

Idaho Hydrilla Final Report 2015
Idaho State Department of Agriculture

Background

Hydrilla (*Hydrilla verticillata*) is one of the most aggressive and environmentally disruptive aquatic plants in the world. This invasive plant forms dense monocultures that restricts water flow, degrades water quality, impedes recreation, and out-competes native species. Hydrilla has been referred to as the “perfect aquatic weed” because of its ability to dominate aquatic systems through effective propagation and colonization. Due to these characteristics, the identification of hydrilla in Idaho is of particular regional concern because of the potential to spread downstream into the Snake and Columbia River systems.

Hydrilla was identified in the Bruneau River near Bruneau, ID in December 2007 along with a second population discovered in a North Boise neighborhood in 2008 (discussed in further detail below). In the Bruneau River population, surveys found an infestation in the twelve mile stretch from Hot Creek downstream toward CJ Strike Reservoir (Map 2 and 3). Dense beds of plants were found throughout, but primarily in areas with geothermal influence. Hydrilla plants were also found in the lower reaches of the infestation zone (outside identified geothermal areas), but plants in these areas were typically scattered and occurred in low densities. Repeated surveys in downstream waters have found no hydrilla in CJ Strike reservoir or the Snake River.

Using DNA analysis, the US Geological Survey determined that the hydrilla in the Bruneau River is of dioecious biotype. Dioecious hydrilla is typically found in southern tier states in the US, whereas the monoecious biotype has been found in colder climates, such as Washington, Maine, New York and Wisconsin. The lower temperature limit of the dioecious biotype is not well established in scientific literature; however, its distribution appears to be limited in the US by cold temperatures. The distribution of dense hydrilla in the Bruneau system appears to be limited to geothermally influenced waters which are found in the first seven miles of river extending below Hot Creek. Primarily, hydrilla found outside of geothermally influenced areas occur in low densities and are believed to have been deposited as tubers that were moved downstream during high spring flows. Due to the extremely aggressive and adaptable nature of this plant, the Idaho State Department of Agriculture (ISDA) is conducting an aggressive program on this population with the intent of eradication.



Image 1: Hydrilla growing side-by-side with native elodea in section 6 of the Bruneau River, ID.

Treatment History

Scientists and experts from around the nation were consulted following the identification of hydrilla in the Bruneau River. Treatment options were identified and stakeholders from around the region were then brought together to develop an eradication plan. ISDA, in cooperation with Idaho Fish and Game, Idaho Department of Environmental Quality, Idaho Office of Species Conservation, US Fish and Wildlife Service, US Bureau of Land Management (BLM), United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) and landowners

from throughout the Bruneau Valley, worked together to coordinate a treatment plan. An aggressive eradication plan which utilized diver-removal, hand-removal and herbicide treatment was implemented in early February of 2008. Treatments consisted of two eight-hour diquat injections into the river, three diquat backpack applications, ten days of diver-harvesting removal, and five days of hand-removal. Efforts in 2008 resulted in an estimated 50% reduction in biomass in the following season. Coordination with the Hot Springs and Buckaroo Ditch Companies also focused treatments to remove hydrilla from the upper parts of the ditch systems.

Treatment in subsequent years further reduced hydrilla biomass and distribution throughout the infested area. Herbicide use decreased as hydrilla densities were reduced into levels where hand removal became more effective. Grant funding in 2010 from USDA, APHIS, and BLM allowed for the hiring of seasonal staff dedicated to the project area which allowed for a comprehensive and sustained mapping, survey and removal program. In 2011, this funding also allowed for the purchase of a suction removal system (modified dredge) to help facilitate the removal of hydrilla biomass, including tubers.

Since 2010, the hydrilla infested area has been surveyed repeatedly each year during periods of plant growth. When hydrilla plants are found, a location is recorded using GPS, the number of plants are counted, and the area covered by these plants is estimated. The plants are then carefully removed by hand, often including the tuber(s). In areas of higher plant density, suction removal is utilized (access permitting). Collecting data in this way has allowed for hydrilla occurrence and density (plants per m²) to be recorded and monitored over time throughout the river system.

In an attempt to increase the sensitivity of the analysis, and to more clearly illustrate changes of the hydrilla population over time, the number of hydrilla plants removed was investigated. Prior to 2013, higher plant densities prohibited a year-to-year comparison of individual plant numbers. Due to substantial reductions in plant densities, along with the implementation of Android based tablets to

increase efficiency in data collection, crews were able to record accurate counts of individual plants throughout the infestation zone. This information provides a metric to track changes over time and quantifies actual hydrilla plant growth rather than focusing on the locations where hydrilla occurs (occurrence). Between 2013 and 2014, the data collected found individual plant numbers to decrease by 46% in the entire infestation zone and 61% in high density areas.



