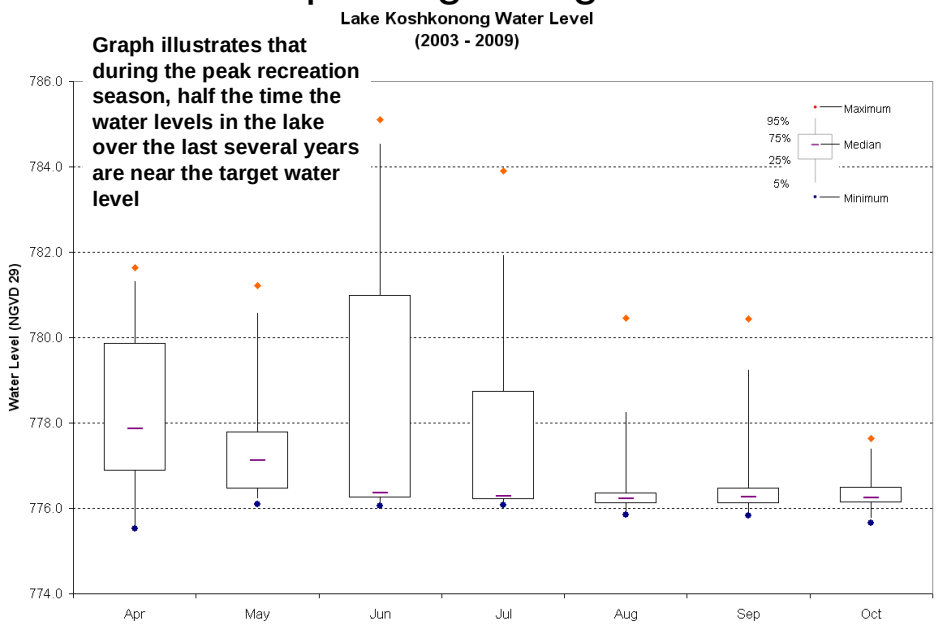
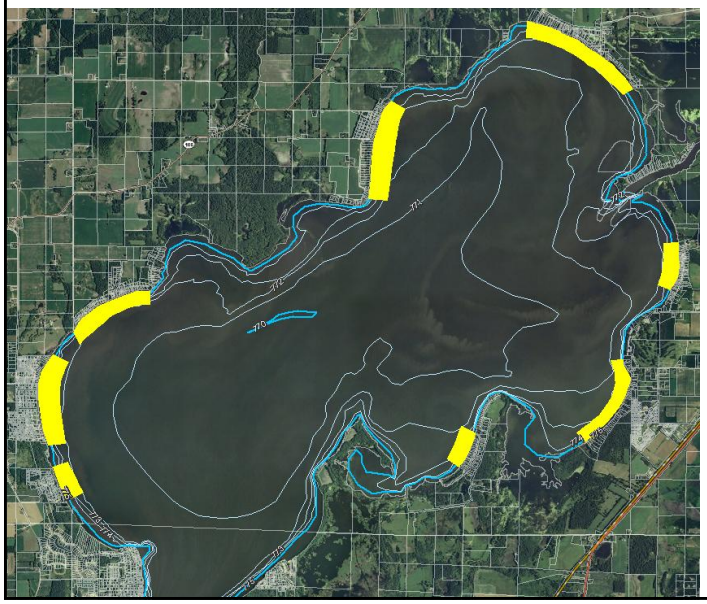
Need for Improving Navigation Access

Graph illustrates that during the peak recreation season, half the time the water levels in the lake over the last several years are near the target water level



Need for Improving Navigation Access



Areas in yellow (or light gray on B&W print) are locations where it is our understanding that long piers (>150') are needed to reliably reach a 3-foot depth at normal pool.

