

## **Final Compatibility Determination for Recreational Fishing on Valentine National Wildlife Refuge**

**Use:** Recreational fishing

**Refuge Name:** Valentine National Wildlife Refuge

**Establishing and Acquisition Authority(ies):**

Valentine National Wildlife Refuge (NWR) was established on August 14, 1935, by Executive Order No. 7142 “as a breeding ground for migratory birds and other wildlife.” Funding for acquisition came from the Emergency Conservation Fund of 1933.

**Refuge Purpose(s):**

The refuge was established by Executive Order No. 7142, August 14, 1935, “. . . reserved and set apart . . . as a refuge and breeding ground for migratory birds and other wildlife.”

**National Wildlife Refuge System Mission:**

The mission of the National Wildlife Refuge System (Refuge System) is “. . . to administer a network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (National Wildlife Refuge System Improvement Act of 1997 [Improvement Act], Public Law 105-57).

**Description of Use:**

*What is the use?*

The use is recreational fishing on the Valentine National Wildlife Refuge (NWR). Fishing is a priority public use of the Refuge System under the National Wildlife Refuge System Administration Act of 1966 (NWRSA), as amended by the Improvement Act (16 United States [U.S.] Code 668dd-668ee).

*Where will the use be conducted?*

Recreational fishing is allowed on West Long, Pelican, Dewey, Hackberry, Clear, Willow, Duck, Rice, and Watts Lakes on Valentine NWR. These nine lakes offer access to approximately 3,200 acres for fishing, allowing remaining lakes and wetlands to serve as a refuge and breeding ground for migratory birds and other wildlife.”

*When will the use be conducted?*

Fishing will be allowed year-round, in accordance with season and bag limits set by the Nebraska Game and Parks Commission (NGPC). Anglers will be allowed on the refuge from two hours before sunrise to two hours after sunset.

*How will the use be conducted?*

Stocking of non-native game fish into the lakes of the Nebraska Sandhills, including the lakes on the refuge, pre-dates the establishment of the refuge. After the establishment of the refuge, a small number of lakes on the refuge were opened to fishing when water returned to the lakes

following the drought of the 1930s. Under a cooperative agreement, the NGPC continues to stock non-native game fish on nine lakes open to fishing, and collects brood stock and eggs from the refuge lakes for their hatchery operations. Currently, the game fish most sought after on the refuge fishing lakes are largemouth bass, yellow perch, bluegill, crappie, and northern pike. The refuge lakes are most noted for large bass, catch-and-release of northern pike, and large bluegills. The refuge lakes are open to fishing year round. Fishing, especially ice fishing, is a very popular recreational use of the refuge.

The U.S. Fish and Wildlife Service (Service) coordinates with the NGPC on management of sport fisheries, fishing seasons, and regulations on the refuge. Recreational fishing is conducted in accordance with NGPC regulations, with some additional refuge-specific conditions to protect fish, wildlife, and habitat, and to reduce potential conflicts among other public uses of the refuge. A valid Nebraska fishing license is required to fish on the refuge. Boats propelled with oars, paddles, or electric motors may be used on refuge lakes. The use of internal combustion motors is prohibited. The possession and use of live or dead minnows, except for frozen or dead smelt, is prohibited to assist in preventing introduction of non-native fish into the fishing lakes. The possession of any fish not taken from refuge waters is prohibited. No reptiles, amphibians, or minnows may be taken on the refuge, with the exception of bull frogs. Bull frogs may be harvested the refuge lakes open to fishing in accordance with NGPC fishing regulations. The voluntary use of non-lead weights will be encouraged. Littering is not part of acceptable use on the refuge, and anglers using the refuge should adopt leave no trace and “pack it in, pack it out” principles.

Facilities for recreational fishing are extensive. Interior refuge roads are improved gravel roads and two track trails. There are 20 mowed boat ramps and parking areas to facilitate access to the fishing lakes. There are seven handicapped accessible fishing dock and surfaced boat ramps throughout the fishing lakes. Restrooms are available for public use at Hackberry Lake.

#### *Why is the use being proposed?*

Fishing is a priority public use identified in the Improvement Act, and has been a public use since the refuge was established. Fishing is a popular activity on these lakes, representing the largest user-group on the refuge and making a large contribution to the economy of this rural area.