Image 2: Large hydrilla patch located in a side flow area in section 5 in the Bruneau River, ID.

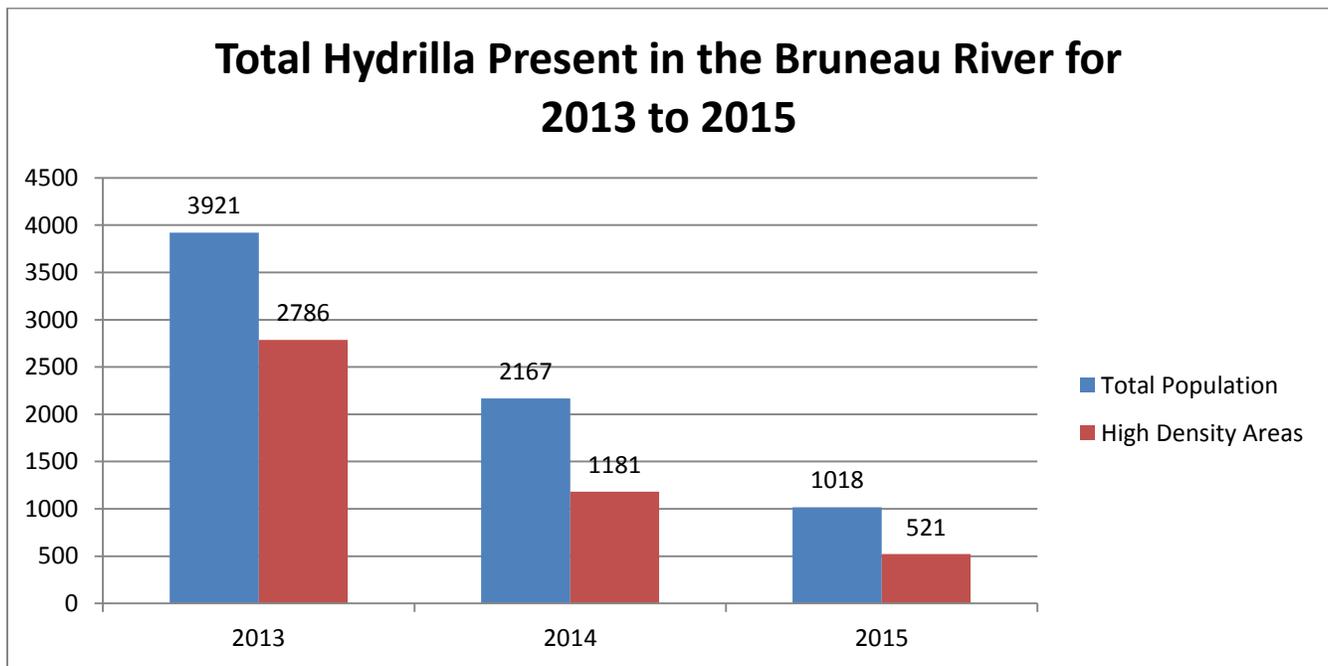
The 2015 Field Season

Treatments in 2015 continued to utilize suction removal and a staff of four to survey and remove hydrilla in the Bruneau system. The 2015 field season was the sixth year of the hydrilla eradication project where intensive survey data was collected and a focused season-long removal effort implemented.

The entire area of known hydrilla infestation was repeatedly surveyed in 2015 and plants were removed whenever encountered. As experienced in previous years, removal efforts in early July found dense hydrilla populations in thermally influenced backwater areas. By late July and into August, hydrilla was found throughout a widely distributed area in the river. Extensive late-season growth was observed in September and October surveys. Very little hydrilla was found in the lower reach of the river and no plants to date have been found in CJ Strike Reservoir or downstream in the Snake River.

Focus in 2015 survey efforts was centered in river sections 1 through 5. These sections contain several densely infested backwater areas that act as point-source locations for the transport of hydrilla back into the main river stem as seasonal flow fluctuates. High spring flow creates the possibility of tubers and turions (overwintering reproductive structures) to be lifted out of sediment and carried downstream. Focusing on these high density areas will help to decrease deposition of hydrilla to downstream areas in subsequent years. During the growing season, hydrilla mainly spreads through fragmentation. The intention in placing focus on upper sections in the infestations zone is to stop hydrilla at the source, and prevent downstream establishment. Removal efforts for 2015 have recorded an 81% reduction in high density areas when compared to 2013 findings. This reduction is also seen throughout the entire infestation zone at a decrease of 74% in overall hydrilla population (Figure 1).