Navigation Improvement Example A Whole Lake Dredging

- Dredge the entire lake 2 feet deeper.
- Approximately 34,000,000 cubic yards of sediment to dredge
- Costs likely range $200M to $300M

Pro's

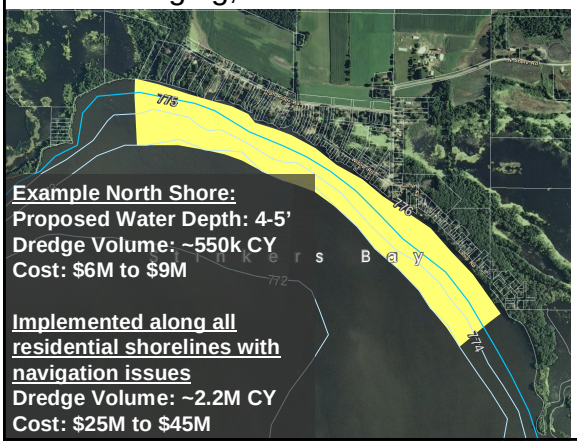
- **Improves navigation access lake-wide**
- **Would provide ample material for creating islands**

Con's

- **Very costly**
- **Not critically needed in all areas**

Navigation Improvement Example B Shoreline Dredging

- Dredge in front of residential areas from the shore to the 3-foot depth at normal pool
- Possible Variation on Example: Reduce depth of dredging, which would reduce costs by 30-50%.



Example North Shore:
Proposed Water Depth: 4-5'
Dredge Volume: ~550k CY
Cost: $6M to $9M

Implemented along all residential shorelines with navigation issues
Dredge Volume: ~2.2M CY
Cost: $25M to $45M

Pro's

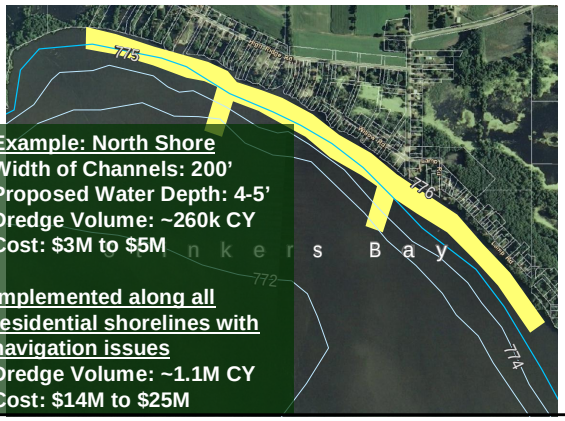
- **Allows direct access from shore for areas dredged**
- **Focuses dredging effort in shallow near-shore areas**

Con's

- **Still costly**
- **How long will it last?**

Navigation Improvement Example C
Shoreline Channels

- Dredge channel parallel to shore in front of residential areas with dredged channels leading to deeper water.
- Possible Variations on Alternative: Reduce depth of dredging or reduce width of channels. Approaches could reduce costs shown by >75%.



Example: North Shore
Width of Channels: 200'
Proposed Water Depth: 4-5'
Dredge Volume: ~260k CY
Cost: $3M to $5M

Implemented along all residential shorelines with navigation issues
Dredge Volume: ~1.1M CY
Cost: $14M to $25M

Pro's

- **Limits dredging effort while still providing improved access in shallow near-shore areas**

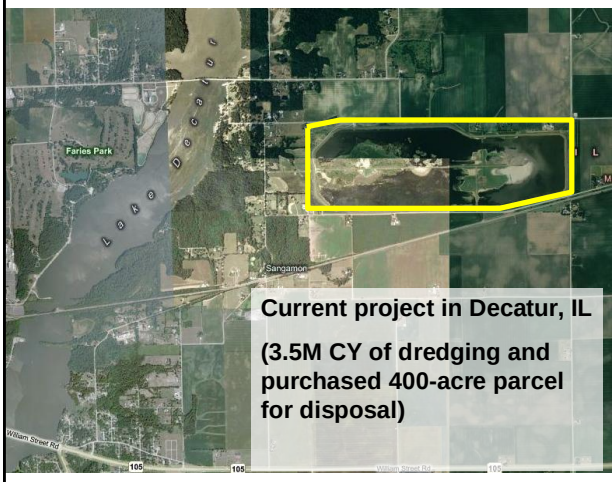
Con's

- **Less costly (although not cheap)**
- **How to locate channels going out to deeper area**
- **How long will it last?**

