ENVIRONMENTAL ASSESSMENT

ZEBRA MUSSEL and COMMON CARP CONTROL & FISH RENOVATION PROJECT GLENN CUNNINGHAM LAKE OMAHA, DOUGLAS COUNTY, NEBRASKA

Prepared by:

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FINDING OF NO SIGNIFICANT IMPACT
ZEBRA MUSSEL and COMMON CARP CONTROL
& FISH RENOVATION PROJECT
GLENN CUNNINGHAM LAKE
OMAHA, DOUGLAS COUNTY, NEBRASKA
October 2018

In accordance with the National Environmental Policy Act and implementing regulations, an Environmental Assessment (EA) has been prepared to evaluate the effects of the proposed Zebra Mussel and Common Carp Control & Fish Renovation Project at Glenn Cunningham Lake in Omaha, Douglas County, Nebraska. The EA was prepared to determine if the proposed scope of work and associated impacts would result in any significant impacts to the human environment. The proposed project consists of drawing the water surface elevation of the lake down to 1101 feet mean sea level during the 2018 fall and winter months, maintaining the lake in the drawn-down condition over the winter to desiccate and freeze zebra mussels, applying the chemical Rotenone to any pools remaining in the lake to control the common carp, allowing the lake to naturally refill with snow melt, rain, and runoff, and then renovating the fishery with desired sport fish. The project would control the populations of two invasive species from the lake, help prevent their spread to other nearby waterways, and increase recreational enjoyment within the lake.

Six alternatives were considered: Alternative 1 - No Action (dismissed because it would not meet the project purpose and need, which is to control the invasive zebra mussel and common carp within the lake and renovate the sport fishery), Alternative 2 – Signage and Education (dismissed as a stand-alone project but implemented in conjunction with the preferred alternative), Alternative 3 – Decontamination Stations (dismissed from consideration due to the high costs of implementation and because it would not address common carp control), Alternative 4 – Lake Closure to Future Watercraft Use (dismissed because it would eliminate an important beneficial use (recreation) from the lake), Alternative 5 –Partial Lake Draw Down with Chemical Application (although meeting the purpose and need, this alternative was dismissed due to the extra cost associated with Rotenone treatment to a half-full lake), and Alternative 6 – Full Lake Draw Down with Chemical Application (**Preferred Alternative**). A subset of Alternative 6 included electro-shocking in pools, harvesting fish, and reintroducing harvested fish in lieu of Rotenone. This subset alternative was dismissed due to the potential reintroduction of zebra mussel veligers into the lake when the fish are reintroduced. The No Action Alternative, although dismissed, was carried forward in order to provide a baseline upon which to compare the impacts of the preferred alternative.

The environmental consequences of the proposed action on the physical, biological, and cultural resources have been evaluated. The factors that were influential in the review included (a) the proposed project will allow for the control of zebra mussels and common carp, and allow for renovation of the sport fishery in the lake, (b) no significant adverse impacts to cultural or historical resources are anticipated; (c) federally endangered and threatened species, and wetlands will not be impacted by the proposed project; (d) all applicable federal and state regulations will be met prior to project initiation, and (e) the resource agencies had no objections to the proposed action nor are there significant unresolved issues.

The EA and comments received from the resource agencies were used to determine whether the proposed action would require the preparation of an Environmental Impact Statement (EIS). All physical, biological, and cultural resources relevant to the proposal were considered in this EA. The preferred alternative is in compliance with applicable environmental statutes.

It is my finding, based on the EA that the proposed federal activity will not have any significant adverse impacts on the environment and will actually result in significant beneficial impacts at the lake. The preferred alternative will not constitute a major federal action significantly affecting the quality of the human environment. Therefore, an EIS does not need to be prepared.

Date: _____

_____
John L. Hudson, P.E.
Colonel, Corps of Engineers
District Commander

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1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE), Northwestern Division, Omaha District (NWD-NWO), has prepared this Environmental Assessment (EA) to evaluate the potential impacts of drawing down Glenn Cunningham Lake (lake) at the request of the Nebraska Game and Parks Commission (Commission) and the City of Omaha, Nebraska (City) in order to control zebra mussels and common carp. The proposed project would consist of drawing the water surface elevation of the lake down to 1101 feet mean sea level during the fall and winter of 2018; maintaining the lake in the drawn-down condition over the winter to desiccate and freeze zebra mussels; applying the chemical Rotenone during the drawn-down period to control the existing common carp population; allowing the lake to naturally refill with snow melt, rain, and runoff; and renovating the fishery with desired sport fish once the lake has refilled. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality's (CEQ) Regulations (40 CFR 1500-1508), as reflected in the USACE Engineering Regulation: ER 200-2-2. This EA provides sufficient information on the potential adverse and beneficial environmental effects to allow the Omaha District Commander to make an informed decision on whether a Finding of No Significant Impact (FONSI) is appropriate, or if an Environmental Impact Statement would be required. If the EA indicates that no significant impact is likely, then the agency can release a FONSI and implement the proposed action.

1.1 PROJECT LOCATION

Glenn Cunningham Lake is located within the city limits of Omaha, Douglas County, Nebraska. North 96th Street lies to the west of the lake, State Highway 36/Bennington Road lies to the north, North 84th Street lies to the east, and State Street/Lake Cunningham Road lies to the south. Glenn Cunningham Lake is located in Section 2, Township 12 North, and Range 12 East. Please refer to Figure 1 for the proposed project location.

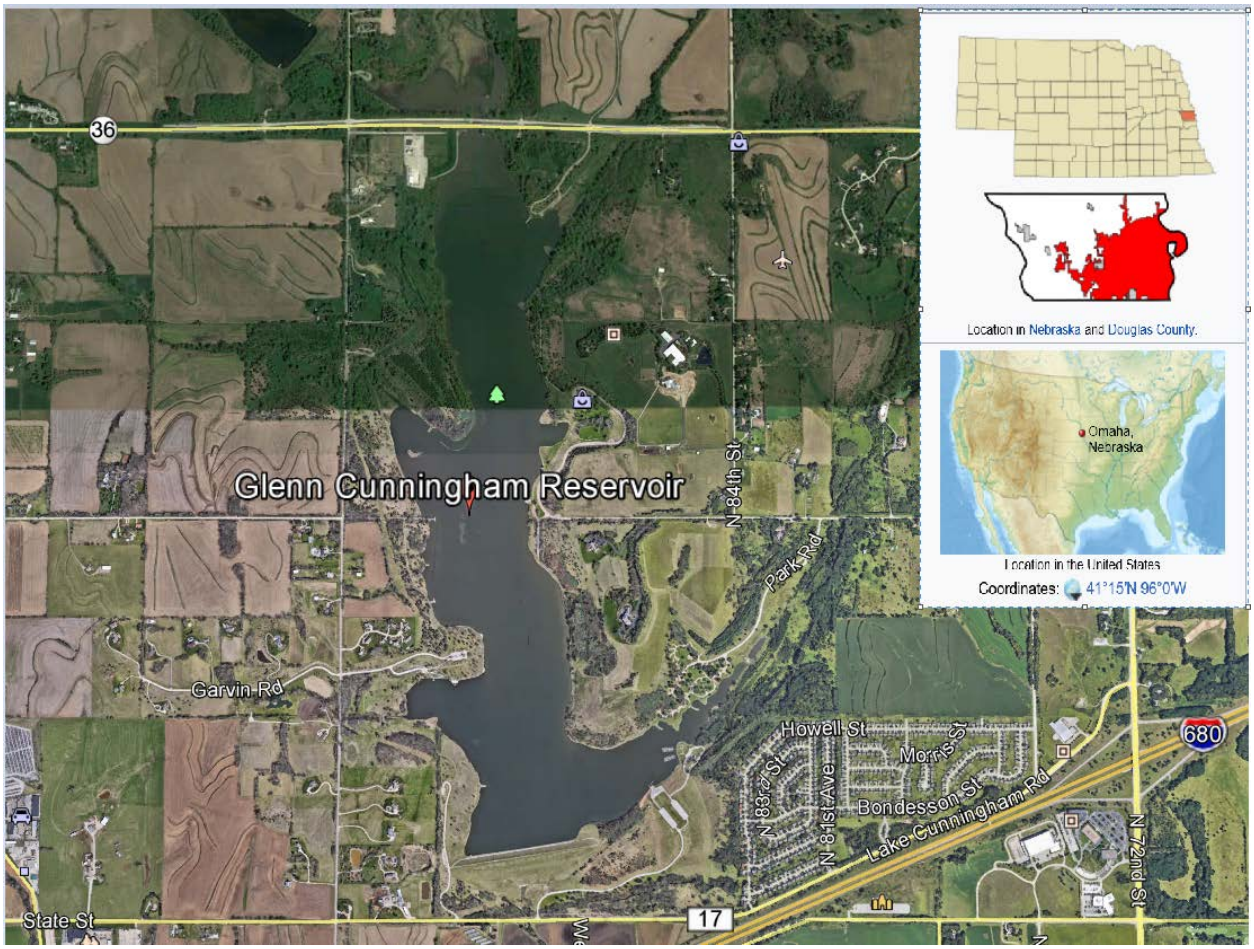

Figure 1. Location of Glenn Cunningham Lake, Omaha, Douglas County, Nebraska.

1.2 PROJECT HISTORY

Glenn Cunningham Lake is an approximately 337- surface acre reservoir that was constructed by the USACE for flood control, recreation, water quality, and fish and wildlife resources. It was opened to the public in 1977. The lake is supplied primarily by the Little Papillion Creek and four small tributaries to the Little Papillion Creek. The USACE owns and operates the dam and surrounding project lands. The City leases the site from the USACE and administers and maintains the reservoir's recreational facilities. From 2006 to 2010, the Commission and the City constructed an aquatic habitat restoration project at the lake. The purpose of the restoration project was to restore and maintain a quality sport fishery by improving water quality, depth diversity, and shoreline and wetland quality. The reservoir was drained in 2006, sediment was removed in 2007 and 2008, shore line stabilization was added in 2008 and 2009, and upstream wetland development was initiated in 2010.

