



**NOAA  
FISHERIES**

**Southeast Fisheries  
Science Center**

# Data Limited Stock Assessment in the U.S. Caribbean

SEFSC Stock Assessment Program Review  
July 2014

Red hind  
(*Epinephelus guttatus*)





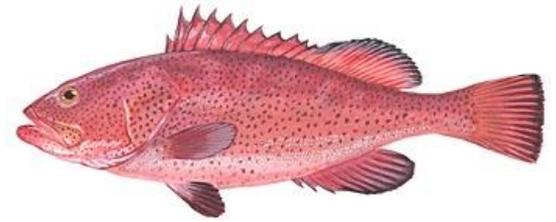
# Fisheries Management and Assessment



- Reef fish FMP (139 species)
  - Management unit – species group
  - To date, OFL-ABC-ACL not estimated using assessment output but with recent landings by species group and island
- Assessments are conducted through the SEDAR process
  - Eleven species have been assessed to date
  - Single species assessments
    - Two – three species are assessed during a single SEDAR
    - Consider each island separately
  - Staff
    - One lead analyst, one support analyst, one analyst from Fisheries and Statistics Division



# Steps in process



- Data scoping calls and webinar → January - February, 2014
- Data workshop held in St. Thomas, USVI → March 11-13, 2014
  - 23 attendees
  - 7-8 working or reference documents
- Assessment webinars from → May 12 – July 31, 2014
  - Every two weeks
  - 7 – 12 attendees, 3-5 are SEFSC or SERO employees
  - 3-4 working and reference documents
- Review workshop or Desk review → September 3, 2014
  - 3 CIE reviewers
  - 2-3 working documents
- SSC review in San Juan, PR → December, 2014

# Commercial landings

- Puerto Rico
  - Electronic database started in 1983 (30 year time-series)
  - Species-specific reporting
  - Known problems with reporting. Expansions factors used to estimate total landings
- USVI
  - Landings are assumed to represent a census
  - Reporting has been an evolving process
    - 1974-2000 (26 years) – Reported according to gear groupings (e.g., “potfish”)
    - 2000-July, 2011 (11.5 years) – Reported as species group (e.g., grouper)
    - July, 2011- Species-specific reporting commenced



# Recreational landings

- Recreational Landings (MRFSS/MRIP)
  - Data have been collected in **Puerto Rico** since 2000
  - Data are not collected in the USVI

Year	AB1	B2	Positive trips	Trips	Proportion positive	Angler hours
2000	5	0	4	628	0.006	2850
2001	18	0	10	656	0.015	3161
2002	2	0	2	419	0.005	2121
2003	5	0	5	657	0.008	3412.5
2004	2	1	3	520	0.006	2682.5
2005	4	1	4	378	0.011	1854.5
2006	2	0	2	287	0.007	1384
2007	2	0	1	450	0.002	2106.5
2008	22	2	12	547	0.022	2665
2009	23	3	16	513	0.031	2668
2010	8	0	4	485	0.008	2215
2011	2	0	2	723	0.003	3124.5

