Aquatic Invasive Plant Management Plan

Sanders County Aquatic Invasive Plants Task Force

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Myriophyllum spicatum
Eurasian watermilfoil

ANY GREEN?
GET IT CLEAN!
SANDERS COUNTY AQUATIC INVASIVE PLANTS TASK FORCE

The Aquatic Invasive Plants Task Force (Task Force) was formed by the Sanders County Commission in response to discovery of Eurasian watermilfoil (EWM) in Noxon and Cabinet Gorge Reservoirs in 2007. The Task Force consists of representatives from MSU Extension, Avista, Green Mountain Conservation District, the Noxon-Cabinet Shoreline Coalition, Sanders County Weed District, Montana BASS Federation, the Confederated Salish and Kootenai Tribes, Montana Fish, Wildlife and Parks, US Forest Service, NorthWestern Energy, and representatives as large.

Background

The Task Force conducted surveys to map EWM distribution in 2009 and 2010 and developed a multi-faceted management program, guided by an Environmental Assessment (EA, Tetra Tech 2010) to address the infestation and limit its spread. Between 2010 and 2016, large-scale operational treatments were conducted that included application of selective aquatic herbicides to target the invasive plants, as provided for in the EA and as authorized for use by the State of Montana. Herbicide treatments were conducted in conjunction with removal by diver dredging and use of benthic barriers. During this timeframe, it was determined that the invader had hybridized with northern watermilfoil and multiple strains of hybrid watermilfoil (HWM) were dispersed throughout the reservoirs (Thum 2018). By 2017, it was apparent that the initial goal of eradicating invasive watermilfoil in the reservoirs was unattainable due to financial constraints, environmental conditions, and parameters prescribed by federal licenses to operate the hydroelectric facilities associated with the two reservoirs.

In 2017, the Task Force conducted an Analysis of Treatment Alternatives for Invasive Watermilfoil in Noxon Rapids and Cabinet Gorge Reservoirs (DeBruychere and Pennington 2017). The purpose of the analysis was to determine the best path forward for management of invasive watermilfoil (including EWM and HWM) in Sanders County waterways. The Analysis included a survey and workshop with Task Force members and other partners and resulted in adoption of a new approach to managing invasive watermilfoil.

Since the analysis aimed to manage aquatic invasive plants in the waterways, the No Action alternative was determined to be an unviable option since it would likely lead to the expansion of aquatic invasive plants, which could have direct, indirect, and cumulative impacts to the native plant community, fisheries, water quality, aquatic resources, and recreational opportunities. Chemical, physical, and mechanical control efforts were considered for effectiveness, along with reservoir drawdowns and use of benthic barriers. These options were considered in the context of modes of action, costs, selectivity, efficacy, and other parameters. The analysis effort also examined various goals of a plant management program within the context of available funding, established uses of the waterway, environmental factors, hydroelectric operations, and permitting. After much consideration, chemical control was considered to be the most effective and applicable in the system, followed by physical and mechanical control (plant removal) and benthic barriers. It was also determined that establishing a prioritization scheme for location of treatments would help guide decisions in times when financial resources fell short of needs. This management plan establishes direction throughout the decision-making process to achieve success in managing invasive plants.

To provide additional input into the decision-making framework, the Task Force also established a Scientific Advisory Panel; a panel of experts in the field to consider and recommend annual management methods based on monitoring data, the prioritization framework, and local or new circumstances or science impacting the feasibility and efficacy of various control methods.

Adaptive Management

This management plan uses a suite of tools in an adaptive management context to address aquatic invasive plants in Sanders County waterways. The adaptive management framework is a process that evaluates success based on defined parameters and allows responses to be adapted based on those assessments. The framework is intended to provide guidance on how to maximize effectiveness and efficiency for maximum conservation gain. All elements of the framework are significant to the work the Task Force implements in Noxon and Cabinet Gorge reservoirs relative to aquatic invasive plant management.

