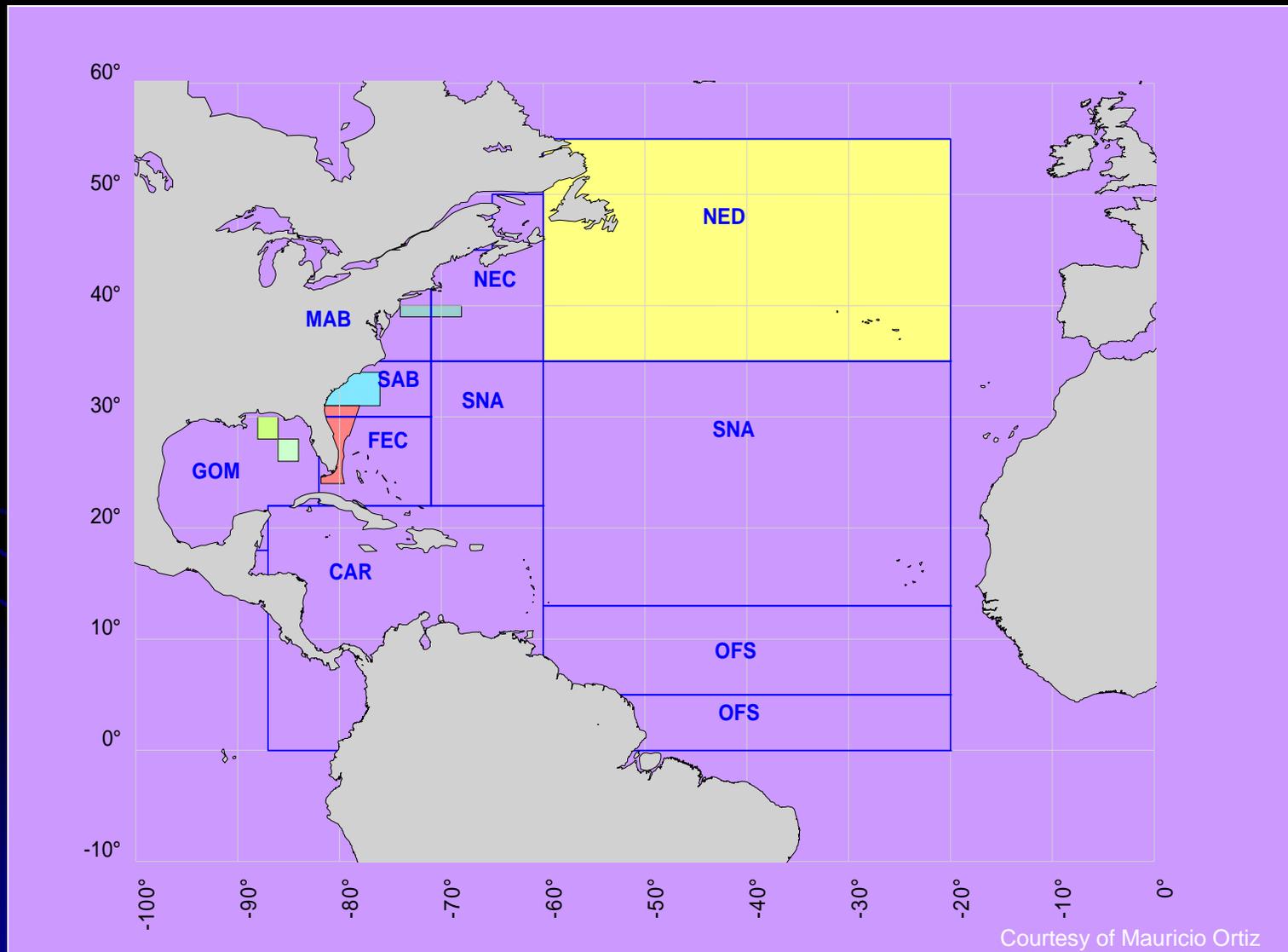


Experiments in the Western Atlantic Northeast Distant Waters to Evaluate Sea Turtle Mitigation Measures in the Pelagic Longline Fishery 2001 - 2003

