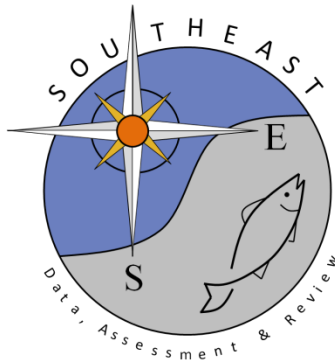


Weighted Length Compositions for Recreational FL Keys-EFL Hogfish
Landings Using MRIP, Biscayne National Park Creel Survey, and
Headboat Data

Shanae D. Allen

SEDAR94-AP-02

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Shanae D. Allen

Florida Fish and Wildlife Conservation Commission & University of South Florida

Fish and Wildlife Research Institute 100 8th Avenue SE, St. Petersburg, FL 33701

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1. Introduction

This document describes the data and methodologies used to generate weighted recreational length compositions for the SEDAR 94 Florida Keys/East Florida Hogfish (*Lachnolaimus maximus*) Assessment.

Three primary data sources are integrated: (1) the Marine Recreational Information Program (MRIP) intercept survey data, (2) the Biscayne National Park (BNP) Creel Survey, and (3) samples from the headboat fleet (e.g., the Southeast Region Headboat Survey [SRHS], at-sea samples).

The BNP Creel Survey provides supplemental recreational length data for the Florida Keys/East Florida (Keys-EFL) stock from 1993 through 2024 by increasing the number of sampled lengths to inform the length comps for the recreational private mode in Miami-Dade County, Florida. Refer to SEDAR94-DW-18 for an overview of the BNP Creel Survey.

Headboat landings account for only a minor fraction of the total recreational catch, with the Marine Recreational Information Program (MRIP) providing the primary data for the charter, private, and shore-based modes (Figures 4.12.22 and 4.12.12 in the Data Workshop Report). Because raw length samples indicate similar selectivity across all modes and gear types (Figure 1), headboat data are used to supplement the recreational private-mode samples for the Keys-EFL stock.

In previous assessments, Biscayne National Park (BNP) samples from the private recreational mode were excluded from length compositions because landings estimates were not available in the MRIP currency. While headboat samples are typically integrated by combining their expanded landings-at-length with MRIP data, this approach is often counterproductive. Despite

headboat samples frequently outnumbering MRIP samples, they represent a negligible fraction of total recreational landings; consequently, their inclusion fails to effectively reduce noise within the overall length compositions.

In this analysis, fork length measurements are binned into 2 cm intervals and observations from MRIP, BNP, and headboat are expanded to the number landed using MRIP survey design weights, which are adjusted to account for the integration of BNP and headboat length samples. Final outputs include landings-at-length matrices (in numbers of fish landed) and sample-size matrices for the Keys-EFL stock formatted for input into the Stock Synthesis (SS) assessment model.

2. Hierarchical Matching Strategy

BNP and headboat sampling units were matched with MRIP sampling units using hierarchical matching criteria. Progressively broader matching criteria applied sequentially and prioritizing matching to sampling units with the highest survey design weights (if there are multiple MRIP sampling units to choose from).

Prior to matching, MRIP sampling units with identical dates, gears, and county were retained that had the highest survey design weights (i.e., WP_SIZE). Records prior to 1981 (before the MRIP survey begins) are identified and excluded before computing landings-at-length.

2.1 BNP Creel Survey Data Matching Strategy

BNP Creel Survey data are matched with MRIP for the Keys-EFL stock using the following steps:

- **Round 1:** Date + Gear + County (most specific)
- **Round 2:** Date + County
- **Round 3:** Month + Month Part + Year + Gear + County (Month Part = first half or second half)
- **Round 4:** Month + Month Part + Year + County
- **Round 5:** Month + Year + Gear + County
- **Round 6:** Month + Year + County
- **Round 7:** Wave + Year + Gear + County (Wave = Jan-Feb, Mar-Apr, May-June, July-Aug, Sept-Oct, Nov-Dec)
- **Round 8:** Wave + Year + County
- **Round 9:** Season + Year + County (Season = Jan – June or July – Dec)
- **Round 10:** Year + County (broadest)

2.2 Headboat Data Matching Strategy

Headboat data originate primarily from the Southeast Region Headboat Survey (SRHS) but also include additional samples from at-sea surveys. Headboat interviews are matched with MRIP interviews for the Keys-EFL stock according to the following steps:

