Monitoring of Exotic Aquatic Plants at the Consumers Energy Webber Hydro

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Part I
The Project
and
The Plan

Presented by: Jim Bernier

Webber Dam

- One of 13 conventional river hydros operated by Consumers
- Located on the Grand River between Lansing and Grand Rapids

Webber Dam

- Began operation in 1907
- 2.2 MegaWatt Capacity

Webber Dam circa 1930

Webber Dam

Webber Dam

Portland Dam

City of Portland, Licensee

Portland Dam

Webber Dam

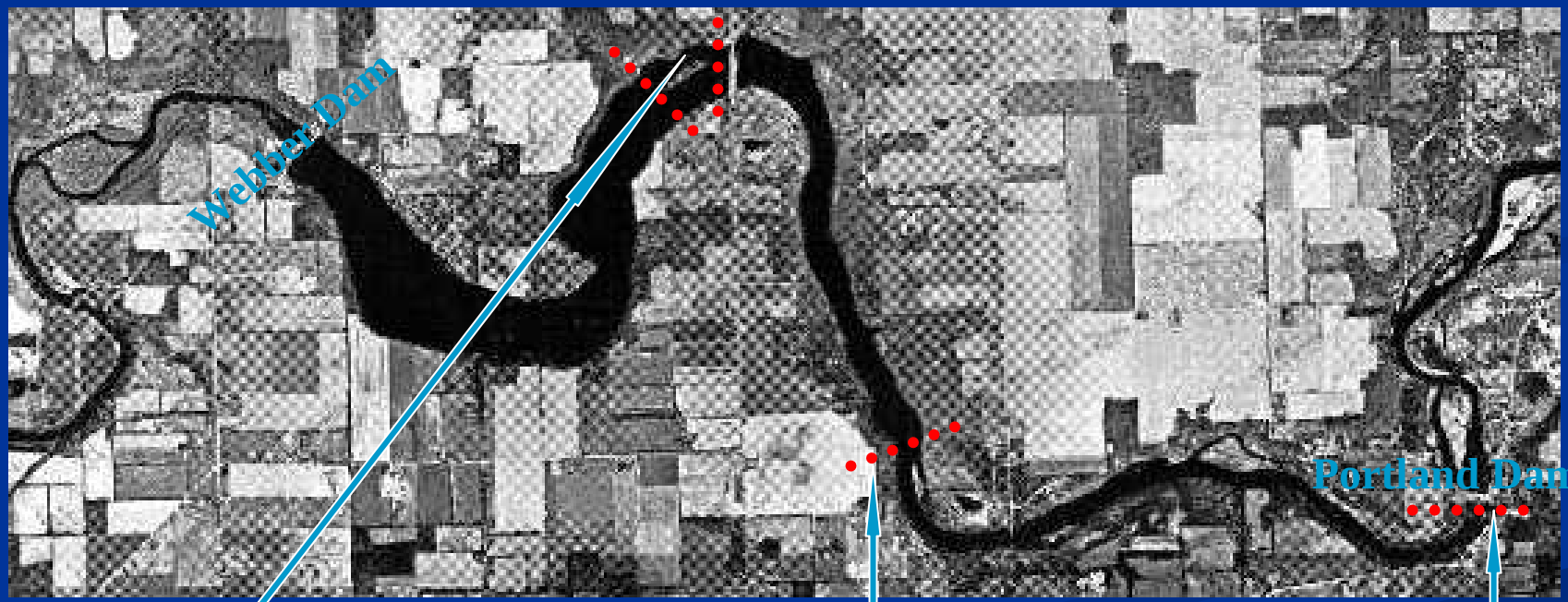
- FERC Project #2566
- Current FERC License issued June 20, 2001
  - 40-Year Term
- Run of River Project

Relicensing Study Survey

- Surveys of the Webber reservoir for exotic aquatic plants were conducted in 1997 as part of the relicensing study process
- Purple loosestrife and Eurasian water milfoil were present on the project

Relicensing Survey Results

- 42 Eurasian milfoil mats were recorded
  - Ranged from about 120 sq. ft. to 50,000 sq. ft.
- 13 Purple loosestrife locations



