

# Providing Data on Discards and Fishery Dynamics to Inform the Management of New Jersey's Recreational Summer Flounder Fishery

## Introduction

- Summer flounder is the most commonly captured species in NJ's recreational fisheries.
- The discard rate of summer flounder is high in recreational fisheries.
  - Estimated 497,000 fish landed, 4,677,000 discarded in 2015 NJ recreational fisheries (NMFS, 2017).
- Information is lacking on contemporary fishing practices and their impacts on discard mortality.
- Sex ratio of landings and discards are female dominated (Morson et al., 2017).

## Objectives

- Describe the fishing practices of anglers targeting summer flounder in NJ's recreational fisheries.
- Evaluate the efficacy of morphometrics for external sex determination of summer flounder.

## Methods

### Survey of Anglers' Practices

- Online survey implemented via Qualtrics to obtain data on anglers' fishing practices via online message boards and fishing club members.
- Gathering information on: angler experience, region fished, jig or bait rigs used, hook types, rig design, hook size, and handling practices.
  - Survey is ongoing through August 2018.



Figure 1 – Example tackle types used by anglers.

### External Sex Determination

- Commercially harvested summer flounder were photographed for morphometric analysis.
  - Fish length, weight, sex, and maturity stage were recorded.
  - Fish were harvested off NJ, NY and MA.



Figure 2 - Sampling fluke at Trinity Seafood in Lakewood, NJ.

## Methods (Continued)

- Photographs were digitized following the methods of Cadrin and Silva (2005) in tpsDig2 using the following landmarks.
  - Principal Components Analysis was then run in R using the "Vegan" package.

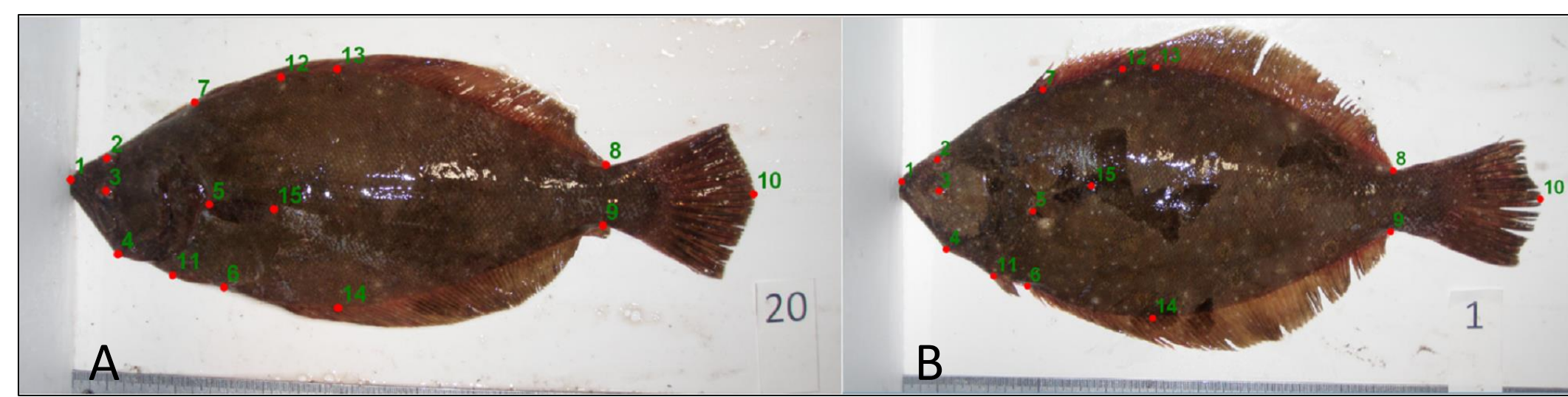


Figure 3 –(A) Female and (B) male summer flounder with morphometric landmarks.

Landmark Number	Description
1	Anterior extent of premaxillary
2	Center of right eye
3	Center of left eye
4	Posterior extent of dentary
5	Insertion of first ray of pectoral fin
6	Anterior insertion point of ventral fin
7	Insertion of dorsal fin in line with points 5 and 6
8	Posterior insertion point of dorsal fin
9	Posterior insertion point of ventral fin
10	Posterior extent of caudal fin
11	Insertion point of first ray of pelvic fin
12	Insertion point of dorsal fin in line with points 5 and 11
13	Highest point along dorsal surface measured from horizontal line through snout and caudal fin
14	Lowest point along ventral surface measured from horizontal line through snout and caudal fin
15	Distal extent of pectoral fin

Table 1 – Morphometric landmarks and their descriptions.