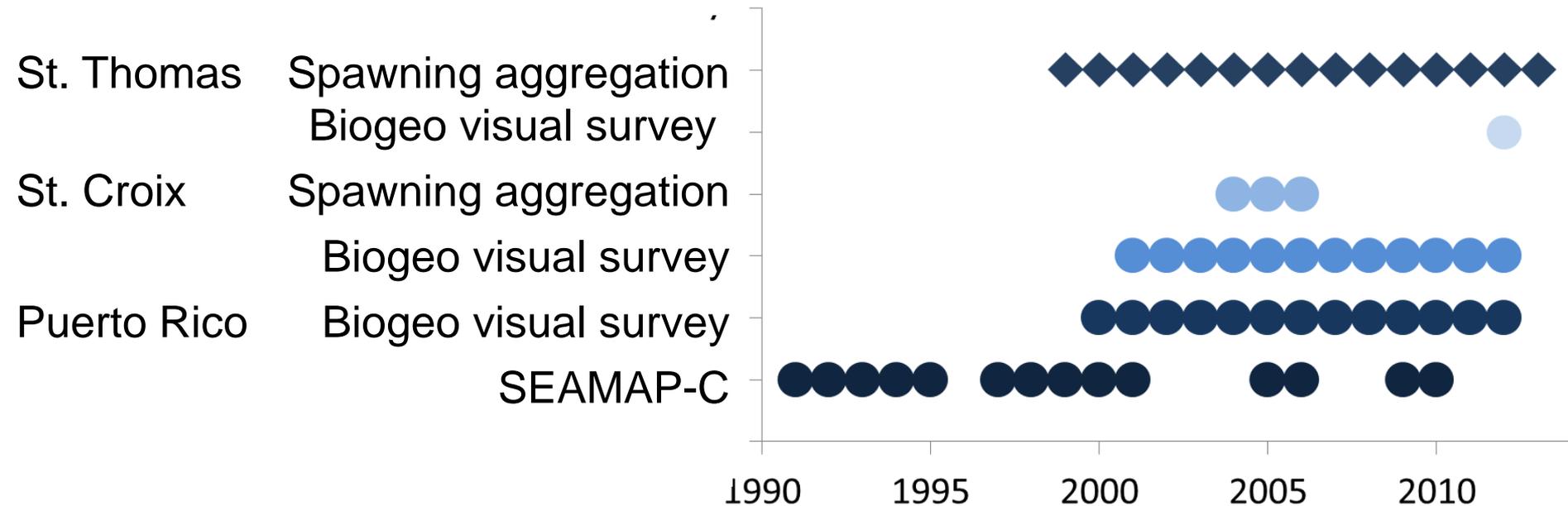
- Recreational landings on intercepted trips expanded using a statistical survey of fishing effort by coastal residents. **High coefficient of variation!**



# Indices

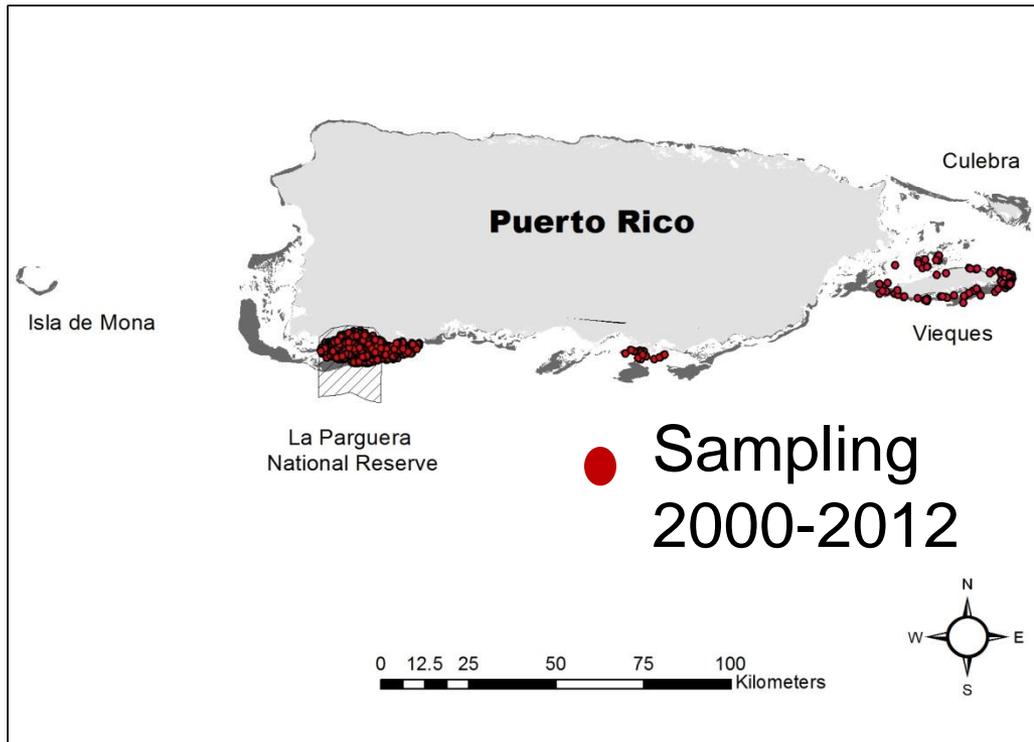
- Fishery dependent
  - Puerto Rico
    - Trip is often the best defined unit of effort
      - Few trips report hours fished
  - USVI
    - At the moment we can develop indices for species groups
- Fishery Independent
  - SEAMAP-C (sampling mainly Puerto Rico)
  - National Ocean Service Biogeography visual survey data
  - Academic partners (e.g., spawning aggregation data)