#### **Availability of Resources:**

Existing roads and trails are available to gain access to the lakes open to recreational fishing. Seven of the nine lakes open to for recreational fishing have boat ramps and docks providing access, and two lakes provide walk-in access. Refuge staff time is required to maintain roads and boat access areas, and to put in and remove docks when the ice goes out and before the lakes ice up, respectively. Refuge staff also coordinate with the NGPC regarding fish stocking requests and assisting in some fisheries operations (such as spawning and renovations). Sufficient resources exist to maintain this use.

### **Anticipated Impacts of the Use:**

Recreational fishing is allowed on nine lakes on the refuge. Stocking of non-native game fish into many Sandhills lakes pre-dated the establishment of refuge. Managing common carp infestations has been and continues to be a problem in these shallow Sandhills lakes. Common carp degrade water quality, alter food webs, and negatively affect native or recreationally important fish and wildlife populations (Bajer et al. 2009; Jackson et al. 2010; Zambrano et al. 2001). It is likely that very few game fish existed in the natural shallow lakes of the Sandhills prior to European settlement. The fish species most likely to occur naturally in shallow refuge lakes tend to be small species that are adapted to tolerate high alkalinities, or those that have affinities for a wide variety of aquatic habitats and may have occasionally found their way into Sandhills lakes (Jennings 1995). Fish native to these lakes were primarily smaller species of little interest to most recreational anglers. This compatibility determination is for allowing nine lakes to remain open to recreational fishing, with the remaining lakes closed to recreational fishing.

### *Fishing Lakes*

The refuge will continue to collaborate with the NGPC to provide fishing on Watts, Rice, Duck, West Long, Pelican, Hackberry, Dewey, Clear, and Willow Lakes. These lakes are a popular fishing destination for anglers, and provide quality fishing opportunities. Past projects with NGPC have provided six of these lakes with an improved concrete boat ramp, and seven lakes have docks to aid in launching boats. There is currently a project underway to renovate five of these fishing lakes to remove an overabundance of invasive common carp. Following renovation, the project plan calls for refuge and NGPC staff to coordinate the restocking of these renovated fishing lakes with game fish to facilitate the recreational fishing program. Stocking and maintaining non-native sport fish in these lakes will result in competition between fish and migratory birds for invertebrate food resources in these lakes (review by Bouffard and Hanson 1997). Several studies have found evidence of competition between ducklings and fish for invertebrates (Eriksson 1983; Hunter et al. 1986; Pehrsson 1984). Non-native fish may also cause decreases in native amphibian populations (Bouffard and Hanson 1997). Many amphibians are adapted to breeding in temporary, fishless ponds, and are susceptible to predation by fish (Kats et al. 1988), and a number of studies have shown that fish can reduce or eliminate certain amphibian populations (Adams 2000; Hecnar and M'Closkey 1997; Knapp 2005; Vrendenburg 2004). Vrendenburg (2005) was able to show that experimentally removing introduced rainbow and brook trout allowed the mountain yellow-legged frog to recover in lakes where the fish were removed. Hatchling Blanding's turtles, a state species of concern, and other hatchling turtles also fall prey to large-mouth bass and northern pike. (Harding and Bloomer 1979; Holland 1991; Holland 1994)

Fishing and other human activities cause disturbance to wildlife, both birds and mammals. The responses of wildlife to human activities include avoidance or departure from the site (Burger 1998; Kahl 1991; Kaiser and Fritzell 1984; Klein 1993; Korschen et al. 1985; Owen 1973; Whittaker and Knight 1998), the use of suboptimal habitat (Erwin 1980; Williams and Forbes 1980), altered behavior or habituation to human disturbance (Burger 1998; Havera et al. 1992; Klein 1993; Korschen et al. 1985; Morton et al. 1989; Whittaker and Knight 1998), attraction (Whittaker and Knight 1998), and an increase in energy expenditure (Belanger and Bedard 1990; Morton et al. 1989). Anglers and other boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs and nestlings to

predation or cooling, resulting in egg and/or nestling mortality. Boating associated with fishing can be especially detrimental to over-water nesting birds such as grebes and terns.

