Stock Assessment of North Carolina Blue Crab

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

Marine Fisheries Commission | Yan Li | May 17, 2018

Life History

- Average lifespan 3 years
- Maximum size 8.5 inches carapace width
- Maximum age ranges from 5 to 8 years
- Mature between 1 to 2 years age
- Mate spring or summer in brackish estuarine waters as female molts into maturity
- Spawning occurs within 2 months after mating
- Aging of crustaceans difficult due to lack of permanent hard structures

NCDMF Assessment History

2004 assessment

- Surplus Production Model: overfished and overfishing
- Catch Survey Analysis: not overfished but, overfishing
- Not used for management due to limited data

2011 assessment

- Traffic Light Approach: not overfished, unknown overfishing status
- Expand data use
- Has been used for management, basis for Amendment 2

2018 Stock Assessment Two-Stage Model

- Unit stock: North Carolina
- Gender: two sexes
- Two stages: recruits, fully recruited
- Calendar year: 1995 through 2016
- Natural mortality: sex and stage specific
- Sex ratio: 1:1 for recruits

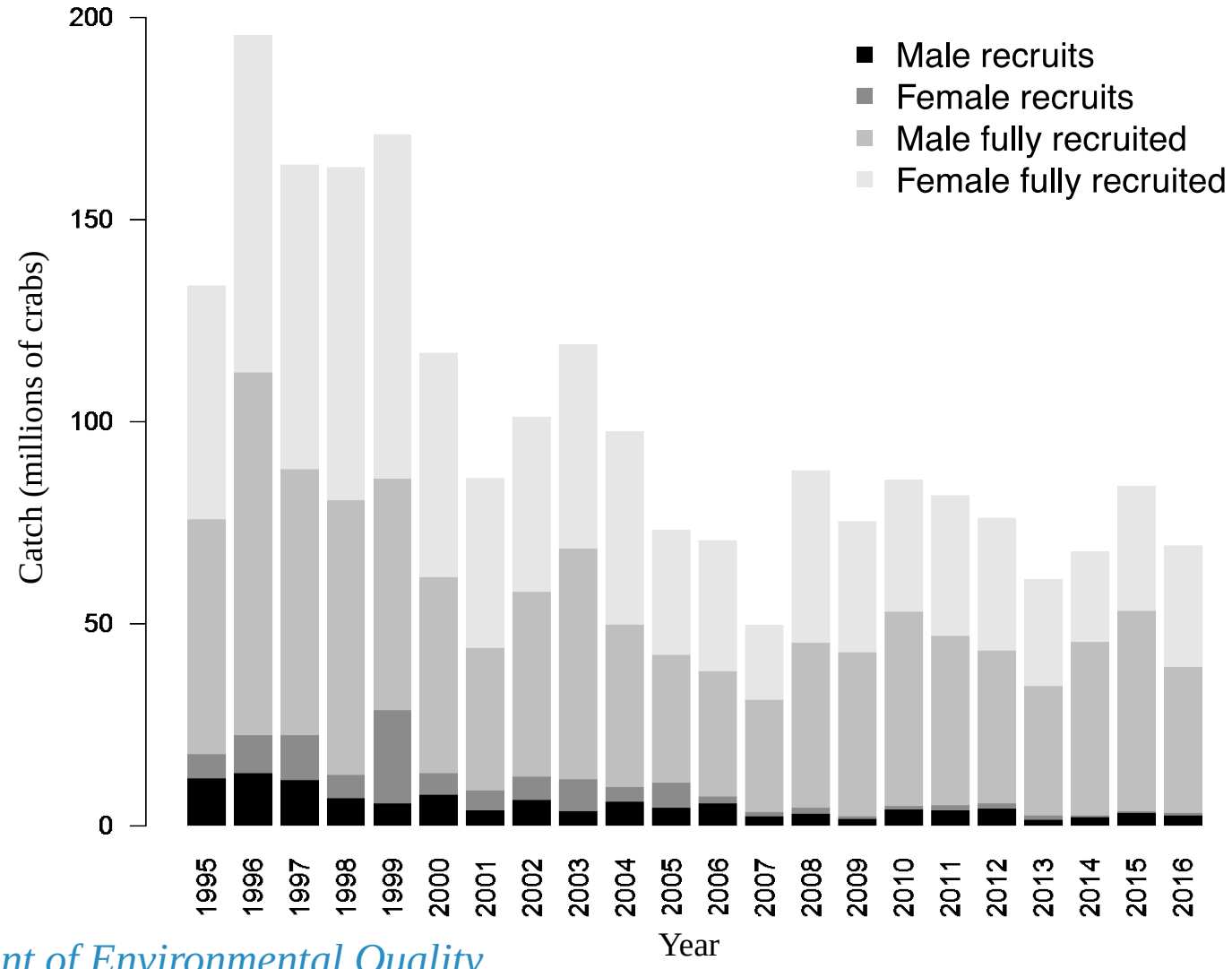
Peer Review

- Accepted the two-stage model for management
- Determination of North Carolina blue crab stock status concurs with professional opinions and observations
- Use of data sources and model approach is appropriate
- Baseline two-stage model is a significant improvement over the traffic light approach

Data Input

- Commercial catch: the amount of crabs removed from a stock by commercial fishing
- Abundance index: relative index of the number of crabs in a stock
- Biology: provides information on growth, maturity, and natural mortality

Commercial Catch



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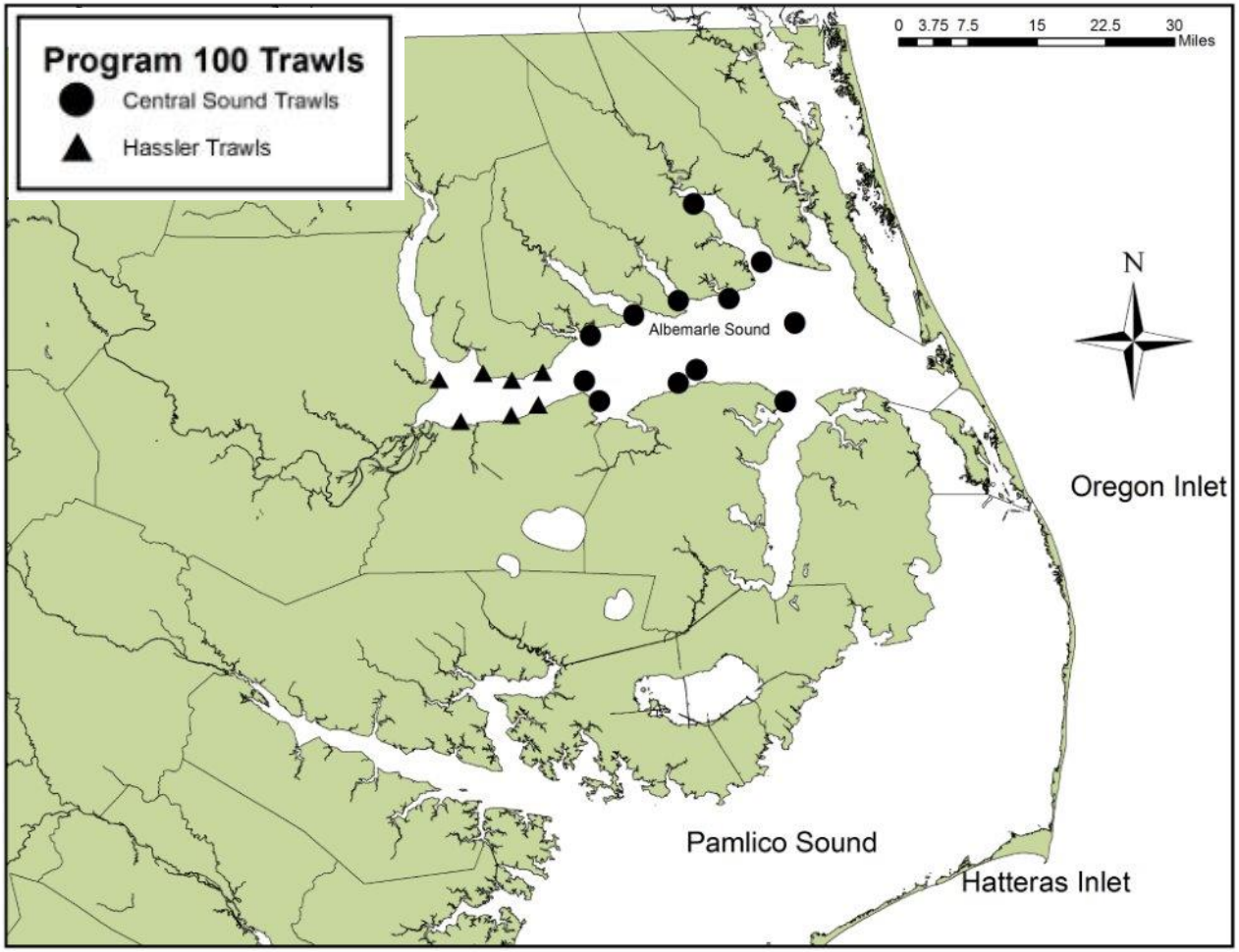
North Carolina Program 100 Juvenile Anadromous Trawl Survey



