

## **Example of Guided View Layout & Script**

**Each learning station, boat stop, or whatever you choose to call it, should have the following elements:**

**THEME**

**LEARNING OBJECTIVES 1,2,3 (No more than 3)**

**FACTS**

**TAKE HOME POINTS**

**ACTIVITY OR DEMONSTRATION**

**WUCD - *What You Can Do***

**RESOURCES**

**ORGANIZATION ROLE**

**INSTRUCTOR FOR THIS STATION IS (1 person!)**

## EXAMPLE OF A LEARNING STATION GV SCRIPT & LAYOUT

### Section 4: Phalen Creek Outfall to Childs Road Industrial Sites

(boat has to stop)

#### **Section Description: Childs Road**

#### **Station topic: Phalen Watershed Connection to the River via Beltline Interceptor**

**Learning objectives** *We will discover these after we do the bullet points. 2-3 main points*

**Instructor** *TBD later*

**Bullet points** *The brain dump of points or topics we could cover. We will constantly edit these in the coming weeks*

- . Phalen Creek outfall is very small; ??combines with Trout Brook flows now??
- Lake Phalen now flows into the Beltline Interceptor
- **. Explain the Beltline Interceptor Watershed**
- What is a watershed? How large this watershed is...the cities it drains...etc
- . Met Council WQ monitoring—what, how and why Eric Korte?
- .Your city, county have lots of outfalls and have to monitor them. In fact we just help a workshop with your staff where defined outfalls.
- . IDDE—illicit discharges may come from missed sanitary sewer disconnects.
- Differentiation between stormwater and sewage.
- 
- **.Explain the Lake Phalen Watershed characteristics**
  - . Drains the Phalen Chain of Lake Watershed—our largest-- \_\_# square miles; Only Lake Phalen has public shoreline. Other lakes have private ownership—unlike Mpls Chain of Lakes—so harder for us to implement stormwater BMPs.
- 
- **.Explain Lake Phalen shoreland and other BMPS thru-out watershed**
- . Phalen Shoreline Restoration benefits, budgets, maintenance.
- 
- .
- .Remind that Interceptor watershed gets no NONE—Nada treatment
- . Need to keep stormwater clean below this to make the most of our investment—use street sweeping, good snow removal BMPs, construction site erosion control, etc.
- .
- .Next stop—Sewage Treatment plant—does NOT treat stormwater.
- .

**Activity or demonstration description** *If there is a demo, or activity -we will indicate it here.*

#### **Supplies**

#### **Participant test question**

**Resources to augment this learning station** *This is the handouts or any supporting materials that we will make a part of the “packet.”*

Overview: Redevelopment is a time of Choices and Consequences along shorelands and uplands, and affecting water quality and flood control.

(4-7 minutes per Section)

As the boat moves upstream during “Wayfinding” and as it turns around to go downstream:

- NSP owns the old and new power plant land as well as the peninsula. Development options vary greatly.
- Notice the Samuel Morgan Bike Trail--west side of the river. A new 3-season trailhead facility opens this month.
- Water-friendly access turns folks to thinking about water quality protection; reinforces our connection to the river.

**Section A: Redevelopment from industrial to mixed use brings opportunity.**

Theme: “Best use” of land changes over time as economics, knowledge and values change.

“BMPs” is the term we will use to refer to current best management practices for stormwater management for water quality improvement and flood control.

- Redevelopment offers an opportunity to challenge our planning and land use patterns and decisions.
  - The historic grain head house and sack house will be converted to a museum and restaurant.
  - Upper Landing and Chestnut Plaza are pleasant areas with unique fountains, native plantings.
- How we choose to redevelop can and will affect both water quality and the quantity of water that we must manage. We just need to be vigilant about opportunities.
- Current Harriet Island and Raspberry Island redevelopment brings back the social and natural resource functions of this urban floodplain area.
  - Nearly 1 million people visit annually. A historic gathering place refurbished in 2001 after decades of neglect and connecting natural areas with Lilydale Park upstream. Harriet Island also now has 2 large rain gardens that infiltrate stormwater into the ground to reduce surface runoff directly in the river. An interpretive sign explaining these features might be a good idea...for public education.
  - Raspberry Island has a new access point for kayaks and canoes at the downstream point to encourage recreational non-motorized boating.
- The Science Museum added watershed exhibit space that overlooks the River, educational signage along the walking paths and a miniature golf game to teach about watersheds. Intentionally placing river stewardship practices in areas where people congregate is smart.
- We as a District, you as local decision-makers and staff have the ongoing challenge of wise redevelopment that allows natural resource functions, social functions and economic value necessary for a vibrant sustainable community.
- What we can do: When considering land and buildings for redevelopment, look not only at the economic factors, but also the social and environmental benefits they can provide such as volume reduction and pollution prevention that will increasing water quality.
- Help is promote these ideas through workshops, media, fairs, schools, etc.