All aquatic invasive plants are considered under this plan. There are known infestations of EWM, HWM, curlyleaf pondweed, flowering rush, and yellow flag iris within the Noxon and Cabinet Gorge systems, as well as other county waterways. However, EWM and HWM are of primary concern based on their propensity to spread and their minimal existence in other Montana waterways. Additionally, EWM and HWM are considered interchangeably within this management framework. Genetic analysis has shown that multiple strains of HWM exist interspersed with pure EWM and native northern watermilfoil strains. Neither EWM nor HWM can be targeted independently of the other, thus they are considered synonymous in this management plan and control efforts.

To provide additional guidance and to comply with regulations, the Task Force completed an Environmental Assessment in 2010 (Tetra Tech 2010) that was subsequently updated in 2021 (MFWP 2021). The Task Force has put into practice many of the parameters of an adaptive management approach since the program was first implemented. The Task Force has proactively researched new treatment methods and products that are selective for invasive plants, conducted tests for water exchange rates (Skogerboe and Getsinger 2015), established control plots in 2019 to provide a test or comparison to a No Action alternative (McLane 2020), and has shifted treatment timeframes. These steps were taken to determine the approaches that most effectively and efficiently reduce the presence of invasive plants in priority areas and contain them to the Noxon and Cabinet Gorge system. Since management of EWM began in 2008, there has been no spread of the invasive plant to upstream areas of the Clark Fork or Flathead drainages, due at least in part to the efforts of the Task Force. While steps were taken to expand knowledge and effectiveness of herbicide treatments, all treatments were conducted according to the applicable herbicide application label rate and instruction, and all adverse or potentially adverse effects, as provided on herbicide labels and within annual Aquatic Pesticide Application Plans[1], have been publicly noticed.

[1] Annual Aquatic Pesticide Application Plans (APAP) are provided by herbicide application contractors and approved by the Task Force before herbicide applications are conducted as required by the Montana Pesticide Discharge Permit held by Sanders County.

Defining Success

Implementing the management plan requires a clear articulation of issues, goals and objectives, links between objectives and proposed actions, treatment, and evaluation. Once the process is complete, course corrections may be implemented to adapt actions to produce more desirable results, as warranted.

The Task Force believes that a successful aquatic invasive plant management program will, as its primary goal, reduce the presence of aquatic invasive plants at or near high-use public and private access sites, including boat launch sites, during peak use seasons. A secondary goal is to reduce or prevent expansion, overall, of invasive plants to other waterbodies. Together, these goals aim to contain and control existing invasive plant populations and prevent new introductions within Noxon and Cabinet Gorge reservoirs and other waterbodies. Additionally, the program will strive for sustainable long-term management of aquatic invasive plants by working to prevent resistance to herbicide products, continually seek ways to improve efficacy and reduce costs, and reduce negative impacts to native species and natural resource communities while addressing broader reservoir uses.

Prioritizing Treatment Areas

The prioritization framework takes into account measures related to containment and control of existing invasive plant populations. Specifically, it incorporates the type of site associated with plots, cover class of plant infestations, public use characteristics of sites, and location of infestation areas. Additionally, water exchange rates, potential impacts to prime fish and wildlife habitat, and other practicalities associated with managing these reservoirs are also considered.

Priority 1: Public boat launches, docks, and designated recreation and swimming areas are the highest priority sites for treatments. Areas will be prioritized based on location with upstream sites having higher priority than downstream sites; the amount of associated boat traffic (higher traffic areas are higher priority); and the cover class for target invasive species, with areas having the highest values being of highest priority (i.e., a greater amount of invasive species in the plant community composition affords higher priority).

