



## **Hodgson Harris Reservoir Ecological Values Assessment**

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Hodgson Harris Reservoir was constructed in 1882, making it one of the oldest agricultural reservoirs in the County. Its age and stability on the landscape had allowed for decades of ecological succession. In the past 25 years however, significant fragmentation has occurred in the general area of Hodgson Harris via residential development and the addition of several associated new roads. Despite these changes, the ecological values associated with Hodgson Harris reservoir remained high.

Ecological values of Hodgson Harris Reservoir:

- Confirmed northern leopard frog breeding site. This species is a Boulder County Species of Special Concern and Colorado State Species of Greatest Conservation Need (Tier 1). It is also a U.S. Forest Service Sensitive Species.
- High diversity of waterfowl, including nesting American avocets and blue-winged teal. Also, there was high use by diving ducks including goldeneyes, and mergansers. This indicates an intact food web, as these species feed on mollusks, crayfish, small fish and macroinvertebrates.
- High population of freshwater mollusks: Marsh Ramshorn (*Helisoma trivolvis*) and big-eared radix (*Lymnaea auricularia*).

However, in 2014, the Hodgson Harris dam was completely demolished and replaced. The engineering, designs, deconstruction and replacement of the dam took 18 months. The town of Superior and BCPOS worked collaboratively on the replacement project.

The replacement of the dam was needed in order to meet the Office of State Engineer's dam safety standards.

During the replacement process, starting in 2013, the reservoir was completely drained and dredged. It was expected that this significant impact would alter the ecological state of the reservoir.

Mitigation measures were implemented in an effort to maintain habitat values during construction such as:

- 1) The placement of a low earthen berm to hold water at the west end of the reservoir (the inlet area). The goal of this action was to maintain habitat for the confirmed breeding northern leopard frogs (*Lithobates pipiens*), pre-construction, and also the significant population of mollusks present pre-construction; Marsh Ramshorn (*Helisoma trivolvis*) and big-eared radix (*Lymnaea auricularia*). There was also a significant population of crayfish.
- 2) Requested date of initial dewatering to occur after August 15, to accommodate northern leopard frog potential overwintering. This action did not occur, based on the contractor needing to determine if the reservoir's substrate would be suitable for use in the dam construction.
- 3) Requested that the gradual slopes on the south side of the reservoir not be excavated to produce more storage capacity. These slopes provide the best habitat / access for shorebirds and provide the best mudflats when water levels are drawn down. The implementation of the recountouring grading plans did take this request into account.
- 4) Requested that the wetland vegetation below the dam be impacted as minimally as possible, due to habitat values. The contractors attempted to limit disturbance to these wetlands during construction, but disturbance did occur. Additionally, the leaking of the original dam was supporting a significant portion of this wetland, and this leaking no longer occurs. Therefore, the size of the wetlands below the dam has decreased.

Since the 2013/2014 reconstruction, BCPOS wildlife staff has conducted surveys to determine the relative state of the current habitat values.

Results of the current survey efforts (2015-2017) by BCPOS wildlife staff:

The reservoir is now inhabited by invasive, non-native bullfrogs (*Rana catesbeiana*), which directly compete with northern leopard frogs, both by predation and as a vector for the chytrid fungus (*Batrachochytrium dendrobatidis*), which has led to significant declines in leopard frog populations. The change in the water levels allowed in the reservoir is likely the cause of this species now being present. Prior to the dam replacement, the reservoir was only filled to approximately 1/3 of its capacity for the prior 15 years, due to the State safety regulations and favored Leopard frogs instead of bullfrogs. Annually, drawdown of this diminished capacity led to exposed mudflats and very little water. This is not conducive to bullfrog life history, as it requires two years to metamorphosize into adults, so requires stable water levels. Conversely, the native northern leopard frogs are adapted to ephemeral water sources and metamorphosize in a single season.

One adult was detected during the dam reconstruction, but Northern leopard frogs have not been detected at the reservoir since the dam completion.

The benthic substrate of the reservoir is currently anoxic in places. The oxygen levels are very low, and the macroinvertebrate assemblage is sparse. No crayfish or mollusks were observed or captured during surveys. Small fish were observed, and determined to be bluegill (*Lepomis macrochirus*). A full sample of fish was not conducted, so a comprehensive list of species present is not possible. Additionally, no crayfish were observed during surveys, but this species was not the focus of surveys, so it is possible they are present.

