NOAA FISHERIES

SEDAR 57
Spiny Lobster

Review Workshop
Presentation 2
DATA

July 9-11, 2019

Review Workshop Presentation 2 - DATA

1. Life history Data
2. Fishery Independent Data
3. Fishery Dependent Data
    - Commercial Fishery Statistics
    - Recreational Fishery Statistics
    - Stakeholder Input
4. DW Research Recommendations

Life History Data

Life History

Natural Mortality (Cruz et al. 1981)

- Point estimate of 0.34 $year^{-1}$
- Within range 0.30 to 0.40 $year^{-1}$ (FAO 2001)
- Similar to previous assessments in Caribbean of 0.34 and 0.36 $year^{-1}$

Release Mortality

- Deemed negligible by SEDAR 57 Data Workshop Panel
- Diving considered highly selective
- Limited handling and sun exposure associated with trap fisheries
- Little known about post-release predation mortality

Life History

Fecundity at Length (FAO 2001; SEDAR 8)

$$Eggs = 0.5911 * L_{CL}{}^{2.9866}$$

Maturity at Length (Die 2005)*

$$mat = \frac{1}{\left(1 - exp\left(\alpha\left(L_{CL} - L_{50}\right)\right)\right)}$$

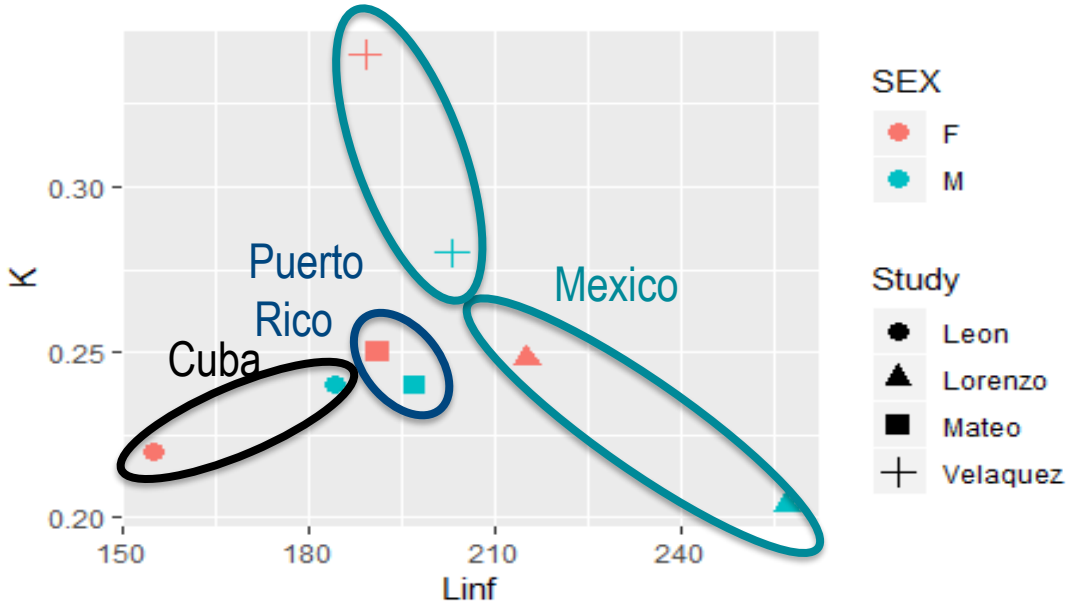
where L_{50} = 92 mm; α = -0.102

*recalculated from inches to mm for SEDAR 57

Life History

Growth (Mateo 2004)

	L_∞	K
Male	191 mm CL	0.24 year^{-1}
Female	191 mm CL	0.25 year^{-1}



Von Bertalanffy growth

Estimated in PR

Supported by growth trajectories of mark-recapture study (next slide)