# Fishery-independent indices



- Temporal coverage seems adequate for some of these data sources

# Spatial coverage



- Common problem among the fishery-independent data sources:
  - To date the spatial coverage has been limited

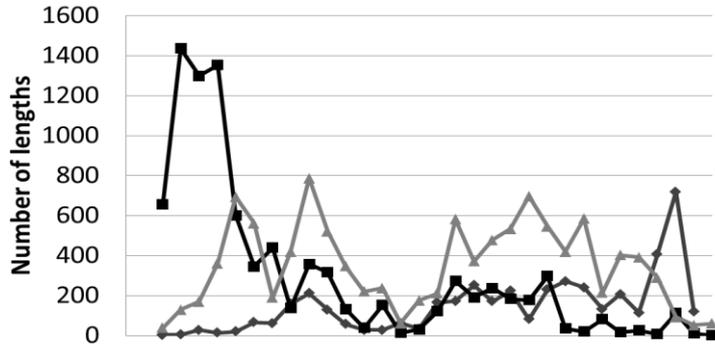
# Composition data

Island	Fleet	Intercepts per year	Lengths per year	Number of years
Puerto Rico	Diving	2-137	3-719	28
	Pot and trap	1-231	1-1436	28
	Vertical line	6-128	38-787	28
St. Croix	Diving	1-46	1-296	11
	Pot and trap	1-112	2-574	28
	Vertical line	1-32	1-561	25
St. Thomas	Pot and trap	2-116	4-971	23

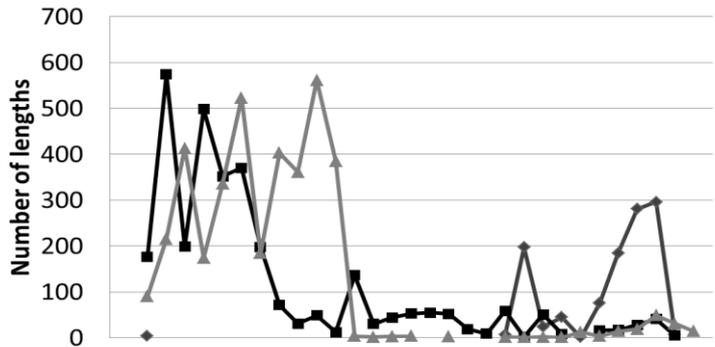
- Main source of data: Trip Interview Program (**lengths only**)
- The number of intercepts and lengths and temporal scale seems adequate when looking at the range of values