The waterfowl diversity at the reservoir remains high (Jones, 2017) and Appendix A. However, a noted change is the overall decrease in diving duck numbers post-reconstruction, presumably based on the decrease of mollusks, aquatic invertebrates and crayfish as a food source (pre-reconstruction, there was heavy use of the reservoir by mergansers, goldeneyes and buffleheads). Diving ducks consume aquatic invertebrates, crayfish, fish and mollusks.

Some shorebirds of great interest still nest at the reservoir, post dam replacement. American avocet (*Recurvirostra Americana*) presence and breeding is of significant concern at the reservoir. This species is a Boulder County Species of Special Concern and requires exposed mudflats for foraging, which is a rare habitat type in Boulder County. The annual drawdown schedule for the reservoir artificially creates this rare habitat type, which has been utilized by as many as four nesting pairs in one season (i.e.; in 2017, four pairs attempted to nest).

Due to the presence of breeding American avocets, BCPOS staff developed an annual recommended drawdown/filling schedule during the Hodgson Harris dam reconstruction planning process (Appendix B). These recommendations were also focused on blue-winged teal (*Anas discors*) nesting, which occurred prior to the dam reconstruction (this species nests in upland habitat, close to water sources). No nesting teal have been observed, post-construction.

Black-tailed prairie dogs (*Cynomys ludovicianus*) are still present at the reservoir, and also on the northern adjacent private parcel (Zaharias). Hodgson Harris reservoir is designated as No Prairie Dog (NPD) within the County's Prairie Dog Habitat Element. This is due to concerns with burrowing into the dam, which could compromise the integrity of the structure. If burrows are detected on the dam, those prairie dogs are removed. However, the County does not prioritize removal of prairie dogs from the rest of the property, unless there are neighbor complaints.

Other mammals are also currently present at the reservoir. Neighbors have seen mink (*Neovison vison*) utilizing the reservoir. This semi-aquatic member of the weasel family is opportunistic and is apparently using the prairie dog colony for prey, as well as bullfrogs, birds' eggs, etc. Anecdotally, mink have increased in numbers in the county (increased reported sightings in the past several years), as they are generalists by nature and highly adaptable.

Coyotes also frequent the general area of the reservoir. They are also highly adaptable to human dominated areas, and utilize prairie dogs for prey. They are generalists and will also prey on a variety of species including rodents, rabbits, birds, and waterfowl.

## **Vegetation and Plant Communities**

The vegetation values of Hodgson Harris and the adjacent Zaharias parcel are a mix of native and non-native plant species grouped into upland grassland plant communities, riparian and wetland communities, and aquatic plants in the reservoir and ephemeral drainages.

### **Wetlands and Riparian Communities**

The reservoir supports lacustrine (lake) fringe wetlands around the perimeter of the reservoir. These wetlands are variable in size and species based on the water fluctuations and other water quality factors. The lacustrine fringe species include cattails (*Typha* sp.), Bulrush (*Schoenoplectus* sp.) spikerush (*Eleocharis* sp.) and Emory's sedge (*Carex emoryi*). The flooding and drying of the pond has resulted in the growth of uncommon alkali wetland species occurring along the northwest corner of the reservoir. Prior to the re-construction of the dam there were large areas of wetland on the northeast side of the dam. Some of those wetlands were protected from construction activities; however, some of the wetland area was removed by construction activities. We have not re-inventoried those wetland areas post the dam re-construction. The fluctuating levels of the water also contribute to non-native aggressive weeds such as Canada thistle (*Breea arvensis*) and other water tolerant weeds.

The drainage on the northern perimeter of the Zaharias property has the typical plains ephemeral stream species such as native Coyote willows (*Salix exigua*), cattails (*Typha* sp.), Bulrush (*Schoenoplectus* sp.), spikerush (*Eleocharis* sp.), and Emory's sedge (*Carex emoryi*). This ephemeral drainage has become perennial and is supporting larger areas of mesic wetlands the length of the drainage on the two properties.

The wetland species found on the properties likely act as filtering and flood storage of water flowing from the development to the west. This complex of wetland plants and undeveloped land could be important to the water quality entering into Rock Creek.

Weedy species found in the wetlands and mesic areas include Canada thistle (*Breea arvensis*), yellow sweet clover (*Melilotus officinalis*), and white top (*Cardaria draba*).

