

M.L. 2017, Chp. 96, Sec. 2, Subd. 06f Project Abstract

For the Period Ending June 30, 2020

PROJECT TITLE: Maximize Value of Water Impoundments to Wildlife

PROJECT MANAGER: Alexandra Wardwell

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FUNDING SOURCE: Environment and Natural Resources Trust Fund

LEGAL CITATION: M.L. 2017, Chp. 96, Sec. 2, Subd. 06f

APPROPRIATION AMOUNT: \$195,000

AMOUNT SPENT: \$194,758

AMOUNT REMAINING: \$242

Sound bite of Project Outcomes and Results

Audubon Minnesota undertook a three-year hybrid-cattail management project at the Agassiz Valley Impoundment. The three-phase management approach increased the amount of open water available to birds and other wildlife. Vegetation measurements (NDVI) decreased in 78% of the plots and the total number of bird species seen or heard increased overtime.

Overall Project Outcome and Results

The Agassiz Valley Impoundment, located near Warren, MN, is a 2,560-acre impoundment with a gated water storage area of 6,840 acre-feet that is managed by the Middle-Snake Tamarac-Rivers Watershed District (District). The primary purpose of this impoundment, like the many others across Minnesota, is for floodwater storage, however, they serve many other secondary functions including important wildlife habitat for migrating and breeding species. Due to their primary purpose, impoundments normally follow a hydrologic regime that includes water-level drawdown during the summer months to increase the impoundment's holding capacity for the fall and following spring. This draw down cycle can stimulate the germination of emergent wetland species, especially the non-native hybrid cattail that can form dense monocultures which crowd out native species and degrade habitat quality. Audubon Minnesota and the District collaborated on a project to test the effectiveness of a cattail management regime and the corresponding bird use throughout the treatment cycle. From 2017-2020, Audubon used a three-phase management approach that included conservative herbicide application, structural biomass reduction, and water management in an attempt to control and reduce the hybrid cattail population. Furthermore, Audubon acquired high-resolution orthophotography in 2019 and 2020 from drone flights to further delineate cattail populations and to allow for precise treatment. From 2017 to 2019, the normalized vegetation difference index decreased in 78% of vegetation points within the treatment area, indicating that the management regime was effective in areas that were able to be inundated. Avian response showed promising results; species diversity initially declined the first year following mechanical treatment (2018) but rebounded in 2019 and 2020 with respective increases of 27% and 41% when compared to the pre-treatment numbers in 2017.

This management regime shows promise as a long-term strategy to improve the habitat quality of impoundments across Minnesota while still allowing them to serve their primary purpose of flood mitigation. Hybrid cattail reduction in impoundments benefits the longevity of the impoundment, and thus, the surrounding Minnesotans depending on it for floodwater mitigation.

Project Results Use and Dissemination

Site documentation through photos occurred 2018-2020 during the growing season, especially concentrating on times with significant water level changes like spring flooding or coinciding with other management actions. A selection of those photos are included in the final report. Audubon Minnesota created a [project webpage](#) highlighting the work we are doing at the Agassiz Valley Impoundment. A [summer update on progress](#) was posted to the project webpage mid-June E-news updates about the project went out to over 25,000 Audubon Minnesota e-newsletter subscribers over the course of the project.

We have also posted updates about the project to Audubon's social media platforms. Audubon has reached out to the Watershed District about adding a segment to the Agassiz Valley Impoundment Page about this project and they are open to it so we will continue to work on website additions to their webpage. Dissemination of the summary fact sheet on the project to area watershed districts is underway along with updates on the culmination of the project in our next e-newsletter and on social media. Our project webpage will also be updated with more photos and project summary information.

Recommendations and Ways to Improve Wildlife Habitat in Impoundments:

- A three-phased approach was most effective in treating and controlling hybrid cattail. The areas that experienced prolonged control were areas that could be inundated during prime cattail germination periods.
- Winter mowing was an effective method to reducing the standing dead cattail structure when fire is not an option.
- Follow up herbicide treatments are likely to be necessary if the area experiences a dry period during the growing season allowing hybrid cattail to germinate.
- Managing invasive non-native species and noxious weeds on the dikes through herbicide use or spot mowing allows delayed overall mowing or haying to occur to benefit ground nesting birds and reduce population sinks.
- Plan new impoundments with habitat management in mind.



Environment and Natural Resources Trust Fund (ENRTF) M.L. 2017 LCCMR Work Plan Final Report

Date of Submission: 15 August 2020

Final Report

Date of Work Plan Approval: 07 June 2017

Project Completion Date: 30 June 2020

PROJECT TITLE: Maximize Value of Water Impoundments to Wildlife

Project Manager: Alexandra Wardwell

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Location: Agassiz Valley Impoundment located in Marshall and Polk Counties T154, R46 & R47

(Latitude 48.1751417, Longitude -96.6440833)

Total ENRTF Project Budget:

ENRTF Appropriation: \$195,000

Amount Spent: \$194,758

Balance: \$242.00

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 06f

Appropriation Language:

\$195,000 the first year is from the trust fund to the commissioner of natural resources for an agreement with the National Audubon Society, Minnesota office, to control invasive hybrid cattails in water impoundments to improve habitat quality for migrating and breeding birds. This appropriation is available until June 30, 2020, by which time the project must be completed and final products delivered.

I. PROJECT TITLE: Maximize the value of floodwater impoundments for wildlife.

II. PROJECT STATEMENT:

In 2012-2013 Audubon Minnesota conducted migratory and breeding bird surveys on five Middle-Snake-Tamarac Rivers Watershed District (Watershed District) impoundments in order to better assess their value to wildlife (*Prairie Pothole Joint Venture Flex Fund - Red River Valley Avian Conservation Final Report, Audubon MN 2014*). Survey results reveal that floodwater impoundments function as artificial wetlands and shallow ponds for a suite of migrating and breeding birds. However, invasive hybrid cattail (*Typha x glauca*) and exotic narrow-leaved cattail (*Typha angustifolia*; hereafter, hybrid cattail) was a major issue noted while conducting these surveys. Its presence and typical rapid expansion poses an immediate threat by reducing the habitat quality of these impoundments. We recognize that floodwater control was the primary function of these sites when they were constructed and will remain so in the future. However, the management capabilities at these sites also show that there is potential to provide essential functions for migratory and breeding birds, and other wetland-dependent wildlife.

Based on observations at the Agassiz Valley Impoundment in particular, the extent of open water habitat has decreased substantially in the four years since we first conducted bird surveys, due primarily to the expansion of hybrid cattail. Previous research has shown that wetlands with an approximate 50:50 ratio of open water and emergent vegetation attract the highest diversity of wetland birds and promote optimal recruitment for population growth. Conversely, wetlands that are dominated by a monoculture of cattail have low wildlife value and are typically only utilized by a small number of bird species. The reduction and subsequent management of hybrid cattail within these impoundments is essential not only to maintain the necessary water storage capacity within these impoundments, but also to provide improved habitat to birds and other wildlife. We propose an invasive hybrid cattail removal project using a combination of site-appropriate best management practices at the Agassiz Valley Impoundment. This cattail removal project is complimentary to the *Cattail Management for Wetland Wildlife and Bioenergy Potential* grant that was awarded by LCCMR in 2014, which is under the supervision of Dr. Dan Svedarsky. Both projects highlight the issue of wetland habitat degradation due to the rapid expansion of invasive hybrid cattail, which is widely recognized as one of the most critical and challenging management issues wetland managers are currently facing throughout the Upper Midwest. Results from this project will inform the maintenance, management, and design of existing and future impoundments throughout the region to maximize their value to wildlife. Additionally, cattail management in these impoundments will ultimately promote their longevity, water storage capacity, and water quality.

For this project we will:

- Conduct 3 avian monitoring surveys of spring migratory and breeding bird species at the Agassiz Valley Impoundment before, during, and after invasive hybrid cattail removal/control management activities.
- Remove up to 500 acres of hybrid cattail from the Agassiz Valley Impoundment owned and operated by the Watershed District (gated water storage area is 6,840 acre-feet; un-gated is 10,670 acre-feet.)
- Use this experience at the Agassiz Valley Impoundment to guide us in developing wildlife enhancement elements that can be integrated into the floodwater management plans of existing and future impoundments throughout the region.

III. OVERALL PROJECT STATUS UPDATES:

Project Status as of 31 October 2017:

Status Report not required as per email communication on 26 July 2017 from Diana Griffith.

30 April 2018 Amendment Request

Due to staff changes, we request the following amendment:

1. Remove Kristin Hall as Project Manager. She is no longer with Audubon Minnesota.
2. Change Alexandra Wardwell's role from Field Supervisor to Project Manager, replacing Kristin Hall.
3. Remove Sue Swanson from budget. She retired. Replacement position is pending.

4. Remove Brent Silvis, Middle-Snake-Tamarac Rivers Watershed District Administrator, from Partners NOT Receiving ENRTF Funding.
5. Change Middle-Snake-Tamarac Rivers Watershed District Administrator to Joel Praska under Partners NOT Receiving ENRTF Funding.

Amendments Approved: 05/03/2018

Project Status as of 30 April 2018:

Pre-treatment monitoring in the Spring and Summer of 2017.

Audubon staff conducted four distinct surveys at the Agassiz Valley Impoundment including: migratory bird presence-absence, secretive marshbird survey (three visits), upland bird point count surveys (one visit), and basic habitat (plant cover) surveys in the spring and summer of 2017. These surveys are intended to capture baseline bird use and site condition data prior to invasive cattail treatments. Surveys took place on May 10th, May 24th and June 16th of 2017 in order to document both the migratory and breeding bird use of the impoundment and surrounding area. General results of this initial effort include: 57 migratory and breeding bird species documented using the impoundment. Six upland species were detected during the point count survey (June visit) and 10 of the secretive marshbird, primary and secondary species, were documented. These data will be compiled with the next two seasons of data collection, and are considered the “pre-treatment” information to be used in a comparative analysis once the cattail treatment process is complete.

Aerial herbicide treatment in the Fall of 2017.

In August 2017, we conducted site visits to the Agassiz Valley Impoundment in order to strategically time the herbicide application for maximum effectiveness for treatment of hybrid cattail and to coordinate the treatment with the Watershed District staff and contractors. We created a treatment map using GIS that targeted the most overgrown areas within the Impoundment. We treated 250+ acres of hybrid cattail aerially with Rodeo in early September.

Cattail mowing treatment was conducted in the Winter and Spring of 2018.

We coordinated the contractor outreach for the mowing project and distributed the project RFP to as many local contractors as possible. We selected our contractor based on their bid price, specialized equipment, and their expected start date. We mowed 250 acres of hybrid cattail in the treatment area from late February-late March 2018 despite some setbacks with subsequent snows and mowing equipment mechanical issues. Due to the amount of snow within the impoundments and adverse weather conditions, including heavy drifting in areas, we were not able to find a contractor willing to mow and bale the cattail.

Project Status as of 31 October 2018:

Post Treatment Bird Monitoring in the Spring and Summer of 2018

Audubon staff conducted four surveys at the Agassiz Valley Impoundment including: migratory bird presence-absence, secretive marshbird survey (three visits), upland bird point count surveys (one visit), and basic habitat (plant cover) surveys in the spring and summer of 2018. Surveys took place on May 11th, May 30th and June 20th in 2018. Data from these surveys are used to monitor post-treatment bird use and site condition data following invasive cattail treatments.

Planning and Coordination in the Spring and Summer of 2018

Audubon Minnesota worked closely with the Watershed District staff and Houston Engineering to create a water level management plan for the season to maximize the benefit to wildlife while at the same time impacting hybrid cattail negatively. Communication between the parties was extensive, with the ultimate goal of meeting all parties’ objectives and needs. Collaboratively, we projected the water inundation acreage at different elevations and what the result would mean for remaining gated storage capacity.

Audubon Minnesota, the Watershed District, and Houston Engineering presented information to the Watershed District Board regarding what each possible elevation would entail. The mean sea level elevation of 912.65 was decided on as a target with water being held longer over the treatment area, which would inhibit new cattail germination.