Northeast of Highway 36/Bennington Road and Glenn Cunningham Lake lies Lonergan Reservoir (Figure 2). This 130-acre reservoir is located on private property and is hydraulically connected to Glenn Cunningham Lake via the Little Papillion Creek. A variety of sport fish are

found in the reservoir including smallmouth bass, largemouth bass, catfish, northern pike, and crappie. The common carp also is known to occupy this reservoir. During periods of high precipitation and runoff, this reservoir overflows and spills into the Little Papillion Creek taking various fish from the reservoir along with it. It is believed that 'overflow' of common carp from this reservoir was responsible for the existing population of common carp in Glenn Cunningham Lake. For this reason, the Commission is currently working with the landowner of Lonergan Reservoir to address the common carp issue within the reservoir and proposes to draw down this reservoir and treat it with Rotenone in concert with the proposed project.

Figure 2. Location of Lonergan Reservoir, Omaha, Douglas County, Nebraska.

On May 24, 2017, the Commission discovered veligers, the mobile early life stage of the invasive zebra mussel in water quality samples that were taken from the lake. On July 17, 2018, the Commission discovered adult zebra mussels on a settling plate placed at the boat ramp. Because zebra mussels of both life stages had been detected, there were strong indications that a breeding population of zebra mussels existed in the lake. To prevent the zebra mussel from spreading throughout the lake or being transported to other area waterways, immediate steps to control the species were considered. In addition, because the Commission was considering manipulating the lake in some way to control zebra mussels, they also considered alternatives to control the population of the invasive common carp that currently resides within the lake.

Zebra mussels (*Dreissena polymorpha*), Figure 3, are native to Eastern Europe and Western Asia, and are primarily located in the Black and Caspian seas. Zebra Mussels are believed to

have been introduced to the U.S. through commercial boat traffic in and around the Great Lakes region in the 1980's. To date, zebra mussels have spread throughout much of the country, to include much of the Eastern U.S., to as far north as Montana and as far west to California. The two main factors contributing to the quick infestation of the zebra mussel in the U.S. are: the lack of a natural predators and an incredibly fast reproductive cycle. While it is known that a few ducks, crayfish, and fish species (gizzard shad, rock bass, blue catfish, white bass, and walleye) will eat the zebra mussel, predation on zebra mussels in the U.S. has not been shown to have an impact on reducing the documented populations of the mussels.

The reproductive cycle of zebra mussels is adapted for quick dispersal in water. The zebra mussel uses external fertilization which results in a free floating planktonic veliger stage. Veligers are not visible unless viewed under a microscope. It may take veligers up to 240 days to reach the adult stage: having a bivalve shell that is attached to substrate with byssal threads. The byssal threads allow zebra mussels to attach to any hard surface such as: rocks, boat docks, intake pipes, boats, and some animals. As an adult, zebra mussels are prolific filter feeders and large colonies can quickly filter a water body so that there are virtually no plankton or algae remaining, much to the detriment of desired native aquatic species. A female zebra mussel can release as many as one million eggs during a single season. Between 2000 and 2010, the U.S. Fish and Wildlife Service had estimated that the approximate economic impact of zebra mussels on the Great Lake region alone has been near $5 billion dollars.

Figure 3. Zebra Mussel (*Dreissena polymorpha*).

Common carp (*Cyprinus carpio*), Figure 4, are native to Europe and Asia, and have been introduced to every part of the world except for the poles. Listed as a Category 3 Invasive Species in Nebraska, carp are regarded as a pest due to their ability to out-compete native fish stocks. Carp can grow to very large sizes if given adequate space and nutrients. Although tolerant of most conditions, common carp prefer large bodies of slow or standing water and soft, vegetative sediments. Carp are able to tolerate water with very low oxygen levels by gulping air at the surface. Carp are omnivorous (eat both plants and animals) and will eat aquatic plants but prefer to scavenge the bottom of their habitat for insects, crustaceans, crawfish, and benthic

worms. This scavenging behavior is known to re-suspend sediment into the water column and result in negative impacts to water quality.

A typical adult female can lay up to 300,000 eggs in a single spawn. Although they typically spawn in the spring in response to rising water temperatures and rainfall, carp can spawn multiple times in a season. Carp that survive to the juvenile stage are preyed upon by other fish such as northern pike and largemouth bass, and a number of bird species including cormorants, herons, and osprey. Mammals, including otter and mink, also prey upon juvenile carp. As carp grow to adulthood, predation is greatly reduced due to the enormous size that the carp can attain. Carp are selectively desired as a sport and food fish by many fishermen, making their 'invasive' status sometimes questionable among those who actively fish for this species.

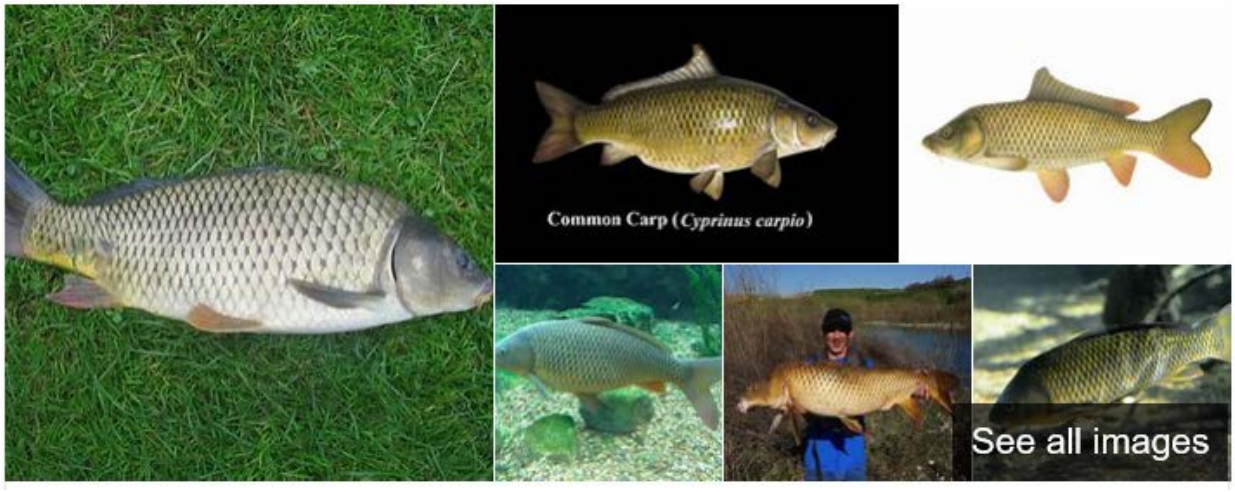

Figure 4. Common Carp (*Cyprinus carpio*).

1.3 PROPOSED ACTION

The proposed action would consist of drawing down the water level in Glenn Cunningham Lake to elevation 1101 feet mean sea level beginning on or about October 1, 2018, with complete drawdown occurring on or near December 1, 2018. The draw down is proposed to control the recently-discovered population of zebra mussels and to renovate the existing fishery. The timing of the draw down would be conducted after zebra mussel veligers stop being produced, which generally coincides with water temperatures below 10-12 degrees Celsius (50-54 degrees Fahrenheit). The drawdown would expose zebra mussels to cooling air temperatures over the fall and winter, causing them to desiccate and freeze. Additionally, the drawdown would be used to help renovate the fishery, and Rotenone would be used for this purpose. Rotenone would be applied in the late fall or early spring depending on when the lake is actually fully drawn down. By waiting for the lake level to be completely drawn down, the amount of chemical needed to complete the fish kill would be greatly reduced. After the Rotenone treatment, the lake would be allowed to refill through natural snow melt, rain and runoff. It is estimated that refill would take only one season provided an average participation occurs. If below average participation occurs, the refill may take an additional season.

1.4 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed project is to prevent the long-term establishment of zebra mussels and common carp within the lake; implement a monitoring plan to investigate any reoccurrence of the two species; and renovate the existing fish community within the lake. The recommended plan is intended to control the zebra mussel and common carp populations and thereby prevent aesthetic and aquatic recreational impacts. The project is expected to control these nuisance species, protect the long-term recreational functions of the lake, and reduce the potential for spread of the nuisance species to other water bodies in the general vicinity of Glenn Cunningham Lake.

The need of the proposed project is to prevent an ecological shift within Glenn Cunningham Lake, maintain recreational activities at the lake, and control the spread of the mussels and common carp to other area water bodies. If left unchecked, a dense population of zebra mussels, through normal filter feeding, are likely to remove much of the phytoplankton and zooplankton at the surface region and shift productivity to the benthic region. This shift would negatively impact native aquatic species feeding that are used to feeding at or near the surface. In addition, without a significant increase in maintenance activities, the zebra mussel colony could expand and encrust on the hard surfaces within the lake (boat ramps, boat docks, outfall pipes, and shorelines) rendering them hazardous (via sharp shells) and creating visual and safety-related impacts. The spread of zebra mussels to any other Nebraska water source is a major concern to municipalities and power companies who have intake structures located in these areas. In addition, the need to remove the common carp and renovate the lake's fish species is desired in order to once again return the lake to a quality sport fishery like it was following the 2006-2010 lake renovation project.

2.0 ALTERNATIVES

2.1 ALTERNATIVES CONSIDERED BUT NOT SELECTED

2.1.1 ALTERNATIVE 1 – (No Action)

The No Action Alternative is defined as maintaining the status quo with no actions being funded or completed to control zebra mussels, the common carp, or renovate the fishery in Glenn Cunningham Lake. Under this alternative, the zebra mussel population would increase and cause an ecological shift in the lake through filter feeding and removal of phytoplankton and zooplankton to the detriment of native fish and wildlife species. The common carp population would increase and cause habitat manipulation and water quality impacts to the detriment of native fish and wildlife species. In addition, zebra mussel and common carp expansion would interfere with the recreational opportunities for boaters and anglers as recreational surfaces become encrusted with zebra mussels and native fish are forced to complete for food and space with an ever increasing carp population. The No Action Alternative would leave Glenn Cunningham Lake as a source pool for zebra mussel dispersion by recreational users. This alternative would not meet the projects purpose and need. For these reasons, this alternative was

not selected. However, the No Action Alternative has been carried forward in the planning process in order to provide a comparison between it and the Preferred Alternative.

