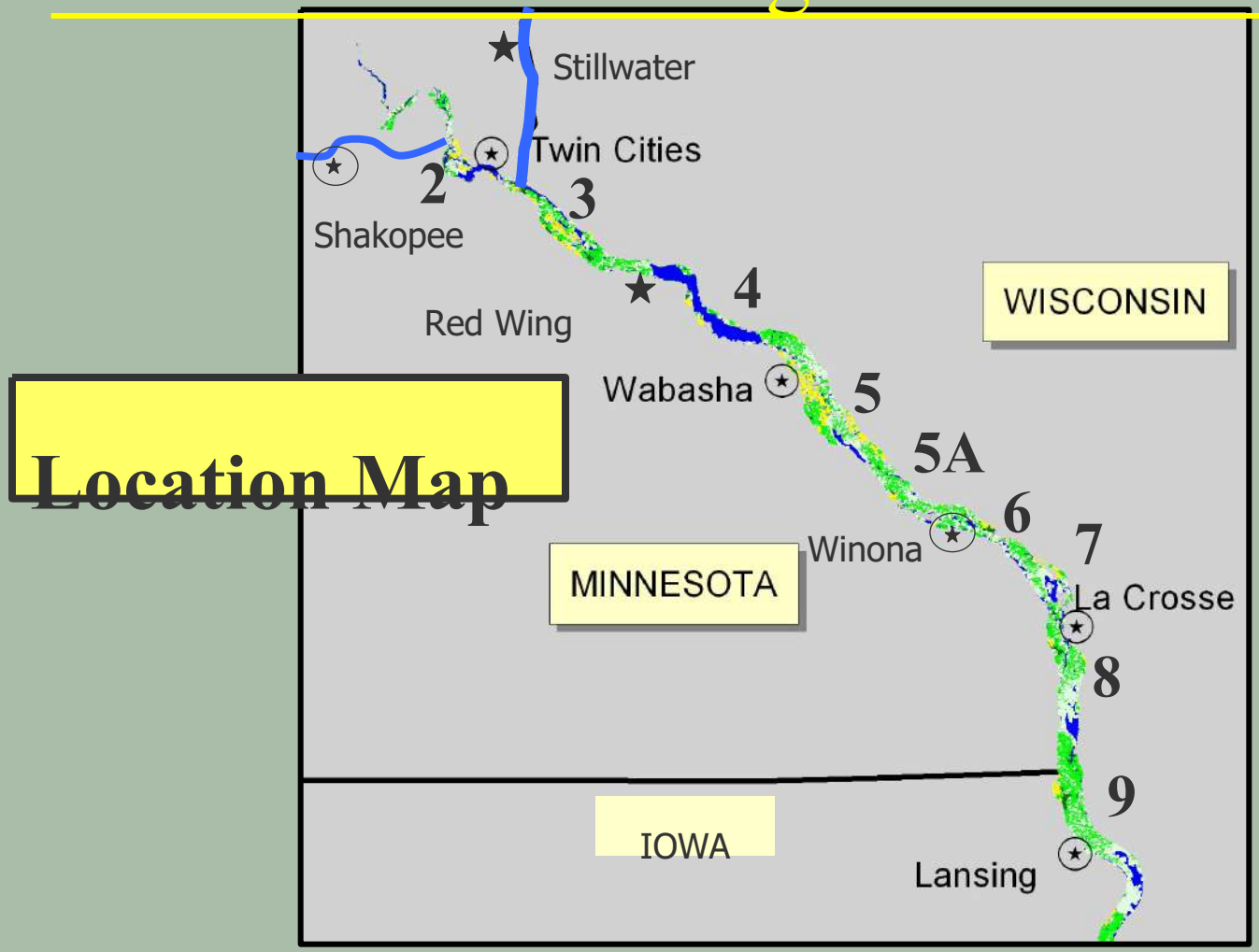
# Upper Mississippi River Recreational Boating

## Research Findings

***With a focus on Pools 2 - 9***

# Upper Mississippi River

# Recreational Boating Research Findings



# *Natural Resource Agency Concerns…*

- Since the late 1980's, user conflict and environmental degradation concerns have continued to grow.

- Over the years, natural resource agencies have conducted numerous field research projects.

