

**Project Subject/Title:** WRFA Buckthorn Treatment and Removal

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**Abstract:** Common buckthorn (*Rhamnus cathartica*) and glossy buckthorn (*Frangula alnus*) have become prolific invaders of the forest understory throughout the state, as well as a major inhibitor of natural tree regeneration. With little to no wildlife uses of the plant, this woody invasive has become a major threat to sites ranging from saturated black ash stands to dry red pine plantations.

In 2008, WDNR Fisheries Management initiated an angler access project to allow fisherman easier access to the south fork of the White River in Bayfield County on WDNR White River Fishery property. It was discovered upon inspection of the site, that there was a large infestation of buckthorn. For the fishery project to be a success, the buckthorn would need to be removed. The control of buckthorn on this site began in 2009 along with tree planting and is still being implemented in 2021. Throughout the years, many different methods have been employed. This document provides an overview of the methods, results and observations of this project.

**Trial Location**

**County:** *Bayfield*

**Township:** *46*

**Range:** *07*

**Section:** *19*

**Property Name:** *White River Fishery Area*

**Baseline Stand Data:**

- **Cover Type:** *Aspen, Balsam Fir, Wetland Shrub - Alder*
- **Acres:** *41*
- **Other stand conditions:** The project location follows a stream corridor that was once the site of several impoundments, resulting in man-made pools (Fig. 1). The sediment from these pools were deposited in the treatment area. This stand was also affected by a large-scale rain event in 2018 which resulted in the loss of access to the south and east. The storm event also deposited a large amount of sediment in the stream channel causing a blockage in the flow of water. The sediment has since been removed and the access road to the south has been repaired. Access from the east is still not possible, due to a bridge that has yet to be repaired.

**Prescription and Methods:**

- **Years Initiated:** *2009 – Present*
- **Prescription Overview:** This trial was initiated in 2009 (FY10) after buckthorn was discovered in densities ranging from 90 to 229 stems per square meter. The buckthorn formed a dense wall that caused access issues, as well as no tree

regeneration in the understory (Fig. 5). Bare soil was also a result of the dense buckthorn population and contributed to increased erosion.

Since the beginning of this project, many methods have been used to remove the buckthorn. These methods have included mechanical mowing with a drum mulching head or rotary mower; manual removal of stems by either digging individuals up or cutting with chain saws; and foliar and basal bark herbicide treatments. These treatments were completed by private contractors, in-house DNR personnel, and use of prison inmates. Mechanical mowing was usually foliar treated prior to being cleared. With manual clearing of buckthorn, stumps were sprayed with a 25% solution of Garlon 4 herbicide mixed with bark oil, the same solution that was used in the basal bark applications. Timing of these treatments varied depending on staff availability, but typically manual control occurred in the fall, mechanical in the winter/spring and herbicide in the summer/fall.

