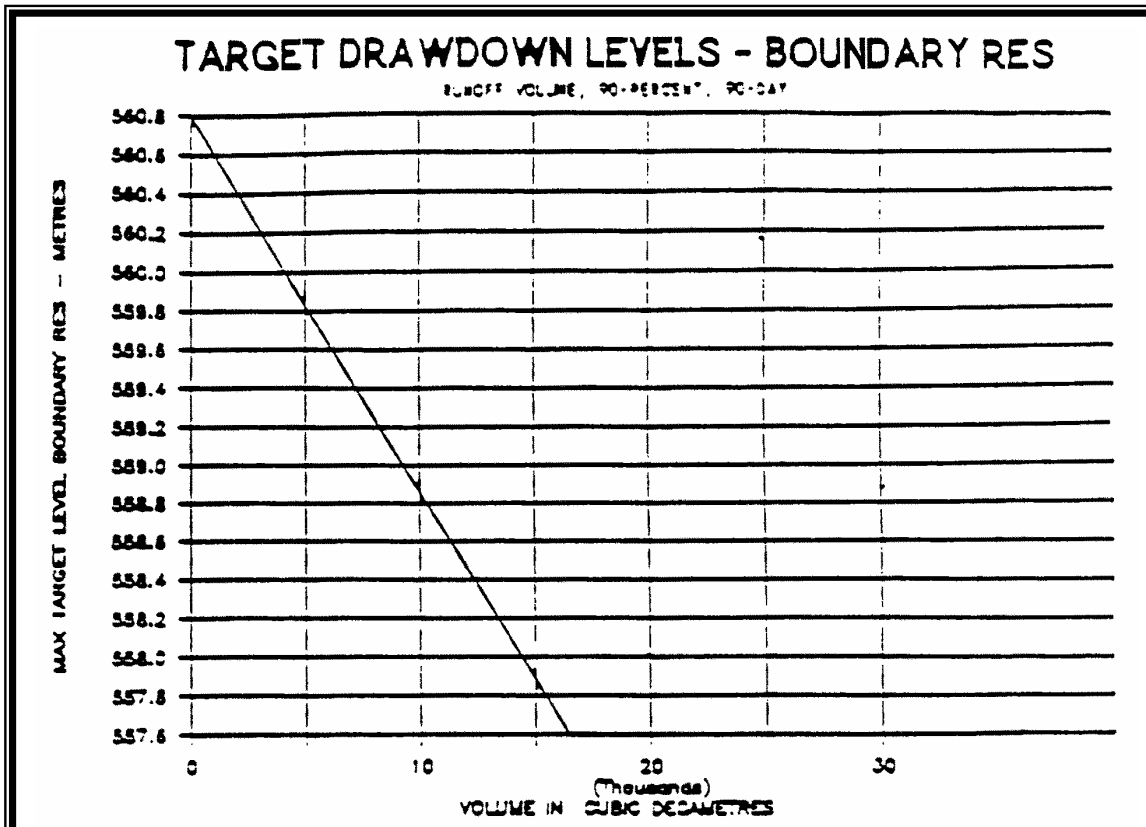

TARGET DRAWDOWN LEVELS – RAFFERTY RES
90 PERCENT RUNOFF VOLUME
MAX TARGET LEVEL – RAFFERTY RES – METRES
550.6
550.4
550.2
550.0
549.8
549.6
549.4
549.2
549.0
548.8
548.6
548.4
548.2
548.0
547.8
547.6
547.4
0
20
40
60
80
100
(Thousands)
VOLUME IN ACRE–FEET

PLATE A-1


TARGET DRAWDOWN LEVELS - BOUNDARY RES
RUNOFF VOLUME, 90-PERCENT, 90-DAY
MAX TARGET LEVEL BOUNDARY RES - METRES
560.8
560.6
560.4
560.2
560.0
559.8
559.6
559.4
559.2
559.0
558.8
558.6
558.4
558.2
558.0
557.8
557.6
0
10
20
30
(Thousands)
VOLUME IN CUBIC DECAMETRES

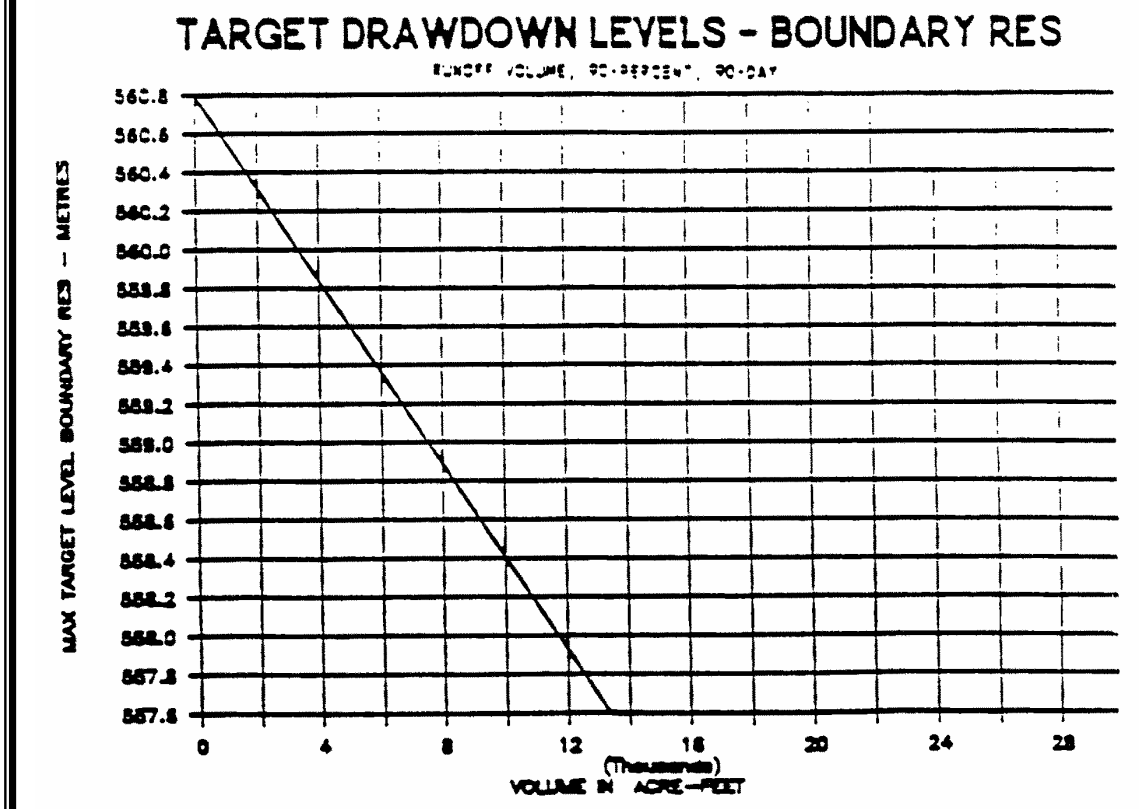
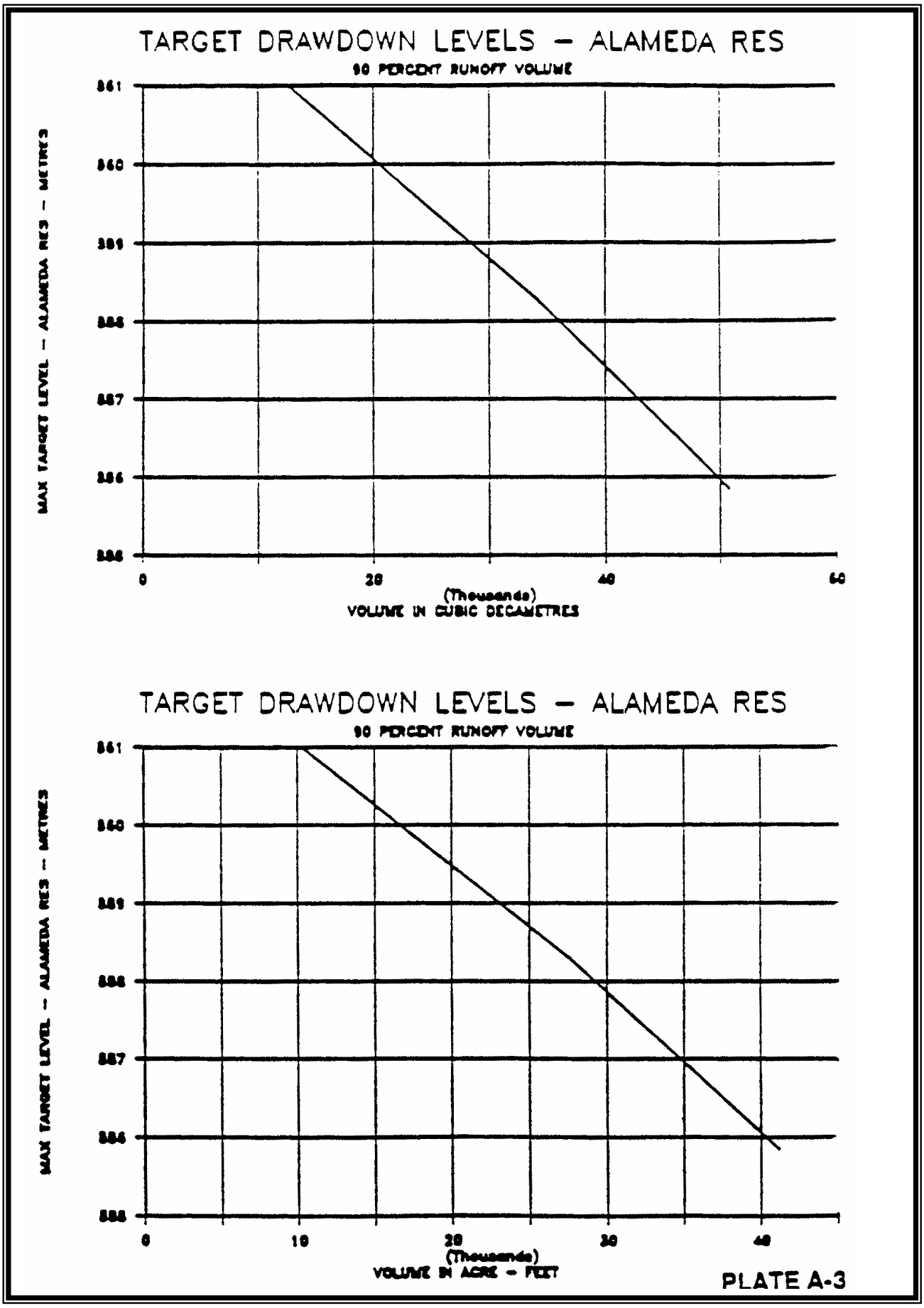
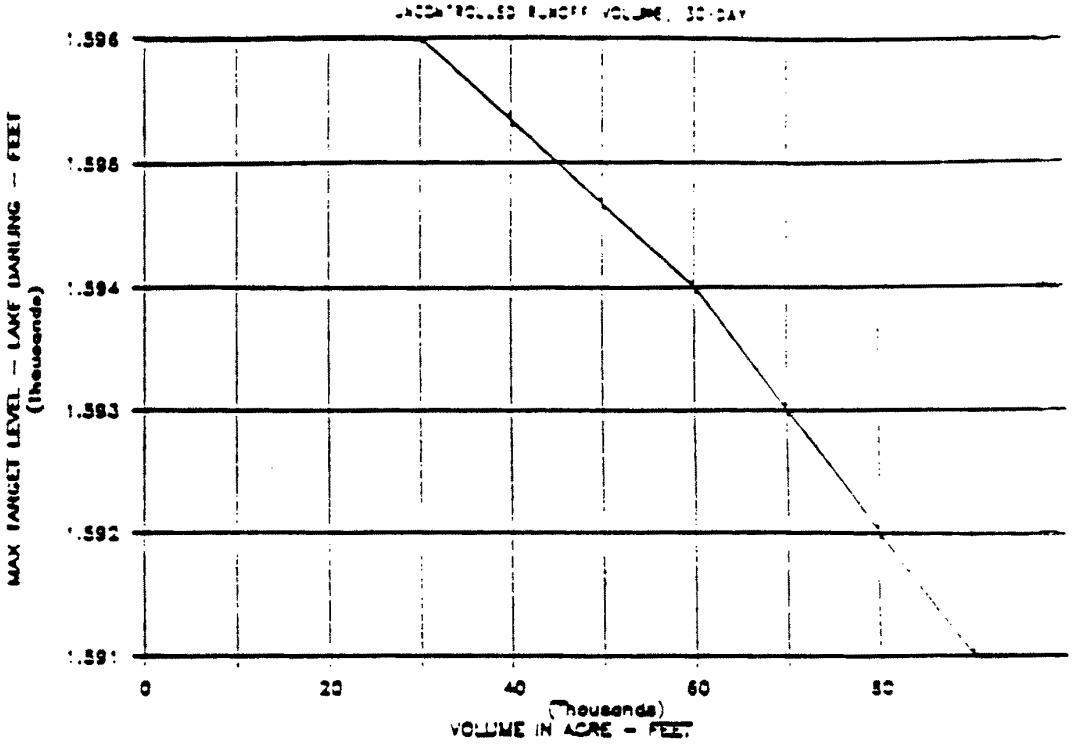

TARGET DRAWDOWN LEVELS - BOUNDARY RES
RUNOFF VOLUME, 90-PERCENT, 90-DAY
MAX TARGET LEVEL BOUNDARY RES - METRES
560.8
560.6
560.4
560.2
560.0
559.8
559.6
559.4
559.2
559.0
558.8
558.6
558.4
558.2
558.0
557.8
557.6
0
4
8
12
16
20
24
28
(Thousands)
VOLUME IN ACRE-FEET

PLATE A


TARGET DRAWDOWN LEVELS – ALAMEDA RES
90 PERCENT RUNOFF VOLUME
MAX TARGET LEVEL – ALAMEDA RES – METRES
561
560
559
558
557
556
555
0
20
40
60
(Thousands)
VOLUME IN CUBIC DECAMETRES
TARGET DRAWDOWN LEVELS – ALAMEDA RES
90 PERCENT RUNOFF VOLUME
MAX TARGET LEVEL – ALAMEDA RES – METRES
561
560
559
558
557
556
555
0
10
20
30
40
(Thousands)
VOLUME IN ACRE – FEET
PLATE A-3


TARGET DRAWDOWN LEVELS - LAKE DARLING
UNCONTROLLED RUNOFF VOLUME, 30-DAY
MAX TARGET LEVEL - LAKE DARLING - FEET (Thousands)
1,596
1,595
1,594
1,593
1,592
1,591
0
20
40
60
80
(Thousands)
VOLUME IN ACRE - FEET

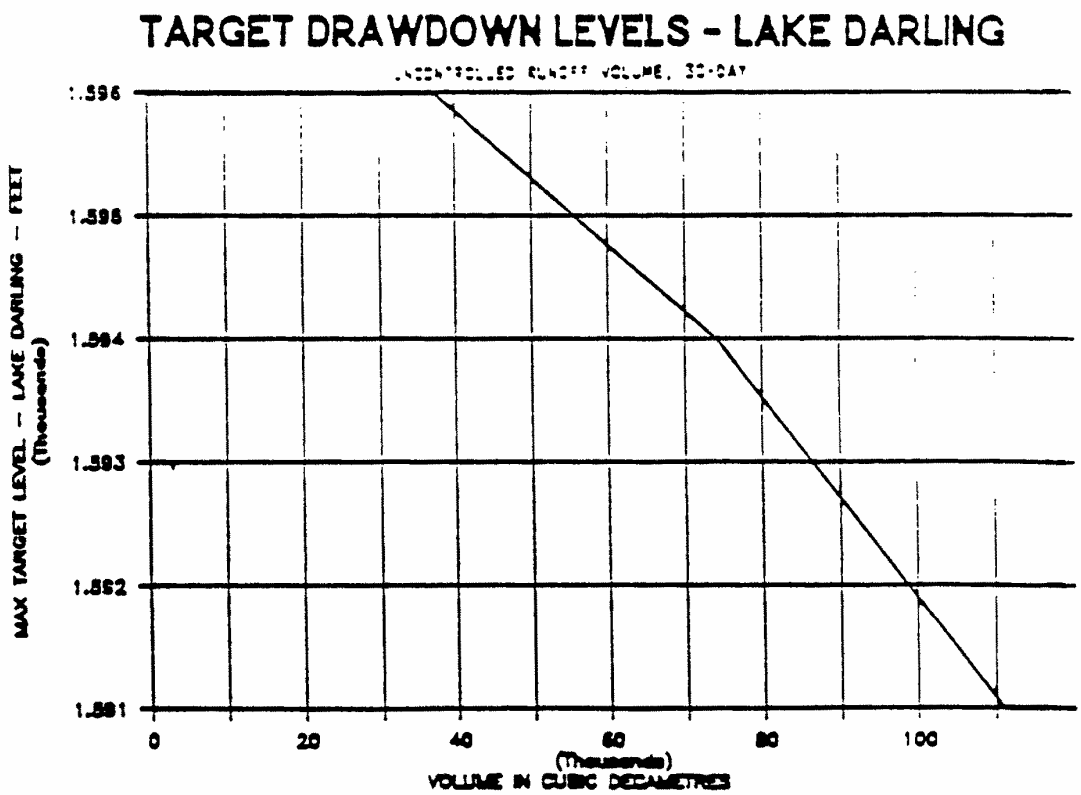
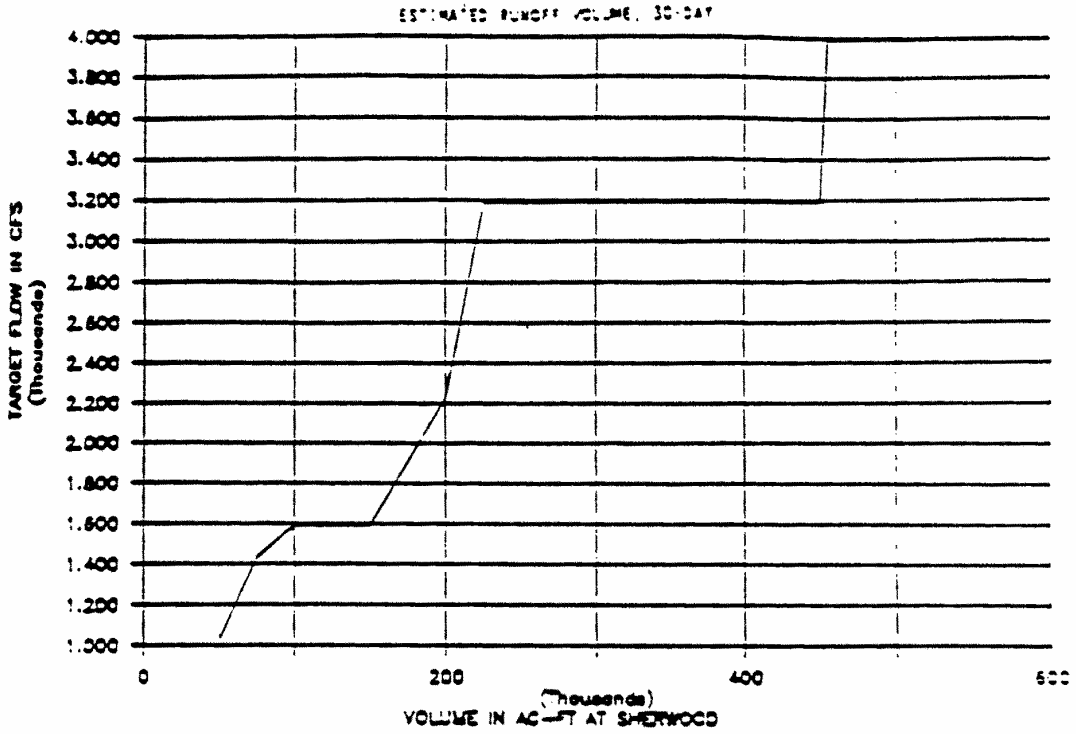

TARGET DRAWDOWN LEVELS - LAKE DARLING
UNCONTROLLED RUNOFF VOLUME, 30-DAY
MAX TARGET LEVEL - LAKE DARLING - FEET (Thousands)
1,596
1,595
1,594
1,593
1,592
1,591
0
20
40
60
80
100
(Thousands)
VOLUME IN CUBIC DECAMETRES

PLATE A-


TARGET FLOW AT SHERWOOD
TARGET FLOW IN CFS (Thousands)
4.000
3.800
3.600
3.400
3.200
3.000
2.800
2.600
2.400
2.200
2.000
1.800
1.600
1.400
1.200
1.000
0
200
400
(Thousands)
VOLUME IN AC-FT AT SHERWOOD

