OUTLINE AND DISCUSSION POINTS FOR MITIGATION PLANNING, NECC MEETING MAY 4-5, 1999

SCOPE

- What are the estimated traffic increases and resultant ecological modeling results?
- Consider significance in terms of FWS resource categories, context of natural variability and uncertainty.
- Focus on the impact assessment endpoints:
  - Larval fish entrained and equivalent adults lost;
  - Change in area of potential fish spawning habitat;
  - Percent reduction in plant growth and reproduction by pool;
  - Further indirect impacts of plant loss to waterfowl feeding, habitat utilization by fish or inverts.;
  - Sublethal effects on mussel growth and identification of beds at risk;
  - Resources of concern at risk due to bank erosion;
  - Identification of backwaters at risk to increased sedimentation;

OBJECTIVES

- Emphasize avoid and minimize measures; compensation will be habitat-based.
- Conduct planning in a collaborative manner with other state and federal agencies.
- Utilize an adaptive approach to implementing and monitoring measures.
- Link projects or measures to resource impacts spatially and temporally.

TIMING

- Tie to the implementation schedule of measures, generated as part of economic model runs.
- Ecological model outputs typically by month or season.
- Mitigation measures in place at the time traffic increases are realized.

LOCATION

- Economic and ecological model results are by pool.
- Hydraulic modeling approach has helped refine or screen impact areas within a pool.
- Consider results of the cumulative impact assessment, HNA to determine trajectory of a pool and where measures might be most effective.

FUTURE NEEDS FOR THE PROCESS

- Refine or add to list of potential measures, agree on those which are most suitable or effective.
- Refine spatial and temporal implementation of potential measures.
- Cost out measures to assist in optimization of tentatively selected plan.

UMR-IWWS NAVIGATION STUDY - POTENTAL MITIGATION MEASURES (4/30/99 DRAFT)

Measure	Application (Resource or impact to be addressed)	Advantages	Disadvantages	Estimated Costs	References	Notes
1. Navigation traffic scheduling	* Avoidance of known resources of concern * spatial, temporal, or reduction of vessel speed	May preclude need for additional measures	* Industry cooperation questionable * Potential for 'accidental' impacts?	Use existing data/models to estimate delay cost or additional fuel use	Anklam 1971	A related issue is better enforcement of the 9' draft, particularly during low water.
2. Breakwaters/Revetments	* Protection /stabilization of eroding banklines * Dissipation of wave energy * Protection of plant beds or islands		* Interference with recreational craft		Niemi and Strauser (1991); WES, Shore Protection Manual	Provides additional habitat structure, may want to focus on materials other than rock
a. Fixed breakwaters		* More effective against incidental and reflective sub-surface waves	* More expensive * Susceptible to scouring * Decrease water circulation, obstruct littoral drift or fish movement	Variable, depending on materials utilized; suggested methods: * Sheetpiling, $6-9/ft.^{2} * rip-rap, $5.50-12.00/yd.^{3} * Reinforced concrete, $130/ft.		
b. Floating breakwaters		* Less costly	* Increased maintenance * Debris accumulation * Less wave-attenuating ability * Susceptible to ice damage and vandalism	* Floating tires, $75/ft. * Tethered raft-type,		May be problematic in northern pools.
c. Revetments		* Greater range of applications		Approx. $88/linear ft.		
d. Off-bank revetments		* Creation of slackwater area landward of structure	* Not applicable for all banklines	"		
3. Non-traditional Bank Stabilization (Vegetation w/ or w/o erosion control matting)	* Protection/stabilization of eroding banklines	* Aesthetically pleasing * Generally lower cost than structural	* May not provide immediate protection * Not applicable to all banklines; probably best for areas of limited size or of 'low energ	* Willow-post plantings, 20-$60/f * Other vegetative plantings, * Bendway weirs, $5-15/bank ft. * Matting, $6-9/yd.^{3}	WES research (H. Allen, D. Derrick), Il State Water Survey, USDA (1998)	
4. Island Construction	* Reduction of wind fetch * Creation of shallow, low velocity shoreline areas * Fish and plant habitat	* Potentially beneficial for several resource categories	* May have an 'un-natural' appearance	* Pool 11 Islands HREP, $41,689-48,620/ha	Lake Onalaska studies (LTRMP) Peoria Lake EMP (?) Simons and Chen (1977)	Different design considerations for habitat vs. for reduction of wind fetch. Consider innovative construction and 'natural' appearance. Consider location to match island trajectory found in cumulative impacts assessment.
5. Nursery Habitat Creation (Moist soil units)	* Compensation for larval fish losses	* Potential for implementation as part of ongoing habitat restoration projects	* Potential for genetic 'contamination', conflict with waterfowl management (e.g., timing of water level manipulation) *Difficult to quantify amount 'replaced' *Does not benefit all species.	EMP-HREP	Sheehan et.al. 1994 French 1997 Irons et.al. 1997	Consider need for related habitat enhancement, e.g. overwintering
6. Dike Construction or Modification (Addition of notching, 'L' head, alternate spacing or elevation)	* Creation/enhancement of off-channel fish habitat	* Creation of more diverse aquatic habitat * Minimize sediment deposition		Similar to revetments	Stang and Nickum 1985; Pitlo 1998	Would include closing structures. Position in river perhaps more important than actual configuration.
7. Fish Attractors/Spawning Structures	* Increase production/survival; compensate for larval fish losses	* Relatively inexpensive	* Applicable to limited areas * Will not benefit all species	Minimal for vegetative placement; $16.00/yd.^{3} for rock spawning reef		Determining placement and materials/techniques is important.
8. Revegetation	* Compensation for plant impacts	*Direct replacement of lost plants.	*Expensive, results uncertain		Doyle (Lewisville studies)	