# Length composition data

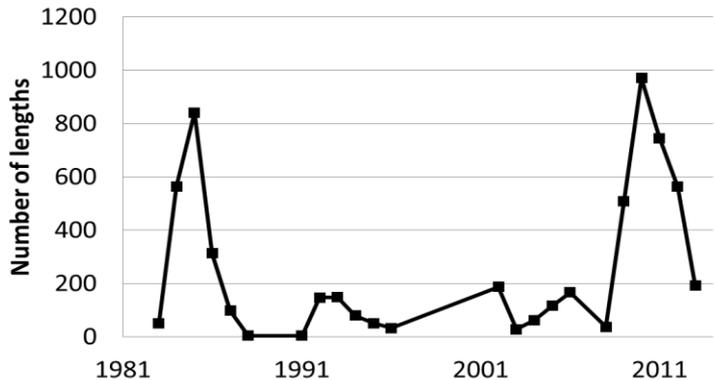
Puerto Rico



St. Croix



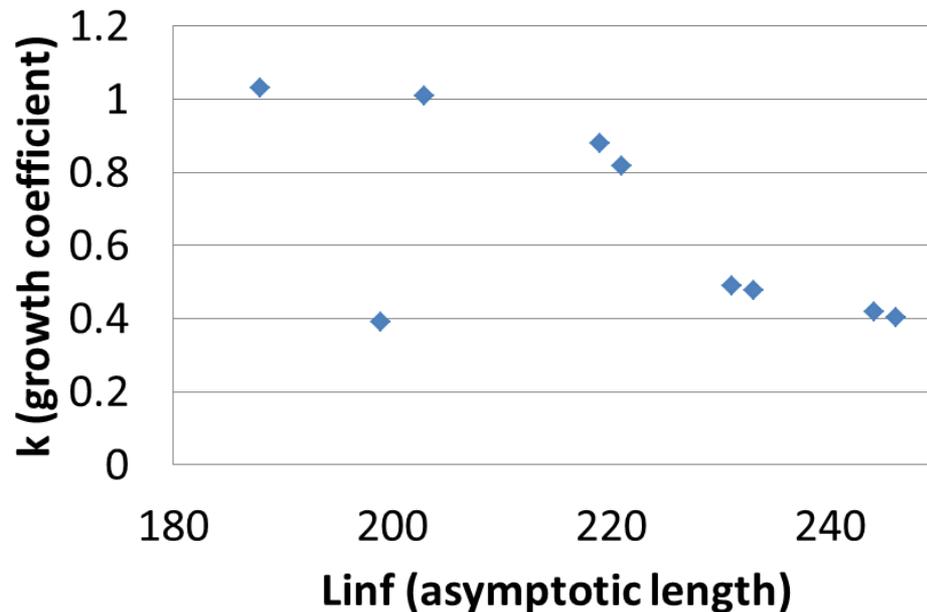
St. Thomas



- Number of lengths have declined to a low in the most recent years for many fleets
  - Time period of most interest
- Main data input for assessments

# Life history

- Life history parameters come from literature and FishBase.
  - Growth relationship can vary greatly among the reviewed studies