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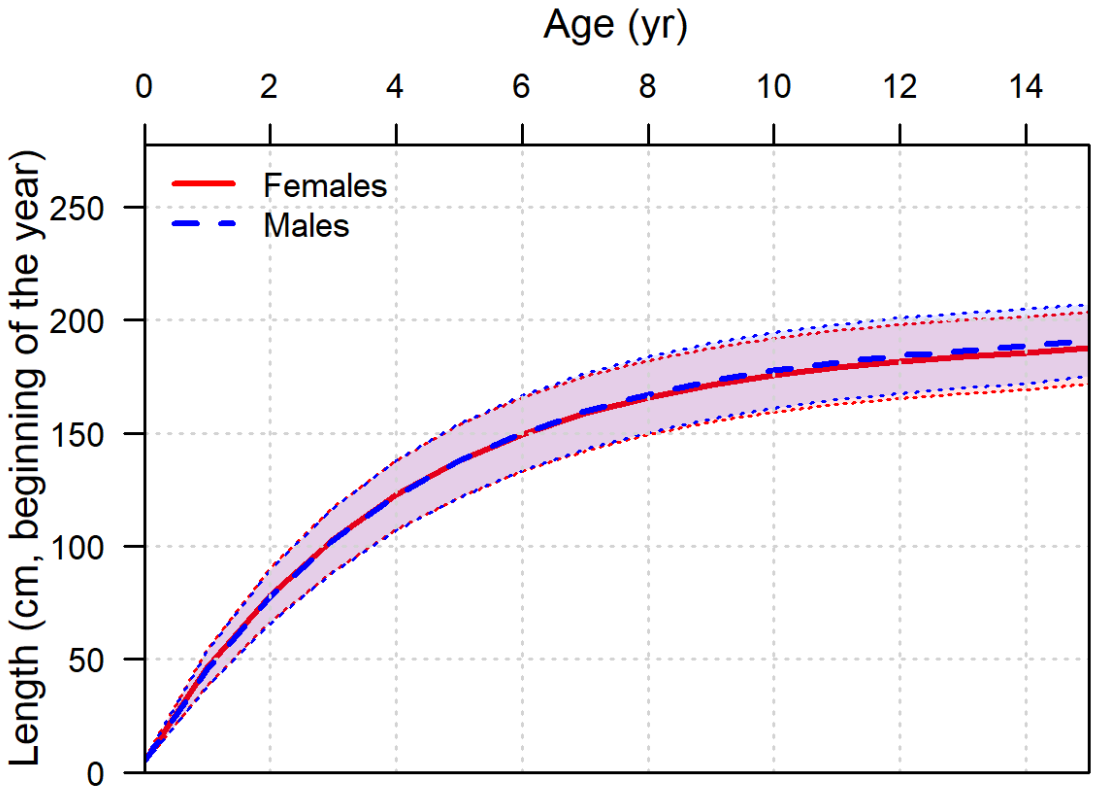

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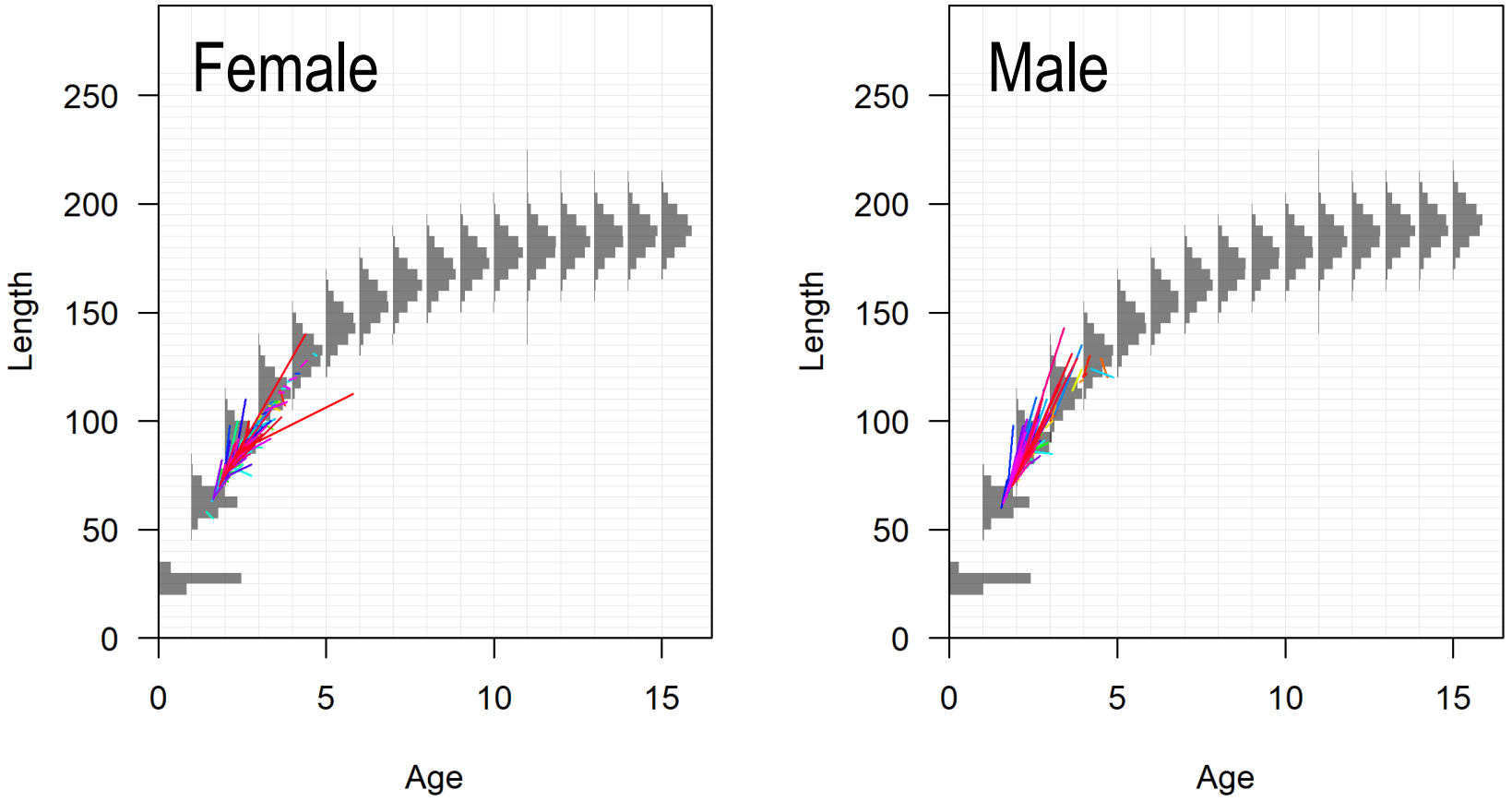