### **Upland Plant Communities**

The upland areas can be described as non-native pasture grasses, invasive non-native grasses, and non-native forbs inter-mixed with some native prairie grasses and forbs. The presence of the prairie dogs has a large influence on the plant composition, and percent cover of the vegetation upland areas. In general the presence of prairie dogs and the fluctuations in their population size cause fluctuations in the area of tall pasture grasses and increase the bare soil on the site. However, the presence of prairie dogs has been found to reduce invasive cheatgrass (*Bromus tectorum*) while increasing native forbs and native shrubs such as scarlet globemallow

(*Sphaeralcea coccinea*), buffalobur (*Solanum rostratum*), fetid marigold (*Dyssodia papposa*), and fringed sage (*Artemisia frigida*).

The upland areas that were disturbed by the dam re-construction were seeded with a reclamation seed mix composed of native prairie grass species and was devoid of forbs or shrubs. This mix was designed to reduce weed pressures and allow BCPOS to treat those weeds with an integrated pest management strategy. The reclamation mix included the following species: Blue grama (*Bouteloua gracilis*), Sideoats grama (*Bouteloua curtipendula*), Buffalograss (*Bouteloua dactyloides*), Slender wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*), Western wheatgrass (*Pascopyrum smithii*), and Green needlegrass (*Nassella viridula*).

### **Summary of habitat values currently present at Hodgson Harris Reservoir**

The dam reconstruction project reset the ecological condition of Hodgson Harris reservoir. However, it is assumed that given appropriate time and management, the values present pre-construction could return. BCPOS staff will continue to survey the reservoir and may take steps to speed the trajectory of the ecological recovery (i.e., bullfrog eradication, invasive weed control). It should be noted however, that additional development directly adjacent to the reservoir will decrease surface permeability and increase storm water run-off into the reservoir. This will further impact water quality.

Additionally, BCPOS does not allow public access to the reservoir and recommends this closure remain due to the wildlife use that still occurs. Also, the space and seclusion provided by the open area to the north of the reservoir allows the waterfowl a relatively undisturbed area to concentrate. Development of this parcel will alter this.

As noted above, the reservoir's unique annual drawdown schedule intermittently exposes mudflats. The drawdown patterns basically mimic a playa ecosystem. This habitat type, whether human caused or otherwise, is rare in Boulder County.

#### Citations:

Jones, S. J., Bauer, S., Hansley, P., Mah, P., 2017. Hodgson-Harris Reservoir-2017 Breeding Bird Survey. Unpublished Report. 24 pp.