## Results

### Survey of Anglers' Practices

- n= 299 respondents as of August 17, 2018
- Most respondents often targeted summer flounder in the past 5 years.

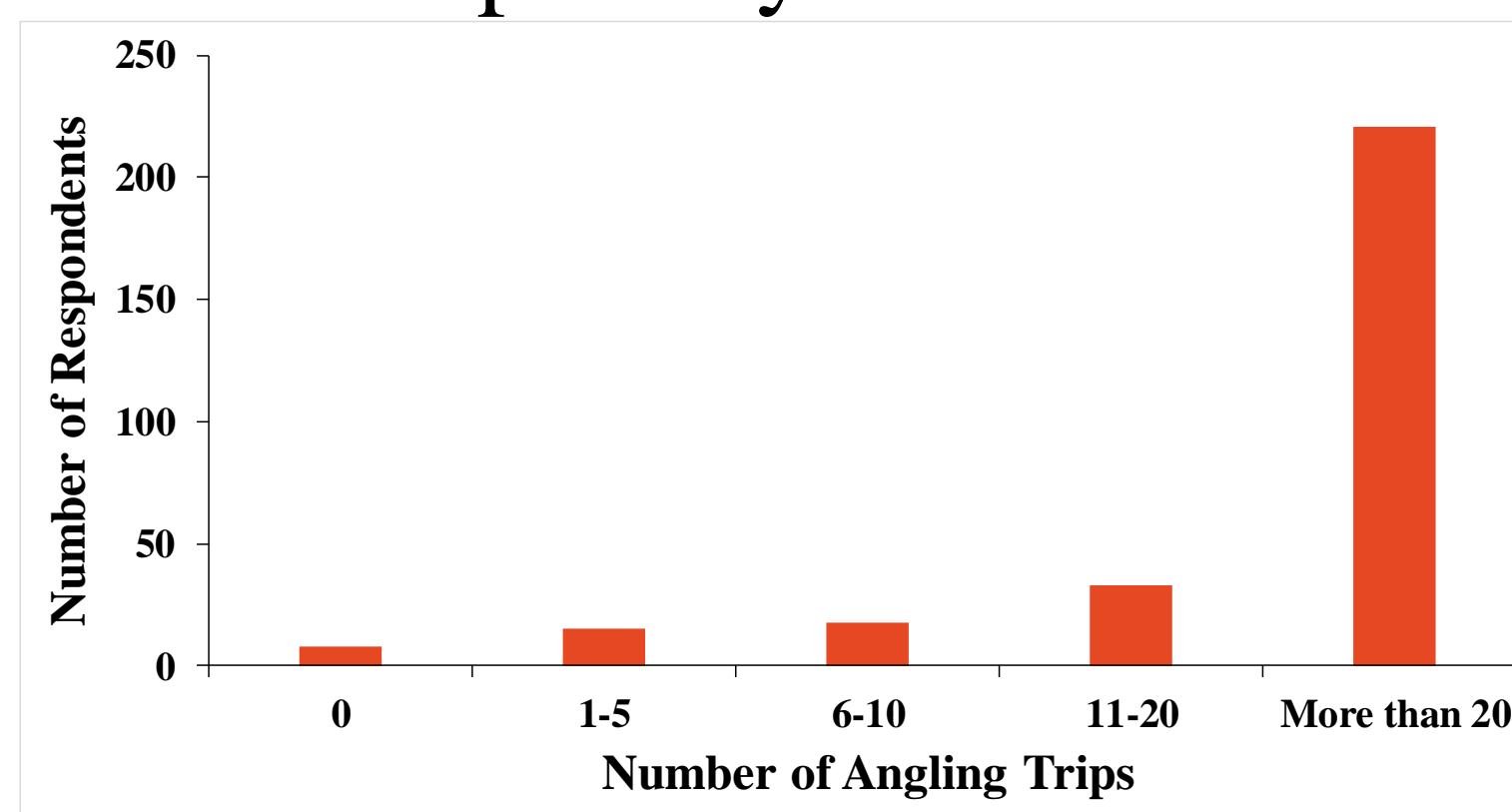


Figure 4 – Angling experience level of respondents.