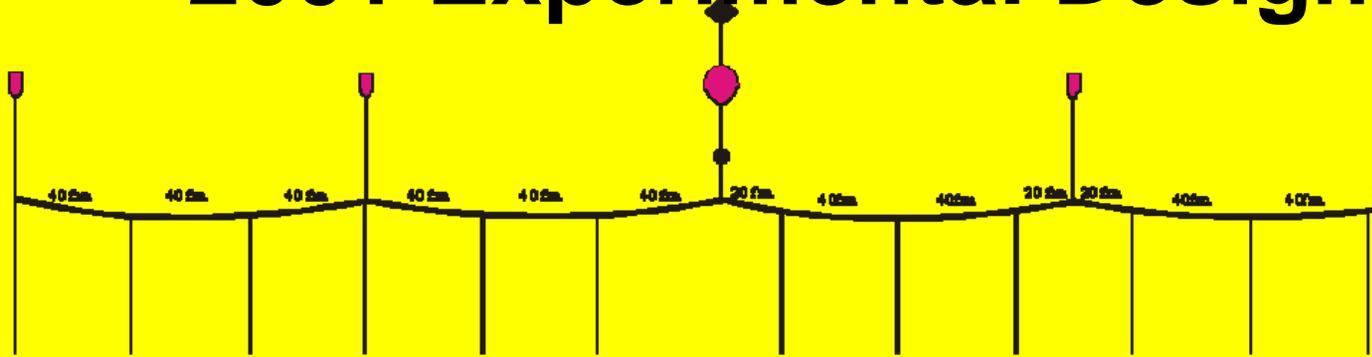
John Watson, Sheryan Epperly, Dan Foster,
and Arvind Shah



The US Atlantic Pelagic Longline Fishery



2001 Experimental Design



Natural Squid



8/0, 9/0, and 10/0 J hooks



Natural Squid

Natural Squid



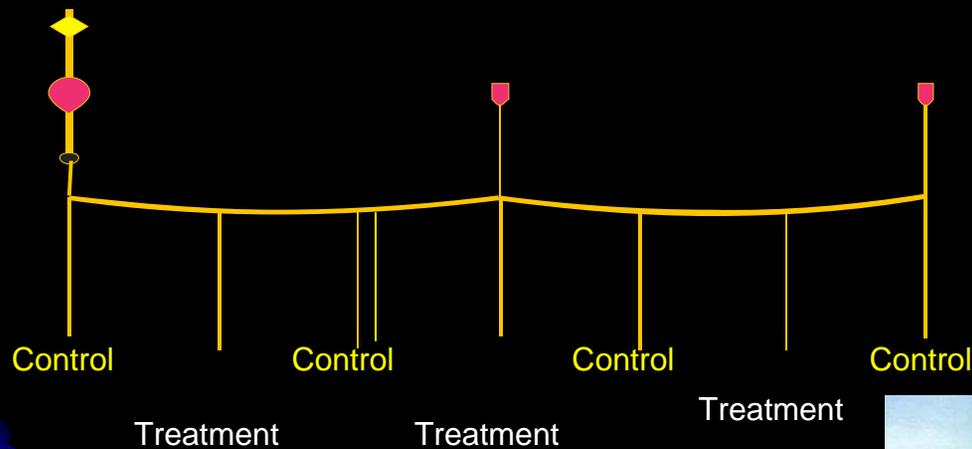
Blue-Dyed Squid

2001 Results

- Effort and Catch: 8 vessels, 186 sets, 164,429 hooks – **142 loggerheads and 77 leatherbacks**
- Blue-dyed Squid bait – **no significant effect**
- Move branch line 20 fathoms away from buoy - **no significant effect for loggerheads**
increased catch of leatherbacks
- Daylight soak time – **significant effect for *Caretta***

Experimental Design 2002-2003

Set Configuration



Control: J Hook, usually 9/0
25-30 Deg. Offset
w/ Squid Bait

Treatments:
Experimental Hooks
Experimental Baits



2002 Experiments



**9/0 J & 18/0 non-
offset circle**



**9/0 J & 18/0
10 ° offset circle**



**9/0 J & 18/0
10 ° offset circle**



Squid



Squid



Mackerel

Goal for haulback completion was set 1 hr earlier than average observed during 2001