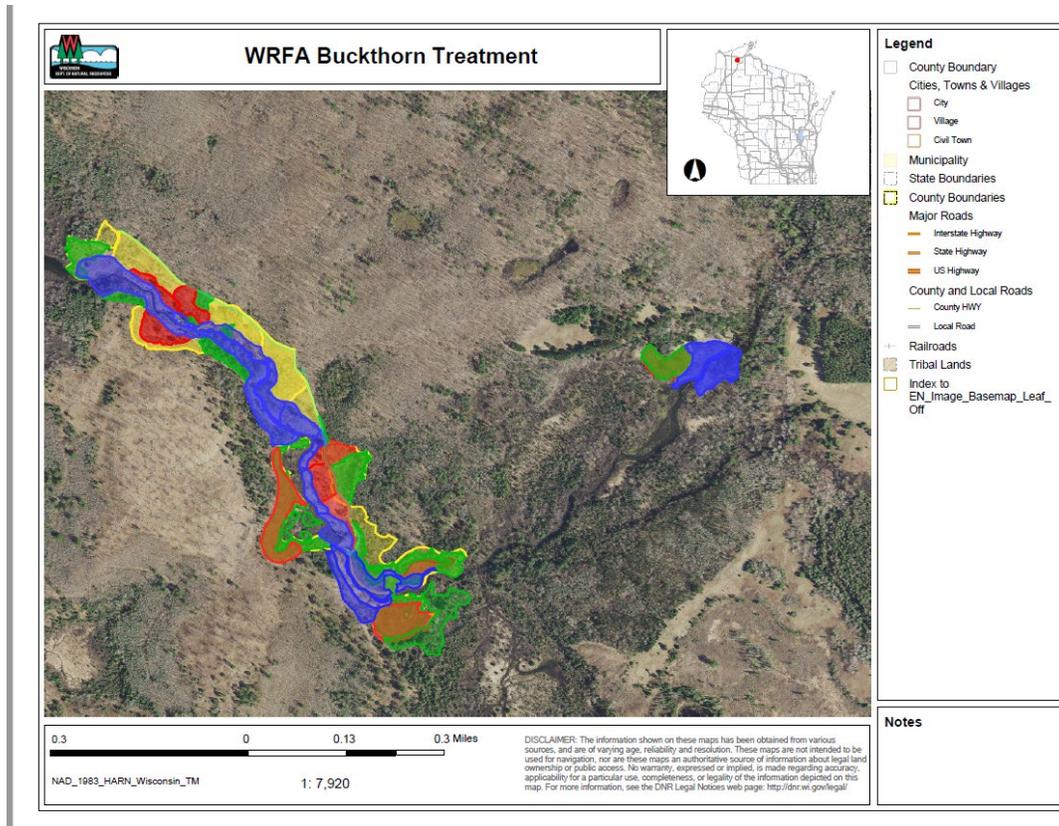
Once an area had been treated, it was then placed on rotation and revisited the following years, mostly by fisheries personnel with backpack sprayers treating sprouts with a 2% solution of Garlon. In some years a contractor out of Eau Claire, Wi (4-Control) would assist in portions of the herbicide treatments, especially when large contiguous areas were being treated.

Part of the project was also to restore a riparian forest. The restoration included planting nearly 9,000 tree seedlings consisting of red pine, white pine, balsam fir, white spruce, black spruce, jack pine, tamarack, burr oak, swamp white oak and quaking aspen. Most of these tree seedlings were obtained at no cost from the WDNR tree nursery, as well as receiving many from the USDA and local county forestry departments.

- **Prescription Timeline:**

- **FY10:**
  - *Project was initiated by manually clearing a 1600 linear feet of stream corridor*
- **FY11:**
  - *An additional 900 feet of corridor was treated through manual cutting*
- **FY12:**
  - *An additional 400 feet of corridor was treated through manual cutting*
  - *Wildlife Management treated an additional 3 acres with mechanical brushing*
- **FY13:**
  - *An additional 500 feet of corridor was treated by manual cutting*
- **FY14:**
  - *An additional 500 feet of corridor was treated by manual cutting*
- **FY15:**
  - *An additional 400 feet of corridor was treated by manual and mechanical brushing*
  - *Wildlife Management foliar treated the 3 acres adjacent to the treatment area that had been implemented in FY12*
  - *Northwoods Cooperative Weed Management Area assisted in foliar treating 2,140 feet of corridor at no cost to the project*