2.1.2 ALTERNATIVE 2 – Signage

Alternative 2 consists of adding signage at access points around the lake to step-up education on the environmental, social, economic, and recreational problems associated with zebra mussels. The signs also would provide the public with watercraft cleaning and drying techniques to eliminate the spread and contamination of other water bodies by zebra mussels. The City, the Commission, and the USACE all agreed that signage would be useful and in mid-August 2018, various signs were erected at Glenn Cunningham Lake (Figure 5). Additionally, the team agreed that signage on its own would not meet the purpose and need of the proposed project. This alternative would not control the existing zebra mussel population, prevent the spread of zebra mussels from this lake to others, address the common carp issue, or provide a fishery renovation. As such, this alternative was implemented but not selected as a stand-alone project. This alternative will be added to implementation of the preferred alternative.

Figure 5. Zebra Mussel Signage Placed at Glenn Cunningham Lake.

2.2.3 ALTERNATIVE 3 – Purchase, Man, and Employ Decontamination Stations

Alternative 3 consists of purchasing, manning, and employing decontamination stations. Decontamination stations generally consist of a high-pressure spray hose and a certified technician capable of properly cleaning watercraft removed from an invested waterbody. Cleaning would consist of removing mud, plants, animals, or other debris from the watercraft, trailer, and other aquatic equipment that came into contact with the lake water. The certified technician would then wash the watercraft and other equipment inside and out, flushing the ballast tanks, bilge, live wells, and motor with high-pressure scald water. A decontamination certification of proper cleaning then would be affixed to the watercraft so that the owner could provide documentation of proper cleaning when the watercraft is taken to the next waterbody on its next outing. Decontamination stations and the cleaning procedures would be employed at each waterbody infected with zebra mussels. Cleaning of the watercraft would be required after each aquatic use at each infected waterbody and before leaving the vicinity of the infected waterbody.

In the absence of official decontamination technician, the watercraft recreationalist could be requested (via signage) to voluntarily take it upon themselves and make it a habitat of removing mud, plants, animals, or other debris from their watercraft; draining ballast, bilge, live wells, and motors; and allowing the water craft to dry for an appropriate time (estimated at seven days during summer heat, 18 days in spring and fall conditions, and 30 days or more in the winter. Allowing the water craft to freeze for approximately 3 days in the winter between uses also would be considered adequate control to kill zebra mussels and prevent spread of zebra mussels in other waterbodies.

Decontamination stations are difficult to operate and manage without sufficient and on-going funding. First the equipment must be purchased and technicians must be properly trained. Then the decontamination stations would have to be manned throughout the boating season to ensure all watercraft in contact with infected waterbodies are being properly cleaned after each use and before leaving the infested vicinity. Currently, the City and the Commission do not have the budgets to allow for purchase and effective operation and management of decontamination stations but are currently discussing ways to include this in the future. Because this alternative requires a sufficient budget for operation and management, and no budgets currently provide that funding, this alternative was dismissed from further consideration.

A subset of this alternative would be to provide signage with instructions to allow individual watercraft owners to personally clean, drain, and dry their watercrafts after each usage. While this would be another method to help prevent the spread of zebra mussels, some individuals may elect to not use the stations for unknown reasons, because it may be considered time-consuming, or because they feel it is not really necessary. Signage to clean, drain, and dry watercraft has been erected at Glenn Cunningham Lake.

Finally, while both official decontamination stations and signage would help reduce the spread of zebra mussels from Glenn Cunningham Lake to other area waterbodies, these alternatives would not address the current population of zebra mussels currently in the lake, nor control of the

common carp from the lake, and; therefore, not address the entire purpose and need of the proposed project.

2.2.4 ALTERNATIVE 4 –Lake Closure to Future Watercraft Usage

Under Alternative 4, Glenn Cunningham Lake would be closed to all future usage of any type of watercraft. Glenn Cunningham Lake was designed and constructed in 1977 with public recreation in mind. The lake and its surrounding areas are used for recreation on a continual year-round basis. Because of the popularity and usage of Glenn Cunningham Lake as a recreational facility within the city limits of Omaha, it was decided that this authorized purpose should be maintained. In addition, closing the lake to watercraft would not address the current problems with the existing zebra mussel and common carp populations. For these reasons, this alternative was dismissed from further consideration.

2.2.5 ALTERNATIVE 5 – Partial Draw Down of the Lake (to Approximate Elevation 1110) to Control Zebra Mussel Followed by Chemical Application to Eliminate Common Carp

Zebra mussels require an environment with a concentration of at least five parts per million (ppm) of dissolved oxygen in order to ensure long term survival. Water quality depth profiles conducted in the spring and summer of 2018 at Glenn Cunningham Lake noted dissolved oxygen concentrations of approximately eight ppm at the waters' surface, with sharp declines of dissolved oxygen at subsequent depths. Dissolved oxygen concentrations fell below five ppm at a depth of roughly five feet below the surface. The depth profiles showed that concentrations of dissolved oxygen dropped to zero ppm at a depth of roughly 10 feet below the surface. This was expected due to seasonal thermal stratification of the water column. From this water quality sampling, it was determined that zebra mussels would not be able to survive at any depth below 10 feet from the surface in Glenn Cunningham Lake.

Zebra mussel adults use byssal fibers to attach to hard surfaces and remain attached to their selected surface for the rest of their lives. Hard surfaces at Glenn Cunningham Lake consist of rock riprap, the recreational boat docks, the boat ramp, a kayak launching facility, and natural rocks along the shoreline. None of these features are found 10 feet below the surface. It is believed that, in combination with zero ppm dissolved oxygen at this level, no zebra mussels are likely to occur at or below elevation 1110 mean sea level.

Under Alternative 5, the lake would be drawn down to approximate water surface elevation of 1110 (10-11 feet below the surface), be maintained at this level over the fall and winter months to desiccate and freeze zebra mussel, then allowed to naturally refill with snow melt, rain, and runoff. This would effectively control the zebra mussel population to the greatest extent possible and meet part of the purpose and need of the proposed project.

Because common carp control also is part of the purpose and need, prior to refill, the remaining water within the reservoir, approximately half of the total volume at normal surface elevation or 1,955 acre feet (conservative estimate) would need to be treated with a chemical application. Rotenone is the chemical of choice (see Appendix A). Rotenone is a natural piscicide

(poisonous to fish) obtained from the root of a South American plant in the family Leguminosae and has been used for centuries by multiple people world-wide to kill or stun fish. Rotenone is a nonsystemic, selective chemical that interferes with the utilization of oxygen in primarily gill-breathing invertebrates and vertebrates. It is harmless to plants, birds, and mammals when used to concentrations designed to kill fish. Rotenone is generally applied at concentrations of five percent active ingredient to target common carp. Approximately one gallon of Rotenone at five percent concentration is needed per acre-foot of water volume to work effectively. The cost of a gallon of Rotenone ranges from $50 to $80. Given these parameters (1,955 acre feet of water = 1,955 gallons of Rotenone x $70 per gallon), the cost to treat the remaining water to control the common carp would be in the neighborhood of $137,000. Given the high cost of this amount of chemical and the Commissions current budget, this alternative was dismissed from further consideration.

2.2 PREFERRED ALTERNATIVE

2.2.1 ALTERNATIVE 6 – Full Draw Down of Lake (to approximant elevation 1101) to Control the Zebra Mussel Population Followed by Chemical Application to Control Common Carp

Under Alternative 6, the lake would be fully drawn down to approximate water surface elevation of 1101, be maintained at this level over the fall and winter months to desiccate and freeze zebra mussels. While the lake is in the drawn-down condition, the entire park would be closed to all citizens to reduce safety risks involved with ice formation and exposed sediments/mud. The chemical Rotenone would be applied to any remaining pools of water contained within the lake to kill the common carp. Rotenone would be applied during either the fall or spring months depending upon when full draw down levels could be achieved. If full draw down could occur before winter freeze, Rotenone could be added to the remaining pools at that time. If full draw down is achieved but winter freeze begins to set in before Rotenone could be applied, Rotenone would be applied the following spring after/during winter melt. Following the Rotenone application, the lake would be allowed to naturally refill. It is believed that lake refill would take only one season under normal precipitation events. Under drier conditions, it might take up to two seasons to refill. Under this alternative, draw down is proposed to begin in early October 2018 and to be completed on or before December 1, 2018. After the lake refills, the Commission would restock the lake with a variety of desired sport fish. Proposed restocking would consist of hatchery-sized fish, one-year old fish, and adult –sized fish. This proposed alternative would effectively control both zebra mussel and common carp, and allow for fish renovation. It is estimated, from the last draw down of the lake in the 2007, that approximately 168 acre-feet of water would remain in pools once the lake is fully drawn down. Based on this estimate (168 acre-feet of water = 168 gallons of Rotenone x $70 per gallon), the cost to treat the pools in the fully drawn down lake would be in the neighborhood of $12,000. Waiting the treat the water when the lake is fully drawn down results in substantial savings in both the amount of Rotenone applied and in costs. For these reasons, this alternative was selected as the **Preferred Alternative**.

A subset of this alternative included the use of electro-shocking fish, harvesting the fish, and reintroducing the fish to the lake in lieu of the Rotenone application. Electro-shocking would

allow the culling of common carp and the harvest of native sport fish. The native fish could be retained over the winter and spring months and re-introduced to the lake following its refill. Because zebra mussels are present in the lake, the harvesting, retaining, and reintroducing desired native fish back into Glenn Cunningham Lake presents a problem. There is the possibility of moving veligers along with the native fish and then reintroducing those veligers back into the system, which would effectively void the entire project. There are some precautions that could be employed to minimize the possibility of veliger reintroduction, such as using well water and Edwards Treatment (treating with potassium chloride and formalin to kill any zebra mussels that might be in the transfer water) in the transfer and holding tanks; however, the risks of a possible reintroduction of veligers back into Glenn Cunningham Lake far outweigh the benefits of restocking with harvested fish and potential live zebra mussel. For this reason, this subset of Alternative 6 was dismissed from further consideration.

Table 1 provides a summary of the effects of implementing the No Action Alternative and the Preferred Alternative. Chapter 3 discusses in detail the resources in the affected area and the potential impacts on those resources from implementation of the No Action Alternative and Preferred Alternative.