Note the Great River Park established in 1938 with Interpretive Centers in 10 states.

**Minnesota Great River Road Interpretive Centers:**

- [Mary Gibbs Mississippi Headwaters Center](#) - Itasca State Park
- [Forest History Center](#) - Grand Rapids, MN
- [Mill City Museum](#) - Minneapolis, MN
- [Historic Fort Snelling](#) - Minneapolis, MN
- [Minnesota History Center](#) - St. Paul, MN
- [Science Museum of Minnesota](#) - Mississippi River Gallery - St. Paul, MN
- [Mississippi National River & Recreation Area Visitor Center](#) - St. Paul, MN
- [National Eagle Center](#) - Wabasha, MN
- 
- Note the large outfall on the west bank as we approach Wabasha Bridge—this outfall comes from Minneapolis MWMO area; 2 workers drowned in there during a storm surge last spring.
- Note the Wabasha Street Bridge with its novel stairway access to Raspberry Island and Harriet Island.
- Note the Water Street Bridge—It is on the National Historic Register for its unique engineering to accommodate trains on the bridge, cars and boat below the bridge.
- Just beyond is the Robert Street Bridge.

### **Section B: Meeting our economic needs while protecting water takes teamwork.**

Theme: Excess stormwater volume is an issue whether due to impervious surfaces or to floodprone natural areas.

- On one side of the River, Union Depot represents the historic use of this land for rail transportation, above the floodplain. Next to it will be the future light rail transit center. Such land use will require lots of impervious surfaces—which is its current condition.
- On the other side of the River, you see barge loading and maintenance industry, and the Comcast Building—behind all that is the St. Paul Downtown Airport which will come into view further down the River. This is floodplain development. An Airport that never dries out is a challenge.
- We as a District, you as local decision-makers and staff have the ongoing challenge of mitigating the stormwater runoff from our highways, parking lots, bus depots. For example we partnered with City of Woodbury to manage the significant runoff along Valley Creek Road. We constructed a lengthy and complex vegetated swale to infiltrate runoff volumes.
- If you have linear road reconstruction projects, or projects near sensitive natural areas, we could provide valuable guidance and possibly cost-sharing if we are notified well in advance for budgeting and work program planning.
- Note the Lafayette Bridge—slated for reconstruction soon.
- As we go under that bridge point out Dayton’s Bluff, and mention Indian Mounds Park on the top—offering valuable view of the River Valley—and the Bruce Vento Nature Sanctuary below...soon to be connected via a limestone staircase.
- The Samuel Morgan Bike Trail does not currently connect, but plans exist for a bridge over the RR yards to the Sanctuary.
- On the farthest east bluff you can see the Historic Northwest Airline Beacon Tower.

### **Section C: Open space and partnerships restore natural floodplain functions.**

Theme: Partnerships. What are they good for? They increase input of ideas, stimulating innovations. They share costs and responsibilities. They share the benefits and pride in accomplishments.

- Phalen Creek and Trout Brook also join together just west of the Bluff and flow to the River as one outfall. Springs flow out at the foot of Dayton’s Bluff forming wetlands which then drain into the River just downstream from the Phalen Creek -Trout Brook outfall.
  - Trout Brook is a stream in CRWD and Phalen Creek eventually connects to Lake Phalen, in RWMWD, but does not carry the flows from the Lake; instead the flows go to

Beltline Interceptor—we will talk about when we get closer to the east end of the bluffs.