- **FY16:**
  - *An additional 400 feet of corridor was treated through manual and mechanical brushing*
  - *Wildlife Management assisted with the mechanical brushing of a 2-acre parcel adjacent to the newly established 400 feet of corridor*
  - *4-Control, a vegetation control contractor from Eau Claire, WI was contracted to assist in the foliar spraying of 6 of the 16 acres cut and treated in previous years*
- **FY17:**
  - *4-Control was contracted to assist in the foliar spraying of 6 of the 19 acres cut and treated in previous years*
  - *An additional 1 acre of corridor was treated through manually brushing*
  - *A private contractor was hired to mechanically brush 2.5 acres within the project area*
- **FY18:**
  - *An additional 0.75 acre of corridor was treated using basal bark treatments and manual brushing*
  - *4-Control was again contracted to assist in the foliar spraying of 10 of the 20 acres cut and treated in previous years*
- **FY19:**
  - *19 of 21 acres treated in previous years were revisited and foliar treated, 10 of these acres were accomplished with the help of 4-control*
  - *4 acres of riparian area were added via basal bark treatment*
  - *Access routes were severely damaged due to a catastrophic storm event, causing nearly \$1,000,000 in repairs in access roads, angler walking trails and habitat damage*
  - *Improve angular access and plant trees, 6 acres of Speckled alder was thinned*
  - *\$40,000 of Great lakes restoration initiative funds were granted to help control buckthorn in an additional 20 acres of the project*
- **FY20:**
  - *4-control assisted in the foliar spraying of 7 of the 22 acres treated as a part of the follow up treatments for this year*
- **FY21:**
  - *Work continued during this fiscal year, but had not been completed as of the start of this summary*



>>Foliar Spray; >>>Basal Bark; >>>>Mechanical; >>>>>Fecon Mow

Fig 1. White River Fishery Area Buckthorn Treatments

- Data collection methods:** Prior to treatment in 2008, 3 permanent plots (square meter) were established. The number of buckthorn seedling/saplings were counted in the permanent plots. Then several years later, data was collected in the summer of 2021, using randomly selected 1/300<sup>th</sup> acre plots, following the WDNR Forest Regeneration Metrics (FRM). Plots were selected randomly to collect regeneration data on not only buckthorn, but also the tree species and height. Due to the area being completely devoid of vegetation prior to tree planting, most trees over one foot in height are assumed to be planted origin. This data is being used to help determine what control methods are most effective on buckthorn, as well as determining an approximate number of years and follow-up treatments that are necessary to control the species from returning to the landscape.