Dredge Disposal Example A
Islands

- Islands could be created as a means to dispose of dredged material and/or create wildlife habitat
- Islands could be located both "mid-lake" and "near shore"
- Location and orientation flexible depending on desired use

Dredge Disposal Example B
Upland Disposal



Current project in Decatur, IL

(3.5M CY of dredging and purchased 400-acre parcel for disposal)

Pro's

- **Provided site is relatively nearby, can be most cost-effective**

Con's

- **Finding land (lease or purchase)**
- **Need to construct containment berms**
- **May need to pump long distances**

Navigation Improvement Example D
Common Harbor

- Creating a protected and dredged harbor with boat slips

Example:

Number of boat slips: 100
Water Depth: 6'
Dredge Volume: 18k CY
Breakwater Length: 1000'

Cost: ~$2-3M each

(not including land purchase for parking)

Pro's

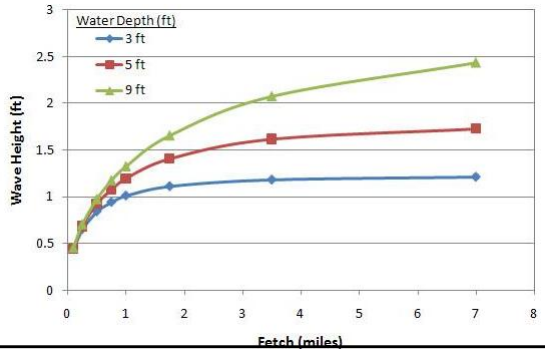
- **Considerable less dredging needed.**

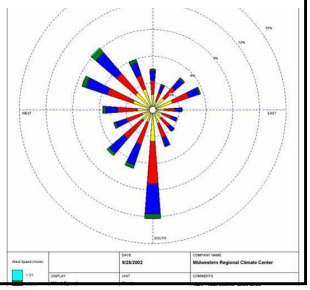
Con's

- **Feasibility for locating parking facilities**
- **Aesthetic impacts to nearby landowners**
- **Proximity of harbor location to properties**
- **Would need several located around the lake**

Near-Shore Wave Reduction

- The predominant wind directions in the summer are from the south and southwest. Winter and fall wind directions are from the northwest.
- Lake Koshkonong oriented with long fetch in dominant wind direction.
- Most shorelines subject to wind and wave action that causes erosion.