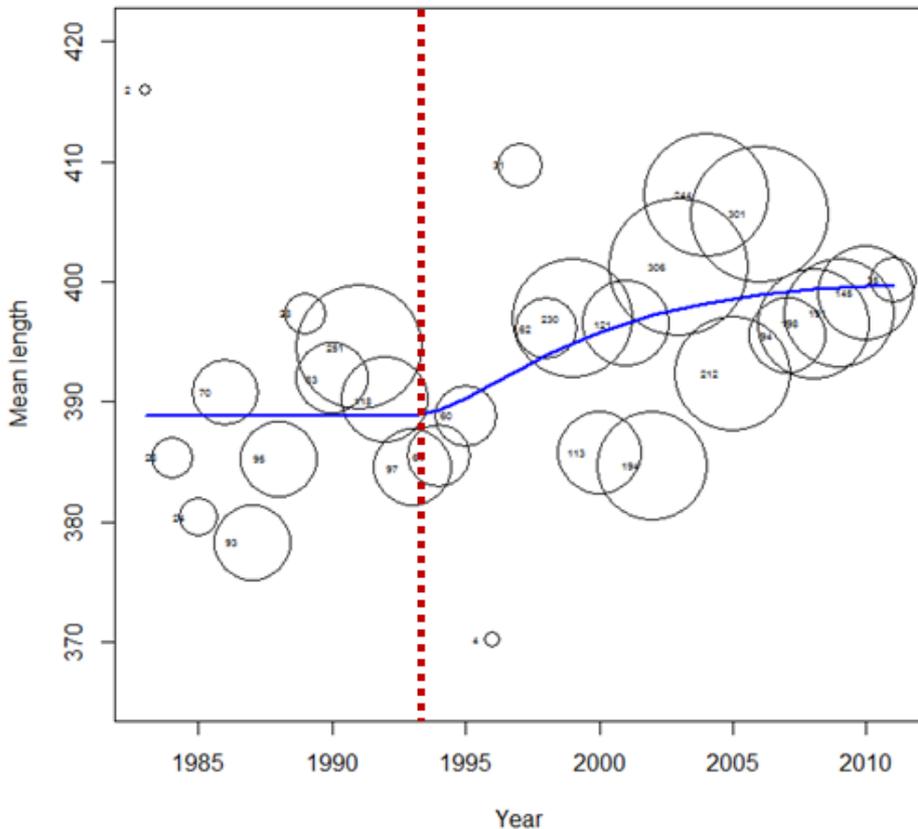


# Stock assessment methods

- Mean-Length Estimator (Gedamke and Hoenig, 2006):
  - Minimal data requirements as compared to traditional stock assessment methods making it an attractive approach for data-limited situations.
- Inputs:
  - A time series of length frequency
  - von Bertalanffy growth parameters (assumed known and constant)
- Strata:
  - Applied separately to each island and fleet combination

# Results

## Change in Z: 1993



- Main result is an estimate of total mortality ( $Z$ )
- Can derive estimate of fishing mortality ( $F$ )
- Use Yield-Per-Recruit analysis to derive a proxy for  $F_{msy}$ 
  - Compare estimate of  $F$  and  $F_{msy}$  proxy to determine overfishing status

# Challenges:

- Caribbean assessments are hampered by data limitations.
  - Annual catches not considered reliable
    - DNER in PR acknowledges underreporting and misreporting: applies expansion factors
    - USVI: Assume census, not verified
  - Few available indices
  - Adequacy of length composition varies among islands and over time
  - Life history parameters from the literature are often variable



# Challenges:

- MSRA requires ACLs for all management units in FMPs.
  - Mean Length Estimator has not (to date ) produced estimates of OFL, ABC or ACL.
  - ACLs are derived using the recent landings history which is uncertain.
- Recommendation:
  - The MSRA/NS guidelines should be modified to be more flexible and allow management strategies other than ACLs
  - This flexibility currently is not supported by legal interpretations of MSRA/NS Guidelines.

# Progress

- Data Improvement Project (implemented in July, 2011)
  - Goal: Increase species-specific reporting and improve effort reporting in the US Caribbean
- Territorial Initiative
  - Immediate goal: Verify reported landings and expedite data entry
  - Future goal: Collect biological samples and improve IT infrastructure
- Expansion of the Coral Reef Program's visual surveys
  - The surveys are being spatially expanded to include all hard-bottom habitat in less than 30m of water on each island (bi-annual sampling)

# Progress

- Data limited workshops
  - Three-year workshop series at the Gulf and Caribbean Fisheries Institute annual meeting
    - Goals:
      - Explore different data-limited assessment methods,
      - Define strategies for improving fishery-dependent and fishery-independent data for stock assessments
  - SEFSC/SERO
    - Goals: Evaluate the available fishery-independent data from the US Caribbean and define strategies for making them useful for stock assessment
- Data triage and assessment workshop in 2015
  - Goal: Evaluate the available data and conduct assessments for many US Caribbean species

# Conclusions

- Follow the same SEDAR procedures as the data-rich and data-moderate assessments
  - Less staff dedicated to the process
  - Assessments have not produced estimates of abundance or management advice
- Data are the main limitation to assessment
  - Uncertain landings
  - Lacking indices of abundance and age composition data
  - Variable sampling of length composition over time
- A series of programs and workshops are on-going with the goal of improving the data and assessment process in the US Caribbean