Figure 1: Total number of hydrilla plants removed by year from 2013 to 2015 in the Bruneau River, ID.



To further investigate the number of plants removed, the river was divided into ten operational areas (Map 4). This illustrates localized treatment progress and number of hydrilla plants for each river section by year. The below table shows the actual plant numbers recorded per river section for each year from 2013 to 2015 (Table 1).

Table 1: Hydrilla plant occurrence per river section from 2013 to 2015, including high density areas.

Section Number	2013	2014	2015
1	493	259	73
2	487	391	325
3	122	60	62
4	2483	991	216
5	317	441	323
6	12	11	16
7	0	6	1
8	5	0	2
9	2	8	0
10	0	0	0

Dividing the river up into sections highlights the low number of plants that are found in downstream areas. These areas have little to no geothermal influence and only a small amount of hydrilla growth is now observed there. It has also helped to drive management decisions in the focusing on upper river sections where the majority of the infestation resides.



Image 3: Flowering hydrilla plant found in Section 1 of the Bruneau River, ID.

Sections 5, 6, and 7 showed slight increases in plant numbers found compared to 2013 and could be explained by water temperatures observed in 2015. Published literature indicates the optimal temperature range for growth in dioecious hydrilla is between 20°C and 27°C. A simple degree-day analysis was conducted on average Bruneau River water temperatures between June 1 and October 30 to determine the number of days per season that temperatures were over 20°C. Results from that analysis show 2015 had 103 days with temperatures averaging over 20°C. This follows the trend since 2012 and has continued to provide optimal growth conditions for hydrilla for an extended period of time (Figure 2).

Figure 2: Degree day analysis for water temperatures in the Bruneau River, ID near Hot Springs. Days over 20°C by year (USGS Gage Water Temperature Data).

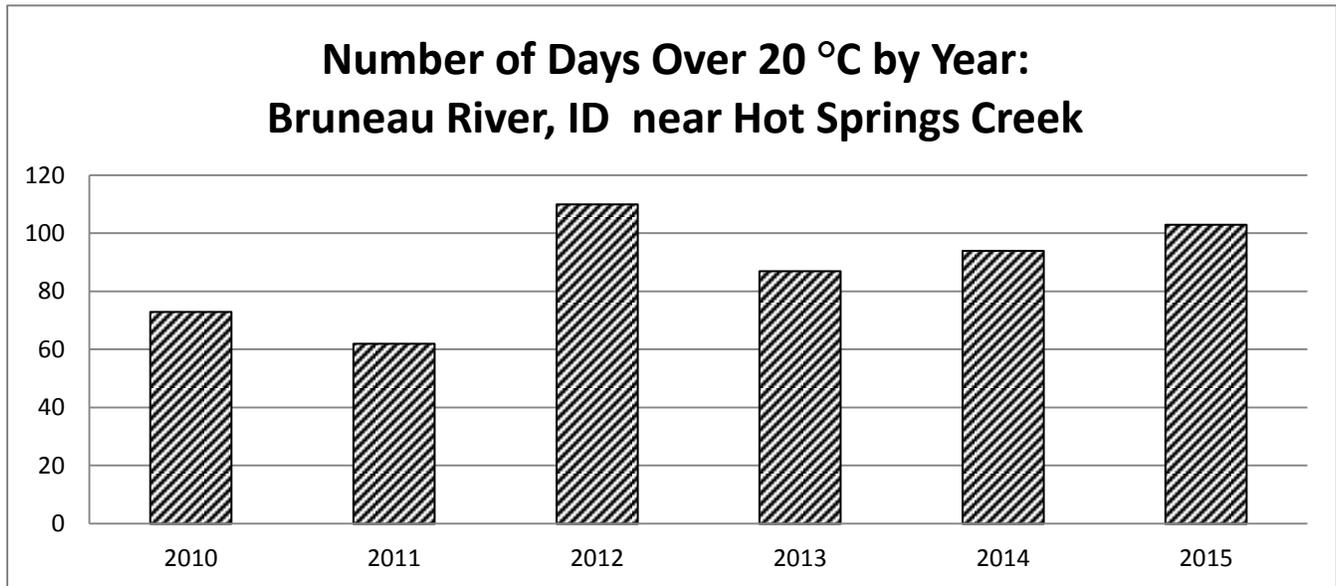


Image 4: Suction removal of isolated hydrilla plants in Section 2 of the Bruneau River, ID.