A second smaller area of concentration occurred about mid-way in the reservoir

Most occurrences for both species were in the upper 1/3 of the reservoir

License Article 413

- Required a plan for monitoring Eurasian water milfoil and purple loosestrife, to include:
  - Monitoring methods
  - Monitoring schedule
  - A schedule for providing results to MDNR and USFWS
  - Agency consultation

Monitoring Plan Development

- Consumers consulted the state Aquatic Nuisance Species Plan
  - Issued in 1996
  - Updated 2002
- Eurasian water milfoil and purple loosestrife are among eight selected Species of Concern addressed in the plan, which notes that:
  - Once established in open aquatic systems, these species of concern have proven impossible to eradicate

State Plan Guidance

- Eurasian water milfoil
  - Reached the Midwest between the 1950s and 1980s
  - Grows in shallow habitat
  - 1200+ chemical treatment permits requested in 2002
    - Currently chemicals are the only effective treatment
  - Weevils that eat milfoil are being tested, but long term effectiveness is not known

State Plan Guidance

- Purple loosestrife
  - Introduced in the U.S. in the early 1800s
  - Adversely affects wetlands
  - Difficult to discourage, let alone control
  - The Galerucella beetle is showing success in some areas


Purple loosestrife: 5 feet

The Public Education Problem
e.g. The Smart Pages

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- Letter to the local editor
  - Pronounced myself personally piqued and perturbed that the PR people at SBC chose this purple pariah of a plant with its pervasive problems as their picture portraying the pleasant pastoral pulchritude provided by our northern Michigan natural resources

Monitoring Plan - Proposal

- Consumers submitted its Article 413 Monitoring Plan July 3, 2002
  - proposed two years of initial monitoring, then change to every five years if no significant change in extent and location of species was evident
  - the proposal reflected our belief that both species had been present in the Grand River basin for many years and are likely established in the parts of the reservoir that have suitable habitat
- Michigan DNR requested annual monitoring for the full 40-year license term
  - Expressed concerns about the rapid spread capability of both species

Monitoring Plan - Order

- FERC ordered annual monitoring, stating
  - Populations of both species were present on the Project and in need of monitoring
  - They are aggressively reproducing plants that can spread rapidly

Monitoring Plan - Rehearing

- Consumers sought rehearing, arguing
  - Absent some change in circumstances there was not likely to be rapid spread of these species at Webber because the suitable habitat was already colonized
  - If a control strategy was initiated for the Grand River basin, additional monitoring may be warranted and Article 413 reserves FERC authority to order it
  - Absent a basin wide control effort, annual monitoring for 40 years is not likely to tell us much more than periodic monitoring over the same time span

Monitoring Plan Rehearing Order

- Recognized potentially validity in Consumers' contention that the potential for significant additional spread of both species may be relatively low
- However, the order concluded that two years of annual monitoring was not sufficient to allow a good determination and that monitoring cost was low
  - Ordered five years of annual monitoring
  - If there is no significant change in extent and location of the milfoil and loosestrife, monitoring will be changed to every five years

Part II
Monitoring Methods and Results

Presented by: Gary Dawson

Monitoring Methods and Results

- Global Positioning System (GPS) unit used in 1997 relicensing survey to map loosestrife and milfoil point locations
- Milfoil mats were not mapped, but their lengths and widths were measured and their areas approximated
- 1997 baseline data transferred to Consumers Energy Geographic Information System (GIS)

Monitoring Methods and Results

- Purple loosestrife locations mapped as points
- Loosestrife confined to very limited moist soil, full sun areas. These include:
  - small alluvial deposits where drainage ways enter the reservoir
  - outside river bends in the upper reaches
  - the tips of islands
- Most of reservoir bank is steep and tree-covered, with shade to the water's edge and does not provide good loosestrife habitat
- Most loosestrife occurs as individual plants—only one "stand" of loosestrife at the end of an island