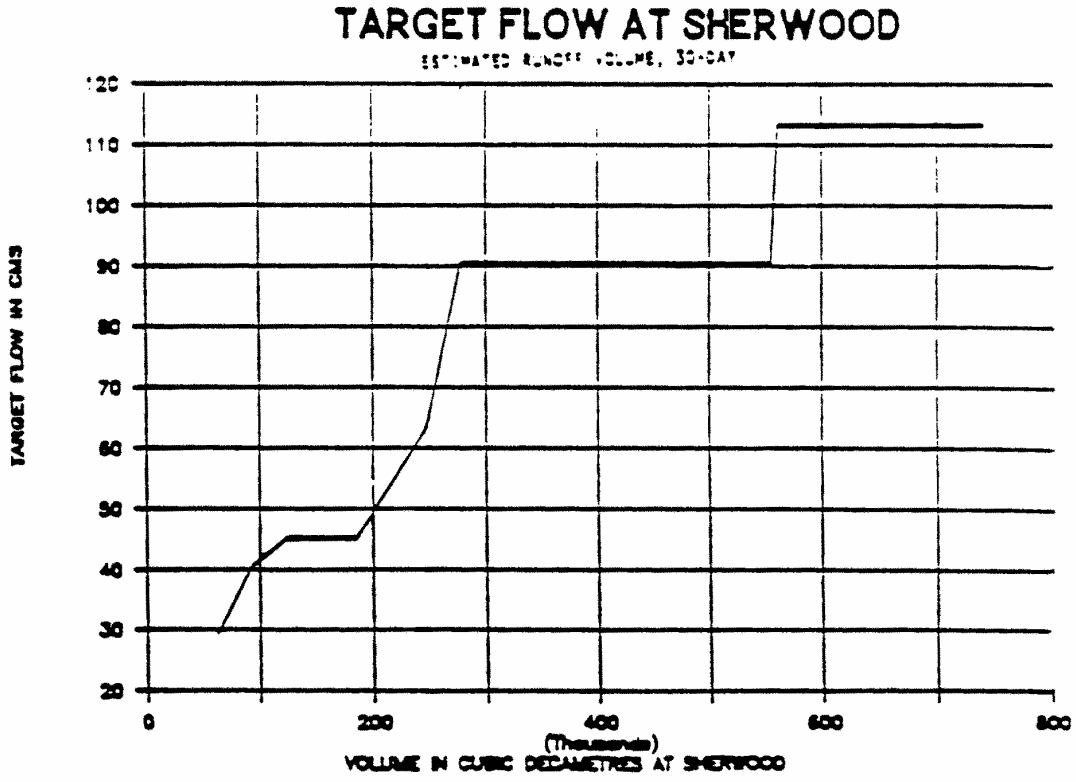
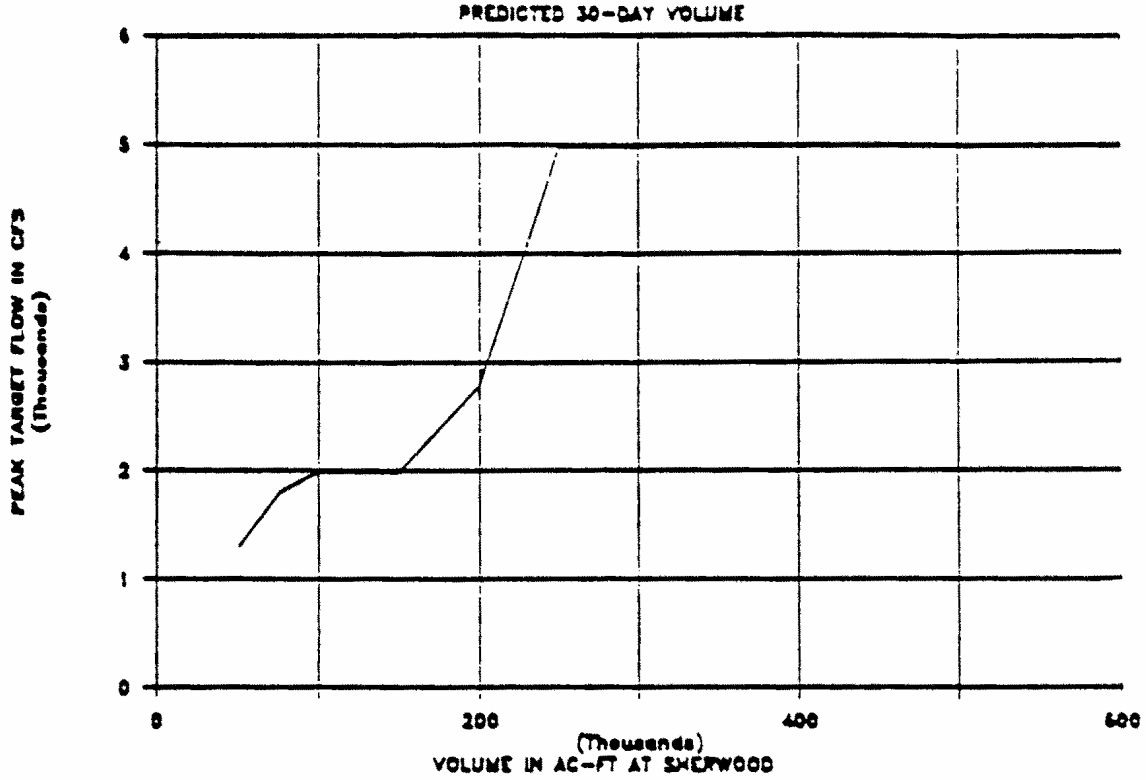

TARGET FLOW AT SHERWOOD
TARGET FLOW IN CMS
120
110
100
90
80
70
60
50
40
30
20
0
200
400
600
800
(Thousands)
VOLUME IN CUBIC DECAMETRES AT SHERWOOD

PLATE A-5


PEAK TARGET FLOW AT MINOT
PREDICTED 30-DAY VOLUME
PEAK TARGET FLOW IN CFS
(Thousands)
6
5
4
3
2
1
0
0
200
400
600
(Thousands)
VOLUME IN AC-FT AT SHERWOOD

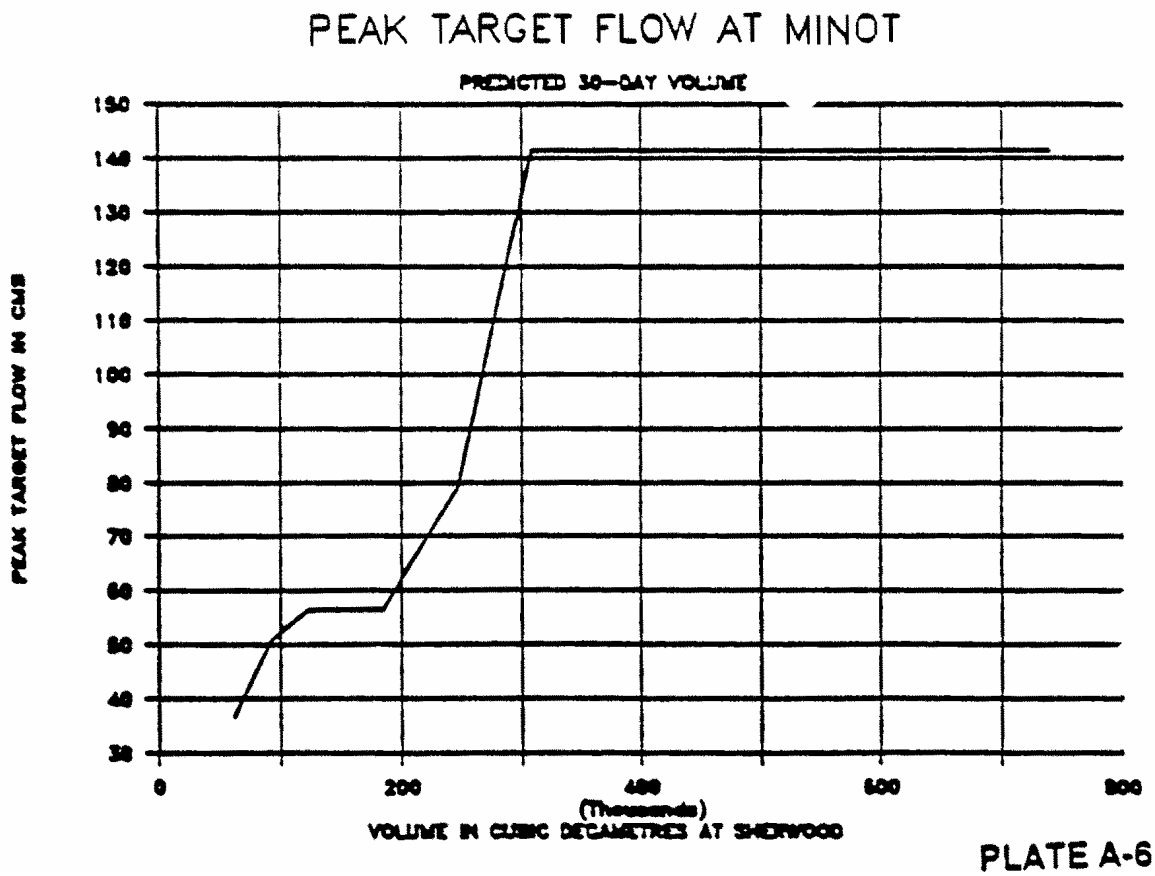
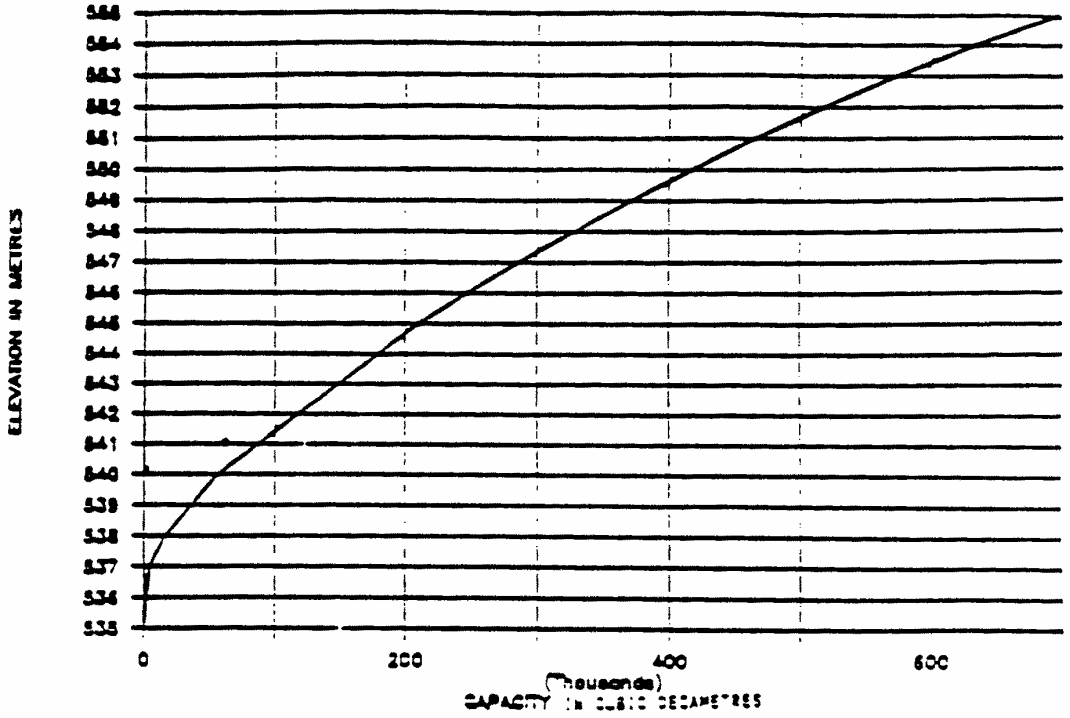

PEAK TARGET FLOW AT MINOT
PREDICTED 30-DAY VOLUME
PEAK TARGET FLOW IN CMS
150
140
130
120
110
100
90
80
70
60
50
40
30
0
200
400
600
800
(Thousands)
VOLUME IN CUBIC DECAMETRES AT SHERWOOD

PLATE A-6

RAFFERTY ELEVATION–CAPACITY



RAFFERTY ELEVATION–AREA

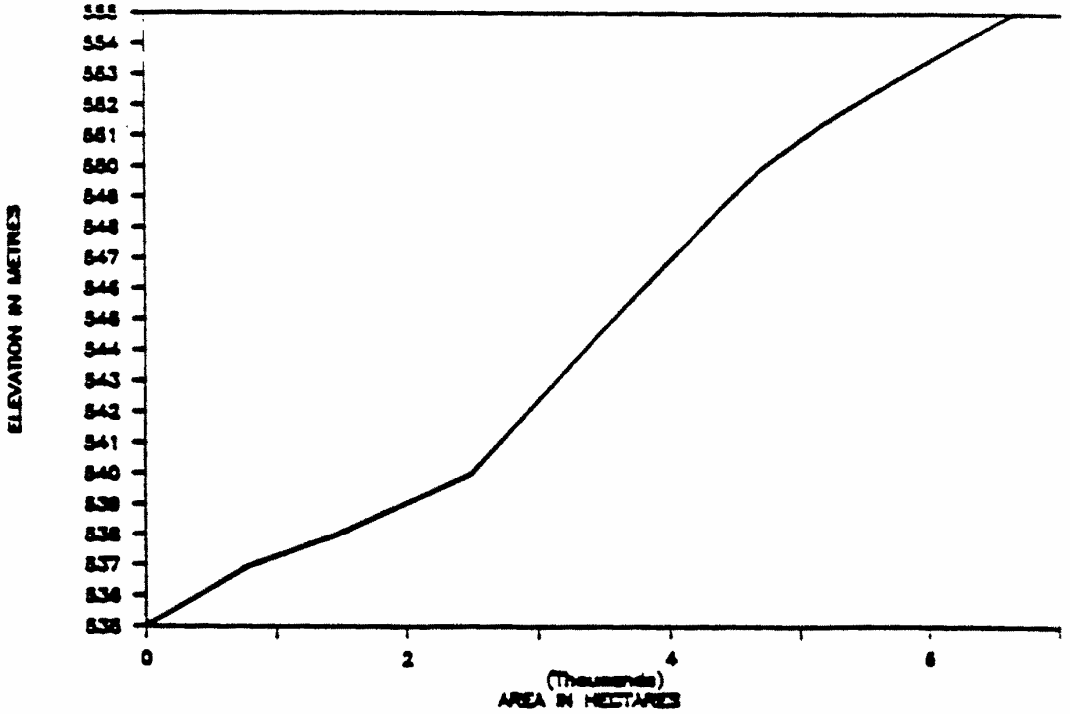
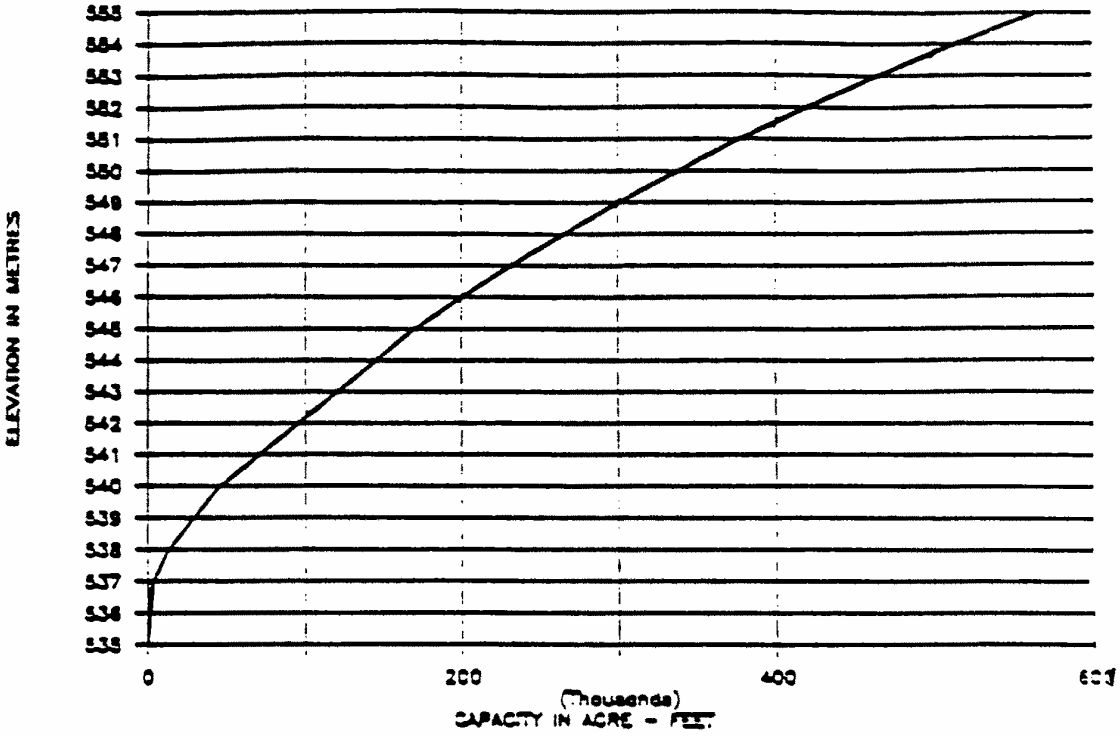


PLATE A–77

RAFFERTY ELEVATION–CAPACITY



RAFFERTY ELEVATION–AREA

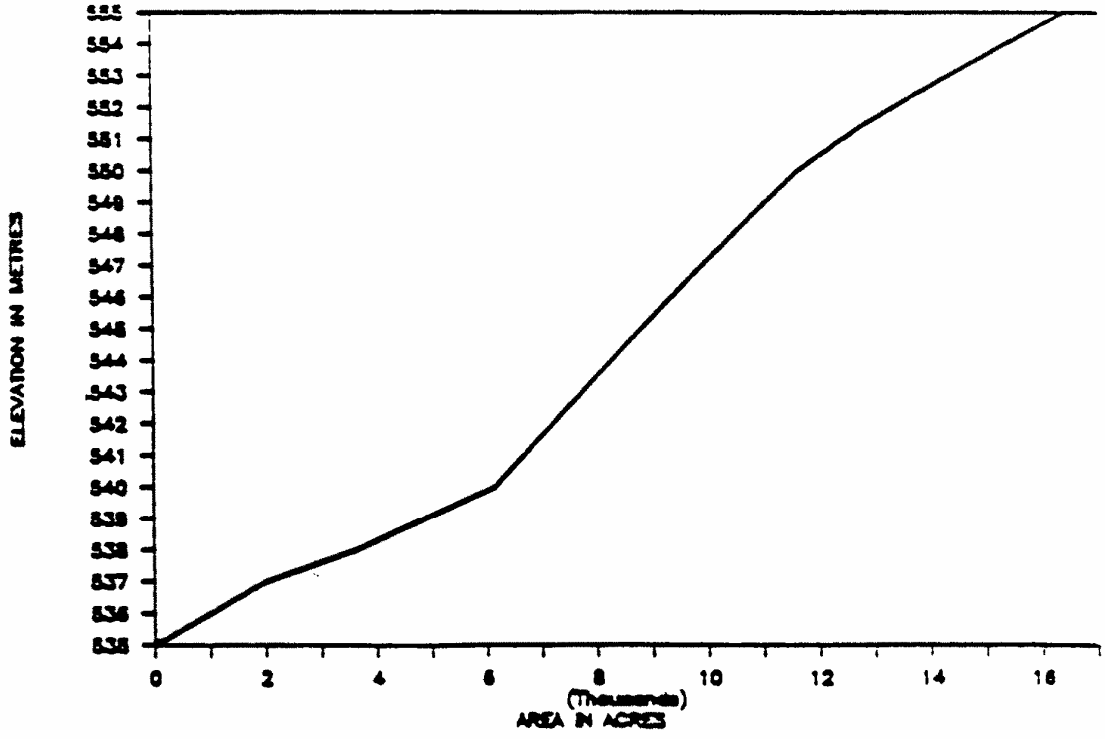
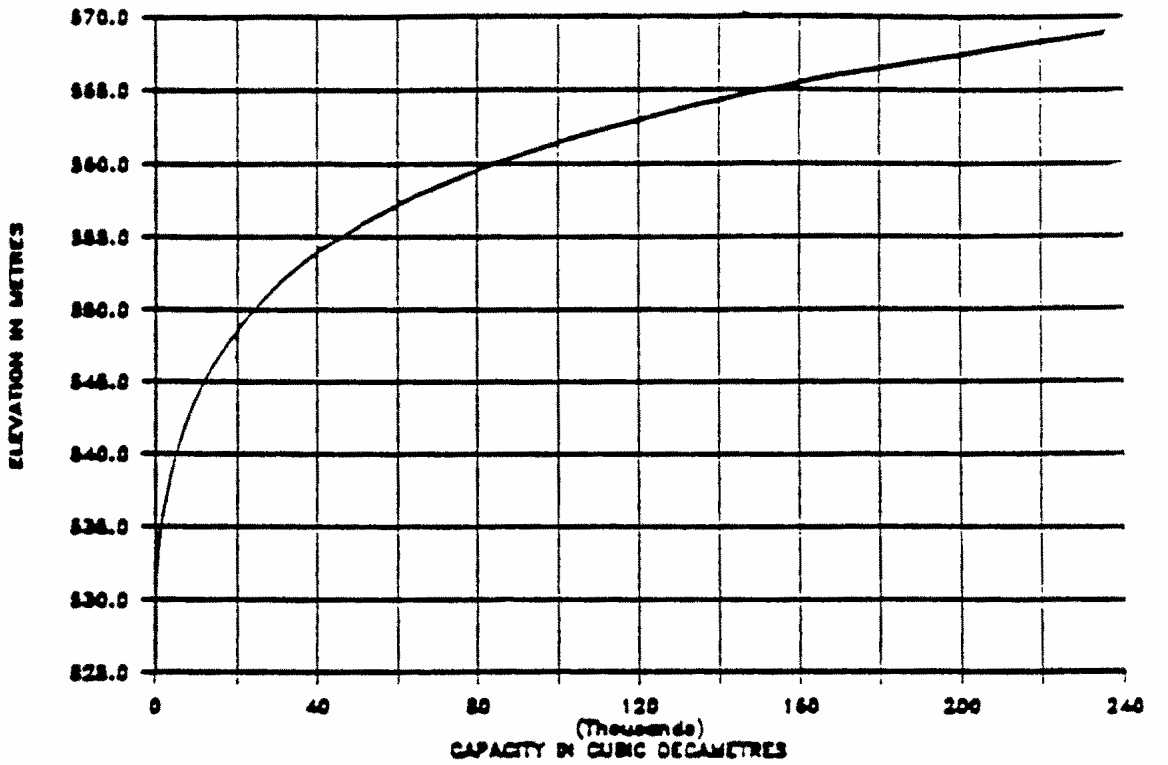


PLATE-7


ALAMEDA ELEVATION–CAPACITY
ELEVATION IN METRES
570.0
560.0
550.0
540.0
530.0
520.0
0
40
80
120
160
200
240
(Thousands)
CAPACITY IN CUBIC DECAMETRES