- Boat launch treatment areas will include a reasonable swath around boat launches, depending on the bathymetry associated with each site. Herbicides, diver hand-pulling, and benthic barriers are potential control options.
- Dock access areas include those in the immediate vicinity of public docks that have significant boat traffic. Control options include herbicides, benthic barriers, diver hand-pulling, and raking. Herbicides may be used at docks where benthic barriers are not used, or in areas past the edges of the benthic barriers to incorporate a wider radius surrounding the docks.
- Designated recreation and swimming areas include public access areas in the immediate vicinity of public docks. Control options include herbicides and diver hand-pulling.

- Known Priority 1 areas on Noxon and Cabinet Gorge reservoirs include, but may not be limited to, boat launches at:
    - Flat Iron Fishing Access Site, Noxon Reservoir
    - Finley Flats Recreation Area, Noxon Reservoir
    - Kirby Gulch Boat Launch, Noxon Reservoir
    - Vermilion Point Boat Launch, Noxon Reservoir
    - Trout Creek Boat Launch, Noxon Reservoir
    - North Shore Recreation Area, Noxon Reservoir
    - Marten Creek Bay Recreation Area, Noxon Reservoir
    - South Shore Recreation Area, Noxon Reservoir
    - Noxon Community Boat Launch, Cabinet Gorge Reservoir
    - Bull River Recreation Area, Cabinet Gorge Reservoir
    - Big Eddy Recreation Area, Cabinet Gorge Reservoir
    - Heron Boat Launch, Cabinet Gorge Reservoir

Priority 2: Private dock access areas are the second priority and are selected based on location (upstream areas are higher priority), and the amount of associated boat traffic (higher traffic areas are higher priority). Areas with higher cover class for target invasive species will be higher priority.

- Dock access areas include those in the immediate vicinity of private docks that have significant boat traffic. Control options include herbicides, benthic barriers, and raking. Herbicides may be used at docks where benthic barriers are not used, or in areas past the edges of the benthic barriers to incorporate a wider radius surrounding the docks. Avista currently allows shoreline residents to rake aquatic vegetation adjacent to their docks and properties (provided the detritus is properly disposed of on land) and will assist with any required permits.
- Known Priority 2 areas on Noxon and Cabinet Gorge reservoirs include, but may not be limited to:
    - Private dock access areas opposite Trout Creek, extending along the north shoreline upstream from the Highway 200 bridge at Trout Creek to where the private docks end
    - Private dock access at the North Shore Homes area, extending along the north shoreline downstream from the Highway 200 bridge at Trout Creek to the North Shore Recreation Area

Priority 3: Large, high density (more than 50% EWM cover) shallow areas with significant boat traffic (e.g., Finley Flats, sloughs near Trout Creek, Nolan Slough, Watkins Flats, Dody Flats, etc.). These sites may be shoreline or mid-lake sites.

- Treatment areas will be prioritized based on the location of upstream (higher priority) to downstream (lower priority) location, the amount of associated boat traffic (higher traffic areas are higher priority), and rake fullness, with the highest values having highest priority. Appropriateness of inclusion in treatments will also be determined with input from Montana Fish, Wildlife & Parks (MFWP) fisheries staff on behalf of or in addition to the angling community. Herbicides are the primary control option in these areas.
- Known Priority 3 areas on Noxon and Cabinet Gorge reservoirs include, but may not be limited to:
    - Trestle Cove, adjacent to the railroad trestle on the north shoreline downstream from North Shore Recreation Area on Noxon
    - Watkins Flats at the mouth of Marten Creek Bay on Noxon
    - Rock Island, just upstream of Noxon Rapids Dam
    - In the cove, southeast of the Highway 200 bridge at Bull River Bay on Cabinet Gorge
    - In the cove, southwest of the Highway 200 bridge at Bull River Bay on Cabinet Gorge

Annual Process for Plant Community Monitoring, Treatment Area Selection, and Conducting Treatments

MFWP will conduct annual pre-treatment monitoring of known Priority 1 and Priority 2 areas, and for Priority 3 areas as recommended by the Scientific Advisory Panel and Task Force in conjunction with MFWP fisheries staff. Monitoring will occur post-runoff when conditions warrant (typically in early July). The Task Force will consider monitoring results amidst guidance from the Scientific Advisory Panel. Based on the prioritization scheme, the Task Force will prioritize and select treatment areas. Pre-treatment monitoring and treatments should be planned for as early in the peak use season as conditions warrant to facilitate treatments within the earliest possible timeframe. Earlier treatment may limit the extent to which EWM and HWM grow into the upper water column where they can be intersected by boat motors.