Purple loosestrife plant on Webber Project

Sole “stand” of purple loosestrife on Webber Project

Monitoring Methods and Results

- Eurasian milfoil is found at reservoir depths <4 feet in upper 1/3 of reservoir and on mid-reservoir shallows near David Hwy.
- Soundings in 1997 showed all milfoil at <4 feet in depth. Turbidity in this agricultural watershed appears to limit the depth at which milfoil can grow
- Grapnel drag did not encounter milfoil at depths > 4 feet
- Virtually all habitat suitable for milfoil is colonized by single plants to aggregations of plants to dense mats of milfoil on flats < 4 feet in depth

Eurasian milfoil mat on Webber Project

Eurasian milfoil co-dominant with water lily

Monitoring Methods

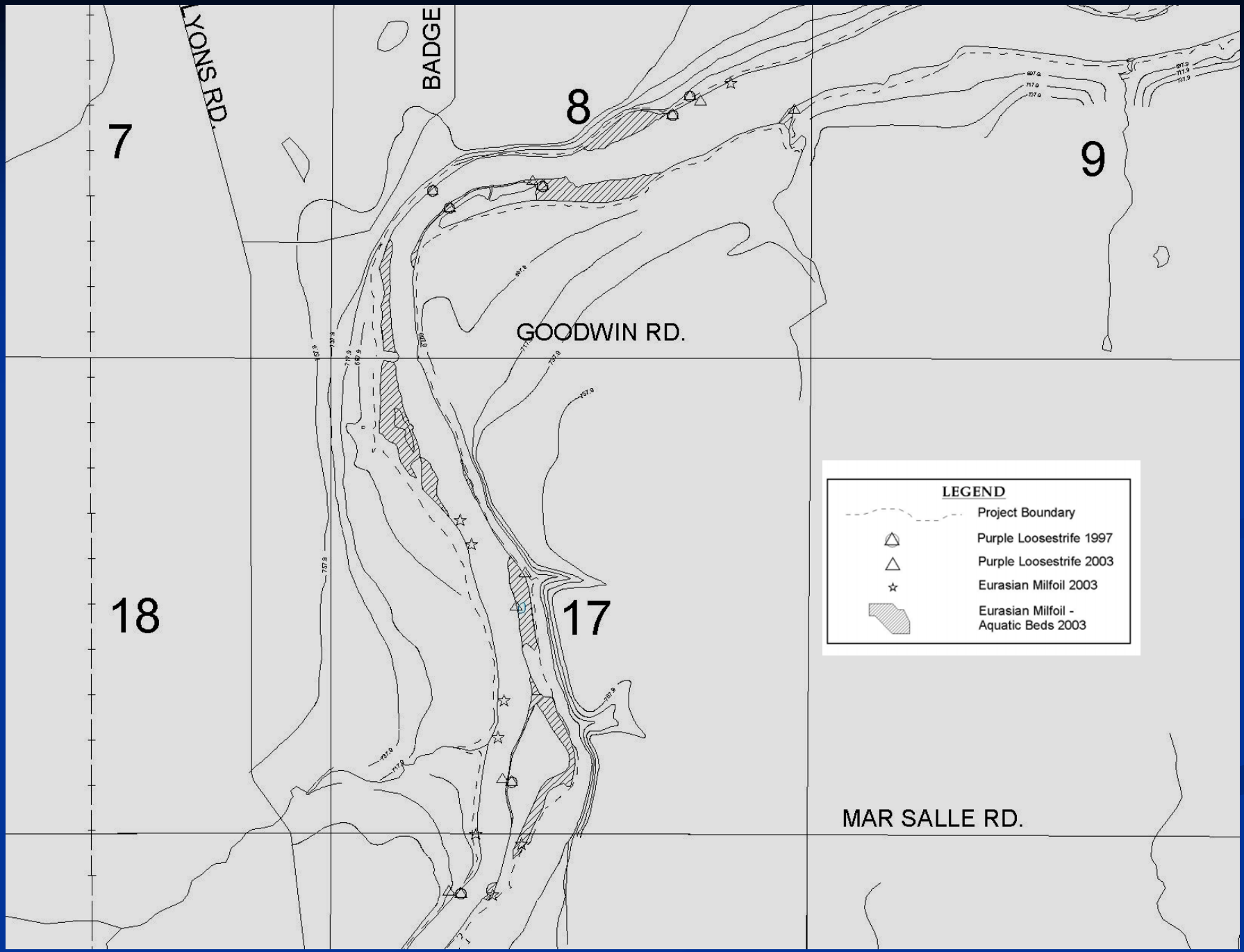
- Today we use the more accurate and precise Trimble GEOXT GPS to map point locations and the polygons formed by stands of loosestrife or milfoil mats
- GPS Unit with screen and Project map to facilitate mapping of points and polygons
- Use shallow draft Grumman Sportscanoe with outboard or electric trolling motor in shallows and rocks to outline polygon
- Use manual mapping function to close polygons in shallows and along shoreline where boat can’t go

