

Boating Activity in the Florida Keys National Marine Sanctuary



**Florida Fish and Wildlife
Conservation Commission**

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FKNMS - SAC



Vessel Use in the Florida Keys National Marine Sanctuary

Final Report

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FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION

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Study Objectives

- Conduct aerial survey of boaters and their activities
- Understand spatial and temporal variation in boating patterns
- Compare boating patterns between 2016 and 1992
- Develop a database to support ongoing analytical assessment of Sanctuary management issues



KeysAir
Cessna 172





FWC Law Enforcement
Cessna 182




NOAA
DHC-6 Twin Otter


Legend


 FKNMS boundary

 No Fly Zone

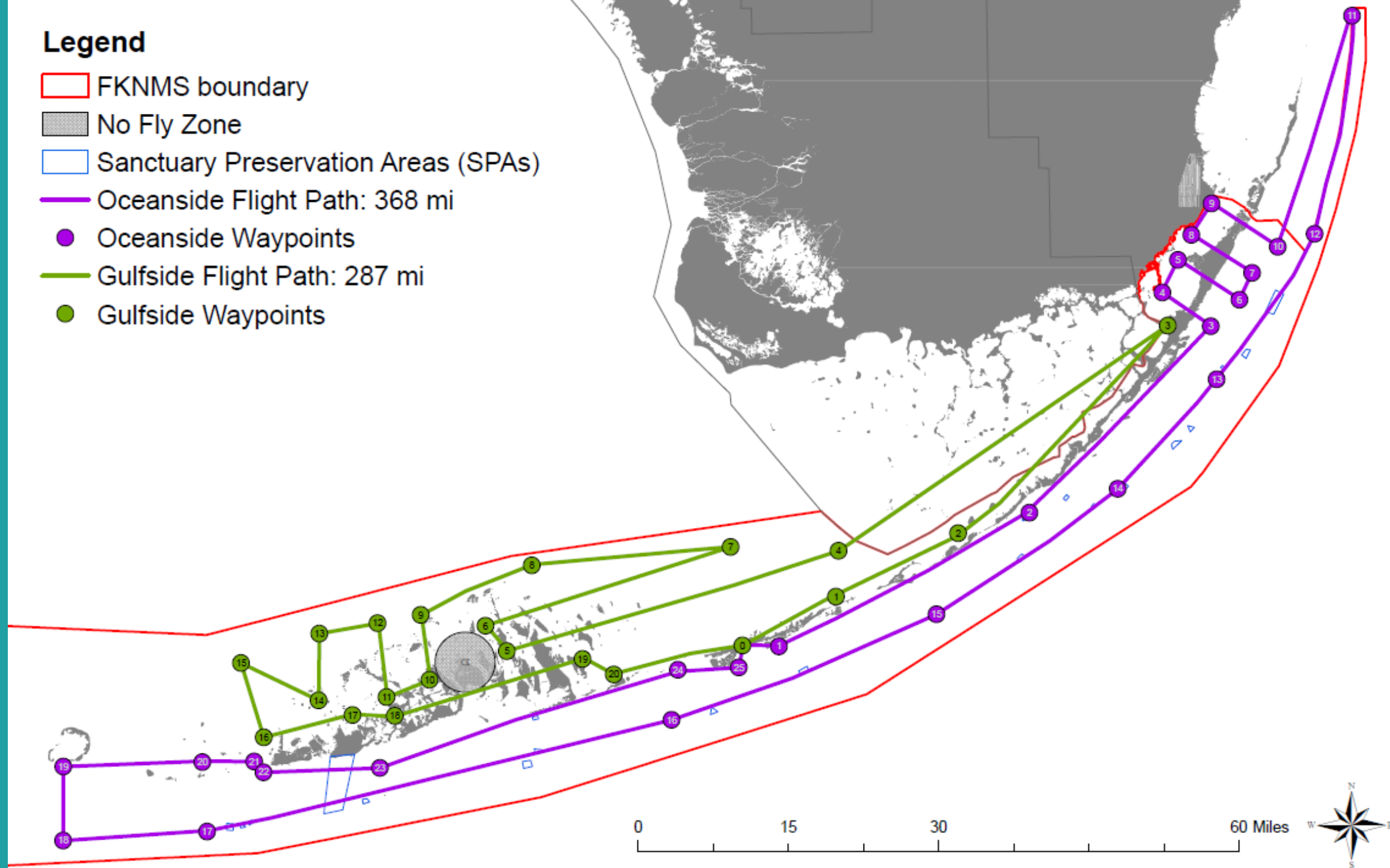
 Sanctuary Preservation Areas (SPAs)