2003 Experiments



**9/0 J & 18/0 non-
offset circle**



**18/0 10° offset circle
& 10/0 tuna**



**18/0 10° offset circle
& 20/0 10° offset circle**



**16/0 offset circle
& 18/0 non-offset circle**



Swordfish Directed Sets

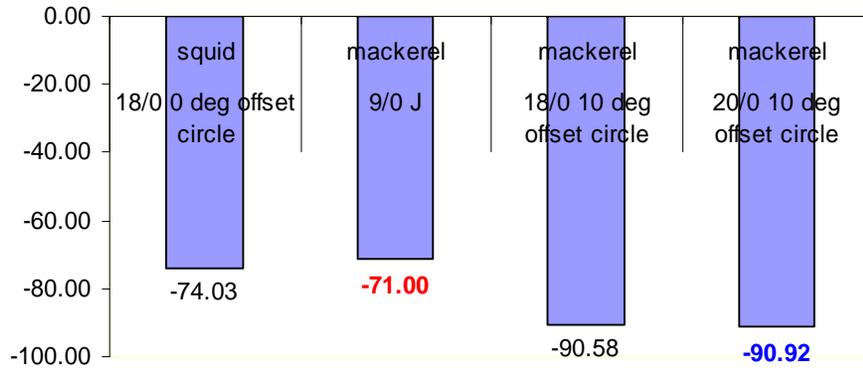
Tuna Sets

2002 & 2003 Results

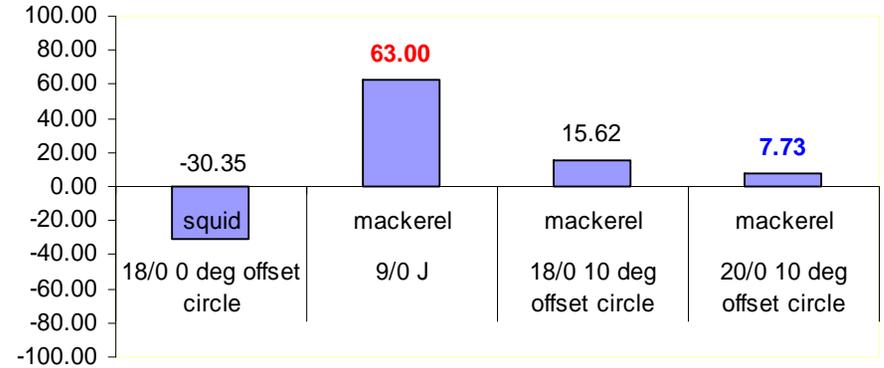
- Effort and catch (2002): 13 vessels, 489 sets, 427,385 hooks – **100 loggerheads and 158 leatherbacks**
- Effort and catch (2003): 11 vessels, 539 sets, 578,050 hooks – **92 loggerheads, 79 leatherbacks, and 1 olive ridley**
- Reduce daylight hook soak time (2002) – **Not significant**
- 18/0 (0° offset and 10° offset in 2002; only 0° offset in 2003) circle hooks with squid bait **Significant reduction loggerheads and leatherbacks, decreased swordfish catch, increased tuna catch**
- 18/0 (10° offset) circle hooks with mackerel bait **Significant reduction loggerheads and leatherbacks, increased swordfish catch, decreased tuna catch**
- 20/0 (10° offset) circle hooks with mackerel bait (2003) **Significant reduction loggerheads and leatherbacks, increased swordfish catch, decreased tuna catch**