Monitoring Methods

- Map entire milfoil beds, including where milfoil subdominant or co-dominant with water lilies (*Nymphaea odorata*)
- With Trimble GEOXT GPS can view polygon relative to Project map and view relative to polygons in previous years to see change in the field
- Calculate differences in areal extent of mats from year to year on GIS with ArcView 3.3

Monitoring Results

- In 2003 and 2004 we completed the first and second year of the five year monitoring program
- The distribution and abundance of purple loosestrife were very similar to the 1997 baseline
- Individual plants had disappeared from some locations and appeared in others, but the number of plants remained about the same, and they were found in the same general area
- The only “stand” of loosestrife on the island contained did not change in location or abundance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BADGE
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8
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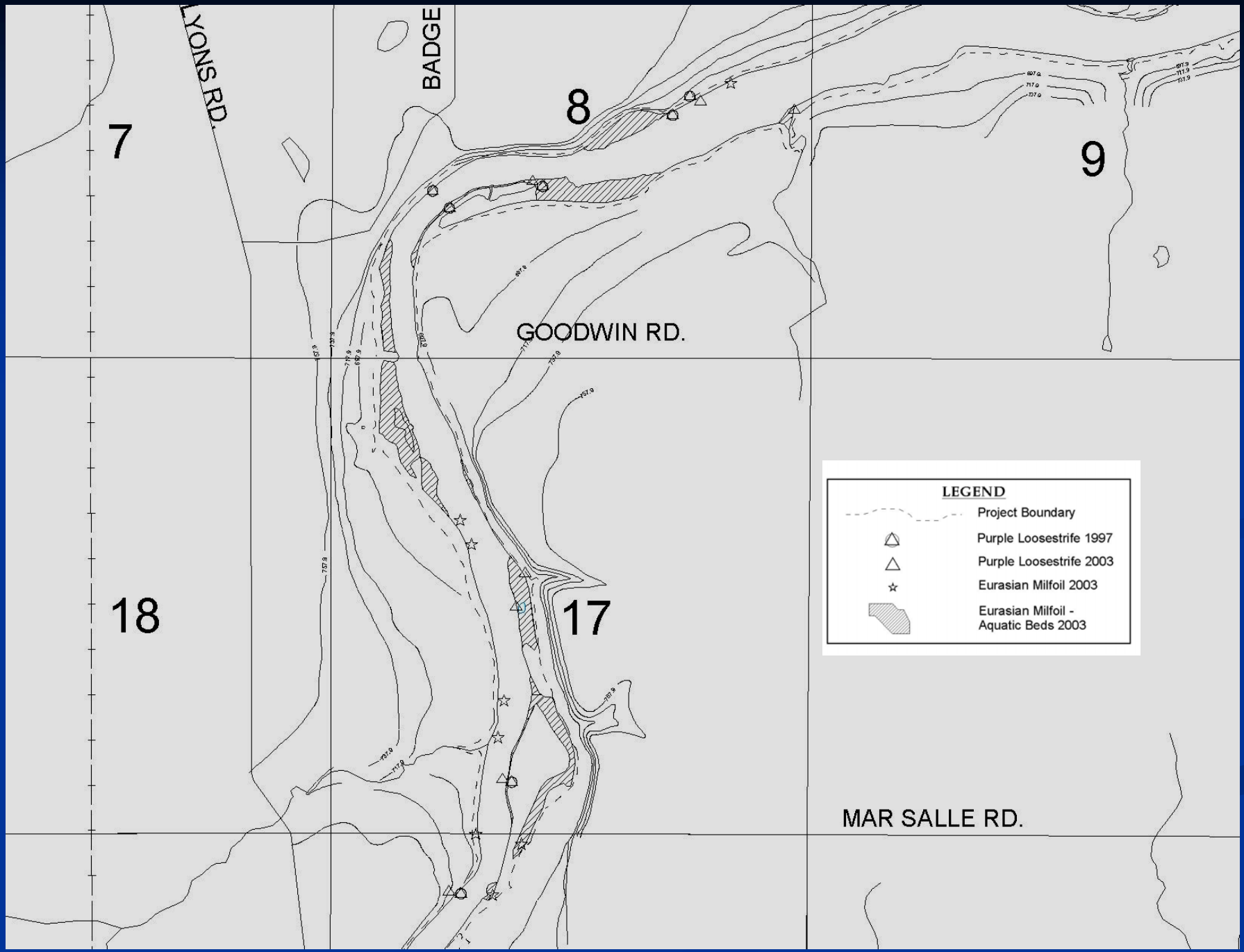
GOODWIN RD.
18
17
MAR SALLE RD.
LEGEND
Project Boundary
Purple Loosestrife 1997
Purple Loosestrife 2003
Eurasian Milfoil 2003
Eurasian Milfoil - Aquatic Beds 2003