Lost or abandoned fishing gear has the potential to harm or kill wildlife throughout the year. Waterfowl and other waterbirds foraging in fishing lakes may ingest lead sinkers or jigs lost by anglers, causing morbidity or direct mortality by lead poisoning (Franson et al. 2003; Goddard et al. 2008). Trumpeter swans nest on refuge lakes and on shallow lakes throughout the Sandhills. With their long necks and feeding habits, swans may be more susceptible to ingesting lost lead fishing gear. Lost or abandoned fishing line and hooks poses another potential wildlife hazard (Heath et al. 2017; Parrish and Maurer 1991). Predatory game fish may reduce the breeding success and alter the habitat use of waterfowl (Dessborn et al. 2011). A recent study of trumpeter swans in the Nebraska Sandhills found that swan reproductive success was lower in lakes that had predatory game fish versus fishless lakes (H. Johnson, personal communication).

Traffic (both vehicular and boat) represents a potential vector for the spread of invasive species (Johnson et al. 2001; Rothlisberger et al. 2010). Invasive plants like purple loosestrife and Eurasian milfoil can be spread on boats and boat trailers, and organisms like zebra mussels can be transferred by similar means. To prevent the spread of aquatic invasive species (plants and animals), the NGPC recommends that hunters and fishermen inspect, clean, and drain any equipment (including hunting and fishing gear and boots) that has come in contact with the water while they were engaged in their recreational activity (NGPC 2019). Vehicle traffic can also result in road mortality for many species of wildlife, particularly reptiles and amphibians (Ashley and Robinson 1996; Congdon et al. 2008; Glista et al. 2008; Langen et al. 2012). Although both NGPC and refuge regulations prohibit the movement of fish between lakes, intentional and unintentional stocking of fish occurs (NGPC 2019).

### *Non-Fishing Lakes*

Management of lakes not open to recreational fishing will provide habitat for migratory birds and other wildlife. Refuge managers are tasked with managing for ecological sustainability, which is compromised by the addition of non-native species, and the practice of stocking non-native fish is inconsistent with Service policy (601 FW 3). When possible, the refuge will work with partners (for example, Ducks Unlimited and NGPC) to remove common carp and other fish from these lakes. This will allow the refuge to better fulfill its mission of providing a refuge and breeding ground for migratory birds and other wildlife.

The exclusion of fish from these lakes is expected to benefit many species of birds that use the refuge, either for migration stopover or breeding habitat, and resident wildlife that depend on lakes and wetlands. Lakes free of non-native fish provide increased vegetative and invertebrate foods for waterfowl and other waterbirds (reviewed by Bouffard and Hanson 1997), and may increase waterfowl production by reducing competition for invertebrate food resources (Eriksson 1983; Hunter et al. 1986; Pehrsson 1984). Waterfowl production may also increase in the absence of predatory game fish, because these fish may make shallow lakes into an ecological trap for waterfowl brood rearing (Dessborn et al. 2011), and even a species as large as the trumpeter swan has recently been found to have reduced reproductive success in Sandhills lakes with predatory game fish (H. Johnson, personal communication). Since many native amphibians are adapted to breeding in fishless waters, and are susceptible to predation by fish (Kats et al. 1988), providing lakes without fish will allow native amphibians to recover (Vrendenburg 2005).

The spotted tiger salamander was once quite common on the refuge, and is now infrequently observed (Nenneman, personal observation). Maintaining refuge lakes as non-fishing lakes will benefit wildlife by reducing the potential for disturbance by human activity. Avoidance or departure from a site is one of the most common wildlife responses to human disturbance (Burger 1998; Kaiser and Fritzell 1984; Korschen et al. 1985; Kahl 1991; Klein 1993; Owen 1973; Whittaker and Knight 1998). This is particularly important for overwater nesting colonial birds because repeated disturbance can cause the whole colony to fail.

Lakes not open to fishing benefit wildlife by reducing exposure to lost or abandoned fishing gear. Lead sinkers and jig heads are commonly used in fishing activities, and are occasionally lost by fishermen. In areas with heavy fishing pressure, losses of this fishing gear can expose birds and other wildlife to a substantial amount of lead that can potentially be ingested, leading to morbidity or direct mortality by lead poisoning (Franson et al. 2003; Goddard et al. 2008). Lost or discarded fishing line and hooks can ensnare birds and other animals, leading to loss of appendages or death (Parrish and Maurer 1991). Ingestion of small pieces of fishing line can also block the digestive system, ultimately leading to starvation (Heath et al. 2017).