Table 1: Summary of potential effects by alternative

Resource	Alternative 2 – (Preferred) Full Draw Down of the Lake Followed by Chemical Application.	Alternative 1 – No Action
Water Quality	Major long-term benefits by allowing normal lake functions and maintaining dissolved oxygen levels. Minor, short-term adverse effects to downstream water quality if anoxic/hypoxic water is released, minimized with timing of water release.	Long-term negative impacts as zebra mussels filter out and remove nutrients and cause an ecological shift to the detriment of native species. Long-term negative impacts to dissolved oxygen levels from common carp life history behaviors.
Fisheries, Wildlife, and Aquatic Life	Long-term benefits to fish through restocking efforts and removal of invasive species. Short-term adverse effects to fish through competition for food and space in pools following draw down. Short-term adverse effect to aquatic insects, amphibians and reptiles through exposure and freezing during draw down. No impact to wildlife that feed on fish treated with Rotenone.	Major, long-term adverse impacts to fish and aquatic life through the removal of nutrients from zebra mussel and common carp feeding activities, reducing phytoplankton and zooplankton abundance at the surface and causing an ecological shift to the detriment of native species.

Aesthetics	Minor and temporary impacts to the viewshed from having the lake in a drawn down state. Short-term adverse odors from exposure of nutrient-rich material. Minor and short-term visual and olfactory impacts from dead fish. Long-term benefits from the removal of encrusting zebra mussels.	Major, long-term visual effects from zebra mussels encrusting all hard surfaces within the lake.
Health and Safety	Potential short-term safety issues from individuals entering the drawn down lake. Minimized with warning signs, and park closure. Long-term benefits from the prevention of sharp zebra mussel shells near the shoreline.	Major, long-term adverse impacts from sharp zebra mussel shells along the shoreline and recreational boat ramps, docks, and other facilities.
Recreation	Long-term beneficial impacts from no potential of encrusting recreational facilities by zebra mussel shells. Long-term beneficial impacts from a restore sport fishery. Minor, short-term impacts during winter and spring recreation activities from the park closure.	Long-term, adverse impacts to recreational facilities from potential zebra mussel encrustation. Long-term, adverse impacts from potential overabundance of plant growth, minimizing water use. Long-term, adverse impacts to the sport fishery through competition with the two invasive species.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter presents an analysis of each resource topic that was identified as having a potential to be affected by implementation of the Proposed Action. Each section describes the environmental setting as it relates to that specific resource topic; and the direct and indirect effects that could result from implementation of the Proposed Action. Impacts are quantified whenever possible. Qualitative descriptions of impacts are explained by accompanying text where used. Also, see Table 1 for a summary of impact to resources by alternative.

"Significance" has been analyzed in this document in terms of both context (sensitivity) and intensity (magnitude and duration):

- Magnitude
    - Minor – noticeable impacts to the resource in the project area, but the resource is still mostly functional.
    - Moderate – the resource is impaired, so that it cannot function normally.
    - Major – the resource is severely impaired so that it is no longer functional in the project area.
- Duration
    - Short term – temporary effects caused by the construction and/or implementation of a selected alternative.

- Long term – caused by an alternative after the action has been completed and/or after the action is in full and complete operation.

A wide variety of resources along with the related environmental, economic, and social effects were considered during the development and evaluation of project alternatives. These included water quality, noise levels, air quality, terrestrial vegetation, wildlife and fish, threatened and endangered species, wetlands, riparian vegetation, aquatic vegetation, agricultural lands, geological resources, archaeological and historic resources, aesthetics, health and safety, and recreation.
Primary resources of concern identified during the evaluation of the recommended plan and the no action alternative include: noise levels, air quality, water quality, terrestrial vegetation, wildlife and fish, threatened and endangered species, wetlands, riparian and aquatic vegetation, geologic resources, archeological and historic resources, aesthetics, health and safety, and recreation.

Considering the primary resources identified above and after an initial evaluation, it was determined that the recommended plan and the no action alternative would not affect noise, air quality, terrestrial vegetation, threatened and endangered species, wetlands, riparian vegetation, aquatic vegetation, geology, or cultural resources. As such, these resources are not discussed further in this Environmental Assessment.

3.1 WATER QUALITY

This resource is institutionally important because of the Federal Water Pollution Control Act Amendments of 1972 (Clean Water Act). The objective of this act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters by preventing point and non-point pollution, providing assistance to publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. Water quality is technically important because of the need for a reliable drinking water supply, for swimming and recreating, for fish and shellfish consumption, for adequate agricultural supply, and for habitat for fish and wildlife. It is publicly important because of the desire for clean water expressed by virtually all citizens.

Glenn Cunningham Lake was listed on the Nebraska Department of Environmental Quality's Section 303(d) List of Impaired Waters as Category 4R in the 2016 Integrated Report. A Category 4R designation means the waterbody exceeds the impairment threshold, however a Total Maximum Daily Load (TMDL) is not appropriate at this time. The 4R category is used for nutrient assessments in new or renovated lakes and reservoirs. Newly filled reservoirs usually go through a period of trophic instability with a trophic upsurge followed by a trophic decline. Erroneous or non-representative water quality assessments are likely to occur during this period. To account for this, all new or renovated reservoirs are placed in this category for a period not to exceed eight years following the fill or re-fill process. After the eighth year of monitoring, data is assessed and the waterbody is appropriately placed into category 1 (attaining all designated uses and water quality standards, with no use threatened), category 2 (attains some of the designated uses, no use is threatened, and insufficient data or no data is available to determine if

the remaining uses are attained) or category 5 (waters are impaired or threatened for one or more designated uses by a pollutant, and a TMDL report is required). In 2016, the Nebraska Department of Environmental Quality noted that Glenn Cunningham Lake's aquatic life use was impaired by total phosphorus, total nitrogen, and chlorophyll A. A fish consumption assessment determined the aquatic life use was impaired due to mercury.

In the April 1, 2018 DRAFT Water Quality Integrated Report, the Department of Environmental Quality proposes to list Glenn Cunningham Lake in Category 5. The Department of Environmental Quality noted recreation, agricultural water supply, and aesthetics as satisfactory with aquatic life and the overall assessment as impaired. The proposed 2018 drawn down of the lake would reset the monitoring 'clock' with a reassessment occurring in or about 2026.

Recommended Plan

The recommended plan would result in major benefits to the water quality in Glenn Cunningham Lake. Because zebra mussels are effective filter feeders, they could eventually remove all phytoplankton and zooplankton at the surface of the lake, likely cause an overproduction of aquatic plants, and eventually reduce dissolved oxygen as the plants die and decay. Destroying the zebra mussels would allow the lake to function normally and, thus, preserve water quality. Similarly, removing common carp would help to alleviate turbidity levels and the up-rooting of aquatic vegetation that results from its benthic-feeding behaviors. As the up-rooted plants decay, dissolved oxygen is used. Removing this species would help to preserve dissolved oxygen levels in the lake.

The recommended plan could result in minor adverse effects to water quality located immediately downstream of the lake's outfall pipe. The greatest concern occurs when timing the water release with the stratified conditions in the lake. The hypoxic water (reduced dissolved oxygen in water), which develops in the hypolimnion (the dense bottom layer of water below the thermocline) during the summer could potentially spread a 'dead zone' immediately downstream of the pipe. The dead zone would adversely affect the aquatic insect community but any fish would likely relocate further downstream to favorable refugia. The risk of sending an anoxic/hypoxic plume of water downstream would be greatly reduced by releasing water in fall and early winter after lake turnover when isothermal conditions exist and before ice covers the lake, as is currently proposed. In Glenn Cunningham Lake, the turnover generally occurs in the fall so sending this anoxic plume downstream is unlikely. Thus, this impact is not considered significant.

The risk of impairing downstream water with mercury is minimal. Mercury in Glenn Cunningham Lake is only found in high concentrations in fish tissue. To be biologically available, inorganic mercury must first be trapped in sediment. This is then followed by a period of hypoxia in which it is taken up by bacteria and methylated. The bacteria are then consumed by blood worms and other organisms suited to hypoxic conditions. Aquatic insects and fish then sequester higher amounts of methylmercury as it is biomagnified through the food chain. Releasing water during isothermal conditions will likely pass sediment or fish downstream. Thus, this impact is not considered significant.

The recommended plan is unlikely to allow the transfer of zebra mussels or common carp to downstream areas. Adult zebra mussels are attached to substrates via byssal threads. Veligers (larval) are generally only free floating when the water temperature is above 10-12 degrees Celsius (50-54 degrees Fahrenheit); the release of water from the lake in the fall would be below these temperatures. As such, this impact is not considered significant.

No Action

The No Action Alternative would have a long-term negative impact on water quality in Glenn Cunningham Lake. Without intervention, the zebra mussels could multiply within the lake. The presence of the zebra mussel would change the nutrient balance in the lake resulting in clearer water due to their aggressive filter feeding and consumption of phytoplankton and zooplankton. This would adversely affect the existing fishery by removing an important food source needed by native fish. Additionally, because the lake was designed as a flood control structure, when water is released, the potential for the veligers to gain access to other local water bodies and impact water intake structures, and the industries connected to those structures, would remain.

3.2 FISHERIES, WILDLIFE, AND AQUATIC LIFE

These resources are institutionally important because of Section 906 of the Water Resources Development Act of 1986, and the Fish and Wildlife Coordination Act of 1958, as amended. Fisheries and aquatic life are technically important because they are a critical element of many valuable aquatic habitats, provide indicators of the health of various aquatic habitats, and many fisheries are important commercial resources. Fisheries and aquatic life are publically important because of the high priority that the public places on their aesthetic; recreational; food-web importance; and/or commercial value.

Glenn Cunningham Lake supports a variety of fish and aquatic life species. Many individuals consider the lake to be an important and valuable sport fishing area.

Fish

The lake's fish community is comprised of largemouth bass, smallmouth bass, channel catfish, black crappie, walleye, bluegill, white bass, northern pike, gizzard shad, and common carp. These species feed, breed, and shelter in the lake on a year-round basis.

Wildlife

The lands surrounding Glenn Cunningham Lake supports a variety of terrestrial wildlife species. Common mammals in the area generally consists of species adapted to human presence. Species include whitetail deer, opossum, raccoons, mink, thirteen-lined ground squirrels, plains pocket

gopher, eastern fox squirrel, eastern cottontail rabbit, deer mouse, and meadow jumping mouse. These species feed, breed, and shelter within the project lands on a year-round basis.