Monitoring Results

- In 2003, we established a new baseline for Eurasian milfoil that included accurately measured polygons for the milfoil mats and mats of milfoil co-dominant with water lily.
- Milfoil mats in 2003 were extensive, dense, and well-established at those sites identified in the 1997 report and covered 53.8 acres
- As with loosestrife, individual plants or aggregations of plants had disappeared from some areas due to ice scour and sediment relocation, but other suitable habitat had formed in the vicinity and was colonized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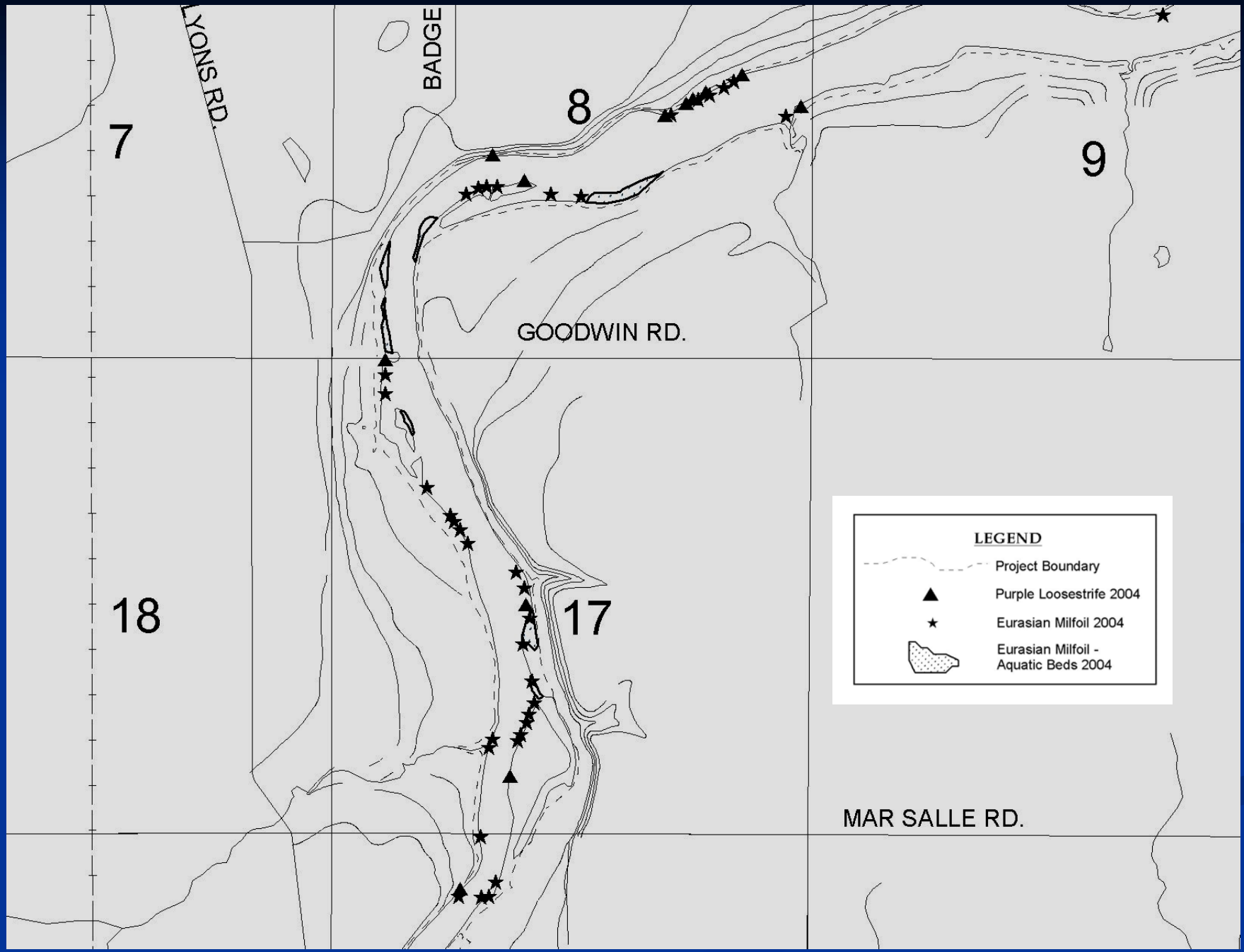
Monitoring Results