 Oceanside Flight Path: 368 mi

 Oceanside Waypoints

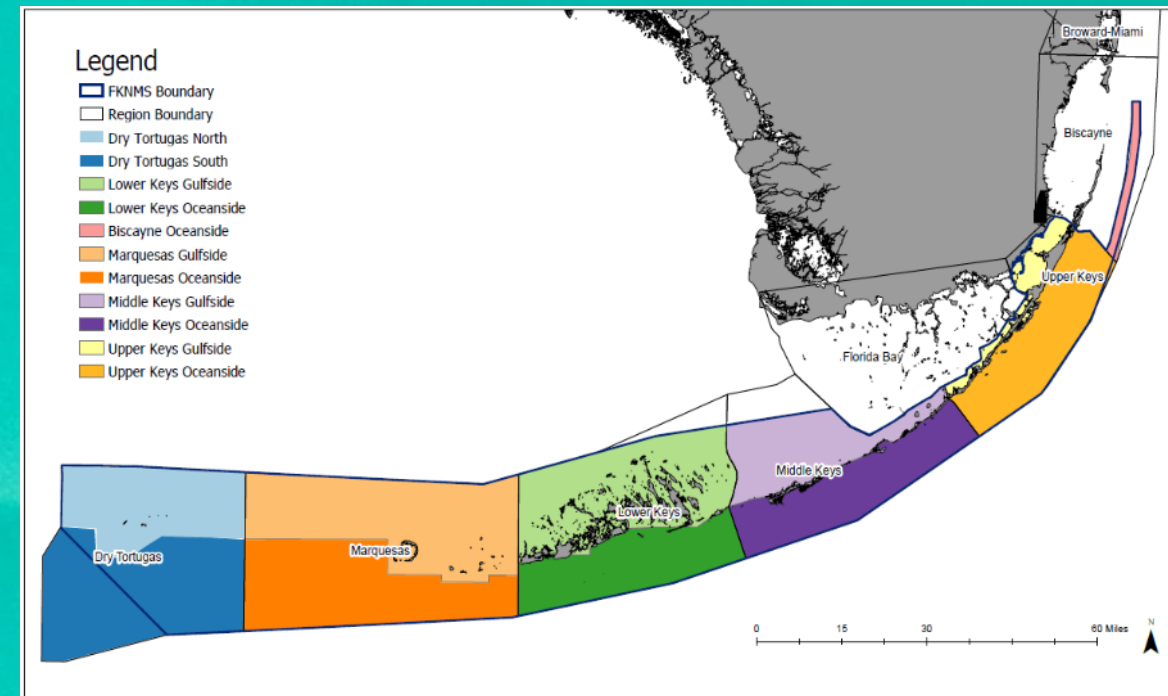
 Gulfside Flight Path: 287 mi

 Gulfside Waypoints



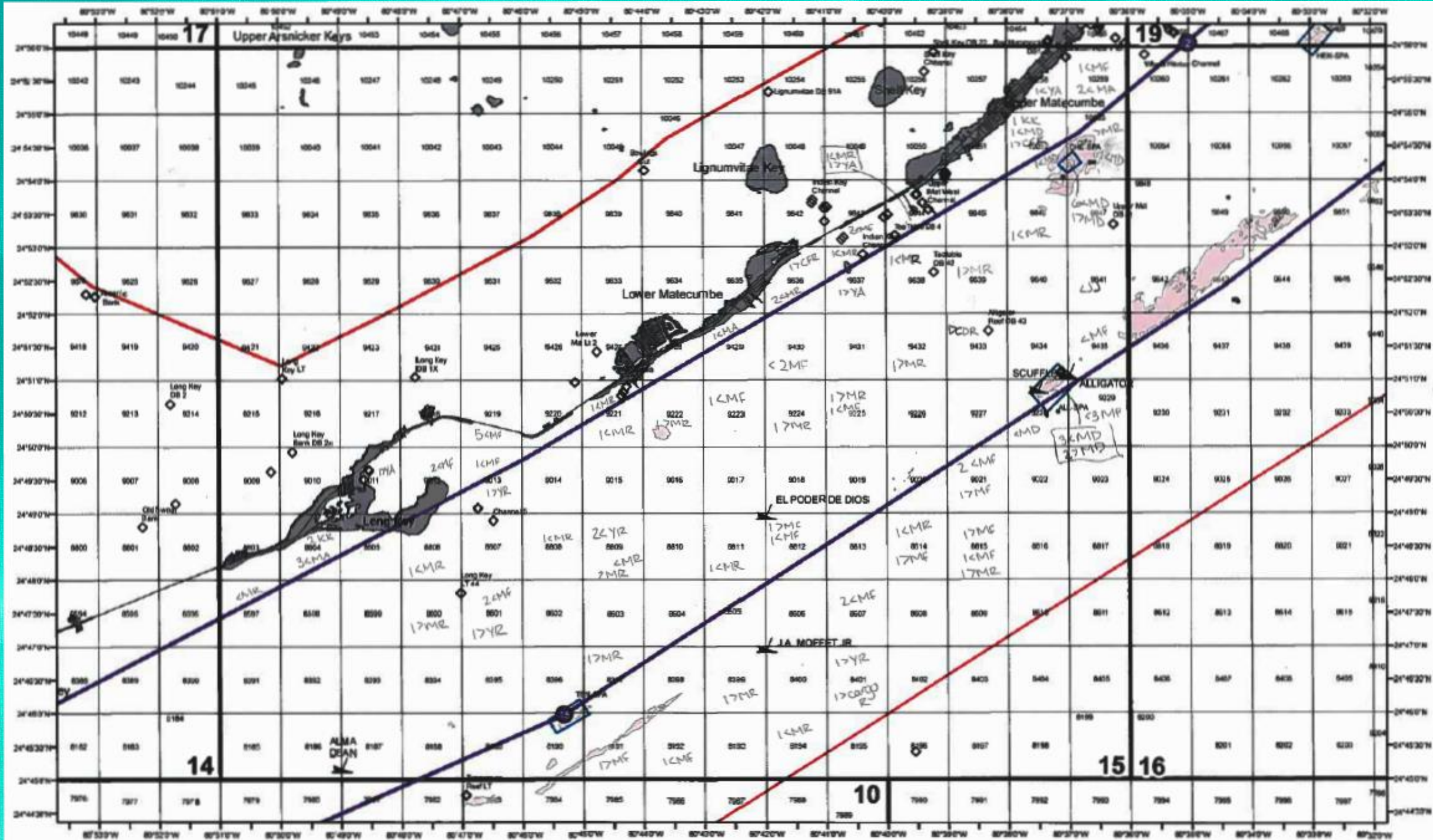
2016 Survey Effort

Day Type	Number of Surveys
Holiday	3
Lobster Season Opening Day	2
Summer Weekday	4
Summer Weekend	5
Winter Weekday	7
Winter Weekend	8



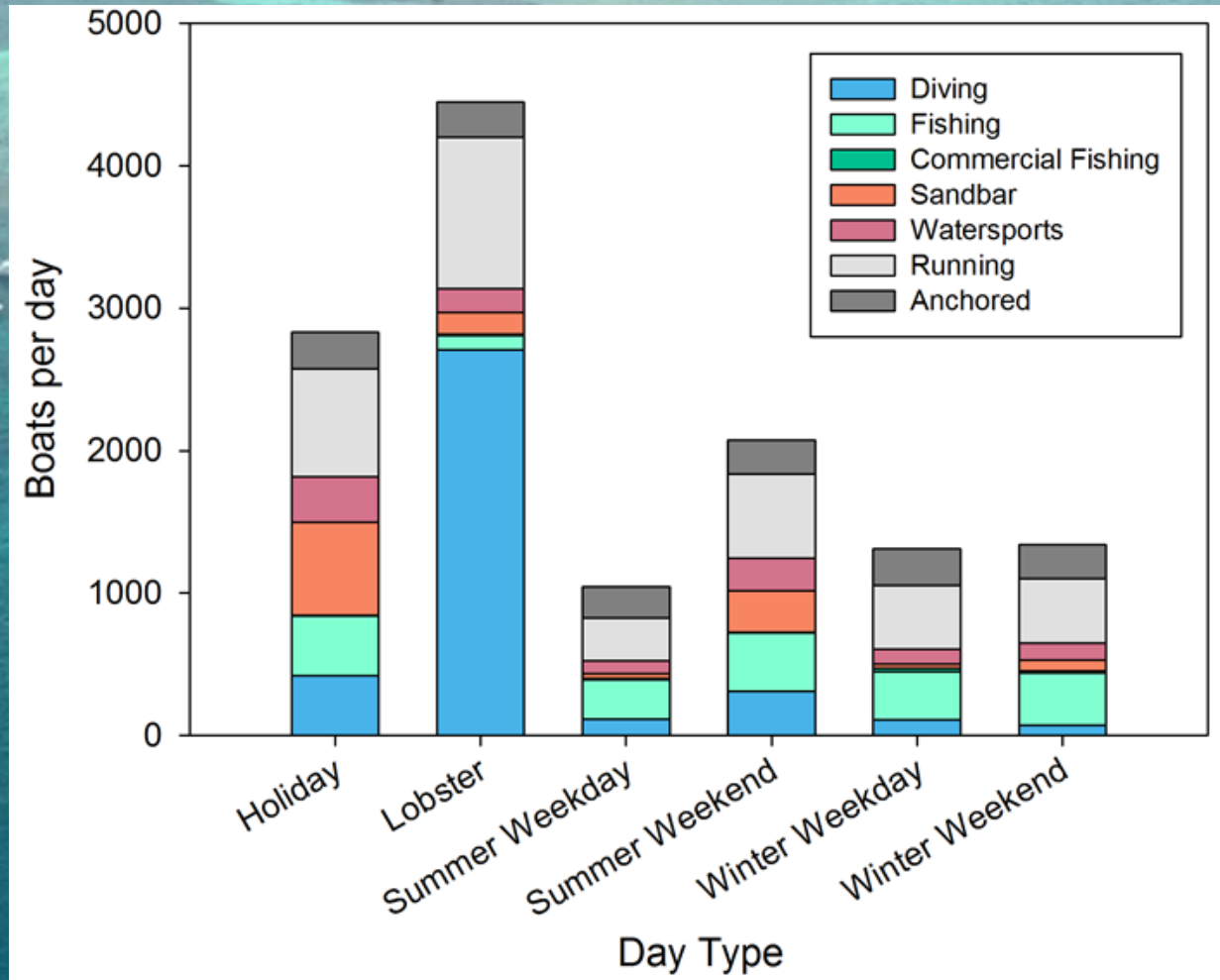
Categories

- Boat Size
 - Greater than or less than 30 feet in length
- Boat Type
 - Motorboat, Sailboat, PWC, Kayaks/Paddleboards
- Boater Activity
 - *e.g.* Fishing, Diving, Partying, Running