Effect of Treatments Relative to Control

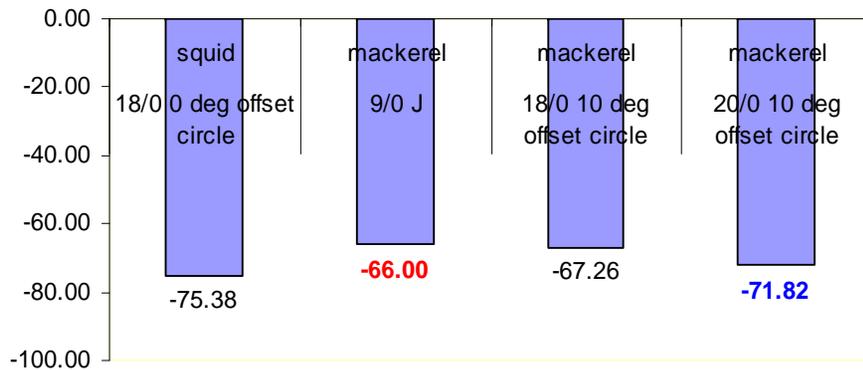
LOGGERHEAD



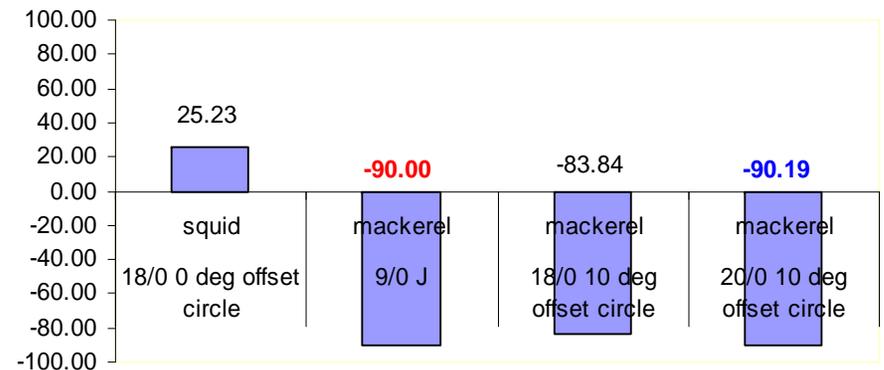
SWORDFISH



LEATHERBACK



BIGEYE TUNA

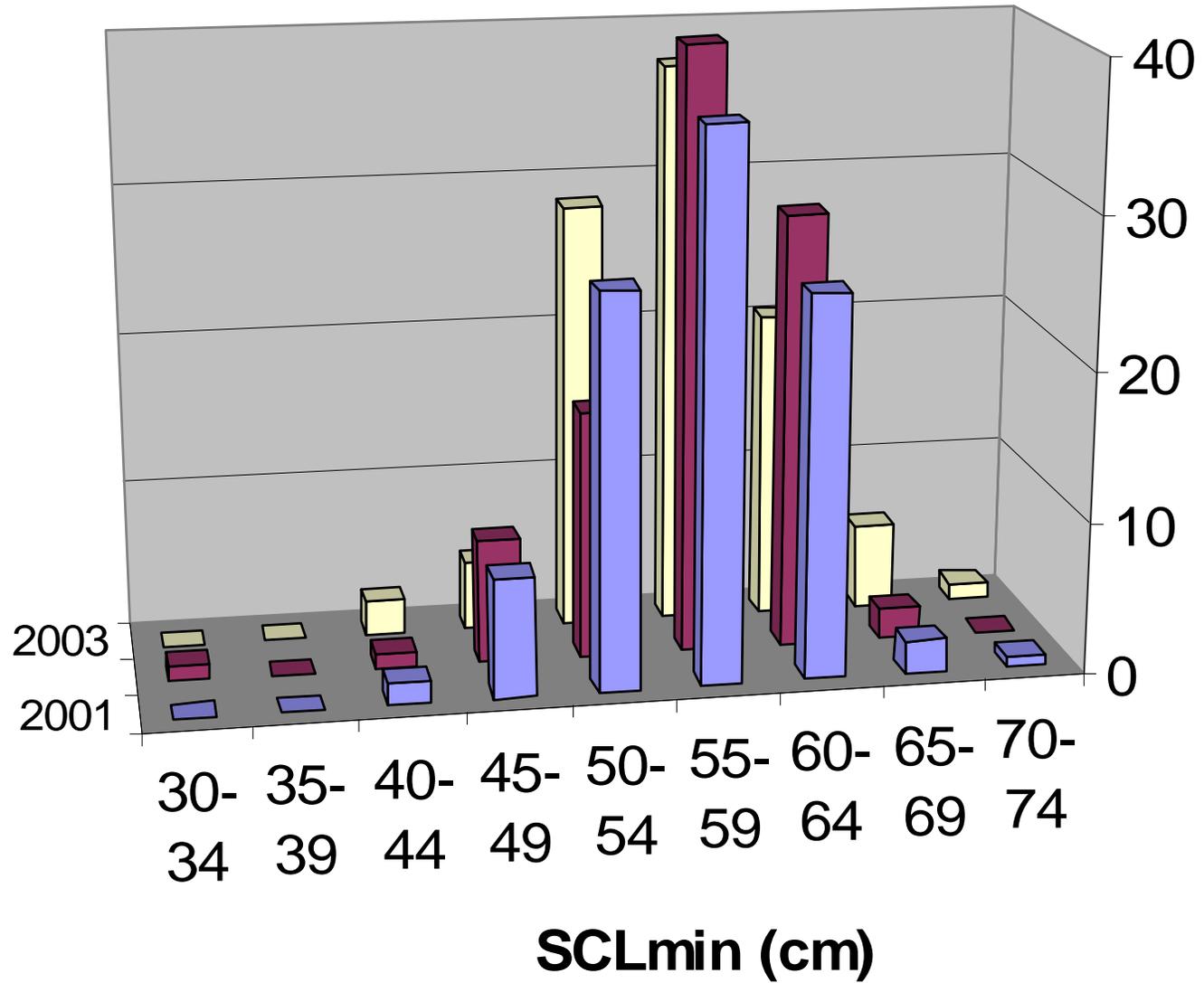


results for combined 2002-2003, unless noted: **2002 only** **2003 only**

LOGGERHEADS

frequency (%)

