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Normandale Lake Carp Assessment Proposal
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This proposal provides a scope of work for next steps to manage common carp in Normandale Lake. Activities are focused on providing additional information to better understand the current population of common carp in Normandale Lake while conducting carp removal work via baited box-net traps, as well as age a subsample of carp from the lake to assess the frequency of past carp recruitment in the lake, which is a key piece of data to inform long-term management planning for the lake.

Objective 1: Age structure analysis

To determine how to control carp populations in a cost-effective manner, it is important to estimate how many young carp recruit into the population and how often. In some populations, carp recruit annually, in which case intensive removal efforts are needed on a quasi-annual basis. In most cases, carp recruit only infrequently (once every several years), in which case only sporadic removal is needed (i.e. winter seining or box netting once every several years). Ageing analyses are used to determine the history of recruitment (i.e. production of young during prior years) in a population. Specifically, gaps between year classes are used to determine the frequency with which recruitment spikes occurred in the past. These analyses can also help in determining if the young recruited within the lake or immigrated from adjacent lakes or marshes. Ageing is also used to determine growth rates and estimate natural mortality (from maximum age). We recommend that 50 randomly selected carp be used for the ageing analysis using otoliths (inner ear bones). The otoliths are extracted, embedded in epoxy, sectioned using an isomet saw and aged under a microscope.

Carp Solutions would conduct boat electrofishing in Normandale Lake fall of 2019 to collect up to 50 carp for an aging analysis. We estimate 2 to 3 days of electrofishing would be needed to capture 50 carp. Aging analysis would occur over the winter 2019-2020.

Objective 1: Age Structure Analysis Costs:

Electrofishing to capture 50 carp: $\$260/\text{hr} \times 15 \text{ hrs} = \$3,900$
Removal of otoliths: 15 minutes/carp x 50 carp X $\$160/\text{hour} = \$2,000$
Electrofishing boat use, setup & decontamination: $\$325/\text{trip} \times 3 \text{ trips} = \975
Embedding, sectioning and slide interpretation: 18 hours at $\$100/\text{hour} = \$1,800$
Travel Costs & Mobilization: $\$200/\text{trip} \times 3 \text{ trips} = \600
Total cost for Objective 1: $\$9,275$

Objective 1 Timeline:

October 2019 – March 2020

Objective 2. Population assessment using electrofishing surveys and marking carp for mark-recapture estimate

In 2018, electrofishing surveys were conducted by staff from Riley Purgatory Bluff Creek Watershed District to assess the carp population in Normandale Lake to determine if the biomass of carp was high enough to warrant management. They found a carp biomass density of 163 kg/ha, exceeding the threshold of 100 kg/ha where ecological damage can occur. It is important to have a more accurate assessment using mark and recapture methods before removals begin. Therefore, Carp Solutions would conduct at least three more days of electrofishing surveys to assess the catch per unit effort as an estimate, but more importantly, mark all carp with PIT tags. The more carp marked during these surveys, the more accurate the estimate will be throughout the box netting removals.

Objective 2 Costs:

Electrofishing surveys for CPUE estimate & marking carp: $\$260/\text{hr} \times 12 \text{ hours (3 days)} = \$3,120$
Implanting PIT tags: 1 hour x 3 days x $\$160/\text{hr} = \480
PIT tags: $\$2/\text{tag} - \text{up to } 100 \text{ PIT tags} = \200
Electrofishing boat use, setup & decontamination: $\$325/\text{trip} \times 3 \text{ trips} = \975
Travel Costs & Mobilization: $\$200/\text{trip} \times 3 \text{ days} = \600
Total cost for Objective 2: $\$5,375$

Objective 2 Timeline:

May 2020 – June 2020

Objective 3: Carp removal and refined population estimate using mark-recapture method – via baited-box net traps

Carp Solutions would use a strategy which exploits the fact that carp can be trained to aggregate in areas baited with cracked corn (Bajer et al. 2010). These fish can then be selectively and effectively removed using a "box net" placed at the baited site. A box net is a square net with mesh bottom and mesh sides lined with weighted line around each side causing it to lay flat on the bottom of the lake. While the net normally lies on the bottom of the lake (i. e. it does not cause non- target fish entanglement), its sides can be quickly lifted above the

surface of the water to trap the carp that aggregate at the bait. The net is usually lifted at daybreak when most carp aggregate at the bait (Bajer et al. 2010). This net is approximately 30 x 60 feet and is placed near shore in secluded areas.

We will install at least 3 box nets in Normandale Lake. Nine Mile Creek Watershed District and/or its volunteers will be responsible for purchasing cracked corn and baiting each net with corn for multiple days. Carp Solutions will handle operation of box nets and facilitate removal of carp from nets. We will conduct at least three rounds of removals with the box nets to maximize their effectiveness. Nine Mile Creek Watershed staff and/or its volunteers will receive training on baiting the box nets between removal events by Carp Solutions staff. All fish captured while box netting will be counted, measured for length, examined for marks (PIT tags) and removed from the lake.

We will treat the box netting in 2019 as a feasibility study to guide the final stages of management goals for removal of carp in Normandale Lake. At the conclusion of the project, we will confirm the number left to remove to achieve threshold goals.

Carp Solutions will obtain all necessary permits from DNR.

Objective 3 Cost Estimate:

Installation of 3 box-net traps: 10 hours x \$280/hour = \$2,800

Uninstallation of 3 box-net traps: 4 hours x \$280/hour = \$1,120

Decontamination of 3 box-nets: 6 hours x \$120/hour = \$720

Subtotal for net install and uninstallation/decontamination: \$4,640

Setting 3 Box-Nets for removal (Prepare the nets to be tripped and sides raised): 4.5 hours x 3 removal events: 13.5 hours x \$280/hour = \$3,780

Tripping Box-Nets (Springing the trap, raising the sides capturing carp present): 2 hours x 3 removal events: 6 hours x \$200/hour = \$1,200

Carp Removal from Box-Nets: 5 hours x 3 removal events: 15 hours x \$400/hour = \$6,000

Carp Disposal: \$560 per removal event x 3 removal events: \$1,680

Subtotal for Carp Removal: \$4,220 x 3 removal events = \$12,660

Travel Costs & Mobilization: \$200/trip x 12 trips = \$2,400

Box-Net Traps Equipment Usage and Maintenance Fee for 3 nets: \$2,025

(covers equipment needed to assemble and maintain working trap and mechanisms)

Total Cost for Objective 3: \$21,725

Objective 3 Timeline:

June 2020 – October 2020

Analysis and report:

All data from Objectives 1, 2 and 3 will be tabulated and analyzed. A report addressing objectives 1, 2 and 3 will be prepared by March 31, 2021. The report will include a section on future recommendations and management needs.

Total Costs for Analysis & Report:

Analysis & Report Preparation by Project Manager: 6 hours x \$100/hour = \$600

Finalize report and management recommendations by Bajer: 2 hours x \$140/hour = \$280

Analysis & Report Timeline:

Analysis & Report to be delivered by March 31, 2021

Budget Table

Objective	Cost
Objective 1: Age structure analysis	\$9,275
Objective 2. Population assessment using electrofishing surveys and marking carp for mark-recapture estimate	\$5,375
Objective 3: Carp removal and refined population estimate using mark-recapture method – via baited-box net traps	\$21,725
Report & Analysis	\$880

Total Estimated Costs: \$37,255