The mode of treatment will be determined based largely on the recommendation of the Scientific Advisory Panel, but also with consideration of past experience, available funding, or other pertinent parameters. If herbicide applications are warranted, the herbicide products selected will be based on input from the Scientific Advisory Panel, other industry professionals, and the target timeframe and species. Herbicide products utilized will be selective for invasive species, will be systematically rotated to prevent herbicide resistance, and application rates will align with the density and composition of the treatment plot. Treatments will target more than one invasive

plant species, as appropriate, and herbicide products used will be labeled to impact multiple invasive species whenever possible.

Treatments will be conducted by an herbicide application contractor licensed in the State of Montana. An applicable Aquatic Pesticide Application Plan will be provided and approved prior to commencement of treatments. The Task Force will provide notice to appropriate entities and to the public about the treatment protocols and timeframes.

Approximately six weeks after treatments are conducted, visual observations of injury will be assessed by the application contractor and Task Force representatives. An annual Aquatic Pesticide Application Report will be prepared by the application contractor and provide herbicide application details along with change in bio-volume between the time of treatments and six weeks post-treatment, and injury rank at six weeks post-treatment.

Annual monitoring reports prepared by MFWP (or other contracted entity) will provide plot-level detail of species present with comparisons to the prior year's results and over longer timeframes to establish infestation trends. This will include plot size in acres and cover class by species.

An annual summary report will be prepared by the Task Force that includes results and highlights from the annual monitoring report and application report, as well as pertinent information from other sources, as deemed useful.

Reservoir-wide monitoring will be conducted to assess infestation of invasive watermilfoil on a system-wide basis at regular intervals, typically every three years. Results of this monitoring effort will provide an examination of how infestations change over time for Priority 1 and Priority 2 areas, and total acreage and percentage of littoral zone infested with invasive watermilfoil.

Measuring Success

Various metrics exist to assist with monitoring conditions related to aquatic invasive plant treatments. However, it may be challenging to access data that is not readily available, or data collected may not consistently measure success of treatments. Some of these challenges include:

- The percentage of watercraft leaving Noxon Rapids and Cabinet Gorge reservoirs that are contaminated with invasive plants is collected at watercraft inspection stations, but the data is not readily available.
- The size of treatment plots (in acres) for Priority 1 and Priority 2 areas and the amount of vegetative cover by EWM in those plots are collected during pre-treatment surveys as a measure of rake fullness and during reservoir-wide surveys as cover class.
- The bio-volume of plots collected pre-treatment and six weeks post-treatment monitors the volume of all vegetation present (native and invasive). The change in bio-volume does not exclusively measure the change of invasives, but also includes native species.

- The EWM injury rank is collected six-weeks post-treatment. Injury rank is a visual observation of the change in EWM biomass (exclusively) but can be subjective.
- The percentage of the littoral zone infested with EWM could be determined through reservoir-wide surveys, though less than half of the littoral zone is actually surveyed during these efforts due to time constraints for conducting the plant surveys and the sheer size of the projects (Noxon has 1,942 acres of littoral zone and about 80 miles of shoreline; Cabinet Gorge has 1,121 acres of littoral zone and about 40 miles of shoreline). Known areas of infestation are the focus of reservoir-wide surveys, though the remaining littoral zone is visually assessed by monitoring crews and new areas of infestation are added to the survey as discovered.
- Shoreline resident participation in aquatic invasive plant removal could impact EWM density and dispersal. However, frequency of this action is very difficult to determine since there is no permitting or other authorization required and thus no mechanism to track participation levels without considerable time and effort conducting personal interviews.
- The volume of use of public recreation sites on the reservoirs is monitored annually by Avista through automatic traffic counters, though doesn't specifically correlate to on-water use. The amount of participation in bass tournaments should be available through tournament organizers, but is not immediately available[2]. Use of recreation sites during bass tournaments are also included in the public use records obtained by Avista.