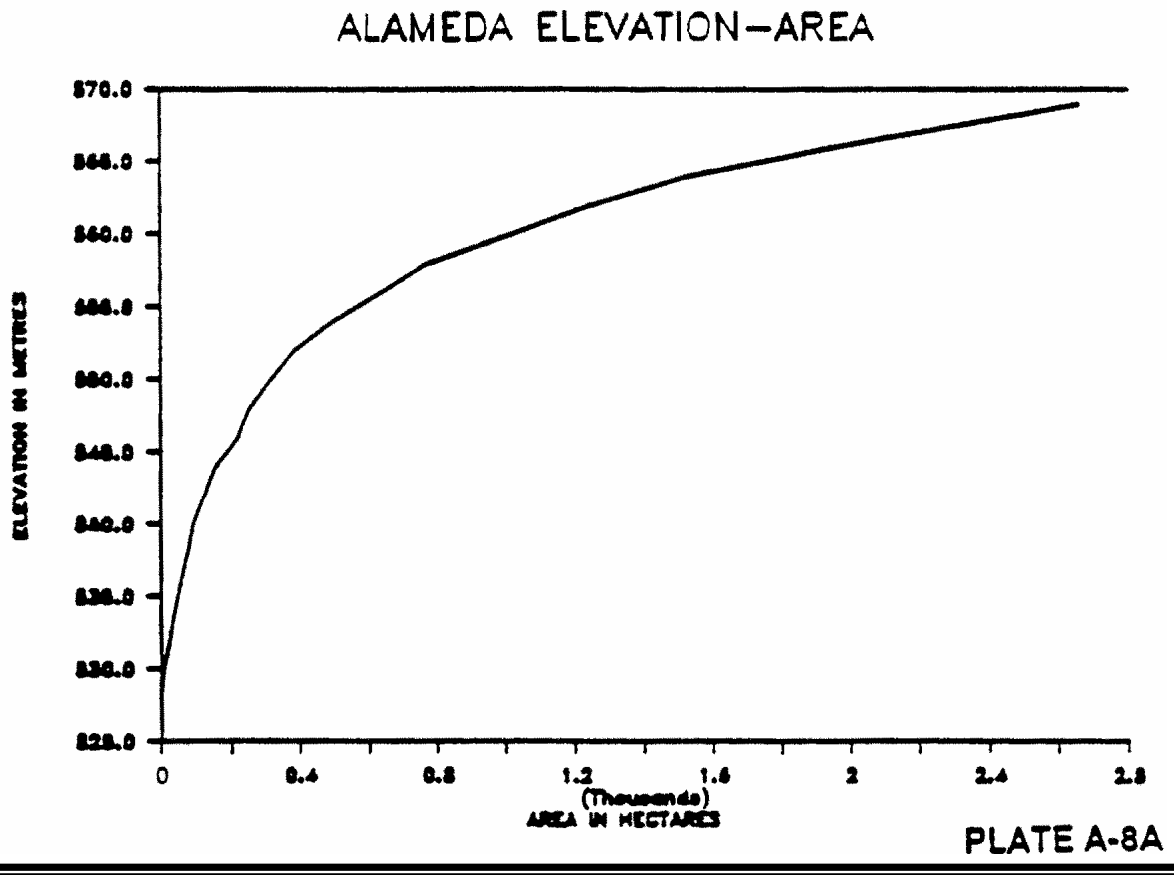
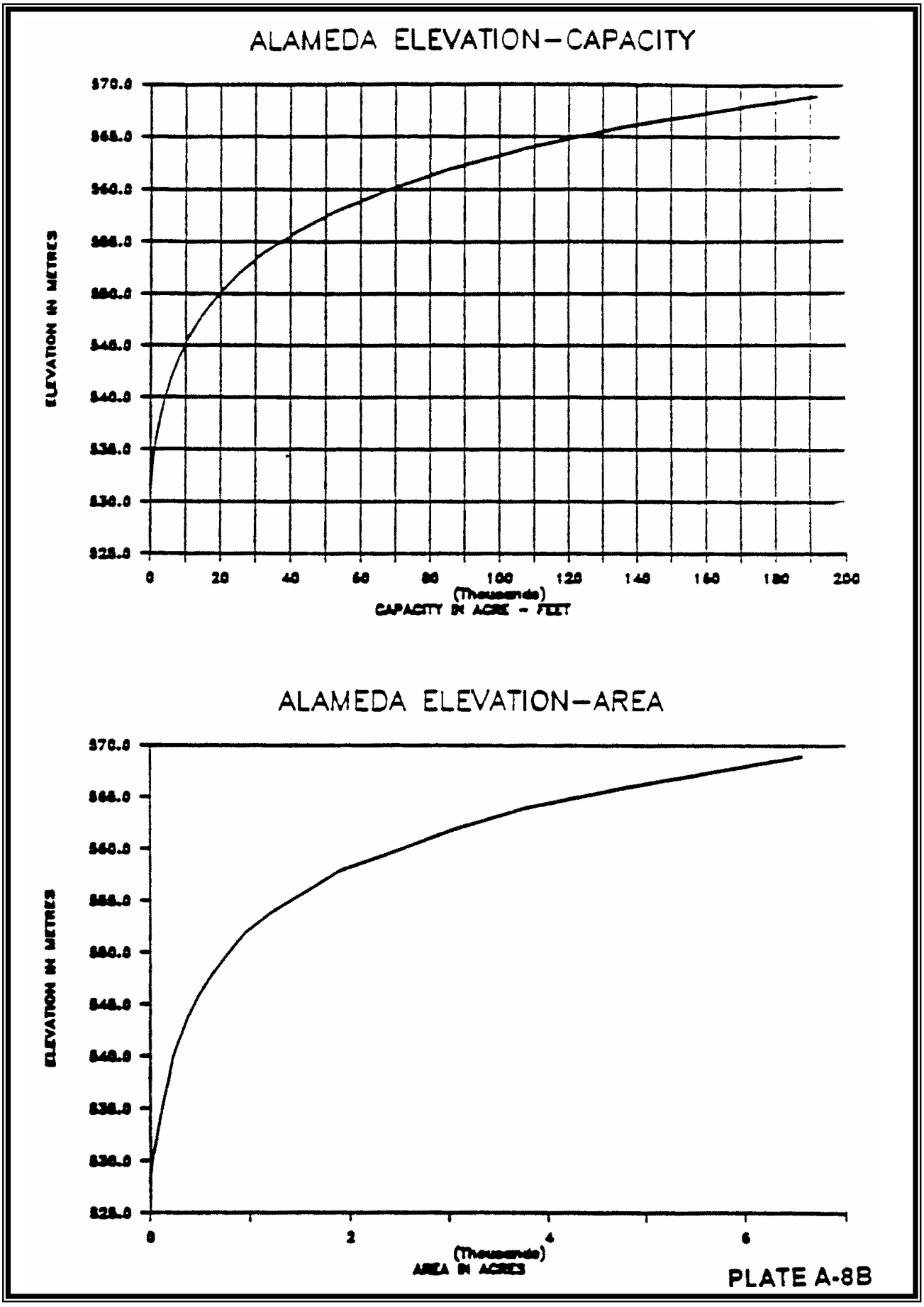
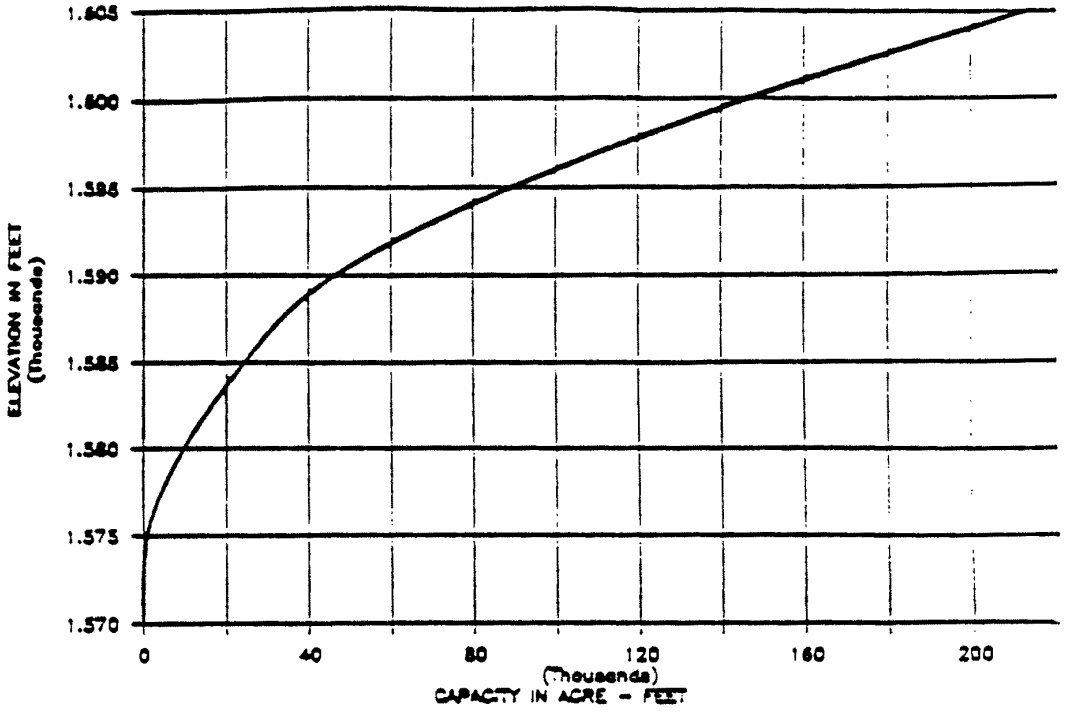

ALAMEDA ELEVATION–AREA
ELEVATION IN METRES
570.0
560.0
550.0
540.0
530.0
520.0
0
0.4
0.8
1.2
1.6
2
2.4
2.8
(Thousands)
AREA IN HECTARES

PLATE A-8A


ALAMEDA ELEVATION—CAPACITY
ELEVATION IN METRES
570.0
565.0
560.0
555.0
550.0
545.0
540.0
535.0
530.0
525.0
0
20
40
60
80
100
120
140
160
180
200
(Thousands)
CAPACITY IN ACRE - FEET
ALAMEDA ELEVATION—AREA
ELEVATION IN METRES
570.0
565.0
560.0
555.0
550.0
545.0
540.0
535.0
530.0
525.0
0
2
4
6
(Thousands)
AREA IN ACRES
PLATE A-8B

LAKE DARLING ELEVATION–CAPACITY



LAKE DARLING ELEVATION–AREA

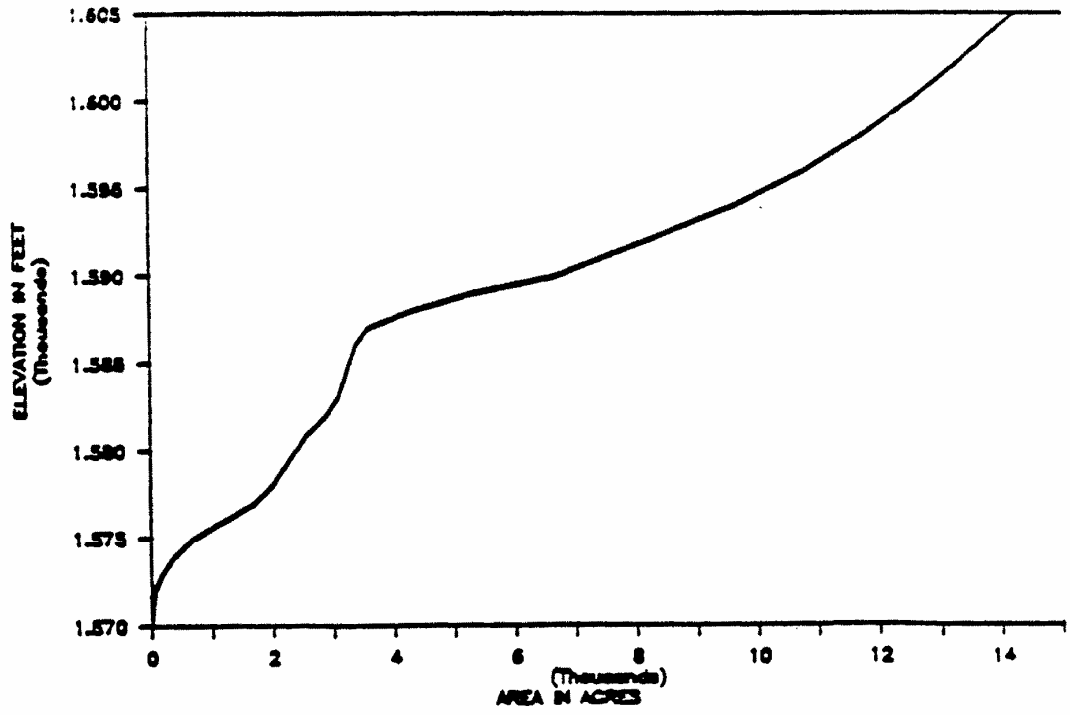
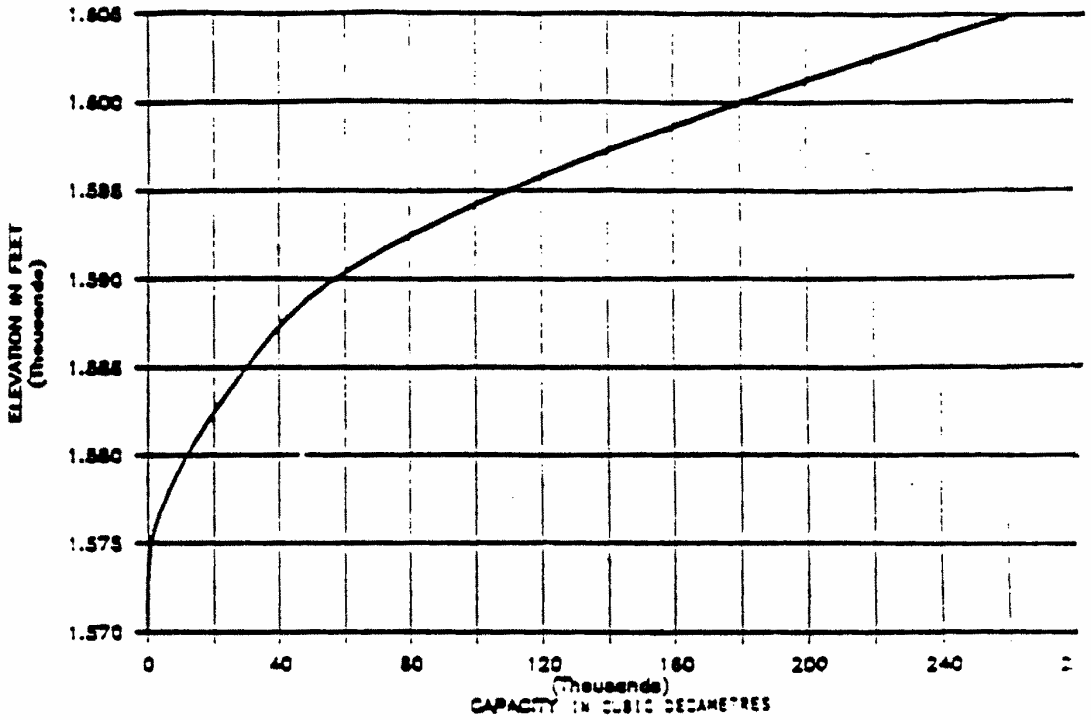


PLATE A–9

LAKE DARLING ELEVATION–CAPACITY



LAKE DARLING ELEVATION–AREA

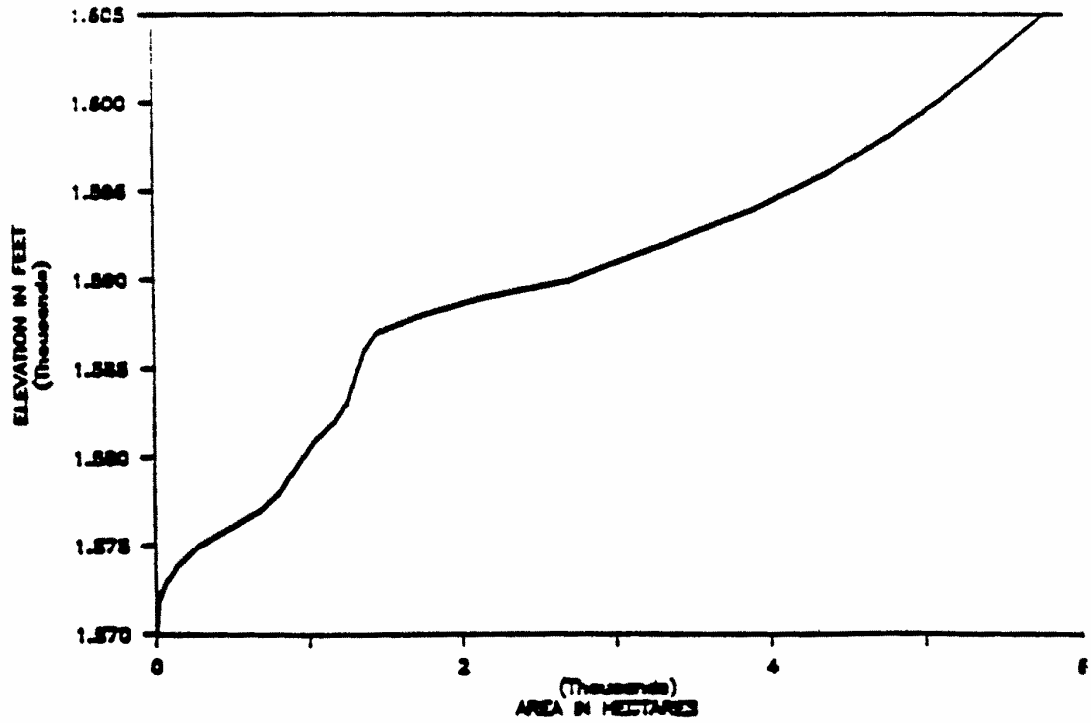


PLATE A–

ANNEX B

1. The Province of Saskatchewan shall have the right to divert, store, and use waters which originate in the Saskatchewan portion of the Souris River Basin, provided that such diversion, storage, and use shall not diminish the annual flow of the river at the Sherwood Crossing more than 50 percent of that which would have occurred in a state of nature, as calculated by the Board. For the benefit of riparian users of water between the Sherwood Crossing and the upstream end of Lake Darling, the Province of Saskatchewan shall, so far as is practicable, regulate its diversions, storage, and uses in such a manner that the flow in the Souris River channel at the Sherwood Crossing shall not be less than 0.113 cubic meters per second (4 cubic feet per second) when that much flow would have occurred under the conditions of water use development prevailing in the Saskatchewan portion of the Souris River Basin prior to construction of the Boundary Dam, Rafferty Dam and Alameda Dam.

(a) Under certain conditions, a portion of the North Dakota share will be in the form of evaporation from Rafferty and Alameda Reservoirs. During years when these conditions occur, the minimum amount of flow actually passed to North Dakota will be 40 percent of the natural flow at the Sherwood Crossing. This lesser amount is in recognition of Saskatchewan's operation of Rafferty Dam and Alameda Dam for flood control.

The following rules determine the percentage of the natural flow at Sherwood Crossing which is to be passed to North Dakota:

i. If the level of Lake Darling is below an elevation of 485.24 meters (1592.0 feet) on October 1 in any calendar year, Saskatchewan will pass 50 percent of the natural flow at Sherwood Crossing in that year and in succeeding years until the level of Lake Darling is above an elevation of 485.55 meters (1593.0 feet) on October 1.

ii. If the natural flow at the Sherwood Crossing is equal to or less than 24,670 cubic decameters (20,000 acre-feet) prior to October 1 of that year, then Saskatchewan will pass 50 percent of the natural flow to North Dakota in that calendar year.

iii. If the conditions specified in subparagraphs 1(a)(i) and 1(a)(ii) do not apply, then Saskatchewan will pass at least 40 percent of the natural flow at the Sherwood Crossing to North Dakota.

(b) Flow releases to the United States should occur (except in flood years) in the pattern which would have occurred in a state of nature. To the extent possible and in consideration of potential channel losses and operating efficiencies, releases from the Canadian dams will be scheduled to coincide with periods of beneficial use in North Dakota. Normally, the period of beneficial use in North Dakota coincides with the timing of the natural hydrograph, and that timing should be a guide to releases of the United States portion of the natural flow. The flow release to the United States may be delayed when the State of North Dakota determines and notifies Saskatchewan through the Board that the release would not be of benefit to the State at that time. The delayed release may be retained for use in Saskatchewan, notwithstanding the minimum release limits, unless it is called for by the State of North Dakota through the Board before October 1 of each year. The delayed release shall be measured at the point of release and the delivery at Sherwood Crossing shall not be less than the delayed release minus the conveyance losses that would have occurred under natural conditions between the point of release and the Sherwood Crossing. A determination of the annual apportionment balance shall be made by the Board on or about October 1, of each year. Any shortfall that exists as of that date shall be delivered by Saskatchewan prior to December 31, if North Dakota requests the delivery.

SEVERE DROUGHT CONDITIONS

(Accepted by the Souris River Board of Control May 7, 1963, Minute 63B-8)

Recommendation 3(b) of the March, 1958, report by the International Joint Commission to the governments of the United States and Canada dealt with severe drought in the Souris watershed as follows:

> "In periods of severe drought when it becomes impracticable for the State of North Dakota to provide the foregoing regulated flows, the responsibility of the State of North Dakota in this connection shall be limited to the provision of such flows as may be practicable, in the opinion of the said Board of Control, in accordance with the objective of making water available for human and livestock consumption and for household use --------."

In order to carry out this directive, the Souris River Board of Control finds it necessary to (a) agree upon certain operating and administrative procedures in the event of severe drought and to (b) define "severe drought."

(a) Operating and Administrative Procedures

The United States member of the Souris River Board of Control will give the Board earliest possible advice, (advance notice of preferably 10 days or more), concerning the onset of "severe drought" conditions. The Board will then decide on the size of a practicable release under severe drought conditions taking into account general hydrologic conditions and the objective of making water available for human and livestock consumption and for household use.

Releases of water from Dam #357 will be subject to the above restrictions until impoundments in North Dakota recover from "severe drought" conditions. "Severe drought" conditions and "recovery" from same are defined below.

It will be the responsibility of the United States and Canadian members of the Board to make their decisions known to the appropriate agencies in their respective countries.

(b) Definition of "Severe Drought" and "Recovery" from Same

The Board will recognize that, for the purposes of interpreting recommendation 3 (b), severe drought conditions exist when the total amount of water in storage in North Dakota at Dam 87 (Lake Darling) and at Dams 320, 326, 332, 341, and 357 (Lower Refuges) is 54,000 acre-feet.

"Severe drought" conditions will prevail until storage in the above, reservoirs recovers so that the total amount of water in storage is 57,000 acre-feet.

The figure 54,000 acre-feet has been determined from reservoir levels as listed on Table I. "Severe drought" is related to aggregate storage as described above rather than individual reservoir levels.

TABLE I

Reservoir	Water Surface Elevation		Amount of Water in Storage
Lake Darling (Dam 87)	1589.0		40,000 acre-feet
Lower Souris Refuge			
Dam #320	1420.2	580)	
Dam #326	1418.0	380)	
Dam #332	1417.0	5400) –	13,860 acre-feet
Dam #341	1415.0	3300)	
Dam #357	1411.0	4200)	
	Total		53,860 acre-feet
		Say	54,000 acre-feet

DRAFT dated August 5, 2006

DIRECTIVE TO THE INTERNATIONAL SOURIS RIVER BOARD

The International Souris River Board was created by the International Joint Commission (hereafter referred to as the Commission) in April 2000 when it amalgamated the Souris River basin responsibilities previously assigned to the Commission in two separate references by the governments of Canada and the United States. The two references were the International Souris River Board of Control Reference (1959) and the Souris-Red Rivers Engineering Board Reference (1948). The International Souris River Board's mandate changed further through an exchange of diplomatic notes on June 9, 2005 assigning water quality functions and the oversight for flood forecasting and operations as described in Section 4 below. The consolidation of water quantity, water quality, and the oversight for flood forecasting and operations is a step in the evolution of the International Souris River Board as it moves towards an integrated approach to transboundary water issues in the Souris River basin.

This directive sets out the mandate under which the International Souris River Board will operate.

1. Pursuant to the Boundary Waters Treaty of 1909 and related agreements, responsibilities have been conferred on the Commission to ensure compliance with apportionment measures for the waters of the Souris River, to investigate and report on water requirements and uses as they impact the transboundary waters of the Souris River basin, and to assist in the implementation and review of the Joint Water Quality Monitoring Program pursuant to the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin.

2. The apportionment measures derive from the approvals given by the governments of Canada and the United States, by letters of March 20, 1959 and April 3, 1959 respectively, to the recommendations made by the Commission in paragraph 22 of its report to the governments of March 19, 1958. Subsequently, with the signing of the Canada-United States Agreement for Water Supply and Flood Control in the Souris River basin on October 26, 1989 (hereafter referred to as the 1989 Agreement), the Interim Measures for apportionment of the Souris River at the Saskatchewan-North Dakota boundary were revised as described in Annex B of the Agreement. By letters of February 28, 1992, the Commission was requested to monitor compliance with the measures as modified in the Agreement. By letters of December 22, 2000, the governments amended Annex B of the 1989 Agreement. The attached Appendix A is a consolidation of the apportionment measures against which the Commission is to monitor compliance.

