Coastal Fisheries Program
January 5, 2011
Macroalgae in Coastal Bays

- Macroalgae naturally occurs
- Increases in macroalgae biomass related to eutrophication

Can macroalgae be used as an indicator of the health of MD’s coastal bays?
Complication

• Many other factors influence macroalgae abundance and composition, including:
  • Light
  • Temperature
  • Grazers
  • Currents
  • Freshwater input
  • Phytoplankton dynamics
  • Nutrient uptake rates
MDNR’s Coastal Fisheries Program

- **Trawl**
  - 20 sites / month
  - April – October
  - 16’ trawl

- **Seine**
  - 19 sites / month
  - June, September
  - 100’ seine
Regions

- Assawoman
- Isle of Wight
- St. Martin
- Sinepuxent
- Newport
- Chincoteague
Macroalgae Estimation

- Began monitoring in 2006
- Measure total volume
- Estimate percentage of type
- Calculate specific volume
Macroalgae Abundance

1. Abundance by region
   • Where was macroalgae most abundant?
   • Which types of macroalgae were most abundant?

2. Abundance over time
   • Did abundance change over time?
   • Did abundance of each type change over time?

Red    Green    Brown    Yellow-Green
Most Abundant Macroalgae

TRAWL
- *Agardhiella* (50%)
  - Agardh’s Red Weed
- *Gracilaria* (28%)
  - Graceful Red Weed
- *Ulva* (11%)
  - Sea Lettuce
- *Chaetomorpha* (5%)
  - Green Hair Algae

SEINE
- *Agardhiella* (43%)
  - Agardh’s Red Weed
- *Gracilaria* (23%)
  - Graceful Red Weed
- *Cladophora* (13%)
  - Green Tufted Seaweed
- *Chaetomorpha* (8%)
  - Green Hair Algae
1. Abundance by Region: TRAWL

![Abundance by Region: TRAWL graph]

- **Volume (l)**: 0, 1000, 2000, 3000, 4000, 5000, 6000
- **Newport (2)**
- **Chincoteague (8)**
- **Sinepuxent (3)**
- **St. Martin (2)**
- **Assawoman (3)**
- **Isle of Wight (2)**
1. Abundance by Region: SEINE

- **Newport (2)**
- **Chincoteague (6)**
- **Sinepuxent (3)**
- **Isle of Wight (3)**
- **St. Martin (1)**
- **Assawoman (3)**
Red and Green Macroalgae

Northern Bays: Commercial & recreational development, marinas, harbors
2. Abundance Over Time

- Does mean macroalgae volume change by **year** and **month**?
- ANOVA, Tukey pairwise comparisons
- Log transform if necessary (seine)
Mean volume is greater in years 2008-2010

Log mean volume is the same between years
Mean volume is the same between months.

Log mean volume is the same between months.
Macroalgae in Maryland's Coastal Bays

• Red volume remains the same.

• Green volume is significantly greater in Apr-Jun than the rest of the year.

Trawl Data by Month and Type

- Mean Volume (l)

Month:
- A
- M
- J
- J
- A
- S
- O

Mean Volume (l):
- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35

Month:
- A
- M
- J
- J
- A
- S
- O

Mean Volume (l):
- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35

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Maryland Department of Natural Resources
Summary

- **Abundance by Region**
  - Macroalgae is most abundant in the northern bays.
  - Red macroalgae (*Agardhiella* and *Gracilaria*) accounts for most total volume.

- **Abundance over Time**
  - Mean volume increased in 2008.
  - Mean green macroalgae volume is significantly higher in Apr-Jun.
Macroalgae as an Indicator

• Determine if there is a relationship between abundance and...
  • Nutrient levels
  • Water quality
  • Chl a
  • Light attenuation

• Physical processes (currents, tides, storms, freshwater input)
Considerations

- Greater abundances of macroalgae may be beneficial (habitat for fish and crabs)...good or bad?
- Because of uncertainties, may not be realistic to use macroalgae to ‘grade the bays.’
- However, continued monitoring will allow us to identify what changes are regular and seasonal vs ‘unusual.’ (Lavery et al. 1991)
Macroalgae Composition by Year: TRAWL

- 3-4 genera represented 95% of total volume per year
- Mostly *Agardhiella* and *Gracilaria*
Macroalgae Composition by Year: SEINE

- 3-5 genera represented 95% of total volume per year
- Mostly *Agardhiella* and *Gracilaria*