**Results:**

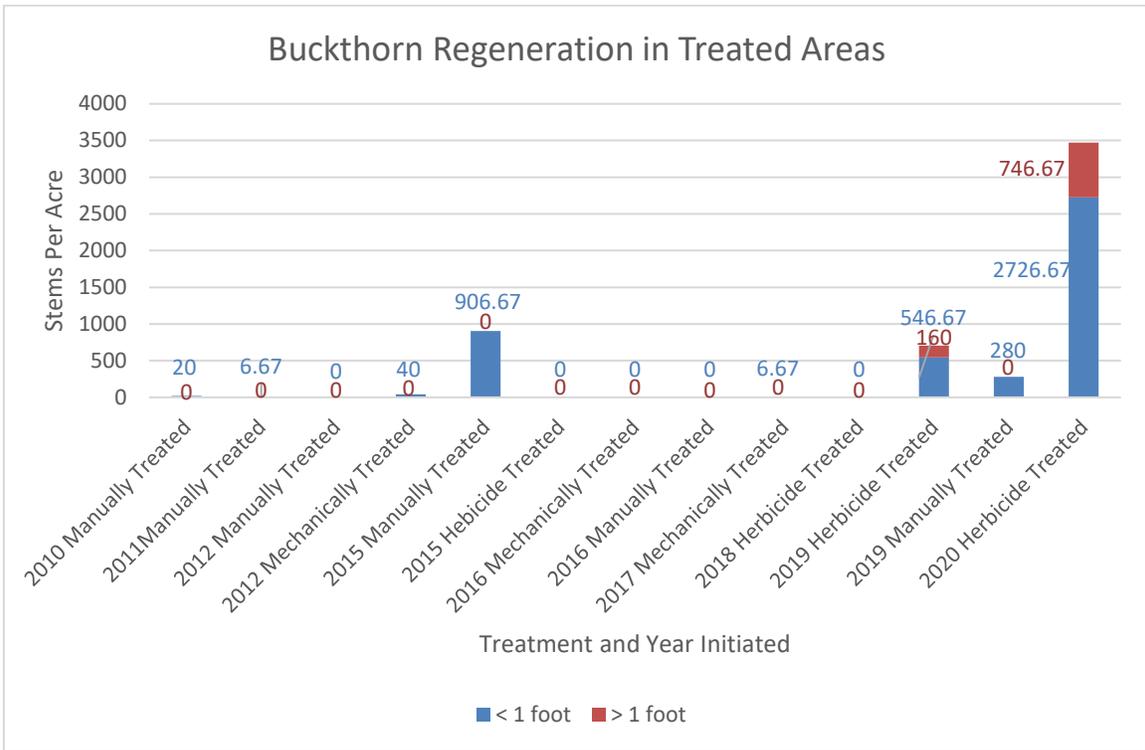
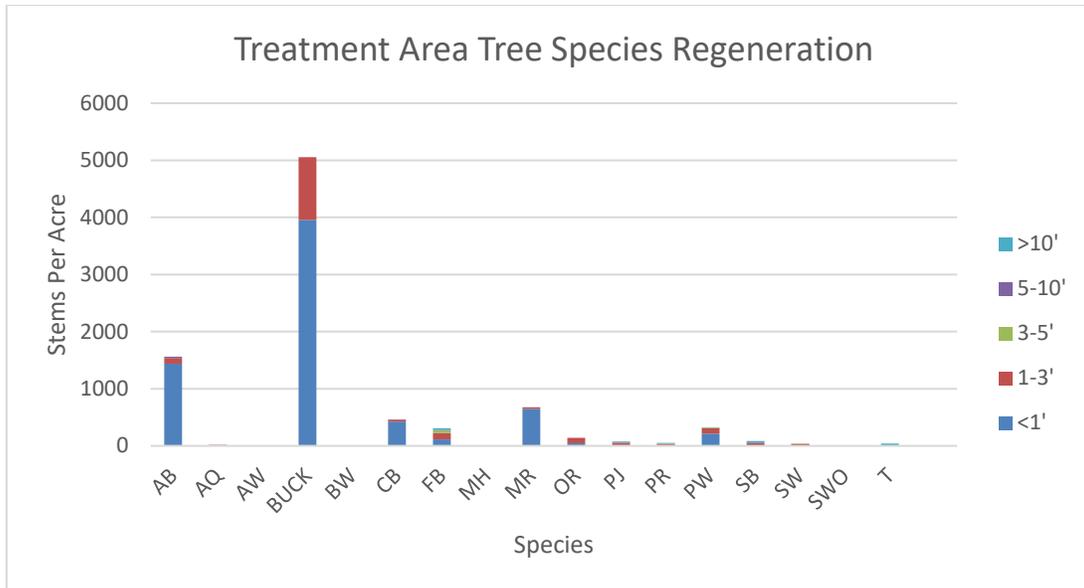


Fig 2.

The chart above is buckthorn regeneration results from different areas of the project, based on initial treatment and year they were initiated. Most areas were very similar in buckthorn abundance post treatment. The subsequent herbicide treatments had a great impact on controlling buckthorn. The spike in the 2015 manual area is the result of being mechanically cleared in the previous year, causing many stump sprouts. This area has since been foliar treated with herbicide.



	<u>AB</u>	<u>AQ</u>	<u>AW</u>	<u>BUCK</u>	<u>BW</u>	<u>CB</u>	<u>FB</u>	<u>MH</u>	<u>MR</u>	<u>OR</u>	<u>PJ</u>	<u>PR</u>	<u>PW</u>	<u>SB</u>	<u>SW</u>	<u>SWO</u>	<u>T</u>	<u>WS</u>
<u>&lt;1'</u>	1440.0	-	6.7	3960.0	6.7	426.7	113.3	6.7	646.7	45.0	13.3	13.3	213.33	-	6.7	-	-	-
<u>1-3'</u>	100.0	20.0	-	1093.3	-	33.3	113.3	-	26.7	93.3	40.0	20.0	93.3	46.7	26.7	6.7	-	20.0
<u>3-5'</u>	-	-	-	-	-	-	40.0	-	-	-	6.7	6.7	13.3	-	6.7	-	-	-
<u>5-10'</u>	20.0	-	-	-	-	6.7	13.3	-	-	-	6.7	-	-	13.3	-	-	-	6.7
<u>&gt;10'</u>	-	-	-	-	-	-	26.7	-	-	-	13.3	13.3	6.7	26.7	-	-	-	33.3