Common birds include dickcissel, bobolink, hawks, blue and green herons, robin, Bell's vireo, black-and-white warbler, black-capped chickadee, house sparrow, cardinal, western meadowlark, orchard oriole, American golden-plover, bald eagle, lesser yellowlegs, red-headed woodpecker, semipalmated sandpiper, waterfowl, and wood thrush. These species feed, breed, and shelter on a year-round or migratory basis.

Aquatic Life

Reptiles likely present in Glenn Cunningham Lake include: false map turtle, painted turtle, snapping turtles, plains garter snake, and bull snake. Amphibians in the lake include: leopard frogs, tree frogs, woodhouse toad, and northern cricket frog. Numerous aquatic insects also may be found within the lake. These species feed, breed, and shelter on a year-round basis in Glenn Cunningham Lake.

Recommended Plan

The recommended plan would likely benefit the sport fishery in the long-term by controlling two invasive species that complete with native species for food and habitat. It is expected that the zebra mussels and carp, if left uncontrolled, could infest the lake and ultimately decimate the existing fishery entirely. The proposed project, through restocking efforts, would save the recreational fishery by providing various desired game fish once the control of zebra mussels and common carp concludes.

During the draw down, mortality would occur to some species of fish in the lake that are less temperature tolerant to colder winter conditions, and the draw down would adversely affect most of the species' feeding, breeding, and sheltering. As the lake is drawn down, fish would have less area to move about and would be crowed closer together, although some fish may be flushed out through the outfall pipe and captured. Species remaining within the lake would compete for the remaining, and likely limited, food and shelter. Smaller fish would be exposed to larger predators. As the fish are crowded into smaller spaces, dissolved oxygen would be used by respirating fish and create low levels of dissolved oxygen. The Commission's use of Rotenone in Glenn Cunningham Lake would effectively kill any remaining fish in the lake. Because a zebra mussel and common carp infestation would likely destroy the entire fishery within the lake if left unchecked, and the Commission proposes to restock the entire fish community with varying sized fish once the zebra mussels and carp have been controlled, the overall impact to the fishery is determined to be beneficial.

The recommended plan likely would not cause impacts to mammals or birds while the lake is being drawn down. However, once fully drawn down, mammals and birds would likely venture out onto the lake bed to explore new habitats and search of food. Large mammals, such as deer, could get trapped in the soft mud and silt substrate and perish. This would be considered a major

but short-term adverse impact. It is not likely that all the deer in the area would get stuck in the mud so this impact is not considered significant.

Smaller mammals and piscivorous birds that venture out onto the lake bed likely would find pools of stranded fish and could easily prey upon the fish that are trapped within the shallow pools. This would be considered a short-term beneficial impact to these piscivorous species. Even after the pools are treated with Rotenone, these piscivorous species likely would continue to feed upon the stranded fish. Rotenone residues in treated fish are generally very low when used at concentrations recommended to kill fish, are broken down quickly, and are not easily absorbed through the gut of the animal eating the fish. Small mammals and birds that eat treated fish or drink treated water would not be affected because the rotenone would be broken down by the strong enzymes naturally present in their stomachs and intestines (Jeff Jackson, Nebraska Game and Parks Commission, pers. comm.). As such, beneficial short-term impacts to small mammals and piscivorous birds would occur.

The recommended plan would likely result in the freezing of hibernating reptiles and amphibians as the water is displaced over areas where they have made their winter shelters. Early life stages of some amphibians and reptiles are gill breathers, so applying Rotenone in the winter rather than the spring would minimize impacts to the early life stages of these species. None of the amphibians or reptiles found at the lake are rare or in a declining status. There are other aquatic areas in close proximity to Glenn Cunningham Lake: thus, as water is returned to the lake, amphibians and reptiles would eventually return. Thus, this impact is not considered significant.

The recommended plan would likely adversely affect aquatic insects by freezing out any species that hibernate beneath the normal water surface elevation. For the same reasons mentioned above for amphibians and reptiles, as water is returned to the lake, the populations of aquatic insects would reestablish. As such, the impact is not considered significant.

No Action

The No Action Alternative would adversely affect fish in the long run as the zebra mussel and carp populations increase. Zebra mussels are effective filter feeders with no effective predators. The increased zebra mussel population could consume much of the phytoplankton and zooplankton that would otherwise be available to native fish, resulting in a nutrient shortage. Common carp often outcompete native species for food and space. These conditions would have dramatic effects on the entire food web, including amphibians and reptiles. The No Action Alternative would have no impacts on wildlife because the lake would not be drawn down. Wildlife species would continue to carry out their normal behavior.

3.3 AESTHETICS

Glenn Cunningham Lake is located within the city limits of Omaha, Nebraska. The lake, surrounded mostly by agricultural lands with a small area of the lake in the southeast corner adjacent to housing, offers the recreationalist long views of open space, riparian habitat and open

water. Overall, the area is deemed an enjoyable space that offers the city dweller a break from city life.

Recommended Plan

The recommended plan would result in minor and temporary adverse impacts to aesthetics associated with the draw down. Glenn Cunningham Lake is used by a large number of the citizens of Omaha, even in the winter time. The human population that could potentially be affected by the draw down includes residents with homes near the lake as well as citizens visiting the area to recreate. Views around the lake would be altered as more of the lakes banks are exposed. The draw down may create a temporary increase in noxious odors if it lasts into the spring and results in exposure of previously submerged, organic-rich material and sediments that decompose before they are again covered by water. These impacts would remain until the lake is refilled. The Rotenone application would result in dead fish that would create a visual impact. The dead fish would not be actively collected due to the potential dangers of individuals getting stuck in the silt and mud as they try to collect the fish. The dead fish would be left to rot or would be consumed by piscivorous mammals and birds. Rotting fish would create additional noxious odors but fish decompose relatively quickly so this impact would be considered short-term. The lake would be held at low level throughout the latter months of 2018 and the first few months of 2019, and this would continue to adversely affect viewsheds. Because the draw down would only last approximately six months, the impacts on aesthetics would not be considered significant.

No Action

The No Action Alternative would result in long-term adverse impacts to aesthetics as zebra mussels encrust on hard surfaces within the lake and shoreline. This would be considered a significant negative impact to aesthetics.

3.4 HEALTH AND SAFETY

The health and safety of area residents and citizens recreating at Glenn Cunningham Lake has always been identified as a primary concern from all resource agencies. As such, alternative selection and associated actions bore this foremost in mind.

Recommended Plan

The recommended plan would require closure of the entire park during the draw down for safety reasons (thick layers of silt could result in individuals that venture into the lake in its drawn down condition to become stuck). Public access to the park would be restricted until notice is given to reopen the lake by the City of Omaha Parks and Recreation Department. The recommended plan would include warning signs and park entrance blockades to prevent citizens from accessing the area and to inform them about the draw down and hazardous conditions. With the precautions presented above, the proposed project would have no significant impact on public health and safety.

No Action

The No Action Alternative would not have a significant impact on public health and safety. However, the presence of the sharp zebra mussel shells along the shoreline area would represent a minor hazard to lake users and their pets if stepped on while bare-footed.

3.5 RECREATION

Glenn Cunningham Lake is a highly visited recreational facility. Amenities include picnicking, hiking, biking, birding, camping, fishing, and boating. Recreation slows a bit in the winter but most activities continue. Of particular enjoyment in the winter at the lake is ice fishing and ice skating.

Recommended Plan

The recommended plan would result in long-term positive impacts to recreation. Controlling the zebra mussel and common carp populations would allow avid sport fishing to continue at the lake for years to come. The zebra mussels would not settle on lake structures or the shoreline. Common carp, as long as they do not somehow get reintroduced into the lake, would not be present to uproot aquatic vegetation or muddy the water and reduce dissolved oxygen levels. The draw down and control of zebra mussel and common carp would allow the Commission to renovate the fishery and establish a quality sport fish community.

Due to safety concerns, the park would be closed for approximately six months, thus eliminating opportunities for ice skating and ice fishing. If the lake must be maintained in the drawn down condition in the spring for common carp control, spring use of the lake would not available. This would have an adverse effect on citizens that enjoy springtime activities. The lake draw down would adversely affect boating use as limited water would be held in the lake and no access to the boat ramp would be provided. Because the draw down would be a temporary inconvenience, citizens would be able to enjoy water-related activities once the lake has refilled. Thus, the temporary lake closure is not considered significant.

No Action

The No Action Alternative would have a long-term adverse impact on the recreational use of the lake. A use restriction on all boats to minimize the potential for spread of the mussels to other water bodies would be implemented under this alternative. Additionally, the zebra mussels would reduce the level of phytoplankton and zooplankton at the surface, which would adversely affect feeding of native fish species in the lake. In addition, the clear water would encourage the growth of rooted aquatic macrophytes, which could create additional problems for people wanting to recreate on the lake if the vegetation covered a large portion of the lake's surface. This would be considered a significant long-term negative impact.

3.6 CUMULATIVE IMPACTS

The Council on Environmental Quality Regulations defines cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (CEQ, 1997). These actions include on- or off-site projects conducted by government agencies, businesses, communities, or individuals that are within the spatial and temporal boundaries of the current action being considered.

The increments of impact expected by this project are temporary and minor in the categories of downstream water quality, short-term adverse impacts to recreation, and short-term adverse impacts to aesthetics. No other activities were identified in the project area which would have additional adverse impacts on the natural resources in the lake or the region. Given the short-term nature of the proposed project, the lack of local projects with similar increments, and the general abundant-availability of these resources locally, significant cumulative impacts would not be expected.

However, because zebra mussels occur within other waterbodies in the area (e.g., Missouri River), it is likely that they could be reintroduced into the lake if no other control methods are used (decontamination stations, enforcement, etc.). If reintroduced and repeated lake draw down is the method of control, negative cumulative impacts to water quality and the environment at the lake could occur.

The No Action Alternative would not produce any cumulative impacts greater in scope or magnitude than those described for each individual environmental resource.