- Upstream areas of Phalen Creek and Trout Brook have been daylighted by citizen efforts. Swede Hollow is a historic neighborhood through which Phalen Creek is daylighted.
  - Partnerships made the Bruce Vento Nature Sanctuary possible.
    - Friends of Swede Hollow
    - Eastside Community members
    - Lowertown Redevelopment Corp.
    - In 2002: NPS and Trust for Public Land helped purchase and convey ownership to City of St. Paul.
    - In 2003 hundreds of volunteers removed 50 tons of trash.
    - In 2004 the site was graded and planted.
    - In 2005 the Sanctuary opened.
    - In 2007 the Bruce Vento Trail celebrated its connection to the Gateway Trail at Lake Phalen.
    - July 2008 the adjacent old brick building was purchased for renovation into an Interpretive Center.
    - Important additional partners include: the DNR, Dayton's Bluff Community Council, Capitol River Council, Community Design Center of Minnesota, Historic St. Paul, Audubon and National Park Trust.
    - This Sanctuary won the 2005 Take Pride in America award for public/private partnerships; Landscape Architecture magazine and a new brownfields reclamation textbook use this as a case study, and it was recently one of 3 St. Paul projects winning the HGTV *Change the World Start at Home* contest.
  - The airport land use on the other side of the river has a different story and set of challenges. By the way, the long round-roofed structure is the historic NW Airline Hangar. This land is owned by Metro Airport Commission, City of St. Paul and the Port Authority. MAC operates the airport. As mentioned earlier, this airport was hit with 3 floods within a decade. To dry out, an earth berm reinforced with corrugated steel was installed. Next they added 22 new "subdrainage culverts" (drain tiles?) to the existing 4 outfalls, in order to speed up the floodwater recedance. These efforts removed a large area of land from the floodplain and so were required to create and equal amount of flood storage by digging and maintaining a giant trench at the bottom of the River.
  - Environmental functions were re-established: Floodplains function for flood attenuation and wildlife habitat.
  - Shared social values came to light with partnerships where partners identified and combined knowledge, expertise and responsibilities for agreed functions, values and connecting points between the upper watershed area to the bottom of the watershed at the Mississippi River.
  - RWMWD has a long history of partnership-based accomplishments.

Ames Lake is a restoration partnership success similar to the Bruce Vento Sanctuary. Originally it was a natural wetland complex. As St. Paul developed, this wetland was filled with soil to make space for a shopping mall. In the 1990s, community redevelopment plans called for this mall to be razed and a wetland be created as a community amenity. In 2000, excavation and grading was completed and the upland, transitional, and aquatic zones were planted and seeded with native plant species.
  - In 2006, we developed the BMP Cost Share program to increase our opportunities to partner with its cities and property owners to reap mutual benefits.
  - Our Continual Challenge is to get the word out about our program and to get information about development, redevelopment and reconstruction projects early enough for us to prepare budgets and time in our work plans to collaborate.
  - What You Can Do: Let us know as early as possible when redevelopment opportunities arise, when reconstruction projects become obvious, and when large

development plans come your way. We have experience in watershed management that could be very helpful and have program policies establish for collaboration and cost sharing.

RWMWD developed the BMP Cost Share program to increase its opportunities to partner with its cities and property owners to reap mutual benefits.

The road bridging over the RR yard is Child Road. This bridge is slated to be replaced and the Samuel Morgan Trail will then connect to the Bluffs.

Note the outfall of the Beltline Interceptor.

**Section D: The Beltline Interceptor Outfall implies a very large watershed above.**

Theme: Description, and function of the Beltline Interceptor; its necessity as development increased stormwater runoff volumes. Define watersheds characteristics.

- The Beltline is very large, as it drains the Phalen Chain of Lakes Watershed (## acres of land) as well as all the streets that drain directly into the Beltline Interceptor (## acres of land). Together these watershed areas comprise ##% of the total area of RWMWD.

Beltline Interceptor drains three watersheds:

The Beltline Interceptor Watershed:

It has its own network of pipes into which street drain directly into the Interceptor.

- Lake Phalen now flows into the huge Beltline Interceptor. The St. Paul Beltline Storm Sewer (Beltline) is approximately 5 miles long (not including all the secondary storm drain pipes) extending from the outlets of Lake Phalen and Beaver Lake to the Mississippi River.
- The Beltline Interceptor discharges directly into the Mississippi River under low flow conditions. At high flows, a portion of the total flow goes through the pressure relief system and into Pigs Eye Lake before entering the river further south.

Constructed in 1920 with section heights of 7, 8, 9, and 12 feet, the pipe is buried up to 30 feet underground. In 1996, ownership, maintenance and operation responsibility for the Beltline Interceptor was officially transferred from the City of St. Paul and the Metropolitan Council to the RWMWD. Due to aging and increased volumes, a pressure relief outlet structure and energy dissipator was necessary in 2001, costing \$1.2 million. The purpose was to reduce hydraulic pressure on the existing pipeline.