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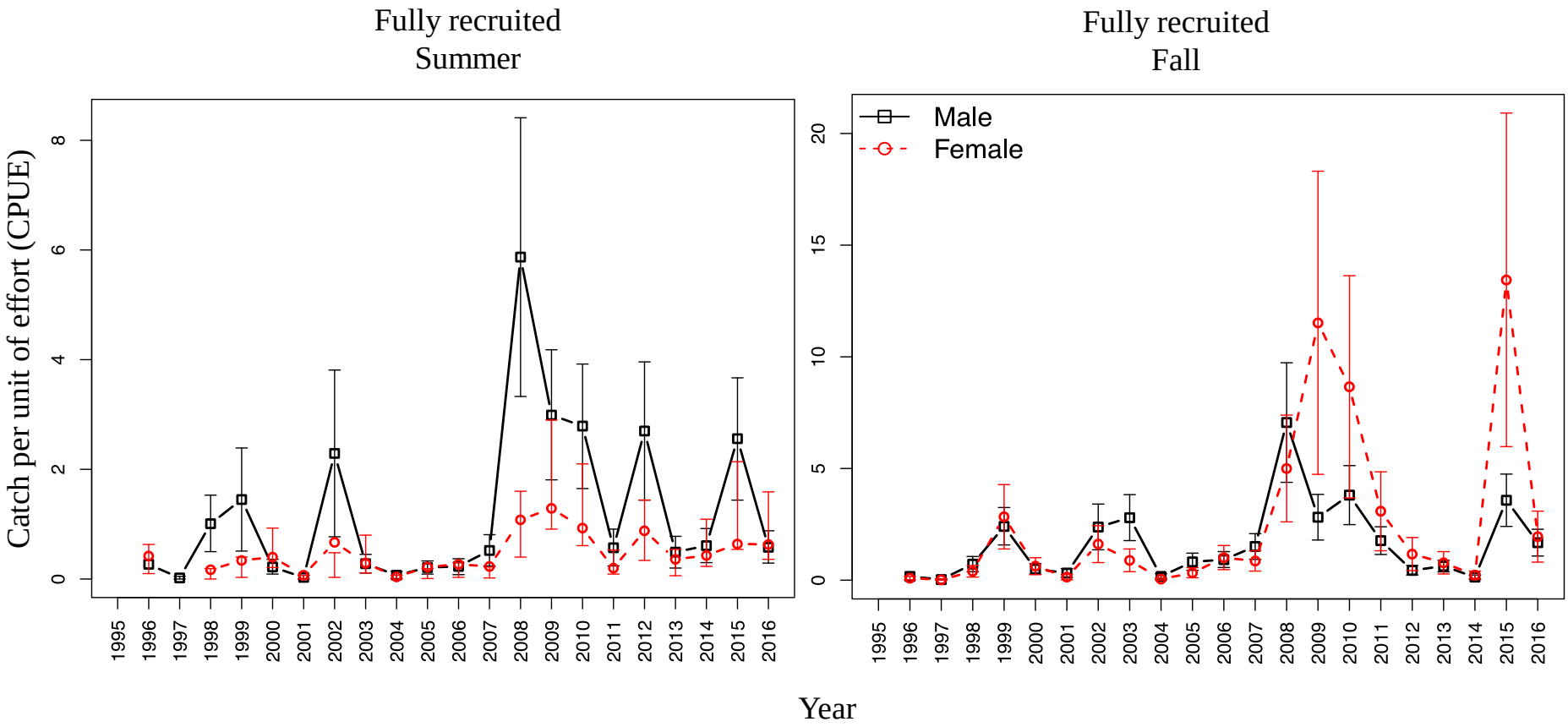

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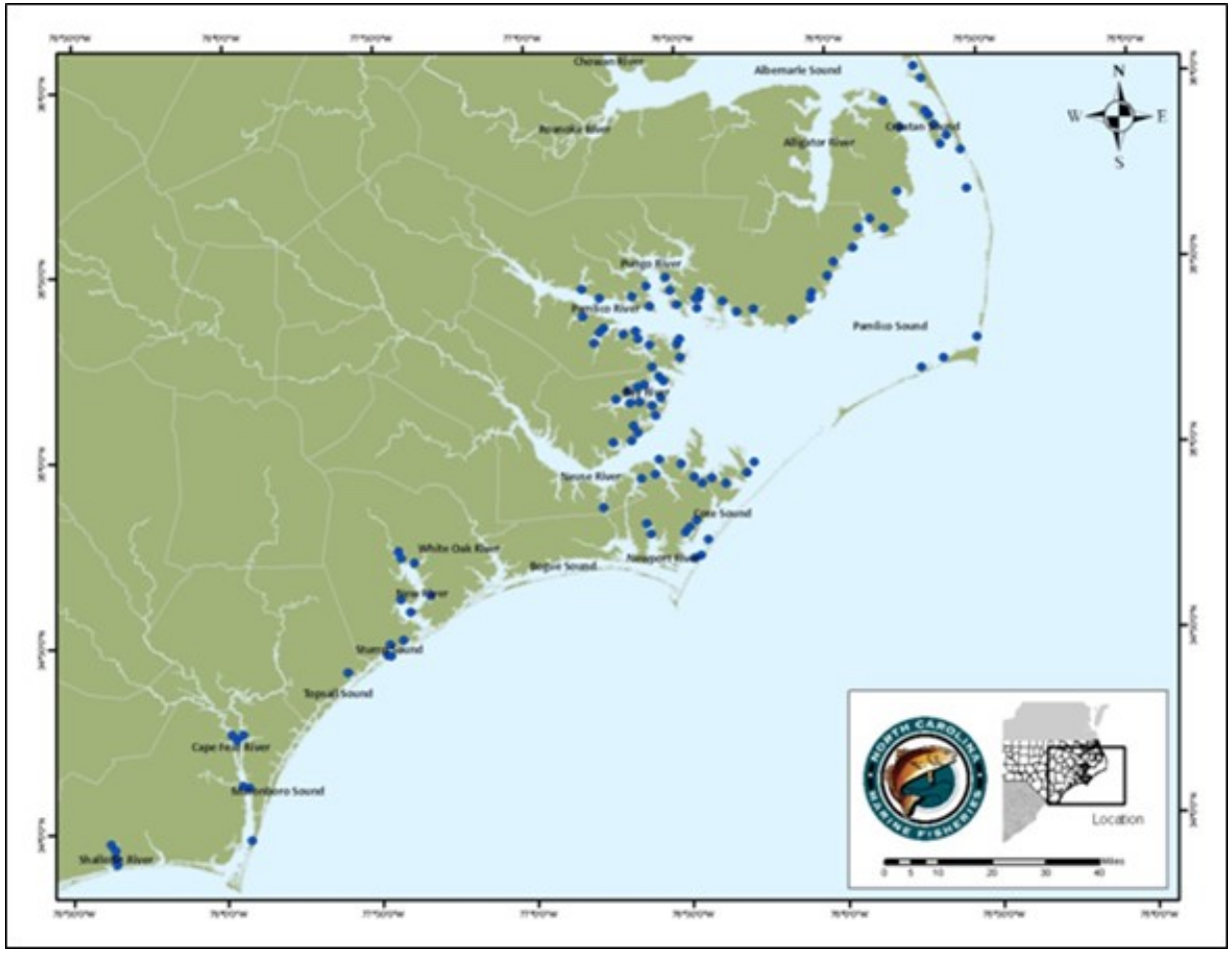
North Carolina Program 120 Estuarine Trawl Survey