It must be emphasized that all hydrilla plants found during surveys are mapped and then removed. Most of the plants that are removed also result in the removal of tubers. Hydrilla tubers remain viable for up to 7 years in the sediment and can break dormancy at any time over that period. The conditions in 2015 were ideal for hydrilla growth and the growth response observed (especially in lower river sections) could be explained by an increased rate of tubers breaking dormancy. The persistent pressure of repeated removal as the plants break dormancy is hoped to be the key to the eradication of this population.

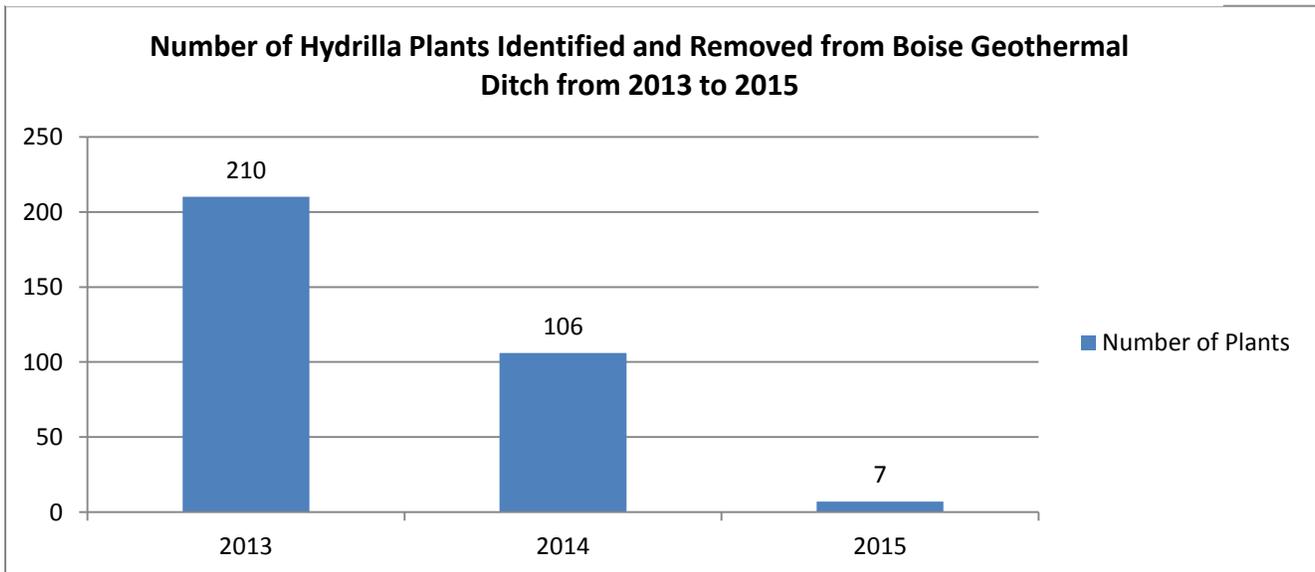


Image 5: Left - newly sprouted turion found in the Buckaroo backwater area. Right - 100+ newly formed tubers from one hydrilla plant mass.

Boise Hydrilla

A population of hydrilla was identified in a small geothermal ditch in Boise in 2008. Plants have been found in a 400 meter length of ditch that runs through the backyards of private homes in a West Boise neighborhood. This population has been repeatedly surveyed since discovery and plants are removed by hand when encountered. In 2015, the ditch was surveyed three times and plant densities have continued to decrease from what has been observed in previous years (Figure 3). The ditch flows into the Farmers Union Canal and repeated surveys have found no hydrilla in it or downstream where water flows into the Boise River. Eradication efforts in this area will continue in 2016.

Figure 3: Total number of hydrilla plants removed by year from a small geothermal ditch located in Boise, ID.