Growth trajectories from mark-recapture study led by the St. Thomas Fishermen's Association (Olsen et al. 2017)

Life History

Length Weight Relationships

Commercial fishery biological samples from TIP (Fishery Dependent)

TIP (NOAA Fisheries Trip interview Program) is a port sampling program that collects data including individual size and weight of Caribbean Spiny Lobsters, to complement information that is collected though logbooks.

Life History

Length Weight Relationships

Length samples from the Trip Interview Program

$W = aL^b$ where W = kg whole weight and L = CL in mm

Years, sample size and parameter estimates by island platform:

	Years	n	a	b
PR	1980-2016	22,980	7.831E-06	2.511
STT	1980-2017	11,723	4.166E-05	2.171
STX	1981-2017	20,046	1.821E-05	2.339

Fishery Independent Data

Fishery Independent Data

Various fishery independent monitoring surveys examined, including:

- Benthic transect surveys (NCCOS, NCRMP, DNER)
- Larval recruitment surveys (SEAMAP-C)
- Others (See SEDAR 57-DW-01 for more details)

None were recommended for use in SEDAR 57

Fishery Dependent Data

Fishery Dependent Data

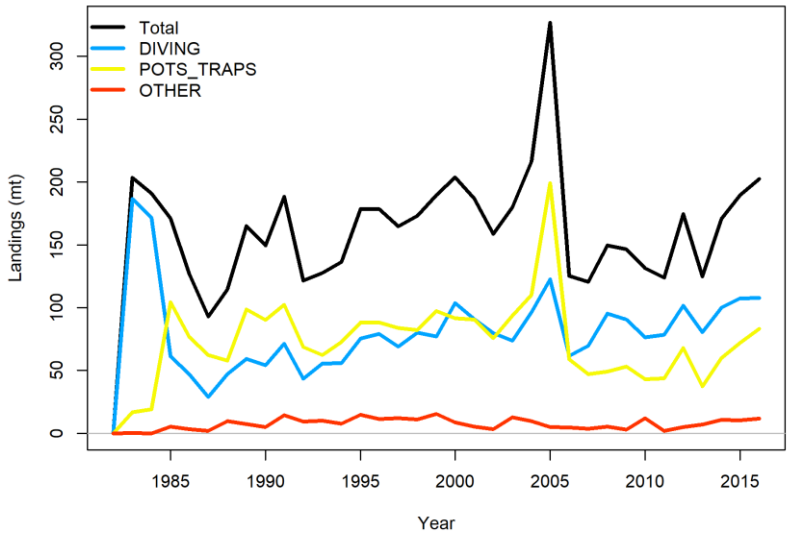
Commercial Fishery Statistics

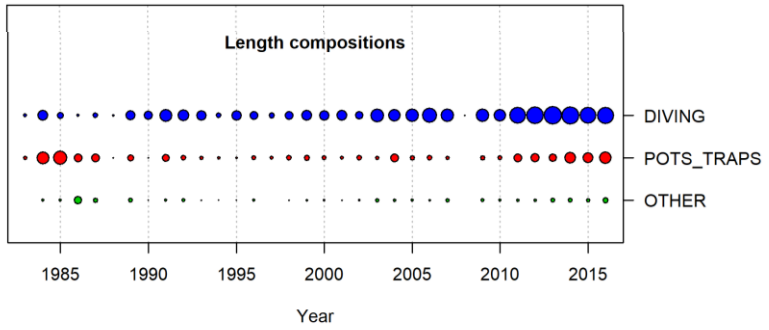
- Annual removals by Gear Type (from self-reported logbooks)
- Length samples by Gear Type (from NOAA Fisheries TIP)
  - TIP carapace measurements reported in quarter inches
  - **Data were binned to reflect 0.25 inch increments in mm**

2 Main Gears: Pots and Traps; Diving

Fishery Dependent Data

PR





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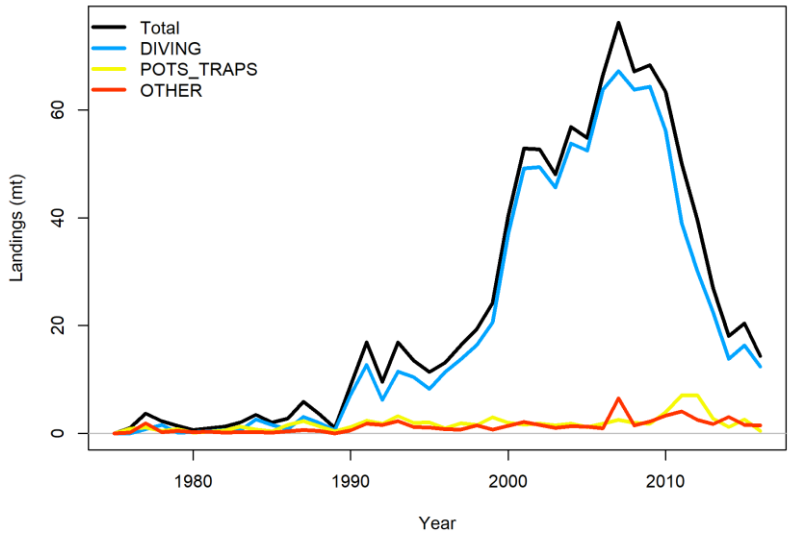
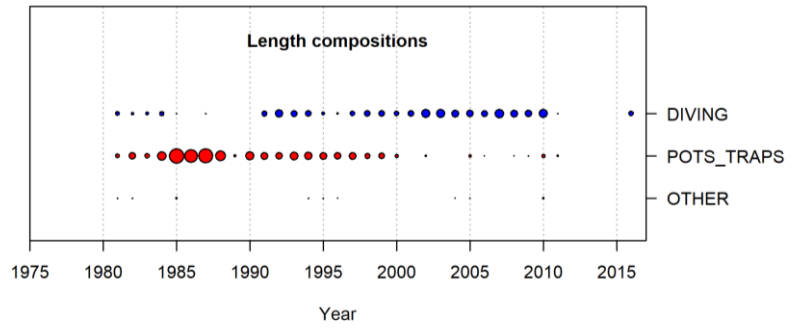
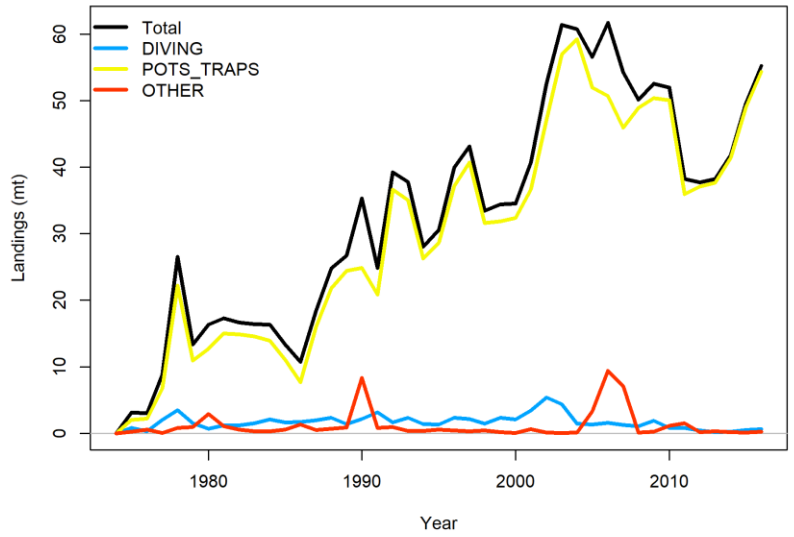
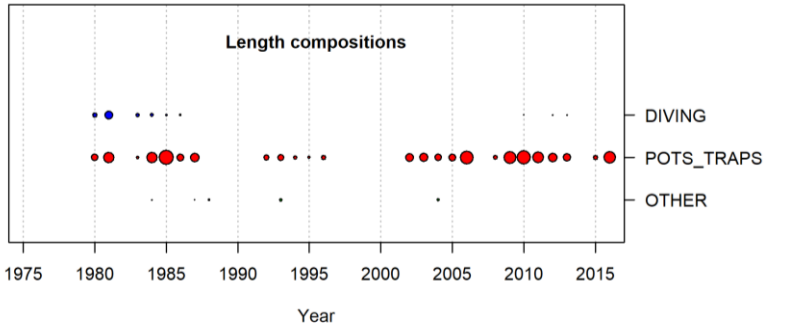