3.7 SUMMARY OF ENVIRONMENTAL EFFECTS OF THE NON RECOMMENDED PLANS

The alternatives considered but not selected have not been recommended because, they did not fulfill all of the purposes and needs of the proposed project or were cost prohibited. In addition, those not selected would not result in successful renovation of the lake.

The No Action Alternative has not been recommended because it would not meet the project purpose and need of controlling zebra mussels, common carp, or renovating the sport fishery in the lake. The No Action Alternative would have long-term adverse effects on water quality, the native fishery, recreation, aesthetics, and health and safety. Escalating maintenance costs associated with removal of zebra mussels from lake structures, outlet pipes, and other structures associated with the function of the dam would certainly occur. Additional recreational closures would be needed on a more continual basis as the zebra mussels are manually controlled. The No Action Alternative also would allow the zebra mussels to be transported to other area water bodies through 'hitch hikers' on boat trailers, bait buckets, and/or other recreational equipment.

4.0 AGENCY AND PUBLIC COORDINATION

Nebraska Game and Parks Commission. The Nebraska Game and Parks Commission is a project proponent and naturally is a supporter of the project. Coordination between this agency and the USACE is currently on-going.

City of Omaha. The City of Omaha is a project proponent and naturally is a supporter of the project. Coordination between the city and the USACE is currently on-going.

U.S. Fish and Wildlife Service (Service). On August 27, 2018, an email describing the proposed project was sent to the Service along with a determination that the proposed project would result in NO EFFECT to northern long-eared bat, pallid sturgeon, piping plover, least tern, and western prairie fringed orchid as habitat for these species does not occur at the lake. The Service normally does not respond to 'no effect' determinations unless they perceive an affect. No response was received from the Service to date.

General Public. On August 25, 2018, a targeted survey of individuals that actively use the recreational facilities at Glenn Cunningham Lake was conducted by USACE personnel. A series of standardized questions was asked and basic information on the proposed alternative was provided. The following information was gathered:

Forty Seven individuals were personally interviewed although a total of 63 individuals were counted using the park on that day. Of those interviewed, all were aware that the Glenn Cunningham Lake portion of the park was closed (from local news stations) and only one individual stated that they received the information from the signs that were recently posted at the lake. Most users were non-boaters and engage exclusively in terrestrial activities (runners/walkers, disc golf players, bikers, relaxers that simply rest, chat, and take in the views), while only five individuals engaged in both terrestrial and aquatic activities (kayaking, canoeing, and paddle boarding). Of the five dual-use users, only two knew of the importance to clean and dry their aquatic equipment after each use.

Seven of the individuals interviewed regularly use the lake for fishing and three of those individuals actively fish for common carp. Those not actively fishing for carp stated they were not upset when a common carp was hooked and actually enjoyed the fight. All fishermen stated that good sized and quality game fish were regularly taken. Catch and release is the preferred method of fishing. When asked if they were aware of the fish advisory (mercury in fish tissue) at the lake, all fishermen responded that they were not aware of such an advisory. Of the seven fishermen interviewed, only one stated that they use a bait bucket with live bait on a regular basis when fishing, and refresh the bait bucket water with lake water at the onset of each fish outing. When informed that dumping old bait bucket water into the lake and refreshing bait bucket water with lake water in areas with zebra mussels could result in the introduction of zebra mussels to other areas, they stated that they were unaware of that vector source but stated that they would refrain from doing so in the future.

When individuals were informed of the proposal to control the zebra mussel through a lake draw down, most did not want to see the lake drawn down again but understood the reasoning for it. When told that the draw down would be for only a few months over the winter and spring, many

were relieved that the lake would not be held low over an extended period of time like in 2006 to 2010 and were more accepting of the proposal.

Only one individual knew, when asked, what Rotenone was and the purpose of using it. When others were informed about the chemical and how it could be used at Glenn Cunningham Lake (to control common carp), most responded negatively to its use, stating they did not like the idea of poisoning fish. When asked their opinion on the invasive common carp, over half did not view the species as an invasive or troublesome species (although they admitted that they do not regularly fish, if at all), and three (all fisherman that actively fish for carp) stated they liked having them in the reservoir. When told of the carp's life history and the adverse impacts they have on native species, most individuals changed their view on the use of Rotenone and accepted it as a viable control method.

Finally, when asked how they felt about the proposed project to control zebra mussel and common carp, and renovate the sport fishery in the lake overall, as opposed to the negative effects of taking no action and what could happen to the lake if left unchecked, all were in favor of the proposed project.

5.0 MITIGATION MEASURES

No mitigation measures have been proposed or are warranted.

6.0 COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

Bald and Golden Eagle Protection Act, 16 U.S.C. Sec. 668, 668 note, 669a-668d. In compliance. This Act prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions for the scientific or exhibition purposes, for religious purposes of Indian Tribes, or for the protection of wildlife, agriculture or preservation of the species. No bald eagle nests were noted within the proposed project area. No bald eagles or their nests would be impacted by the proposed project.

Clean Air Act, as amended, 42 U.S.C. 185711-7. et seq. In compliance. The purpose of this Act is to protect public health and welfare by controlling air pollution at its source. No impacts, short or long-term, to air quality will occur from implementation of the proposed project.

Clean Water Act, as amended. (Federal Water Pollution Control Act) 33 U.S.C. 1251. et seq. In compliance. The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (33 USC 1251). The Corps regulates discharges of dredge and fill material into waters of the United States pursuant to Section 404 of the CWA, and regulates the placement of structures over, in, under, and on navigable waters pursuant to Section 10 of the Rivers and Harbors Act. This permitting authority applies to all waters of the United States including navigable waters and wetlands. The selection of disposal sites for dredged or fill material is done in accordance with the Section 404(b)(1) guidelines, which were developed by the EPA (see 40 CFR Part 230). General permits are a type of authorization that is issued on

a nationwide or regional basis for a category of activities. Activities that are authorized under general permits must be substantially similar in nature and cause only minimal individual or cumulative adverse effects on the aquatic environment. Nationwide permits are a type of general permit that authorize certain specified activities nationwide that have been authorized after meeting requirements of NEPA and extensive coordination with the EPA and other federal agencies. Minor impacts to water quality downstream of the outfall pipe could occur from any anoxic/hypoxic water released. The impact will be short-term and pre-existing conditions would likely begin to reestablish once lake releases cease.

Comprehensive Environmental Response Compensation and Liability Act (CERCLA). In compliance. Typically CERCLA is triggered by (1) the release or substantial threat of a release of a hazardous substance into the environment; or (2) the release or substantial threat of a release of any pollutant or contaminant into the environment which presents an imminent threat to the public health and welfare. To the extent such knowledge is available, 40 CFR Part 373 requires notification of CERCLA hazardous substances in a land transfer. There are no known hazardous substances occurring on the proposed project site.

Endangered Species Act, as amended. 16 U.S.C. 1531, et seq. In compliance. Section 7 (16 U.S.C. 1536) states that all Federal agencies shall, in consultation with the Secretary of the Interior, ensure that any action authorized, funded, or otherwise carried out by them do not jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. The USACE has determined that the proposed project would have no effect on threatened or endangered species or the habitats upon which they depend. This determination was shared with the U.S. Fish and Wildlife Service (Service) in an email dated August 27, 2018. No response was received from the Service to date.

Environmental Justice (E.O. 12898). In compliance. Federal agencies shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. The project does not disproportionately impact minority or low-income populations.

Farmland Protection Policy Act (Subtitle I of Title XV of the Agriculture and Food Act of 1981), effective August 6, 1984. In compliance. Compliance with this act also will satisfy the requirements set forth in CEQ Memorandum dated August 11, 1980, *Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA*. No prime farmland would be converted as a result of the preferred action. As such, this project is not subject to the Farmland Protection Act.

Federal Water Project Recreation Act, as amended, 16 U.S.C. 460-1(12), et seq. In compliance. The Act establishes the policy that consideration be given to the opportunities for outdoor recreation and fish and wildlife enhancement in the investigating and planning of any Federal navigation, flood control, reclamation, hydroelectric, or multi-purpose water resource project, whenever any such project can reasonably serve either or both purposes consistently. The proposed project is within line and consistent with this Act. Public recreation will be temporarily

impacted. Long-term benefits from zebra mussel and common carp control and fish renovation in the lake will be realized after project implementation.

Fish and Wildlife Coordination Act. 16 U.S.C. 661 et seq. In compliance. The Fish and Wildlife Coordination Act requires governmental agencies, including the USACE, to coordinate activities so that adverse effects to fish and wildlife will be minimized when water bodies are proposed for modification. On August 27, 2018, an email describing the proposed project was sent to the U.S. Fish and Wildlife Service. No response was received from the U.S. Fish and Wildlife Service to date. In a follow-up telephone call dated September 12, 2018, the U.S. Fish and Wildlife Service stated they have no comments on the proposed project.

Floodplain Management (E.O. 11988). In compliance. The purpose of this Order is for each agency to provide leadership and 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 flood plains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to, water and related land resources planning, regulating, and licensing activities. The proposed project would have no impact on flood plain management.

Migratory Bird Treaty Act of 1918 as amended, 16 U.S.C. 703-711, et seq. In compliance. The Migratory Bird Treaty Act of 1918 (MBTA) is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts and nests. The take of all migratory birds is governed by the MBTA's regulation of taking migratory birds for educational, scientific, and recreational purposes and requiring harvest to be limited to levels that prevent over utilization. Executive Order 13186 (2001) directs executive agencies to take certain actions to implement the act. Migratory birds will not be impacted as a result of the proposed project.

National Environmental Policy Act (NEPA), as amended, 42 U.S.C. 4321, et seq. In compliance. This environmental assessment has been prepared for the proposed action and to satisfy the NEPA requirement. An Environmental Impact Statement is not required.

National Historic Preservation Act (NHPA), as amended, 16 U.S.C. 470a, et seq. In compliance. Federal agencies having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking shall take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places. Coordination with the USACE Cultural Resources staff at the Omaha District has ensured that the proposed project would not affect cultural resources (pers. comm., Sandy Barnum).

There is always potential for an unanticipated discovery of cultural resources during construction activities. In the event that historic resources are uncovered, work would be halted immediately and a District archeologist would be notified. The work would not be continued until the area is inspected by a staff archeologist. If he or she determines that the resources require further consultation, he or she will notify the Nebraska State Historic Preservation Office.