Limiting vehicular and boat access to lakes not open to fishing will minimize the potential for spreading invasive species, and the potential introduction of additional fish species. Vehicles and boats provide a potential vector to move invasive plants and animals between lakes, and into wetlands not open to fishing along roadways (Johnson et al. 2001; Rothlisberger et al. 2010). Leaving lakes closed to fishing will also reduce wildlife road mortality, which often significantly affects reptiles and amphibians (Ashley and Robinson 1996; Cogdon et al. 2008; Glista et al. 2008; Langen et al. 2012). On the refuge, this is particularly important because new access roads and trails will likely follow lake and wetland edges, where these animals will be more likely to be run over.

**Public Review and Comment:**

This section will be completed after the public review and comment period is over.

**Determination:**

- Use is not compatible.
- Use is compatible with the below stipulations.

**Stipulations Necessary to Ensure Compatibility:**

- To reduce wildlife disturbance, only boats powered by oars, paddles, or electric motors will be allowed.
- Taking of amphibians (with the exception of bull frogs), turtles, and minnows will not be allowed as part of recreational fishing. Bull frogs in refuge lakes are outside their native range and may be harvested on lakes open to fishing following NGPC regulations.
- The use of live or dead minnows will be prohibited to help prevent accidental introduction of additional non-native and exotic species.
- No additional lakes will be opened to fishing.

## **Justification:**

Recreational fishing is a priority wildlife-dependent use for the Refuge System through which the public can develop an appreciation for fish and wildlife Improvement Act. Continuing to allow recreational fishing on nine lakes currently open to fishing supports this priority wildlife-dependent use. Without stocking and active management, the sport fishery of non-native game fish will not exist on the refuge. Allowing fishing on nine lakes that already have a history of game fish stocking on the refuge will allow native wildlife to find sufficient food resources, nesting and breeding areas, and resting places on the majority of the refuge. This will ensure that the abundance and use of the refuge by migratory birds and other native wildlife will not be measurably reduced by recreational fishing. Although this activity could result in disturbance to wildlife and habitat, recreational fishing on the nine fishing lakes will be compatible.

Expanding fishing and game fish populations to non-fishing lakes will not be compatible for the refuge (603 FW 2.10[D][g]). The refuge was established on August 14, 1935, by Executive Order No. 7142 “as a breeding ground for migratory birds and other wildlife (USFWS 1999, p. 8).” The mission of this system is “to administer a 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” (Improvement Act, Public Law 105-57). The goals of the Refuge System are aimed at fulfilling this mission and are the following:

- Goal 1: To preserve, restore, and enhance in their natural ecosystems all species of animals and plants that are endangered or threatened with becoming endangered.
- Goal 2: To perpetuate the migratory bird resource. “Studies have shown that fish compete for invertebrate food resources with migratory birds” (USFWS 1999, p. 100).

Expanding fishing and game fish populations to non-fishing lakes will be in conflict with the enabling legislation for the refuge as well as the mission of the Refuge System. As mentioned in the 1999 Valentine NWR Comprehensive Conservation Plan (CCP), the Service’s Platte/Kansas Rivers Ecosystem team has identified the five main areas of concern that need to be addressed for this ecosystem, and they are prairie grassland restoration and preservation, species of concern (rare species), water quality, native fishes, small fishes and mussels, and water quantity. Non-native, invasive game fish can negatively affect native fauna (from fish to reptiles, and amphibians to waterfowl and shorebirds) indirectly through competition for natural forage, and can have direct, negative effects by consuming native fauna such as ducklings and other young waterbirds, tiger salamanders and other amphibians, and also hatchling Blanding’s turtles, which are a Tier 1 at-risk species within the Nebraska Natural Legacy Project.

Biological integrity, diversity, and environmental health (16 U.S. Code 668dd[a][4][B]) of the refuge habitats will be seriously compromised with the introduction of non-native species to non-fishing lakes. The “Sandhill Lake Survey” completed by the Nebraska Game, Forestation, and Parks Commission in 1960 details all the fish species naturally occurring within these shallow lakes. It also outlines how game fish populations were introduced in the early 1900s to the Nebraska Sandhills; thus, these game fish are considered non-native fish species (Sandhill Lake Survey; Job Completion Report; 1960).