- Study area findings are generally applicable to Reels 2 - 9

# *Contributing Research Institutions*

- Minnesota Department of Natural Resources
- U S Army Corp of Engineers
- National Park Service
- Wisconsin Department of Natural Resources
- University of Minnesota
- United States Geological Survey
- Illinois State Water Survey




# *Minnesota Department of Natural Resources*

## Mississippi River Landscape Team

Recreational Boating Sub-Team–Divisional Participation

* ***Enforcement***
* ***Waters***
* ***Trails and Waterways***
* ***Fisheries***
* ***Parks***
* ***Ecological Services***
* ***Wildlife***
* ***Region IV Administration***

# *Report Findings….*

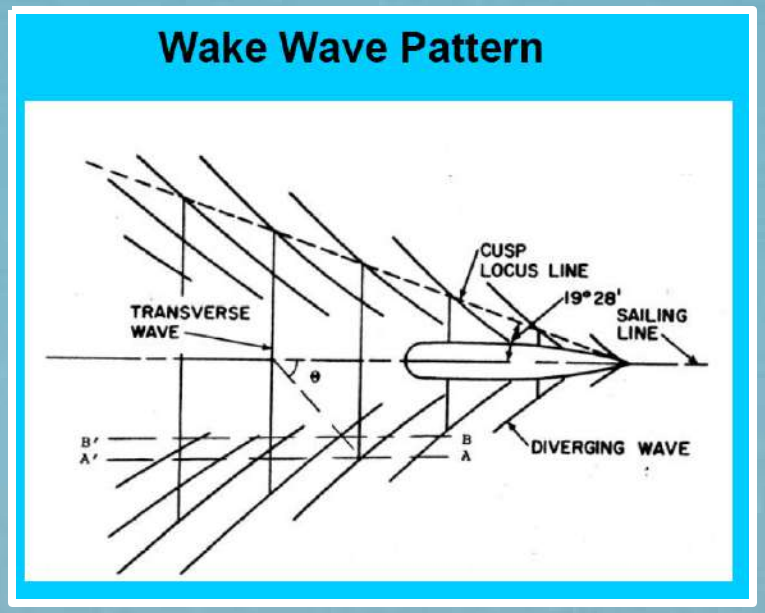
## Upper Mississippi River

## 2003 Recreational Boating Survey of Pools 4 – 9

- over 3,000,000 boater hours
- over 600,000 boaters
- over 8,000 lockages
- mean boat length - 19 feet
- mean motor size - 117 horsepower

* Numbers exclude high use pools 2 and 3.

# *Report Findings….*




- Big boats throw big waves.

- Shorelines are subject to wave activity of high intensity.

# *Report Findings….*

**-The majority of shoreline erosion is attributable to recreational boat waves.**

**- Bank erosion rates of 2 to 3 feet per year are not uncommon.**

**- Most accelerated shoreline erosion is found along the main channel where large recreational boats navigate.**

**- Recreational boat waves can fragment and reduce island size.**

# *Report Findings….*

**-The greater the recreational boat use in an area the fewer perennial plant species.**

**- The greater the recreational boat use in an area the more bare soil along shoreline.**

**-Reduced water clarity near shore is attributable to recreational boat waves eroding and resuspending channel sediments.**

**- Turbidity values 10 times the water quality standard are produced in areas subject to high levels of recreational boating activity**