Noise Control Act of 1972, 42 U.S.C. 4901 et seq. In compliance. This Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. Federal agencies are required to limit noise emissions to within compliance levels. No short or long-term noise will occur as a result of the proposed action.

Protection of Wetlands (E.O.11990). In compliance. No impacts to wetlands are anticipated from the proposed action.

Rivers and Harbors Act, 33 U.S.C. 401, et seq. Not Applicable. A Section 10 permit is not required.

Wild and Scenic Rivers Act, as amended, 16 U.S.C. 1271, et. seq. In Compliance. The area within which the proposed project would occur is not designated as a wild or scenic river.

7.0 CONCLUSION & RECOMMENDATIONS

Based on the analysis of the proposed alternative, it is concluded that the recommended plan would best satisfy the projects purpose and need and result in beneficial impacts in the long-term for every resource category. The recommended plan would not result in any adverse impacts to wetlands or to threatened or endangered species as these species do not occur at the site. The recommended plan would result in no impacts to any properties listed, proposed for listing, eligible for listing, or potentially eligible for listing in the National Register of Historic Places. The minor, short-term adverse effects to other resources, as described in this EA, would be greatly offset by controlling the zebra mussel and common carp populations and renovating the sport fishery within the lake.

Based on coordination with the public and resource agencies, as documented in this EA, the USACE has made a preliminary determination that this project would have no significant impacts on the human environment including natural and cultural resources and Federally-listed threatened and endangered species; therefore, a Finding of No Significant Impact (FONSI) has been prepared.

8.0 PREPARERS

This EA and the associated draft FONSI were prepared by Mr. Matthew Vandenberg, Environmental Resources Specialist. The address of the preparers is: U.S. Army Corps of Engineers, Omaha District, PMA-C, 1616 Capitol Avenue, Omaha, Nebraska 68102.

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Appendix A

Rotenone Fact Sheet

NEBRASKA GAME PARKS
See You Out There

NEBRASKA POND GUIDE

Private Waters Program
Management Assistance for Lakes, Ponds, Pits & Streams

REMOVING or CONTROLLING UNWANTED FISH SPECIES


Bullhead


Green Sunfish


Common Carp

If a new pond already has bullheads, carp, and/or green sunfish established, or there are plans for restoring an old pond containing these same fish species, it will be very difficult to establish or restore a balanced bass-bluegill fishery. The easiest and quickest way to resolve either problem will be to eliminate all the fish in the pond and start over with the appropriate pond species – largemouth bass, bluegill, and channel catfish.

If there is no concern with contaminating downstream fish populations with the fish from the pond, it can be drained or pumped dry; however, keep in mind that a downstream neighbor may not appreciate fish rotting on their land. Renovating the pond by killing fish with a chemical is another option. Even if the pond cannot be drained completely, lowering it just a few feet will reduce the amount of chemical needed and save you money, provided pumping costs are not substantial.

Fish renovations should be undertaken only in ponds with: adequate depth (10-12 feet), sufficient size (half acre or larger), controlled watersheds, and undesirable fish populations. Fish population improvements in ponds with marginal habitat or poor water quality would be short-lived. If fish are already present in the new pond site due to a live or intermittent stream, or from a pond above it, the new pond should be renovated as soon as the dam is completed. Especially if there is no possibility of additional unwanted fish entering before desirable fish can be stocked. Any undesirable fish in the pond's watershed should also be eliminated, if feasible – provided Threatened and Endangered fish species are not present.

Rotenone is a chemical which kills fish by making it impossible for their gills to absorb dissolved oxygen from the water. Within a few minutes of application, fish can be seen struggling at the surface and dying. It is not toxic to most warm-blooded mammals (one exception is pigs) at prescribed concentrations. Rotenone is a naturally occurring organic compound extracted from the roots of certain tropical plants. It can be purchased either as a powder or liquid. The liquid is recommended because of its easier application. Rotenone with 5% active ingredient (or 2.5% synergized) is recommended, especially for eliminating carp and bullheads.

Pond owners must obtain authorization from the Commission to use rotenone. Since rotenone is a restricted use pesticide, it can only be purchased and applied by an applicator licensed through the Department of Agriculture. Contact Commission

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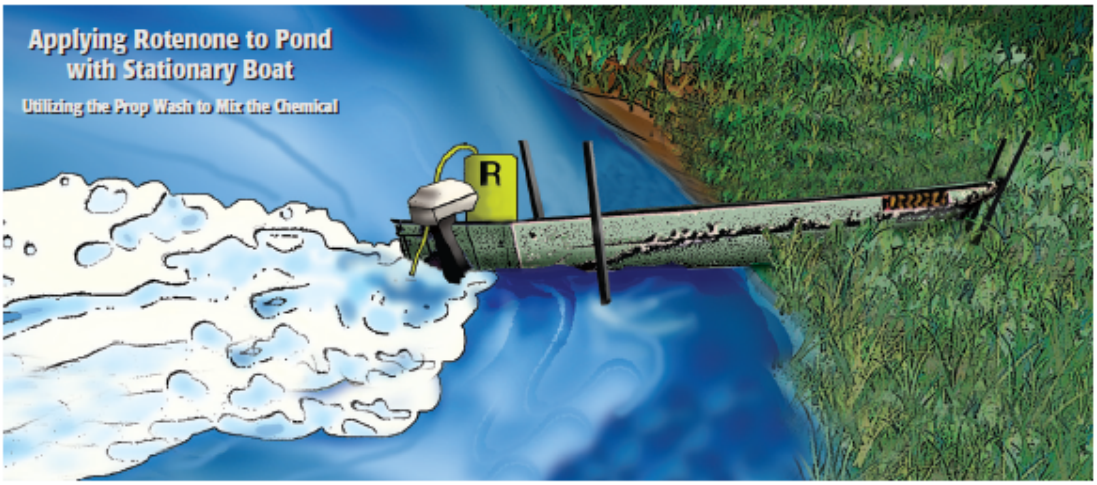
fisheries personnel regarding the permit process, chemical purchasing, and application.

To determine how much rotenone is needed, the volume of the pond has to be calculated, which can be found by multiplying the number of surface acres by the average depth of the pond. Average depth can be estimated by multiplying the maximum depth by 0.4. Volume is expressed as acre-feet of water. One acre-foot of water will cover one surface acre with one foot of water. For example, a 5-acre pond with an average depth of 4 feet has a volume of 20 acre-feet. Liquid rotenone should be applied at a rate of one gallon per acre-foot of water. Additional examples of volume and surface area determinations are presented at the end of this guide.

One way to apply rotenone is to drive around on the pond in a boat with an outboard motor and slowly pour or spray diluted rotenone into the water near the prop wash. Be sure to cover the entire pond and make extra passes over deep water. If a large portion of the pond contains depths of 8 feet or more, a pump or portable sprayer with a weighted hose should be used to get the chemical down to the bottom.

A more effective method, particularly in smaller ponds, is mixing the chemical into the water by utilizing the prop wash from a stationary outboard motor. Point the front end of a small boat toward the bank. If there are no solid objects to restrain the boat, the front and sides can be tied to stakes driven into the pond bottom or shore to prevent the boat from running up the bank. Run the outboard motor in forward gear as fast as safely possible and slowly pour or spray diluted rotenone into the prop wash. This will circulate the chemical to all depths of the pond. The location of the boat should be changed several times so the chemical can be mixed into all areas of the pond. A portable sprayer should be used along the shoreline for applying chemical in shallow water areas where both prop wash techniques may not have distributed the chemical effectively.

The best renovation results are achieved in August. This is when water temperature is at its highest and water level is normally at its lowest so as no treated water exits the pond. Ponds with outflows will have to be partially drained or pumped down prior to chemical application to ensure no treated water escapes. Wait at least 2 to 4 weeks



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before restocking. This will allow enough time for the chemical to detoxify. To ensure the pond has detoxified, leave a bait bucket containing some minnows in the pond overnight. If they survive, the pond is safe to restock.

A pond owner may not want to kill all the fish in a pond to get rid of the undesirable fish. If the pond is spring-fed or has a large inflow, rotenone may not be a viable option due to the likelihood of chemical dilution; or in the case of large ponds, the chemical may be cost-prohibitive. In these situations, the owner may have to live with what is present.

To make the best of a non-renovation situation, either learn to enjoy harvesting carp, bullheads, and green sunfish, or use management techniques to reduce their numbers. The best thing to do with numerous little bullheads and green sunfish is to convert them into bigger, more desirable sport fish. Largemouth bass, northern pike, walleye, large catfish, and other predators all eat these unwanted species and can be experimentally stocked if the pond is of sufficient size and contains appropriate habitat. Depending on availability and cost, the predators should be introduced by stocking 20 to 50 sub-adults, 8 to 12 inches or longer, per acre of water. If protected from harvest, the predators should reduce the numbers of undesirable fish. Eventually the pond may even produce some trophy-size fish that anglers can enjoy catching. Once bullheads, carp, and green sunfish are controlled, or if bass appear to be getting skinny, stock 4- to 6-inch bluegills at 50 to 100 per acre if they are not already present. Bluegills will eventually provide adequate prey to support an expanded, desirable bass fishery.

While stocking predators can be a way to control carp, bullheads, and green sunfish, they have to be able to see these fish in order to eat them. In some cases, the unwanted fish may keep the water so stirred up that sight feeding predators can't detect their prey effectively. Turbid ponds are usually the best candidates for draining, excavating, and restocking. If that's not possible, various techniques can be used to clear muddy water, as discussed in **PG13-8**, or possibly stock adult flathead catfish, a very effective predator even in turbid water.

Contacts: Jeff Blaser, Private Waters Specialist
Nebraska Game and Parks Commission
2200 North 33rd Street
Lincoln, NE 68503
402-471-5435
or area Commission fisheries biologist.

Surface area/volume calculations and diagrams are on the following pages.