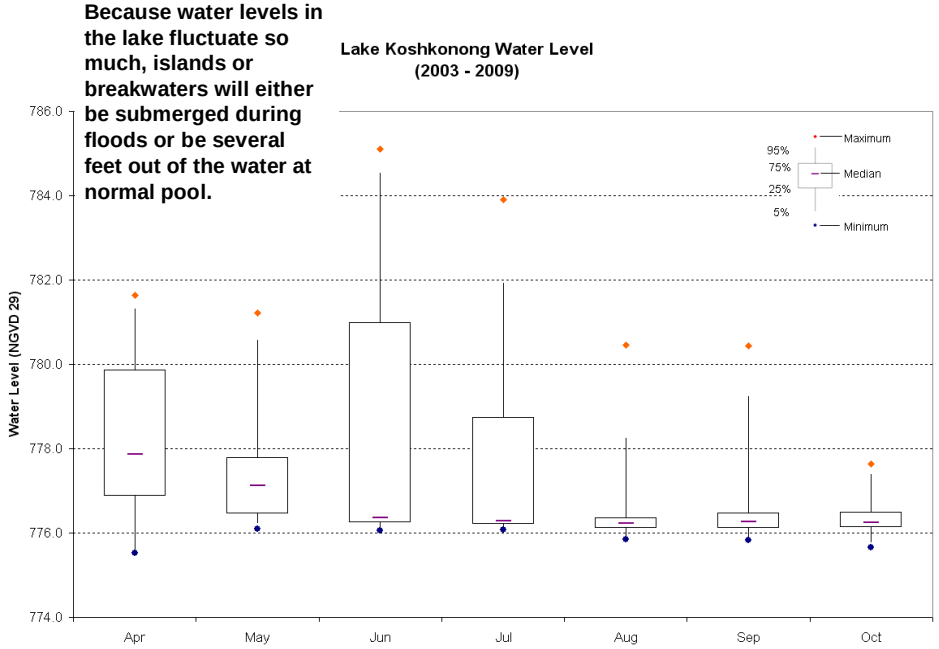




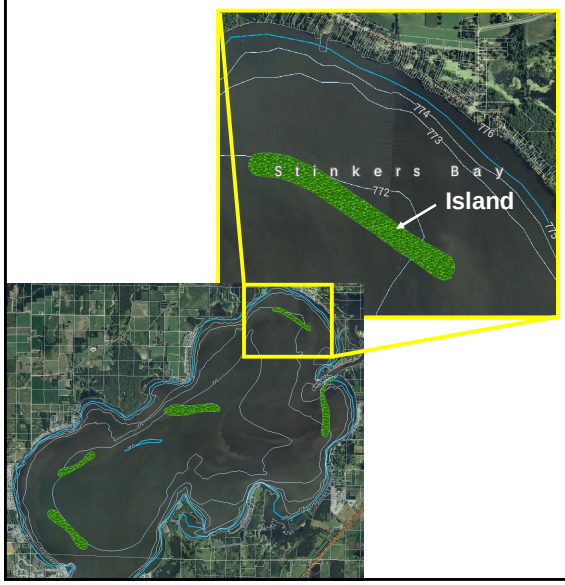
Near-Shore Wave Reduction Trade-Offs

- Existing wave action can move sediment away from shore to other parts of the lake. Reducing waves may cause sediment to build up and remain.
- At flood levels, islands or breakwaters would be below water and could pose a navigation hazard.

Because water levels in the lake fluctuate so much, islands or breakwaters will either be submerged during floods or be several feet out of the water at normal pool.



Near-Shore Wave Reduction Example A Near-Shore Islands



Example: North Shore

Island area: ~30 acres
Island height: ~779 (3' above normal pool)

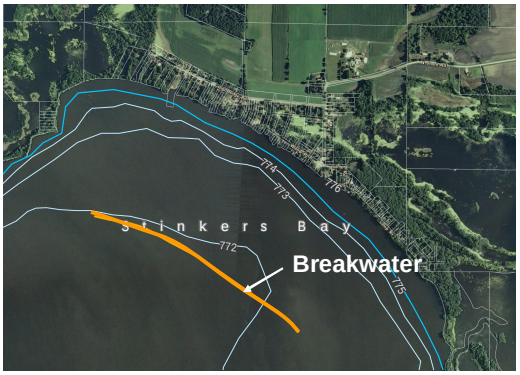
Cost: $6M to $12M (includes 430k CY of dredging costs)

Pro's
- **Also provides disposal location for dredge material**
- **Potential habitat creation**

Con's
- **Very costly if only goal is wave reduction**
- **Long term maintenance**
- **Would need to armor the perimeter with riprap or similar material**

Shoreline Protection Example B
Rip-Rap Breakwaters

- Create riprap breakwaters



Example: North Shore

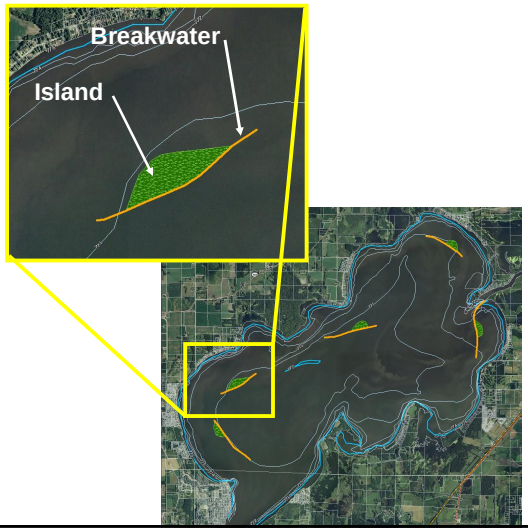
Breakwater length: ~4000'
Breakwater height: ~779 (3' above normal pool)

Cost: $1M to $2M

Pro's
- **Most economical way to provide long-term wave reduction.**
- **Not tied to dredging projects.**

Con's
- **If dredging is completed, provides little disposal opportunity**
- **Little habitat value**

Shoreline Protection Example C
Island - Rip-Rap Breakwater Combination



Example: Olson's Bay

Island area: 15 acres
Breakwater length: 3,700 feet
Height: ~779

Cost: $4M to $7M (includes 225k CY of dredging costs)

Pro's
- **Disposal location for dredge material**
- **Potential habitat creation**

Con's
- **Long term maintenance of island area**

Navigational Hazards

- One-time removal or ongoing marking of navigational hazards.