# *Report Findings….*

**-Recreational boats traveling at less than 5 mph do not cause erosion.**

**- Recreational boats with a planing hull design –when traveling faster than planing speed - create only small waves.**

**-Cruisers and other large craft without a planing hull design create bigger waves with increasing speed.**

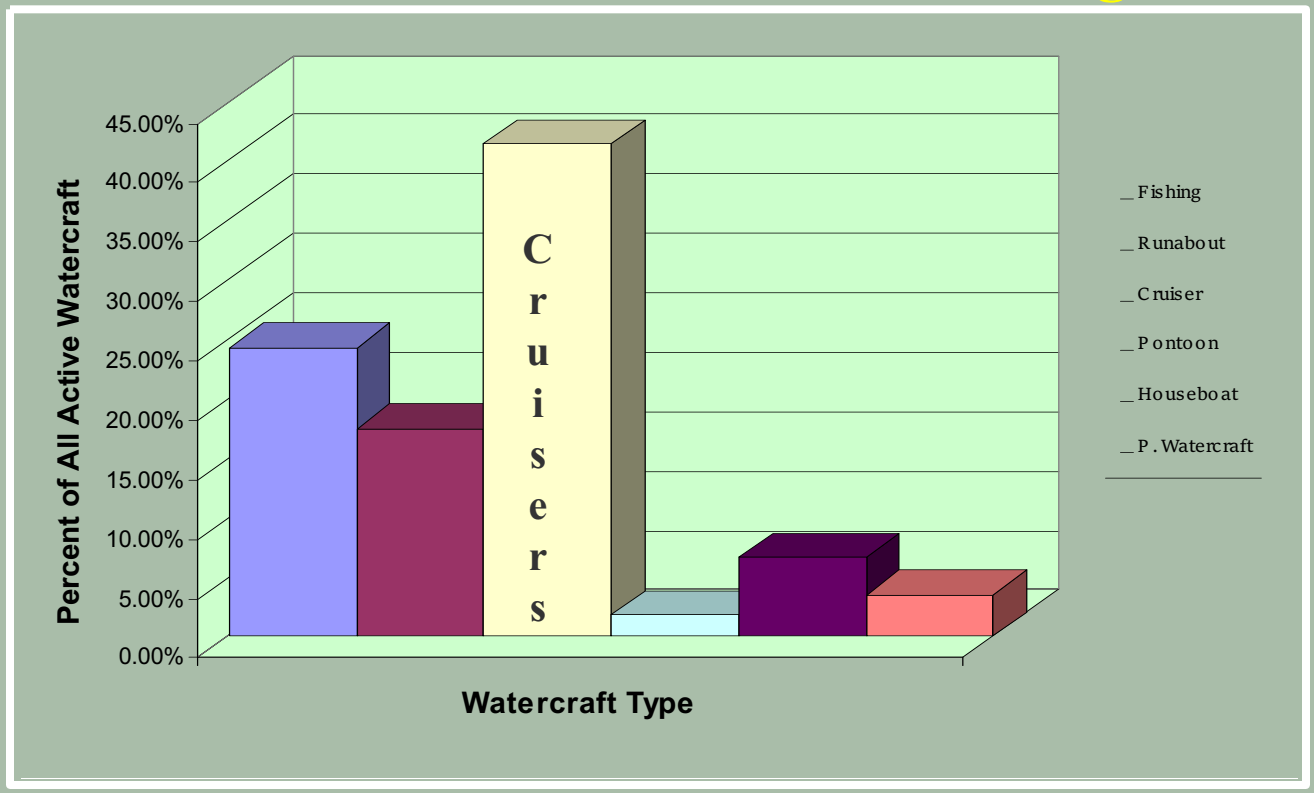
**Maximum Wake Wave Heights**

| Vessel Type | Distance from Sailing Line | | |
|---|---|---|---|
| | 0 to 100 ft | 100-300 ft | 300-500 ft |
| Sailboats | N/A | N/A | N/A |
| Jet Skis | 8 cm | 4 cm | 0 |
| Fishing Boats | 16 cm | 8 cm | 4 cm |
| Pontoon | 8 cm | 4 cm | 4 cm |
| Medium Power | 24 cm | 20 cm | 10 cm |
| Large Cruisers | 50 cm | 40 cm | 20 cm |
| House boats | 8 cm | 4 cm | 4 cm |