3. By letters of January 12, 1948, the governments requested the Commission to undertake investigations of water requirements and uses arising out of existing dams and other works or projects in the mid-continent portion of the Canada-United States boundary, including the Souris River basin, and to make advisory recommendations.

4. By exchange of diplomatic notes between the governments of Canada and the United States dated January 14 and June 9, 2005, the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin was formally revised to include a reference pursuant to Article IX of the Boundary Waters Treaty which assigned the water quality responsibilities contained in the 1989 Agreement to the Commission. The Commission was requested to assist with the implementation and review of the Joint Water Quality Monitoring Program. On Friday, October 21, 2005 at the October 2005 Commission's meeting with governments, the U.S. State Department read a statement into the Commission's formal record that the U.S. State Department is of the opinion the Commission has the authority and has obtained the notification it needs from the U.S. State Department to proceed with carrying out the flood related responsibilities for the Souris River. On Thursday, April 6, 2006 at the April 2006 Commission's meeting with governments, Foreign Affairs Canada indicated that the Board should be assigned these responsibilities. It is recognized that Article X of the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River basin designates the entities responsible for operation and maintenance of the improvements mentioned in the Agreement and that the operations will be in accordance with the Operating Plan shown in Annex A of the Agreement. The Department of Army is the entity designated responsible for flood operations within the United States. The Government of Saskatchewan is the Canadian entity designated responsible for flood operations within the Canadian Province of Saskatchewan.

5. This directive replaces the April 11, 2002 Directive to the former International Souris River Board.

6. The Board's mandate is to assist the Commission in carrying out the responsibilities assigned to it by the governments of the United States and Canada in the Souris River basin by performing the tasks identified in Clause 7 below.

7. The Board's duties shall be to:

   (i) Maintain an awareness of existing and proposed developments, activities, conditions, and issues in the Souris River basin that may have an impact on transboundary water levels, flows, water quality, and aquatic ecosystem health and inform the Commission about existing or potential transboundary issues.

   (ii) Oversee the implementation of compliance with the Interim Measures As Modified For Apportionment of the Souris River as described in Appendix A of this document by:
      - identifying an adequate hydro-climatic monitoring network to support the determination of natural flow and apportionment balance,
      - encouraging the appropriate authorities to establish and maintain hydro-climatic monitoring and information collection networks and reporting systems to ensure suitable information is available as required for the determination of natural flow and apportionment balance.

- informing the Commission, in a timely manner, of critical water supply or flow conditions in the basin,
- encouraging appropriate authorities to take steps to ensure that apportionment measures are met, and
- preparing an annual report and submitting it to the Commission.

(iii) Assist in the implementation and review of a Joint Water Quality Monitoring Program (referred to hereafter as "the Program") by:

- developing recommendations on the Program and setting water quality objectives,
- exchanging data provided by the Program on a regular basis,
- collating, interpreting, and analyzing the data provided by the Program,
- reviewing the Program and the water quality objectives at least every five years,
- recommending, as appropriate, any modifications to improve the Program, and
- preparing an annual report containing:
  - a summary of the principal activities of the Board during the year with respect to the Program,
  - a summary of the principal activities affecting water quality in the Souris River Basin during the year,
  - a summary of the collated, interpreted, and analyzed data provided by the Program,
  - a summary of the water quality of the Souris River at the two locations at which it crosses the International Boundary
  - a section summarizing any definitive changes in the monitored parameters and the possible causes of such changes,
  - a section discussing the water quality objectives for the Souris River at the Saskatchewan/North Dakota boundary and at the North Dakota/Manitoba boundary as established pursuant to Agreement,
  - a section summarizing other significant water quality changes and the possible causes of such changes, and
  - recommendations on new water quality objectives or on how existing water quality objectives can be met, including suggestions on water quality as it relates to water quantity during periods of low flow, in the event that the annual report indicates that the water quality objectives have not been attained as a result of activities pursued under the Agreement.

(iv) Perform an oversight function for flood operations in cooperation with the designated entities identified in the 1989 Canada-United States Agreement for Water Supply and Flood Control in the Souris River Basin by:

- ensuring mechanisms are in place for coordination of data exchange, flood forecasts and communications related to flood conditions and operations;
- determining whether the operations under the Agreement should proceed based on the Flood Operation or Non-Flood Operation of the Operating Plan, which is Annex A to the Agreement, using its criteria and informing designated agencies of this determination;
- reporting to the Commission on any issues related to flood operations and management; and
- providing the Commission and the designated entities under the Agreement recommendations on how flood operations and coordination activities could be improved.

(v) Report on aquatic ecosystem health issues in the watershed and regularly inform the Commission on the state and implications of aquatic ecosystem health.

(vi) Carry out such other studies or activities as the Commission may, from time to time, request.

8. The Board shall provide opportunities for the public to be involved in its work, including at least one public meeting in the basin each year.

9. The Board shall coordinate and collaborate with other agencies and institutions both within and outside the Souris River basin as may be needed or desirable, and facilitate the timely dissemination of pertinent information within the basin.

10. The Board shall have an equal number of members from each country. The Commission shall normally appoint each member for a three-year term. Appointments may be renewed for additional terms. Members shall act in their personal and professional capacity, and not as representatives of their countries, agencies or institutions. The Commission shall appoint Canadian and United States co-chairs of the Board and will strive to appoint chairs with complementary expertise that encompasses a broad spectrum of basin issues.

11. The co-chairs of the Board shall be responsible for maintaining proper liaison between the Board and the Commission, and among the Board members.

12. The co-chairs shall ensure that members of the Board are informed of all instructions, inquiries, and authorizations received from the Commission and also of activities undertaken by or on behalf of the Board, progress made, and any developments affecting such progress.

13. The co-chairs may appoint secretaries of the Board who, under the general supervision of the co-chairs, shall carry out such duties as are assigned by the co-chairs or the Board as a whole.

14. The Board may establish such committees and working groups as may be required to fulfill its responsibilities in a knowledgeable and effective manner. The Commission shall be kept informed of the duties and composition of any committee or working group.

15. Unless other arrangements are made with the Commission, members of the Board, committees, or working groups shall make their own arrangements for reimbursement of necessary expenditures for travel or other related expenses.

16. The Board shall inform the Commission in advance of plans for any meetings, or other means of involving the public in Board deliberations, and shall report to the Commission, in a timely manner, on these and any other presentations or representations made to the Board.

17. The Board shall conduct its public outreach activities in accordance with the Commission's public information policies and shall maintain files in accordance with the Commission policy on segregation of documents.

18. Prior to their release, the Board shall provide the text of media releases and other public information materials to the Secretaries of the Commission for review by the Commission's Public Information Officers.

19. The Board shall submit an annual report covering all of its activities, including the annual report regarding the Program, as described in Section 7 (ii) and (iii) above, to the Commission, at least three weeks in advance of the Commission's fall semi-annual meeting, and the Board shall submit other reports as the Commission may request or the Board may feel appropriate in keeping with this Directive. Reports shall be submitted in a format suitable for public release and electronic copies shall be provided to each of the Commission's section offices.

20. Reports, including annual reports, minutes and correspondence of the Board shall, normally, remain privileged and be available only to the Commission and to members of the Board and its committees until their release has been authorized by the Commission. The Board shall provide minutes of Board meetings to the Commission within 45 days of the close of the meeting in keeping with the Commission's April 2002 Policy Concerning Public Access to Minutes of Meetings. The minutes will subsequently be put on the Commission's web site.

21. If, in the opinion of the Board or of any member, any instruction, directive, or authorization received from the Commission lacks clarity or precision, the matter shall be referred promptly to the Commission for appropriate action.

22. The Board shall operate by consensus. In the event of any disagreement among the members of the Board which they are unable to resolve, the Board shall refer the matter forthwith to the Commission for decision.

23. The Commission may amend existing instructions or issue new instructions to the Board at any time.

Signed this _____day of _____, 2006

Elizabeth Bourget	Murray Clamen
Secretary	Secretary
United States Section	Canadian Section

Appendix A
to the
Directive to the International Souris River Board

Interim Measures As Modified For Apportionment of the Souris River

By letters dated March 20, 1959 and April 3, 1959, respectively, the Commission was advised that the governments of Canada and the United States approved the apportionment arrangements for the Souris River contained in paragraph 22 of the March 19, 1958 report to the Governments of the United States and Canada concerning the Souris River. The measures became known as the 1959 Interim Measures, and the Commission was assigned responsibility for ensuring compliance with them. Article VII of the 1989 Agreement Between the Government of Canada and the Government of the United States of America For The Water Supply And Flood Control In The Souris River modified paragraph 1 of the 1959 Interim Measures. The measures were further modified by the governments in December 2000. The 'Interim Measures As Modified' are as follows:

From Canada-United States Exchange of Letters December 22, 2000:

1. The Province of Saskatchewan shall have the right to divert, store, and use waters which originate in the Saskatchewan portion of the Souris River basin, provided that such diversion, storage, and use shall not diminish the annual flow of the river at the Sherwood Crossing more than 50 percent of that which would have occurred in a state of nature, as calculated by the International Souris River Board of Control[1] (the Board). For the purpose of these calculations, any reference to "annual" and "year" is intended to mean the period January 1 through December 31.

   For the benefit of riparian users of water between the Sherwood Crossing and the upstream end of Lake Darling, the Province of Saskatchewan shall, so far as is practicable, regulate its diversion, storage, and uses in such a manner that the flow in the Souris River channel at the Sherwood Crossing shall not be less than 0.113 cubic metres per second (4 cubic feet per second) when that much flow would have occurred under the conditions of water use development prevailing in the Saskatchewan portion of the Souris River basin prior to construction of the Boundary Dam, Rafferty Dam and Alameda Dam.

   Under certain conditions, a portion of the North Dakota share will be in the form of evaporation from Rafferty and Alameda Reservoirs. During years when these conditions occur, the minimum amount of flow actually passed to North Dakota will be 40 percent of the annual natural flow volume at the Sherwood Crossing. This lesser amount is in recognition of Saskatchewan's operation of Rafferty Dam and Alameda Dam for flood control in North Dakota and of evaporation as a result of the project.

[1] In April 2000, the International Joint Commission renamed the Board the International Souris River Board. Any reference hereafter to the International Souris River Board of Control refers to the International Souris River Board.

(a) Saskatchewan will deliver a minimum of 50 percent of the annual natural flow volume at the Sherwood Crossing in every year except in those years when the conditions given in (i) or (ii) below apply. In those years, Saskatchewan will deliver a minimum of 40 percent of the annual natural flow volume at the Sherwood Crossing.

(i) The annual natural flow volume at Sherwood Crossing is greater than 50 000 cubic decametres (40 500 acre-feet) and the current year June 1 elevation of Lake Darling is greater than 486.095 metres (1594.8 feet); or

(ii) The annual natural flow volume at Sherwood Crossing is greater than 50 000 cubic decametres (40 500 acre-feet) and the current year June 1 elevation of Lake Darling is greater than 485.79 metres (1593.8 feet), and since the last occurrence of a Lake Darling June 1 elevation of greater than 486.095 metres (1594.8 feet) the elevation of Lake Darling has not been less than 485.79 metres (1593.8 feet) on June 1.

(b) Notwithstanding the annual division of flows that is described in (a), in each year Saskatchewan will, so far as is practicable as determined by the Board, deliver to North Dakota prior to June 1, 50 percent of the first 50 000 cubic decameters (40 500 acre-feet) of natural flow which occurs during the period January 1 to May 31. The intent of this division of flow is to ensure that North Dakota receives 50 percent of the rate and volume of flow that would have occurred in a state of nature to try to meet existing senior water rights.

(c) Lake Darling Reservoir and the Canadian reservoirs will be operated (insofar as is compatible with the Projects' purposes and consistent with past practices) to ensure that the pool elevations, which determine conditions for sharing evaporation losses, are not artificially altered. The triggering elevation of 485.79 metres (1593.8 feet) for Lake Darling Reservoir is based on existing water uses in North Dakota, including refuges operated by the U.S. Fish and Wildlife Service. Each year, operating plans for the refuges on the Souris River will be presented to the Board. Barring unforeseen circumstances, operations will follow said plans during each given year. Lake Darling Reservoir will not be drawn down for the sole purpose of reaching the elevation of 485.79 metres (1593.8 feet) on June 1.

Releases will not be made by Saskatchewan Water Corporation from the Canadian reservoirs for the sole purpose of raising the elevation of Lake Darling Reservoir above 486.095 metres (1594.8 feet) on June 1.

(d) Flow releases to the United States should occur (except in flood years) in the pattern which would have occurred in a state of nature. To the extent possible and in consideration of potential channel losses and operating efficiencies, releases from the Canadian dams will be scheduled to coincide with periods of beneficial use in North Dakota. Normally, the period of beneficial use in North Dakota coincides with the timing of the natural hydrograph, and that timing should be a guide to releases of the United States portion of the natural flow.

(e) A determination of the annual apportionment balance shall be made by the Board on or about October 1, of each year. Any shortfall that exists as of that date shall be delivered by Saskatchewan prior to December 31.

(f) The flow release to the United States may be delayed when State of North Dakota determines and notifies Saskatchewan through the Board that the release would not be of benefit to the State at that time. The delayed release may be retained for use in Saskatchewan, notwithstanding the 0.113 cubic metres per second (4 cubic feet per second) minimum flow limit, unless it is called for by the State of North Dakota through the Board before October 1 of each year. The delayed release shall be measured at the point of release and the delivery at Sherwood Crossing shall not be less than the delayed release minus the conveyance losses that would have occurred under natural conditions between the point of release and the Sherwood Crossing. Prior to these releases being made, consultations shall occur between the Saskatchewan Water Corporation, the U.S. Fish and Wildlife Service, and the State of North Dakota. All releases will be within the specified target flows at the control points.

From paragraph 22 of March 19, 1958 IJC report:

2. Except as otherwise provided herein with respect to delivery of water to the Province of Manitoba, the State of North Dakota shall have the right to divert, store, and use the waters which originate in the North Dakota portion of the Souris River basin together with the waters delivered to the State of North Dakota at the Sherwood Crossing under Recommendation (1) above; provided, that any diversion, use, or storage of Long Creek water shall not diminish the annual flow at the eastern crossing of Long Creek into Saskatchewan below the annual flow of said Creek at the western crossing into North Dakota.

3. (a) In addition to the waters of the Souris River basin which originate in the Province of Manitoba, that Province shall have the right, except during periods of severe drought, to receive for its own use and the State of North Dakota shall deliver from any available source during the months of June, July, August, September, and October of each year, six thousand and sixty-nine (6,069) acre-feet of water at the Westhope Crossing regulated so far as practicable at the rate of twenty (20) cubic feet per second except as set forth hereinafter: provided, that in delivering such water to Manitoba no account shall be taken of water crossing the boundary at a rate in excess of the said 20 cubic feet per second.

(b) In periods of severe drought when it becomes impracticable for the State of North Dakota to provide the foregoing regulated flows, the responsibility of the State of North Dakota in this connection shall be limited to the provision of such flows as may be practicable, in the opinion of the said Board of Control, in accordance with the objective of making water available for human and livestock consumption and for household use. It is understood that in the circumstances contemplated in this paragraph the State of North Dakota will give the earliest possible advice to the International Souris River Board of Control with respect to the onset of severe drought conditions.

4. In event of disagreement between the two sections of the International Souris River Board of Control, the matters in controversy shall be referred to the Commission for decision.

5. The interim measures for which provision is herein made shall remain in effect until the adoption of permanent measures in accordance with the requirements of questions (1) and (2) of the Reference of January 15 1940, unless before that time these interim measures are qualified or modified by the Commission.

Appendix L

Compatibility Determination for Prescribed Grazing

COMPATIBILITY DETERMINATION
for
Prescribed Grazing on
National Wildlife Refuges and Waterfowl Production Areas
for Management Purposes

Use: Prescribed grazing on National Wildlife Refuges and Waterfowl Production Areas in North and South Dakota.

Station Names:

South Dakota Refuges and Wetland Management Districts:

Lake Andes NWR and WMD, SD
Madison WMD, SD
Huron WMD, SD
Waubay NWR and WMD, SD
Sand Lake NWR and WMD, SD
LaCreek NWR and WMD, SD

North Dakota Refuges and Wetland Management Districts:

Tewaukon NWR and WMD, ND
Kulm WMD, ND
Arrowwood NWR and WMD, ND
Valley City WMD, ND
Chase Lake NWR and WMD, ND
Audubon NWR and WMD, ND
Long Lake NWR and WMD, ND
J Clark Salyer NWR and WMD, ND
Devils Lake WMD, ND
Lostwood NWR and WMD, ND
Crosby WMD, ND
Des Lacs NWR, ND
Upper Souris NWR, ND

Establishing and Acquisition Authorities:

Arrowwood NWR; Executive Order (E.O.) 7168, Sept. 4, 1935
Audubon NWR; 16 USC $664 (Fish and Wildlife Coord. Act)
Chase Lake NWR; E.O. 932, Aug. 28, 1908
Des Lacs NWR; E.O. 7154-A, Aug. 22, 1935
Florence Lake NWR; E.O. 8119, May 10, 1939

Kellys Slough NWR; E.O. 7320, Mar. 19, 1936
Lake Alice NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Lake Ilo NWR; E.O. 8154, June 12, 1939
Lake Nettie NWR; E. O. 8155, June 12, 1939
Lake Zahl NWR; E. O. 8158, June 12, 1939
Long Lake NWR; E.O. 5808, Feb. 25, 1932
Lostwood NWR; E.O. 7171, Sept. 4, 1935
McLean NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Slade NWR; 16 USC 715d (Mig. Bird Cons. Act)
Sullys Hill NGP; E. O. 3596, Dec. 22, 1921
Tewaukon NWR; Public Land Order (PLO) 286, June 26, 1945
Upper Souris NWR; E.O. 7161, Aug. 27, 1935

LaCreek NWR; E.O. 7160, Aug. 26, 1935
Lake Andes NWR; E. O. 7292, Feb. 14, 1936
Sand Lake NWR; E. O. 7169, Sept. 4, 1935
Waubay NWR; E. O. 7245, Dec. 10, 1935

Waterfowl Production Areas, Wetland Easements, Grassland Easements - The Migratory Bird Hunting and Conservation Stamp Act, March 16, 1934, (16 USC Sec. 718-718h, 48 Stat. 452) as amended August 1, 1958, (PL 85-585; 72 Stat. 486) for acquisition of "Waterfowl Production Areas"; the Wetlands Loan Act, October 4, 1961, as amended (16 USC 715k-3 - 715k-5, Stat. 813), funds appropriated under the Wetlands Loan Act are merged with duck stamp receipts in the fund and appropriated to the Secretary for the acquisition of migratory bird refuges under the provisions of the Migratory Bird Conservation Act, February 18, 1929, (16 USC Sec. 715, 715d - 715r, as amended.

Refuge Purpose(s):

The Executive Orders for most of the refuges state the purpose "as a refuge and breeding ground for migratory birds and other wildlife."

"...as Waterfowl Production Areas" subject to "...all of the provisions of such Act [Migratory Bird Conservation Act] ...except the inviolate sanctuary provisions..." 16 USC 718(c) (Migratory Bird Hunting and Conservation Stamp)

"...for any other management purpose, for migratory birds." 16 USC 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The Mission of the National Wildlife Refuge System is to administer a national network

"The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16 USC 668(dd)-668(ee)].

Description of Use:

Prescribed grazing is the use of livestock, usually cattle, to remove standing vegetation, reduce vegetative litter, suppress woody vegetation or noxious weeds, open up vegetation-choked wetlands, or open up areas to sunlight and encourage native grass seedlings and growth. Prescribed grazing is carefully timed, and usually of short duration (usually 2-4 weeks), to target certain species for grazing impacts in order to benefit other species for growth after the competing vegetation has been removed.

The prescribed grazing period generally will take place between April and September. Early spring grazing (mid-April through late May) is targeted at cool season exotic species and encourages warm season native grasses and forbs. Mid-season grazing (June and July), especially on non-native grasslands, stimulates fall regrowth. Late-season grazing (August and September) removes litter and encourages spring growth of cool season natives or other cool season species.

Fence construction and maintenance, often temporary electric fence, and control and rotation of the livestock, are the responsibility of cooperating private party. Market rate grazing fees are determined by the Regional Office, but may include standard deductions for fence construction and maintenance, frequent livestock rotations, construction of water gaps, or hauling/providing additional water in dry pastures.

The frequency and duration of prescribed grazing on any Refuge or WPA will be based on site-specific evaluations of the grassland being managed.

Availability of Resources:

Developing grazing plans and Special Use Permits (SUPs) and monitoring compliance and biological effects requires some Service resources. Most grazing management costs; fencing labor, monitoring and moving the livestock, hauling water; are provided by the cooperator or permittee. Evaluating the grasslands for grazing prescriptions and grassland response is already a part of the stations grassland management responsibilities. Some alternative form of grassland management, prescribed burning or haying, may be used if the areas are not treated with prescribed grazing. Managing grasslands through permitted haying has comparable costs to managing a prescribed grazing program. Managed mowing is more expensive since all the labor costs are assumed by the Service. Prescribed burning can be an effective grassland management tool, but there are personnel and weather

limitations on a burning program, as well the fact the some tracts are just not suited to burning management. In addition, there is an ecological benefit to rotating grassland management techniques, such as grazing, burning, and haying, at different seasons, rather than just relying on one technique.

Anticipated Impacts of the Use:

Grazing by domestic livestock has the short-term effect of removing some or much of the standing vegetation from a tract of grassland. Properly prescribed, the effect of this removal of vegetation increases the vigor of the grassland, stimulates the growth of desired species of grass and forbs, and reduces the abundance of targeted species such as cool season exotics, woody species, noxious weeds or invasive species, or cattails. Grazing in the spring may cause the loss of some bird nests due to trampling, and may cause some birds not to nest in areas being grazed. Grazing on public wildlife lands can create an aesthetic issue of concern for some people or visitors who do not understand grassland management. Prescribed grazing is usually of short duration and enhanced, most diverse and vigorous grassland habitats are the end result. Grazing livestock may create a minor and temporary disturbance to wildlife but generally do no harm. There is a slight potential for conflict between the visiting public and the livestock or the permittee, particularly during fall hunting seasons. These situations can be limited by having the livestock removed by the anticipated beginning of fall hunting seasons.

In 2004, prescribed grazing occurred on approximately 17,500 acres of Refuges and WPAs in South Dakota (202,000 fee acres). During the 1996-2000 period, approximately 39,700 acres of grasslands on North Dakota Refuges and WPAs (470,000 fee acres) were treated annually by prescribed grazing treatments.

To eliminate any appearance of favoritism or impropriety, managers should follow Refuge Manual procedures for cooperator or permittee selection.

