

IMPACTS OF MOTOR BOATS ON WATER QUALITY

The following is an overview of the potential impacts of motorized watercraft on water quality and lake ecology from a literature review by Dick Osgood of Ecosystem Strategies in Shorewood, Minn. Much of the following came from Wagner (1990) but other authors are also cited. Most effects are related to boat density with some effects also related to boat size.

- 1). **Increased turbidity, sediment resuspension, decrease in water clarity.** - This issue relates to the ability of motor boats to resuspend bottom sediments into the water column. The degree of impact is related to motor size, water depth and sediment type. Nedohin and Elefsiniotis (1997) showed that a 10 hp motor will mix down to a depth of 6 feet and a 50 hp motor can mix down to 15 feet. Yousef et al (1978) showed that a 100 hp motor can re-suspend sediments of all sizes to water depths greater than 10 feet. The density of motor boats can increase the amount of sediment resuspension with unsatisfactory conditions found at 14 to 50 acres per motor.
- 2). **Increased nutrient levels, algae growth** - This issue is also related to sediment resuspension from boat motors. Several studies have shown significant increases in phosphorus from re-suspended sediment especially in shallow lakes where internal loading is high. There is some evidence that increased algae growth can occur as a result of increased phosphorus concentrations from sediment resuspension. Again this would most likely occur in shallow lakes or shallow arms of lakes.
- 3). **Increased hydrocarbon concentrations.** - According to Wagner (1990) most hydrocarbon compounds emitted by gasoline engines do not persist in water. However, methyl tertiary-butyl ether (MTBE) a gasoline additive and known carcinogen is soluble in water. Known potential sources of MTBE include recreational power boating (California EPA 1998). In fact, the use of fuel containing MTBE is prohibited in most California lakes. Advances in engine design have reduced unspent fuel discharges. This is an issue where smaller, older engines, especially two cycle engines cause more pollution. Larger engines are generally more efficient. Hallock and Falter (1987) showed that for every liter of gasoline consumed by a 2 cycle engine there was 8600 mg carbon, 300 mg total nitrogen and 1 mg of total phosphorus in the exhaust. These discharges were considered to be small in comparison with other nutrient sources. Juttner et al (1995) showed that the toxicity of emissions from two-stroke engines persisted longer than four stroke engines, greater than 14 days compared with negligible after 14 days. Hydrocarbon pollution is generally greatest in areas of high boat concentration (marinas).
- 4). **Increased contamination by pathogens** - only a factor from boats with sanitary facilities.
- 5). **Shoreline erosion** - This effect which logically might be related to boat size is often difficult to separate from wind-generated waves and land activities, both of which also cause shoreline erosion.
- 6). **Direct damage to rooted aquatic plants/dispersal of rooted plants** - It is clear that boat motors cause direct damage to rooted aquatic plants at water depths of three feet or less and it is likely that some damage occurs to depths of 10 feet. Again, larger boats with larger motors would have an effect to deeper depths. The cutting of pieces of plants by boat motors can allow the plants, which may be nuisance species, to disperse.