Feasibility study

Creating a wetland community in the Lower Tidal Schuylkill River

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Overview

Only small remnants of once continuous freshwater tidal wetlands remain

- Increase habitat for juvenile American shad and other fish species.
- Increase habitat for resident and migratory birds
- Increase habitat for the threatened red-bellied turtle
- Improve local water quality
Vision
The chosen area

**Pros:**
- Ownership
- Protection afforded
- Accessibility
- Average depth
- Suitable substrate
- Limited disturbance

**Cons:**
- Industrial Urban area
- Limited human presence
- Average depth
- Amount of flotsam
- Nature of flotsam
Site suitability

- The city owns one half of the basin. Sun refining owns the other half.
- The area can be easily accessed on foot.
- There is a small measure of bulkhead protection and the routine docking of PWD barges.
- There is little human recreation in this area to disrupt the foliage.
- An existing mudflat.
- Tidal flow is generally gentle and the daily maximum water depth is between 5 – 6 feet.
The downside

- An Industrial urban area, refinery and pump station discharge
- Appreciable amount of large timber and man made flotsam
- There is so little human traffic that waterfowl are largely undisturbed
- Average tidal depth is at the upper limits acceptable for foliage chosen.
Foliage used

- *Nuphar lutea/advena*  
  Spatterdock

- *Pontederia cordata*  
  Pickerel weed

- *Sagittaria latifolia*  
  Duck potato

- *Peltandra virginica*  
  Arrow arum
• These species were chosen for their ability to tolerate tidal conditions and their natural range.

• Several sources were used to determine the maximum depth of water each could handle.

• We used the maximum depths listed in the literature (Creating Freshwater Wetlands 2nd ed. D. A. Hammer).

• Our daily tidal maximum depth is 5 – 6 feet.
Grid placement and planting assignment
Protective measures employed

- Grazing by waterfowl was a major concern
- Canada Geese (*Branta canadensis*) are the main grazing fowl
- Persistent and aggressive
- Difficult to deter using limited passive measures
Fenced grids and twine top cover

- The area was broken into 25 grids of 15 X 15 Feet
- The fence employed was 30 inch construction fence
- Top cover was later employed on 6 grids.
Results
Foliage performance

Percent grid coverage

Time

- Sagittaria latifolia
- Pontederia cordata
- Peltandra virginica
- Nuphar lutea/advena
Nuphar lutea/advena
Spatterdock

- Foliage was not as heavily grazed as the other species
- Plants got “leggy”
- Maximum depth was likely exceeded
- Plants simply had to work too hard to get established
Grid 16
6-5-08

Nuphar lutea/advena
Grid 16
*Nuphar lutea/advena*
Top cover added on 8/6/08
**Pontederia cordata**
Pickerel weed

- Our most successful specie
- Grids that received top cover began to recover quickly
- Suffered heavy grazing in every instance
- Likely to be the specie that emerges in the coming spring.
Grid 2
6-5-08

Pontederia cordata
Grid 2
*Pontederia cordata*
Top cover added on 7-18-08
Sagittaria latifolia
Duck Potato

- The least successful plant we introduced
- They were grazed immediately upon planting
- There also seemed to be an overall failure to thrive.
Grid 14
6-5-08

*Sagittaria latifolia*
Grid 14
Sagittaria latifolia

Percentage Vegetative Coverage

Date

0% 20% 40% 60% 80% 100% 120% 140% 160% 180% 200%

Peltandra virginica
Arrow Arum

- Had a similar failure rate to Sagittaria
- Grazing was a major factor
- A very small amount remained likely due to a late installed top cover.
Grid 7
Peltandra virginica
Top cover added on 08-06-08
Flotsam damage
Types of Flotsam

• The chosen area is subject to timber and man made Flotsam of varying sizes

• These materials damage fence grids and top covers by:
  - Pushing down
  - Pulling up
  - Tearing away
Results of protection damage
Effects on foliage
Geese are deterred by human presence
Cannot use several accepted methods for varying reasons

- Hunting not allowed in city limits especially near a refinery
- Chase dogs, cost and potentially difficult terrain
- Cannons or screamers, cost and potential Homeland Security issues.
- Artificial owls, snakes or other predators are not really that effective long term
Lessons learned

- Grazing is a significant factor in foliage failure
- Grids that had top covers even when installed late in the project fared much better than those that were not covered
- Flotsam must be deflected or otherwise kept out of the grids.
- Top covers should be installed much sooner and must be maintained to preserve their integrity.
Questions that remain

• How much established foliage is needed to exceed the grazing effects
• Will more foliage simply mean more consumers
• What are the most cost effective and successful passive measures that can protect the foliage.