- **Round 1:** Month + Month Part + Year + Gear + Region (Month Part = first half or second half)
- **Round 2:** Month + Month Part + Year + Region
- **Round 3:** Month + Year + Gear + Region
- **Round 4:** Month + Year + Region
- **Round 5:** Wave + Year + Gear + Region (Wave = Jan-Feb, Mar-Apr, May-June, July-Aug, Sept-Oct, Nov-Dec)
- **Round 6:** Wave + Year + Region
- **Round 7:** Season + Year + Gear + Region (Season = Jan – June or July – Dec)
- **Round 8:** Season + Year + Region
- **Round 9:** Year + Gear + Region
- **Round 10:** Year + Region

3. Survey Design Weight Adjustment Procedure

A key methodological step in this analysis is the recalculation of MRIP survey design weights to account for the addition of BNP and headboat length samples within shared sampling units (i.e., interview ID). When BNP or headboat interviews are linked to MRIP sampling unit IDs, the total weight assigned to that sampling unit must be redistributed across the combined (MRIP + BNP + Headboat) pool of length measurements.

Each MRIP sampling unit has a total survey design weight representing the estimated number of landed fish that the sampling unit represents. In the MRIP + BNP + Headboat combined dataset, this total weight is divided equally among the length measurements in that sampling unit. The final survey design weight is then equal to the Total MRIP weight / (Number of BNP Samples + Number of Headboat Samples + Number of MRIP Samples).

This ensures that the sum of all survey design weights within a sampling unit remains equal to the original MRIP survey design weight, regardless of whether the lengths came from MRIP, BNP, or headboat sampling.

4. Results

For the Keys-EFL stock, BNP, headboat, and MRIP samples contributed 3,244, 657, and 3,618 measured hogfish, respectively. Despite having a relatively large raw sample count, BNP samples contributed a comparatively modest total assigned weight of 572,363 fish, while

headboat and MRIP samples were assigned weights of 5,276,478 and 14,879,609 fish, respectively (Table 1). All weights are expressed in estimated number of landed fish.

Figure 2 compares the historically applied method (i.e., aggregating separately expanded MRIP and SRHS landings-at-length) to the proposed method of pooling MRIP, BNP, and headboat samples prior to weight assignment. Both approaches yield very similar recreational landings-at-length distributions, supporting the validity of the proposed methodology.

The final output of this analysis is estimated numbers of fish landed per 2 cm length bin, expressed in MRIP units and informed by the combined MRIP, BNP, and headboat samples. Although the Florida State Reef Fish Survey (SRFS) serves as the currency for recreational private-mode landings in SEDAR 94, SRFS estimates are proportional to MRIP private-mode landings from 1981–2020 (SEDAR-94-DW-21), and the same length distributions therefore apply over this period. A worthwhile future improvement would be to recalculate the MRIP survey design weights (WP_SIZE) in SRFS units across the full time series.

5. Tables

Table 1. Total assigned weight (in 1000s of fish) by year and recreational data source for the Keys-EFL stock.

Year	Keys-EFL			Total
	BNP	HB	MRIP	
1981	0.000	338.845	1537.394	1876.238
1982	0.000	33.375	122.407	155.783
1983	0.000	65.355	217.249	282.604
1984	0.000	4053.654	5625.791	9679.444
1985	0.000	90.861	162.603	253.464
1986	0.000	68.796	129.118	197.914
1987	0.000	73.729	330.070	403.799
1988	0.000	61.440	241.139	302.578
1989	0.000	53.674	192.166	245.840
1990	0.000	78.939	280.016	358.954
1991	0.000	11.054	117.365	128.420
1992	0.000	3.946	338.240	342.186
1993	53.990	22.083	312.639	388.712
1994	45.259	15.720	223.174	284.153
1995	42.267	2.907	184.617	229.790
1996	21.555	7.695	129.713	158.963
1997	13.441	8.609	73.567	95.616
1998	11.036	3.692	54.514	69.241
1999	0.000	11.640	128.302	139.942
2000	10.148	4.896	35.723	50.766
2001	5.729	10.743	84.624	101.096
2002	25.538	2.585	86.474	114.597
2003	26.036	5.335	162.521	193.892
2004	4.950	23.386	209.370	237.706
2005	4.668	38.922	190.583	234.173
2006	4.928	4.306	171.877	181.111
2007	14.220	7.428	240.048	261.697
2008	8.726	14.185	495.260	518.171
2009	12.438	19.655	325.424	357.516
2010	13.356	2.009	264.948	280.313
2011	5.823	12.491	98.995	117.310
2012	11.439	50.743	500.345	562.527
2013	24.389	9.341	167.366	201.095
2014	7.998	16.726	383.001	407.725
2015	113.495	14.854	580.205	708.554