Land Use in the Beltline Subwatershed is fully developed predominantly medium density residential land use.

- 87% of the flow through the Beltline Interceptor is from the Phalen Chain of Lakes watershed; the rest comes from the Beltline subwatershed. However the Beltline subwatershed contributes 73% of the overall phosphorus load because it is fully developed and has more impervious surface area than any other watershed in RWMWD.

Beaver Lake subwatershed contributes less than 1% of the total flow to the Beltline Interceptor.

- Stormwater comes from rain and snowmelt. It naturally soaks into the ground and porous surfaces such as porous pavement and green roofs. Once in the ground, it continues to go down farther into aquifers, or it may flow laterally downhill just below the surface of the ground.

- When stormwater cannot infiltrate, it will run off the surface of the land, form rivulets, that widen into creeks and rivers. As stormwater runs off the land, it washes off the land and carries away dirt, trash and pollutants.
  - A watershed is the land area in which all stormwater flows to one common low point, such as a lake or a particular spot on the Mississippi River. That "spot" is sometimes called the mouth of the creek, the outfall to the river, or the confluence of the creek and the River. And of course we all know where that common low spot is in the Mississippi River watershed!
  - Water volume becomes an issue when the amount of impervious surface in the watershed increases by more than just 10%. Higher volumes of water wash more dirt, trash and pollutants into receiving waters such as lakes and the Mississippi.
  - Water quality monitoring at the outfall reflects the condition of the watersheds above. Water quality is automatically monitored at the outfalls of the Beltline Interceptor, Battle Creek and Fish Creek. Our monitoring has shown that a system of stormwater pipes and treatment ponds is not enough to keep our water resources clean. We need to partner with landowners across the watersheds to create ways to reduce stormwater volume and pollution reduction at the source areas such as yards, parking lots, roofs and streets.
- Phalen Chain of Lakes Watershed:
- Lake Phalen drains the Phalen Chain of Lake Watershed—our largest subwatershed-- 25 square miles.

Has numerous water bodies with revegetated shorelines:

- Ames Lake in St. Paul
- Phalen Lake shoreline
- Casey Lake shoreline in N. St. Paul
- PCU pond in N. St. Paul
- PCU Learning Center water body with restored wetland vegetation in N. St. Paul
- Kohlman Creek resto in Maplewood

Stormwater volume reduction BMPs:

- Schmelz Volkswagen dealership lot in Maplewood
- H.B. Fuller parking lot BMP in Vadnaia Heights
- Maplewood rain gardens along street reconstruction
- Little Canada rain gardens along street reconstruction
- Market place Pond restoration in Little Canada
- Watershed District Office site in Little Canada

End of pipe WQ monitoring reflects:

- effects of upstream watershed conditions
- effectiveness and density of BMPs
- What do we sample, how and why....

The more BMPs across these watershed on anyone's property, the more that WQ can potentially be improved. Our CIPs used to be mainly regional facilities to manage inter-jurisdictional stormwater flows and protect water quality of our lakes and streams and the function and value of our wetlands.

We designed our new BMP Cost Share Program to increase our opportunity to cost share BMPs on all willing landowners who meet our costs share criteria. We cost share up to 50% of the labor and materials.

Note: Great Western Docking Terminal  
Morton Salt piles not covered and dripping into the river.  
Americal Iron & Steel Company  
Then the Metro Wastewater Treatment Facility.

## **Section E: Battle Creek Watershed issues are typical of all our Blufflands Watersheds**

Theme: Stormwater management issues and practices of sloping watersheds draining uplands to the river. While floodplain management has its challenges, management of steeply sloped bluffland watersheds has its own challenges.

- Battle Creek Restoration Project is typical of problems in developing or developed steeply sloped watersheds. As you look around, you see bluffs surrounding the Mississippi. We manage the Blufflands on the east side of the boat all the way to I-494 where Fish Creek reaches the River.
  - Battle Creek Restoration Story: For more details visit our Story Board.  
In 1982 the District repaired (at a cost of \$7 million from special assessments) the effects of urbanization, and the District continues to conduct maintenance on the creek on a 5-year cycle.
    - reducing the sediment loading through erosion mitigation measures, and
    - reducing the velocity of the creek flows.
    - Increasing flood controls

The project enjoyed great success, which led to the redevelopment of the parkland and trails along the creek. The area has since become a popular recreational area.

Very few wetlands or stormwater ponds exist in the watershed....