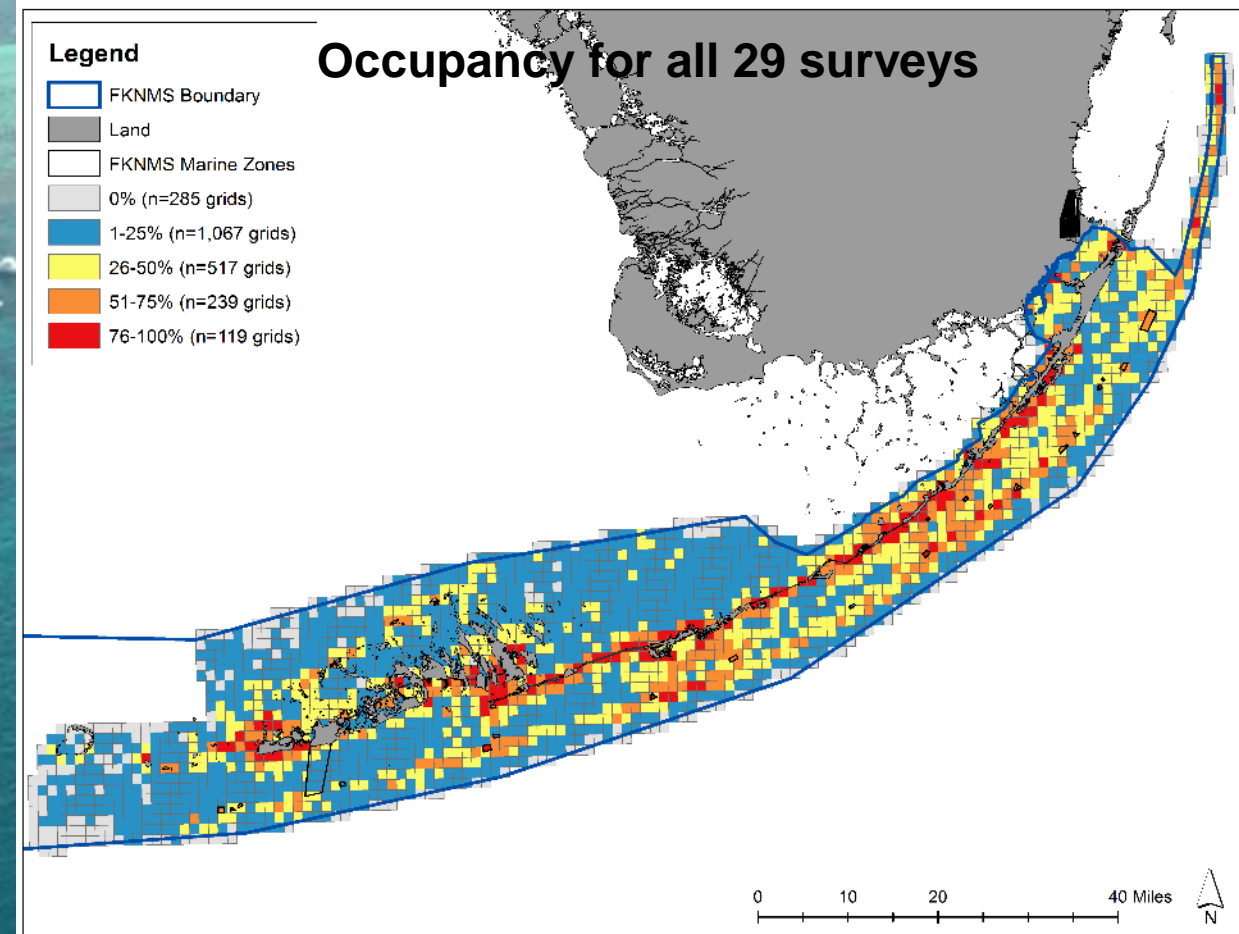
Overall Results

- Estimated $550,461 \pm 40,946$ (sd) boat days
- The first day of the Lobster Sport Season had 4,818 boats and Opening Day of Lobster Season had 4,096 boats.
- Holiday weekends were the second highest boat use times, with an average of $2,875 \pm 818$ boats per day. Peak boat use was on Memorial Day weekend, 4,019 boats).
- Winds greater than 15 mph tended to reduce the number of boats observed.
- On windy days, more boats were concentrated nearshore, around bridges, and on the Gulfside.