Fig. 3

The chart above shows the regeneration data (stems and height) per acre collected from plots across the entire project area. Natural seeding from species such as black ash, red maple, white pine and black cherry occurred. Of all the trees planted, tamarack did very well followed by black spruce and balsam fir. One issue with tamarack is that many of the stems were rubbed by deer antlers, causing damage and some mortality in younger trees. The planted jack pine and red pine did not do nearly as well, with stems dying, poor form and minimum growth compared to other species.

### Fiscal Year Spending

FY	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
LTE \$	\$6,441	\$4,852	\$6,122	\$3,210	\$3,142	\$5,348	\$4,500	\$5,008	\$3,596	\$5,409	\$1,583	-
LINE(S) \$	\$2,499	\$1,950	\$3,690	\$3,113	\$4,492	\$8,851	\$9,000	\$7,403	\$6,225	\$6,427	\$5,000	-
Total \$	\$8,940	\$6,802	\$9,812	\$6,323	\$7,635	\$14,199	\$13,500	\$12,411	\$9,821	\$11,836	\$6,583	TBD

Table 1.

The above table is a breakdown of the funding for this project by year and category, which was mostly derived from trout stamp funds. In FY20, money that was received as part of a Great Lakes Restoration Initiative grant was used alongside trout stamp funds adding an additional 20 acres to this project.

**Discussion:** There were several notable things that were discovered as a result of this project. First, the largest factor in controlling buckthorn on this site was repeated treatments. The areas that had successful tree regeneration and the least number of buckthorn had multiple treatment entries over many years. Second, the foliar treatments on stump sprouts are necessary when used in conjunction with other methods such as mowing or manual removal. If left untreated, the stumps will quickly resprout, creating multiple stems from what used to be one singular stem (Fig. 7). That area has since been treated with a foliar application of herbicide.

One treatment that has not been attempted as a part of this project is the use of fire. While logistically challenging, prescribed burn could be used as a more natural alternative to herbicide. The area already contains good road infrastructure to accommodate personnel and equipment and easy access to water with the stream nearby.

With the removal of the buckthorn and reforestation, the results have been very site specific. This site in terms of natural tree species has a large number of speckled alder returning to the stream banks. Species such as white pine, black ash and red maple have natural seeded in from the nearby overstory. There was also a surprising number of black cherry seedlings present and doing well on the site. When it comes to the planted species, tamarack was a clear winner in terms of survival and growth, along with black spruce, balsam fir and white pine. However, most of the red pine and jack pine that had been planted did not do well on the site for unknown reasons.

In conclusion, accomplishing a project like this is not an easy task. This is a very time and labor-intensive project, that without the help of many different individuals, and some outside organizations would not have been possible. This project has already created a more ecologically diverse area for not only members of the public, but also the wildlife community. Hopefully by documenting this project, the time, effort and materials used to make this possible will not go unnoticed. With this demonstration, it is also hoped that land managers and the public will begin to understand buckthorn impacts on the ecosystem and possible treatment alternatives.

**Photos:**



Fig. 4 Untreated Area



Fig. 5. Recently treated via basal bark and foliar herbicide application



Fig. 6. Pre-treated with herbicide and recently mowed



Fig. 7. Pre-treated with herbicide, mowed and left untreated for one growing season.



Fig. 8. Mechanically and manually cleared, followed by multiple follow-up treatments of herbicide application, as well as planting of multiple tree species.