Water Level Management in the Summer and Fall of 2018

Audubon Minnesota along with the Middle-Snake-Tamarac Rivers Watershed District began the water level management phase of the project in the spring of 2018. The goal was to keep water over the treated cattail (sprayed and mowed) to create open water areas that would appeal to various waterbird species. Previously, the treatment area was a dense hybrid cattail monoculture. Most importantly, we wanted to impede the germination on new cattail seeds remaining or washing into the impoundment by holding as much water as we were permitted through the primary period of hybrid cattail germination from mid-summer-early fall. This was accomplished through in person presentations and communications with the Middle-Snake-Tamarac Watershed District Board of Directors and Watershed District staff with detailed projection maps of what elevation would hold water over what acreage. The Board of Directors decided the amount of water they were comfortable holding given all the other factors such as the impoundment's gated storage capacity, snowfall and rainfall, potential for heavy rainfall or flood events, and the fact that we wanted enough outflow water to provide the Snake River with consistent flow for agricultural producers downstream. The projection of 912.65 was decided on as a target to flood the majority of the treatment area while also keeping enough gated storage capacity free for a potential extreme flood event.

Project Status as of 30 April 2019:

Planning and Water Level Management

Since October, we have continued to work with the Watershed District staff and the Watershed District Board Members about our objectives for the coming year. Audubon Minnesota presented information on the proposed management of the Impoundment, including the water level management target of 912.65 feet to the Watershed District Board at the board meeting on April 1st, 2019. With last year's water level management successes and no adverse effects to the Impoundment or staff, the Board voted to approve the mean sea level elevation target of 912.65 feet for the 2019 growing season.

Bird Monitoring in the Spring and Summer of 2019

Avian surveys will continue this spring and summer to monitor both migratory and breeding bird species utilizing the impoundment. We are in the process of hiring the same surveyor as last year to promote continuity with the data.

Follow-up Aerial herbicide treatment in the late Summer-Early Fall 2019

In addition to the continued water level management, we will also be assessing the need for follow-up aerial herbicide applications in the Impoundment and potentially targeting some new areas such as the two water input channels.

Project Status as of 31 October 2019:

Planning and Water Level Management

Audubon continued to work with the Watershed District staff and the Watershed District Board Members on the water level management objectives in the spring, summer, and fall of 2019. The Watershed District did allow Audubon to hold the water level at 912.65 from freeze out to August 19th, 2019. At that time, they felt they needed to begin the drawdown of the water level over concerns with fall 2019 precipitation events and being fully prepared for potential spring 2020 flooding. The Impoundment was near complete drawdown on September 19th after which, a large rain event occurred.

Bird Monitoring in the Spring and Summer of 2019

Avian surveys were conducted at the Impoundment in late spring and early summer during this year's breeding season. Datasheets were checked for correctness and scanned so we have a digital backup. New data gleaned from these efforts is currently under review but bird activity and the number of species present was very good throughout the monitoring period.

Follow-up Aerial Herbicide Treatment

Audubon wrote a Contract and Scope of Work for an unmanned aerial systems (UAS) survey over a 420 acre treatment area within the Impoundment at a height of 200 feet. The project was put out for bid and a local contractor was selected. The finished product was a georeferenced ortho-mosaic of the 420 acre treatment area. This drone flight allowed us to better view, analyze, and map all of the Impoundment treatment area for retreatment and showed us where there was a need for additional work adjacent to the treatment area.

Audubon wrote a Contract and Scope of Work for a follow-up aerial hybrid cattail spray in the Agassiz Valley Impoundment. The project was put out for bid and a local contractor was selected. The treatment and management area was reviewed and approved ahead of time by Watershed District staff. We re-treated some areas that had been aerielly treated in 2017 where re-sprout/germination occurred. We included an additional 100 acres of additional control adjacent to the initial treatment area where the hybrid cattail cover was extensive. By including more acres adjacent to our initial treatment area we will buffer our primary treatment area where multiple treatments have been performed.

Amendment Request as of 03/30/2020

Due to a surplus of funds in our Travel budget, and the likelihood we won't be traveling as much in the coming weeks due to the Covid-19 pandemic, we are reassessing and restructuring the budget. More travel funding was initially allocated to this grant than ended up being needed thanks to a partnership developed with the U.S. Fish and Wildlife Service, allowing Audubon Minnesota to utilize one of their fleet vehicles for project work. This partnership saved a considerable amount of mileage that otherwise would have been claimed. With this in mind, we request the following amendment:

1. Travel budget would be reduced by \$6,000 bringing the new revised travel budget to \$6,500.
 - a. Contract budget would increase by \$1,500. This will allow for an additional drone flight over the impoundment to assess an additional year of hybrid cattail coverage and to map the treated area for overall treatment effectiveness.
 - b. Personnel budget would increase by \$4,500 bringing the new revised budget to \$109,000. Moving these funds to personnel will allow additional staff support to work on the drone contract, compile the additional bird survey data, and to incorporate these findings into the final report.

Amendment Approved by LCCMR 04/21/2020

Project Status as of 30 April 2020:

Planning and Water Level Management

Audubon will continue to work with the Watershed District staff and the Watershed District Board Members on the water level management objectives in the spring and summer of 2020. Discussions continue with the Watershed District, to allow Audubon to hold the water level at 912.65 from the ice out until the end of the grant. The hope is that they will continue this practice to hold more water to benefit waterbirds of all types as well as to impede cattail germination during the prime growing season window.

Bird Monitoring in the spring and early summer of 2020

Avian surveys are planned at the Impoundment in late spring and early summer during this year's breeding season pending approval of amendment. Having four years of bird data, especially having the same surveyor for the last three years, will provide a good amount of data and provide the consistency that is often lacking in seasonal surveys.

Vegetation Monitoring

Another drone survey of the treatment areas in the Agassiz Valley Impoundment is planned for early summer with approval of the proposed amendment. The drone operator will fly at the same height and with same resolution as our last survey. This will give us a current picture of the hybrid cattail extent so we can estimate the existing overall hybrid cattail coverage and overall treatment effectiveness.

Overall Project Outcomes and Results: 15 August 2020

The Agassiz Valley Impoundment, located near Warren, MN, is a 2,560-acre impoundment with a gated water storage area of 6,840 acre-feet that is managed by the Middle-Snake Tamarac-Rivers Watershed District (District). The primary purpose of this impoundment, like the many others across Minnesota, is for floodwater storage, however, they serve many other secondary functions including important wildlife habitat for migrating and breeding species. Due to their primary purpose, impoundments normally follow a hydrologic regime that includes water-level drawdown during the summer months to increase the impoundment's holding capacity for the fall and following spring. This draw down cycle can stimulate the germination of emergent wetland species, especially the non-native hybrid cattail that can form dense monocultures which crowd out native species and degrade habitat quality. Audubon Minnesota and the District collaborated on a project to test the effectiveness of a cattail management regime and the corresponding bird use throughout the treatment cycle. From 2017-2020, Audubon used a three-phase management approach that included conservative herbicide application, structural biomass reduction, and water management in an attempt to control and reduce the hybrid cattail population. Furthermore, Audubon acquired high-resolution orthophotography in 2018 and 2019 from drone flights to further delineate cattail populations and to allow for precise treatment. From 2017 to 2019, the normalized vegetation difference index decreased in 78% of vegetation points within the treatment area, indicating that the management regime was effective in areas that were able to be inundated. Avian response showed promising results; species diversity initially declined the first year following mechanical treatment (2018) but rebounded in 2019 and 2020 with respective increases of 27% and 41% when compared to the pre-treatment numbers in 2017. This management regime shows promise as a long-term strategy to improve the habitat quality of impoundments across Minnesota while still allowing them to serve their primary purpose of flood mitigation. Hybrid cattail reduction in impoundments benefits the longevity of the impoundment, and thus, the surrounding Minnesotans depending on it for floodwater mitigation.

IV. PROJECT ACTIVITIES AND OUTCOMES:

ACTIVITY 1: Invasive Hybrid Cattail Reduction in Agassiz Valley Impoundment

Description: Conduct hybrid cattail removal at Agassiz Valley Impoundment to allow for increased flood control capabilities, enhance bird and wildlife habitat, and promote water quality. Our projected treatment regime is as follows:

- Fall 2017: Initial treatment with an aerial herbicide application using a wetland-approved glyphosate-based or imazapyr-based herbicide. Late summer and early fall is an ideal time frame for treatment, as it aligns with the phenological time frame in which cattail is sending nutrient reserves into its root mass and therefore promotes an optimal "kill".
- Approximately two weeks to one month after the chemical application, we will conduct either a mechanical removal, mowing, or haying of the treated area in order to reduce and/or remove residual dead standing cattail and effectively 'push' the impoundment's habitat toward the desired 50:50 ratio of open water to emergent vegetation.

- Spring/Summer 2018: Conduct targeted water level management in coordination with Watershed District staff objectives, to ensure little to no cattail germination from seed banks within the previously treated area. At a minimum, we will aim to maintain water levels $\geq 6''$ during the period of cattail germination (June- August).
- Fall 2018: Follow-up management treatments to include spot herbicide application, mowing, or haying will be applied as necessary, based on an ocular vegetation assessment of the site.

Our treatment schedule does not allow for the initial avian survey to take place under the LCCMR grant window, as migratory and breeding bird surveys are typically conducted in May and June. Audubon Minnesota will provide project leverage funding (approximately \$12,250) to insure that the initial “pre-treatment” surveys are conducted in order to begin the hybrid cattail control treatment within the early phases of the grant cycle (estimated award date: 1 July 2017). Please see Activity 2 for the avian surveys description.

Summary Budget Information for Activity 1:

ENRTF Budget: \$ 117,500
Amount Spent: \$ 117,258
Balance: \$242

Outcome	Completion Date
1. Conduct pre-treatment monitoring of migratory and breeding bird use at the impoundment (1st survey season funding from Audubon and/or assistance from partner agencies).	May-June 2017
2. Prepare a Management Plan in cooperation with Watershed District staff for hybrid cattail control and water-level management at the impoundment, outlining project process, timeline, roles, and responsibilities.	Summer 2017
3. Remove up to 500 acres of invasive hybrid cattail using a combination of herbicide, flooding, mowing, mechanical removal, and haying (USFWS, Watershed District, and contracted entities).	Fall 2017-Fall 2018

Project Status as of 31 October 2017:

Status Report not required as per email communication on 26 July 2017 from Diana Griffith.

Project Status as of 30 April 2018:

June-July 2017- The Management Plan was discussed with area Partners (MN DNR Biologist, USFWS Biologist and USFWS Project Manager) to gain insight on first-hand control experiences regarding timing of treatments. Research was conducted on the specifics in other regional Management Plans for hybrid cattail control. We met with Middle-Snake-Tamarac-Rivers Watershed District staff and the Watershed District Board to update them on the status of the grant, our management plan, and subsequent phases of the project.

August 2017- The Scope of Work (work to be performed) for the first phase of control, the aerial herbicide application, was written. Using GIS, we created a map of the treatment area for the Scope of Work and to guide future contractors (Map 1). Outreach to local aerial herbicide applicators was conducted. The RFP for the first phase of control was put out for bid and sent to licensed area applicators. Bids were received and a qualified and reasonable contractor was selected.

8th-11th September 2017- 250+ acres of hybrid cattails in the treatment area were aurally sprayed on low wind days with Rodeo (glyphosate-based, aquatic-approved herbicide) at the rate specified in the Scope of Work (3 qt/acre of Rodeo combined with the surfactant Wheelhouse at a rate of 1oz/gallon and “spray grade” ammonia sulfate at a rate of 1 lb/acre to help with hard water amendment).

18th September 2017- A week post-spray we visited the treatment site to assess the spray effectiveness. The spray looked to be 90% or more effective as the cattails were already dying and brown upon the 3rd week of September whereas cattails on the west side of the dike (unsprayed area) of the impoundment were yet green.

We met with the Watershed District Staff to update them on progress and discussed the overall project goals, the second phase in our treatment plan, and answered any questions that arose.

December 2017-January 2018- We met with Watershed District Staff to discuss contractors and equipment for phase two of our treatment plan- mowing of the treated cattail area. We contacted the Red Lake Watershed District staff for additional trusted contractors. We compiled list of local area contractors and contacted each one by phone and those we had emails for my email as well.