The District monitors the water quality of Battle Creek as part of the Metropolitan Council Outlet Monitoring Program. The monitoring station is located near Highway 61. The program samples water chemistry, a number of dissolved and suspended solids, and performs a macroinvertebrate count on the creek.

- Initial work was a huge project requiring the creation of the Watershed District.
- Maintenance continues because we had to alter the creek significantly to handle flood volumes due to full development of the watershed.
- Generic blufflands watershed issues:  
The Blufflands subwatershed consists separate ravines that outlet into the Pigs Eye Lake area (Mississippi River Bottomlands subwatershed). The undeveloped land along the rolling hills will likely be developed for residential land use, with the steep bluffs with numerous rock outcroppings along Highway 61 left in their natural state.

Due to the steep topography in this area, erosion can be a problem. The RWMWD will strive to prevent excessive erosion and sediment loading downstream. For example:

Lower Afton Road Drainageway CIB Project (11/95- 6/96) Cost \$220,000

- The project involved replacing an old outlet structure at an upstream pond and stabilizing erosion along the drainage channel next to Upper Afton Road.

Another way to minimize erosion is to provide upstream storage, therefore limiting the peak flows in the ravines. The RWMWD will seek opportunities to provide upstream storage as development and/or redevelopment occurs in this subwatershed. Please contact us if you have scheduled a future CIP or major development plan. We would like to collaborate if it will help us meet some of our management needs.

- Flood flows, water quantity, and need for upstream storage in ponds or infiltration BMPs.
- Erosion from ditching, vegetation destruction and flood flows—and the need for state of the art erosion control and upstream water storage to reduce flow volumes.
- Partnership with upstream landowners to install BMPs using our Cost Share Program.
- Lessons Learned: We need to reduce stormwater volumes—which requires infiltration practices across the watershed—on public land, quasi-public land, and private land.
- Our Continual Challenge: Erosion of slopes and sediment transport is exacerbated by high volumes of flow—beyond the capacity of the creeks.
- What you can do: .....??

## **Section F: Mississippi Bottom Lands Watershed is where watersheds eventually flow.**

### **Land Use**

Some low-density residential exists in the northwest corner of the drainage area. River industry includes Metropolitan Wastewater Treatment Plant, a wood recycling facility, the old Pig's Eye Landfill, and the railroad.

### **Historic WQ**

- The Minnesota Department of Health (MDH) has set a fish consumption advisory for Eagle Lake. The mean Secchi disc transparency for Pigs Eye Lake is 1.3 feet.
- Sedimentation has historically been a problem for the waterbodies in the Mississippi River Bottomlands subwatershed. Sedimentation occurs when the streams in the steep ravines east of the subwatershed enter the floodplain and lose their sediment-carrying capacity as the flow velocity decreases.
- Wastewater Treatment Plant no longer discharges to Pigs Eye Lake, and no longer disposes of ash north of the Lake .

**It is also the low elevation collecting point for the SANITARY sewer system.**

Theme: Difference between stormwater and sanitary sewerage management.

- The Metro Wastewater Treatment Facility treats only SANITARY SEWERAGE.
- Stormwater does not flow through this facility—it flows directly into storm drains that lead into wetlands, lakes, creeks and rivers. Constructed ponds help settle out sediments that contain phosphorous and other pollutants. Wetlands used to often get plumbed to receive stormwater from streets. However, now we are trying to use rain gardens for such purposes.
- In the 1980's the stormwater flows were separated out from the sanitary sewer system because storm surges created unsanitary overflows.
- The separation effort was not total, so we still have illicit discharges of sanitary sewerage into storm sewers. Other illicit discharges may exist from uniformed or even intentional plumbing connections or dumping of oil, gasoline and other hazardous wastes down storm drains. We therefore conduct an annual illicit discharge detection and elimination survey every fall during dry weather.

### **Metro Wastewater Treatment Plant**

- Built in 1938, combining storm and sanitary flows
- 1980's separated stormwater system to stop the incidence of sewerage pollution during big storm events.
- Stormwater volumes are too enormous to treat at this plant. Treatment needs to be a more natural process everywhere across the watersheds.
- Therefore stormwater does NOT get treated at this plant; it gets treated in ponds and special infiltration systems such as sand filters and biofiltratoin systems, open space vegetated areas, and in ultra urban areas sumps and collector vaults are used. There is also high value in the use of good housekeeping practices like street sweeping and wise use of road salt.
- In 2002, Natural Resources staff provided technical assistance on a prairie restoration project associated with the Metro Wastewater Treatment Plant.
  - Staff provided a restoration design and assisted with supervising the site preparation and plant installation. The project's main goal was to demonstrate to Metro Plant staff what could be done with open space areas around the plant, and to provide an interesting natural area for workers to walk around and use for lunch breaks.
  - The RWMWD staff periodically monitors the site and makes management recommendations. The District and the Metro Plant viewed the project as a success, and the RWMWD would likely assist in future best management projects on the facility grounds.