Goals, units of measure, and other considerations for metrics used to measure success are described in detail in Table 1.

[2] It may be possible to require participant registration data as a permitting condition for tournaments, but that is currently not the case.

Table 1. Measurable assessments for determining success.

Unit of Measure	**The size of treatment plots at access areas and the amount of EWM/HWM cover in those plots.**
Data Source and Goal	Individual treatment plot size in acres and EWM cover class are available in annual monitoring reports. Goals are to (1) prevent plots from expanding and, if possible, reduce them in size while providing clear boat access during the peak recreation season, and (2) prevent an increase in cover class of EWM/HWM within the plots or, if possible, reduce cover class over time.
Discussion	Annual monitoring surveys are conducted prior to annual treatments, amidst the current year's growth of EWM/HWM. Contact herbicides do not typically have hold-over effect to reduce invasive plant communities over time, but reductions in cover class may be an indication of native species out-competing invasive species due to annual herbicide treatments, or may be influenced by factors related to growing conditions. While specific reasons for change in plot size or cover class cannot be entirely determined, it stands to reason that treatments, in addition to a variety of environmental factors, likely support reductions in acreage and/or cover class over time.
Unit of Measure	**The change in injury rank of EWM/HWM six weeks post-treatment.**
Data Source and Goal	The goal for injury rank of EWM/HWM in treatment plots is 80% or higher at six weeks post-treatment.
Discussion	Since visual assessment of injury is subjective, the Task Force will have a representative accompany the treatment contractor to cooperatively assess injury rank (and prevent any perception of bias).

Table 1. Measurable assessments for determining success *(continued)*.

Unit of Measure	**The change in bio-volume of treatment plots six weeks post-treatment.**
Data Source and Goal	The goal for change in bio-volume is a reduction of 40% or more between the time herbicide treatments are conducted and six weeks post-treatment. Bio-volume is recorded through sonar and is a measure of all vegetation. Change in bio-volume can be attributed to changes in both native and invasive plants.
Discussion	Bio-volume is a measure of all biomass, so it isn't specific to invasive or native plant biomass. Therefore, a change in overall biomass isn't a direct correlation to change in invasive plant biomass. However, herbicides utilized for treatments are selective for invasive species so it's reasonable to assume that most biomass reduction is due to invasive plant injury. Additionally, the six-week timeframe may be adequate for some growth or expansion by native species, but is a short timeframe to accommodate a significant amount of growth. Therefore, it is reasonable to assume that a large component of biomass reduction is attributable to impacted invasive species.
Unit of Measure	**The percentage of the littoral zone of both reservoirs with EWM/HWM present, and EWM/HWM cover class in monitored littoral zone areas.**
Data Source and Goal	Reservoir-wide surveys will provide a total estimate of EWM/HWM acreage, the percentage of the littoral zone that contains EWM (at any level of cover), and the cover class of EWM/HWM in monitored areas. The goal is to maintain or reduce the percentage of littoral zone that contains EWM/HWM over time and maintain or reduce EWM/HWM cover in the littoral zone.
Discussion	Since many known plots in large, shallow bays have not been treated since 2017 or before, the total acreage of EWM/HWM may continue to grow until equilibrium is reached in the system. Maintaining access points clear of EWM/HWM will allow for continued access and will maintain a percentage of the littoral zone devoid of aquatic invasive plants. Reservoir-wide surveys are done periodically (about every 3 years) so this assessment can't be conducted annually.

Table 1. Measurable assessments for determining success *(continued)*.