Introducing non-native game fish into new refuge lakes will be detrimental to the natural wildlife communities. It also compromises the mission of the Improvement Act, which states, in part, that the Service must “ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans” (601 FW 3). In addition, Executive Order 13112, signed by President Clinton on February 3, 1999, requires that a Council of Departments, including the Department of the Interior, dealing with invasive species be created to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health effects that invasive species cause. In addition, fishing is a known vector for invasive species transmission. Populations of exotic and invasive carp and curly-leaf pondweed have already established on the refuge, and the possibility of transporting additional invasive species to new lakes via boat motor, livewell, and bait buckets is very high. Since the renovation of Watts Lake in 2015, there have been no common carp but many northern pike found in the lake. Northern pike were not part of the restocking plan for Watts Lake, and because no carp survived the renovation, land managers and biologists believe that local fishermen are taking it upon themselves to stock lakes illegally with their preferred species of game fish. This community stocking of non-native species will be anticipated to happen elsewhere on the refuge if fishing were to be expanded. The refuge’s CCP states as a specific stipulation to ensure compatibility, “no additional lakes will be opened for fishing” (USFWS 1999, p. 100). The refuge’s CCP (1999, 602 FW 1.6[C]) states that “the Service intends to maintain the current level of sport fishing opportunities at the Refuge. The nine lakes on the Refuge open to fishing provide ample opportunity for sport fishing. The lakes are seldom crowded . . . Other lakes on the Refuge will be managed for migratory birds and remain closed to sport fishing” (USFWS 1999, p. 26).

As mentioned previously, “Studies have shown that fish compete for invertebrate food resources with migratory birds” (USFWS 1999, p. 100). The refuge’s CCP had a goal of “maximizing production of invertebrate (protein) and plant carbohydrate resources on 11,181 wetland acres to provide an appropriate food base for indigenous wildlife (migratory birds, mammals, reptiles, amphibians, fish),” by “providing an unexploited food base on the . . . wetlands that are not designated for sport fishing” (USFWS 1999, p. 43). The Exotic and Invading species objectives described in the plan stipulated to “prevent the establishment of additional introduced species and refrain from carrying out management activities specifically to encourage population expansion of existing introductions” (USFWS 1999, p. 45).

“Fishing and other human activities cause disturbance to wildlife, both birds and mammals. Boating associated with fishing is especially detrimental to over water nesting species such as grebes and black terns” (USFWS 1999, p. 100). The refuge’s CCP requires the Service staff to achieve specific goals and objectives related to migratory bird management. They are, among other things, to “(a) achieve an average annual breeding pair density of equal to or greater than 4,000 dabbling and 700 diving ducks with a brood/pair ratio expressed as a percent of equal to or greater than 20 percent over a five year period; (b) maintain an annual breeding population of approximately 100 Canada goose pairs; (c) provide approximately 11,000 acres of wetland for spring and fall migrating waterfowl; (d) maintain and increase breeding populations of indigenous, neotropical migrants that are water-based including American bittern, white-faced ibis, black tern, marbled godwit, northern harrier and other shorebirds and wading birds that inhabit the refuge” (USFWS 1999, p. 44). In addition, the 2019 Valentine NWR Integrated Pest Management Plan describes that “the (non-fishing) lakes on the Valentine NWR will be

managed without invasive populations of non-native game fish and will be managed for migratory bird and native wildlife values” (USFWS 2019, p. 34).

Considerable refuge resources are expended to manage and maintain the facilities for fishing as a recreational use. Parking areas and boat launches next to lakes are very high-maintenance, and any additional opening of lakes will require incorporation of both of these in order to provide a quality visitor-use experience. In order to ensure compatibility, the appropriate refuge resources will be dedicated to the real property resources of the existing fishing lakes.