Overall Results

- High-use areas of the Sanctuary were along the reef tract, nearshore, and near bridges.
- On average, 65% of all boats were observed on the Oceanside during the survey.



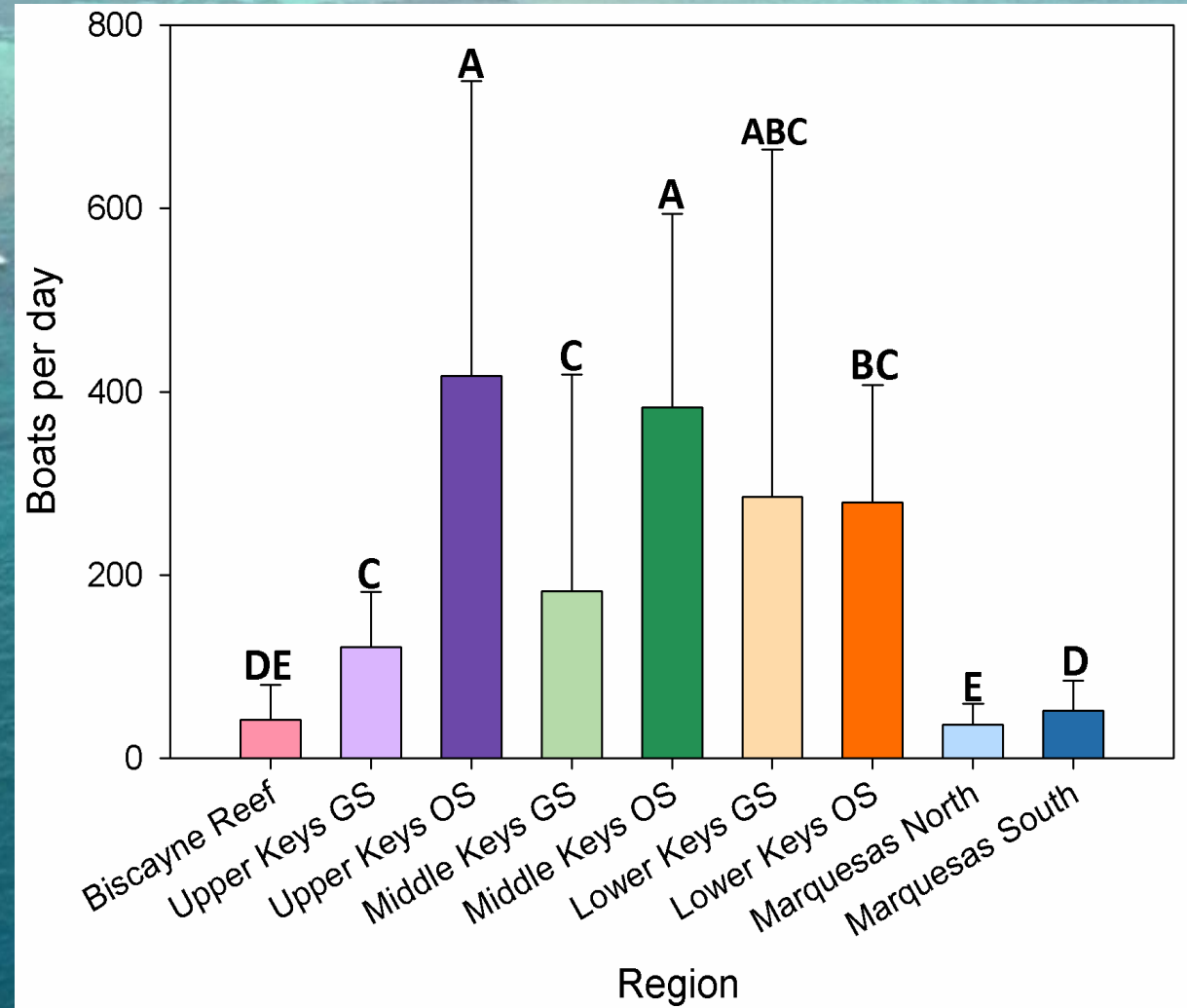
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		Total Boats			Density of Boats	
	Area (nmi ²)	Avg. Boats per day	St. Dev. Boats per day	% boats per day	Avg. Boats per nmi ²	St. Dev. Boats per nmi ²
Biscayne Ref	29	42.1	38.3	2	1.43	1.30
Upper Keys GS	81	121.6	60.2	7	1.50	0.74
Upper Keys OS	273	417.3	321.8	23	1.53	1.18
Middle Keys GS	227	182.3	236.2	10	0.80	1.04
Middle Keys OS	279	383.0	211.3	21	1.37	0.76
Lower Keys GS	419	285.6	378.3	16	0.68	0.90
Lower Keys OS	267	279.2	127.8	16	1.05	0.48
Marquesas North	473	36.5	22.9	2	0.08	0.05
Marquesas South	399	52.3	32.6	3	0.13	0.08
Grand Total	2447					

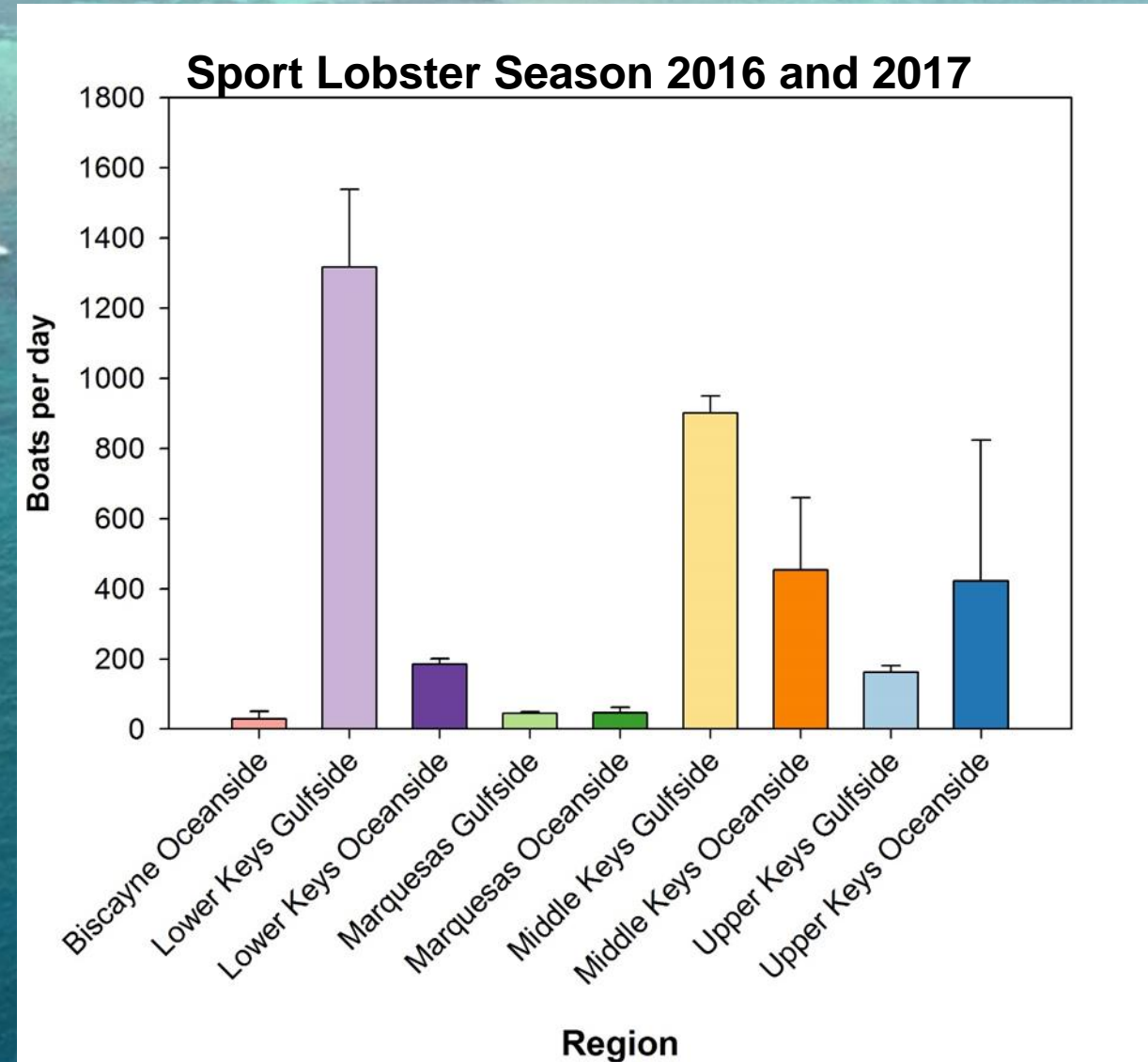
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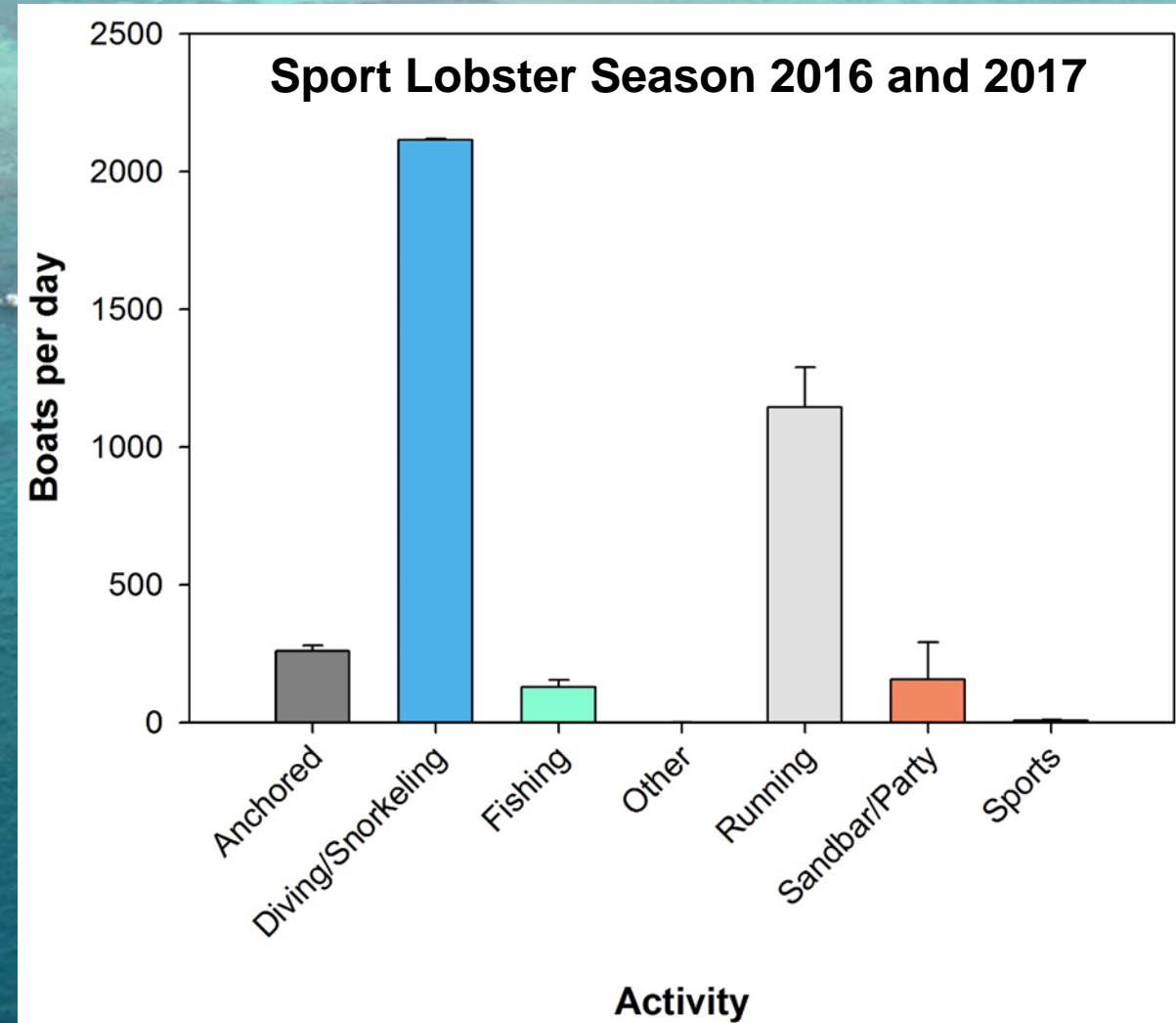
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- Many of the boats observed in the Middle and Lower Keys Gulfside areas (36-38%) were observed during Lobster Season Opening Days.