- In 2004, the extent of milfoil mats was greatly reduced from 2003, from 53.8 acres to 25.6 acres, or 52%
- In some areas where extensive milfoil mats had occurred in 2003, only scattered individual plants remained in 2004, or none at all
- Individual plants and scatterings of plants had disappeared from the upper reservoir
- Plants appeared to be in poor condition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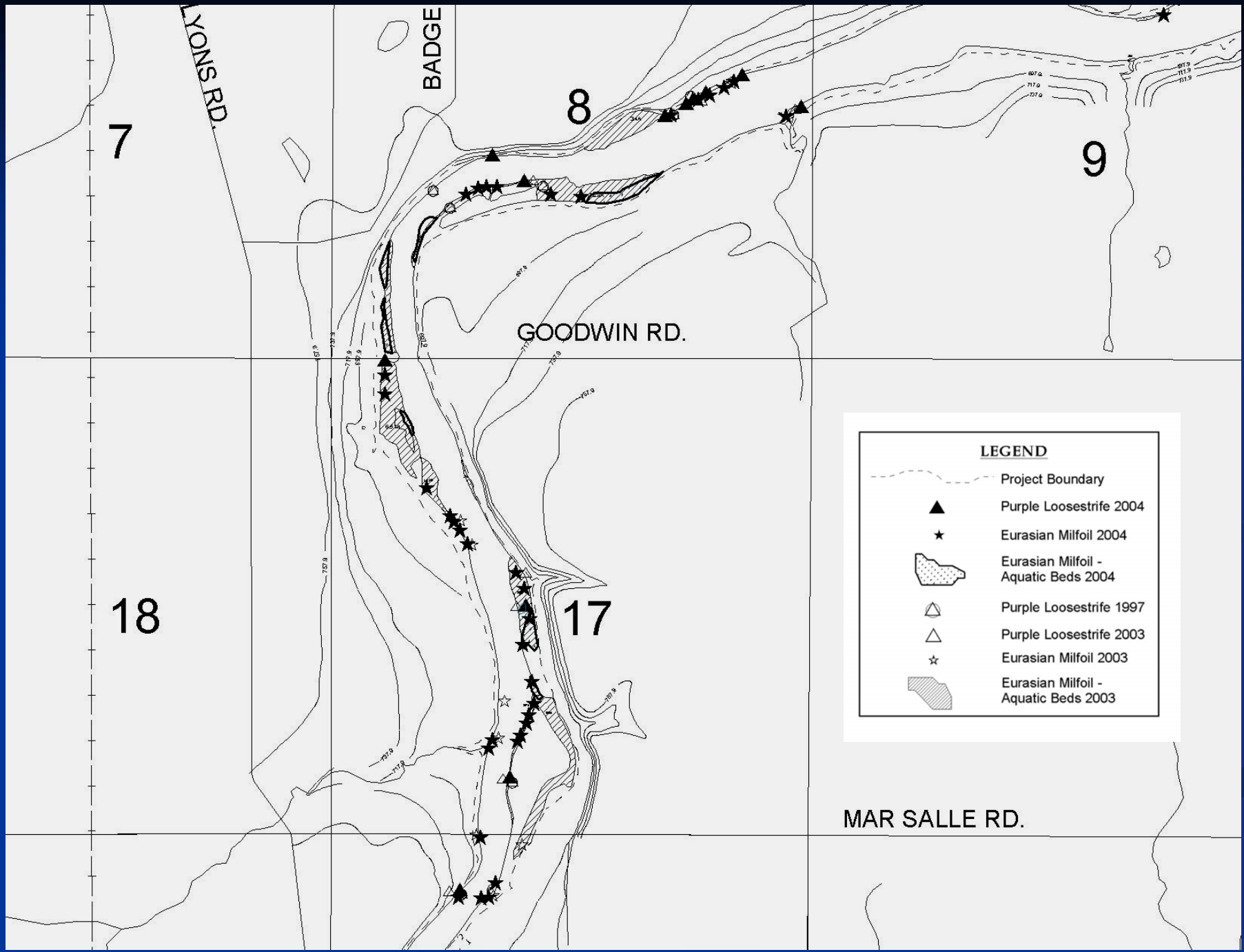
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Monitoring Results