2016	34.774	14.158	284.666	333.598
2017	25.529	8.446	79.228	113.203
2018	9.416	0.200	17.411	27.027
2019	0.000	0.000	8.311	8.311
2020	0.000	2.837	10.285	13.122
2021	8.684	1.880	25.115	35.679
2022	1.791	1.421	26.622	29.835
2023	2.672	2.935	17.280	22.887
2024	8.073	0.985	13.847	22.904
Total	572.369	5276.478	14879.609	20728.456

6. Figures

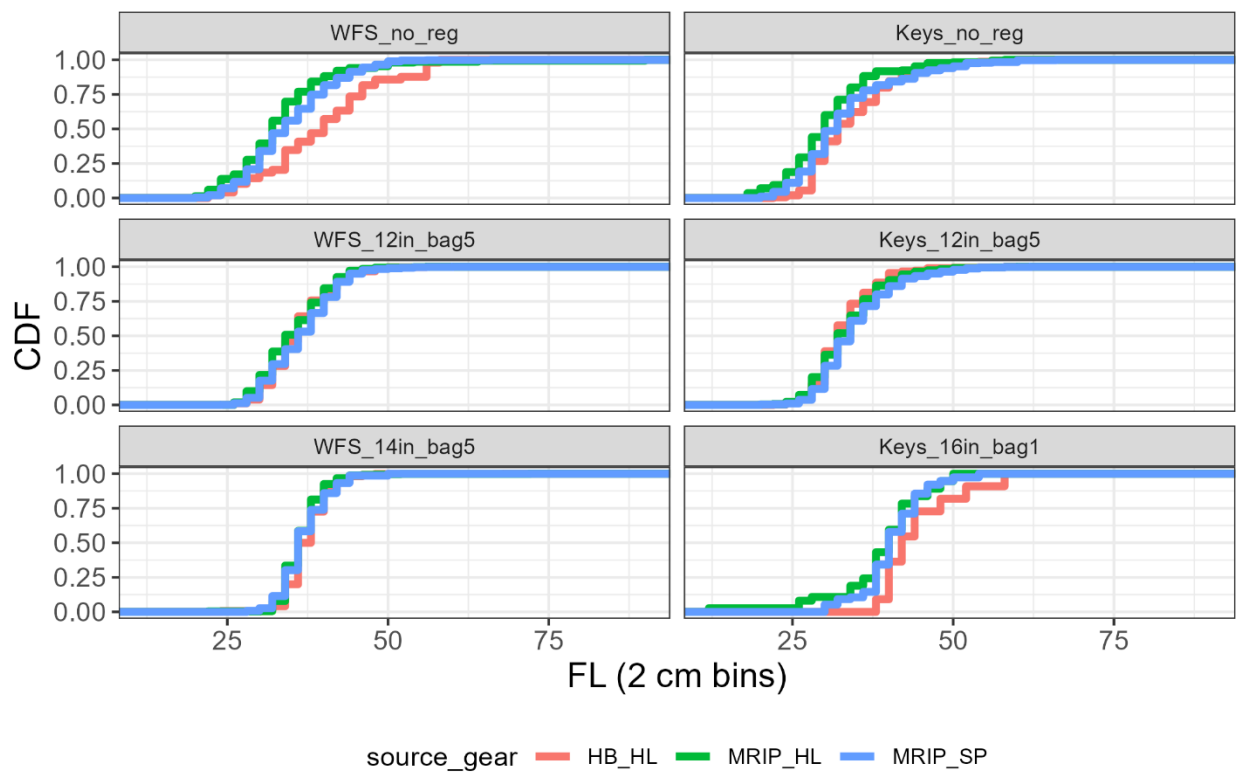


Figure 1. Cumulative Distribution Functions (CDFs) of headboat (HB) samples and MRIP by gear, stock, and management time period.