STT





Fishery Dependent Data

Recreational Fishery Statistics

Statistics of recreational spiny lobster removals are not available

Marine Recreational Fisheries Statistical Survey (SEDAR 46-WP-07)

2000 to 2017; Puerto Rico only; Finfish only

Recent pilot studies document sampling difficulties

Puerto Rico (Valle-esquivel and Trumble 2016)

St. Croix (Goedeke et al. 2016)

Fishery Dependent Data

Stakeholder Input at Data Workshop

Topics included:

- Classification of gears
- Maximum observed size
- Socio-economic and ecological events
- Selectivity and retention
- Discards and discard mortality

DW Research Recommendations

DW Research Recommendations

Life History

- Research on stock structure is needed, particularly as it relates to connectivity caused by larval dispersal.
- Encountering the right habitat is important for survival of juvenile lobster recruits. Research should be conducted to explore effects of sargassum, water quality, coastal development, and mangrove root communities on the availability and quality of habitat for juvenile spiny lobsters.
- Explore plausibility of cause and effect mechanisms that may lead to temporal growth variation.
- Investigate potentially unaccounted for discards in the self-reported commercial logbook data to be able to quantify the number of lobster discarded dead, as well as the number of lobster discarded alive.
- Research aimed at quantifying post-release mortality (including post-release predation) of spiny lobster to better understand and propose mechanisms that could potentially mitigate mortality among lobsters that are discarded.

DW Research Recommendations

Fishery Dependent

- General data improvements are recommended, including continued reporting of specific gear categories (eg. different types of diving).
- Investigate the sensitivity of stock assessment results to landings data associated with high uncertainty.
- Investigate improvements or alternatives to past correction factors in Puerto Rico (2005 in particular).
- Continue SEFSC funded commercial landings validation studies in Puerto Rico and begin similar surveys in the US Virgin Islands.
- General data improvements are recommended, including encouraging complete reporting of discards.
- Further explore TIP data for possible data entry and/or measurement errors, particularly regarding the number of individuals associated with a given length entry and associated with potentially miscoded species.

DW Research Recommendations

Fishery Dependent (Continued)

- Permanent programs that quantify the recreational effort and landings in the US Caribbean are needed. The results of recent pilot studies (Valle-esquivel and Trumble 2016 and Goedeke et al. 2016) should be used to develop future surveys.
- Continue comprehensive bio-socio-economic database of events, compile references and time series of quantitative as available.
- Identify significant EBM quantitative socioeconomic indicators (ex. gravity of the market, network market analyses, population growth, tourism, poaching).
- A Caribbean-specific staff for data statistics and assessments was recommended to aid in establishing and maintaining high expertise of

DW Research Recommendations

Fishery-Independent

- Development of fishery-independent surveys that are specifically designed for spiny lobster, which would require considerable planning regarding data priorities (e.g., relative abundance versus length), the life stage to target (e.g., adult, juveniles, or larvae), type of gear, sampling design, temporal and spatial resolution, and the availability of funds. In addition to discussing field sampling, planning of how best to record and store data would be beneficial to future analyses and stock assessments.
- Research aimed at identifying correlations between larval and juvenile abundance from the SEAMAP-C surveys and lobster landings could assist in determining the relationship between juvenile abundance and adult abundance (e.g., Butler et al. 2010)

Overall

- Where possible, the research recommended above should consider ecosystem linkages toward developing capacity in the region for ecosystem based fisheries management.

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