Public Review and Comment:

The period of public review and comment began May 1, 2005 and ended on May 14, 2005.

Notices were posted in public places at each of the field stations listed on this Compatibility Determination. This method was selected because the proposed activity is considered minor, incidental, infrequent, with only short-term disturbance.

Determination:

Compatibility Threshold: As this activity is an economic use, it must meet the compatibility threshold of "contributing to the Mission and Purposes" of the Refuge System and the Refuge Area. Prescribed grazing is used to improve and manage grassland habitats

on Refuges and Waterfowl Production Areas and the migratory birds and other wildlife that use these habitats.

_____ Use is Not Compatible

__XXX___Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. SUPs will specify the stocking rate, dates of use, and timing for each unit or grazing cell on the Refuge or WPA.

2. The standard grazing fee, as determined for each state by the Regional Office. and any standard deductions for any labor or work done on the Service lands will be included on the SUP.

3. Grazing permittees must comply with all applicable State Livestock Health laws.

4. No supplemental feeding will be allowed without authorization from the Project Leader/Manager.

5. Control and confinement of livestock will be the responsibility of the permittee.

6. The permit is issued subject to the revocation and appeals procedure contained in Title 50, Part 25 of the Code of Federal Regulations.

Justification:

Controlled grazing by domestic livestock will not materially interfere or detract from the purposes for which these NWRS lands were acquired or established. Prescribed livestock grazing creates temporary disturbances to vegetation. Many of these disturbances are desirable for grassland management. Grazing produces an undesirable but short-term impact to grassland nesting birds and site aesthetics. In the long-term, prescribed grazing increases grassland vigor, species diversity, and habitat quality. Prescribed grazing is an alternative management tool that can be used to replace or complement prescribed burning, mowing, or haying of Service grasslands. Without periodic disturbance caused by haying, burning, or grazing, the health of the grassland community would decline, as would an areas potential for waterfowl and other migratory bird nesting.

Mandatory 10-Year Reevaluation Date: 10 years from the date of APPROVAL signature

Signatures:

Submitted:

Michael Bryant, Project Leader — 4/26/05 Date
Lake Andes Complex

Tom Tornow, Project Leader — 4-26-05 Date
Madison WMD

Harris Hoistad, Project Leader — 4-26-05 Date
Huron WMD

Larry Martin, Project Leader — 26 April 2005 Date
Waubay Complex

Gene Williams, Project Leader — 4-26-05 Date
Sand Lake Complex

Tom Koerner, Project Leader — 4-26-05 Date
LaCreek Complex

Jack Lalor, Acting Project Leader — 4/26/05 Date
Tewaukon Complex

Dave Azure, Acting Project Leader — 4/26/05 Date
Kulm WMD

Kim D. Hanson, Project Leader — 4/26/05 Date
Arrowwood NWR
Chase Lake WMD
Valley City WMD

Gary Williams, Acting Project Leader — Date 4/26/05
Audubon Complex

Paul Van Ningen, Project Leader — Date 4/26/05
Long Lake Complex

Tedd Gutzke, Project Leader — Date April 26, 2005
J Clark Salyer Complex

Roger Hollevoet, Project Leader — Date 4/26/05
Devils Lake Complex

Fred G. Giese, Project Leader — Date 04/26/05
Des Lacs NWR
Lostwood WMD
Crosby WMD

Dean Knauer, Project Leader — Date 4-27-05
Upper Souris NWR

Review:

Lloyd Jones — Date 4.27.05
Regional Compatibility Coordinator

Rod Krey — Date 4/28/05
Refuge Supervisor, ND-SD

Approval: _____ Date May 15, 2005

Ronald D. Shupe, Region 6
Acting Chief of Refuges

Appendix M

Compatibility Determination for Prescribed Haying

COMPATIBILITY DETERMINATION
for
Prescribed Haying of Grasslands
on National Wildlife Refuges and Waterfowl Production Areas
for Management Purposes

Use: Prescribed Haying of Grasslands on National Wildlife Refuges and Waterfowl Production Areas in North and South Dakota.

Station Names:

South Dakota Refuges and Wetland Management Districts:

Lake Andes NWR and WMD, SD
Madison WMD, SD
Huron WMD, SD
Waubay NWR and WMD, SD
Sand Lake NWR and WMD, SD
LaCreek NWR and WMD, SD

North Dakota Refuges and Wetland Management Districts:

Tewaukon NWR and WMD, ND
Kulm WMD, ND
Arrowwood NWR and WMD, ND
Valley City WMD, ND
Chase Lake NWR and WMD, ND
Audubon NWR and WMD, ND
Long Lake NWR and WMD, ND
J Clark Salyer NWR and WMD, ND
Devils Lake WMD, ND
Lostwood NWR and WMD, ND
Crosby WMD, ND
Des Lacs NWR, ND
Upper Souris NWR, ND

Establishing and Acquisition Authorities:

Arrowwood NWR; Executive Order (E.O.) 7168, Sept. 4, 1935
Audubon NWR; 16 USC $664 (Fish and Wildlife Coord. Act)
Chase Lake NWR; E.O. 932, Aug. 28, 1908
Des Lacs NWR; E.O. 7154-A, Aug. 22, 1935
Florence Lake NWR; E.O. 8119, May 10, 1939

J. Clark Salyer NWR; E.O. 7170, Sept. 4, 1935
Kellys Slough NWR; E.O. 7320, Mar. 19, 1936
Lake Alice NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Lake Ilo NWR; E.O. 8154, June 12, 1939
Lake Nettie NWR; E. O. 8155, June 12, 1939
Lake Zahl NWR; E. O. 8158, June 12, 1939
Long Lake NWR; E.O. 5808, Feb. 25, 1932
Lostwood NWR; E.O. 7171, Sept. 4, 1935
McLean NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Slade NWR; 16 USC 715d (Mig. Bird Cons. Act)
Sullys Hill NGP; E. O. 3596, Dec. 22, 1921
Tewaukon NWR; Public Land Order (PLO) 286, June 26, 1945
Upper Souris NWR; E.O. 7161, Aug. 27, 1935

LaCreek NWR; E.O. 7160, Aug. 26, 1935
Lake Andes NWR; E. O. 7292, Feb. 14, 1936
Sand Lake NWR; E. O. 7169, Sept. 4, 1935
Waubay NWR; E. O. 7245, Dec. 10, 1935

Waterfowl Production Areas, Wetland Easements, Grassland Easements - The Migratory Bird Hunting and Conservation Stamp Act, March 16, 1934, (16 USC Sec. 718-718h, 48 Stat. 452) as amended August 1, 1958, (PL 85-585; 72 Stat. 486) for acquisition of "Waterfowl Production Areas"; the Wetlands Loan Act, October 4, 1961, as amended (16 USC 715k-3 - 715k-5, Stat. 813), funds appropriated under the Wetlands Loan Act are merged with duck stamp receipts in the fund and appropriated to the Secretary for the acquisition of migratory bird refuges under the provisions of the Migratory Bird Conservation Act, February 18, 1929, (16 USC Sec. 715, 715d - 715r, as amended.

Refuge Purpose(s):

The Executive Orders for most of the refuges state the purpose "as a refuge and breeding ground for migratory birds and other wildlife."

"...as Waterfowl Production Areas" subject to "...all of the provisions of such Act [Migratory Bird Conservation Act] ...except the inviolate sanctuary provisions..." 16 USC 718(c) (Migratory Bird Hunting and Conservation Stamp)

"...for any other management purpose, for migratory birds." 16 USC 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The Mission of the National Wildlife Refuge System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16 USC 668(dd)-668(ee)].

Description of Use:

Haying is the cutting and removal, by baling and transport to an off-site location, of grass or other upland vegetation for the production of livestock forage. Haying for this purpose is typically done by a cooperating farmer acting under authority of a Cooperative Farming Agreement or Special Use Permit (SUP) issued by the Project Leader, Refuge Manager or Wetland District Manager.

Haying is an effective management tool as part of an overall grassland management plan to improve and maintain Fish and Wildlife Service (Service)-managed grasslands for the benefit of migratory birds and other wildlife. Grasslands require periodic renovation to maintain vigor, diversity, and the structure necessary for migratory bird nesting. Haying can be an alternative to prescribed burning or grazing, which are the two other methods used to manage grassland habitats. If local conditions preclude the use of prescribed fire, or livestock numbers are not available, removal of biomass through haying serves to reduce unwanted overstory, reduce woody plant invasion, and open the soil surface up to sunlight. Such removal of vegetation allows for more vigorous regrowth of desirable species following the haying although results are neither as dramatic nor positive as with fire or grazing.

Haying may also be used as part of a native grass seeding strategy on newly acquired lands or on tame grass stands on older lands needing renovation. To reduce weed or undesirable species competition and minimize herbicide applications, a cooperating farmer may be used to seed the native grass seed mix and interseed with a cover crop. As a requirement of the SUP, the cooperator would be required to cut. bale, and remove the cover crop before it matures and goes to seed. The resultant hay can be used for livestock feed and haying serves the biological purpose of releasing young native grass and forb seedlings for growth with minimal competition.

A third possible use of haying on FWS-managed grasslands involves the initial steps of removing unwanted vegetation prior to seeding the tract to native grasses. Haying of a nonnative cool season stand of grass is an effective step in advance of spraying the field with herbicide to kill all existing vegetation. Removal of the heavy grass overstory by haying allows the herbicide to more effectively reach and treat the remaining target plants. Better removal of the unwanted grasses will in turn ensure better success of the planted grasses and forbs whether they are interseeded into the sod or into the soil turned over and leveled prior to seeding.

Haying is sometimes used prior to a noxious weed treatment; the tract is hayed and after a period of time, the "flush" of noxious weeds is treated with a herbicide application. Removing the vegetation through haying allows the herbicide to more effectively reach and treat the target weeds.

A more limited application of haying on FWS-managed lands involves its use for establishing fire breaks for prescribed burning. A cooperative farmer would be permitted to hay the firebreak strips in the fall. That area would then have little standing dead vegetation in the early spring, or would green up earlier in the spring and allow use as a fire break.

Prescribed haying in North Dakota averaged about 13,500 acres per year (1996-2000). In South Dakota, FWS managers use prescribed haying on about 2450 acres annually (2004 estimates).

Availability of Resources:

Financial and staff resources are determined to be sufficient at each field station to administer these requests. Staff time will be needed to evaluate the proposed use, to prepare the site-specific SUPs, and to insure compliance with the permit authorization and stipulations necessary to insure compatibility.

To lessen any appearance of favoritism or impropriety, managers should follow Refuge Manual procedures for establishing rental rates and cooperator selection.

Anticipated Impacts of the Use:

Haying will result in short-term disturbances to wildlife and long-term benefits to grasslands and the wildlife species that use these grasslands. Short-term impacts will include disturbance and displacement of wildlife typical of any noisy heavy equipment operation. Cutting and removal of standing grass will result in the short-term loss (late-summer to mid-summer the following year of habitat for those species requiring taller grass for feeding and perching. Prescribed haying will typically be scheduled after July 31 to avoid impacts to most nesting birds. Long-term benefits will accrue due to the increased vigor of the regrown grasses or the establishment of highly desirable native grass and forb species, which will improve habitat conditions for the same species affected by the short-term removal of the cover. Longer-term negative impacts may occur to some resident wildlife species such as pheasant that may lose overwinter habitat in hayed areas. Strict time constraints, and limiting grass stands to no more than 50 percent being hayed at any one time will limit the anticipated impacts to these areas.

Public Review and Comment:

The period of public review and comment began May 1, 2005 and ended on May 14, 2005.

Notices were posted in public places at each of the field stations listed on this Compatibility Determination. This method was selected because the proposed activity is considered minor, incidental, infrequent, with only short-term disturbance.

Determination:

Compatibility Threshold: As this activity is an economic use, it must meet the compatibility threshold of "contributing to the Mission and Purposes" of the Refuge System and the Refuge Area. Prescribed haying is used to benefit Refuge and Waterfowl Production Area grasslands and the migratory birds and other wildlife that use these grasslands.

_____ Use is Not Compatible

__XXX____Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. Prescribed haying will generally not take place before August 1 in any given year, unless there are documented management reasons for prescribing an earlier hay date.

2. The permit is issued subject to the revocation and appeals procedure contained in Title 50, Part 25 of the Code of Federal Regulations.

3. Generally, not more than 50 percent of a tract may be hayed in any one year, unless size restrictions or habitat conditions warrant haying of more than half of the area.

4. Prescribed haying can be coupled with a light discing or dragging operation, or an interseeding of desirable species of grass or legumes to further increase the vigor of the grass stand.

5. Bales or stacks must be removed from the area by September 10.

Justification:

Haying will not materially interfere with or detract from the purposes for which these NWRS lands were acquired or established. Haying creates temporary disturbance to vegetation. This disturbance is desirable for grassland management. Haying produces an undesirable but short-term impact to grassland nesting birds and site aesthetics. In the long-term, haying increases grassland vigor, species diversity, and habitat quality. Haying is an alternative management tool that can be used to replace or compliment prescribed burning, mowing, or grazing of Service grasslands. Without periodic disturbance caused by haying, burning, or grazing, the health of the grassland community would decline, as would an areas potential for waterfowl and other migratory bird nesting.

Mandatory 10-Year Reevaluation Date: 10 years from the date of APPROVAL signature

Signatures:

Submitted:

Michael Bryant, Project Leader — Date: 4/26/05
Lake Andes Complex

Tom Tornow, Project Leader — Date: 4-26-05
Madison WMD

Harris Hoistad, Project Leader — Date: 4-26-05
Huron WMD

Larry Martin, Project Leader — Date: 26 April 2005
Waubay Complex

Gene Williams, Project Leader — Date: 4-26-05
Sand Lake Complex

Tom Koerner, Project Leader — Date: 4-26-05
LaCreek Complex

Jack Lalor, Acting Project Leader — Date 4/26/05
Tewaukon Complex

Dave Azure, Acting Project Leader — Date 4/26/05
Kulm WMD

Kim D. Hanson, Project Leader — Date 4/26/05
Arrowwood Complex
Chase Lake WMD
Valley City WMD

Gary Williams, Acting Project Leader — Date 4/26/05
Audubon Complex

Paul Van Ningen, Project Leader — Date 4/26/05
Long Lake Complex

Tedd Gutzke, Project Leader — Date April 26, 2005
J Clark Salyer Complex

Roger Hollevoet, Project Leader — Date 4/26/05
Devils Lake Complex

Fred G. Giese, Project Leader — Date 04/26/05
Des Lacs NWR
Lostwood WMD
Crosby WMD

Dean Knauer, Project Leader — Date 04-27-05
Upper Souris NWR

Review:

Lloyd Jones
Regional Compatibility Coordinator

4-27-05
Date

Rod Krey
Refuge Supervisor, ND-SD

4/28/05
Date

Approval:

Ronald D. Shupe, Region 6
Acting Chief of Refuges

May 15, 2005
Date

Appendix N

Compatibility Determination for the Cooperative Farming Program

COMPATIBILITY DETERMINATION
for
the Cooperative Farming Program on
National Wildlife Refuges and Waterfowl Production Areas
for Management Purposes

Use: Cooperative farming on National Wildlife Refuges and Waterfowl Production Areas in North and South Dakota.

Station Names:

South Dakota Wetland Management Districts:

Lake Andes NWR and WMD, SD
Madison WMD, SD
Huron WMD, SD
Waubay NWR and WMD, SD
Sand Lake NWR and WMD, SD
LaCreek NWR and WMD, SD

North Dakota Wetland Management Districts:

Tewaukon NWR and WMD, ND
Kulm WMD, ND
Arrowwood NWR and WMD, ND
Valley City WMD, ND
Chase Lake NWR and WMD, ND
Audubon NWR and WMD, ND
Long Lake NWR and WMD, ND
J Clark Salyer NWR and WMD, ND
Devils Lake WMD, ND
Lostwood NWR and WMD, ND
Crosby WMD, ND
Des Lacs NWR, ND
Upper Souris NWR, ND

Establishing and Acquisition Authorities:

Arrowwood NWR; Executive Order (E.O.) 7168, Sept. 4, 1935
Audubon NWR; 16 USC $664 (Fish and Wildlife Coord. Act)
Chase Lake NWR; E.O. 932, Aug. 28, 1908
Des Lacs NWR; E.O. 7154-A, Aug. 22, 1935
Florence Lake NWR; E.O. 8119, May 10, 1939
J. Clark Salyer NWR; E.O. 7170, Sept. 4, 1935

Kellys Slough NWR; E.O. 7320, Mar. 19, 1936
Lake Alice NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Lake Ilo NWR; E.O. 8154, June 12, 1939
Lake Nettie NWR; E. O. 8155, June 12, 1939
Lake Zahl NWR; E. O. 8158, June 12, 1939
Long Lake NWR; E.O. 5808, Feb. 25, 1932
Lostwood NWR; E.O. 7171, Sept. 4, 1935
McLean NWR; 16 USC $ 715d (Mig. Bird Cons. Act)
Slade NWR; 16 USC 715d (Mig. Bird Cons. Act)
Sullys Hill NGP; E. O. 3596, Dec. 22, 1921
Tewaukon NWR; Public Land Order (PLO) 286, June 26, 1945
Upper Souris NWR; E.O. 7161, Aug. 27, 1935

LaCreek NWR; E.O. 7160, Aug. 26, 1935
Lake Andes NWR; E. O. 7292, Feb. 14, 1936
Sand Lake NWR; E. O. 7169, Sept. 4, 1935
Waubay NWR; E. O. 7245, Dec. 10, 1935

Waterfowl Production Areas, Wetland Easements, Grassland Easements - The Migratory Bird Hunting and Conservation Stamp Act, March 16, 1934, (16 USC Sec. 718-718h, 48 Stat. 452) as amended August 1, 1958, (PL 85-585; 72 Stat. 486) for acquisition of "Waterfowl Production Areas"; the Wetlands Loan Act, October 4, 1961, as amended (16 USC 715k-3 - 715k-5, Stat. 813), funds appropriated under the Wetlands Loan Act are merged with duck stamp receipts in the fund and appropriated to the Secretary for the acquisition of migratory bird refuges under the provisions of the Migratory Bird Conservation Act, February 18, 1929, (16 USC Sec. 715, 715d - 715r, as amended.

Refuge Purpose(s):

The Executive Orders for most of the refuges state the purpose "as a refuge and breeding ground for migratory birds and other wildlife."

"...as Waterfowl Production Areas" subject to "...all of the provisions of such Act [Migratory Bird Conservation Act] ...except the inviolate sanctuary provisions..." 16 USC 718(c) (Migratory Bird Hunting and Conservation Stamp)

"...for any other management purpose, for migratory birds." 16 USC 715d (Migratory Bird Conservation Act)

National Wildlife Refuge System Mission:

"The Mission of the National Wildlife Refuge System is to administer a national network

of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans" (National Wildlife Refuge System Administration Act of 1966, as amended) [16 USC 668(dd)-668(ee)].

Description of Use:

Cooperative farming is the term used for cropping activities done by a third party on lands that are owned in fee-title by the U. S. Fish and Wildlife Service (Service) or controlled by the Service through a conservation easement (wetland, grassland, or FmHA). This activity is usually done on a short-term basis (3-4 years or less) to provide an optimum seed bed for the establishment of native grasses and forbs or other more desirable planted cover for wildlife. Cooperative farming may also be used on certain tracts to provide a fall food source for migratory waterfowl or a winter food source for resident wildlife.

The farming is done under the terms and conditions of a Cooperative Farming Agreement or Special Use Permit (SUP) issued by the Project Leader, Refuge Manager, or Wetland District Manager. Terms of the agreement insure that all current Service and District restrictions are followed.

Cooperative farming activities are generally limited to areas of former cropland or poor quality stands of tame or cool season exotic grasses. Service policies do not allow highly erodible soils to be tilled or cropped without an approved NRCS Conservation Plan. Waterfowl Production Areas (WPAs) in the Dakotas average about 200 acres in size. Generally, areas to be cooperatively farmed at one time prior to reseeding to more desirable plant species will not be more than 50 percent of the tract. Areas on WPAs and Refuges planted for food plots will be limited to the size needed to provide sufficient food for the targeted wildlife species.

Availability of Resources:

Staff time for development and administration of Cooperative Farming Agreements is already available. Most of the needed field work to prepare and plan for this use would be done as part of routine grassland management duties. The decision to use a cooperating farmer would occur as part of the overall strategy for managing lands on the Refuge or within the WMD. The additional time needed to coordinate issuance of the SUP or Cooperative Farming Agreement and oversight of the permit is relatively minor and within Refuge or WMD resources. In addition, the use of a cooperating farmer frees up other staff time from conducting the farming operation through force account.

Cooperative farming of Service lands in most cases is done on a share basis rather than for a fee. The Service typically receives its share as harvested grain used for other management purposes, as standing grain left for wildlife food, or as additional work such as

weed control, cultivation, or additional seed bed preparation, or for supplies such as herbicide or grass seed to be used on the same tract of land. Any fees or cash income received by the Service would be deposited in the Refuge Revenue Sharing Account. The Service will receive fair market value consideration from cooperating farmers, but the generation of income is a secondary consideration when developing the terms and conditions of a cooperative farming agreement or SUP.

To lessen any appearance of favoritism or impropriety, managers should follow Refuge Manual procedures for establishing rental rates and cooperator selection.

Anticipated Impacts of the Use:

Cooperative farming to prepare suitable seed beds for planting better cover and habitat will result in short-term disturbances and long-term benefits to both resident and migratory wildlife using the Refuges, WPAs, and easements. Short-term impacts include disturbance and displacement of wildlife typical of any noisy heavy equipment operation, and the loss of poor quality cover while the tract is farmed. Wildlife may also use the farmed area as an additional food source for the period which it is farmed. Long-term benefits are extremely positive due to the establishment of diverse or more desirable habitat for nesting, escape cover, perching, or non-crop feeding activities. The resulting habitat will generally improve conditions for most of the species negatively affected by the short period of farming activity.

In 2004, approximately 2900 acres of Service lands were farmed under SUPs in South Dakota. North Dakota refuges and WPAs permitted an average of 6,400 acres of cooperative farming during the 1996-2000 period.

Public Review and Comment:

The period of public review and comment began May 1, 2005 and ended on May 14, 2005.

Notices were posted in public places at each of the field stations listed on this Compatibility Determination. This method was selected because the proposed activity is considered minor, incidental, infrequent, with only short-term disturbance.

Determination:

Compatibility Threshold: As this activity is an economic use, it must meet the compatibility threshold of "contributing to the Mission and Purposes" of the Refuge System and the Refuge Area. Cooperative farming is used to benefit Refuge and Waterfowl Production Area uplands and the migratory birds and other wildlife that use these lands.

_____ Use is Not Compatible

__XXX__ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. SUPs or Cooperative Farming Agreements will specify the type of crop to be planted and describe the refuges' share.

2. The SUP may specify any herbicide or agricultural restrictions of the tract.

3. The SUP may specify timing constraints to insure that the proper field work is completed at the appropriate time.

4. The permit is issued subject to the revocation and appeals procedure contained in Title 50, Part 25 of the Code of Federal Regulations.