**Signature:**

\_\_\_\_\_  
Steve Hicks, Project Leader

\_\_\_\_\_  
Date

**Review:**

\_\_\_\_\_  
Juancarlos Giese, Refuge Manager

\_\_\_\_\_  
Date

**Approval:**

\_\_\_\_\_  
Maureen Gallagher, Refuge Chief  
Region 6

\_\_\_\_\_  
Date

**Mandatory 10- or 15-year Re-Evaluation Date:** 2035

## References

- Adams, M.J. 2000. Pond permanence and the effects of exotic vertebrates on anurans. *Ecological Applications* 10:559–568.
- Ashley, E.P.; Robinson, J.T. 1996. Road mortality of amphibians, reptiles, and other wildlife on the Long Point Causeway, Lake Erie, Ontario. *Canadian Field Naturalist* 110:403–412.
- Bajer, P.G.; Sullivan, J.; Sorensen, P.W. 2009. Effects of a rapidly increasing population of common carp on vegetative cover and waterfowl in a recently restored Midwestern shallow lake. *Hydrobiologica* 632:235–245.
- Belanger, L.; Bedard, J. 1990. Energetic cost of man-induced disturbance to staging snow geese. *Journal of Wildlife Management* 54:36–41.
- Bouffard, S.H.; Hanson, M.A. 1997. Fish in waterfowl marshes: waterfowl managers' perspective. *Wildlife Society Bulletin* 25:146–157.
- Burger, J. 1998. Effects of motorboats and personal watercraft on flight behavior over a colony of common terns. *Condor* 100:528–534.
- Congdon, J.D.; Graham, T.E.; Herman, T.B.; Lang, J.W.; Pappas, M.J.; Brecke, B.J. 2008. *Emydoidea blandingii* (Holbrook 1938) – Blanding's Turtle. In: Rhodin, A.G.J.; Pritchard, P.C.H.; van Dijk, P.P.; Saumure, R.A.; Buhlmann, K.A.; Iverson, J.B., editors. *Conservation Biology of Freshwater Turtles and Tortoises: A Compilation Project of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group*. Chelonian Research Monographs. 5 p., 015.1–015.12; doi:10.3854/crm.5.105.blandingii.v1.2008. <[www.iucn-tftsg.org/cbft/](http://www.iucn-tftsg.org/cbft/)>
- Dessborn, L.; Elmberg, J.; Englund, G. 2011. Pike predation affects breeding success and habitat selection of ducks. *Freshwater Biology* 56:579–589.
- Eriksson, M.O.G. 1983. The role of fish in the selection of lakes by nonpiscivorous ducks: mallard, teal, and goldeneye. *Wildfowl* 34:27–32.
- Erwin, R.M. 1980. Breeding habitat use by colonially nesting waterbirds in two mid-Atlantic US regions under different regimes of human disturbance. *Biological Conservation* 18:39–51.
- Franson, J.C.; Hansen, S.P.; Creekmore, T.E.; Brand, C.J.; Evers, D.C.; Duerr, A.E.; DeStefano, S. 2003. Lead fishing weights and other fishing tackle in selected waterbirds. *Waterbirds* 26:345–352.
- Glista, D.J.; DeVault, T.L.; DeWoody, J.A. 2008. Vertebrate road mortality predominantly impacts amphibians. *Herpetological Conservation and Biology* 3:77–87.
- Goddard, C.I.; Leonard, N.J.; Stang, D.L.; Wingate, P.J.; Rattner, B.A.; Franson, J.C.; Sheffield, S.R. 2008. Management concerns about known and potential impacts of lead use in shooting and fishing activities. *Fisheries* 33:228–236.

- Havera S.P.; Boens, L.R.; Georgi, M.M.; Shealy, R.T. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. *Wildlife Society Bulletin* 20:290–298.
- Heath, S.A.; Dahlgren, S.; Simon, D.; Brooks, D.M. 2017. Monofilament fishing line as a threat to American oystercatchers (*Haematopus palliatus*) on the Texas coast, USA. *Waterbirds* 40:123–126.
- Hecnar, S.J.; M'Closkey, R.T. 1997. The effects of predatory fish on amphibian species richness and distribution. *Biological Conservation* 79:123–131.
- Holland, D.C. 1991. A synopsis of the ecology and status of the Western pond turtle (*Clemmys marmorata*) in 1991. A report to the U. S. Fish and Wildlife Service, National Ecological Research Center, San Simeon, California. 141 p.
- . 1994. The Western Pond Turtle: Habitat and History. Unpublished final report, U.S. Department. of Energy, Portland, Oregon.
- Hunter, M.L.; Jones, J.J.; Gibbs, K.E.; Moring, J.R. 1986. Duckling responses to lake acidification: Do black ducks and fish compete? *Oikos* 47:26–32.
- Jackson, Z.J.; Quist, M.C.; Downing, J.A.; Larsheid, J.G. 2010. Common carp (*Cyprinus carpio*), sport fishes, and water quality: ecological thresholds in agriculturally eutrophic lakes. *Lake and Reservoir Management* 26:14–22.
- Harding, J.H.; Bloomer, T.J. 1979. The Wood Turtle, *Clemmys insculpta*: a natural history. *Bulletin of the New York Herpetological Society* 15:9–26.
- Jennings, M. 1993. Historical distribution of fishes in northcentral Nebraska. 37–46. In: Bogen, M.A, editor. A Biological Survey of Fort Niobrara and Valentine National Wildlife Refuges. Fish and Wildlife Service – Natural Ecology Research Center. 251 p.
- Johnson, L.E.; Ricciardi, A.; Carlton, J.T. 2001. Overland dispersal of aquatic invasive species: a risk assessment of transient recreational boating. *Ecological Applications* 11:1789–1799.
- Kahl, R. 1991. Boating disturbance of canvasbacks during migration at Lake Poygan, Wisconsin. *Wildlife Society Bulletin* 19:242–248.
- Kaiser, M.S.; Fritzell, E.K. 1984. Effects of river recreationists on green-backed heron behavior. *Journal of Wildlife Management* 48:561–567.
- Kats, L.B.; Petranka, J.W.; Sih, A. 1988. Antipredator defenses and the persistence of amphibian larvae with fishes. *Ecology* 69:1865–1870.
- Klein M.L. 1993. Waterbird behavioral responses to human disturbance. *Wildlife Society Bulletin* 21:31–39.
- Knapp, R.A. 2005. Effects of nonnative fish and habitat characteristics on lentic herpetofauna in Yosemite National Park, USA. *Biological Conservation* 121:265–279.