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Average Number of Boats During Lobster Holidays

Legend

Land

SPAs

FKNMS Boundary

Total Boats per Grid

0 boats

1 boats

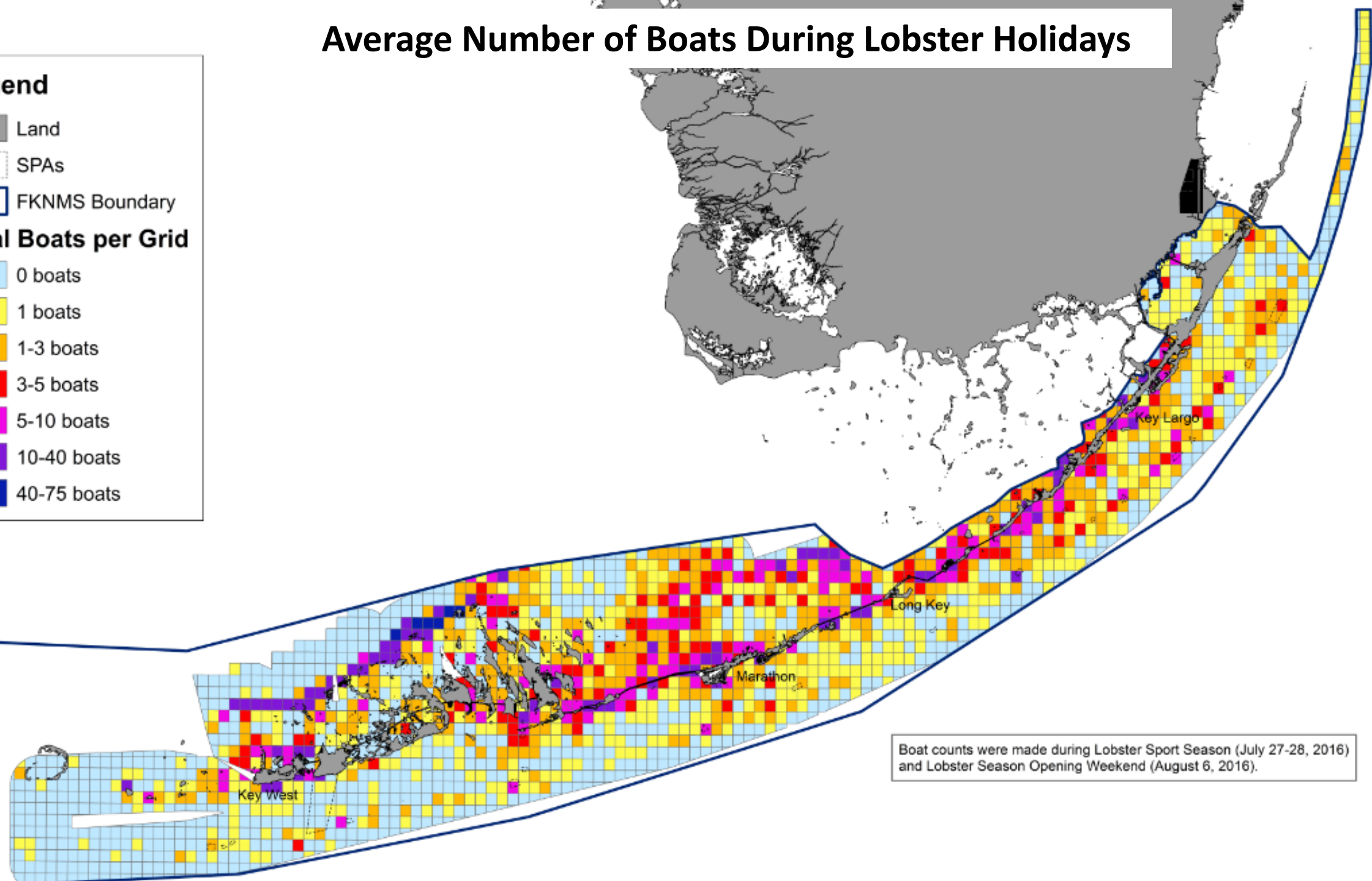
1-3 boats

3-5 boats

5-10 boats

10-40 boats

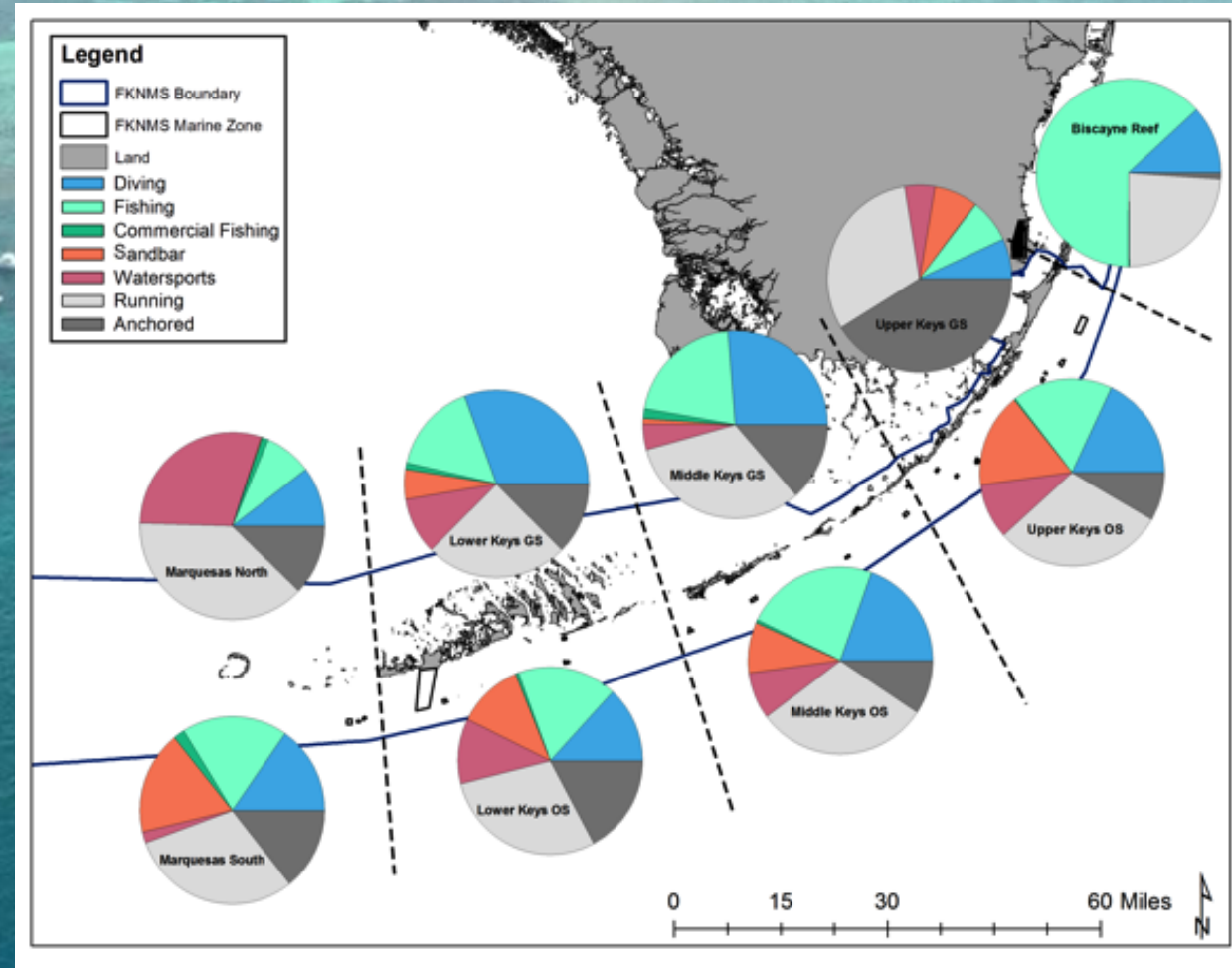
40-75 boats



Boat counts were made during Lobster Sport Season (July 27-28, 2016) and Lobster Season Opening Weekend (August 6, 2016).

Overall Results

- High-use areas of the Sanctuary were along the reef tract, nearshore, and near bridges.
- On average, 65% of all boats were observed on the Oceanside during the survey.
- Many of the boats observed in the Middle and Lower Keys Gulfside areas (36-38%) were observed during Lobster Season Opening Days.
- Diving and hook-and-line fishing each represented ~ 19% of boating activities. Sandbar and watersports activities each made up ~ 9%. Boats that were running (29%) when counted were likely also participating in other activities, just not at the time and location when they were counted



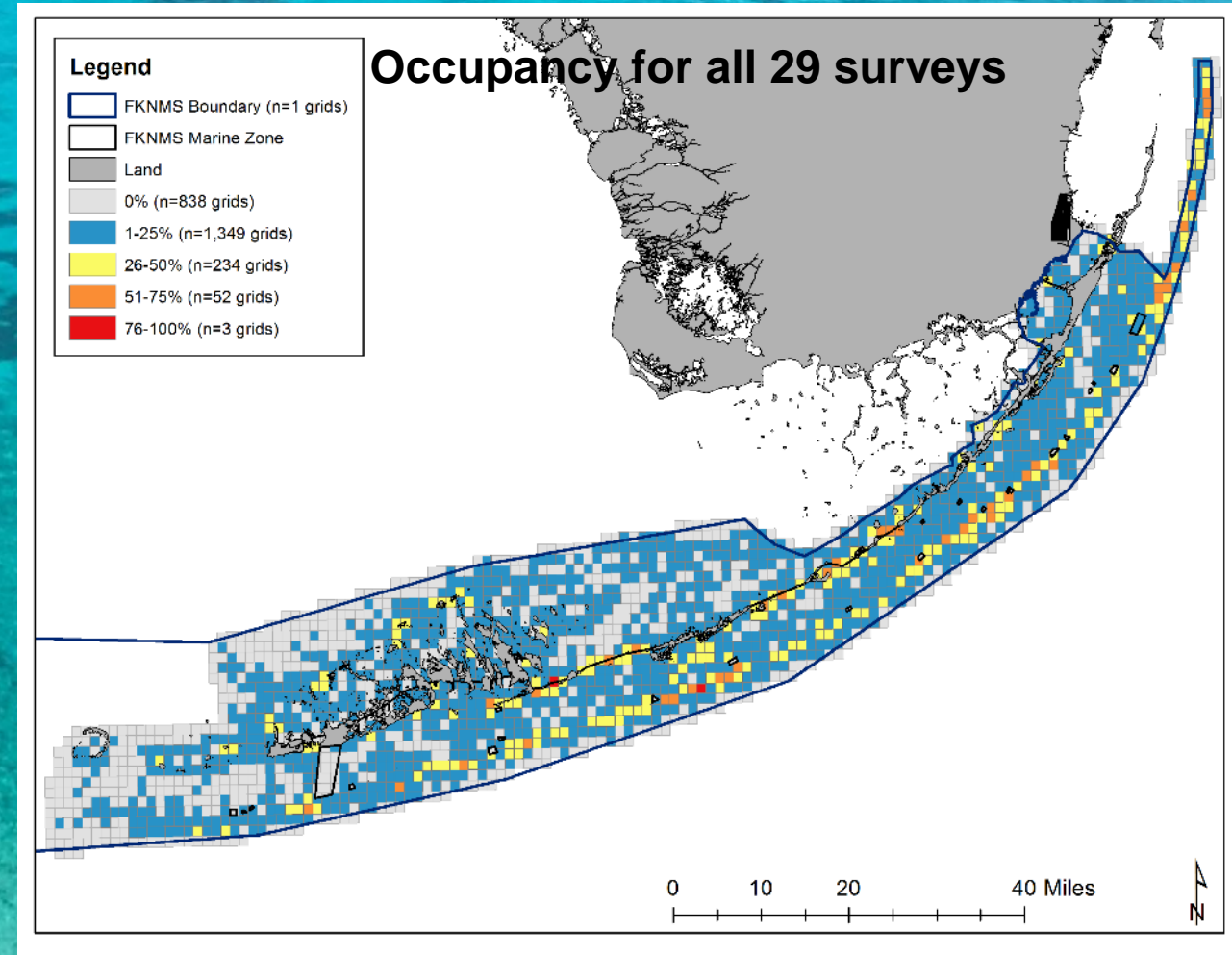
Hook-and-Line Fishing

- At any given time, 15-28% of vessels in the Sanctuary were fishing.
- An average of 342 ± 190 vessels were observed fishing daily.

		Total Fishing Boats			Density of Fishing Boats	
		Avg. Boats per day	St. Dev. Boats per day	% Boats per day	Avg. Boats per nmi ²	St. Dev. Boats per nmi ²
Biscayne Reef	29	25.0	26.1	7	0.90	0.88
Upper Keys GS	81	9.3	8.0	3	0.12	0.10
Upper Keys OS	273	73.3	52.2	21	0.27	0.19
Middle Keys GS	227	38.2	26.8	11	0.17	0.12
Middle Keys OS	279	89.4	53.8	26	0.32	0.19
Lower Keys GS	419	45.1	25.0	13	0.11	0.06
Lower Keys OS	267	48.8	29.8	14	0.18	0.11
Marquesas North	473	3.0	2.3	1	0.01	0.00
Marquesas South	399	9.7	6.3	3	0.03	0.02
Grand Total	2447					

