

## **EVALUATION OF THE ENVIRONMENTAL IMPACTS RESULTING FROM MOTOR BOAT ACTIVITIES - PHASE I**

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*Descriptors: Aquatic Plants, Boating, Economics, Lakes, Plant Stress, Pollution Control, Recreation*

### *Problem and Research Objectives:*

Due to the expanding population and increased environmental concerns yet finite water resources, use of New Hampshire water resources for recreational purposes is becoming a focal point of disagreement. A case in point is personal water craft use (jet skis). The personal water craft (PWC) is classified by the Coast Guard as a motor boat. PWC bans on ponds and lakes are increasing, often with environmental justification. Yet, on these same water bodies, other pleasure motor craft are still allowed. A critical question, therefore, is "What are the typical environmental consequences of various recreational craft on the water column as well as on flora and fauna?"

The nature of this first phase of research was a literature review. The review delineated the current body of knowledge regarding the environmental effects of propeller and hydraulic jet pleasure craft. This phase paves the way for the second phase, which will be a field testing of various water craft and the measurement of their environmental effects.

### *Principal Findings to Date:*

#### *General Information*

Most of the general information material originated from nontechnical sources, i.e., newspapers, news magazines, manufacturers' journals, etc.; however, some technical articles were included in this category. Themes that were also present in this category included: regulation of ski craft, utility of ski craft, introduction to ski craft, production literature, common ski craft criticism and important issues surrounding the regulation of ski craft use.

An important subliminal message in articles berating ski craft is not so much at issue with the machine itself as with the operator. There would appear to be a derogatory typecast of ski craft operators which has no documented logical basis. The typecast seems to be that of one who is not concerned at all with impacts on the environment and/or consideration of others.

#### *Turbulence and the Effect of mixing on sediments and Microorganisms*

Researchers have documented relations between motor boat activities and turbidity (suspended sediments in the water column). In few cases have researchers looked at specific motor boat types (inboard versus outboard, propeller versus jet) and ensuing consequences. However, variables which repeatedly are related to increased turbidity levels are: water depth, boat (horse)power, amount of boat traffic, and bottom sediment characteristics. Here, the engine thrust (propeller or jet) is dispersed into the water column. When this thrust dispersion reaches the water body floor, sediments may be moved. Once sediments are resuspended from the bed, there may be a host of subsequent consequences such as: reduced light penetration, increased nutrient concentration and increased micro-organisms.

### *Boating Effects on Fish and Aquatic Plants*

Two primary subclasses in this category are direct and indirect effects. Direct effects result from immediate contact of boats or boat turbulence on fish and aquatic plants. Indirect effects stem from the secondary effects of boat traffic; for example, resuspending sediment which, in turn, reduces light penetration into water which, in turn, is disruptive to macrophytes.

The indirect effects of the types of water quality problems associated with motor boats (sediment re-suspension, turbulence, increase in dissolved oxygen) have been extensively studied. That is, there are numerous studies relating to the effects of silt and sediment on aquatic flora and fauna. No studies have documented the effects of ski craft on sediment resuspension or their indirect effects on fish and aquatic plants. No studies have documented the relative indirect effects of ski craft and motor boats.

The direct effect of turbulence on fish is manifested in increased mortality of fish species and eggs; mortality being directly related to the intensity of the turbulence.

### *Pleasure Boats and Water Pollution*

As the ski craft is a relative newcomer to water recreation, no literature could be found which documented water pollution resulting from them. However, a large body of literature has been presented, since the 1950's, concerning water pollution from pleasure craft. There are two basic classes of water pollution in this category: overboard discharges and exhausts.

### *Boating Impacts on Water Fowl*

There are many human interferences in and around lakes and ponds which may have effects on water fowl population, diversity and mortality. These human interferences include: land development, recreation on the water and on riparian lands, water development, and resources development. To account for or isolate the effects of boating on water fowl, typically researchers will perform enumeration studies either over time at a fixed location or at various locations during a similar time frame. The environments studied in these cases have, in the former, boating increasing with time, or in the latter, locations with and without boating. Of course, it is very difficult to control all other human-related variables in these studies, however, there do appear to be certain trends, for certain species, relating boating activity to effects on water fowl. Also, timing of disturbances seems to be important for certain species in that a critical time is during the nesting selection period.

Mortality of water fowl due to motor boat activity was never reported for any species; that is, what fraction of the total population is killed by motor boats. However, when evaluating discovered carcasses, motor boats can represent a significant percentage of water fowl deaths. This type of sampling can be severely biased in that carcasses resulting from motor boat injuries are easier to find than those where the effect occurred at the water (i.e., toxicity) and the carcass exists far from the water due to water fowl mobility.

### *Recreation/Water Resources Economics and Management*

A current mindset is that when viewing humans and nature, humans are not members or participants, but rather, consumers. In this vein, all human activity is disruptive or destructive to nature. Current environmental policy and philosophy seems to be refuting this concept. The "no net loss of wetlands" policy is a case in point. The mindset pits those who pursue less harmful activity (i.e., birdwatching)

against those who pursue more harmful activity (i.e., dredging). This all falls into the development of management strategies not only at the federal level, but at the local level. Such planning activity reduces conflict by delineating the range and utility of all recreational uses of water resources. These strategies must also be compatible with maintenance of existing environmental conditions.