January 2018- We wrote a Scope of Work for the cattail mowing and distributed it to all contractors we had heard back from (11). We visited the Impoundment to meet with Watershed District staff and interested contractors. We discussed the project and possible approaches with different types of equipment. We assessed the site conditions after recent snows and took snow depths and photos.

27th February 2018- We received 5 bids within the bid period.

A contractor was chosen after we conducted reference checks. A meeting at the Impoundment was held with Watershed District Staff and the contractor. Snow was cleared for access to the site and mowing began using a combination of equipment including: 2 Bombardiers with front-mounted mower and dozer attachments, skid steer with forestry mulcher, 2 tracked and 1 non-tracked tractors with pull-behind rotary mowers.

28th of March 2018- Mowing of treatment area was completed on the treatment area.

29th of March 2018- The cattail treatment area was mapped by bombardier using Avenza Maps and Arc GIS Collector and shapefiles were created. The area mowed was found to be very accurate holding to the 250 acre treatment area boundaries tightly.

Project Status as of: 31 October 2018:

We conducted targeted water level management in coordination with Watershed District staff objectives, to prevent the germination of cattail from seed banks within the previously treated area. Initially, we had aimed to maintain water levels $\geq 6''$ during the period of cattail germination (June- August) however, we able to hold water 2 feet over the typical 910.65 mean sea level elevation that the Watershed District usually maintains. The elevation was held at 912.65 until August when water was gradually released. Through August, water was held a foot over where it normally is at that time with the drawdown continuing into mid-September to prepare for fall precipitation and maximum water retention capacity in the spring.

Project Status as of 30 April 2019:

We coordinated with the Watershed District staff and Board Members about our management and monitoring plans. In 2019, we will continue our water level management strategy focusing on 912.65 feet above mean sea level during the spring and summer of 2019. This target water level was proposed to the Watershed District Board and approved by the Board on April 1st, 2019. Water levels at the impoundment will be monitored weekly and the gate will be adjusted accordingly to maintain 912.65 feet in the impoundment for the duration of the growing season.

In addition to the continued water level management, we will also be conducting follow-up aerial herbicide applications of hybrid cattail in the Impoundment treatment area and potentially targeting some new areas such as the two water input channels. Audubon Minnesota is exploring the possibility of one or more drone flights to assess the acreage of any remaining cattails for treatment as well as to document the changes to the impoundment since treatments began. This would also provide high quality photos to showcase the work and provide valuable imagery to the Watershed District for ongoing management.

Project Status as of 31 October 2019:

We continued with our water level management strategy in 2019 coordinating with the Watershed District Staff and Board Members on good compromises. Water levels at the impoundment were monitored weekly by Watershed District Staff and the gate was adjusted accordingly to maintain 912.65 feet elevation until August when the Watershed District decided to begin the Impoundment's drawdown to prepare for fall and spring 2020 flood storage. Around August 20th the Impoundment was close to being completely drawn down but

precipitation events between then and October 1st caused the elevation to increase back to 913 feet. As of the week of October 20th, the Impoundment water level is the highest it has been since its creation at 917.0 feet. The next highest record was in spring of 2011 at 916.1 feet. The high water will likely drown some cattail rhizomes on higher ground and will have the added benefit of providing nice feeding conditions for late migrating waterfowl, especially diver ducks.

Project Status as of 30 April 2020:

An aerial herbicide application follow-up was conducted in early fall of 2019, which re-treated some previously treated areas in addition to adding approximately another 100+ acres of previously untreated hybrid cattails. This treatment was the last herbicide treatment that will be conducted under this grant. The remaining hybrid cattail management will be done through coordinated water level management with the Watershed District.

Final Report Summary:

Audubon directly removed approximately 540 acres of invasive hybrid cattail using a combination of aerial herbicide applications, winter mowing over ice to alter cattail structure, and water level management in 2018 and 2019. The impacts of the water level management also had far-reaching effects in areas outside of our primary treatment areas. The Agassiz Valley Impoundment only has one outlet structure and is graded from east to west, so water once held would spread out over a much larger acreage within the 2,560-acre impoundment. The water level management had countless benefits for waterbirds and shorebirds especially creating new shallow water areas for feeding and nesting.

In 2020, typical March planning meetings were delayed due to Covid-19. Water level management options were discussed with the Middle-Snake-Tamarac Watershed District staff but the Watershed District Board had to make the decision about water levels. The 912.65 elevation over mean sea level that Audubon advocated for and which was approved by the Board for the majority of the 2018 and 2019 growing seasons was not approved at the summer board meeting in 2020. Due to extreme rain events in late fall 2019 and snow melt in spring of 2020 the Board declined to allow the same water level management regime in 2020 and water was only held to the low flow augmentation pool level of 910.65 during the 2020 growing season. This will likely impact some of the more upland areas within the treatment area allowing some hybrid cattail seed to germinate where it otherwise would not have due to higher water levels.

One very interesting aspect of this project was the likely first time that a winter cattail mowing had been done over ice in northwest Minnesota as a habitat management tool. It was a huge unknown whether it would even be possible when undertaking the structural alteration aspect of the project. Initially, prescribed fire was the proposed and preferred method. When that was taken off the table as a management tool due to concerns over ash nutrient inputs, a winter mowing seemed like the next possible option. Since this experiment was successful, especially where water can be actively drawn down, this method was adopted by our partner the U.S. Fish and Wildlife Service. In the winter of 2019-2020, the U.S. Fish and Wildlife Service contracted the mowing of 1000 acres of previously treated hybrid cattail because the open water results had been so substantial at the Agassiz Valley Impoundment.

ACTIVITY 2: Avian and vegetation monitoring of impoundment pre- and post-treatment activities

Description: Conduct pre- and post-treatment avian response monitoring of the cattail removal project. These surveys will collect both avian and aquatic vegetation data. Information gathered throughout the monitoring process will be used to better advise the design and subsequent management of future floodwater impoundments.

Survey Methodology

- A subset of survey locations will use the standard method for sampling birds which is an unlimited-radius, 10-minute point count protocol. All birds seen or heard from a specific point are recorded during a 10-minute period by a qualified observer.

- We will also use the Standardized North American Marsh Bird Monitoring Protocol (Conway 2011) which includes a 5-minute passive listening period followed by 6 minutes of call playback species specific monitoring to detect secretive marshbirds (e.g., bitterns, rails).
- A standard form with map will be used to record data. This form requires the observer to estimate where each bird was first encountered and when each bird was first encountered (during the census period). These details facilitate comparisons with other studies.
- Birds flying over and not actively using the count area should be recorded separately as “flyovers.”
- Whenever possible, sex and age (adult vs. juvenile) of each bird should be recorded. In particular, juvenile birds (e.g., recent fledglings) should be distinguished from adults in order to estimate the number of breeding pairs in the area.
- Time of day, weather conditions, and exact locality in lat/long or UTM coordinates should be recorded for each count locality.
- Avian surveys will take place each year from 1 May – 30 June with the goal of conducting three surveys per season (early May, late may- early June and late June) in order to document both spring migrants early in the season and breeding birds as the season progresses.
- Associated vegetative/habitat information will be recorded at each avian survey location annually.
- Specific vegetation plots will also be designated throughout the project area for pre and post treatment monitoring using Daubenmire style plots which consist of systematically placing a 20- x 50-cm quadrat frame along permanently located transects. This method captures the following vegetation attributes: species identification, canopy cover, frequency, composition by canopy cover.

Summary Budget Information for Activity 2:

ENRTF Budget: \$35,000
Amount Spent: \$35,000
Balance: \$0.00

Outcome	Completion Date
1. Conduct a second season of avian surveys – overlap with the ongoing treatment process	Summer 2018
2. Conduct a third and final season of surveys – post treatment surveys	Summer 2019
3. Perform survey analysis and write up comparative results	Fall 2019

Project Status as of 31 October 2017:

Status Report not required as per email communication on 26 July 2017 from Diana Griffith.

Project Status as of 30 April 2018:

No action. Activity 2 set to begin May-June 2018.

Project Status as of 31 October 2018:

We conducted avian response monitoring at this stage in the ongoing cattail removal project in the spring and early summer of 2018. A surveyor made three separate visits to the impoundment on May 11th, May 30th, and June 20th to survey waterbirds from our survey locations using the Standardized North American Marsh Bird Monitoring Protocol (Conway 2011). Additionally, an upland bird point count survey was conducted on June 20th to assess breeding birds from the survey points.

First year post management monitoring was conducted in May and June of 2018. The preliminary analysis of the data we have collected to date shows higher avian presence and use post management actions. A total of 517 individual birds of primary and secondary marshbird species, representing 11 species were counted in 2018 compared to 147 individual birds representing 10 primary and secondary species in 2017. A greater diversity of avian species was found in the upland survey point count as well, with a total of 17 species represented in 2018

compared to only 10 species in 2017 before any management actions occurred. The number of individual birds was higher in 2017 with 207 birds compared to 163 in 2018, however a single large group (200 individuals) of common grackles was present in 2017, which was absent in 2018 at the time of the survey. The final collection of monitoring data, including vegetation information, will be collected in the spring and early summer of 2019 and our findings will be summarized in the final report.

Project Status as of 30 April 2019:

We will continue to monitor avian response at this stage in the hybrid cattail removal project in the spring and summer of 2019. Waterbirds will be surveyed from our survey locations using the Standardized North American Marsh Bird Monitoring Protocol (Conway 2011). Additionally, an upland bird point count survey will be conducted to assess other species of breeding birds from the survey points.

In addition to avian surveys, the vegetation community will be monitored using Daubenmire style plots which consist of systematically placing a 20- x 50-cm quadrat frame along transects. This method will capture the following vegetation attributes: species identification, canopy cover, frequency, composition by canopy cover.

Project Status as of 31 October 2019:

Avian Monitoring

This year was the third year of avian monitoring at the Impoundment. A technician surveyed the Impoundment on 3 separate visits during late migration and during the breeding season. Data sheets were checked for correctness and scanned. Analysis of that data is underway and will continue through the winter. Anecdotal observations over the breeding season have provided us with new and useful information, however. Black terns were observed breeding in the impoundment for the first time by Audubon staff. Adult black terns were observed carrying food back to nest sites within the Impoundment treatment area. Additionally, red-necked grebe pairs, a Species of Greatest Conservation Need in Minnesota (SGCN), were seen on several occasions with chicks within the treatment area. They are often considered an indicator of high quality habitat in northern waters and their numbers have been declining.

Vegetation Monitoring

Due to high water levels and our water level management strategy we were not able to access the Impoundment treatment areas for intensive vegetation sampling during the growing season. The Impoundment hit a new record high water elevation level of 917.0 this fall. The previous high water elevation was 916.1 in the spring flood of 2011. We are now looking at other methods for determining the acres affected by our treatments and the hybrid cattail control success such as detailed pre-treatment aerial images and post-treatment images from our summer 2019 drone flight. Access to many areas of the impoundment is very limited even with low water or frozen conditions.

Amendment Request as of 04/16/2020

The amendment to move \$1,500 to Contracts from Travel will allow for another drone flight over the Agassiz Valley Impoundment. This additional imagery will provide for a better assessment of the success of the second treatment as well as to detect changes in the additional 100 acres that was treated in 2019. This imagery can also be used by the Watershed District for future hybrid cattail control.

Project Status as of 30 April 2020:

Avian Monitoring in the spring and early summer of 2020

The Avian Surveyor Contract has been written and avian surveys are planned at the Impoundment in late spring and early summer during this year's breeding season, pending approval of amendment. Having four years of bird data, will provide a good amount of data and provide the consistency that is often lacking in seasonal surveys. Surveys will be conducted in the window from May 1st - June 30th. The data will be analyzed to investigate the avian response to management actions.

Vegetation Monitoring

Another drone flight is planned for this coming early summer, pending the approval of the proposed amendment. This will give us the most current imagery possible so that we can analyze the extent of hybrid cattail cover. The drone operator will fly at the same height and with same resolution as our last survey. This snapshot in time will help us assess the effectiveness of management actions.