# *Report Findings….*

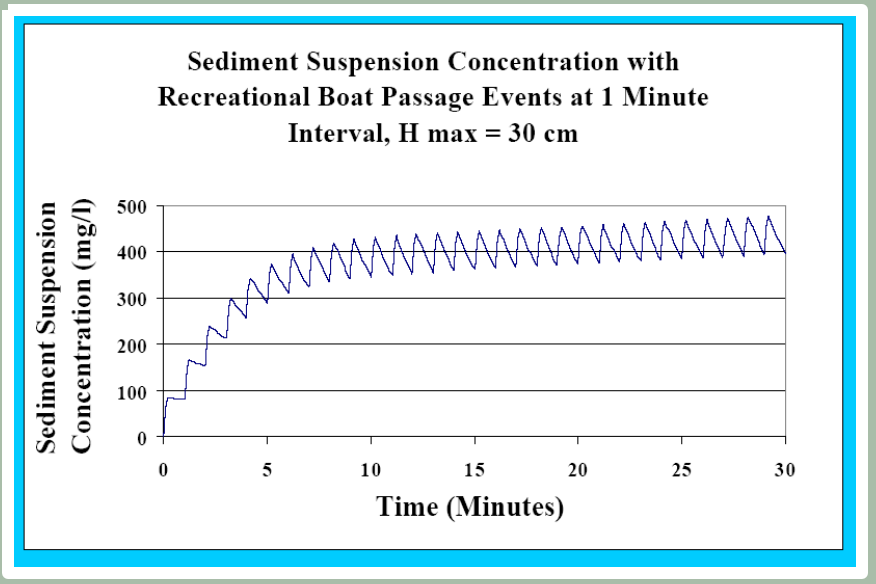
**-Cruisers represent the largest category of recreational boats in Pools 2 –4.**

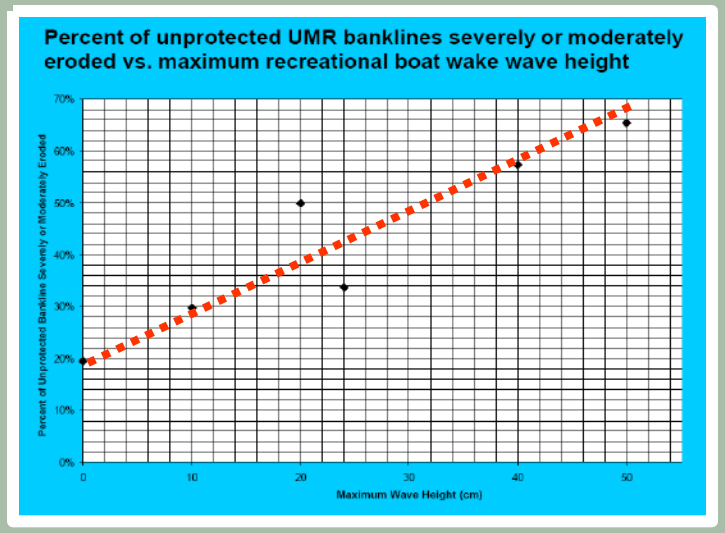
**- The number of cruisers has been increasing since 1997.**