Example: "Junk Pile" or "Rock Pile"

Marking Cost: Low but would be ongoing

Removal Cost: Depends on amount and type of material

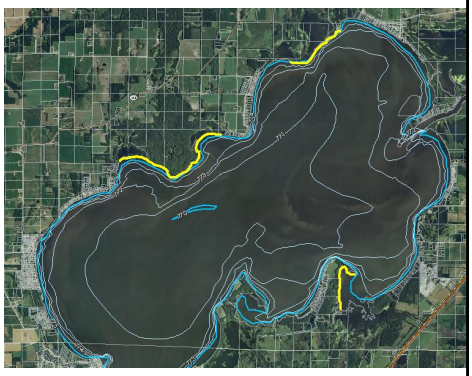
Natural Environment Fisheries Improvement

- Continued commercial rough fish (carp) harvesting.
- Restart Bark River Hatchery
- Repair carp gate at Mud Lake outlet
- Possibly utilize wetland areas such as Mud Lake as additional game and pan fish spawning and rearing
- Explore other markets for carp

Natural Environment

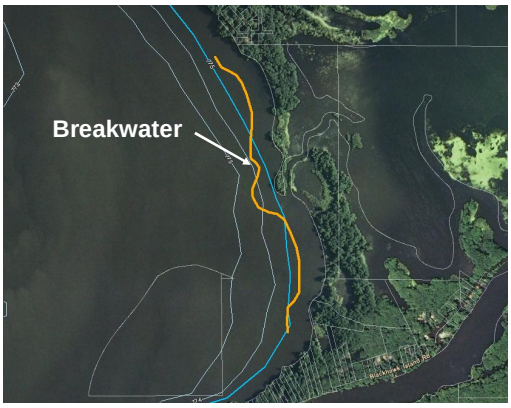
Wetland and Aquatic Vegetation Protection

•Areas in orange (or light gray on B&W print) are locations where there are natural shorelines subject to high wind-wave action.



•Areas in yellow (or light gray on B&W print) are locations where there are existing small breakwaters along the shore.

Wetland Protection Example A
Protection Only



Example: Mud Lake

Breakwater length: 3,700 feet
Height: ~779

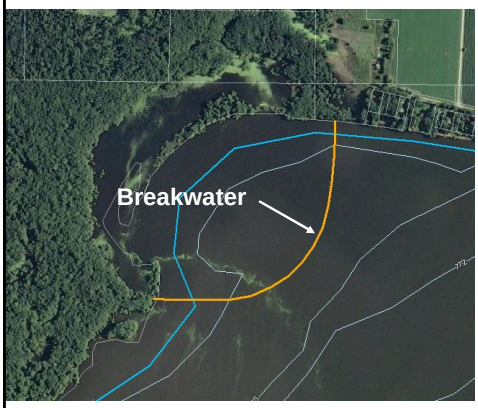
Total Cost: $500k to $1M

Possible variation: lower breakwater elevation, which could reduce costs by 30-50%

Pro's
- **Protects wetland from further erosion and potential to become "part of the lake"**
- **Could place some dredged material behind breakwater.**

Con's
- **Would alter shoreline aesthetic**

Wetland Protection Example B Expansion



Example: White Crow Bay

Breakwater length: 2,700 feet
Height: ~779
(3' above normal pool)

Total Cost: ~$1M

Possible variation: lower breakwater elevation, which could reduce costs by 30-50%

Pro's
- **Expands wetland area in marginal navigational areas**
- **Could place dredged material behind breakwater.**

Con's
- **Would alter shoreline aesthetic**
- **Would prevent shallow draft boats from using area behind breakwater**