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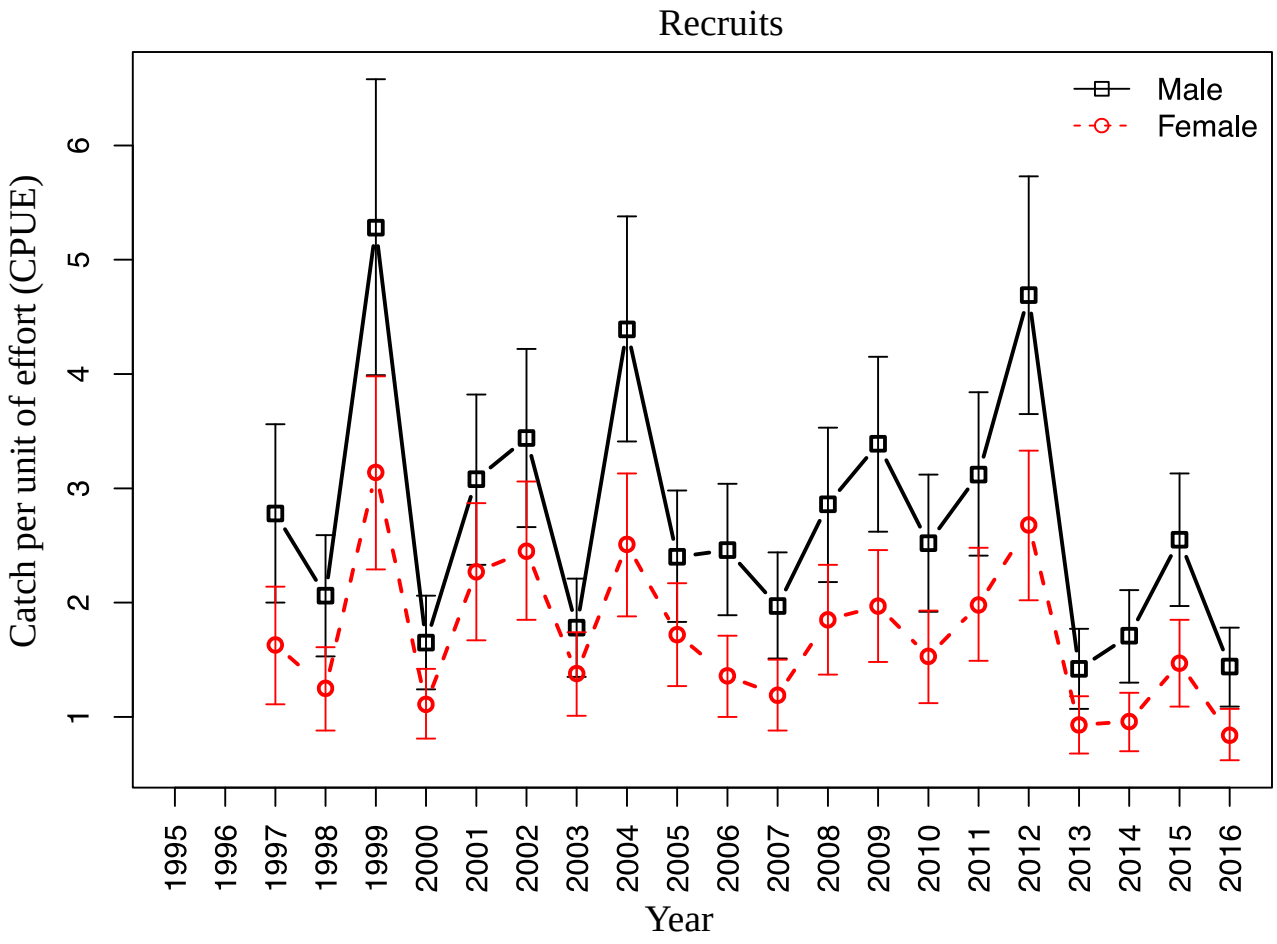

