Juvenile Sportfish Populations in Florida Bay: Influence of Salinity

Christopher Kelble
Joan Browder
GEER 7/14/10
Outline

• Methodology

• Seatrout relationship to salinity

• Potential hypotheses for salinity relationship

• Other species relationship to salinity

• Suggested Performance Measures
Methodology

- June – Nov.
- Monthly
- CERP influence
- significant juv. sportfish pops.
- otter trawls
- optimized with power analysis
If salinity performance measure is met, we may see increase in juvenile spotted seatrout.
Seatrout Results (Rankin)

All years near the salinity performance measure had “high-population” of juvenile spotted seatrout.
The years with the lowest salinities were all “high-population” years, except the Pre-MAP period.
Seatrout Results (Crocodile Dragover)

“High-population” years had the lowest salinities, except 2004.
Salinity regression

West
- Frequency
- Abundance
- Concentration

$y = -0.350x + 20.9$
$R^2 = 0.958$

Rankin
- Frequency
- Concentration

$y = -0.190x + 11.7$
$R^2 = 0.544$

Whipray
- Frequency

$y = -0.0122x + 0.6161$
$R^2 = 0.72126$

$y = -0.056x + 2.93$
$R^2 = 0.579$

Crocodile Dragover
- Frequency

$y = -0.127x + 7.08$
$R^2 = 0.667$

$y = -0.003x + 0.140$
$R^2 = 0.344$

$y = -0.012x + 0.562$
$R^2 = 0.803$
Multiple Regression
Generalized Linear Model
Potential Explanatory Hypotheses

1. Physiological limits survival
   - Larval density greater at higher salinities (Powell 2003)

2. Recruitment cue

3. Competition for Prey – Gut Contents Analysis

4. Predators – ENP Fishery Surveys
q, an index of body condition, is independent of salinity suggesting physiology is not significantly degraded at high salinities.
Model results suggest that decreasing salinity by 5% throughout the year will increase *A. mitchilli* (an important forage fish) by ~2-fold
• “High-Population” years are more common when salinities are lower and near performance measure targets

• Multiple lines of evidence suggest juvenile spotted seatrout populations have an inverse linear relationship with salinity

• If CERP meets salinity performance measures, the population of juvenile spotted seatrout should increase
Sportfish Diversity

Salinity

Taxa Observed

All Values

0 1 2 3 4 5 6
Sportfish Salinities

- Sheepshead
- Spadefish
- Seatrout
- Hogfish
- Grey Snapper
- Lane Snapper
- Gag
- Yellowtail
- Barracuda
Great Barracuda
Current Performance Measure

- “Maximum increase to seatrout density in Zone 3.”
- “Moderate increases to pre-adult seatrout densities in Zones 4 and 16.”
### Potential Performance Measures

1. Increase number of “High-Population” years
   - West = >50% of years (>3 1000 m⁻², >25% frequency)
   - Rankin = >60% of years (>0.5 1000 m⁻², >15% frequency)
   - Whipray = >70% of years (>0.5 1000 m⁻², >15% frequency)
   - Crocodile = >70% of years (>0.1 1000 m⁻², >5% frequency)

2. The juvenile spotted seatrout population should resemble “high-population” years on average

3. Population should resemble population currently observed within salinity targets
Acknowledgements

• Statistical & Methodology Assistance
  – Allyn Powell, Joe Serafy, Kyle Sherzer, Clay Porch

• Field Assistance
  – Joseph Contillo, Mike Lacroix, Patrick Cope

• Lab Assistance
  – Betty Huss, Laura Petteway, Lloyd Moore