Final Report Summary:

Vegetation Monitoring

Audubon acquired high-resolution orthophotography in late summer of 2019 from unmanned autonomous vehicle (UAV) flights to further delineate the hybrid cattail population and to allow for precise treatment of the remaining hybrid cattail in early September in 2019 and adding a new additional 117 acre treatment area to further expand the effects. Additionally, another UAV flight occurred in June 2020 to see the change in vegetation cover after the multiyear management actions. The extent of hybrid cattail in the treatment area was measured by calculating the normalized vegetation difference index (NDVI) from four-band orthophotography (Figure 1).

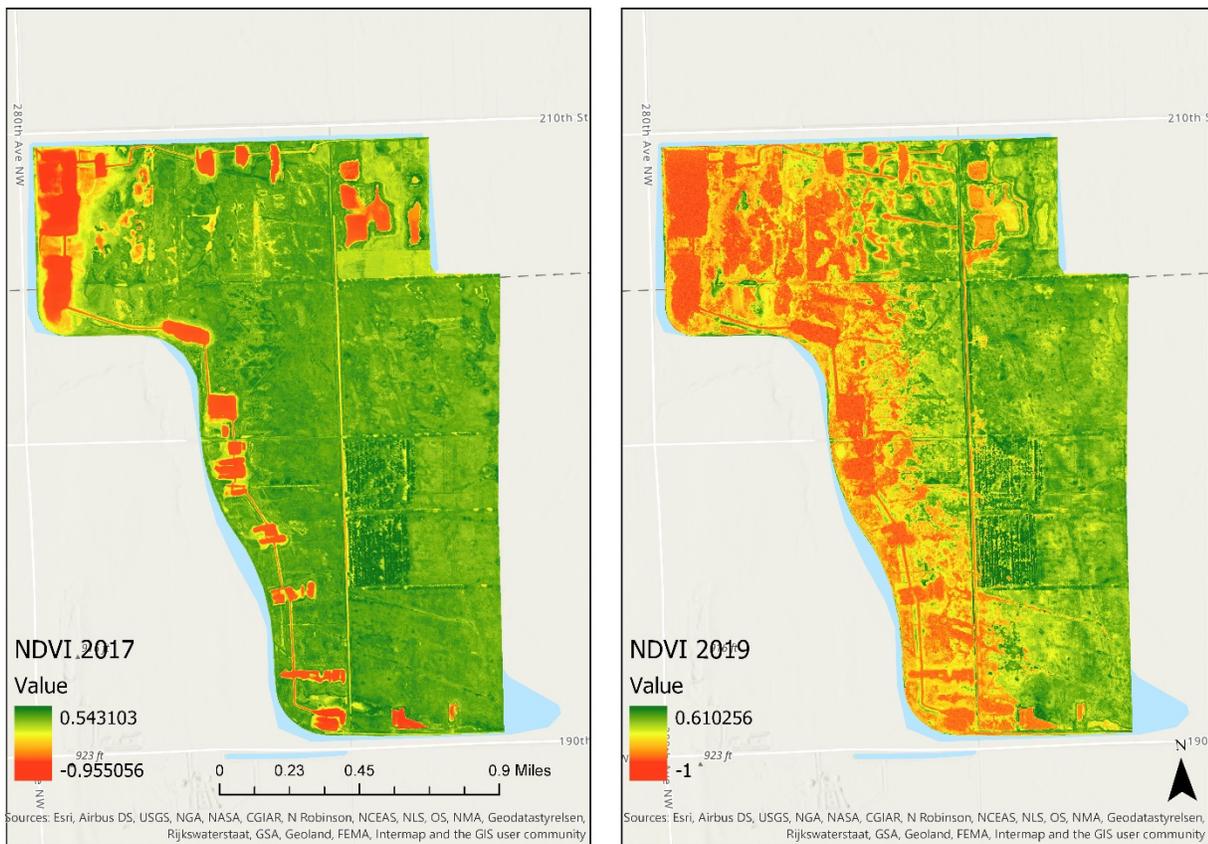


Figure 1. NDVI orthophotography of the Agassiz Valley Impoundment from 2017-2019. The warmer the colors, the less photosynthesizing emergent vegetation present.

NDVI is a common measure to assess plant health and can be used to detect changes through time. From 2017 to 2019, hybrid cattail was reduced throughout the treatment area (change from green to yellow or red) by a combination of herbicide applications, mowing of hybrid cattail over ice, and water level management in 2018 and 2019. The deeper red indicates an absence of vegetation present. At the time of this report, there was no NDVI orthophotography available for 2020. The Farm Service Agency who manages the National Agriculture Imagery Program (NAIP) commissions this imagery every few years or when there is available funding.

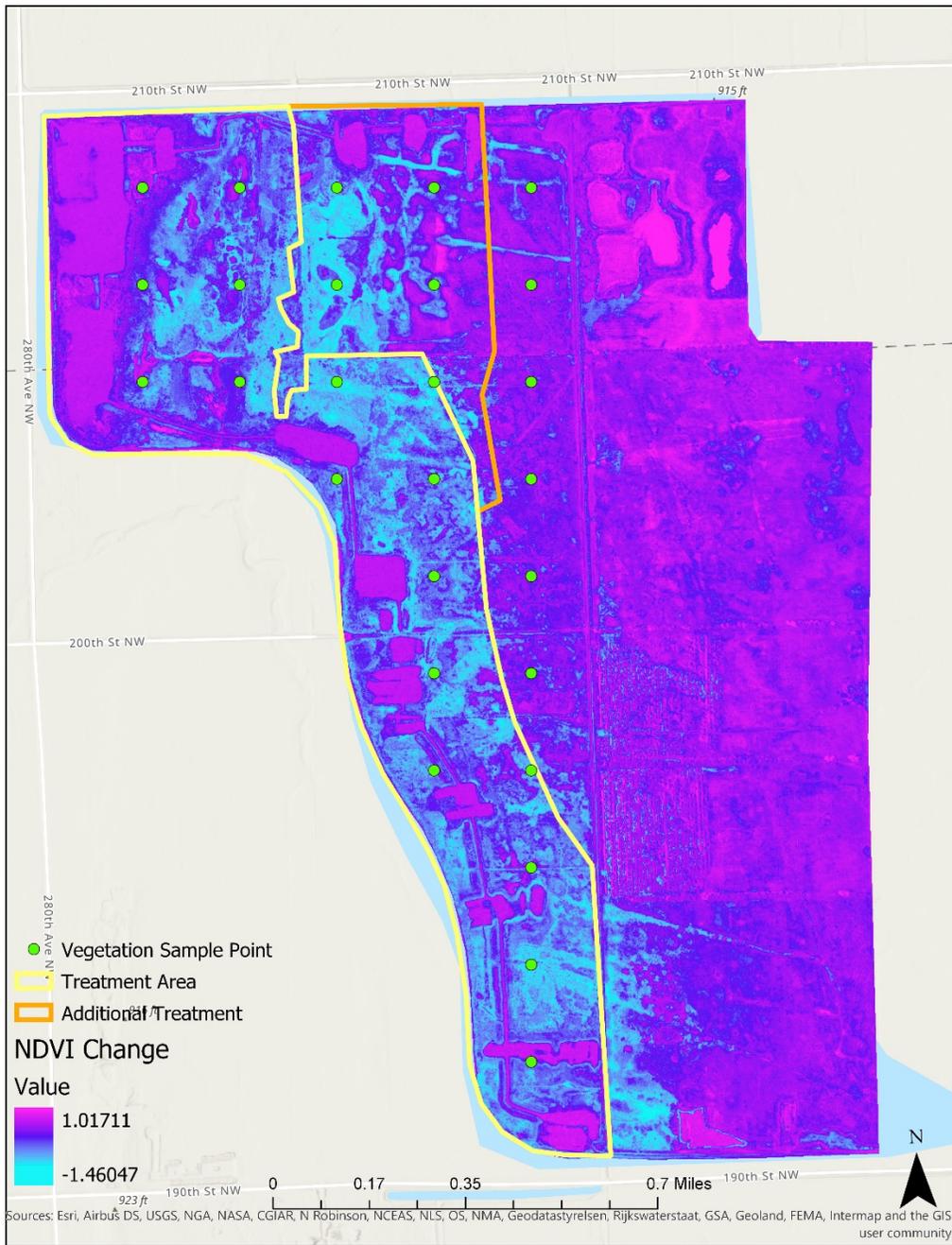
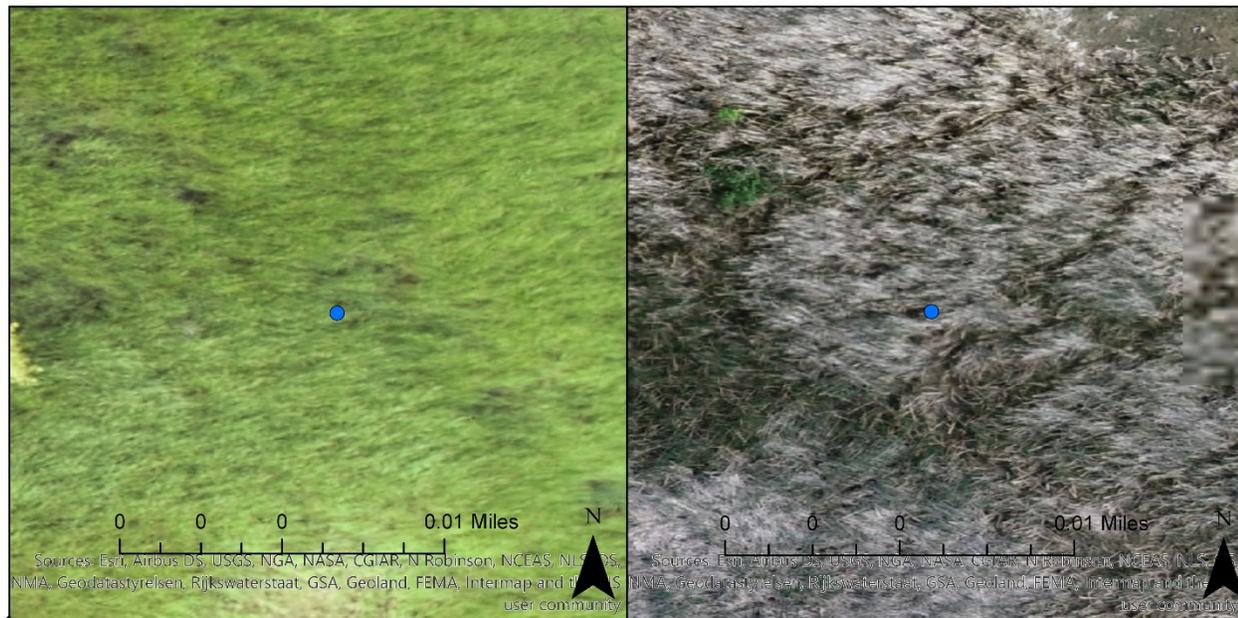


Figure 2. This map shows the difference in normalized vegetation difference index (NDVI) from 2017-2019. The negative values (aqua) show that the NDVI decreased, indicating hybrid cattail vegetation was negatively impacted creating more open water.

Vegetation points were placed into a systematic grid over the primary and additional treatment areas. From 2017 to 2019, the normalized vegetation difference index decreased in 78% of vegetation points within the treatment area, indicating that the management regime was effective in areas that were able to be inundated with water through the water level management regime.