Future eradication efforts

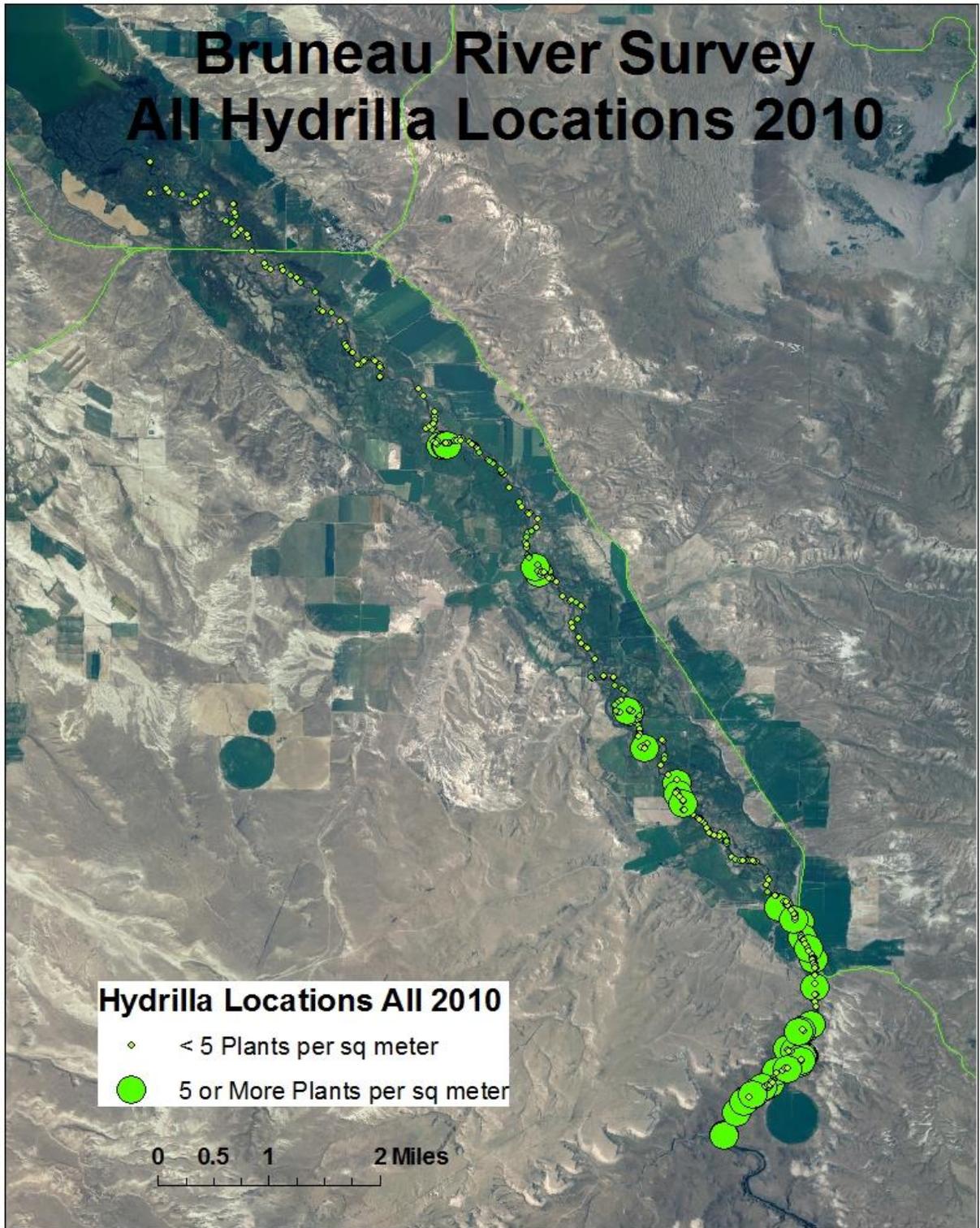
Results in the 2015 Bruneau infestation zone showed the second largest percentage decrease in overall plant population since initial removal efforts began in 2009. Weather conditions remained favorable throughout the season and provided for optimal growing conditions. This suggests that a sustained and persistent survey and removal program is reducing plant densities as well as tuber bank, and also highlights the importance for these efforts to continue on the Bruneau River and Boise hydrilla populations. Hydrilla density will continue to decline over time as the regrowth is consistently found and removed. Lower plant densities will aid in making this process easier and more efficient. Survey and removal efforts will continue into 2016 following the same mapping and removal methods. Eradication continues to be the goal of the program and through persistence and a sustained effort, substantial progress is being made toward that goal.

For more information on the progress of the Hydrilla Eradication Program in Idaho, please contact the Idaho State Department of Agriculture Noxious Weeds Department @ 208-332-8500.

Map 1: Regional map indicating the location of the hydrilla infestation in the Boise area and in the Bruneau River near the town of Bruneau, Idaho.



Map 2: All hydrilla locations in 2010 in plants per m². Bruneau River, Idaho.



Map 3: All hydrilla Locations 2015. Bruneau River, Idaho.



Map 4: River sections for hydrilla survey and removal. Bruneau River, Idaho.