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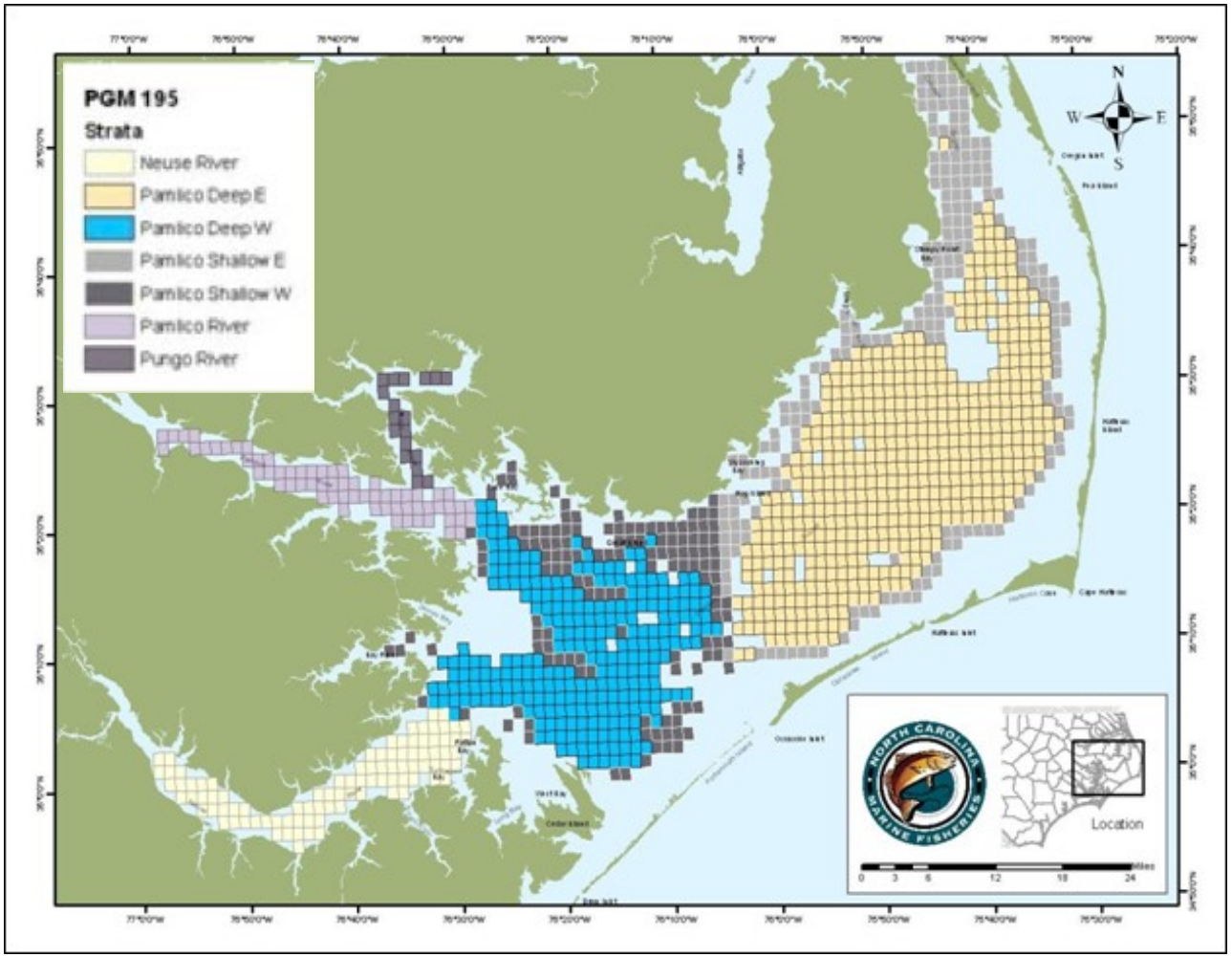
North Carolina Program 195 Pamlico Sound Survey



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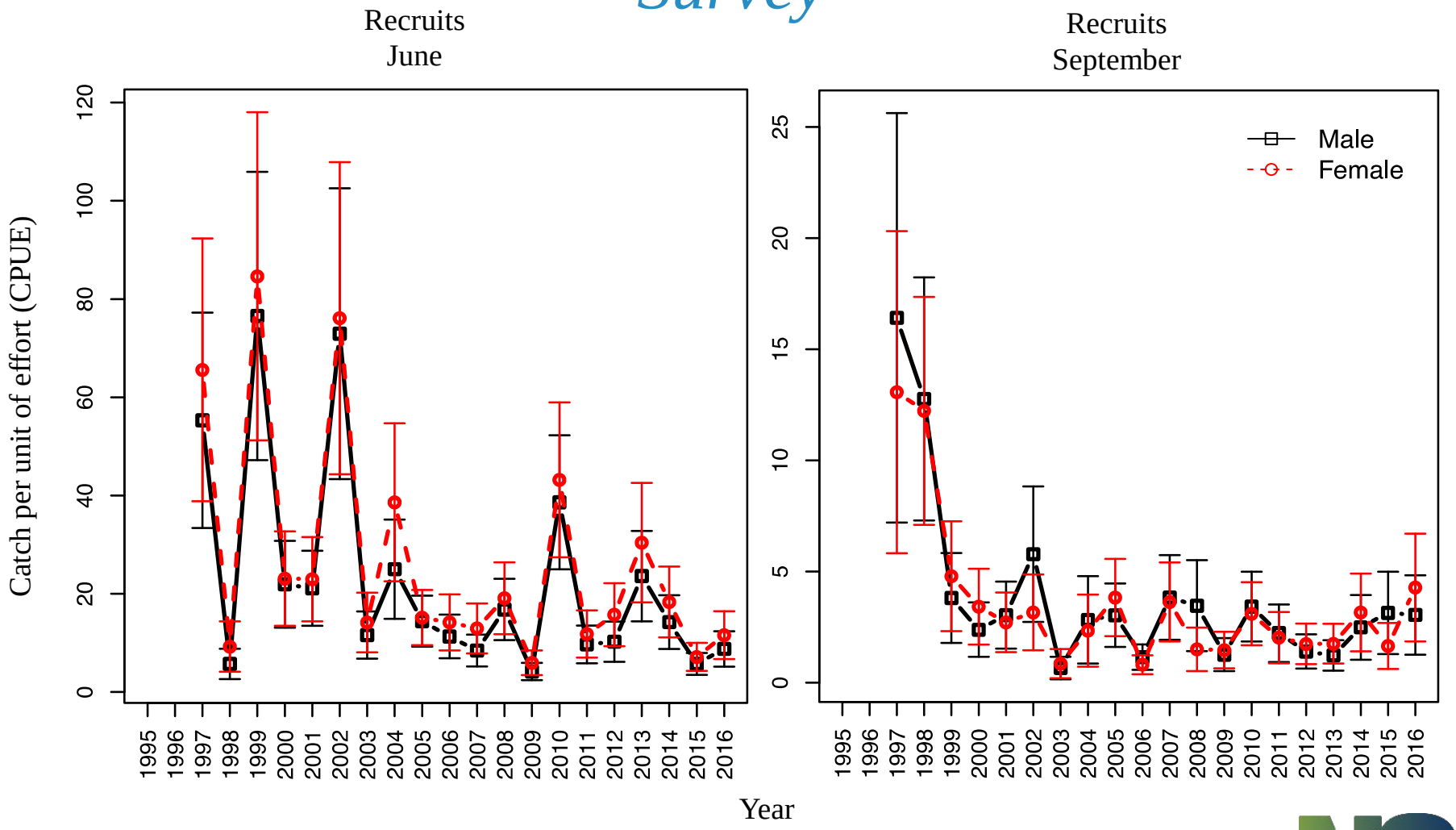