2019 - Pre Aerial Treatment

2020 - Post Aerial Treatment

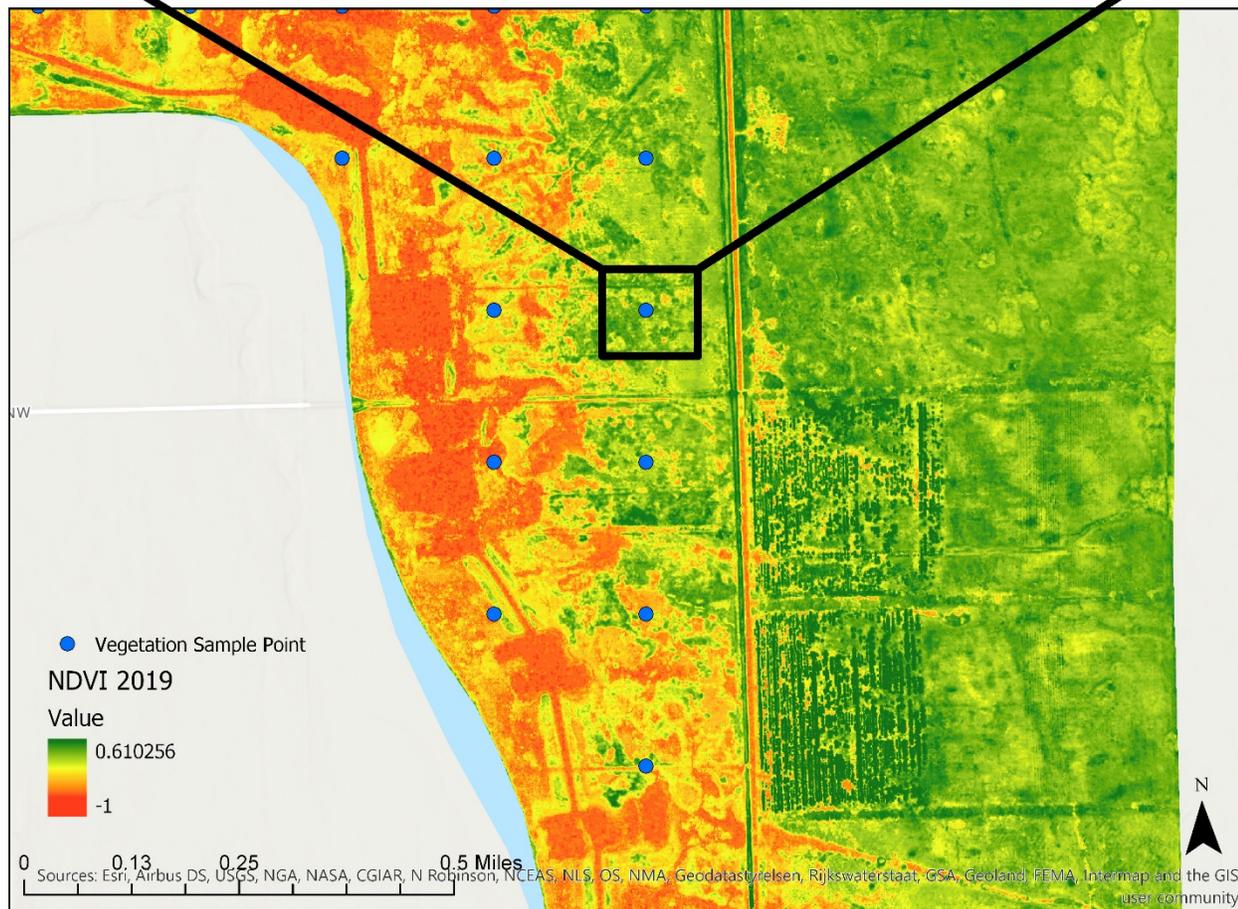


Figure 3. Drone imagery was used for precision herbicide treatment in 2019 and additionally to assess vegetation at each vegetation sampling point. The drone imagery above shows hybrid cattail pre-herbicide treatment and hybrid cattail post-herbicide treatment (2019).

Avian Monitoring

Purpose

The primary purpose of the surveys was to document as many as possible of the species utilizing the site and to provide information about species use and nesting behavior that could be used to determine, if possible, what effect, if any, management actions may be having on the bird populations utilizing and/or nesting on the site. The data may also be used for baseline data for future surveys and monitoring bird populations at the site over time.

Methods

In 2017 and 2018, Audubon Minnesota conducted statewide Marsh Bird Surveys using standardized marsh bird survey protocol and included three survey points within the Agassiz Valley Impoundment along the margins of the impoundment. Two survey points were also established in the upland area in the eastern area of the impoundment where point counts for upland, grassland bird species were conducted using standardized 10 minute point counts with unlimited radius (as defined by University of Minnesota Natural Resources Research Institute (NRRI) for the Breeding Bird Atlas). In 2019 and 2020, Audubon Minnesota conducted a series of more intensive bird surveys throughout Agassiz Valley Impoundment to help assess the response to habitat management strategies to benefit birds at the site.

Analysis

For the purpose of comparison with historical data for this site, each species seen or heard during the course of all bird surveys was evaluated according to Breeding Bird Atlas (BBA) methods to determine nesting status for that species. The following definitions are a condensed description of the methods used by BBA to determine the nesting status for each species:

C = Confirmed nesting: this status was conferred to species which were confirmed by direct observation to be nesting within the site. Examples of sufficient evidence include observations such as seeing a bird carrying nesting material, seeing an active nest, seeing adult birds accompanied by or feeding young etc.

Pr = Probable nesting: this status was conferred to species which were assumed to be nesting within the site even though direct evidence of nesting was not documented. Examples of sufficient evidence include observations such as singing of males from established locations over a period of several weeks, male and female seen together on multiple occasions during nesting season for their species, and other courtship or territorial behavior.

Po = Possibly nesting: this status was conferred to species which were documented in appropriate nesting habitat within the study site during their nesting season, but due to a limited number of observations or for other reasons cannot be assumed to be likely nesting within the site.

O = Observed: this status was conferred to species observed within the site that are assumed to not be nesting within the site. This category includes birds that utilize the site temporarily during migration or birds for which the site does not contain suitable nesting habitat.

For the purpose of comparison between multiple study years and various survey methods, we combined "Confirmed Nesting" with "Probable Nesting" to provide an estimate of the number of bird species assumed to be nesting within the site*.

(*It should be understood that some of the bird species included may not actually nest within the site and that it is likely that there are some bird species that do nest within the site are not included in this number, but this number provides a fairly good comparison of nesting activity between years).

Results

Marsh Bird Surveys Primary Species

There are six primary marshbird species identified in Conway's Protocol that we surveyed for.

- American Bittern
- Sora
- Virginia Rail
- Pied-billed Grebe
- Least Bittern
- Yellow Rail

Marsh bird survey results were similar across years with a few possible trends that may be of interest.

The only primary species that showed a possible significant change in detections in 2020 compared with past year's surveys was American bittern which was only detected a few times during 2020 surveys. There were no real notable changes in numbers of detections of the other five primary marsh bird species. No least bitterns were detected in the four years of marshbird surveys but they are notably more secretive than several other species of marshbirds. No yellow rails were detected in the four years of marshbird surveys but, in truth, the locations of the marshbird survey points were not near any sedge meadows, their preferred habitat, and they are even more secretive than least bitterns.

2019 Intensive Bird Surveys

- 73 bird species were documented utilizing the impoundment during their nesting season based on surveys conducted between May 20 and June 19, 2019.
- 47* of these species are assumed to have nested within the boundaries of the impoundment based on the timing of detections and other behavioral observations. (*This number correlates to the combination of the number of confirmed nesting pairs with the number of probable nesting pairs as described under methods above).
- 26 additional species were documented that could potentially be nesting on the site, but would need further observations to verify nesting status.

2020 Intensive Bird Surveys

- 78 bird species were documented utilizing the impoundment during their nesting season based on surveys conducted between May 14 and June 27, 2020.
- 48 of these species are assumed to have nested within the boundaries of the impoundment based on the timing of detections and other behavioral observations.
- 30 additional species were documented that could potentially be nesting on the site, but would need further observations to verify nesting status.

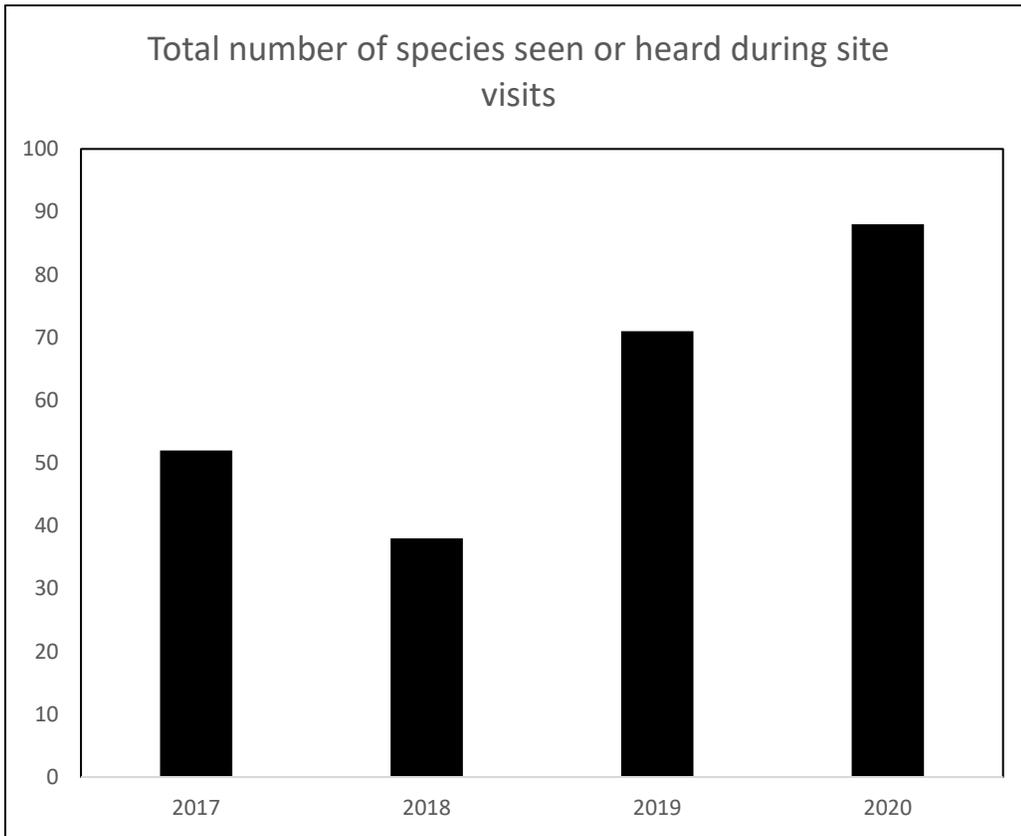


Figure 4. Total number of bird species seen or heard during site visits and surveys from 2017-2020.

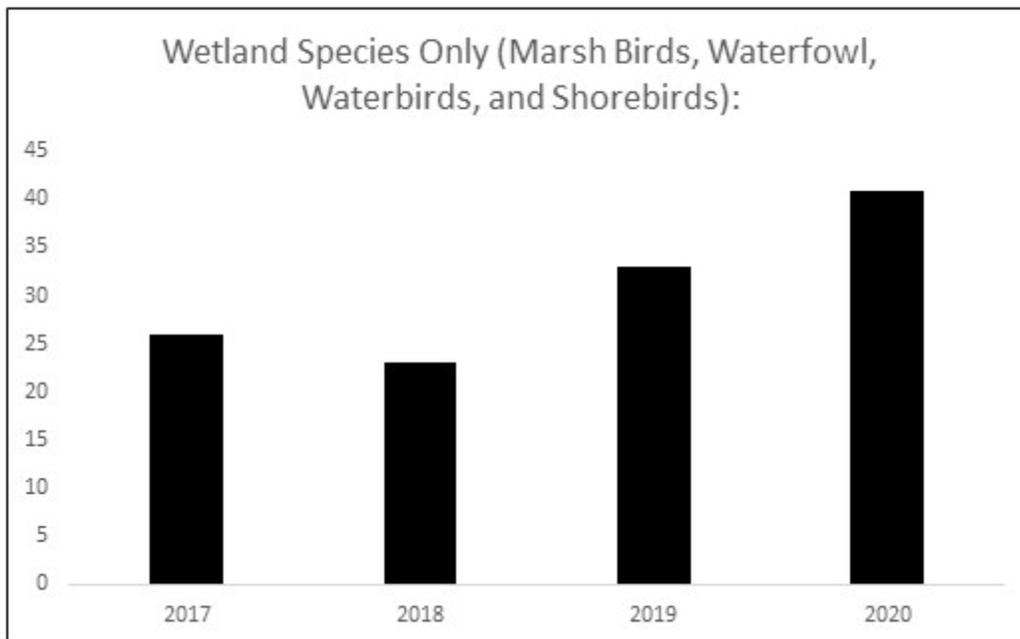


Figure 5. Wetland bird species utilizing the Agassiz Valley Impoundment from 2017-2020.