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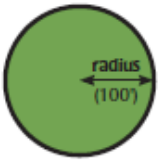
CALCULATING THE SURFACE AREA AND VOLUME OF A POND

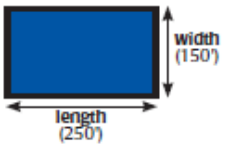
Presented below are formulas for calculating the **surface area** of a pond. Pick a shape that most closely resembles the pond and measure the necessary distances in feet. Put these measurements into the appropriate equation and multiply to find the surface area in square feet. Surface area in acres is simply obtained by dividing the surface area by the number of square feet in an acre (43,560). If a pond is irregular in shape, the best thing to do is divide it into workable shapes and then add the areas of the smaller units together to get the area of the whole.

CIRCLE = 3.14 x radius^2



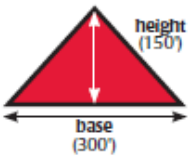
EXAMPLE: pond radius 100 feet x 100 feet x 3.14 = 31,400 square feet total surface area ÷ 43,560 = .72 surface acre

RECTANGLE = length x width



EXAMPLE: pond length 250 feet x width 150 feet = 37,500 square feet total surface area ÷ 43,560 = .86 surface acre

TRIANGLE = $\frac{\text{base x height}}{2}$



EXAMPLE: pond base 300 feet x height 150 feet = 45,000 square feet ÷ 2 = 22,500 total surface area ÷ 43,560 = .52 surface acre

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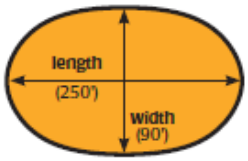
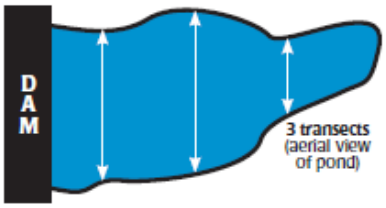
ELLIPSE = length x width x 0.8



EXAMPLE: pond length 250 feet x pond width 90 x 0.8 = 18,000 square feet total surface area ÷ 43,560 = .41 surface acre

The formula for calculating a pond's **volume** is surface area (acres) x average depth (feet). Average pond depth can be estimated by measuring the depth of the water in a number of places throughout the pond, adding these measures together to get a total, and then dividing the total by the number of measurements. Several transects should be established across the pond (from one side straight across to the other side). Depth measurements should be taken/recorded every 40 feet with an electronic depth finder or a weight attached to a string marked in feet.

VOLUME (acre-feet) = surface area (acres) x average depth (feet)



EXAMPLE: forty measurements were taken while conducting three transects across the surface of a .75 acre pond; average depth calculated to be 4 feet; therefore, .75 x 4 = 3 acre-feet

NOTE: Average depth can be estimated by multiplying the maximum depth by 0.4

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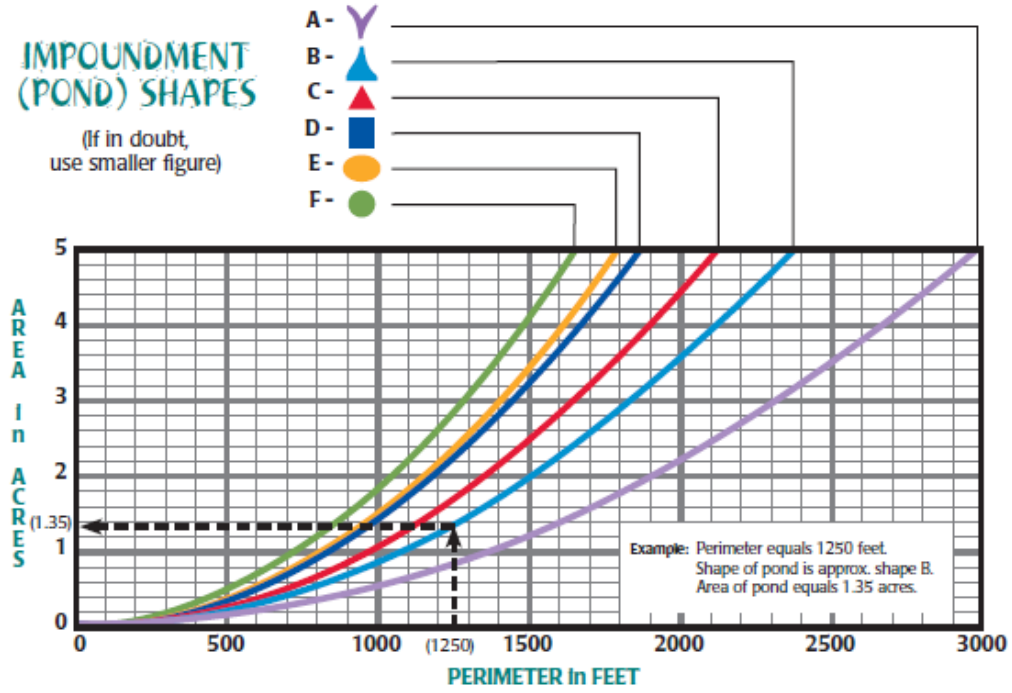
POND AREA ESTIMATOR

If the distance around the entire pond can be measured, this pond estimator can be used.



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TECHNICAL ASSISTANCE CONTACTS

Nebraska Game and Parks Commission (Commission)
2200 N 33rd Street PO Box 30370
Lincoln, NE 68503
Private Waters Specialist 402-471-5435
Natural Heritage Program 402-471-5419

Northwest (NW) District - Alliance
Game and Parks Commission
299 Husker Road PO Box 725
Alliance, NE 69301
308-763-2940
Fisheries Division or
Wildlife Habitat Partners Section

Northwest (NW) Field Office - Valentine
Valentine State Fish Hatchery
90164 Hatchery Road
Valentine, NE 69201
402-376-8080 or 402-376-2244

Southeast (SE) District - Lincoln
Game and Parks Commission
2200 N 33rd Street PO Box 30370
Lincoln, NE 68503
402-471-7651 or 402-471-5561
Fisheries Division or
Wildlife Habitat Partners Section

Northeast (NE) District - Norfolk
Game and Parks Commission
2201 N 13th Street
Norfolk, NE 68701
402-370-3374
Fisheries Division or
Wildlife Habitat Partners Section

Northeast (NE) Field Office - Bassett
Game and Parks Commission
524 Panzer Street PO Box 508
Bassett, NE 68714
402-684-2921
Fisheries Division or
Wildlife Habitat Partners Section

Southwest (SW) District - Kearney
Game and Parks Commission
1617 First Avenue
Kearney, NE 68847
308-865-5310
Fisheries Division or
Wildlife Habitat Partners Section

Southwest (SW) Field Office - North Platte
Game and Parks Commission
301 East State Farm Road
North Platte, NE 69101
308-535-8025
Fisheries Division or
Wildlife Habitat Partners Section

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United States Department of Agriculture -
Natural Resources Conservation Service (NRCS)
Federal Building, Room 152
100 Centennial Mall North
Lincoln, NE 68508
Statewide Wildlife Biologist
402-437-4100
or contact Local County Office

University of Nebraska - Lincoln, Cooperative Extension
211 Agricultural Hall - UNL East Campus
Lincoln, NE 68583
Main Office 402-472-2966
or contact Local County Office;
Water Quality Questions 402-643-2981, ext. 115

Nebraska Department of Natural Resources (DNR)
301 Centennial Mall South, PO Box 94676
Lincoln, NE 68509
Water Storage Permits 402-471-2363 or
Dam Safety Guidelines 402-471-1222

U.S. Army Corps of Engineers (ACOE)
8901 S. 154th Street, Suite 1
Omaha, NE 68138 402-896-0723
or contact the Kearney office at:
1430 Central Avenue
Kearney, NE 68847
308-234-1403

Nebraska Department of Environmental Quality (NDEQ)
1200 N Street, PO Box 98922
The Atrium, Suite 400
Lincoln, NE 68509
402-471-0096

Nebraska Association of Resources Districts (NARD)
601 S. 12th Street, Suite 201
Lincoln, NE 68508
402-471-7670
or contact your local Natural Resources District (NRD)
listed in White Pages of the phone book

Appendix B

Agency and Public Coordination

From: Vandenberg, Matthew D CIV USARMY CENWO (US)
To: "Hines, Eliza"
Subject: Zebra Mussel and Common Carp/Glenn Cunningham Lake
Date: Monday, August 27, 2018 2:47:00 PM

Eliza,

As you may be aware, Glenn Cunningham Lake in Omaha, Douglas County, Nebraska was found to have both veligers and adult zebra mussels residing in the lake. In addition, a sizeable number of common carp also are found within the lake.

A proposal has been developed to conduct a full lake drawn down starting on or about October 1, 2018 and ending once all water in evacuated, on or about December 1, 2018. The lake would remain in the drawn down condition over the fall and winter months to effectively desiccate and freeze the zebra mussel. This method has been proven effective at Zorinsky Lake when draw down, desiccation, and freezing was conducted in the fall and winter of 2010/2011. No new zebra mussels have been found in Zorinsky Lake since.

Once the water is completely evacuated, a number of small pools containing native fish species and common carp will remain. The Nebraska Game and Parks Commission (NGPC) would then apply Rotenone, either in fall of 2018 if application can be made before winter freeze, or in the spring of 2019 in freezing conditions result and time in limited. The Rotenone would kill all species of fish and aid in the removal of the common carp.

Following Rotenone treatment and fish clean up, the Lake would be allowed to naturally refill and the NGPC would then restock the lake with native sport fish, excluding common carp

Review of the IPaC website revealed 5 listed species as occurring in Douglas County, Nebraska: northern long-ear bat, piping plover, least term, pallid sturgeon, and western prairie fringed orchid.

Because the proposed project is confined to Glenn Cunningham Lake and no construction would take place, the U.S. Corps of Engineers has determined that a NO EFFECT determination is appropriate for each species noted above since no habitat for any of these species is found within the Lake.

Noting that the Service normally does not respond to 'no effect' determinations, please consider the proposed project and provide a response email so that we may retain coordination records with your agency in the project files.

The Corps is on a tight timeline to complete coordination and review and hopes to have the DRAFT Environmental Assessment posted on its webpage by early September. Please note that you will be informed of the posting at that time so that you may review the document and provide additional comment.

Thanks for your assistance in this matter.

Matthew D. Vandenberg
Environmental Resources Specialist
Omaha District, US Army Corps of Engineers
1616 Capitol Avenue
Omaha, Nebraska 68102
402/995-2694