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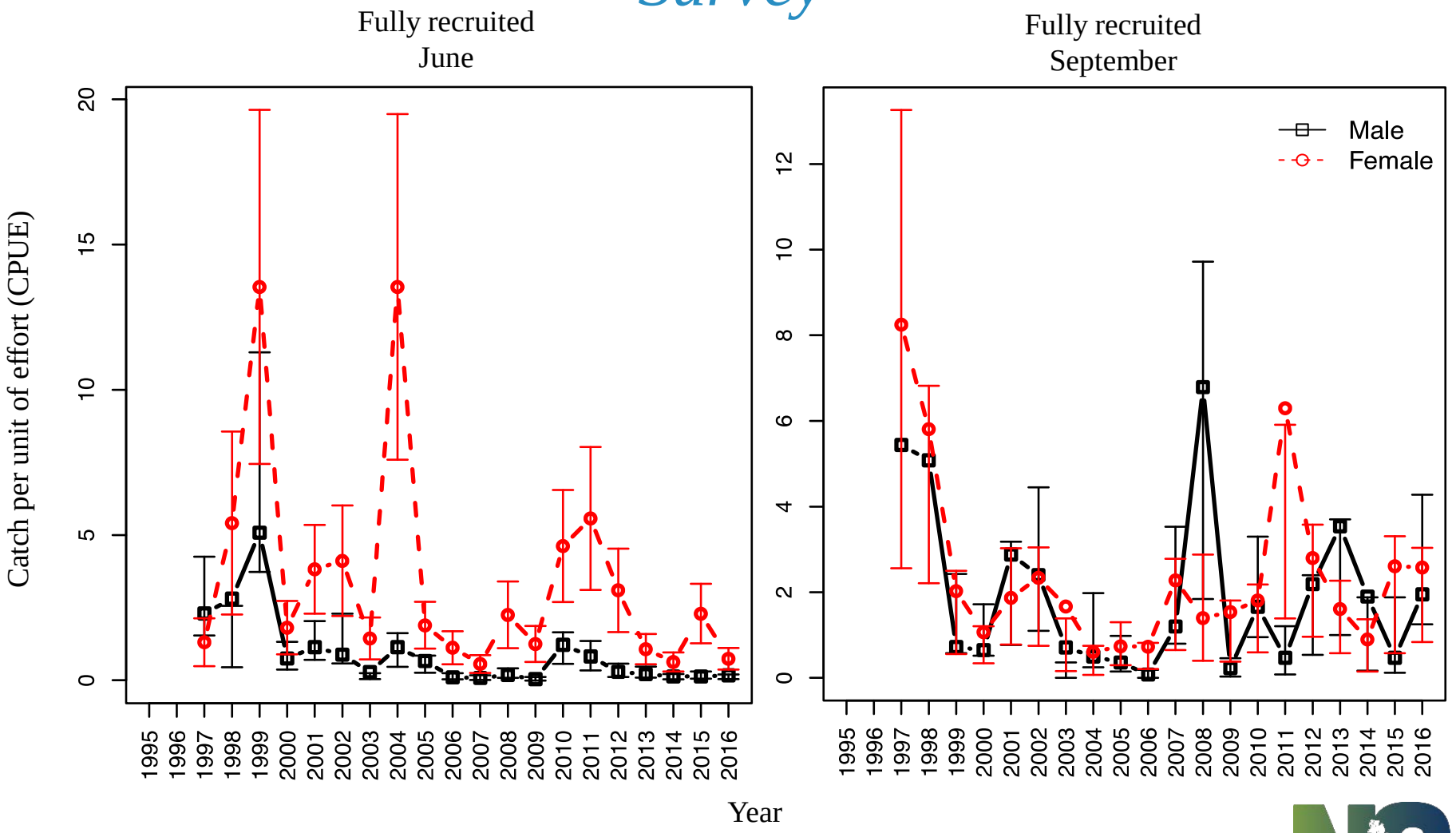

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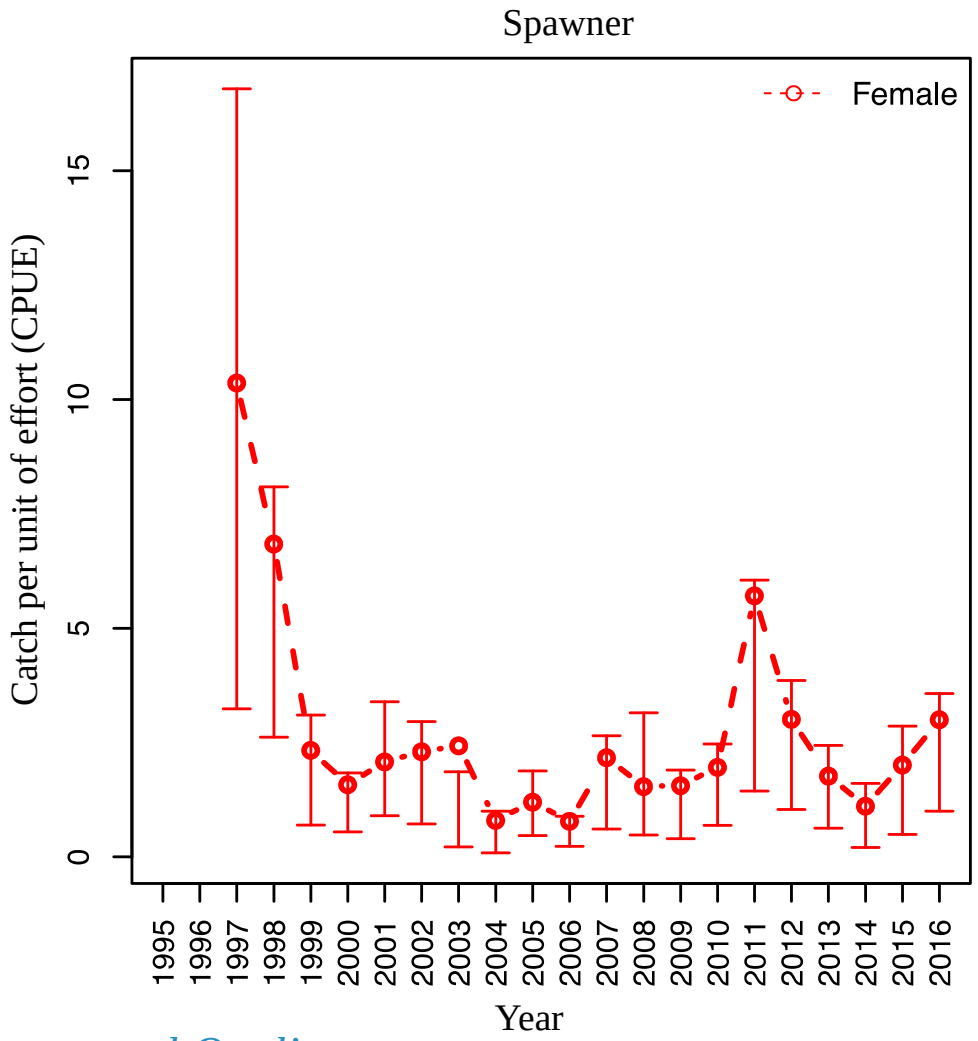

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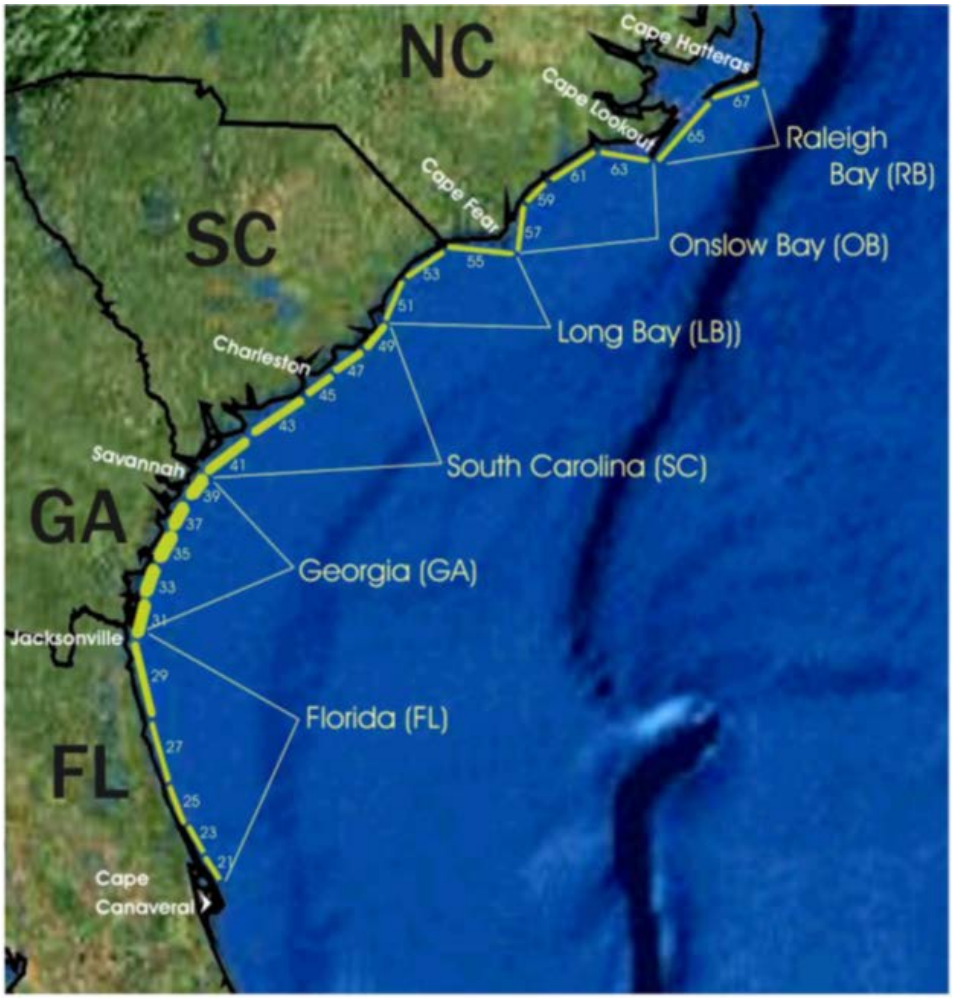
SEAMAP Coastal Trawl Survey