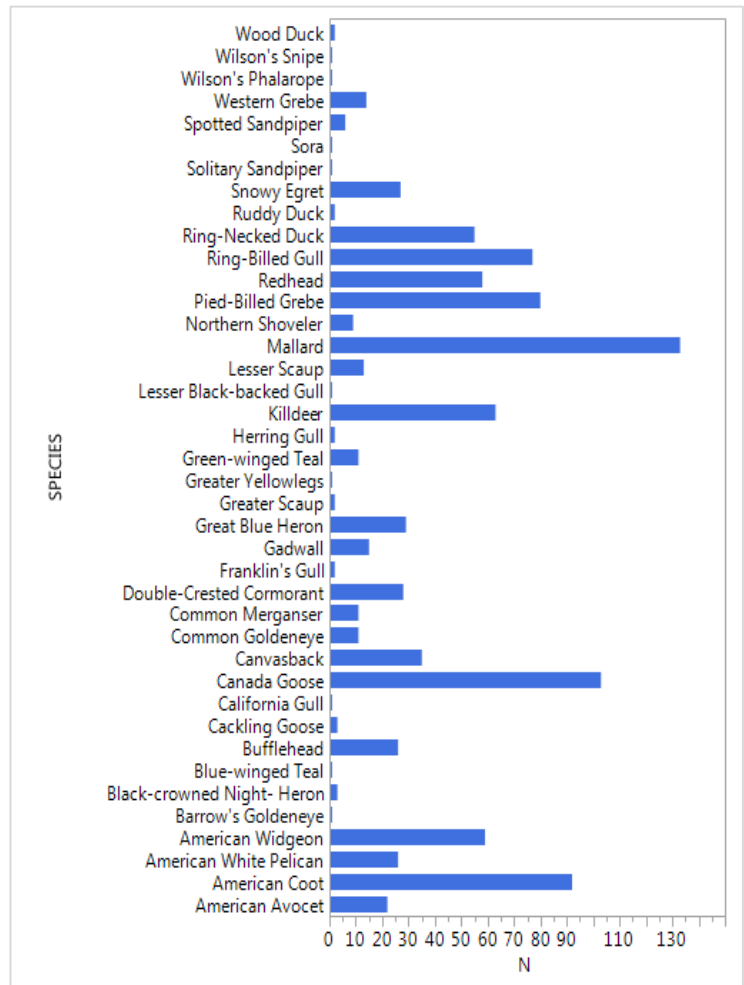
## Appendix A

### SPECIES LISTS-HODGSON-HARRIS RESERVOIR

The species lists below were created based on survey records from the Boulder County Parks & Open Space Waterfowl Monitoring Database. All species were recorded by six trained volunteers who performed a census of waterfowl and shorebird species during 138 weekly or bimonthly surveys between October 2014 and November 2017. In addition to waterfowl and shorebirds, volunteers also listed raptors, passerines, and mammals observed during some, but not all surveys.