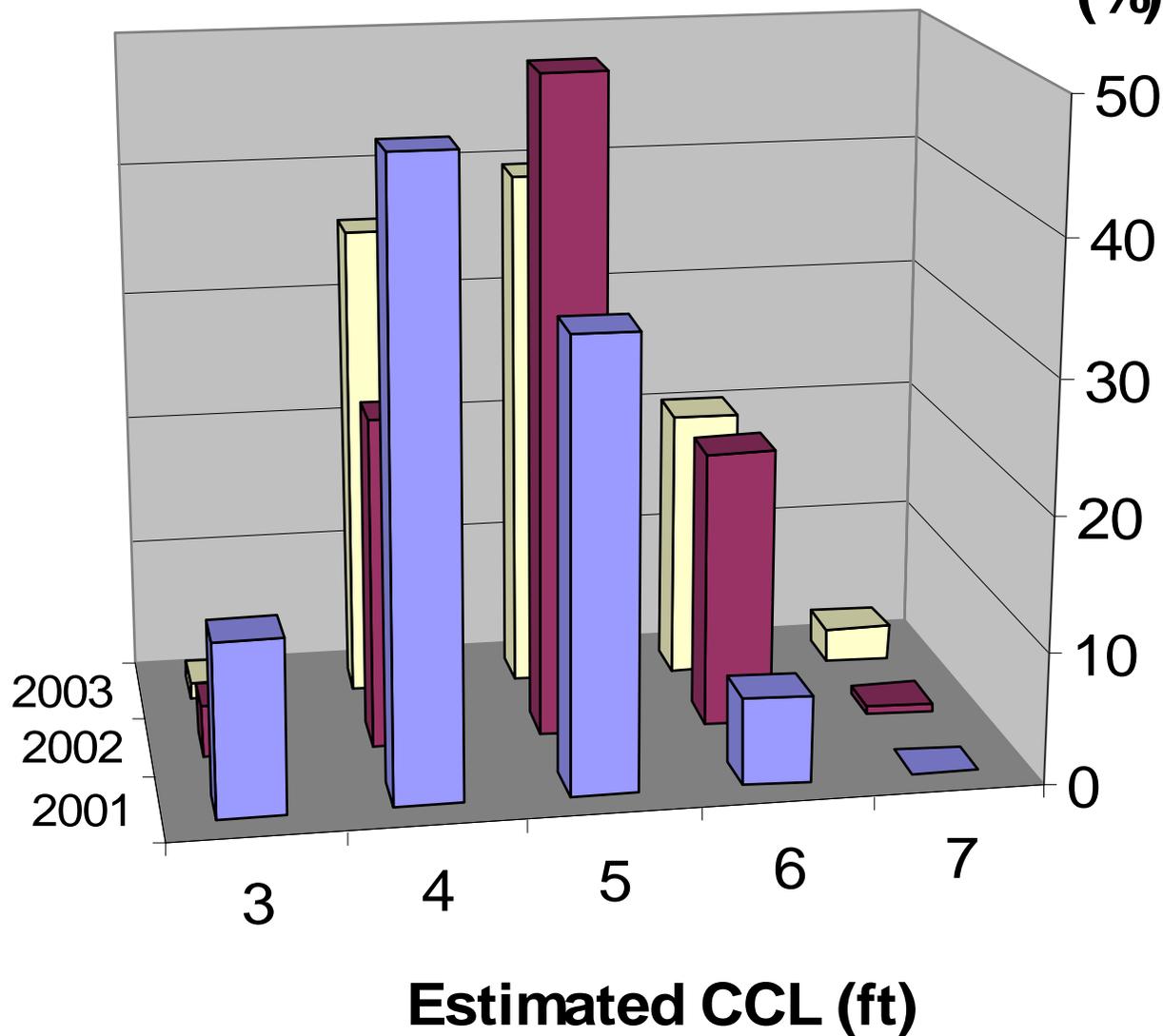
Year n=
 2003 88
 2002 97
 2001 138



LEATHERBACKS

frequency (%)

Year n=
2003 78
2002 157
2001 77



Loggerhead Genetics - Summary

Sea Turtle Molecular Genetics Lab, NMFS SWFSC, La Jolla, CA

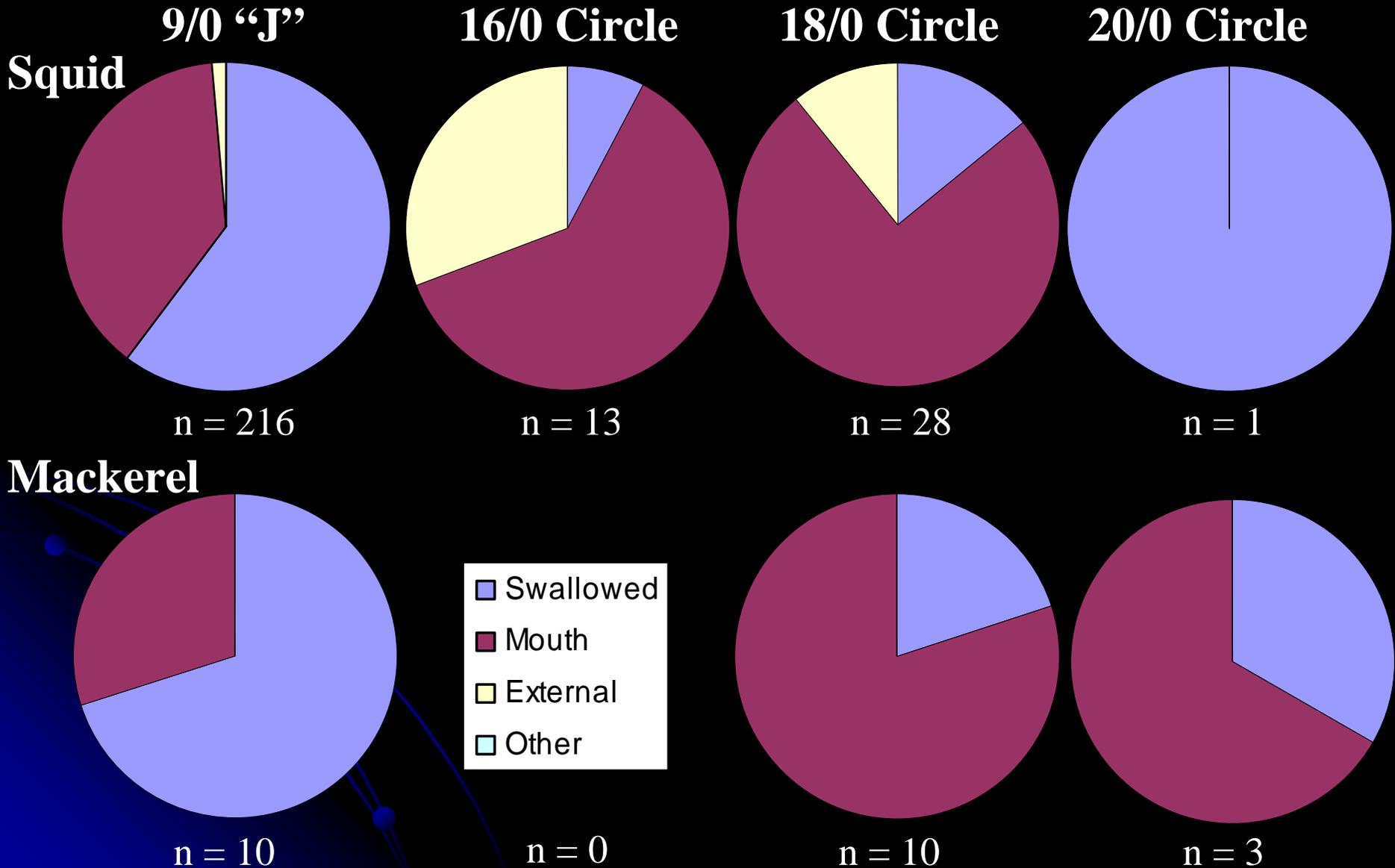
- A total of 279 samples have been analyzed to date using mtDNA sequence data
- Preliminary analysis suggests most of the loggerheads encountered in the NED are of South Florida nesting stock (>80%)
- The NE US nesting stock contributes approx. 12% of the NED bycatch
- See poster by LaCasella et al.: **GENETIC STOCK COMPOSITION OF ATLANTIC LOGGERHEADS (CARETTA CARETTA) IN THE NORTHEAST DISTANT (NED) LONGLINE FISHERY USING MITOCHONDRIAL DNA ANALYSIS**