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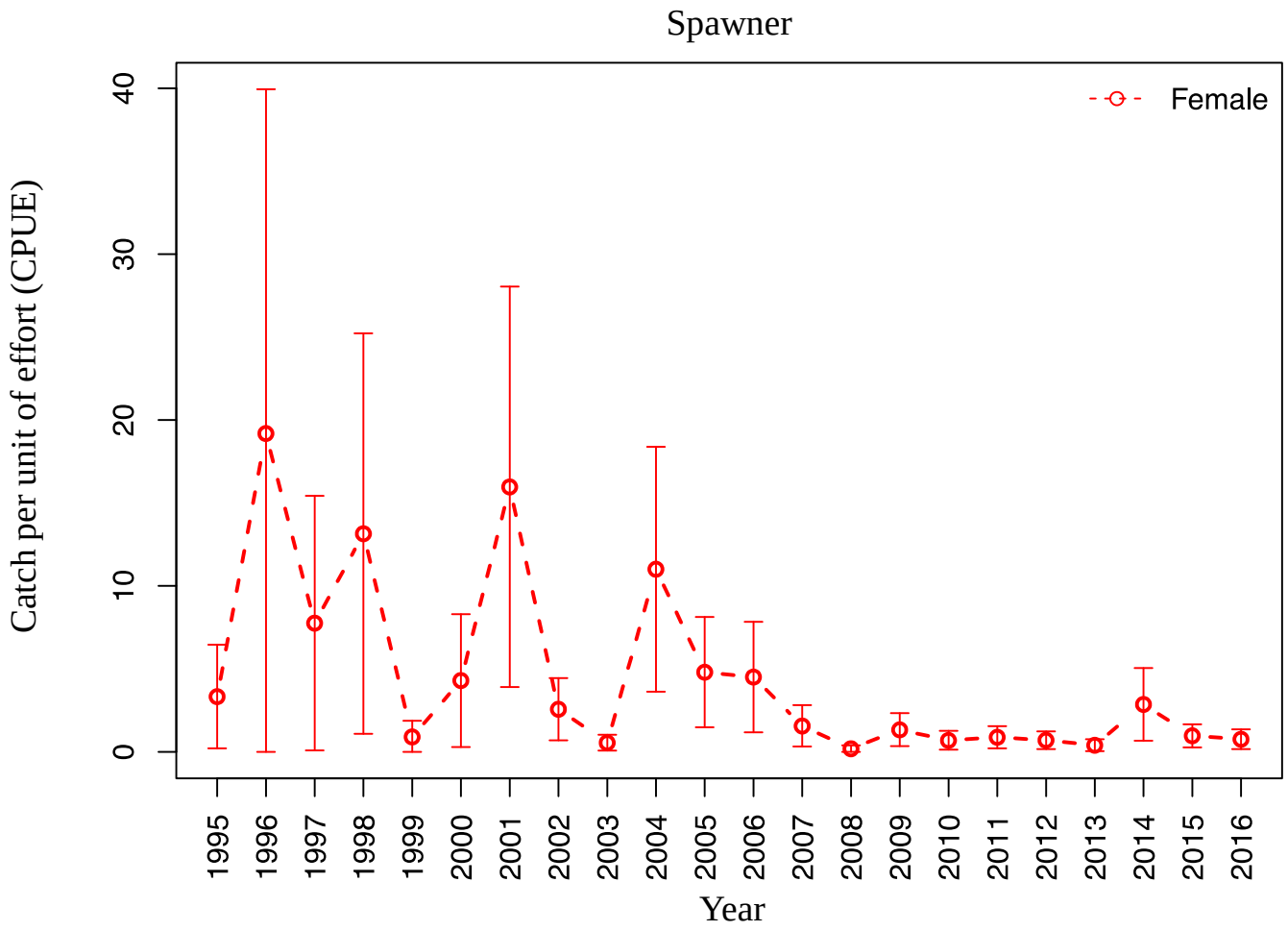

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Results: Estimated Recruits Abundance

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Results: Estimated Fully Recruited Abundance

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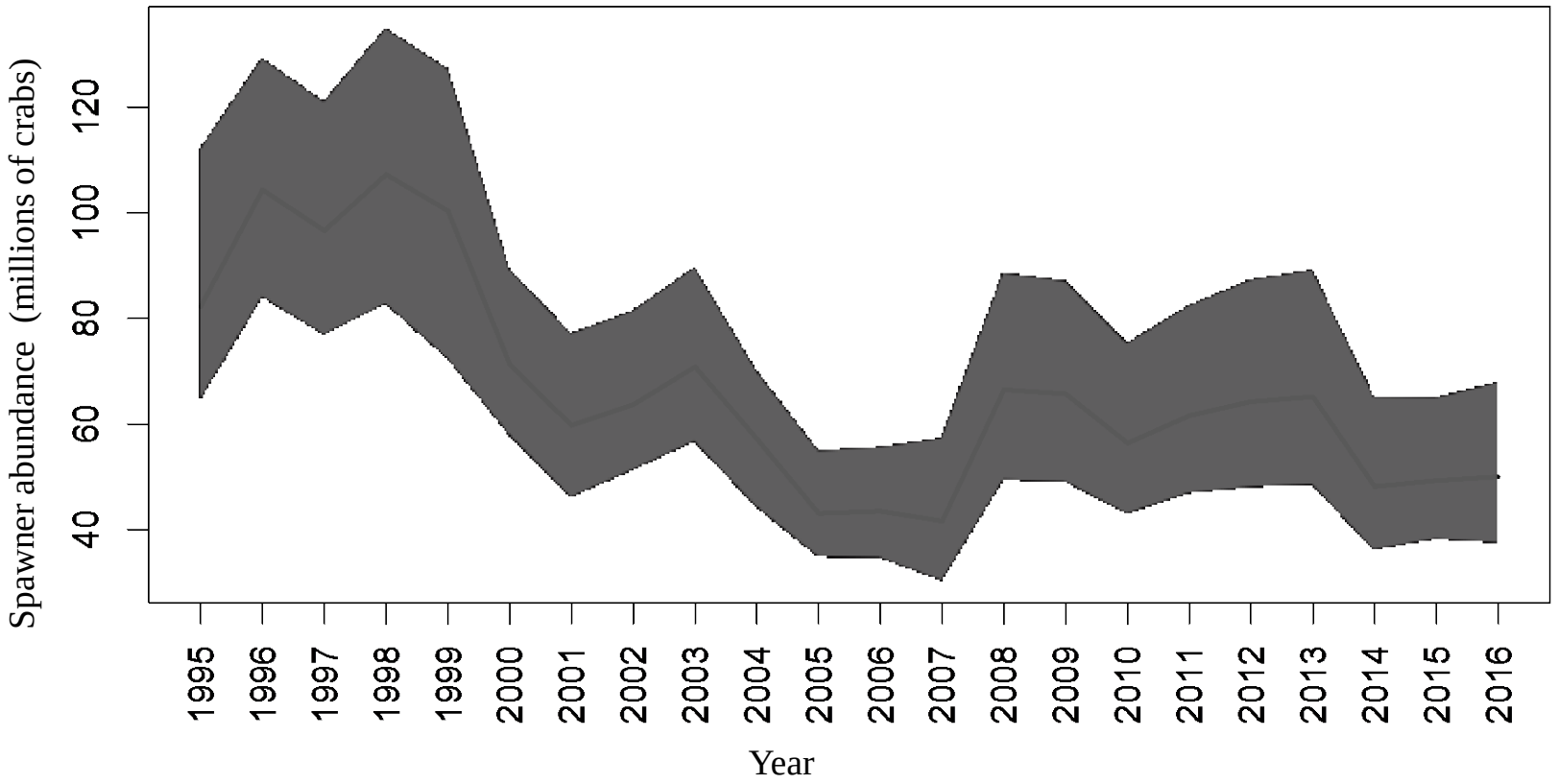
Results: Estimated Spawner Abundance



