**PROJECT TITLE: Enhancing habitat and diversity in cattail-dominated shorelines**

**I. PROJECT STATEMENT**

* **Goal:** We will determine whether and where cattail reduction at the individual landowner scale can be an ecologically and socially beneficial component of nearshore lake management. To accomplish this, we will experimentally remove sections of cattail in 36 lakes across Minnesota’s three major ecoregions and measure environmental, vegetation, and fish responses.
* **Objectives:**

1. Identify landowners willing to participate in experimental cattail removal following specific technical guidance, treatment implementation, and subsequent environmental monitoring.
2. Measure environmental variables and plant and fish communities in paired experimental locations (one plot with dense cattail removed paired with a no-removal control plot) in each study lake.
3. Use results to inform Department of Natural Resources Aquatic Plant Management (DNR APM) permitting policies that strive to balance aquatic plant conservation with landowner recreational needs.

Hybrid/narrowleaf cattail (hereafter cattail) has steadily encroached on shorelines of Minnesota lakes, altering environmental conditions and displacing native plant communities. Nearshore aquatic plants are an important source of biodiversity and are critical to sportfishes such as bass, pike, walleye, and sunfish. But the value of dense cattail stands as fish habitat is poorly understood. Fishes using nearshore, vegetated habitat usually prefer a combination of emergent, floating-leaved, and submerged plants for spawning, rearing, refuge, and feeding habitat. However, as cattail invades, the environment becomes more homogeneous and dominated by tall, dense, difficult-to-penetrate cattail and its litter (dead cattail). Furthermore, lakeshore property owners frequently raise concerns that cattails limit recreation and access. Yet despite the negative impacts of dense cattail in many habitats, in some Minnesota lakes (e.g. shallow southern lakes where other species struggle to survive), cattails play crucial roles by providing vegetated habitat and preventing erosion. Thus, the extent to which cattails are detrimental or beneficial to nearshore habitats is likely to vary across the state.

**II. PROJECT ACTIVITIES AND OUTCOMES**

**Activity 1 Title: Site choice, landowner enrollment, and cattail removal.**

**Description:**We will collaborate with DNR APM staff to select suitable lakes with encroached cattail populations. Experimental sites will be located near areas of public land or adjacent to private property of landowners willing to participate in our project. DNR will be the liaison between landowners and the project. Cattails will be removed by mechanical harvesting below the water in channels 30 ft (9 m) wide from shore to open water. Non-removal control sites will have the same dimensions.

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| **ENRTF BUDGET: $ 194,373** |  | | |
| **Outcome** | | **Completion Date** |
| 1. Select 12 lakes in each of 3 ecoregions (36 lakes) for cattail removal experiments. | | *August 2020* |
| 1. Collaborate with landowners for removal timeline. | | *August 2020* |
| 1. Remove cattails at selected sites in all lakes. | | *November 2020* |

**Activity 2 Title: Assess hybrid cattail removal effects on the nearshore environment, native plants, and fishes.**

**Description:** All variables will be measured at paired control and cattail removal sites in 36 lakes across 3 ecoregions. Environmental variables will include depth, temperature, dissolved oxygen, and water chemistry.

Landowners (where applicable) will be enlisted to help measure some lake variables. Quadrats will be used to measure physical habitat structure, vegetation structure, and plant species composition and diversity. Fish abundance and diversity will be measured using minnow traps (10 traps per 30 m2) deployed for 10 days.

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| **ENRTF BUDGET: $ 372,869** |  | | |
| **Outcome** | | **Completion Date** |
| 1. Provide landowners with equipment and detailed instructions for water depth, water temperature, and plant regrowth monitoring. | | *March 2021* |
| 1. Complete 2-year, post-treatment monitoring of environmental variables, plants, and fishes at control and removal sites in all study lakes. | | *September 2023* |

**Activity 3 Title: Write completion report and recommendations for APM permitting policies.**

**Description:**  Complete data analysis, write completion report, and collaboratively work with DNR to evaluate and recommend changes to APM permitting policies as appropriate. Current DNR APM permitting typically allows landowners to open and maintain a 15-foot channel through emergent vegetation, including cattail. Our study sites double the size of current allowances to 30 feet to explicitly explore the ecological and social tradeoffs of allowing landowners to remove more cattails. Where results warrant the increase, we would recommend more flexible permitting policies.

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| **ENRTF BUDGET: $ 15,752** |  |
| **Outcome** | | **Completion Date** |
| 1. Analyze all data and compare environmental, plant, and fish community variables between cattail and control sites across lakes within ecoregion. | | *June 2023* |
| 1. Provide written completion report and recommendations to DNR APM program. | | *June 2023* |

**III. PROJECT PARTNERS AND COLLABORATORS:**

1. **Partners receiving ENRTF funding**

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| **Name** | **Title** | **Affiliation** | **Role** |
| Amy Schrank | Project Manager | University of Minnesota | Project PI |
| Daniel Larkin | Project Co-Manager | University of Minnesota | Project co-PI |
| TBD | Master’s Student –fish focus | University of Minnesota | Research Assistant |
| TBD | Master’s Student – vegetation focus | University of Minnesota | Research Assistant |

1. **Partners not receiving ENRTF funding**

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| **Name** | **Title** | **Affiliation** | **Role** |
| Jon Hansen | Fisheries Program Consultant: **Please see the DNR letter of support for the project** | DNR | Landowner, lake, and site selection |
| Donna Dustin | Fisheries Research Biologist | DNR | Aquatic plant mapping, fish sampling |

**IV. LONG-TERM IMPLEMENTATION AND FUNDING:**

* Our direct, long-term goal is to identify ways to maintain or enhance shoreline ecological function while empowering landowners. We will deliver recommendations to DNR’s permitting process and provide landowner-relevant, actionable science to support nearshore fish habitat and ecological function in Minnesota’s lakes.
* This research-management project addresses invasive taxa (narrowleaf/hybrid cattail) that are included in MAISRC’s priority list. We have discussed this project with MAISRC Director Dr. Nick Phelps and would implement this as a MAISRC partnership project. We did not apply to the December 2018 MAISRC RFP for two reasons: (1) the proposed research was not identified in the MAISRC research priorities list, and (2) the work involves a substantial management component—DNR-regulated aquatic plant management on public and private lands—in addition to research. This management component is beyond the scope of the MAISRC RFP’s research focus.