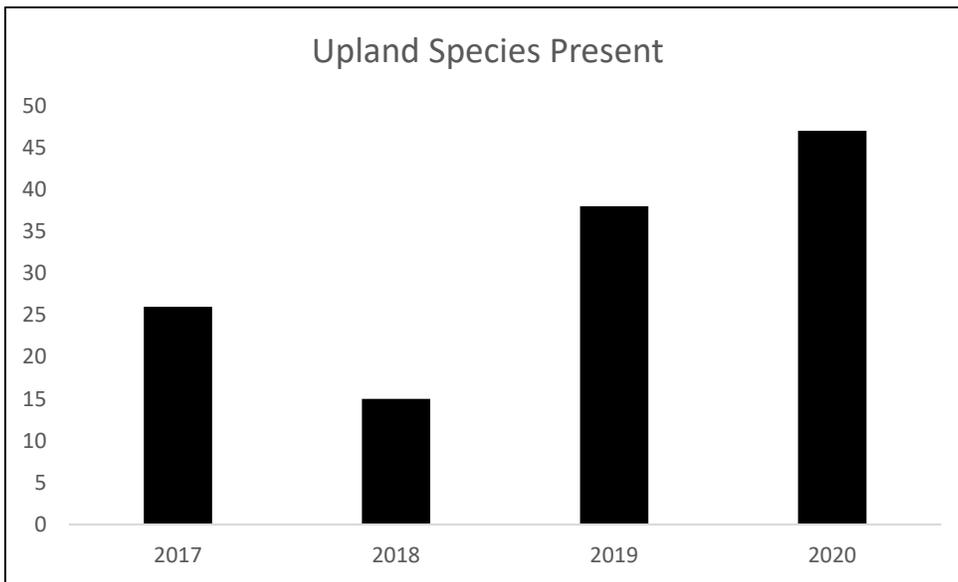


Figure 6. Upland bird species present during site visits and surveys from 2017-2020.

This pilot study’s avian response showed promising results; though species diversity initially declined the first year following the mechanical treatment (mow over ice in 2018) but rebounded in 2019 and 2020 with respective increases of 27% and 41% when compared to the pre-treatment numbers in 2017 (Figure 4). Similar increasing species trends can be seen for wetland obligate species (Figure 5) and upland species in (Figure 6). This management regime shows promise as a long-term strategy to improve the habitat quality of impoundments across Minnesota while still allowing them to serve their primary purpose of flood mitigation.

ACTIVITY 3: Develop and integrate wildlife management recommendations into Middle-Snake-Tamarac Rivers Watershed District impoundment operational plans

Description: Develop wildlife management recommendations in coordination with the Watershed District and input from state and federal wildlife agencies for existing impoundments. Using lessons learned in the Agassiz Valley Impoundment project, we will work with Watershed District staff to make adjustments, as needed, to the water-level management in their other impoundments. This will allow them to provide a flood control function, while also benefiting migratory and breeding bird species, as well as other wildlife. Recommendations would also include working with the watershed district to enhance habitat conditions adjacent to the impoundments for grassland nesting birds (e.g., blue-winged teal, marbled godwit), which utilize the wetland impoundments for part of their life cycle.

Summary Budget Information for Activity 3:

ENRTF Budget: \$42,500
Amount Spent: \$42,500
Balance: \$0.00

Outcome	Completion Date
1. Assess wildlife potential value and needs at the four remaining impoundments	Fall 2019
2. Draft wildlife management recommendations with the input of agencies and area experts	Spring 2020
3. Work with Watershed District staff on the review, approval and integration of these recommendations into their overall operational structure.	Spring/ Summer 2020

Project Status as of 31 October 2017:

Status Report not required as per e-mail communication on 26 July 2017 from Diana Griffith.

Project Status as of 30 April 2018:

No Action. Activity 3 is set to begin in 2019.

Project Status as of 31 October 2018:

No Action. Activity 3 is set to begin in 2019.

Project Status as of 30 April 2019:

No Action. Activity 3 will begin later in the year after the field season.

Project Status as of 31 October 2019:

Work on Activity 3 is underway and progress was already made working with the Watershed District to enhance habitat conditions adjacent to the impoundments for grassland nesting birds this season. Audubon discussed delaying mowing on the dike system with watershed District Staff and the Watershed District Board until after the primary nesting season of August 1st. Some concerns were raised by staff and the board about the delaying of mowing impacting the Watersheds District ability to manage perennial invasive plants such as Canada thistle which is present in locations on the dike. Audubon suggested the use of spot herbicide treatment of invasive plant species so that grassland birds could nest unharmed. A compromise was reached that the Watershed District would work with their contractors to spot-mow patches of Canada thistle to prevent it flowering and going to seed and leave the majority of the Impoundment dike system un-mowed. This was a positive step as many species of sparrows as well as Bobolinks were nest and forage on the dike. This one action likely saved many nests with young birds from destruction and we hope to make it becomes typical protocol in the future. Audubon and the Watershed District have scheduled additional site visits to the other Middle-Snake-Tamarac River Watershed District Impoundments in November to assess potential for improving habitat for wildlife through management actions.

Amendment Request as of 04/16/2020

For Activity 3, the personnel budget would increase by \$4,500 bringing the new revised budget to \$109,000. Moving these funds from travel to personnel will allow additional staff support to work on the drone contract, compile the additional bird survey data, and to incorporate these findings into the final report. These funds are being moved from the travel budget due to a significant expected reduction in travel due to the Covid-19 pandemic.

Project Status as of 30 April 2020:

Plans to visit all Middle-Snake-Tamarac Rivers Watershed District impoundments were discussed with the watershed district in the fall and were set to take place this spring. However, the Covid-19 pandemic may make a “ride-along” and joint site visits with Watershed District staff unlikely. Coordination by email and phone will continue to keep up to date on Impoundment water level changes. Wildlife management recommendations are in the process of being drafted. The focus will be on continued water level management, invasive species control, but also on the management of the grasslands and hay lands that surround the impoundments. In the uplands and on the dikes, recommendations on haying and mowing timing will be made.

Final Report Summary:

Once management actions have taken place, continued water level management is key to long-term benefits, negative impacts on the hybrid cattail population, and positive impacts resulting in more open water. Water level management is an efficient and cost-effective tool, where possible, to compound the benefits of other more costly management actions like herbicide treatments and winter mowing. Upon Audubon’s recommendations, the watershed district agreed to delay mowing until August 1st in 2019 and 2020. Thoughtful management of the grasslands and hay lands that surround the impoundments can have far-reaching impacts for grassland as well as wetland obligate birds. There were numerous occasions where a wetland obligate bird like a black tern would forage in the uplands and fly back to their nests in the

Impoundment. These observations show that management must be considered across the whole impoundment system since wildlife are using the uplands and wetlands simultaneously for foraging and nesting.

Recommendations and Ways to Improve Wildlife Habitat in Impoundments

- A three-phased approach was most effective in treating and controlling hybrid cattail. The areas that experienced prolonged control were areas that could be inundated during prime cattail germination periods.
- Winter mowing was an effective method to reducing the standing dead cattail structure when fire is not an option.
- Follow up herbicide treatments are likely to be necessary if the area experiences a dry period during the growing season allowing hybrid cattail to germinate.
- Managing invasive non-native species and noxious weeds on the dikes through herbicide use or spot mowing allows delayed overall mowing or haying to occur to benefit ground nesting birds and reduce population sinks.
- Plan new impoundments with habitat management in mind.

Discussion

Audubon and the Watershed District and Board had a close, good working relationship. One piece of advice would be to clearly define roles and expectations in partnerships like this early on. This was made more challenging due to several Watershed District Administrator staff changes over the course of this three-year project and one Audubon staff member change.

In spring and summer of 2020, Covid-19 impacted communication channels between all partners. The previous water level management plan (912.65 mean sea level elevation) was not approved by the Watershed District Board and they decided to go back to their previous operational draft management plan (low augmentation pool level of 910.65). The challenge is compromising on Impoundment management actions where there will be conflicting interests at times. Due to the primary occupation of the impoundment being for floodwater mitigation, management actions benefiting wildlife habitat will often come second, though, good compromises can be made with open discussions. Hybrid cattail reduction is important for the longevity of an impoundment due to the sheer amount of biomass generated from hybrid cattail. Overtime hybrid cattail mats can fill up the impoundment over time and even break away and compromise water control structures and other outlets.

V. DISSEMINATION:

Description: Over the course of the project we will photo-document the treatment site and host updates on our webpage: mn.audubon.org. The project will be written about in Audubon Minnesota's monthly on-line newsletter and featured periodically in our quarterly newsletter. We will work collaboratively on communications with the Watershed District for their website content and outreach documents as well. Most importantly, the information gained from this project, along with the corresponding avian surveys, will be applied to existing and future impoundment operational guidelines.

Project Status as of 31 October 2017:

Status Report not required as per e-mail communication on 26 July 2017 from Diana Griffith.

Project Status as of 30 April 2018:

Pre-treatment photo documentation from several points along the dike of the impoundment occurred in mid-summer, pre-herbicide treatment, and late-summer, post herbicide treatment. Photos were taken in March 2018 during the cattail mowing progress. Photo points will continue to be taken periodically over the course of the subsequent growing seasons or after management actions. A communications plan is underway with Audubon Minnesota communications staff to craft website content, e-news update, and an article for our newsletter this summer.

Project Status as of 31 October 2018:

We have continued to photo-document the treatment site with each management stage. Photo documentation of management activities and the results were taken in February, March, May, and July so far in 2018. We took photos from our set photo point locations in May and July of this year during different stages of the growing season and the water level management process. Photo points will continue to be taken periodically over the course of the subsequent growing seasons or after additional management actions take place. Audubon Minnesota has given several presentations that have showcased the work we are doing at the Agassiz Valley Impoundment. Work is currently underway on an e-newsletter article that will go out this winter along with several social media posts to Facebook and Twitter about the project's progress. Webpage content focused on the project and the various management phases is currently under development and will be hosted on Audubon Minnesota's website.

Project Status as of 30 April 2019:

Photo documentation of the project will commence once again in May of 2019 and continue throughout the growing season, concentrating on times there will be water level changes or other management actions. Audubon Minnesota has created a project webpage showcasing the work we are doing at the Agassiz Valley Impoundment and the birds that will benefit. We have also posted updates to social media and included an article in our e-news newsletter which reaches 15,000 people. We plan to work with the Watershed District on some additions to their website which will better inform others about our findings, the partnership, and our funding source. We are quickly finalizing content for more outreach highlighting what we are doing at the impoundment and how it benefits birds and hope to share that with area media and community leaders in the coming months.

Project Status as of 31 October 2019:

Site documentation through photos continued monthly in 2019 during the growing season, especially concentrating on times with significant water level changes like drawdowns or other management actions like the hybrid cattail aerial treatment in early September. Audubon Minnesota has created a project webpage highlighting the work we are doing at the Agassiz Valley Impoundment. The public can visit <https://mn.audubon.org/program/improving-agassiz-valley-birds> for more information. We have also posted updates about the project to Audubon's social media platforms. Audubon has reached out to the Watershed District about adding a segment to the Agassiz Valley Impoundment Page about this project and they are open to it so we will work on website additions to their page this fall and winter.

Project Status as of 30 April 2020:

Audubon is discussing outreach options and is compiling an outreach plan for how information on the project might be shared once the data is analyzed, maps are created, and final images are analyzed. Dissemination of a summary fact sheet on the project to area watershed districts is one idea along with social media posts and articles in our e-newsletter. Our website will also be updated with more photos and summary information.

Final Report Summary:

Site documentation through photos occurred 2018-2020 during the growing season, especially concentrating on times with significant water level changes like spring flooding or coinciding with other management actions. A selection of those photos are included in the final report. Audubon Minnesota created a project webpage highlighting the work we are doing at the Agassiz Valley Impoundment. The public can visit <https://mn.audubon.org/program/improving-agassiz-valley-birds> for more information about the project. A summer update on progress was posted to the project webpage mid-June and can be viewed here <https://mn.audubon.org/conservation/improving-bird-habitat-northwest-minnesota>. E-news updates about the project went out to over 25,000 Audubon Minnesota e-newsletter subscribers over the course of the project.