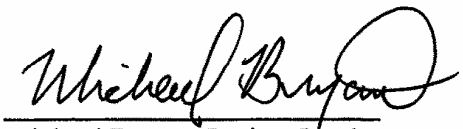
Justification:

The cooperative farming of Service lands or easements is done to develop or reseed better wildlife cover and habitat than was previously on the area. Only areas that have been previously cropped, or are seeded to decadent stands of cool season grasses (brome or crested wheatgrass), or decadent tame grass-legume mixes will be included in a cooperative farming plan. Cooperative farming in most cases provides the fastest, most cost effective means to establish native grasses or re-seeded cover on the Service property. In many cases, tracts are located many miles away from the Refuge or WMD headquarters, making force account labor a very time-consuming effort. The long-term benefits of managed, quality cover offset the short-term impacts and disturbance while the tract is farmed prior to seeding or re-seeding.

Mandatory 10-Year Reevaluation Date: 10 years from the date of APPROVAL signature

Signatures:

Submitted:



Michael Bryant, Project Leader
Lake Andes Complex

4/26/05
Date

Thomas R. Tornow — 4-26-05
Tom Tornow, Project Leader — Date
Madison WMD

Harris Hoistad — 4-26-05
Harris Hoistad, Project Leader — Date
Huron WMD

Larry D. Martin — 26 April 2005
Larry Martin, Project Leader — Date
Waubay Complex

Gene Williams — 4-26-05
Gene Williams, Project Leader — Date
Sand Lake Complex

Tom Koerner — 4-26-05
Tom Koerner, Project Leader — Date
LaCreek Complex

Jack Lalor — 4/26/05
Jack Lalor, Acting Project Leader — Date
Tewaukon Complex

David A. Azure — 4/26/05
Dave Azure, Acting Project Leader — Date
Kulm WMD

Kim D. Hanson — 4/26/05
Kim D. Hanson, Project Leader — Date
Arrowwood Complex
Chase Lake WMD
Valley City WMD

Gary Williams — 4/26/05
Gary Williams, Acting Project Leader — Date
Audubon Complex

Paul C. Van Ningen — 4/26/05
Paul Van Ningen, Project Leader — Date
Long Lake Complex

Theodore Gutzke — Apr. 26, 2005
Tedd Gutzke, Project Leader — Date
J Clark Salyer Complex

4/26/05
Roger Hollevoet, Project Leader — Date
Devils Lake Complex

04/26/05
Fred G. Giese, Project Leader — Date
Des Lacs Complex

4-27-05
Dean Knauer, Project Leader — Date
Upper Souris NWR

Review:

4.27.05
Lloyd Jones — Date
Regional Compatibility Coordinator

4/28/05
Rod Krey — Date
Refuge Supervisor, ND-SD

Approval:

May 15, 2005
Ronald D. Shupe, Region 6 — Date
Acting Chief of Refuges

Appendix O
Fire Management Program

The Service has administrative responsibility including fire management for the Souris River basin refuges, which cover approximately 110,292 acres in North Dakota.

Fire: A Critical Natural Process

In ecosystems in the prairie of the Great Plains, vegetation has evolved under periodic disturbance and defoliation from bison, fire, and drought. This periodic disturbance is what kept the ecosystem diverse and healthy while maintaining significant biodiversity for thousands of years.

Historically, natural fire and including Native American ignitions, have played an important disturbance role in many ecosystems by removing fuel accumulations, decreasing the impacts of insects and diseases, stimulating regeneration, cycling critical nutrients, and providing a diversity of habitats for plant species and wildlife.

When fire is excluded on a broad scale (over several decades) as it has been in many areas, the unnatural accumulation of living and dead fuel can contribute to degraded plant communities and wildlife habitats. These fuel accumulations often change fire regime characteristics. This has created a potential in many areas across the country for uncharacteristically severe wildland fires. These catastrophic wildland fires often pose risks to public and firefighter safety. In addition, they threaten property and resource values such as wildlife habitat, grazing opportunities, timber, soils, water quality, and cultural resources.

Return of fire is essential for healthy vegetation and wildlife habitat in most ecosystems including grassland, wetland, woodland, and forest. When integrated back into an ecosystem, fire can help restore and maintain healthy systems and reduce the risk of wildland fires. To facilitate fire's natural role in the environment, fire must first be integrated into land and resource management plans and activities on a broad scale.

Reintroduced fire

- can improve waterfowl habitat, wetlands, and riparian areas by reducing the density of vegetation or by modifying the plant species;
- can improve deer and elk habitat, especially in areas with shortages such as winter habitat and on spring and fall transitional ranges;
- can sustain biological diversity;
- can improve access in woodland and shrubland;
- can improve soil fertility;
- can improve the quality and amount of livestock forage;
- can improve growth in immature woodland by reducing density;
- can remove excessive buildup of fuels;
- can reduce susceptibility of plants to insects and disease caused by moisture and nutrient stress;
- can improve water yield for off-site activities and communities dependent on wildlands for their water supply.

Wildland Fire Management Policy and Guidance

In 2001, an update of the 1995 "Federal Fire Policy" was completed and approved by the Secretaries of Interior and Agriculture. The 2001 "Federal Wildland Fire Management Policy" directs federal agencies to achieve a balance between fire suppression to protect life, property, and resources and fire use to regulate fuels and maintain healthy ecosystems. In addition, it directs agencies to use the appropriate management response for all wildland fires regardless of the ignition source. This policy provides eight guiding principles that are fundamental to the success of the fire management program:

- Firefighter and public safety is the first priority in every fire management activity.
- The role of wildland fires as an essential ecological process and natural change agent will be incorporated into the planning process.
- Fire management plans (FMPs), programs, and activities support land and resource management plans and their implementation.
- Sound risk management is a foundation for all fire management activities.
- Fire management programs and activities are economically viable, based on values to be protected, costs, and land and resource management objectives.
- FMPs and activities are based on the best available science.
- FMPs and activities incorporate public health and environmental quality consideration—

federal, state, tribal, local, interagency, and international coordination and cooperation are essential.

- Standardization of policies and procedures among federal agencies is an ongoing objective.

The fire management considerations, guidance, and direction should be addressed in the land use resource management plans (for example, the CCP). FMPs are step-down processes from the land use plans and habitat plans, with more detail on fire suppression, fire use, and fire management activities.

Management Direction

The Souris River basin refuges will protect life, property, and other resources from wildland fire by safely suppressing all wildland fires. Prescribed fire and manual and mechanical fuel treatments will be used in an ecosystem management context for habitat management, and to protect both federal and private property. Fuel reduction activities will be applied where needed, especially in areas with a higher proportion of residences that may be considered "wildland–urban interface" (WUI) areas.

All aspects of the fire management program would be conducted in a manner consistent with applicable laws, policies, and regulations. The Souris River basin refuge stations will maintain an FMP and carry out the plan to accomplish resource management objectives. Prescribed fire and manual and mechanical fuels treatments will be applied in a scientific way under selected weather and environmental conditions. These activities will occur on approximately 500–2,500 acres, over a 5-year average, for native and restored prairie habitat to accomplish habitat management objectives.

Fire Management Goal

Restore and enhance fire as an ecosystem process within prairie habitats. The return and maintenance of fire is essential for wildlife habitat in these ecosystems.

Fire Management Objective

Fire is an important management tool that can be used to accomplish habitat management objectives. If not used properly, fire is also a tool that can quickly damage or destroy natural resources, equipment, buildings, and property; and can hurt or kill those that work with it. Prescribed fire and manual and mechanical fuels treatments will be used to reduce hazardous fuels and on refuge lands to reduce the intensity and severity of wildland fires. Special attention will be given to WUI areas, both on Service-owned and adjacent lands to reduce the risk of wildland fires to communities and improvements.

Strategies

Strategies and tactics that consider public and firefighter safety as well as resource values at risk will be used. Wildland fire suppression, prescribed fire methods, manual and mechanical means, timing, and monitoring are all found in a more detailed list in a step-down FMP.

All management actions would use prescribed fire and manual and/or mechanical means to restore and maintain desired habitat conditions and control nonnative vegetation and the spread of woody vegetation within the diverse ecosystem habitats. The prescribed fire program will be outlined in the FMP for the refuges. Detailed prescribed burn plans will be developed, which describe the following:

- burn units and their predominant vegetation
- primary objectives for burn units
- acceptable range of results
- site preparation requirements
- weather requirements
- safety considerations and measures to protect sensitive features
- burn day activities
- communications and coordination for burns
- ignition techniques
- smoke management procedures
- postburn monitoring

Prescribed fire temporarily reduces air quality by reducing visibility and releasing several components through combustion. The four major components are carbon monoxide, carbon dioxide, hydrocarbons, and particulates. Varying amounts of particulate content are generated in different types of fuels (for example, wildlife habitat improvement burns versus fuel reduction burns). The refuges will meet the Clean Air Act emission standards by adhering to the "North Dakota State Implementation Plan" requirements during all prescribed fire activities.

Fire Management Organization, Contacts, and Cooperation

Qualified fire management technical oversight and support for the refuges will be established by region 6 of the Service, using the fire management district approach. Under this approach, an appropriate fire management staffing organization will be determined by established modeling systems based on the fire management workload of a group of refuges, and possibly that of interagency partners. The fire management workload consists of historical wildland fire suppression activities and historical and planned fuels treatments.

Depending on budgets, fire management staffing and support equipment may be located at the station or at other refuges in the district and shared between all units. Wherever possible, fire management activities will be conducted in a coordinated and collaborative manner with federal and nonfederal partners.

On approval of the CCP, a new FMP would be developed for the Souris River basin national wildlife refuges as (1) a stand-alone FMP, (2) a FMP with two or three refuges (the three refuges in the fire management district), or (3) as an interagency FMP.

Appendix P

Draft Compatibility Determination for Recreational Hunting

Use: Recreational Hunting

Refuge Names: Des Lacs National Wildlife Refuge (NWR)

J. Clark Salyer NWR

Upper Souris NWR

Establishing and Acquisition Authorities

- Migratory Bird Conservation Act
- Executive Orders 7154-A, 7161, and 7170

Refuge Purposes

"As a refuge and breeding ground for migratory birds and other wild life."
[Executive Orders 7154-A, 7161, and 7170]

"For use as an inviolate sanctuary, or for any other management purpose, for migratory birds."
[16 U.S.C. § 715d (Migratory Bird Conservation Act)]

National Wildlife Refuge System Mission

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.

Description of Proposed Use:

Recreational Hunting

All three refuges are open to recreational public hunting in accordance with state of North Dakota seasons and regulations established for each area. Visitation during 2004 for this activity was estimated at Des Lacs NWR (big game 800, upland game 175); at J. Clark Salyer NWR (big game 2,000; upland game 600); and at Upper Souris NWR (big game 2,200; upland game 50). Currently hunted or additional animals that may be hunted are listed below.

Des Lacs NWR

deer	sharp-tailed grouse
fox	ring-necked pheasant
moose	Hungarian partridge
rabbit	turkey

J. Clark Salyer NWR

deer	sharp-tailed grouse
fox	ring-necked pheasant
waterfowl	Hungarian partridge
turkey	

Upper Souris NWR

deer	sharp-tailed grouse
fox	ring-necked pheasant
moose	Hungarian partridge
turkey	

Specific areas are open to hunting during early seasons. Other areas at the refuges, with the exception of administrative areas, may open later in the season. Additional hunting information, regulations, and maps are found in hunting brochures specific to J. Clark Salyer NWR and Upper Souris NWR (available at information kiosks and administrative areas).

Hunting is a designated priority public use established for the Refuge System. The harvest of these species would be compensatory mortality, with minimal impact to the overall health of their populations.

Availability of Resources

Currently, sufficient resources are available to continue the existing recreational hunting programs. Implementing improvements or expanding hunting opportunities would be described in step-down management plans and addressed through future funding requests. The refuges would provide special accommodations for people with disabilities.

Anticipated Impacts of Use

The draft comprehensive conservation plan (CCP) recommends an annual review of the hunting program. This evaluation would determine what effect diverting funding and staff would have on the ability of the refuges to implement habitat management. Limited staff and funding would be directed toward habitat management first. Lack of funding and personnel may result in decreased opportunities and/or facilities.

Temporary disturbance would exist to wildlife in the vicinity of the activity. Animals surplus to populations would be removed by hunting. A temporary decrease in populations of wild animals would be experienced which may help ensure that carrying capacity (especially for big-game species) is not exceeded. Closed areas would provide some sanctuary

for game and nongame species and minimize conflicts between hunters and other visitors and provide a safety zone around communities and administrative areas.

Public Review and Comment

Public review and comment will be solicited through public posting of notices at each refuge, notices in local newspapers, and public meetings held during the CCP process.

Determination

Recreational hunting is compatible.

Stipulations Necessary to Ensure Compatibility

Current hunting regulations would be retained. The following stipulations would apply to all three refuges:

- Hunting would be permitted in accordance with state regulations.
- Overnight camping and open fires would not be allowed.
- The areas around refuge offices, visitor centers, and residences would be posted closed to hunting. State law prohibits hunting within one-quarter mile of an occupied building.
- It would be unlawful to carry a loaded firearm in any vehicle on refuge lands or roads.
- Nontoxic shot would be required for hunting upland game and waterfowl. No other type of shot may be possessed while in the field.
- Collecting, injuring, disturbing, destroying, or harming any animal or plant except legally taken game animals would be prohibited.
- Searching for, disturbing, or collecting prehistoric or historic artifacts would be prohibited.
- Archery and gun seasons for deer hunting would coincide with state hunting seasons.
- A deer hunter would need a special state permit to hunt on a refuge during rifle season. A hunter with a state muzzleloader deer permit would be allowed to hunt without a refuge permit.
- Trash, including shell casings, would be required to be packed out so the areas would remain clean, natural, and enjoyable.
- Possession of fireworks would be prohibited.
- Possessing alcohol would be prohibited. Intoxicated and disorderly conduct would not be permitted. Open container of alcoholic beverage in a vehicle would be prohibited.

The following stipulations would apply only to J. Clark Salyer NWR:

- Nine designated areas would be open for hunting waterfowl, sharp-tailed grouse, partridge, pheasant, and deer.
- The entire refuge would be open for late-season sharp-tailed grouse, partridge, pheasant, and fox hunting following the close of firearm deer season, in accordance with state hunting seasons.
- Entry without a firearm to retrieve legally taken waterfowl would be permitted within 100 yards of exterior refuge boundaries and interior boundaries of designated public hunting areas.

The following stipulations would apply only to Upper Souris NWR:

- Vehicle travel would be restricted to public roads and recreation area parking lots. The use of all-terrain vehicles, snowmobiles, and other off-road vehicles would not be allowed.
- Horses would not be permitted.
- Weapons would not be allowed in boats and canoes.
- Preseason scouting for deer would be allowed only in open public use areas and areas marked “foot traffic only.”
- Baiting for deer would not be allowed.
- Portable tree stands during deer hunting would be allowed, but daily removal would be required. Only strap-on steps or removable climbing ladders would be allowed.
- Hunters would be allowed to carry, drag, or use carts to remove their deer.
- Once hunters filled their deer tags, they would not be allowed to return to the refuge with weapons. However, they would be allowed to carry shotguns while hunting upland game birds in open bird-hunting areas.
- Land south of Lake Darling Dam would be closed to all upland game bird-hunting.
- Wearing of a blaze orange vest and cap would be required when hunting game birds during the deer firearm season.
- Dogs would be allowed during hunting of grouse, partridge, and pheasant.

Justification

Recreational public hunting is an historical wildlife-dependent use of the refuges, and is designated as one of the priority public uses in the National Wildlife Refuge System Improvement Act of 1997. Infrastructure is in place to support hunting programs, while current staffing levels and funding

are adequate. Special regulations are in place to minimize negative impacts to the refuges and associated wildlife, and state of North Dakota law further controls hunter activities.

Hunting is a legitimate wildlife management tool that can be used to control wildlife populations.

Hunting harvests a small percentage of the renewable resources, which is in accordance with wildlife management objectives and principals.

Mandatory 15-Year Reevaluation Date:

2021

Signature

Dan Severson Refuge Manager Des Lacs NWR Kenmare, ND	Date
Gary Erickson Refuge Manager, J. Clark Salyer NWR Upham, ND	Date
Tom Pabian Refuge Manager, Upper Souris NWR Berthold, ND	Date

Review

Tedd Gutzke Project Leader Souris River Basin Complex Upham, ND	Date
Lloyd Jones Regional Compatibility Coordinator NWRS, U.S. Fish and Wildlife Service, Region 6, Coleharbor, ND	Date
Rod Krey Refuge Supervisor (ND, SD,) NWRS Lakewood, CO	Date

Concurrence

Richard A. Coleman, Ph.D. Assistant Regional Director, NWRS U.S. Fish and Wildlife Service, Region 6 Lakewood, CO	Date

Appendix Q

Draft Compatibility Determination for Wildlife Observation, Wildlife Photography, Environmental Education, and Interpretation

Uses: Wildlife Observation, Wildlife Photography, Environmental Education, and Interpretation

Refuge Names: Des Lacs National Wildlife Refuge (NWR)

J. Clark Salyer NWR

Upper Souris NWR

Establishing and Acquisition Authorities

- Migratory Bird Conservation Act
- Executive Orders 7154-A, 7161, and 7170

Refuge Purposes

"As a refuge and breeding ground for migratory birds and other wild life."
[Executive Orders 7154-A, 7161, and 7170]

"For use as an inviolate sanctuary, or for any other management purpose, for migratory birds."
[16 U.S.C. § 715d (Migratory Bird Conservation Act)]

National Wildlife Refuge System Mission

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.

Description of Proposed Uses:

Wildlife Observation, Wildlife Photography, Environmental Education, and Interpretation

All three refuges are currently open to public use in accordance with special refuge regulations developed for each refuge. Total estimated visits during 2004 for these activities were 10,675 visits for Des Lacs NWR, 14,830 visits for J. Clark Salyer NWR, and 67,712 visits for Upper Souris NWR. Entry into closed areas may be permitted by special use permit and special conditions; these would be evaluated on a case-by-case basis.

These activities may take place by foot, bicycle, automobile, boat, canoe, horse, cross-county skis, and snowshoes. Refuge staff would assist in activities when available. Organized groups such as school, scouts, 4-H, and others may have instructors or leaders who would use the refuges' habitats and facilities to conduct compatible programs. Ages of participants range from preschool to college and beyond.

Current activities for the refuges are listed below.

Des Lacs NWR

- 1 auto tour route (scenic backway)
- 4 hiking trails (1 national recreation trail)
- 1 canoe route
- 1 observation blind
- 3 annual environmental education events
- 1 interpretive kiosk
- 1 visitor contact station in headquarters building

The auto tour route is open daily from 5:30 a.m. to 10:00 p.m. Informational brochures are available at the kiosk located beside the refuge headquarters, which is open Monday–Friday (except on federal holidays) from 7:30 a.m. to 4:00 p.m.

J. Clark Salyer NWR

- 2 auto tour routes (both interpreted)
- 1 hiking trail
- 1 canoe route (national recreation trail)
- 1 observation blind
- 1 kiosk
- 1 visitor contact station in headquarters building

Specific areas are open daily to the public, from 5:00 a.m. to 10:00 p.m. Office hours are Monday–Friday (except on federal holidays) from 8:00 a.m. to 4:30 p.m. Regulations are available at information kiosks and administrative areas. In addition, a bird list is available.

Upper Souris NWR

- 1 auto tour route
- 5 hiking trails (1 is interpreted)
- 2 canoe routes
- 4 observation blinds
- 2 interpretive kiosks (2 additional kiosks are planned for 2006 construction)
- 1 visitor contact station in headquarters building

Specific areas are open to public, from 5:00 a.m. to 10:00 p.m., year-round. Visitor center hours are Monday–Friday (except on federal holidays) from 8:00 a.m. to 4:30 p.m. Regulations are available at information kiosks and administrative areas. In addition, lists for wildlife including birds and mammals are available.

Availability of Resources

Currently, sufficient resources are available to continue the existing public use programs. The refuges would provide special accommodations for people with disabilities.

The draft comprehensive conservation plan (CCP) recommends (1) expanding interpretation and environmental education, and (2) maintaining or decreasing development of wildlife observation programs and facilities. The interpretation and environmental education programs would emphasize the principles of natural plant and animal communities and ecological processes and restoration.

Implementing improvements or expanding public use opportunities would be addressed in future step-down management plans and through future funding requests. Program expansion would require increased funding for operations and maintenance. When funding is not adequate to operate and maintain programs, the public use would be reduced in scope or discontinued. Informational kiosks, interpretive signs, and other infrastructure are in place for the present level of public use.

Anticipated Impacts of Uses

No detrimental impacts are anticipated with the public use programs. Temporary disturbance would exist to wildlife in the vicinity of the activity. Closed areas would provide sanctuary for wildlife.

Public Review and Comment

Public review and comment will be solicited through public posting of notices at each refuge, notices in local newspapers, and public meetings held during the CCP process.

Determination

Wildlife observation, wildlife photography, environmental education, and interpretation are compatible.

Stipulations Necessary to Ensure Compatibility

Current regulations related to these wildlife-dependent uses would be retained. The following stipulations would apply to all three refuges:

- Collecting, injuring, disturbing, destroying, or harming any animal or plant would be prohibited.
- Searching for, disturbing, or collecting prehistoric or historic artifacts would be prohibited.
- Vehicles would be required to stay on designated roads.
- Trespassing in closed areas would not be permitted.
- Overnight camping and open fires would not be allowed.
- Trash would be required to be packed out so the areas would remain clean, natural, and enjoyable.
- Pets would be required to be leashed, except dogs used while hunting.
- Firearms would be prohibited except during appropriate hunting seasons.
- Possession of fireworks would be prohibited.
- Possessing alcohol would be prohibited. Intoxicated and disorderly conduct would not be permitted. Open container of alcoholic beverage in a vehicle would be prohibited.

The following stipulation would apply only to Des Lacs NWR:

- Swimming and motorized boating would be prohibited.

The following stipulations would apply only to Upper Souris NWR:

- Wildlife observation would be permitted year-round in all open areas, on nature trails, on the auto tour route, and in areas marked with "Foot Traffic Only" signs.
- Permission would be required to enter closed areas.
- Photo blinds for observing sharp-tailed grouse on their dancing grounds would be available in April by phone reservation.

- Two canoe trails would be available from May 1 to September. No swimming would be permitted on either the Beaver Lodge or Mouse River canoe trails.
- Swimming, water skiing, and sailing would not be allowed. Recreational boating and the use of jet boats or personal watercraft would not be allowed.
- The use of all-terrain vehicles, snowmobiles, and other off-road vehicles would not be allowed.
- The use of horses for wildlife viewing would be allowed with advanced permission from the refuge manager.
- Dog training would not be allowed.
- Guiding would be prohibited.
- Geocaching or similar activity would be prohibited.