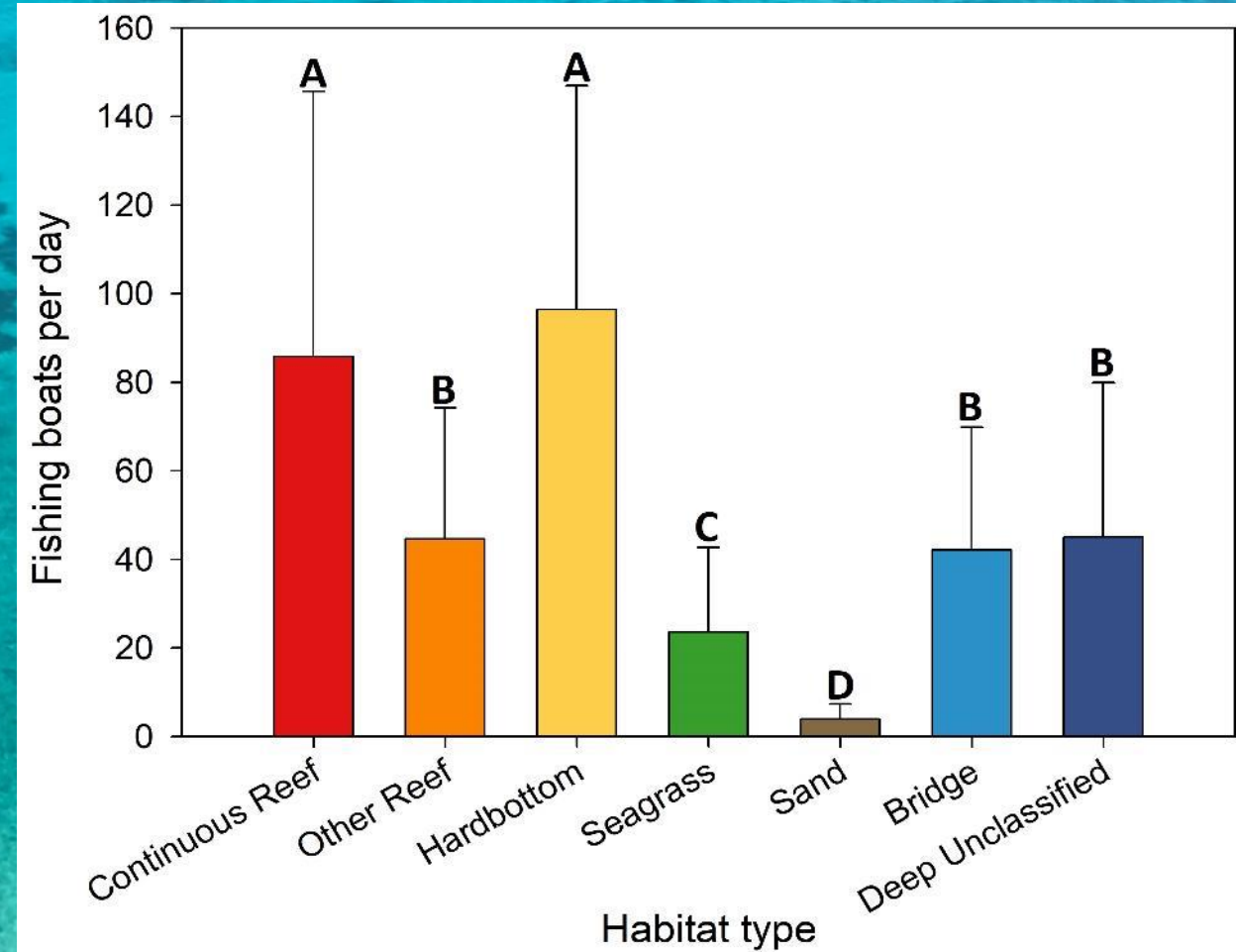
Hook-and-Line Fishing

- Hook-and-line fishing boats were fairly spread throughout the Sanctuary, but there were popular fishing areas – particularly along the reef tract and near bridges.



Hook-and-Line Fishing

- The majority of fishing boats were observed over hardbottom (28%) and over continuous reef (25%) habitats. Other reefs supported 13% of fishing boats, while bridges (12%) and deep areas offshore (12%) were also popular. Per area, bridges and continuous reef habitats saw the highest densities of fishing boats.



Diving

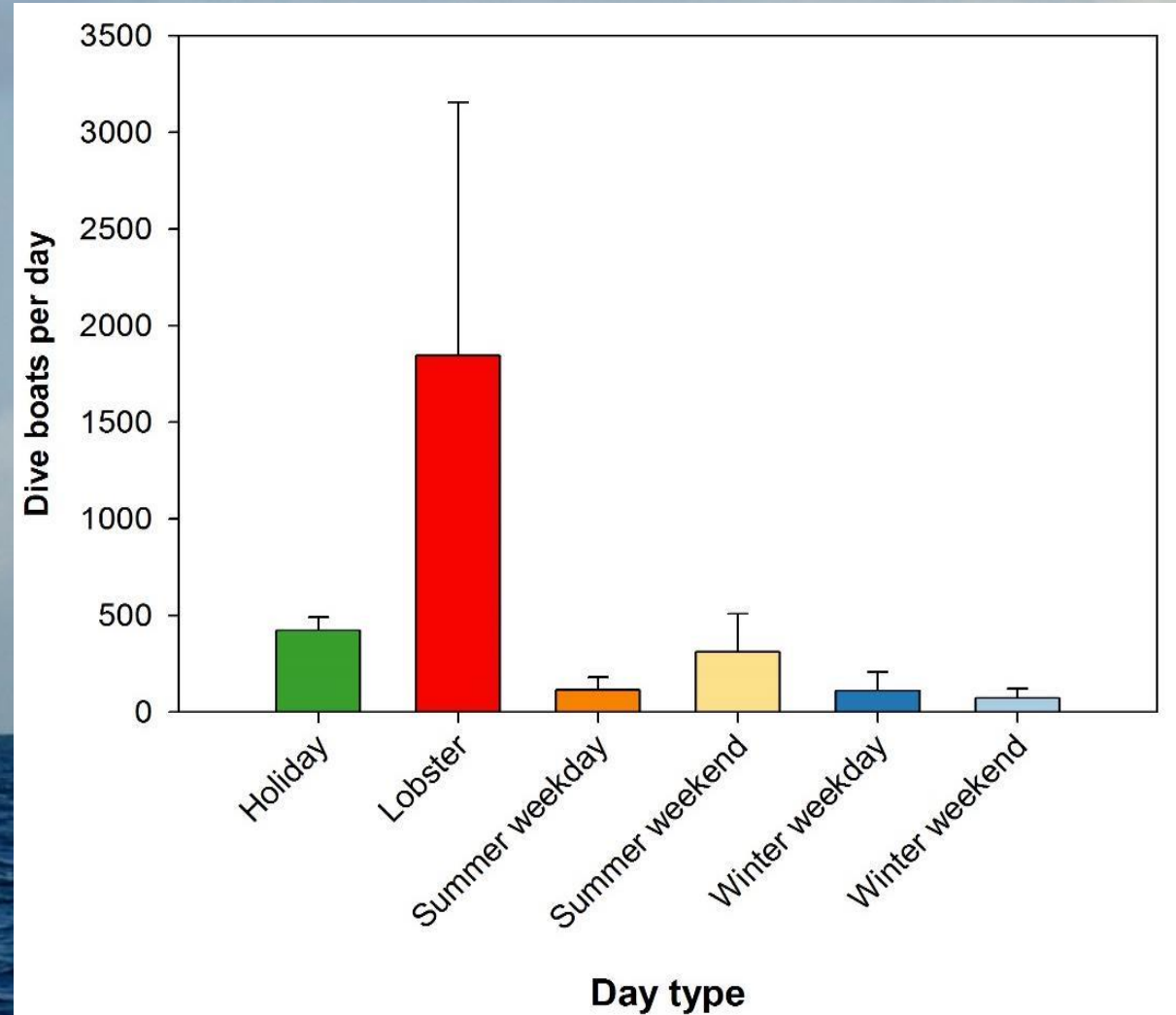
- There was an average of 172 ± 162 dive and 18 ± 10 charter dive boats observed each day.
- The greatest number of dive boats, 518 were seen on Memorial Day weekend.
- At any given time, 19% of vessels in the Sanctuary were diving. The number of dive boats varied by time of year, day of the week, and with wind speed.

		Total Dive Boats			Density of Dive Boats	
	Area (nmi ²)	Avg. Boats per day	St. Dev. Boats per day	% Boats per day	Avg. Boats per nmi ²	St. Dev. per nmi ²
Biscayne Reef	29	5.04	9.35	3	0.17	0.32
Upper Keys GS	419	0.69	1.29	1	0.01	0.02
Upper Keys OS	267	54.88	52.30	36	0.20	0.19
Middle Keys GS	473	2.19	4.85	2	0.01	0.02
Middle Keys OS	399	54.62	59.23	34	0.20	0.21
Lower Keys GS	227	4.81	10.02	3	0.01	0.02
Lower Keys OS	279	26.69	25.93	17	0.10	0.10
Marquesas North	81	0.38	0.74	0	0.001	0.002
Marquesas South	273	6.42	4.72	4	0.02	0.01
Grand Total	2447					