Leatherback Genetics - Summary

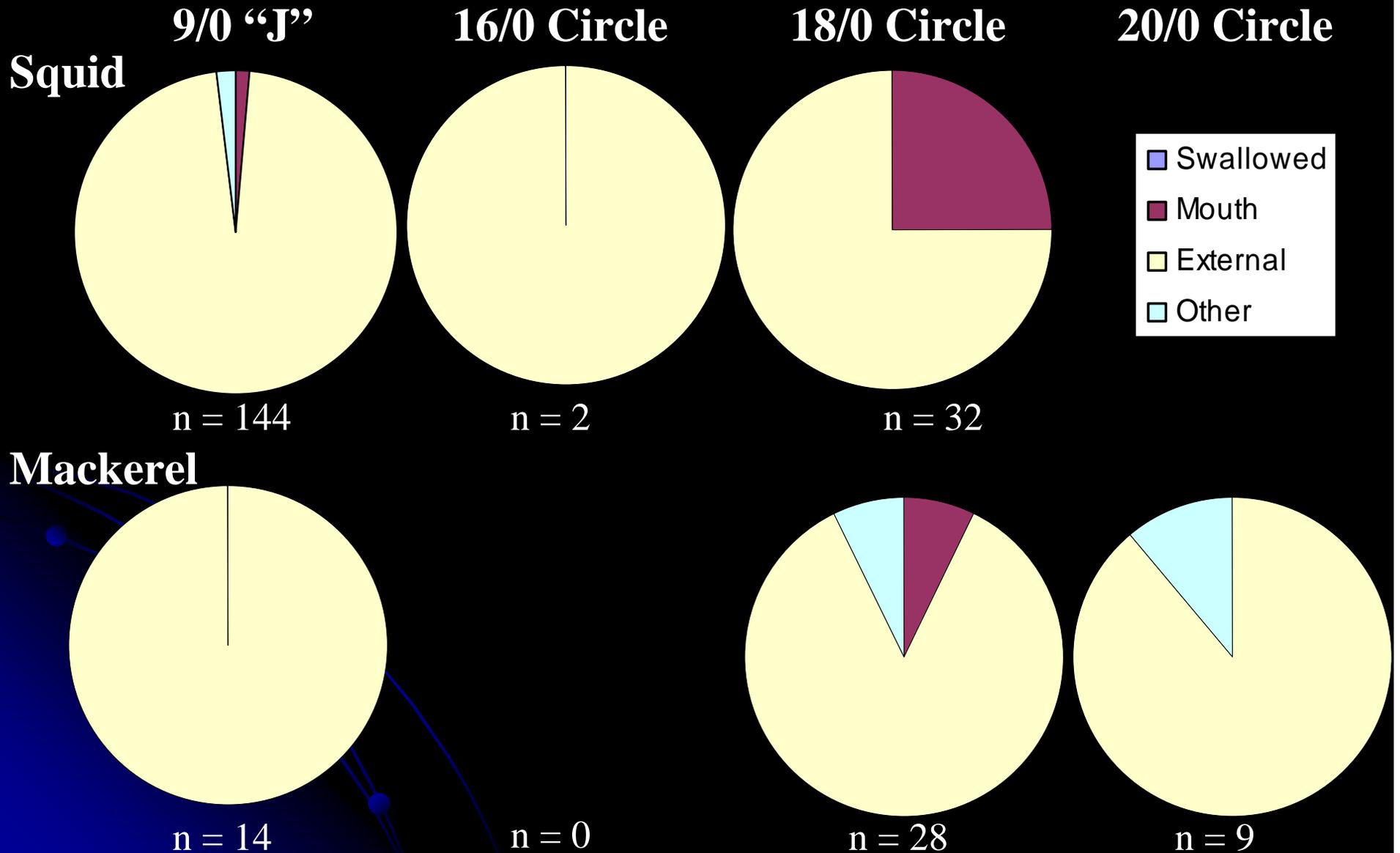
Sea Turtle Molecular Genetics Lab, NMFS SWFSC, La Jolla, CA