Unit of Measure	**Native species richness.**
Data Source and Goal	Reservoir-wide monitoring surveys record the cover class of native species in monitored areas. Maintaining or improving native species richness amidst treatments to reduce invasive plants is the goal.
Discussion	Maintaining or increasing native species richness in treatment plots and in the reservoirs overall is indicative of a healthy biome capable of supporting a variety of animal and fish species.
Unit of Measure	**Changes in EWM/HWM cover class and plot acreage for treatment plots compared to untreated Control plots.**
Data Source and Goal	Annual monitoring surveys assess the size (in acres) and cover class for both treatment plots and untreated Control plots. Assessing changes in untreated plots approximates conditions of a No Action alternative, which in turn helps assess whether treatments are affecting infestation areas in ways that align with plant management goals.
Discussion	No Action affords free proliferation of all species, invasive and native alike. Over time, invasives are likely to out-compete native plants for nutrients, alter the ecological community, and threaten biodiversity, which in turn will negatively impact water quality and fisheries resources.

Timeline for Data Analysis

To the extent possible, annual assessment of metrics will be conducted, reported, and reviewed by the Task Force and Scientific Advisory Panel each year before decisions regarding upcoming treatments are made. This will allow the Task Force to respond to situations such as new threats, herbicide resistance, and the need to employ additional treatment methods. Periodic assessments also afford opportunities to add additional inputs into the analysis as technologies expand and change. The Task Force will assemble results in a concise, easy-to-read format in an annual summary report that also includes highlights and details from annual treatment and monitoring reports, with additional anecdotal comments and information, as feasible.

Additional metrices may be available that can offer input and support for aquatic plant management, as described in Table 2.

Table 2. Additional metrics that may inform invasive plant management success.

Unit of Measure	**Percentage of watercraft leaving Noxon Rapids and Cabinet Gorge reservoirs that are contaminated with vegetation.**
Data Source	MFWP inspection station data could be analyzed to determine how the percentage of contaminated vessels with Noxon and/or Cabinet Gorge listed as the last known on-water location changes over time.
Discussion	Regional stations of key interest include Clark Fork, Idaho, and Troy and Thompson Falls stations since they stop traffic exiting Sanders County. This data may not be readily available.
Unit of Measure	**Resident participation in aquatic invasive plant removal (e.g., raking, use of benthic barriers, hand pulling).**
Data Source	The Noxon-Cabinet Shoreline Coalition and Avista can promote raking or hand-removal of invasive plants to their membership and permitees in order to increase or maintain high levels of participation over time.
Discussion	Avista currently allows raking or hand removal of invasive plants along shoreline property owned by the utility. Tracking participation by residents would be challenging since it could only be determined by self-reporting under current scenarios.
Unit of Measure	**Public recreation use of the reservoirs.**
Data Source	Data related to visitor volume and visitation patterns to public recreation sites are collected by Avista annually and are typically available in January each year. Data could be monitored for anomalies or changes over time.
Discussion	Avista monitors visitation to public recreation sites through the use of automatic traffic counters at site entrances, but total site use does not necessarily correlate to on-water use since many recreation sites offer opportunities in addition to boat launching facilities. Patterns or changes in recreation site use may not correlate with aquatic plant conditions.

Table 2. Additional metrics that may inform invasive plant management success *(continued)*.

Unit of Measure	**The number of bass tournaments held annually.**
Data Source	MFWP and Avista maintain schedules of annual fishing tournaments. Reductions in the number of tournaments or participation rates could be investigated to determine the extent, if any, to which the presence of aquatic invasive plants is a factor in that reduction.
Discussion	In recent years, bass tournaments on Noxon Reservoir have been scheduled to the maximum level allowed by MFWP regulations. Ongoing tournaments imply a healthy and desirable fishery. A reduction in the number of tournaments or participation could indicate dissatisfaction with conditions such as the amount of aquatic invasive species present or other conditions.

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