- Korschen C.E.; George, L.S.; Green, W.I. 1985. Disturbance of diving ducks by boaters on a migrational staging area. *Wildlife Society Bulletin* 13:290–296.
- Langen, T.A.; Gunson, K.E.; Scheiner, C.A.; Boulerice, J.T. 2012. Road mortality in freshwater turtles: identifying causes of spatial patterns to optimize road planning and mitigation. *Biodiversity and Conservation* 21:3017–3034.
- Morton, J.M.; Fowler, A.C.; Kirkpatrick, R.L. 1989. Time and energy budgets of American black ducks in winter. *Journal of Wildlife Management* 53:401–410.
- [NGPC] Nebraska Game and Parks Commission. 2019. Aquatic Invasive Species. <[www.outdoornebraska.gov/aquaticinvasivespecies/](http://www.outdoornebraska.gov/aquaticinvasivespecies/)> accessed December 12, 2019.
- Owen, M. 1973. The management of grassland areas for wintering geese. *Wildfowl* 24:123–130.
- Parrish, J.R.; Maurer, B.A. 1991. Injury to a merlin (*Falco columbarius*) from discarded fishing tackle. *Journal of Raptor Research* 25:136–139.
- Pehrsson, O. 1984. Relationship of food to spatial and temporal breeding strategies of mallards in Sweden. *Journal of Wildlife Management* 48:322–339.
- Rothlisberger, J.D.; Chedderton, W.L.; McNulty, J.; Lodge, D.M. 2010. Aquatic invasive species transport via trailered boats: what is being moved, who is moving it, and what can be done? *Fisheries* 35:121–132.
- Steen, M.O.; Foster, G.R.; Agee, C.P.; Orr, O.E.; McCarraher, D.B. 1960. Sandhill Lake Survey, Job No. 2. Federal Aid in Fish Restoration Act Dingell-Johnson Project F-4-R. 83 p.
- [USFWS] U.S. Fish and Wildlife Service. 1999. Valentine National Wildlife Refuge Comprehensive Conservation Plan. <[www.fws.gov/mountain-prairie/refuges/completedPlanPDFs M-S/vlt\\_1999\\_ccpfinal\\_all.pdf](http://www.fws.gov/mountain-prairie/refuges/completedPlanPDFs/M-S/vlt_1999_ccpfinal_all.pdf)> accessed December 13, 2019.
- . 2019. Valentine National Wildlife Refuge Integrated Pest Management Plan.
- Vrendenburg, V.T. 2004. Reversing Introduced Species effects: Experimental Removal of Introduced Fish Leads to Rapid Recovery of a Declining Frog. *PNAS* 101:7646–7650. <[www.pnas.org/cgi/doi/10.1073/pnas.0402321101](http://www.pnas.org/cgi/doi/10.1073/pnas.0402321101)>
- Whittaker, D.; Knight, R. 1998. Understanding wildlife responses to humans. *Wildlife Society Bulletin* 26:312–317.
- Williams, G.J.; Forbes, E. 1980. The habitat and dietary preferences of dark-bellied brant geese and widgeon in relation to agricultural management. *Wildfowl* 31:151–157.
- Zambrano, L.; Scheffer, M.; Martinez-Ramos, M. 2001. Catastrophic response of lakes to benthivorous fish introductions. *Oikos* 94:344–350.