Restoration of aquatic grass communities of Chesapeake Bay: How should we proceed?

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Outline

• Aquatic grass communities widespread in Chesapeake Bay, but they are variable and greatly reduced from historical distribution

• Transplanting can work, but has limited long term success

• Natural recovery has occurred where good water quality exists

• Main bottleneck for aquatic grass restoration is water quality
Aquatic grass communities are widely distributed in Chesapeake Bay

York River

Zostera marina 'eelgrass'

St Mary's River

Ruppia maritima 'widgeongrass'

Sources: VIMS & Maryland DNR
Aquatic grass communities are important in Chesapeake Bay

- Food for waterfowl
- Increase water clarity
- Habitat for blue crabs
Annual aquatic grass monitoring using aerial photography

- **Annual** monitoring project (1978, 1984-present)
- 173 flight lines (2,340 mi)
- 2,033 B/W aerial photographs
- Scale 1:24,000
Photographs are converted to maps by VIMS and ground truthed

- Diamonds show ground truth sites, where species are recorded
- Density is also estimated from photographs
Aquatic grass abundance is inversely related to freshwater flows.

Mean inflow to Chesapeake Bay:
- 1984-2003: 16,000 - 36,000 ha
- 1999-2002: dry
- 2003: wet
- 1984-1992: normal or dry
- 1993-1998: mainly wet

Aquatic grass area (ha):
- 20,000-40,000 ha

Conservative historical distribution:
- 75,000 ha
Aquatic grass communities are determined by salinity regime.

Chesapeake Bay Communities

Names color coded to map

- Freshwater
- Potamogeton
- Ruppia
- Zostera

A variety of techniques are used for restoration of aquatic grass

- Adult shoot transplants
- Seed dispersal

- All are labor intensive; tedious; have potential donor bed impacts; and only plant small areas
Long term survival of eelgrass planted in the York River at VIMS

1984

1985

1987

1988

1990-2004
However, less than 10% of transplant sites (adult or seed) have long term survival.
How is nature doing relative to our efforts?

• Humans

• Nature
Nature is doing pretty well in some areas (natural recovery).

Middle Potomac River

MD Coastal Bays
Natural recovery of freshwater community in the middle Potomac; 1982-2003

- Initial recruitment of exotic *Hydrilla*
- Native species slowly increased from propagules upriver – *Hydrilla* remains
- During this period, nitrogen in the middle Potomac declined (next slide)

Aquatic grass area (ha)

Source: VIMS
Middle Potomac had improving water quality (nitrogen) during this natural recovery.

49% reduction in TN discharge from Blue Plains WWTP; 1985-2003.

Sources: MD DNR, MWCOG
Natural recovery of *Zostera* community in MD Coastal Bays; 1986-2003

- Aquatic grass died in 1930s; wasting disease
- 600 acres per year returned without planting (1986-2003)

Source: State of Maryland Coastal Bays 2004
MD Coastal Bays had good water quality where this natural recovery occurred.

- Areas of regrowth in Chincoteague had good water quality 2001-2003.
- Among MD Coastal Bays, grass cover highly related to water quality (see below).

### Water Quality Index
- **EXCELLENT**: 0.8 - 1.0
- **GOOD**: 0.6 - 0.8
- **POOR**: 0.4 - 0.6
- **DEGRADED**: 0.2 - 0.4
- **VERY DEGRADED**: 0.0 - 0.2

### Aquatic Grass Area (% of Bay)
- **Sinepuxent**: 36
- **Chincoteague**: 32
- **Assawoman**: 8
- **Isle of Wight**: 5
- **Newport**: 4
- **St Martin**: <1

*Source: State of Maryland Coastal Bays 2004*
Conclusions

• Aquatic grass communities widespread in Chesapeake Bay; variable and greatly reduced from historical distribution

• Seed and shoot transplanting can work, but <10% long term success

• Natural recovery has occurred where there is good water quality

• Where good water quality occurs, targeted local restoration efforts are valuable
Recommendations

• Need better understanding of the four aquatic grass communities, their variability and recovery

• Due to limited long term survival, restoration projects must include long term monitoring, and improved site and technique targeting

• Continue annual aquatic grass mapping to quantify natural recovery events

• Returning aquatic grasses to Chesapeake Bay will require improved water quality
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