- Most common terminal tackle rig utilized was a jig rig.

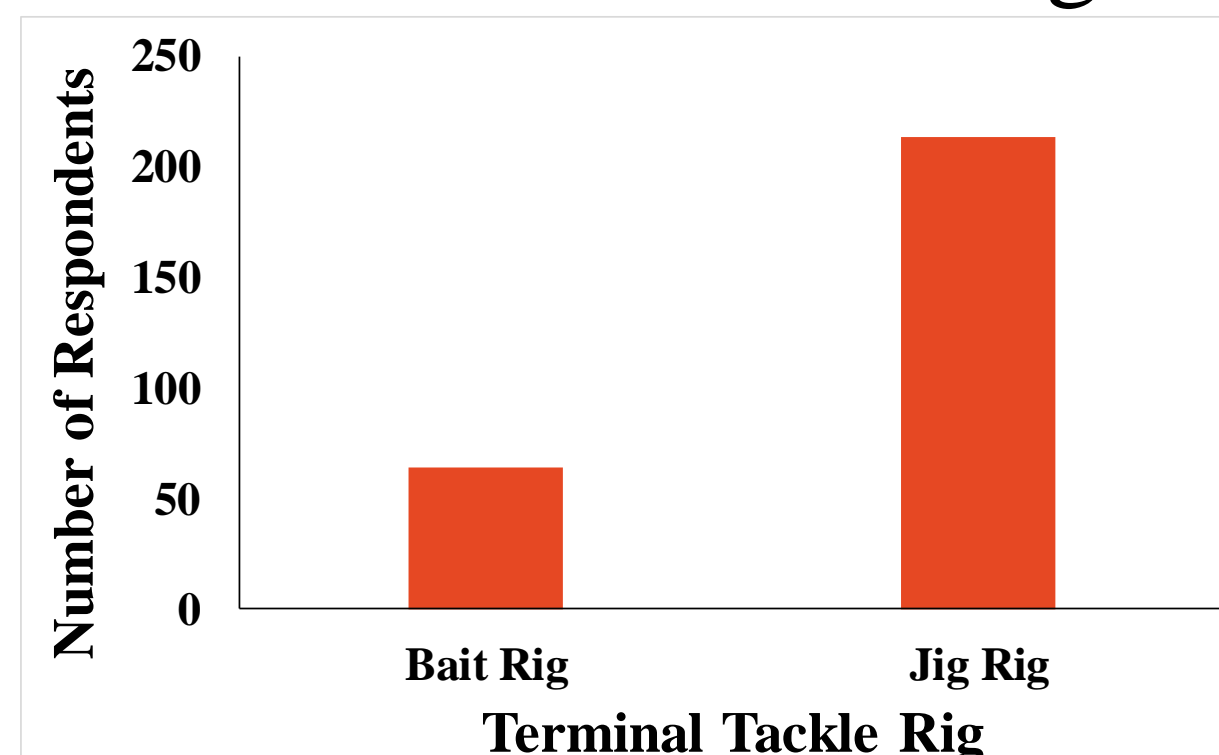


Figure 5 – Terminal tackle rigs favored by respondents.

- Common bait rigs include 3-way swivel bottom rigs (55%) and high-low rigs (27%).
- Commonly used hook sizes have increased since last survey was conducted by Lucy and Holton (1998), however hook style has remained constant.