Justification

Wildlife observation, wildlife photography, environmental education, and interpretation are historical wildlife-dependent uses of the refuges, and are designated as priority public uses in the National Wildlife Refuge System Improvement Act of 1997. Infrastructure is in place to support public use programs, while current staffing levels and funding are adequate. Special regulations are in place to minimize negative impacts to the refuges and associated wildlife.

Mandatory 15-Year Reevaluation Date:

2021

Signature

_____ _____

Dan Severson
Refuge Manager
Des Lacs NWR
Kenmare, ND

Date

_____ _____

Gary Erickson
Refuge Manager,
J. Clark Salyer NWR
Upham, ND

Date

_____ _____

Tom Pabian
Refuge Manager,
Upper Souris NWR
Berthold, ND

Date

Review

_____ _____

Tedd Gutzke
Project Leader
Souris River Basin Complex
Upham, ND

Date

_____ _____

Lloyd Jones
Regional Compatibility Coordinator
NWRS, U.S. Fish and Wildlife Service,
Region 6, Coleharbor, ND

Date

_____ _____

Rod Krey
Refuge Supervisor (ND, SD,)
NWRS
Lakewood, CO

Date

Concurrence

_____ _____

Richard A. Coleman, Ph.D. Date
Assistant Regional Director, NWRS
U.S. Fish and Wildlife Service, Region 6
Lakewood, CO

Appendix R

Draft Compatibility Determination for Recreational Fishing

Use: Recreational Fishing

Refuge Names: J. Clark Salyer National Wildlife Refuge (NWR)

Upper Souris NWR

Establishing and Acquisition Authorities

- Migratory Bird Conservation Act
- Executive Orders 7154-A, 7161, and 7170

Refuge Purposes

"As a refuge and breeding ground for migratory birds and other wild life."
[Executive Orders 7154-A, 7161, and 7170]

"For use as an inviolate sanctuary, or for any other management purpose, for migratory birds."
[16 U.S.C. § 715d (Migratory Bird Conservation Act)]

National Wildlife Refuge System Mission

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.

Description of Proposed Use:

Continued Historical Public Use Activity of Noncommercial Fishing

Public use areas such as parking areas, fishing areas, boat ramps, docks, jetties, piers, interpretive panels and signs, informational kiosks, and other structures would need to be maintained to facilitate this program. Seasonally sensitive areas at the refuge would remain closed to the the public. Public visitation at Upper Souris NWR may range from 30,000 to 150,000 visits annually for fishing, while at J. Clark Salyer annual visitation may range from 3,000 to 5,000 visits.

Only selected areas of each refuge would be open to fishing and would be posted accordingly. Special refuge regulations for fishing would be available in brochures at the refuge.

J. Clark Salyer NWR

At J. Clark Salyer NWR, there are 14 public fishing areas and each is posted with "Public Fishing Area" signs. Fishing is open year-round. The refuge is open daily from 5:00 a.m. until 10:00 p.m. Anglers are required to follow North Dakota state law and refuge regulations.

- Bank fishing at designated sites is allowed whenever there is open water.
- Boat fishing, without motors, is allowed in designated areas from May 1 through September 30.
- Ice fishing at designated areas is allowed when the ice is thick enough to support anglers. Only insured and licensed automobiles are allowed on the ice. The use of ice fishing shelters would be allowed in accordance with state law and special refuge regulations.

Upper Souris NWR

Fishing at Upper Souris NWR is allowed year-round from 5:00 a.m. to 10:00 p.m. daily. Anglers are required to follow North Dakota state law and refuge regulations. There are four developed boat ramps with associated parking areas, boat docks, and restroom facilities to support the summer boat fishing program.

- Bank fishing at designated sites is allowed whenever there is open water. Thirteen areas are open for bank fishing. Parking areas and several restroom facilities are available to bank anglers.
- Boat fishing is allowed from May 1 through September 30 at two designated areas of Lake Darling.
- Ice fishing is allowed when the ice is thick enough to support anglers. Several areas are designated for ice fishing access. Only properly insured and registered automobiles and pickups would be allowed to drive on the ice of Lake Darling. The use of ice fishing shelters would be allowed in accordance with state law and special refuge regulations.

- Fishing derbies may be allowed by issuing special use permits and special conditions. Permits would only be issued to nonprofit organizations. Ten percent of the entry fees would be returned to the refuge to maintain or replace fishing facilities. Typical special conditions governing fishing derbies are attached.

Availability of Resources

Currently, both refuges have adequate administrative and management staff to maintain their fishing programs. Implementing improvements or expanding fishing opportunities would be described in step-down management plans and addressed through future funding requests. The refuges would provide special accommodations for people with disabilities.

At Upper Souris NWR, boat ramps and docks are in place and all have been replaced within the last 5 years. Condition of these facilities is currently good to excellent.

Annual funding is needed for seasonal workforce salary and for supplies to maintain fishing facilities (including mowing, painting, repair, litter pickup, restroom cleaning, and periodic pumping costs of vaulted toilets). Funding is needed for a maintenance worker salary and equipment to maintain fishing areas and facilities.

Funding is needed for law enforcement staff salary, fuel costs, repair and maintenance of patrol vehicles, and associated costs to support the law enforcement program. Routine law enforcement patrols occur year-round. J. Clark Salyer NWR has two collateral duty law enforcement officers. Upper Souris NWR has one full-time law enforcement officer and two "collateral duty" law enforcement officers. Both refuges also receive assistance from local North Dakota state district wardens.

Anticipated Impacts of Use

The draft comprehensive conservation plan (CCP) recommends an annual review of the fishing program. This evaluation would determine what effect diverting funding and staff would have on the ability of the refuges to implement habitat management. Limited staff and funding would be directed toward habitat management first. Lack of funding and personnel may result in decreased opportunities, or facilities, or both.

Temporary disturbance of wildlife may occur in the vicinity of fishing activity. Fishing would temporarily decrease the fish population until natural reproduction or stocking replenishes the population. Frequency of use would be directly dependent on fish populations and their feeding activity. When fish populations are high and active, public use would climb and vice versa. No long-term negative impacts to the refuge or its resources are anticipated.

Public Review and Comment

Public review and comment will be solicited through public posting of notices at each refuge, notices in local newspapers, and public meetings held during the CCP process.

Determination

Recreational fishing is compatible.

Stipulations Necessary to Ensure Compatibility

Current fishing regulations would be retained. The following stipulations would apply to both refuges:

- Fishing would be permitted in accordance with state regulations.
- Use or possession of bait fish other than those listed in the North Dakota Fishing Guide would be prohibited.
- Collecting, injuring, disturbing, destroying, or harming any plant or animal (including minnows, frogs, crawfish, and worms) would be prohibited.
- Searching for, disturbing, or collecting prehistoric or historic artifacts would be prohibited.
- Overnight camping and open fires would not be allowed.
- Vehicles would be required to stay on designated roads.
- Trespassing in closed areas would not be permitted.
- Overnight camping and open fires would not be allowed.
- Trash would be required to be packed out so the areas would remain clean, natural, and enjoyable.
- Pets would be required to be leashed.
- Firearms would be prohibited except during appropriate hunting seasons.
- Possession of fireworks would be prohibited.
- Possessing alcohol would be prohibited. Intoxicated and disorderly conduct would not be permitted. Open container of alcoholic beverage in a vehicle would be prohibited.

The following stipulation would apply only to J. Clark Salyer NWR:

- Ice fishing would be permitted on all refuge waters between December 15 and the end of the state fishing season.

The following stipulations would apply only to Upper Souris NWR:

- Fishing boats and canoes would be permitted on Lake Darling from May 1 to September 30 in designated fishing areas.
- Float tube fishing would be allowed where boat fishing is permitted.
- Releasing bait fish into any refuge or state waters would be prohibited.
- Operation of a boat in excess of idle speed in the Grano Boat Ramp Bay would be prohibited.
- Fishing would not be permitted on the Beaver Lodge Canoe Trail.
- Bow and spear fishing, including underwater spear fishing, would be prohibited.
- Use of designated spring, summer, and fall fishing areas would follow area-specific regulations described in the fishing brochure available at the refuge.
- The use of all-terrain vehicles and snowmobiles would not be allowed.
- Access to ice for ice-fishing would be permitted only at designated sites.
- Only cars and pickups would be allowed on the ice from Lake Darling Dam north to Carter Dam for ice-fishing purposes.
- At designated winter-fishing areas, ice-fishing shelters would be permitted and would be required to be removed on the date set by the state for ice-fishing shelter removal. Following the date for removal of permanent shelters, portable ones would be permitted but would need to be removed daily.
- At the remainder of the refuge, portable ice-fishing shelters would be permitted but would need to be removed daily.
- Fishing derbies would conform to event-specific conditions such as those specified in the attachment.

Justification

Recreational fishing is an historical wildlife-dependent use of each refuge, and is designated as one of the priority public uses in the National Wildlife Refuge System Improvement Act of 1997. Current staffing levels and funding resources are adequate. Special regulations are in place to minimize negative impacts to the refuges' habitats and associated wildlife.

Mandatory 15-Year Reevaluation Date:

2021

Signature

Dan Severson Refuge Manager Des Lacs NWR Kenmare, ND	Date	Tom Pabian Refuge Manager, Upper Souris NWR Berthold, ND	Date
Gary Erickson Refuge Manager, J. Clark Salyer NWR Upham, ND	Date		

Review

_____ _____

Tedd Gutzke
Project Leader
Souris River Basin Complex
Upham, ND

Date

_____ _____

Lloyd Jones
Regional Compatibility Coordinator
NWRS, U.S. Fish and Wildlife Service,
Region 6, Coleharbor, ND

Date

_____ _____

Rod Krey
Refuge Supervisor (ND, SD,)
NWRS
Lakewood, CO

Date

Concurrence

_____ _____

Richard A. Coleman, Ph.D.
Assistant Regional Director, NWRS
U.S. Fish and Wildlife Service, Region 6
Lakewood, CO

Date

Attachment—Typical Special Conditions

Upper Souris NWR

Ice Fishing and Open-water Fishing Derbies

1. This permit will only be valid after a North Dakota Game and Fish Department (NDGF) fishing contest permit has been issued.
2. The permittee shall conduct and supervise this event by following the refuge and NDGF fishing contest rules and regulations and by following all required self-imposed tournament rules.
3. The permittee shall submit a report within 30 days after completion of the fishing contest to the refuge manager and to NDGF. The report should include the following: (1) number of contest participants; (2) quantity (number, total length, and weight) and species of fish taken in the contest; (3) gross and net proceeds for the tournament; (4) percentage of entry fees paid to participants as prizes; and (5) identification of the intended fishery conservation project to be accomplished at Upper Souris NWR. Failure to submit this report shall be justification for denial of future fishing contest permits.
4. The permittee shall provide readily visible and marked patrol vehicles staffed with volunteers to assist contestants having problems and to check for compliance with ice-fishing derby rules. One patrol vehicle per 50 teams is required during ice-fishing derbies.

   The permittee shall provide readily visible and marked patrol boats staffed with volunteers to assist contestants having problems and to check for compliance with open water fishing derby rules. The ratio of derby patrol boats to participant boats shall be at no time less than 1:20 in fishing contests involving 100 or fewer boats, and 1: 25 for contests involving more than 100 boats.
5. All areas where the derby is held shall be cleaned of litter before leaving for the day. All trash must be packed out. There are no fish cleaning facilities available.
6. Participants shall not interfere with other refuge visitor activities.
7. No entry or participation fees or prize winnings may be collected or distributed on federal property. No commercial products may be sold or distributed on federal property.
8. All fish brought to the check station to be measured or weighed shall be marked by cutting off one-half of the tailfin and the fish returned to the contestant. All fish must remain in the possession of the team that caught them.
9. Participants may use only one-half of the “Landing 1” parking lot during open water fishing derbies. The remainder of the parking lot is reserved for refuge visitors not fishing in the derby. Non-derby anglers should not have to wait in line to launch their boat. Derby sponsors shall provide volunteers to direct parking of participants and non-derby anglers. The overflow parking lot west of the township road may be used for derby vehicle and trailer parking.

Appendix S

RONS and SAMMS Projects, Des Lacs NWR

Refuge Operations Needs System

RONS amounts shown for Des Lacs NWR include a startup cost to carry out each program, with successive yearly costs that are significantly less.

RONS[1] Number	*Project Description*	*First-Year Need ($1,000s)*	*Recurring Annual Need ($1,000s)*	*Personnel (FTE[2])*
R–94009	Implement the geographic information system (computer specialist)	151	74	1.0
R–99009	Increase resource protection and security (law enforcement officer)	140	60	1.0
R–99013	Increase biological monitoring for adaptive resource management (biologist)	151	74	1.0
R–93007	Increase habitat management (refuge manager)	151	74	1.0
R–94001	Increase the integrated pest management program (biological technician)	106	50	1.0
R-93014	Protect and manage water rights	126	0	0
R–94005	Construct an equipment storage building	200	0	0
R–01002	Construct refuge housing for the law enforcement officer	228	0	0
R-99003	Construct water development to expand the grassland grazing program	155	0	0
R-99001	Conduct a cultural resource inventory	55	0	0

[1] *RONS=Refuge Operations Needs System.*

[2] *FTE=full-time equivalent.*

Service Asset Maintenance Management System

SAMMS Number*	*Description*	*Cost ($1,000s)*
Deferred Maintenance		
93106800	Replace the unit 4 water control structure	215
93106830	Replace the unit 5 water control structure	235
93106834	Replace the unit 6 water control structure and emergency spillway	280
01116014	Replace the unit 3 water control structure spillway/weir	250
01115455	Replace residence Q-4	280
Large Construction		
	Construct the fire equipment storage and cache	450
Road Rehabilitation		
03126148	Do preliminary engineering of auto tour route (routes 011, 012,103;12.3 miles)	313
03126149	Construct and asphalt the auto tour route (routes 011, 012,103;12.3 miles)	1,500
03126152	Do preliminary engineering of the Canada Goose Trail (route 102, 11.0 miles)	282
03126153	Construct the Canada Goose Trail (route 102, 11.0 miles)	2,700
Heavy Equipment		
97106791	Replace the 1978 Ford backhoe	110
99106837	Replace the 1978 JD 544 B front-end loader	181
01114123	Replace the 1979 IHC tractor	95
Small Equipment		
00106802	Replace the 1992 Dodge Dakota 4x4 pickup	30
01111766	Replace the 1990 Polaris 4x4 ATV	10
01111763	Replace the 1989 Dodge 4x4 pickup	30
01111766	Replace the 1989 Chevrolet 4x4 pickup	30
01114123	Replace the 1997 Ford 4x4 pickup	30
00106859	Replace the 1984 Type 4X fire engine	98

**SAMMS=Service Asset Maintenance Management System.*

Appendix T

RONS and SAMMS Projects, J. Clark Salyer NWR

Refuge Operations Needs System

RONS amounts shown for J. Clark Salyer NWR include a startup cost to carry out each program, with successive yearly costs that are significantly less.

RONS[1] Number	*Project Description*	*First-Year Need ($1,000s)*	*Recurring Annual Need ($1,000s)*	*Personnel (FTE[2])*
R-00001	Restore and enhance the prairie grassland and forest habitat (resource specialist)	125	75	1.0
R-99012	Improve marsh habitat management (refuge operations specialist)	139	75	1.0
R-99010	Improve habitat management, and population and habitat monitoring (biologist)	139	75	1.0
R-00002	Improve visitor services and outreach programs (administrative receptionist/clerk)	110	55	1.0
R-03001	Improve the resource protection capability (law enforcement officer)	136	55	1.0
R-97010	Enhance streamflow monitoring and the water management capability (refuge operations specialist)	97	55	1.0
R-97038	Develop a new area-capacity table for marsh impoundments	324	0	—

[1] *RONS=Refuge Operations Needs System.*

[2] *FTE=full-time equivalent.*

Service Asset Maintenance Management System

SAMMS Number*	*Description*	*Cost ($1,000s)*
Deferred Maintenance		
90106948	Replace the boundary fence	118
02121135	Repair the pool 320 dike and nesting islands	201
89106942	Rehabilitate the 6-stall storage building	28
99106956	Repair and rehabilitate quarters 40	223
01117727	Rehabilitate the office visitor area	34
Large Construction		
97109872	Construct a vehicle and equipment storage building	1,460
99109875	Improve water level management in pool 341	1,298
Small Construction		
99112488	Construct a wildfire response storage building	449
97123485	Construct an equipment storage yard	54
Road Rehabilitation		
88106960	Do preliminary engineering for the headquarters and a scenic trail	408
02121139	Construct a scenic trail	1,400
02121147	Construct the headquarters road and parking areas	396
10028965	Replace the Johnson Bridge	689
Heavy Equipment		
00106973	Replace the 1972 Caterpillar Grader	116
01115317	Replace the 1968 5-ton 6x6 fire truck	95
01117349	Replace the Case 680E loader/backhoe	95
01116659	Replace the 1972 White semi-tractor	105
01117375	Replace the 1972 John Deere 8630 tractor	126
01116987	Replace the 1982 dump truck	95
Small Equipment		
01113840	Replace the 1996 Honda ATV	7
01115730	Replace the 1991 Chevrolet Service truck	33
01113900	Replace the John Deere loader tractor	90
01116659	Replace the John Deere rotary mower	9
01116659	Replace the 1988 pickup	29

**SAMMS=Service Asset Maintenance Management System.*

Appendix U

RONS and SAMMS Projects, Upper Souris NWR

Refuge Operations Needs System

RONS amounts shown for Upper Souris NWR include a startup cost to carry out each program, with successive yearly costs that are significantly less.

RONS[1] Number	*Project Description*	*First-Year Need ($1,000s)*	*Recurring Annual Need ($1,000s)*	*Personnel (FTE[2])*
R-97008	Monitor adaptive management (biologist)	151.0	86	1.0
R-97001	Increase the environmental education and outreach efforts (public use specialist)	151.0	86	1.0
R-00002	Support the visitor service, educational, biological, and law enforcement functions (receptionist/typist)	63.5	26	0.5
R-98002	Initiate a comprehensive biological inventory (biological technician)	74.5	37	0.5
R-02001	Manage invasive species (range technician)	83.0	39	0.5
R-97005	Develop a fire management program	130.5	78	1.0
R-97004	Protect water rights and monitor water quality	193.0	140	0
R-01001	Compile and analyze the existing Souris River water quality data and its affect on the refuge	358.0	48	0.6
R-01004	Construct a shelter for environmental education activities	185.0	43	0.6
R-97019	Survey for archeological and historical sites	181.0	10	0

[1] *RONS=Refuge Operations Needs System.*

[2] *FTE=full-time equivalent.*

Service Asset Maintenance Management System

SAMMS Number*	*Description*	*Cost ($1,000s)*
Deferred Maintenance		
05139174	Expand quarters 7	118
01117654	Deepen the landing 1 boat channel	160
89106755	Rehabilitate the deteriorating dam 41 Oxbow Marshes	136
05139281	Replace unsafe bridges (1st, 2nd, and 3rd north of Highway 5 East)	129
05139389	Replace three unsafe bridges north of Highway 5 West	129
93106756	Replace a deteriorated bridge (1st north of dam 41 east)	43
05139360	Replace unsafe bridges (1st, 2nd, 3rd, and 4th north of Greene, West)	172
00106777	Replace 12 miles of boundary fence (Highway 28 to dam 41 west)	257
89106776	Replace 11 miles of boundary fence (Highway 28 to dam 41 east)	237
89106775	Replace 7 miles of boundary fence (Grano to Highway 28 West)	151
Small Construction		
97109865	Build a new equipment storage building	725
97123624	Construct two interpreted observation towers	164
98109866	Expand the refuge office's interpretive, educational, and office space	447
97123510	Create prairie wetlands and restore riparian wetlands	135
02121177	Replace two deteriorated mobile home trailers	354
Heavy Equipment		
01117777	Replace the 1979 Case backhoe	79
96106738	Replace the aging 1986 5-ton, White Freightliner truck tractor	182
01117780	Replace the 1981 GMC dump truck	116
Small Equipment		
01117696	Replace the worn-out 1985 blue Dodge pickup	32
97106744	Replace the aging 1990 Chevy 4x4 extended-cab pickup	29
97106745	Replace the aging 1991 Chevy 4x4 pickup	34
01117706	Replace the 1999 John Deere F911 riding lawn mower	14
01117711	Replace the 1991 Chevrolet fire engine	37
01117784	Replace the 1990 Wajax Pacific BB-4 fire pumper unit	13

SAMMS Number*	*Description*	*Cost ($1,000s)*
Road Rehabilitation		
02121052	Construct the landing 1 parking lot (916)	156
98106752	Construct the Outlet Fishing Area road and parking (route 101, parking lot 908-9; 0.5 mile)	272
98106750	Do the preliminary engineering for landings 2 and 3 roads, parking, and spillway road and parking (routes 12, 102; 1.72 miles; parking lots 900 and 908-917)	136
98106768	Construct landings 2 and 3 roads, parking, and the spillway road and parking (routes 12, 102; 1.72 miles; parking lots 900 and 908-917)	1,100
02121048 02121049	Pave the Overlook Viewing Trail parking lot (Federal Highway Administration [FHWA] Route 910); regravel the Lake Darling Interpretive Overlook (FHWA Route 913); and pave the Lake Darling Dam pullout (FHWA 911)	108

**SAMMS=Service Asset Maintenance Management System.*

References

Anderson, Oscar. 1955. A brief history of Velva, North Dakota. Velva, ND: Hauff Printing. 26 p.

Anonymous. 1962. Objectives of marsh vegetation control. Documentation files at J. Clark Salyer NWR, Upham, ND.

Aufforth, A.D.; Goetz, H.; Higgins K.F. 1990. Duck nesting on islands at J. Clark Salyer refuge in North Dakota, 1983–1984. Prairie Naturalist. 22: 1–12.

Bailey, V. 1913. Field notes, Kenmare, ND. *In:* U.S. Fish and Wildlife Service, 1860–1961 field reports. Smithsonian Institute Archives, record unit 7176.

Beachy, Christopher. Unpublished data. Minot, ND: Minot State University, Biology Department.

Berger, R.P.; Baydack, R.K. 1992. Effects of aspen succession on sharp-tailed grouse, *Tympanuchus phasianellus*, in the Interlake Region of Manitoba. Canadian Field-Naturalist. 106: 185–191.

Bildstein, K.L.; Gollop, J.B. 1988. Northern harrier. *In:* Palmer, Ralph S. Handbook of North American birds. New Haven, CT: Yale University Press. 251–303.

Billeck, William T. 1990. Alexander Henry's 1806 route between the Assiniboine and Missouri rivers. Journal of the North Dakota Archaeological Association. Vol. 4. [Pages unknown].

Blankespoor, G.W. 1987. The effects of prescribed burning on a tall-grass prairie remnant in eastern South Dakota. Prairie Naturalist. 19: 177–88.

Bluemle, J.P. 1991. The face of North Dakota (rev.). North Dakota Geological Survey Education Series 21. [Place of publication unknown]: [Publisher unknown]. 177 p.

