

Advantages and Disadvantages of Mechanical Harvesting of Aquatic Plants (AERF, 2009)

Advantages

Water can be used immediately following treatment. Some aquatic herbicides have restrictions on use of treated water for drinking, swimming and irrigation. Also, plants are removed during mechanical harvesting and do not decompose slowly in the water column as they do after herbicide application. In addition, oxygen content of the water is generally not affected by mechanical harvesting, although turbidity and water quality may be affected in the short term. Nutrient removal is usually insignificant because only small areas of lakes (1 to 2%) are typically harvested; however, some nutrients are removed with the harvested vegetation. It has been estimated that aquatic plants contain less than 30% of the annual nutrient loading that occurs in lakes.

The habitat remains intact because most harvesters do not remove submersed plants all the way to the lake bottom. Like mowing a lawn, clipped plants remain rooted in the sediment and regrowth begins soon after the harvesting operation.

Mechanical harvesting is site-specific because plants are removed only where the harvester operates. If a neighbor wants vegetation to remain along his or her lakefront, there is no movement of herbicides out of the intended treatment area to damage the neighbor's site.

Herbicide concerns remain widespread despite extensive research and much-improved application and despite use and registration requirements enforced by local regulatory agencies. Mechanical harvesting, despite some environmental concerns (as outlined below), is perceived to be environmentally neutral by the public.

Utilization of harvested biomass is thought by many to be a means of offsetting the relatively high costs and energy requirements associated with mechanical harvesting. Unfortunately, no cost-effective uses of harvested vegetation have been developed, despite much research examining the utility of harvested plant material as a biofuel, cattle feed, soil amendment, mulch or even as a papermaking substrate. As much as 95% of the biomass of aquatic plants is water, so 5 tons of Eurasian watermilfoil yields only 500 pounds of dry matter. In addition, cut plants in northern lakes are only available for 3 to 4 months of the year.

Disadvantages

The demand for aquatic weed harvesters is very small, so the equipment associated with these operations is often custom-made and expensive.

The area that can be harvested in a day depends on the size of the harvester, transport time, distance to the disposal site and density of the weeds being harvested. These factors can result in a wide range of costs. The cost of harvesting is site-specific, but mechanical harvesting is generally more expensive than other weed control methods due to the variables noted above and

the generally high capital outlay required to purchase equipment that may only be used for 3 or 4 months per year.

Mechanical harvesters are not selective and remove native vegetation along with target weeds. By-catch, or the harvesting of non-target organisms such as fish, crayfish, snails and frogs along with weeds, may be a concern. Research on fish catch during mechanical harvesting of submersed vegetation has shown that 15 to 30% of some species of fish can be removed with cut vegetation during a single harvest. If the total area of a lake that is harvested is 1, 5 or 10% of the lake's area, this will likely be of little consequence. However, if the management plan for a 10-acre pond calls for complete harvests 3 times per year, then the issue of by-catch of fish deserves more consideration.

Regrowth of cut vegetation can occur quickly. For example, if hydrilla can grow 1" per day as reported, a harvest that cuts 5 feet deep could result in plants reaching the water surface again only two months after harvesting. Speed of regrowth depends on the target weed, time of year harvested, water clarity, water temperature and other factors.

Floating plant fragments produced during mechanical harvesting can be a concern because most aquatic weeds can regrow vegetatively from even small pieces of vegetation. If an initial infestation of aquatic weeds is located at a boat ramp, care should be taken to minimize the spread of fragments to uninfested areas of the lake by maintaining a containment barrier around the area where mechanical harvesting will take place. On the other hand, if a lake is already heavily infested with a weed, it is unlikely that additional fragments will spread the weeds further. However, homeowners downwind of the harvesting site may not appreciate having to regularly rake weeds and floating fragments off their beaches.

Disposal of harvested vegetation can be an expensive and difficult problem after mechanical harvesting. Research during a project in the 1970s on Orange Lake in Florida compared the costs of in-lake disposal to the transport, off-loading and disposal of cut material at an upland site. As water levels on Orange Lake decreased during a drought period, the mechanical harvester was allowed to off-load cut vegetation along the shoreline among emergent vegetation instead of transporting harvested plants to the shore for disposal. The cost of in-lake disposal reduced the per-acre cost by about half when compared to transporting the vegetation to shore, loading it into a truck and disposing of the plant material in an old farm field.

Some lakes or rivers may not be suitable for mechanical harvesting. If there is only one public boat ramp on a lake and it is not close to the area to be harvested, the costs of moving the cut vegetation from the harvester to shore will add significantly to the cost of the operation. Harvesters are not high-speed machines and move at 3 to 4 mph, so if a river flows at 2 mph and the harvester has to travel upstream to the off-loading site, well, do the math! Off-loading sites usually must have paved or concrete surfaces because the weeds are wet and an unpaved off-loading site can quickly become a quagmire.