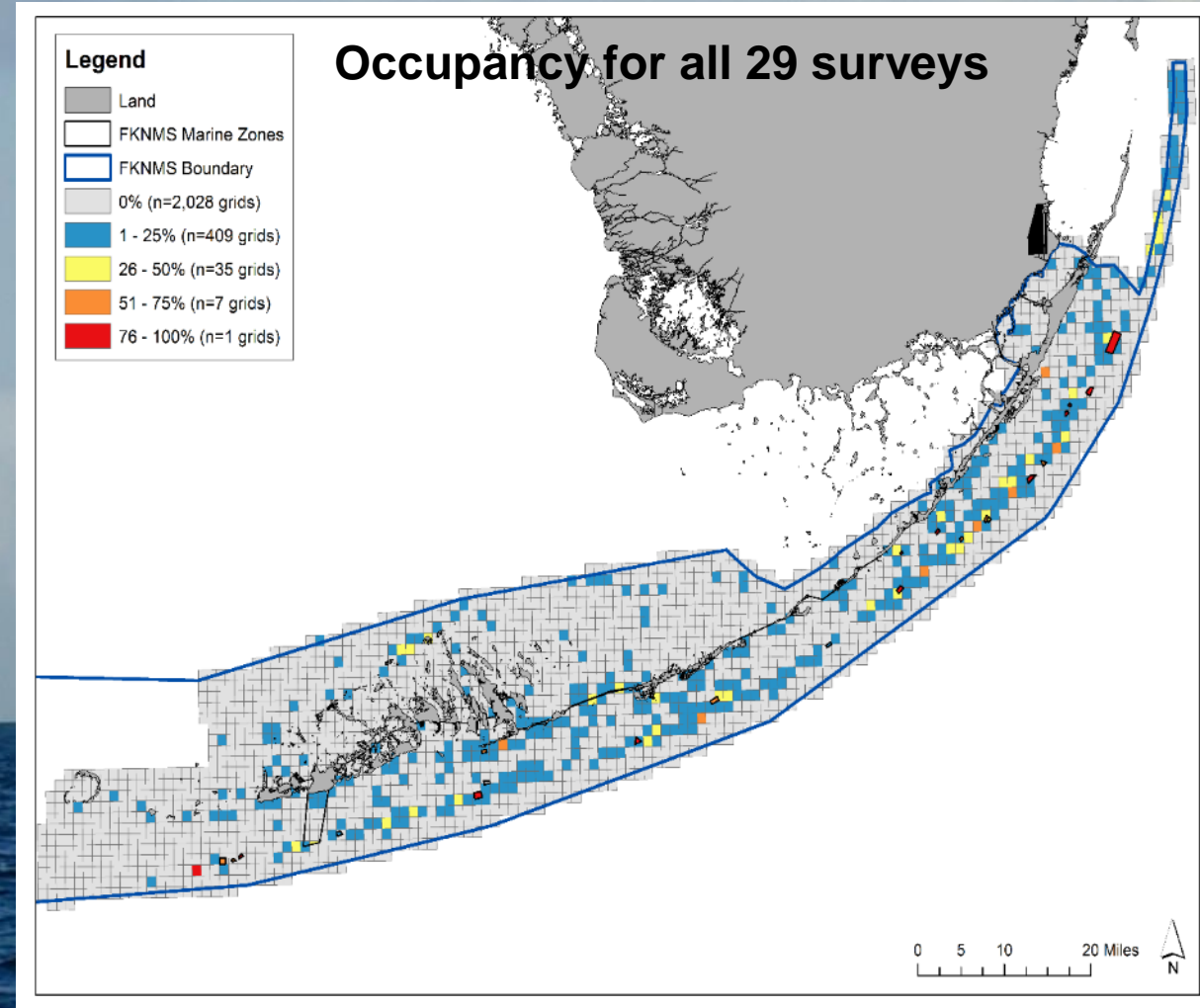
Diving

- A greater number of dive boats were observed during the summer, particularly summer weekends.



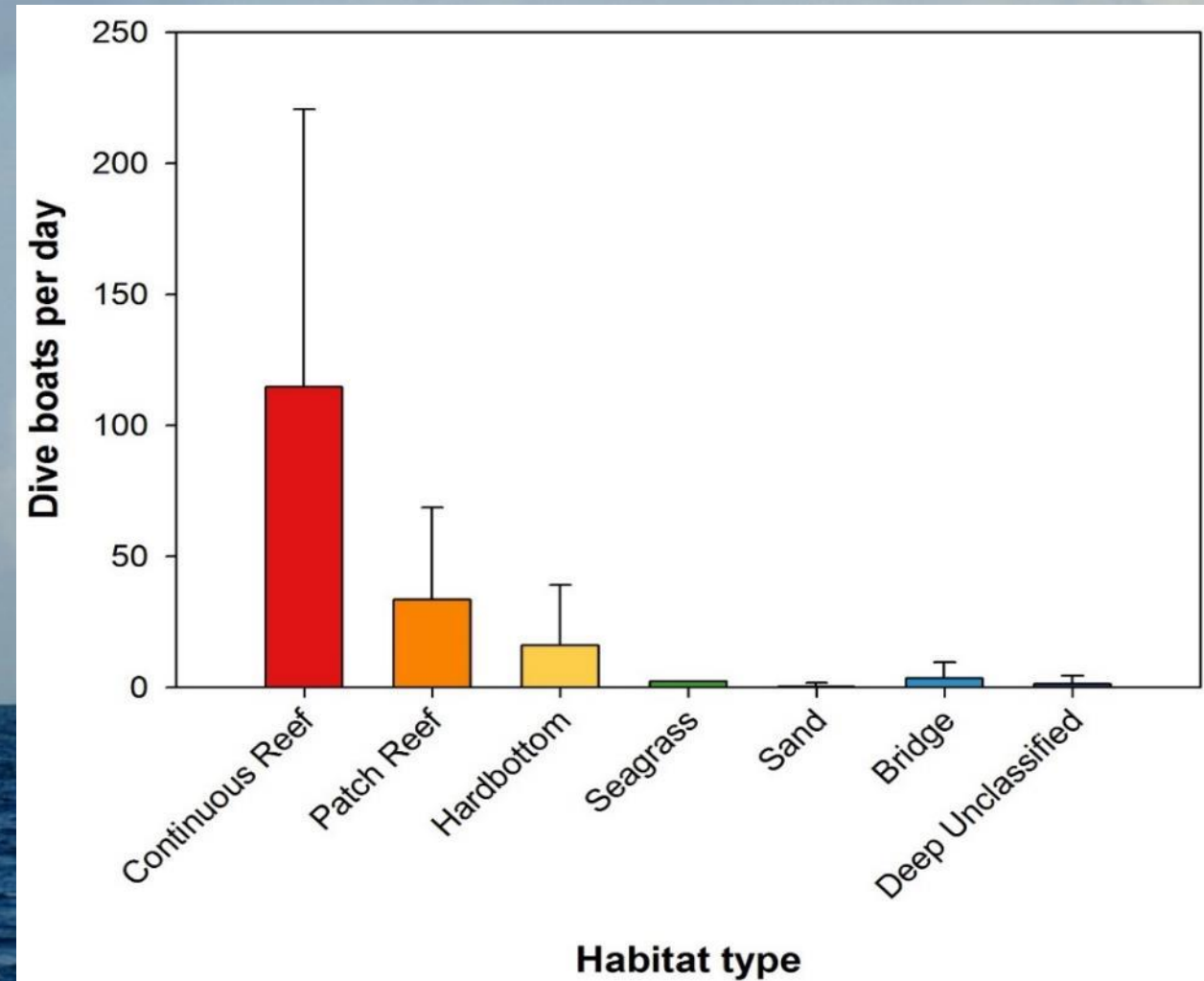
Diving

- A greater number of dive boats were observed during the summer, particularly summer weekends.
- Dive boats were concentrated along continuous reef habitat on the Oceanside of the Florida Keys during both the summer and winter, with 55% of all dive boats observed in FKNMS Marine Zones.
- The highest densities of dive boats were observed at Upper and Middle Keys reefs.














Diving

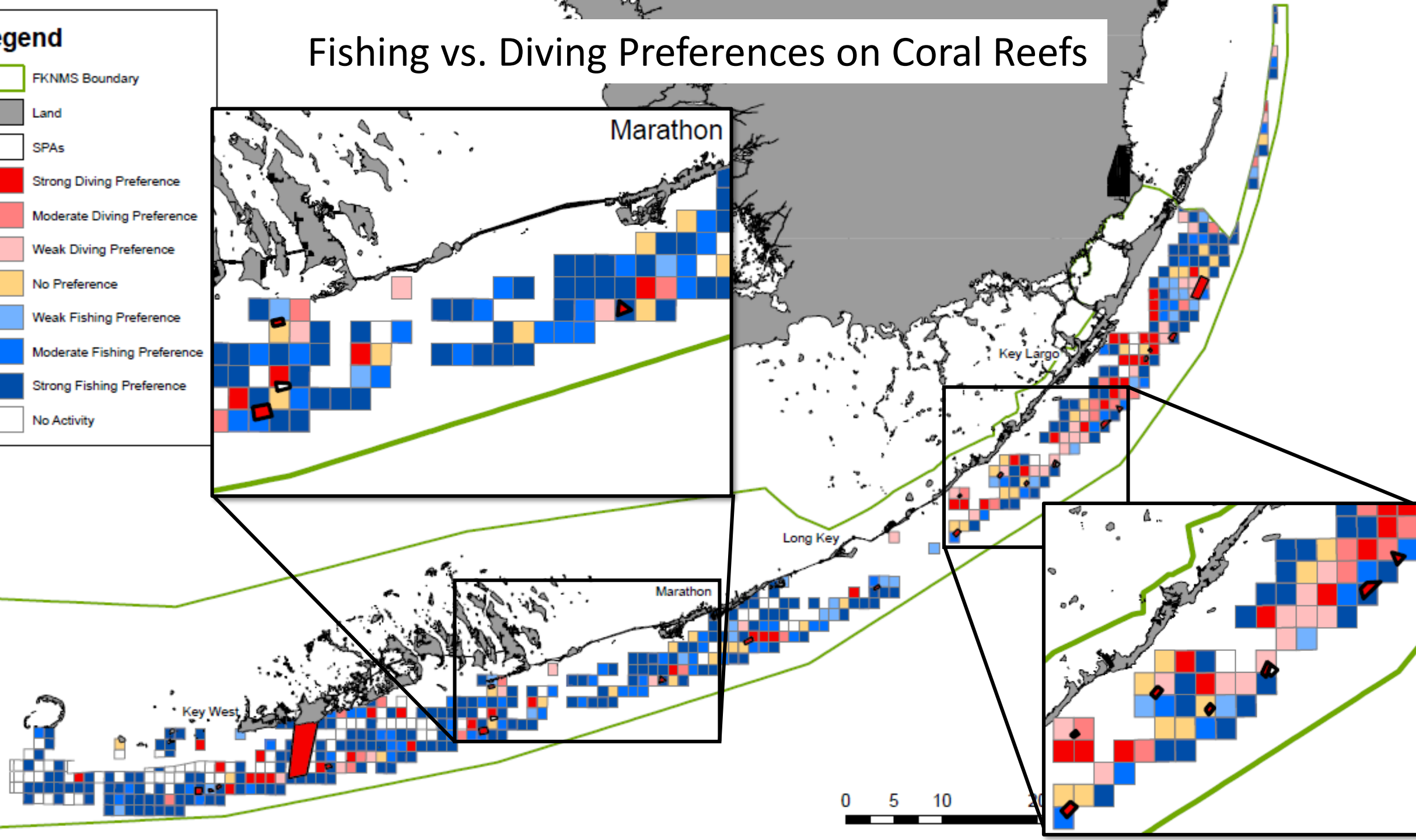
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- The highest densities of dive boats were observed at Upper and Middle Keys reefs.
- The majority of dive boats (67%) were at located at the continuous reef habitat. Other reefs and hardbottom supported 19% and 9% of dive boats respectively.