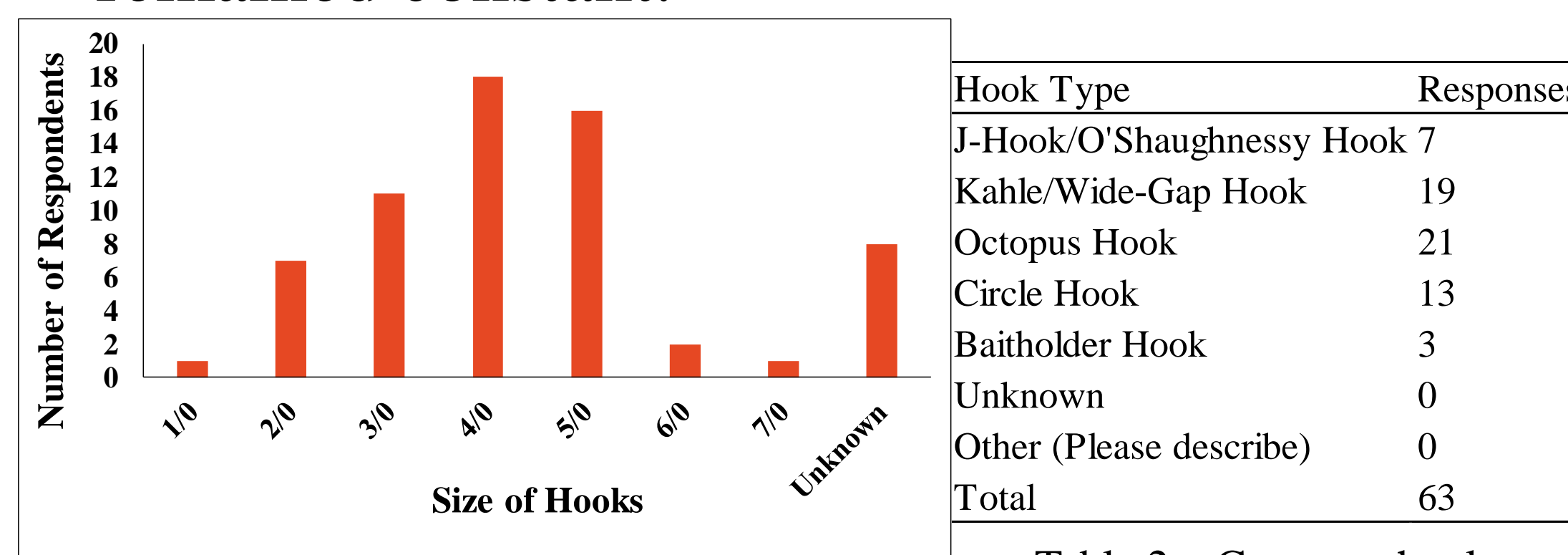


Figure 6 – Hook sizes used with bait rigs.

Table 2 – Common hook styles used with bait rigs

- Bucktail jigs are the most common jig type used (92% of jigs).
- Common modes of fishing included private vessels (70%) and party/head boats (13%).

## Results (Continued)

### External Sex Determination

- n=345 summer flounder sampled in July/August of 2018.

Date	Number of Specimens	Location Harvested	Sex Ratio (M:F)	Mean Length +/- std. dev (mm)	
				Males	Females
7/2/2018	50	Jones Beach, NY	37:13	384 +/- 17	388 +/- 13
7/8/2018	100	Barnegat Light, NJ	N/A	N/A	N/A
7/16/2018	58	Jones Beach, NY	45:13	380 +/- 16	388 +/- 16
8/6/2018	54	Massachusetts	14:40	429 +/- 9	456 +/- 30
8/11/2018	3	Sea Bright, NJ	0:3	N/A	507 +/- 24
8/13/2018	80	Massachusetts	14:63	430 +/- 14	462 +/- 29

Table 3 – Descriptive statistics of summer flounder sampled.

- There are apparent body shape differences between male and female summer flounder.