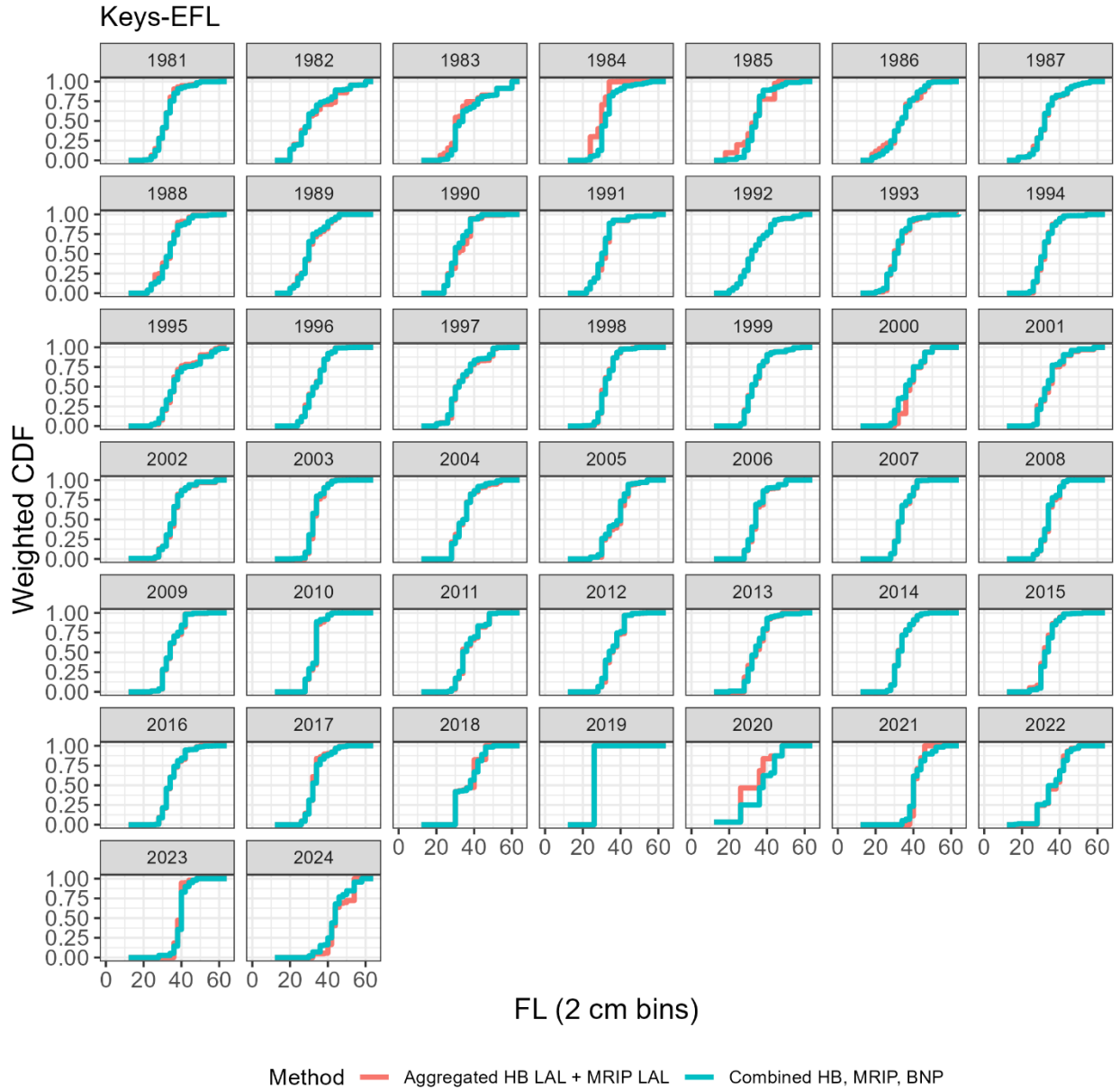


Figure 2. Comparison of CDFs from two methods of weighting the Keys-EFL recreational length compositions 1) by first weighting the headboat and MRIP fleets separately then aggregating and 2) by combining HB, MRIP, and BNP data prior to weighting as described herein.