- The array of 12 Microsatellite markers developed are useful for Atlantic leatherback stock ID
- Leatherback encountered in the NED Fishery are primarily from Western Atlantic (Caribbean) breeding populations rather than West African or South African stocks
- See poster by Roden et al.: **STOCK COMPOSITION OF FORAGING LEATHERBACK POPULATIONS IN THE NORTH ATLANTIC BASED ON ANALYSIS OF MULTIPLE GENETIC MARKERS**

LOGGERHEADS



LEATHERBACKS



Long Handled Devices

Tether

Gaff

ARC Dehooker

Line Cutter

J-Style Dehooker

Short Handled Dehookers

Scotty's

ARC

J-Style

Bolt Cutters



Needle Nose Pliers

Mono Cutters



Dipnet



PVC Splice Couplings

Dog Chew Toys

Rope Loop

Avian Oral Speculum

Canine Mouth Gags

Hank of Rope

Wooden Brush Handle

C

Hooks Removed from Loggerhead Turtles (NED 2003)

Hook Location	Hook Removed?			Total
	No	Yes	Not Applicable	
Swallowed	34	2	0	36
Mouth	0	46	0	46
External	0	7	0	7
Unknown	2	0	0	2
Not Hooked	0	0	1	1
Total	36	55	1	92

Hooks Removed from Leatherback Turtles (NED 2003)

Hook Location	Hook Removed?			Total
	No	Yes	Not Applicable	
Swallowed	0	0	0	0
Mouth	1	3	0	4
External	14	34	0	48
Unknown	3	5	0	8
Not Hooked	0	0	19	19
Total	18	42	19	79

Future Research

- **Tuna directed fisheries – compare target species catch on 16/0 and 18/0 circle hooks**
- **Additional experiments using 18/0 and 20/0 circle hooks in both swordfish and tuna fisheries**
- **Comparison of turtle catch and hook location of 10 degree offset and non-offset 18/0 and 20/0 circle hooks**
- **Laboratory experiments using captive reared turtles: effect of hook style, hook size, offset, bait and bait size, and turtle/mouth size on ability of turtle to ingest the hooks**
- **Post-hooking mortality experiments**

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- **Bill Hogarth**



Leatherbacks Aboard