We have also posted updates about the project to Audubon’s social media platforms. Audubon has reached out to the Watershed District about adding a segment to the Agassiz Valley Impoundment Page about this project and they are open to it so we will continue to work on website additions to their webpage. Dissemination of the summary fact sheet on the project to area watershed districts is underway along with updates on the culmination of the project in our next e-newsletter and on social media. Our project webpage will also be updated with more photos and project summary information.

VI. PROJECT BUDGET SUMMARY:

A. Preliminary ENRTF Budget Overview:

***This section represents an overview of the preliminary budget at the start of the project. It will be reconciled with actual expenditures at the time of the final report.**

Budget Category	\$ Amount	Overview Explanation
Personnel:	\$ 104,500	Alex Wardwell – Project Manager \$57,000 (75% salary, 25% benefits; 40% FTE for each year of 3 years), TBD_- Administrative Support \$7,500 (75% salary, 25% benefits; 5% FTE for each year of 3 years) and Field Survey Staff \$18,000 (Salary and 12% benefits; 12 weeks for 2 of the 3 years; 28% FTE).
Professional/Technical/Service Contracts:	\$ 78,000	Cattail Removal Contract - remove up to 500 acres of hybrid cattail using a combination of, herbicide, flooding, mowing, and haying (estimate \$155/acre)
Travel Expenses in MN:	\$ 12,500	Surveyor travel and lodging for 2 years of avian surveys. Staff travel to project site for 3 yr. duration of project
TOTAL ENRTF BUDGET: \$ 195,000		

Explanation of Use of Classified Staff: N/A

Explanation of Capital Expenditures Greater Than \$5,000: N/A

Total Number of Full-time Equivalent (FTE) Directly Funded with this ENRTF Appropriation: 1.91

Total Number of Full-time Equivalent (FTE) Estimated to Be Funded through Contracts with this ENRTF Appropriation: N/A

B. Other Funds:

Source of Funds	\$ Amount Proposed	\$ Amount Spent	Use of Other Funds
Non-state			
Middle-Snake-Tamarac Rivers Watershed District	\$ 54,000	\$71,514.18	Providing impoundment management expertise, conducting specified water level management and various other maintenance needs related to the project.
Audubon MN	\$ 12,250	\$12,250	To conduct first year of avian surveys, pre-cattail treatment - to take place prior to grant award period.

U.S. Fish and Wildlife Service	\$0	\$12,775.38	Project planning and technical support.
State	\$	\$	
TOTAL OTHER FUNDS:	\$ 66,250	\$96,539.56	

VII. PROJECT STRATEGY:

A. Project Partners:

Audubon Minnesota, United States Fish and Wildlife Service, Middle-Snake-Tamarac Rivers Watershed District, University of Minnesota- Crookston, Minnesota Department of Natural Resources

Partners receiving ENRTF funding

- Alex Wardwell - Habitat Restoration Specialist and TBD Financial Administrator - **Audubon Minnesota**- Project lead providing overall project management and implementation.
- **Contracted Entity** - conduct cattail reduction treatments including aerial chemical application, mowing, haying, vegetation reduction and removal (receiving funds approximately \$78,000).

Partners NOT receiving ENRTF funding

- Gregg Knutsen - Manager, and Laurie Fairchild - Private Lands Biologist, Glacial Ridge and Rydell National Wildlife Refuges , **United States Fish and Wildlife Service** - providing area expertise and assistance in planning (in-kind).
- Joel Praska - Administrator, and Danny Omdahl - Assistant Administrator, **Middle-Snake-Tamarac Rivers Watershed District** - providing area expertise and assistance in the planning and site coordination (providing \$54,000). Will assist in implementation of this project.
- Dan Svedarsky - Director, Center for Sustainability, **University of Minnesota Crookston** - providing area expertise (in-kind)
- Jeff Lewis - Executive Director and Aaron Ostlund - Project Coord., **Red River Basin Commission** - providing area expertise (in-kind)
- Christine Herwig - Regional Non-game Specialist, **Minnesota Department of Natural Resources** - providing wildlife plan review and comment upon completion of draft (in-kind)

B. Project Impact and Long-term Strategy:

C. Funding History:

Funding Source and Use of Funds	Funding Timeframe	\$ Amount
Joint Ventures Flex Fund Grant "Red River Valley Avian Conservation. Impoundment Avian Monitoring Project" (\$20,000 Joint Ventures; \$23,500 Audubon Funding as Match)	2012-2014 (complete)	\$ 43,500
ENRTF Appropriation 2015: Creating a Statewide Wetland Bird Survey - original budget amount received \$146,520	2015-2018	\$146,520

VIII. REPORTING REQUIREMENTS:

- **The project is for 3 years; to begin on July 1, 2017, and end on June 30, 2020.**
- **Periodic project status update reports will be submitted April 30 and October 31 of each year.**
- **A final report and associated products will be submitted between June 30 and August 15, 2020.**

IX. VISUAL COMPONENT or MAP(S):

See Appendix A.

X. FEE TITLE ACQUISITION/CONSERVATION EASEMENT/RESTORATION REQUIREMENTS:

A. Parcel List: Not Applicable.

B. Acquisition/Restoration Information: Not Applicable.

Fee Title Acquisition: DOES NOT APPLY

Conservation Easement Acquisition: DOES NOT APPLY

Restoration

1. **Provide a statement confirming that all restoration activities completed with these funds will occur on land permanently protected by a conservation easement or public ownership.** The Agassiz Valley Impoundment is public land managed by the Middle-Snake-Tamarac Rivers Watershed District.
2. **Summarize the components and expected outcomes of restoration and management plans for the parcels to be restored by your organization, how these plans are kept on file by your organization, and overall strategies for long-term plan implementation.** All planning, management and implementation aspects of the project will be tracked and managed by Audubon Minnesota's Conservation Manager, Kristin Hall. Documentation and paperwork for our contracted entities will be tracked by Audubon Minnesota's Financial Officer. This project is one aspect in our larger efforts to implement habitat restoration benefiting birds and other wildlife within the Tallgrass Aspen Parklands region and will be included in our reports/updates to the Statewide Prairie Conservation Plan working group as well.
3. **Describe how restoration efforts will utilize and follow the Board of Water and Soil Resources (BWSR) "Native Vegetation Establishment and Enhancement Guidelines" in order to ensure ecological integrity and pollinator enhancement.** This project involves removing and controlling the re-growth of non-native/hybrid cattail by maintaining areas of open water; therefore, the project does not include plantings at this time. However, most impoundments include areas of associated upland. As we are working with the watershed district, BWSR recommendations for plantings and pollinator habitats should be easily incorporated into their operational guidelines if they are not included already.
4. **Describe how the long-term maintenance and management needs of the parcel being restored with these funds will be met and financed into the future.** Floodwater impoundments are equipped with water control structures that will facilitate the on-going maintenance needs of cattail control. Once the initial infestation is reduced through this project's management efforts, alterations in flood regime that are scheduled to correspond with controlling cattail will be incorporated into the impoundments' operational plans. Intermittent cutting and flooding of areas with invasive cattail can become part of the routine maintenance within the impoundment and should not create an added expense to already existing management costs of the impoundments.
5. **Describe how consideration will be given to contracting with Conservation Corps of Minnesota for any restoration activities.** Audubon MN has contracted with the Conservation Corps of Minnesota in the past and will consider their services, if applicable, for this project as well.
6. **Provide a statement indicating that evaluations will be completed on parcels where activities were implemented both 1) initially after activity completion and 2) three years later as a follow-up. Evaluations should analyze improvements to the parcel and whether goals have been met, identify any problems with the implementation, and identify any findings that can be used to improve implementation of future restoration efforts at the site or elsewhere.** As part of the project we will be conducting pre and post monitoring of the site. Audubon Minnesota will also seek future funding/assistance via a federal Joint Ventures monitoring grant or through the North American Wetlands Conservation Act small grants program to conduct monitoring at 5- and 10-year intervals after project completion. In addition, Audubon Minnesota is currently coordinating and implementing the Minnesota Statewide Secretive Marshbird Survey (M.L.

2015, Chp. 76, Sec. 2, Subd. 03f) and will establish survey sites associated with this treatment area in order to ensure future monitoring takes place and an assessment of the project treatment area is documented. Another important aspect of this project is the creation of a working partnership with the Watershed District. Through this partnership, it is our intention to assist with improving the wildlife value and use of additional existing and future impoundments throughout the region.

Appendix A. Additional Visualizations



Agassiz Valley Impoundment Treatment Area



Agassiz Valley Impoundment Pre-treatment in August of 2017.



Agassiz Valley Impoundment post-aerial treatment in September of 2017.



Treated hybrid cattail standing in January of 2018.



Tractor with rotary mower heading in to mow treated cattail in the Impoundment for the first time in February of 2018.



Tractor with pull-behind rotary mower in March of 2018.



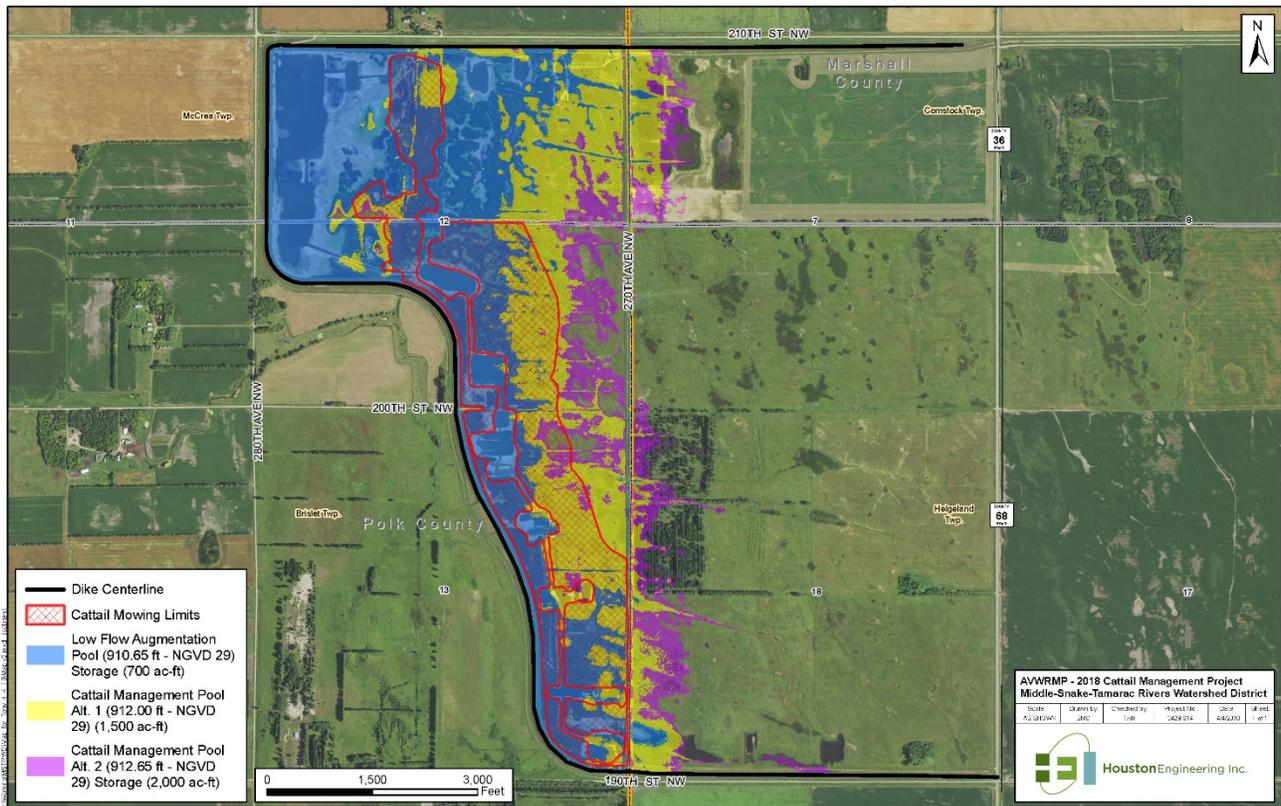
Mowed hybrid cattail within the Impoundment in March of 2018.