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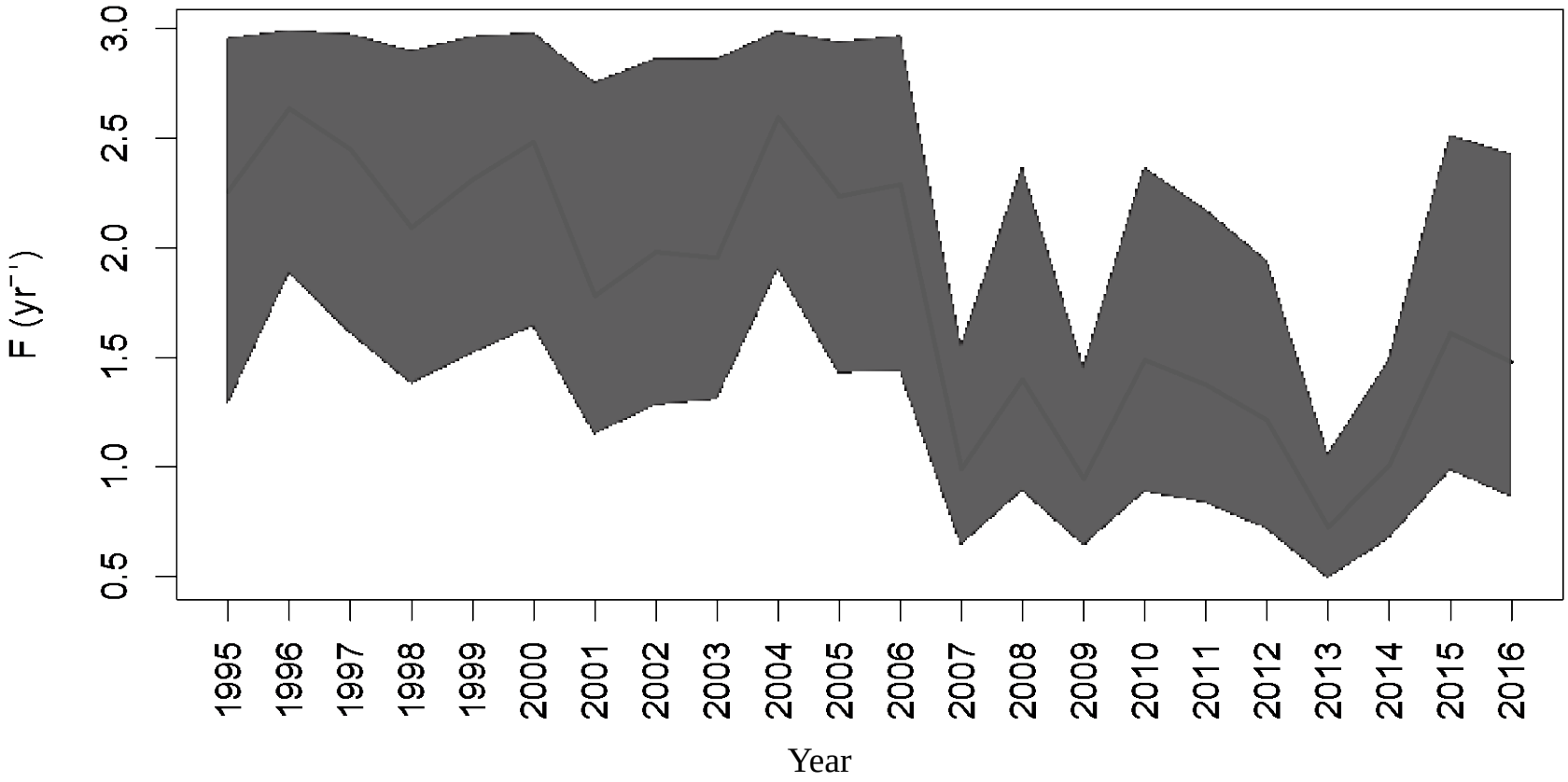
Results: Estimated Fishing Mortality (F)



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Reference Points

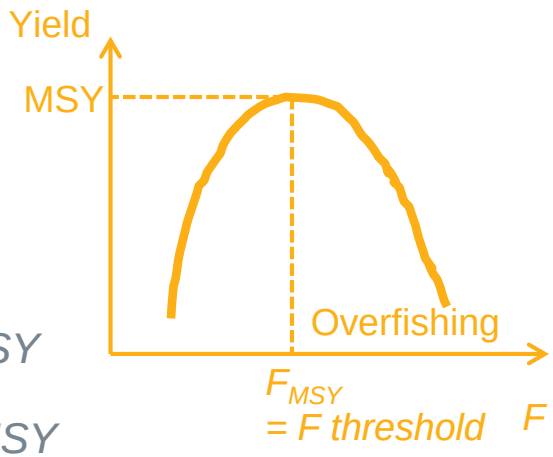
- Maximum sustainable yield (MSY)

<u>Overfishing</u>

- Threshold: fishing mortality at MSY (F_{MSY})
- Target: 0.75F_{MSY}
- 2016 *F* > threshold