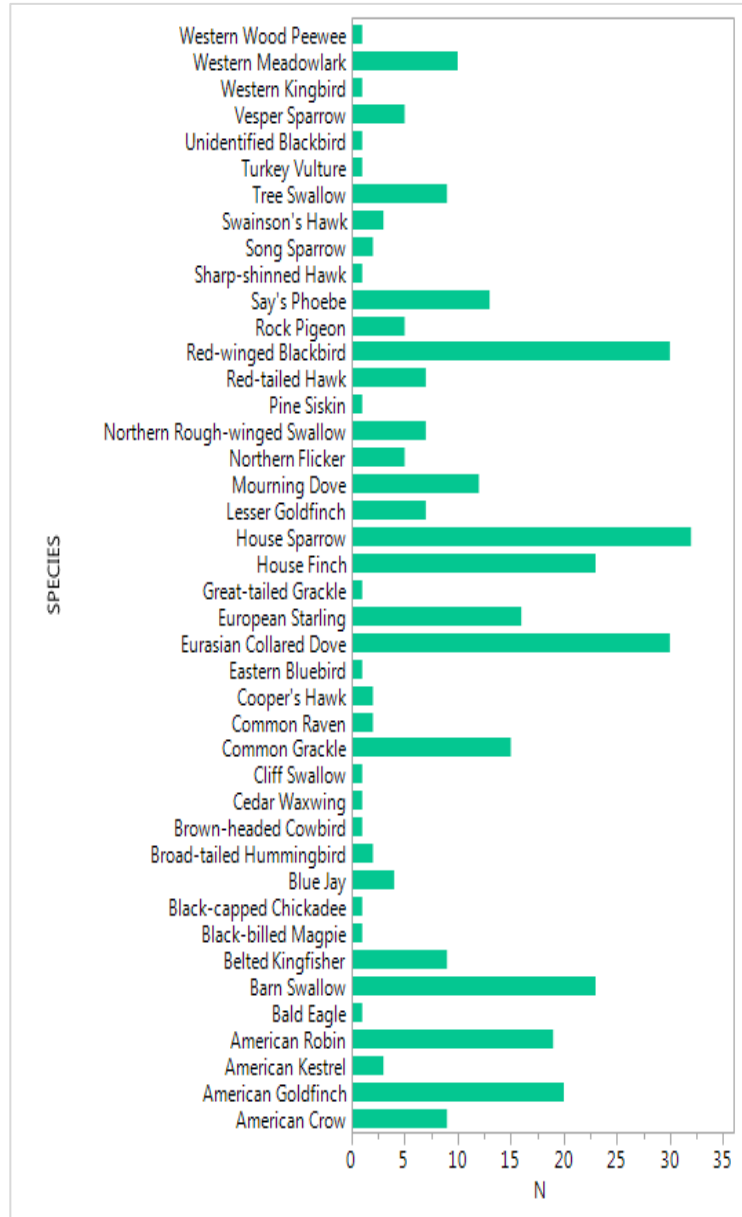
#### Waterfowl, shorebirds, gulls

- American Avocet
- American Coot
- American White Pelican
- American Widgeon
- Barrow's Goldeneye
- Black-crowned Night- Heron
- Blue-winged Teal
- Bufflehead
- Cackling Goose
- California Gull
- Canada Goose
- Canvasback
- Common Goldeneye
- Common Merganser
- Double-Crested Cormorant
- Franklin's Gull
- Gadwall
- Great Blue Heron
- Greater Scaup
- Greater Yellowlegs
- Green-winged Teal
- Herring Gull
- Killdeer
- Lesser Black-backed Gull
- Lesser Scaup
- Mallard
- Northern Shoveler
- Pied-Billed Grebe
- Redhead
- Ring-Billed Gull
- Ring-Necked Duck
- Ruddy Duck
- Snowy Egret
- Solitary Sandpiper
- Sora
- Spotted Sandpiper
- Western Grebe
- Wilson's Phalarope
- Wilson's Snipe
- Wood Duck



## Other bird species

- American Crow
- American Goldfinch
- American Kestrel
- American Robin
- Bald Eagle
- Barn Swallow
- Belted Kingfisher
- Black-billed Magpie
- Black-capped Chickadee
- Blue Jay
- Broad-tailed Hummingbird
- Brown-headed Cowbird
- Cedar Waxwing
- Cliff Swallow
- Common Grackle
- Common Raven
- Cooper's Hawk
- Eastern Bluebird
- Eurasian Collared Dove
- European Starling
- Great-tailed Grackle
- House Finch
- House Sparrow
- Lesser Goldfinch
- Mourning Dove
- Northern Flicker
- Northern Rough-winged Swallow
- Pine Siskin
- Red-tailed Hawk
- Red-winged Blackbird
- Rock Pigeon
- Say's Phoebe
- Sharp-shinned Hawk
- Song Sparrow
- Swainson's Hawk
- Tree Swallow
- Turkey Vulture
- Vesper Sparrow
- Western Kingbird
- Western Meadowlark
- Western Wood Peewee





## Parks & Open Space

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4/25/11

Hodgson Harris Reservoir

### Wildlife Recommendations

The following recommended water levels and timing are based on waterfowl migration on a general scale. Recommendations for seasonal timing are based on specific breeding chronology from species accounts for American Avocets and secondarily, Blue-winged Teal. These species have been reported as intermittent breeders at Hodgson Harris Reservoir, and are both species of interest.

Both Blue-winged Teal and American Avocet populations are subject to declines if wetland conditions in prairies deteriorate due to drought, or experience degradation due to development (USFWS 2000).

Both these species depend on prairie wetland habitat which in the U.S. and Canada, have been severely impacted (Higgins, 1977, Turner et al. 1987, Dahl 1990). In the U.S., most prairie (Northern Great Plains) states have lost about 50% of their original wetlands (Dahl 1990, Ducks Unlimited 1994). Some states (e.g., Iowa) have lost virtually all of their original wetlands (Dahl 1990).

Seasonal and temporary wetlands, which Blue-winged Teal and American Avocets tend to prefer, are subject to degradation from agricultural development (Stewart and Kantrud 1973, Lokemoen et al. 1990a). Habitats used by migrating and wintering blue-winged teal in many states have been severely impacted and are continually threatened by agricultural development, industrial and urban encroachment, hydrologic alterations, and pollution (Chabreck et al. 1989, Stutzenbaker and Weller 1989, Dahl 1990). The American avocet, due to its dependence on North American habitats for both wintering and breeding, was ranked as highly vulnerable to habitat alteration relative to western North American shorebirds as a whole (Page and Gill 1994).

Nesting time period range (Robinson et al. 1997, Rohwer et al. 2002):

American Avocet: April 15- July 30

Blue-winged Teal: May 15- August 15

### Primary recommendations based on American Avocet breeding chronology:

As possible, drawing down the reservoir in the Spring by mid-April would expose the mudflats favored by Avocets for nesting substrate. The level of drawdown could occur to 40 acre-feet, and can occur over what ever time period is appropriate, but a slow drawdown would be most beneficial. Slow drawdown would allow for gradual exposure of new, wet, mud being exposed. This is beneficial for foraging by avocets. (For information on recommendation of 40 acre-feet for minimum water to remain, see general recommendations below).

Avocets are easily detected, and if nesting does not occur within a given breeding season, water levels could fluctuate as necessary. However, certainty about whether nesting may occur in a year would depend on avocets not being present on nests by June 1.