- We are not sure why the milfoil on Webber Project declined in 2004, but believe it is probably weather-related, with potential factors including
  - Abnormally low temperatures
  - Substantial cloud cover
  - Heavy precipitation and associated water turbidity in this agricultural watershed
- There may be other operative factors as well, but we do not believe that milfoil is suddenly on the decline on the Webber Project or the Grand River watershed

Lessons Drawn from Results

- The Trimble GeoXT GPS coupled with our GIS system is an excellent tool for mapping and monitoring the distribution of these invasive aquatic plants
- The distributions of both purple loosestrife and Eurasian milfoil on the Webber Project are consistent with their baselines and appear to be habitat limited
  - Expansion of these well-established species are likely to occur only with an increase in habitat, e.g. additional sedimentation in the headwaters over time

Lessons Drawn from Results

- Abundance/biomass within the habitat may vary substantially from year to year, dependent on external factors such as weather
- Given the variation in abundance/biomass and cover, the year established as “baseline” can make a difference!
- Overall distribution within the Project is a better measure, but even that can be affected in years with more or less favorable than average growing conditions

Monitoring Costs

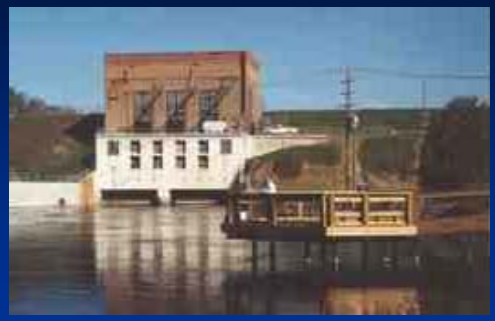
- Consumers performs monitoring with in-house personnel. Annual cost of $3,000 to $4,000, includes:
  - Fieldwork
  - Map preparation
  - Report preparation
  - Resource Agency consultation
  - FERC filing
- Sought environmental consultant bids for similar scope
  - All were in the range of $5,000 to $6,000

Conclusion

- Monitoring already well-established invasive species is of limited utility. It does provide a basis for estimating the magnitude of control measures that might be required over time, but little else

Conclusion

- Monitoring already well-established invasive species is of limited utility. It does provide a basis for estimating the magnitude of control measures that might be required over time, but little else
- To be useful, this information must be integrated into a watershed-wide or larger control program or used in some way to prevent the spread of the organism



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Hydro Generation