Mowed hybrid cattail within the Impoundment in March of 2018.



Flooded hybrid cattail stubs within the Impoundment treatment area in May of 2018.



This map shows the water level management options that were discussed with the Middle-Snake-Tamarac Watershed District Board (Board) and staff in the early spring of 2018 prior to initiation of water level management. The 912.65 elevation over mean sea level (magenta) was preferred by Audubon and was approved by the Board for the 2018 and 2019 growing seasons. Due to extreme rain events in late fall 2019 and snow melt in spring of 2020 the Board declined to allow the same water level management regime in 2020 out of caution. Water was held to the low flow augmentation pool level of 910.65 during the 2020 growing season.

Photopoints

Point 1

7-17-2018



6-27-2019



6-29-2020



Point 2

7-17-2018



6-27-2019



6-29-2020



Point 3

7-17-2018



6-27-2019



6-29-2020



Point 4

7-17-2018



6-27-2019



6-29-2020



Point 5

7-17-2018



6-27-2019



6-29-2020



Point 6

7-17-2018



6-27-2019



6-29-2020



**Environment and Natural Resources Trust Fund
M.L. 2017 Final Project Budget**



Project Title: Maximize the Value of Floodwater Impoundments for Wildlife.

Legal Citation: M.L. 2017, Chp. 96, Sec. 2, Subd. 06f

Project Manager: Alexandra Wardwell

Organization: Audubon Minnesota

M.L. 2017 ENRTF Appropriation: \$195,000

Project Length and Completion Date: 3 years, June 30, 2020

Date of Report: August 15, 2020

ENVIRONMENT AND NATURAL RESOURCES TRUST FUND BUDGET	Activity 1 Budget	Amount Spent	Activity 1 Balance	Activity 2 Budget	Amount Spent	Activity 2 Balance	Activity 3 Budget	Amount Spent	Activity 3 Balance	TOTAL BUDGET	TOTAL BALANCE
BUDGET ITEM	<i>Invasive Cattail Removal</i>			<i>Avian and Vegetation Monitoring</i>			<i>Integrate Wildlife Mgt. into Impoundment Plans</i>				
Personnel (Wages and Benefits)	\$36,500	\$36,500	\$0	\$30,000	\$30,000	\$0	\$42,500	\$42,500	\$0	\$109,000	\$0
<i>Alex Wardwell - Project Manager \$79,000(75% salary, 25% benefits;40% FTE for each year of 3 years)</i>											
<i>TBD- Administrative Support \$7,500 (75% salary, 25% benefits; 5% FTE for each year of 3 years)</i>											
<i>Field Survey Staff \$18,000 (Salary and 12% benefits; 12 weeks for 2 of the 3 years; 28% FTE)</i>											
Professional/Technical/Service Contracts	\$79,500	\$79,258	\$242	\$0	\$0	\$0	\$0	\$0	\$0	\$79,500	\$242
<i>Cattail Removal Contract - remove up to 500 acres of hybrid cattail using a combination of herbicide, flooding, mowing, and haying (estimate \$155/acre)</i>											
Travel expenses in Minnesota	\$1,500	\$1,500	\$0	\$5,000	\$5,000	\$0	\$0	\$0	\$0	\$6,500	\$0
<i>Surveyor travel and lodging for 2 years of avian surveys. Staff travel to project site for 3 yr. duration of project</i>											
Other											
<i>Describe the expense—one row per type/category. Add rows as needed. Be specific.</i>											
COLUMN TOTAL	\$117,500	\$117,258	\$242	\$35,000	\$35,000	\$0	\$42,500	\$42,500	\$0	\$195,000	\$242

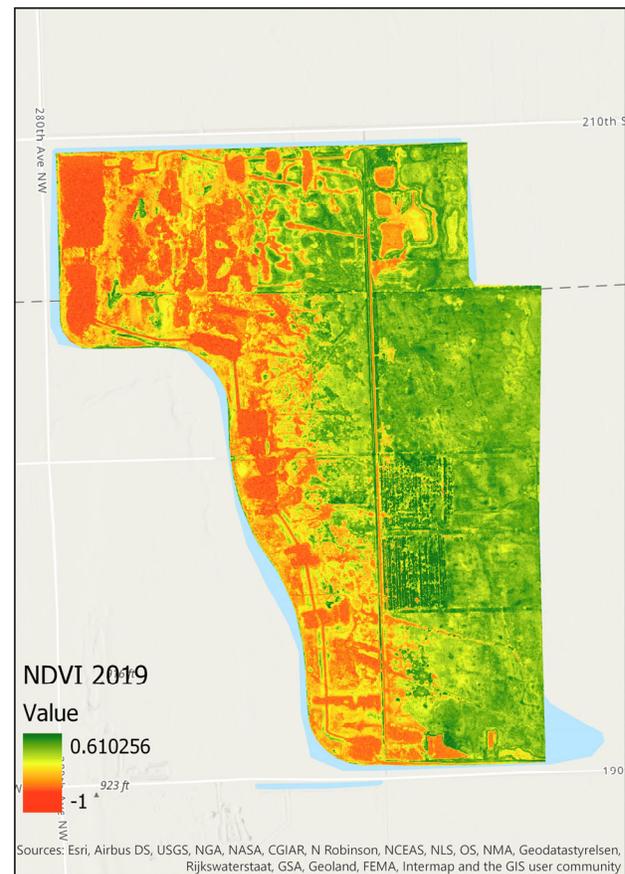
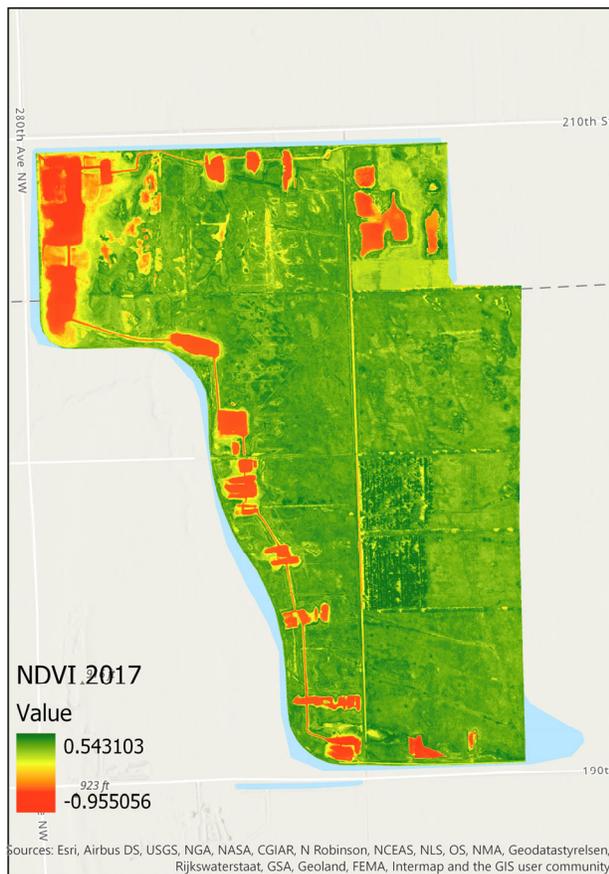
Maximize Value of Water Impoundments to Wildlife

PROJECT OVERVIEW

The Agassiz Valley Impoundment, located near Warren, MN, is a 2,560-acre impoundment with a gated water storage area of 6,840 acre-feet that is managed by the Middle-Snake Tamarac-Rivers Watershed District (District). The primary purpose of this impoundment, like many others across Minnesota, is for floodwater storage, however, they serve many other secondary functions including important wildlife habitat for migrating and breeding species. Due to their primary purpose, impoundments normally follow a hydrologic regime that includes water-level drawdown during the summer months to increase the impoundment's holding capacity for the fall and following spring. This drawdown cycle can stimulate the germination of emergent wetland species, especially the non-native hybrid cattail that can form dense monocultures which crowd out native species and degrade habitat quality. Audubon Minnesota and the District collaborated on a project to test the effectiveness of a cattail management regime and the corresponding bird use throughout the treatment cycle.



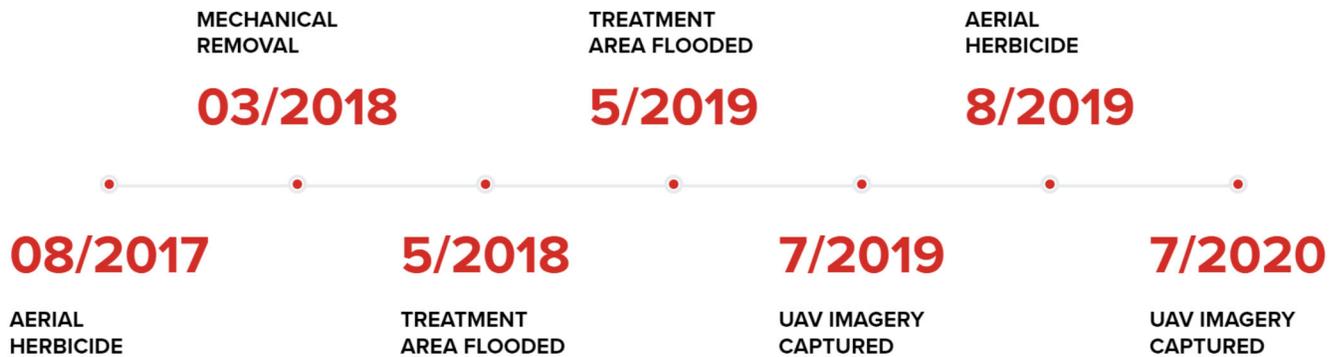
Reduction of Hybrid Cattail



The extent of hybrid cattail in the treatment area was measured by calculating the normalized vegetation difference index (NDVI) from four band orthophotography. NDVI is a common measure to assess plant health and can be used to detect changes through time. From 2017 to 2019, hybrid cattail was reduced throughout the treatment area (change from green to yellow or red) by a combination of herbicide application, mowing, and water level management.



Management Actions



Preliminary Monitoring

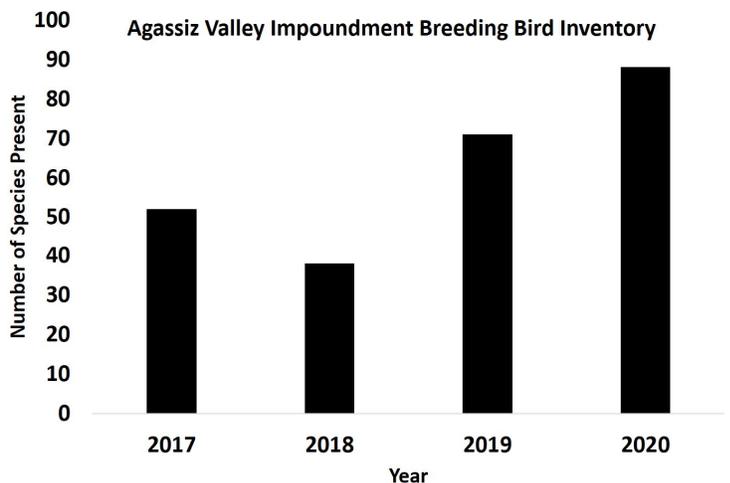
This pilot study’s avian response showed promising results; though species diversity initially declined the first year following the mechanical treatment (mow over ice in 2018) but rebounded in 2019 and 2020 with respective increases of 27% and 41% when compared to the pre-treatment numbers in 2017. Marsh bird survey results were similar across years without any significant trends, indicating that the management actions may have had little effect on use throughout the treatment regime.



Winter Mowing by Alex Wardwell

Management Recommendations

- A three-phased approach was most effective in treating and controlling cattail. The areas that experienced prolonged control were areas that could be inundated during cattail germination periods.
- Winter mowing was an effective method to reducing the standing dead cattail structure when prescribed fire is not a management tool.
- Follow up herbicide treatments are necessary if the area experiences a dry period during the growing season.



For more information, please contact Audubon Minnesota
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