Additionally, if avocets are nesting, observers can watch nests for fledging. As avocet fledglings are precocial, they leave the nest within 24 hours after hatching. At this time, which may occur before July 30, filling the reservoir could occur, as long as some mudflats remain available for foraging. The



## Appendix B Continued

amount of mudflats appropriate will be determined by the number of individuals utilizing the area, but in general, not filling the reservoir past 70 acre-feet would likely be sufficient. We will be adaptive in this, however, as necessary.

Annual monitoring for American Avocets:

We recommend surveys for American Avocets commence April 15 annually. If water levels are at 40 acre-feet on April 15, and no avocets appear before May 1, gradual filling of the reservoir may occur starting on May 1, but not exceed 65 acre-feet by June 1. However, if nesting is observed, filling should cease for the remainder of the breeding season.

Recommendations based on Blue-winged Teal breeding chronology:

During the breeding season, we recommend water levels to remain at a minimum of 40 acre-feet, and maximum of 65 acre-feet. Blue-winged teal nest in vegetated upland habitat, and therefore are not dependent on mudflat exposure. However, records of past nesting show that teal nested on the south side of the reservoir near the cluster of existing willows. These willows are not inundated with a water level of 65 acre-feet.

Blue-winged teal are easily detected, and if nesting does not occur within a given year, water levels could fluctuate as necessary. However, certainty about whether nesting may occur in a year would depend on teal not being present on nests by June 1.

Additionally, if teal are nesting, observers can watch nests for fledging. As teal fledglings are precocial, they leave the nest within 24 hours after hatching. At this time, which may occur before August 15<sup>th</sup>, filling the reservoir could occur without causing harm to individuals.

Annual monitoring for Blue-winged Teal:

We recommend surveys for Blue-winged Teal commence April 15 annually. If water levels are at 40 acre-feet on April 15, and no teal appear before May 1, gradual filling of the reservoir may occur starting on May 1, but not exceed 65 acre-feet by June 1. However, if nesting is observed, filling should cease for the remainder of the breeding season.

Spring Waterfowl Migration

Spring migration typically occurs Feb 15- April 30<sup>th</sup>. Any level of water would be suitable for this migration, but it is recommended that at least 40 acre-feet remain during this time period. The recommendation for this level is based on observations made during October 2010- April 2011. The water level was at approximately 20-30 acre feet during this time period. Increasing the minimum level to 40 acre-feet would be beneficial to gastropods, and well as being aesthetically pleasing to the public. Additionally, this level of water would likely benefit a greater variety of waterfowl, due to differences in diving depths for each species of diving duck.

Fall Waterfowl Migration

Fall migration occurs as early as August 15<sup>th</sup>, and typically concludes by November 1<sup>st</sup>. Any level of water would be suitable for this migration, but it is recommended that at least 40 acre-feet remain during this time period. (See above "Spring Migration")

Winter

Leaving the most water possible in the reservoir over the winter months could benefit overwintering birds. The more water stored, the less likely it is to freeze over completely. Unfrozen, open water is limited in Boulder County during the winter months.

In addition, deep water may protect the gastropod population from predation by diving ducks. This would allow some level of recovery to then be utilized by foraging ducks in the spring after drawdown.

#### General Recommendations and Additional Information:

We recommend a range of water level from 40-65 acre-feet, during the breeding season for American avocet and Blue-winged teal, with 40 acre-feet being the minimum. We have determined that 40-acre feet would provide a water level (and depth) suitable for use by a diversity of waterfowl, as well as being aesthetically pleasing.

As necessary to maintain the County's water rights, complete filling of the reservoir will need to occur at least once per decade. It is recommended that complete filling occur after August 15<sup>th</sup> and remain until Mid-April of the following year, as possible. However, if drawdown cannot occur before Mid-April, it would be unlikely that avocets would nest in that year, as there would be no mudflat exposure. In the years necessary to fill to full capacity, if no nesting occurred by either American avocets or blue-winged teal, this would not be considered a direct adverse impact to either species. However, filling to full capacity during April 15-Aug 15, if nesting is confirmed in that year, could directly impact these species.

All recommendations are based on our best estimation of what would be beneficial for waterfowl and American avocets and blue-winged teal specifically. However, if it is determined that our guidelines are not sufficient, we request that adaptive management occur.

Additionally, as it is likely that the parcel north of Hodgson Harris will be developed, we foresee the value of the wildlife habitat decreasing significantly. After development occurs, we recommend continuous monitoring of waterfowl nesting. If nesting no longer occurs due to this development, our recommendations may no longer be relevant.

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