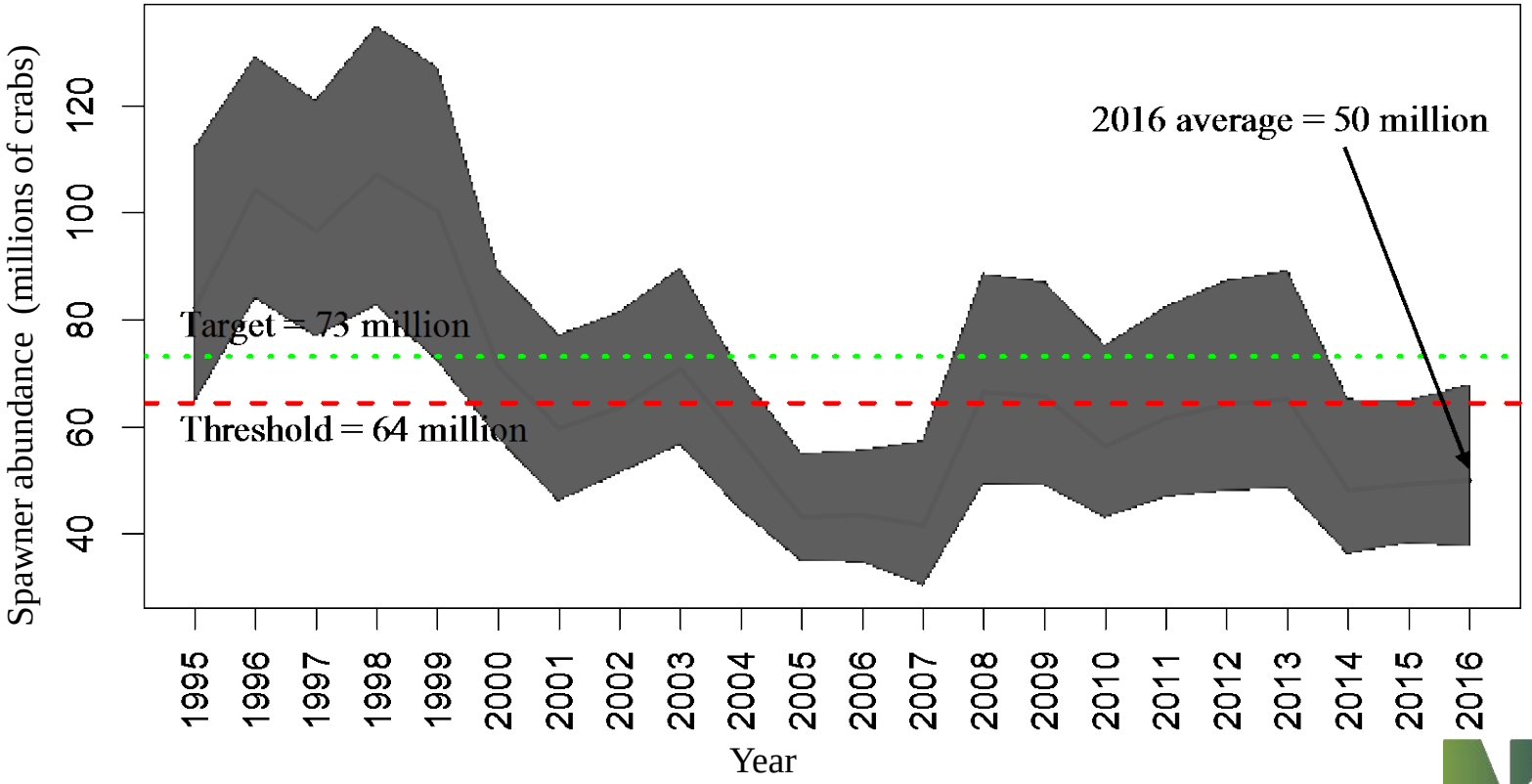
<u>Overfished</u>

- Threshold: spawner abundance at F_{MSY}
- Target: spawner abundance at 0.75F_{MSY}
- 2016 spawner abundance < threshold



2016 Stock Status

- Overfished (98% probability)
- 2016 spawner abundance 50 million < threshold 64 million



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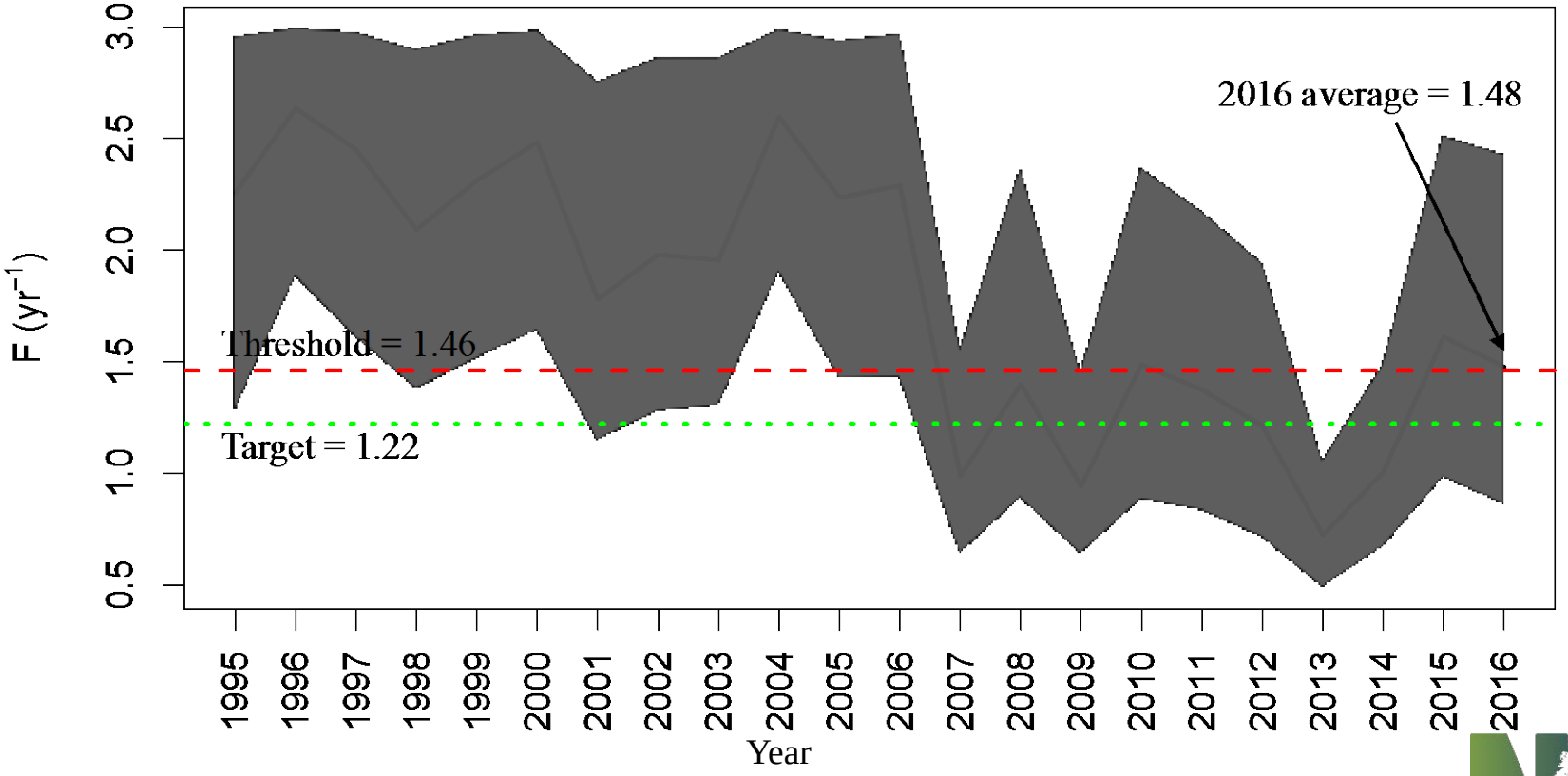
2016 Stock Status

- Overfishing (52% probability)
- 2016 fishing mortality 1.48 > threshold 1.46



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High Priority Research Recommendations

- Develop statewide surveys for blue crabs
- Expand time and spatial coverage of existing surveys
- Better characterize the magnitude of recreational harvest
- Better estimate life-history parameters of blue crabs (growth and natural mortality)

Questions?