# *Report Findings….*

**-The more recreational boating activity the more sediment resuspended in the water column.**



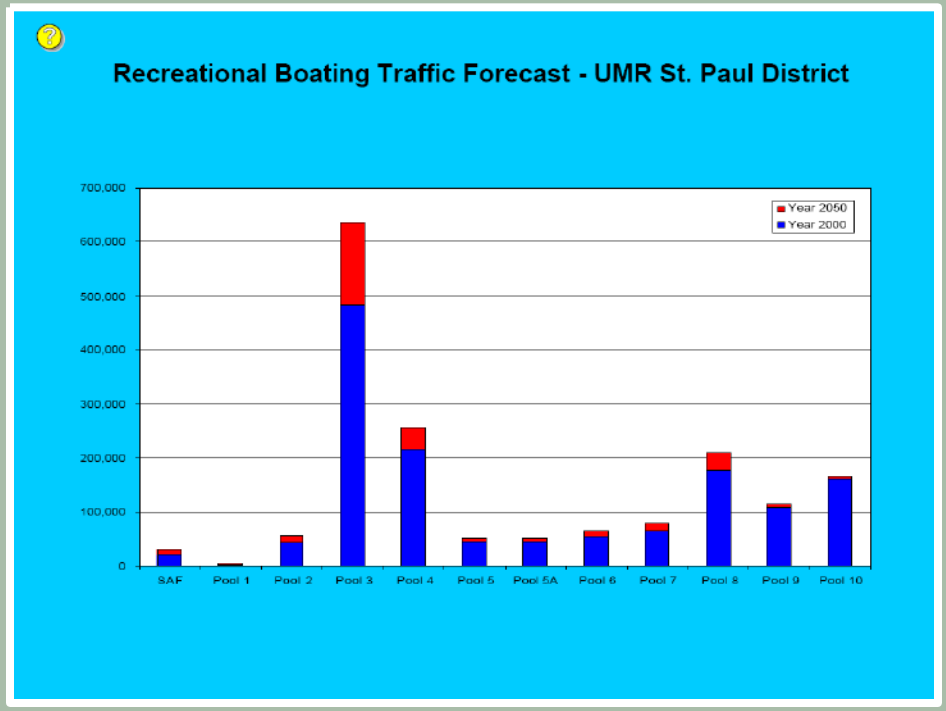




**- The more recreational boats capable of creating large waves the more shoreline that is eroding.**

# *Report Findings….*

- Recreational boat traffic is forecast to increase 20% on the Upper Mississippi River in the next 50 years.

- Most of the traffic increase will be in Pools 3 and 4 which are already the busiest pools.



# * Potential Biological Impacts

## Boat Wave Energy

- Aquatic plants uprooted or sediments unsuitable for rooting.
- Plant leaves and stems stripped or broken.
- Bugs in the sediment dislodged and disturbed
- Fish spawning habitat disturbed or eliminated.
- Fish nest disturbed or destroyed.
- Turtle nesting and basking sites disturbed or destroyed.
- Large Woody Debris (LWD) destabilized and abraded.
- Waterfowl and shorebird disturbance and hazing.
- Burrowing, fur-bearing animal den collapse.

** Based on the literature and professional observations.*

# * Potential Biological Impacts

## High Turbidity

- Reduced light penetration limits aquatic plant growth and reproduction.
- Reduce respiratory function in fish due to abrasion and clogging.
- Reduced prey capture efficiency by Largemouth Bass and Walleye.
- Reduced aquatic plant beds resulting in more algal blooms.
- Reduced filter feeding zooplankton vitality.
- Reduced Bluegill feeding rates.
- Greater effects likely occur during particularly vulnerable life stages.
- Longer the duration the greater the impact.

** Based on the literature and professional observations.*

# *Report Findings….*

**Factors that contribute *less* than recreational boat waves to shoreline erosion:**

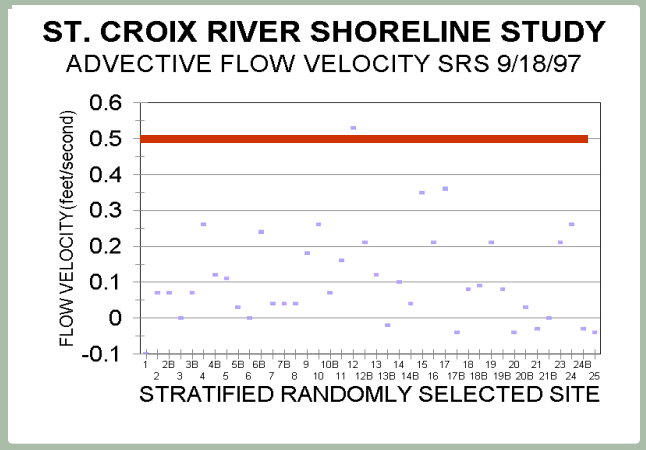
**- Wind generated waves in river channels**