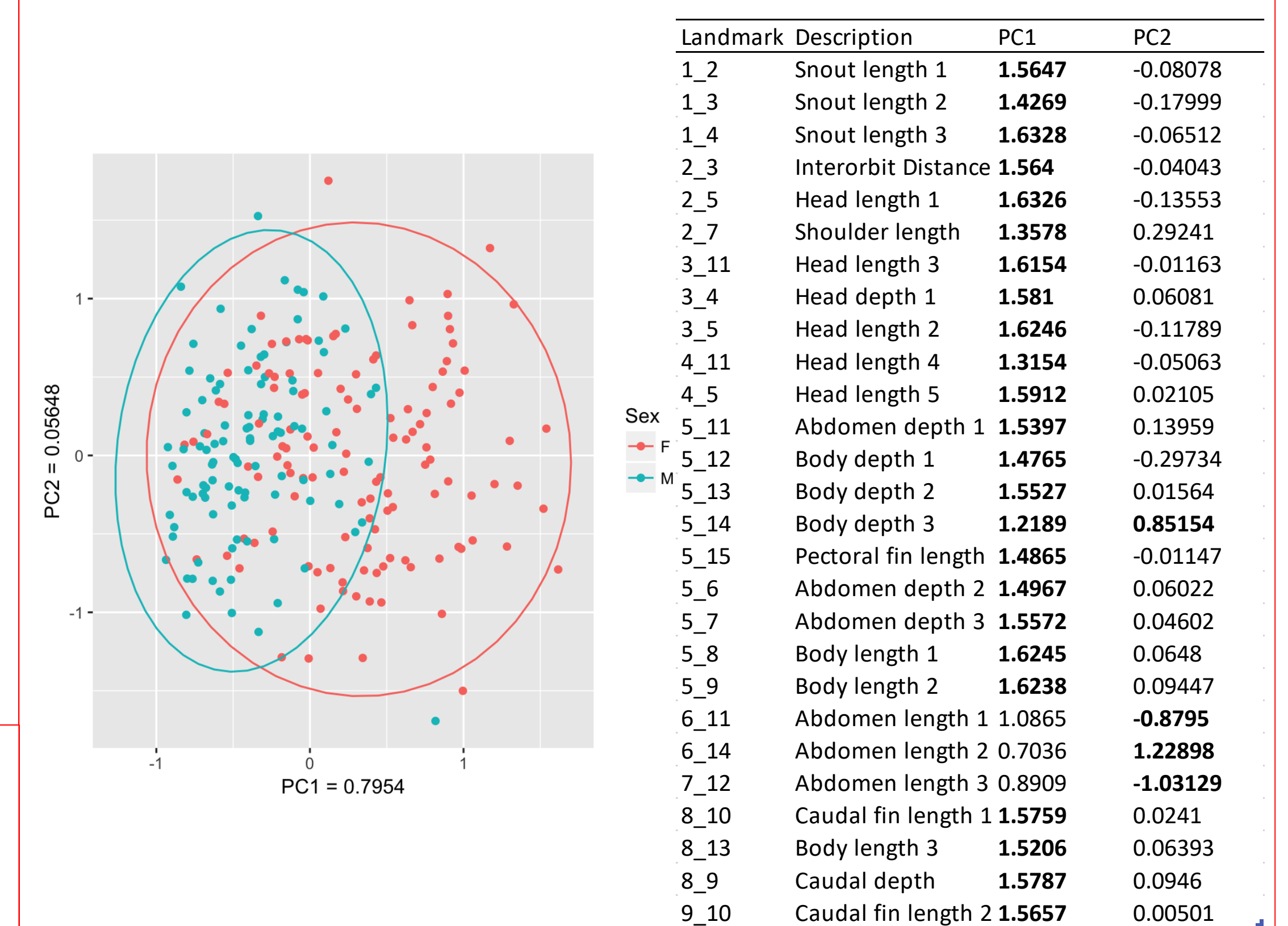


Figure 7 –Principal Component Analysis scores for male (blue) and female (pink) summer flounder.

Table 4 – Morphometric distances, associated landmarks, eigenvector elements, and amount of total variance of multiple-group principal components analysis of morphometric data from all summer flounder specimens (strong loadings indicated in bold).

## Discussion

- Changes in experienced anglers' practices may be due to current management regulations and summer flounder population dynamics.
  - Survey will continue until the end of August 2018
- Anglers' fishing practices influence the number of dead discards. Discard mortality rates by current common tackle types are unknown.
- Morphometrics appears effective at discriminating between male and female summer flounder.
  - Useful tool to employ in broad scale monitoring studies and tagging programs.
  - Additional sampling will be completed during the late summer of 2018.

## References

Cadrin, S. X. and Silva, V. M. 2005. Morphometric variation of yellowtail flounder. ICES Journal of Marine Sciences, 62:683-694.

Lucy, J. A., and Holton, T. D. 1998. Release mortality in Virginia's recreational fishery for summer flounder, *Paralichthys dentatus*. Virginia Marine Resource Report. 97-8. 48p.

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National Marine Fisheries Service. 2017. Fisheries Economics of the United States, 2015. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-170, 247p.

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