### **Pigs Eye Lake**

Largest heron rookery in upper Miss River.<sup>1</sup>

Largest pollution site in the upper Miss. River. Capped landfill is leaching into Pigs Eye Lake.<sup>2</sup>  
Scientific Natural Area is monitoring eagles for contaminants.<sup>3</sup>

Pigs Eye Lake covers 628 acres. Receives surface runoff from Battle Creek and Blufflands watersheds.

Although its name implies that Pigs Eye Lake is a lake, it is **not** a DNR classified lake, therefore is not considered a District-managed lake. Pigs Eye Lake is a DNR protected large **riverine wetland** and a significant regional waterbody covering an area of 628 acres with a maximum depth of 4 feet, and is considered backwaters of the Mississippi River and part of the Upper Mississippi River Pool 2.

### **Eagle Lake**

Eagle Lake is a DNR-protected water, with a surface area of 64 acres and a maximum depth of 5 feet. The lake is also known as North Star Lake. It receives flows from some Blufflands drainages and Fish Creek. The lake is a valuable wildlife habitat resource and a DNR Scientific and Natural Area, but has limited recreational use, as there is no public boat access and the lake is surrounded by industry. Carry-on access to the lake is legal and bank fishing is possible off of the west side roadway.

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<sup>1</sup> MNRRA

<sup>2</sup> Ibid.

<sup>3</sup> Ibid.

**Section G: Port Crosby Area is on one side with Blufflands and Fish Creek on the other side.**

Theme: View to the RR Tressel you can almost see the southern end of the RWMWD watershed—our watershed, our legacy.

- Spoils from the airport drainage system flood mitigation dredging requirements are piled onto the Port Crosby Area.
- Blufflands can be seen across to the east, and Fish Creek is in the distance downstream where I-494 crosses the River. From here to the I-494 bridge the bottomlands are now maintained as a State Scientific Natural Area, where waterfowl, eagles, egrets, cormorants, and herons flourish.
- Battle Creek, Blufflands and Fish Creek watersheds are all steeply sloped watersheds. Volume and erosion are constant challenges, and steep slopes offer little opportunity for water quality treatment.

**Fish Creek Repairs**

In 1988 a \$1.6 million project began to stabilize the creek bed and bank erosion caused by increasing storm water flows due to upstream urbanization (very similar to, but on a smaller scale, the Battle Creek issues). Original project plans were to only stabilize the erosion areas; however, major damage occurred as a result of the July 1987 storm event. Therefore, an underground pipe was installed to force damaging flood flows to remain in the pipe until they discharge on bedrock 400 feet upstream of Highway 61. A surface channel was reconstructed for low flows. We also constructed 3 upstream control structures to delay storm flows.

In 2005, an extreme storm event caused considerable damage to Fish Creek. Each of the 3 embankments within the lower ravine (downstream of I-494) overtopped. In addition, all 7 boulder waterfalls in the lower ravine were damaged, and the creek bed was eroded.

- Fortunately the bottomlands are slow-moving backwaters that can settle out the sediments in the stormwater runoff. Overtime, the sediments fill up these backwaters so that they can no longer function as "settling ponds." These bottomlands are also heavily contaminated from seepage from bottomlands landfills.
- We rely on volume reduction, erosion control and pollution prevention at the source. That is where your role begins. Learn about and fund volume reduction practices such as tree preservation, vegetation restoration, bioinfiltration, rain gardens and green roofs to protect water quality.
- Water quality improvement is not an impossible task. We can do it together. 100 years ago the Metro Mississippi River section was a dead zone; now a fishery exists again. But Minnesota is about more than "a fishery." It is about high quality fisheries, high quality outdoor recreation and high quality outdoor aesthetics. As we work to meet our water quality challenges we will be working together to design and implement cost effective practices from the simplest to the complex.

Boat turns around and heads back upstream.

Groups switch places.