**- Ice heaves**

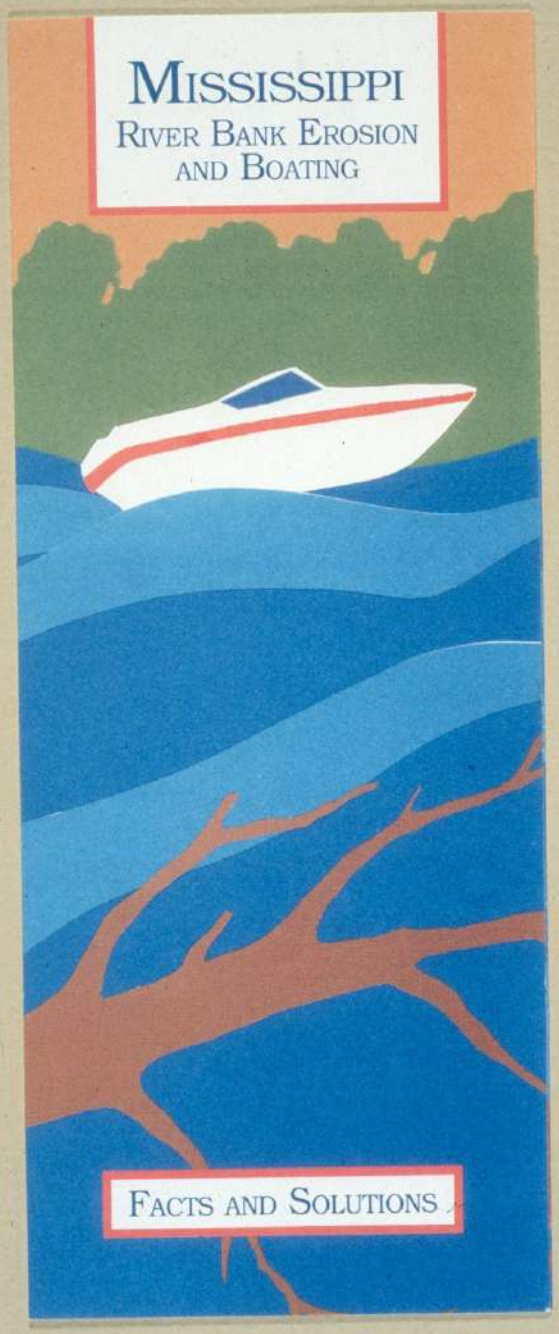
**- Commercial Tow Boats**

**- Normal Flow Velocities**

**- Flood Flow Velocities**



*DNR Management Action*




*1993 DNR Publication*

# Shoreline and Water Quality Impacts from Recreational Boating on the Mississippi River

Minnesota
DEPARTMENT OF NATURAL RESOURCES

*Mississippi River Landscape Team*

*January 2004*

[DRAFT]
12/30/03 – not for distribution

# Upper Mississippi River System Potential Options to Reduce Recreational Boating Impacts.

| **Effectiveness of alternative*: H = High M = Medium L = Low** | **Alternative** | **Comments** |
|---|---|---|
| | | |
| H | **No wake based on boat size** | Could reduce impacts from boats causing the most damaging wakes while not impacting other users; would not be popular with large boat operators; **would require local, state, or federal water surface use regulations** |
| H | **No wake periods based on season and/or water levels** | Would reduce impacts during especially critical times; **would require local, state, or federal water surface use regulations** |
| H | **No wake zones** | Could be used in specific locations or reaches; currently used in some locations**; would require local, state, or federal water surface use regulations** |
| H | **Enforcement add more water patrol officers** | Would help in existing no-wake locations; not a systemic solution unless there are more restrictive local, state, or federal water surface use regulations |
| H | Engineering design more river-friendly boats | Construct boats/hulls that minimize or eliminate wake; could also be an outcome of more stringent surface water use regulations |
| M | Limit boats based on size, horsepower, and or hull design | To be effective only smaller boats could be used unless hulls can be designed to reduce wake; would not be popular with large boat operators |
| M | Limit/schedule days and times of use, access points | Difficult to enforce; **would require local, state, or federal surface water use regulations** |
| M | Marinas cap or reduce the number and/or length of boat slips | Would reduce or limit number of large boats causing most impact; address social conflicts with increasing numbers of boats; not popular with marina owners or boat manufacturers |
| M | Restore natural shorelines add sand, re-vegetate | Could work in specific locations with heavy boat traffic, but not a systemic solution; water level management (drawdowns) or bank restoration projects could help establish vegetation to increase bank stability |
| L | Advertising campaign raise public awareness level | Has been tried unsuccessfully in the past despite broad media releases and brochures distributed at marinas |
| L | Armor (rock) shorelines | Could work at specific sites, however not a systemic solution; very costly; ecologically undesireable |
| L | Boat drivers license | Could help educate but would not by itself reduce impacts |
| L | Boat ramps reduce number of trailer parking spaces or accesses | Would limit the number of boats but would not address impacts erosion caused by larger boats which are typically not trailered to access sites, but are moored at marinas |
| L | Education | Has not worked in the past |
| L | Limit cruising limit number of drive-by passes allowed | Very difficult to enforce; most trips now once down or up, and back |
| L | No wake voluntary | Has not worked in the past |

* Effectiveness represents the MN DNR Mississippi River Team s assessment of how well the alternative reduces recreational boating impacts.