Boller, Henry A.; Quaife, Milo Milton, ed. 1972. Among the Indians, four years on the upper Missouri, 1858–1862. Lincoln, NE: University of Nebraska Press. 372 p.

Bragg, T.B. 1995. The physical environment of Great Plains grasslands. *In:* Keeler, K.; Joern, A.; eds. The changing prairie. New York: Oxford University Press. 49–81.

Bragg, T.B.; Steuter, A.A. 1995. Mixed prairie of the North American Great Plains. *In:* Transactions of the North American wildlife and natural resources conference; [Dates of conference unknown]; [Place of conference unknown]; [Place of publication unknown]: [Publisher unknown]. 60: 1–14.

Buell, M.F.; Buell, H.F. 1959. Aspen invasion of prairie. Bulletin of the Torrey Botanical Club. 86: 264–265.

Caudill, J.; Henderson, E. 2003. Banking on nature 2002: the economic benefits to local communities of national wildlife refuge visitation. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service, division of economics. [Pages unknown].

Christian, J.M.; Wilson, S.D. 1999. Long-term ecosystem impacts of an introduced grass in the northern Great Plains. Ecology. 80: 2397–2407.

Coues, E. 1878. Field notes on birds observed in North Dakota and Montana along the 49th parallel during the seasons of 1873 and 1874. Bulletin, U.S. Geological Survey Territories. 4: 545–661.

Coues, Elliot. 1897. New light on the early history of the great Northwest: the manuscript journals of Alexander Henry and of David Thompson 1799–1814. New York: F.P. Harper. 446 p. Vol. 1, The Red River of the North.

Coupland, R.T. 1961. A reconsideration of grassland classification in the northern Great Plains of North America. Journal of Ecology. 49: 135–167.

Coupland, R.T. 1992. Mixed prairie. *In:* Coupland, R.T., ed. Ecosystems of the world: natural grasslands. New York: Elsevier Press. 151–182.

Cowardin, L.M.; Carter, V.; Golet, F.C.; LaRoe, E.T. 1979. Classification of wetlands and deepwater habitats of the United States. Washington DC: U.S. Department of the Interior, Fish and Wildlife Service. [Pages unknown.]

Cowardin, L.M.; Gilmer, D.S.; Shaiffer, C.W. 1985. Mallard recruitment in the agricultural environment of North Dakota. Wildlife Monograph 92. Washington DC: The Wildlife Society. 37 p.

Dahlberg, James C.; Whitehurst, John C. 1990. An overview of Souris River basin prehistory in North Dakota. Journal of the North Dakota Archaeological Association. 4: 76–110.

Duebbert, H.F. 1966. Island nesting of the gadwall in North Dakota. Wilson Bulletin. 78: 12–25.

Duebbert, H.F.; Higgins, K.F.; Jacobson, E.T.; Podoll, E.B. 1981. Establishment of seeded grasslands for wildlife habitat in the prairie pothole region. U.S. Fish and Wildlife Service Special Science Report, Wildlife No. 234. [Place of publication unknown]: U.S. Department of the Interior, U.S. Fish and Wildlife Service. [Number of pages unknown].

Eddingsaas, Aren; Kadrmas, Neil; Grant, Todd; Murphy, Robert; Rubin, Cory. Unpublished data. On file at Des Lacs NWR (Kenmare, ND), J. Clark Salyer NWR (Upham, ND), and Upper Souris NWR (Carpio, ND).

Euliss, N.H.; Mushet, D.M.; Wrubleski, D.A. 2003. [Draft] Invertebrates in wetlands in the prairie pothole region. Jamestown, ND: U.S. Department of the Interior, U.S. Geological Survey, Northern Prairie Wildlife Research Center. 22 p.

Ewing, J. 1924. Plant succession of the brush-prairie in north-western Minnesota. Journal of Ecology. 12: 238–266.

Fredrickson, L.H. 1979. Impact of water management on the resources of lowland hardwood forests. *In:* Chabreck, R.A.; Mills, R.H.; eds. Proceedings of the 29th annual forest symposium; [Dates of symposium unknown]; [Place of symposium unknown]. Baton Rouge, LA: Louisiana State University. 51–64.

Fredrickson, L.H.; Batema, D.L. 1992. Greentree reservoir management handbook. Gaylord Memorial Laboratory, Wetland Management Series No. 1. Puxico, MO: Gaylord Laboratory.

Gates, C.M. 1933. Five fur traders of the Northwest. Minneapolis, MN: University of Minnesota Press. [Number of pages unknown].

Gleason, R.A.; Euliss, N.H., Jr.; Holmes, C.W. 2003. Sedimentation rates in the marshes of Sand Lake National Wildlife Refuge. Quick Response Project QR-F6-00-07. Jamestown, ND: U.S. Department of the Interior, U.S. Geological Survey, Northern Prairie Wildlife Research Center. 27 p.

Gough, Barry M., ed. 1988. The journal of Alexander Henry the younger: 1799–1814. *In:* Red River and the journey to the Missouri. Vol. 1. Toronto, ON: The Champlain Society. [Pages unknown].

Grace, J.B.; Collins, S.L.; Grace, S.L.; Smith, M.D.; Stohlgren, T.J. 2001. Interactions between fire and invasive plants in temperate grasslands of North America. *In:* Tall Timbers Research Station Miscellaneous Publication 11. Proceedings of the invasive species workshop: the role of fire in the control and spread of invasive species; fire conference 2000: the first national congress on fire ecology, prevention, and management; [Dates of conference unknown]; [Place of conference unknown]. [Place of publication unknown]: [Publisher unknown]. 40–65.

Grant, T.A.; Berkey, G.B. 1999. Forest area and avian diversity in fragmented aspen woodland of North Dakota. Wildlife Society Bulletin 27. Washington DC: The Wildlife Society. 904–914.

Grant, T.A.; Berkey, G.B.; Madden, E.M. 2004a. Tree and shrub invasion in northern mixed-grass prairie: implications for breeding grassland birds. Wildlife Society Bulletin 32. Washington DC: The Wildlife Society. 807–818.

Grant, T.A.; Madden, E.M.; Murphy, R.K.; Nenneman, M.P.; Smith, K.A. 2004b. Monitoring native prairie vegetation: the belt transect method. Ecological Restoration. 22: 106–111.

Grant, T.A.; Madden, E.M.; Shaffer, T.L.; Martin, J.S. [In review]. Fire effects on vegetation and breeding grassland birds in northern mixed-grass prairie. Journal of Wildlife Management.

Grant, T.A.; Madden, E.M.; Shaffer, T.L.; Pietz, P.J.; Berkey, G.B.; Kadrmas, N.J. [In press]. Nest survival of clay-colored and vesper sparrows in relation to woodland edge in mixed-grass prairies. Journal of Wildlife Management.

Grant, T.A.; Murphy, R.K. 2005. Changes in woodland cover on prairie refuges in North Dakota, USA. Natural Areas Journal. 25: 359–368.

Grant, Todd. Unpublished data. Fire effects on duck and songbird nest density and nest survival; J. Clark Salyer NWR, 1998–2003. Field forms on file at J. Clark Salyer NWR, Upham, ND.

Grant, Todd; Hammond, Merrill. Unpublished data. Prairie grouse survey field forms. On file at J. Clark Salyer NWR, Upham, ND.

Grant, Todd; Shaffer, Terry. Unpublished data. Island nesting study field forms and data summaries. On file at J. Clark Salyer NWR, Upham, ND.

Great Plains Flora Association. 1986. Flora of the Great Plains. Lawrence, KS: University Press of Kansas. 1402 p.

Hammond, M.C. [No date]. Marsh transects and surveys, 1946–1956, Lower Souris Refuge. On file at J. Clark Salyer NWR, Upham, ND.

Hammond, M.C. 1961. Proposal for needed research on aquatic plant (pondweed) study. Memo on file at J. Clark Salyer NWR, Upham, ND.

Hammond, M.C. 1962. Herbicides in control of moist soil, marsh and aquatic vegetation. Memo to the regional director. On file at J. Clark Salyer NWR, Upham, ND.

Hammond, M.C.; Mann, G.E. 1956. Waterfowl nesting islands. Journal of Wildlife Management. 20: 345–352.

Hanson, J.R. 1984. Bison ecology in the northern plains and a reconstruction of bison patterns for the North Dakota Region. Plains Anthropologist. 29: 93–113.

Hanowski, J.M.; Christian, D.P.; Niemi, G.J. 2000. Landscape requirements of prairie sharp-tailed grouse *Tympanuchus phasianellus campestris* in Minnesota, USA. Wildlife Biology. 6: 257–263.

Henry, C. J. 1939. Response of wildlife to management practices on the Lower Souris Migratory Waterfowl Refuge. *In:* Transaction of the North American wildlife conference; [Dates of conference unknown]; [Place of conference unknown]. [Place of publication unknown]: [Publisher unknown]. 4: 372–377.

Hickerson, Harold. 1965. The Virginia deer and intertribal buffer zones in the upper Mississippian Valley. *In:* Lewis, Anthony; Vayda, Andrew P.; eds. Man, culture, and animals: the role of animals in human ecological adjustments. Publication 78. Washington DC: American Association for the Advancement of Sciences. 43–65.

Higgins, K.F. 1986. Interpretation and compendium of historical fire accounts in the northern Great Plains. U.S. Fish and Wildlife Service Resource Publication 161. [Place of publication unknown]: U.S. Department of the Interior, U.S. Fish and Wildlife Service. 39 p.

Higgins, K.F.; Barker, W.T. 1982. Changes in vegetation structure in seeded nesting cover in the prairie pothole region. U.S. Fish and Wildlife Service Special Science Report, Wildlife No. 242. [Place of publication unknown]: U.S. Department of the Interior, U.S. Fish and Wildlife Service. [Number of pages unknown].

Hood, G.N. 1994. Against the flow: Rafferty–Alameda and the politics of the environment. Saskatoon, SK: Fifth House Publishers. 220 p.

United States and Canadian Negotiating Delegation. 1989. Agreement between the United States of America and Canada for water supply and flood control in the Souris River basin. Modified in 2000.

James, F.C.; Shugart, Jr., H.H. 1970. A quantitative method of habitat description. Audubon Field Notes. 24: 727–736.

Johnson, D. H. 1979. Estimating nest success: the Mayfield method and an alternative. Auk. 96: 651-661.

Johnson, D.H.; Igl, L.D. 1995. Contribution of the Conservation Reserve Program to populations of breeding birds in North Dakota. Wilson Bulletin. 107: 709–718.

Johnson, D.H.; Igl, L.D. 2001. Area requirements of grassland birds: a regional perspective. Auk. 118: 24–34.

Jones, J.K.; Armstrong, D.M.; Hoffman, R.S.; Jones, C. 1983. Mammals of the northern Great Plains. Lincoln, NE: University of Nebraska Press. 379 p.

Jordan, Nicholas; Larson, Diane; Huerd, Sheri. Unpublished data. Manuscript on file with Nicholas Jordan, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN. 33 p.

Kadlec, J.A. 1982. Mechanisms affecting salinity of Great Salt Lake marshes. American Midland Naturalist. 107: 82–94.

Kadrmas, Neil. Unpublished data. Vegetation survey field notes. On file at J. Clark Salyer NWR, Upham, ND.

Kadrmas, N.J. 2005. Community dynamics of terrestrial vertebrates in aspen parkland–mixed grass prairie habitats at J. Clark Salyer National Wildlife Refuge, North Dakota. Grand Forks, ND: University of North Dakota. 103 p. M.S.

Kemner, D.P.; Higgins, K.F. 1993. Response by upland nesting ducks to three rejuvenation treatments applied to two types of seeded nesting cover in eastern South Dakota. *In:* Proceedings of the South Dakota Academy of Sciences; [Dates of academy unknown]; [Place of academy unknown]. [Place of publication unknown]: [Publisher unknown]. 72: 87–109.

Kerns, C. 2005. Passerine nest survival in managed, mixed-grass prairie. Columbia, MO: University of Missouri. 87 p. M.S.

Kruse, A.D.; Bowen, B.S. 1996. Effects of grazing and burning on densities and habitats of breeding ducks in North Dakota. Journal of Wildlife Management. 60: 233–246.

Kuchler, A.W. 1964. Potential natural vegetation of the conterminous United States. American Geographical Society Special Publication 36. [Place of publication unknown]: [Publisher unknown]. 39 p.

Laubhan, M.K.; Fredrickson, L.H.; Gleason, R.A. 2003. A biological assessment of wetland conditions on the Souris River National Wildlife Refuges (Upper Souris, Des Lacs, and J. Clark Salyer). Jamestown, ND: U.S. Department of the Interior, U.S. Geological Survey, Northern Prairie Wildlife Research Center. 91 p.

Laubhan, M.K.; Roelle, J.E.. 2001. Managing wetlands for waterbirds. *In:* Rader, R.B, Batzer, D.P., Wissinger, S. Biomonitoring and management of North American freshwater wetlands. New York: John Wiley and Sons. 387–411.

Livingston, R.J.; Loucks, O.L. 1979. Productivity, trophic interactions, and food web relationships in wetlands and associated systems. *In:* Greeson, P.E., Clark, J.R., Clark, J.E. Wetland functions and values: the state of our understanding. American Water Resources Technical Publication 79-2. [Place of publication unknown]: [Publisher unknown]. 101–119.

Lord, M.L.; Kehew, A.E. 1990. Geomorphology of the Souris River Valley, Saskatchewan, North Dakota, and Manitoba. Journal of the North Dakota Archaeological Association. 4: 8–16.

Ludwick, T.L.; Murphy, R.K. 2006. Fire history and passerine abundance and habitat on a North Dakota drift plain prairie. Prairie Naturalist.

Madden, E.M.; Hansen, A.J.; Murphy, R.K. 1999. Influence of prescribed fire history on habitat and abundance of passerine birds in northern mixed-grass prairie. Canadian Field-Naturalist. 113: 627–640.

Madden, E.M.; Hansen, A.J.; Murphy, R.K.; Murray, L. 2000. Models for guiding management of prairie bird habitat in northwestern North Dakota. American Midland Naturalist. 144: 377–392.

Miller, H.W. 1971. Relationships of duck nesting success to land use in North and South Dakota. *In:* Transactions of the Congress of International Union of Game Biologists; [Dates of congress unknown]; [Place of congress unknown]. [Place of publication unknown]: [Publisher unknown]. 10: 133–141.

Minot Chamber of Commerce. 2005. <www.minot chamber.org>

Mitsch, W.J.; Gosselink, JG. 2000. Wetlands. 3d ed. New York: John Wiley and Sons. 936 p.

Murphy, R.K.; Freed, D.W.; Grondahl, C.D.; Hasselblad, K.W.; Martin, R.E.; Sidle, J.G. 2001. Status of the burrowing owl in North Dakota. Journal of Raptor Research. 35: 322–330.

Murphy R.K.; Grant, T.A. 2005. Land management history and floristics in mixed-grass prairie, North Dakota, USA. Natural Areas Journal. 25: 351–358.

Murphy, R.K.; Sondreal, M.L. 2003. Breeding bird abundance and habitat along the Des Lacs River valley, North Dakota. Blue Jay. 61: 82–94.

Murphy, Robert; Boyle, Jennifer; Behrend, Keith. Unpublished data. On file at Des Lacs NWR, Kenmare, ND.

Murphy, Robert; Whipp, Stacy. Unpublished data. On file at Des Lacs NWR, Kenmare, ND.

Naugle, D.E.; Bakker, K.K.; Higgins, K.F. 2000. A synthesis of the effects of upland management practices on waterfowl and other birds in the northern Great Plains of the U.S. and Canada. Wildlife Technical Report 1. Stevens Point, WI: University of Wisconsin, College of Natural Resources. 28 p.

Nenneman, Melvin; Grant, Todd; Kadrmas, Neil. Unpublished data. Woodland plot vegetation sampling field forms. On file at J. Clark Salyer NWR, Upham, ND.

Nenneman, Melvin; Murphy, Robert. Unpublished data. On file at Des Lacs NWR, Kenmare, ND.

Nenneman, M.P. 2003. Vegetation structure and floristics at nest sites of grassland birds in north central North Dakota. Missoula, MT: University of Montana. 103 p. M.S.

Nenneman, M.P.; Grant, T.A.; Murphy, R.K.; Sondreal, M.L. 2003. Nesting habitat of Cooper's hawks in northern Great Plains woodlands. Journal of Raptor Research. 37: 246–252.

Nenneman, M.P.; Murphy, R.K.; Grant, T.A. 2002. Cooper's hawks (*Accipiter cooperii*) nest successfully at high densities in deciduous woodlands of the northern Great Plains. Canadian–Field Naturalist. 116: 573–577.

Peterjohn, B.G.; Sauer, J.R. 1999. Population status of North American grassland birds from the North American breeding bird survey, 1966–96. Studies in Avian Biology. 19: 27–44.

Robinson, Elwyn B. 1966. History of North Dakota. Lincoln, NE: University of Nebraska Press. 599 p.

Romo, J.T.; Grilz, P.L.; Driver, E.A. 1990. Invasion of the Canadian prairies by an exotic perennial. Blue Jay. 48: 131–135.

Rumble, M.M.; Sieg, C.H.; Uresk, D.W.; Javersak, J. 1998. Native woodlands and birds of South Dakota: past and present. Research Paper RMRS-RP-8. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 11 p.

Schneider, Fred E. 1977. Preliminary cultural resource investigation of the upper Souris River basin. U.S. Army Corps of Engineers Research Report, Purchase Order Number, DACW37, 77M-1387. [Place of publication unknown]: U.S. Army Corps of Engineers. 39–51.

Schranck, B.W. 1972. Waterfowl nest cover and some predation relationships. Journal of Wildlife Management. 36: 182–186.

Schweigert, Kurt P. 1990. An historic overview of the Souris River valley in North Dakota. *In:* Gnabasik, V., ed. Journal of the North Dakota Archaeological Association. 4: 206–229.

Seastedt, T.R. 1995. Soil systems and nutrient cycles of the North American prairie. *In:* Joern, A.; Keeler, K.H.; eds. The changing prairie: North American grasslands. New York: Oxford University Press. 157–174.

Sexton, N.R.; Koontz, L.; Stewart, S.C. 2005. Visitor survey results for Souris River loop national wildlife refuges. Completion report: U.S. Geological Survey, Biological Division, Open-file Report 2005-1399. [Place of publication unknown]: [Publisher unknown]. 172 p.

Speulda, Lou Ann; Lewis, Rhoda Owen. 2003. Historical and architectural assessment of the Depression era work projects, U.S. Fish and Wildlife Service in Region 6. Lakewood, CO: U.S. Department of the Interior, U.S. Fish and Wildlife Service, Region 6. 129 p.

Squires, L.; van der Valk, A.G. 1992. Water-depth tolerances of the dominant emergent macrophytes of the Delta Marsh, Manitoba. Canadian Journal of Botany. 70: 1860–1867.

Stammen, Henry. 1978. Personal communication. Foxholm, ND.

Steenis, J.H. 1939. Marsh management on the Great Plains waterfowl refuges. *In:* North American wildlife conference; [Dates of conference unknown]; [Place of conference unknown]. [Place of publication unknown]: [Publisher unknown]. 4: 400–405.

Stewart, R.E. 1975. Breeding birds of North Dakota. Fargo, ND: Tri-college Center for Environmental Studies. 295 p.

Stewart, R.E.; Kantrud, H.A. 1971. Classification of natural ponds and lakes in the glaciated prairie region. Resource Publication 92. [Place of publication unknown]: U.S. Department of the Interior, U.S. Fish and Wildlife Service. 57 p.

Ulrich, R.A.; Pfeifer, F.K. 1976. Limnological survey of the Souris River and its major tributaries in North Dakota, October 1975. Bismarck, ND: U.S. Department of the Interior, U.S. Fish and Wildlife Service, Division of Fishery Services, Bismarck Area Office. 75 p.

U.S. Army Corps of Engineers (USACE). 2004. <http://www.mvp.usace.army.mil> 12 February 2004

U.S. Census Bureau. 2000. Census 2000 summary file, American factfinder. <http://factfinder .census.gov>

U.S. Department of Commerce. 2002. Regional economic information system. U.S. Department of Commerce, Bureau of Economic Analysis. <www.bea.gov>

U.S. Department of the Interior, U.S. Fish and Wildlife Service; and U.S. Department of Commerce, U.S. Census Bureau. 2002. 2001 National survey of fishing, hunting, and wildlife-associated recreation. [Place of publication unknown]: [Publisher unknown]. [Number of pages unknown].

U.S. Fish and Wildlife Service (USFWS). 1999. Fulfilling the promise: the National Wildlife Refuge System. Arlington, VA: U.S. Department of the Interior, U.S. Fish and Wildlife Service. 94 p.

———. 1994. Draft revised recovery plan for piping plovers (*Charadrius melodus)*, breeding on the Great Lakes and northern Great Plains of the United States. Twin Cities, MN: U.S. Department of the Interior, U.S. Fish and Wildlife Service. 120 p.

———. 2002. Birds of conservation concern 2002. Arlington, VA: U.S. Department of the Interior, U.S. Fish and Wildlife, Division of Migratory Bird Management. 99 p.

———. Unpublished data. Weather records. On file at Des Lacs NWR (Kenmare, ND) and at J. Clark Salyer NWR (Upham, ND).

U.S. Soil Conservation Service. 1975. Field technical guide. Bismarck, ND: USDA, Soil Conservation Service. 14 p.

van der Valk, A.G. 1981. Succession in wetlands: a Gleasonian approach. Ecology. 62: 688–696.

van der Valk, A.G.; Welling, C.H. 1988. The development of zonation in freshwater wetlands: an experimental approach. *In:* During, H.; Werger, M.; Willems, J. Diversity and pattern in plant communities. Hague, Netherlands: Academic Publishing. 145–158.

Weller, M.W.; Fredrickson, L.H. 1974. Avian ecology of a managed glacial marsh. Living Bird. 12: 269–291.

Weller, M.W.; Spatcher, C.E. 1965. Role of habitat in the distribution and abundance of marsh birds. Entomology Special Report 43. Ames, IA: Iowa State University, Department of Zoology, Agriculture and Home Economics Experiment Station. 31 p.

Wettlaufer, B.N.; Mayer-Oakes, W.J. 1960. The Long Creek site. Anthropological Series No. 2. Regina, SK: Saskatchewan Museum of Natural History. 137 p.

Willms, M.A.; Crawford, R.C. 1989. Use of earthen islands by nesting ducks in North Dakota. Journal of Wildlife Management. 53: 411–417.

Willson, G.D.; Stubbendieck, J. 2000. A provisional model for smooth brome management in degraded tall-grass prairie. Ecological Restoration. 18: 34–38.

Wilson, S.D. 2002. Prairies. In: Davy, A.J.; Perrow, M.R.; eds. Handbook of ecological restoration. Cambridge, MA: Cambridge University Press. 443–465.

Wilson, S.D.; Belcher, J.W. 1989. Plant and bird communities of native prairie and introduced Eurasian vegetation in Manitoba, Canada. Conservation Biology. 3: 39–44.