Legend

-  FKNMS Boundary
-  Land
-  SPAs
-  Strong Diving Preference
-  Moderate Diving Preference
-  Weak Diving Preference
-  No Preference
-  Weak Fishing Preference
-  Moderate Fishing Preference
-  Strong Fishing Preference
-  No Activity

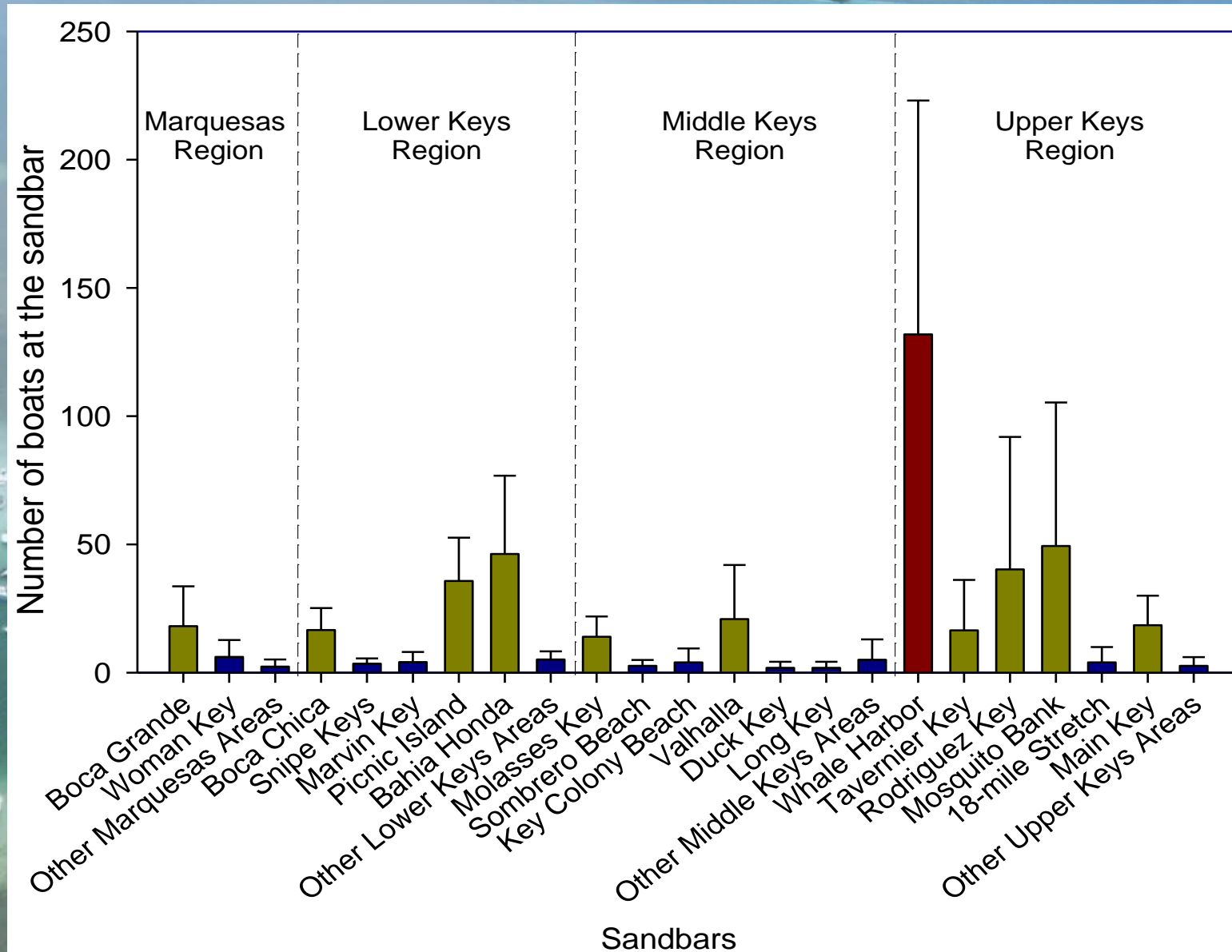
Fishing vs. Diving Preferences on Coral Reefs



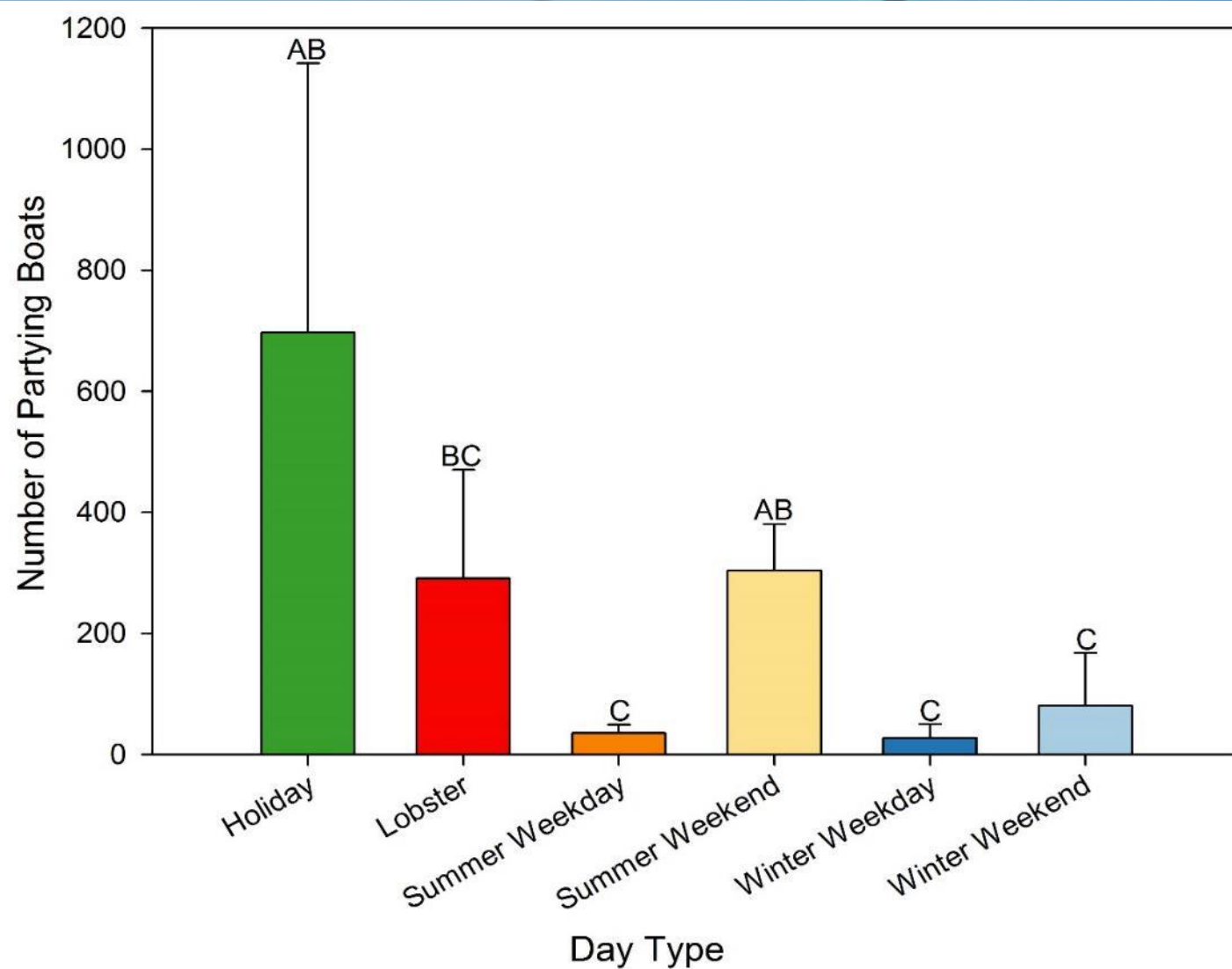
Sandbar/Party Zones

- Includes boats/PWCs that were beached, anchored, or rafted near sandbar/party zones
- On Memorial Day Weekend Sunday, there were 1200 boats at sandbars/party zones throughout the Keys
- 9.4% of vessels counted

Sandbar/Party Zones



Sandbar/Party Zones



An aerial photograph showing a boat's wake in a coastal area. The water is a mix of blue and green, indicating varying depths and vegetation. A long, white wake from a boat stretches from the bottom center towards the middle of the frame. To the right, there's a small, sandy peninsula with some greenery. In the background, there are more landmasses and water bodies, with some structures visible on the far shore. A semi-transparent blue box with white text is overlaid on the right side of the image.

31% of observed boats
were in transit

Commercial Fishing

- Includes trap boats, head boats, spongers, trawlers, and purse seines
- Commercial fishing boats make up 1.7% of all vessels in the FKNMS



Personal Watercraft (PWC)

- PWC account for 4% of vessels in the FKNMS



Kayaks/Paddleboards

An aerial photograph of a coastal area with a large, dense mangrove forest on the left. Several kayakers in red and yellow kayaks are visible on the water. A small sandy beach with some structures is visible on the right side of the mangrove area. The water is a deep blue-grey color.

Kayaks and Paddleboards make up 5% of all vessels in the FKNMS

Watersports

- Includes boats actively participating in parasailing, waterskiing, and tubing
- Boats participating in watersports make up 0.3-1% of vessels observed in the Keys



Mooring Areas



Special Thanks to:
Emily Hutchinson, Gabby Renchen,
Mike Bollinger, and our Pilots at
KeysAir, FWC Law Enforcement, and
NOAA Commissioned Officer Corps



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