Biological Surveys To Assess The Relative Abundance And Distribution Of Coastal Sharks And Teleosts Of The Western North Atlantic Ocean 1995 - 2001

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Background

Sharks - 1993 NOAA/NMFS Fisheries Management Plan for Sharks of the Western North Atlantic Ocean

1979 - 1989 landings data

Commercial landings increased

Recreational landings decreased

Over-fishing of unregulated shark fisheries

K selected; late maturity, slow growth, few offspring

Lack of baseline data

Red snapper - 2001 Regulatory Amendment To The Reef Fish Fishery Management Plan To Set A Red Snapper Rebuilding Plan Through 2032

Over-fished stock

Management plan mandates restoration

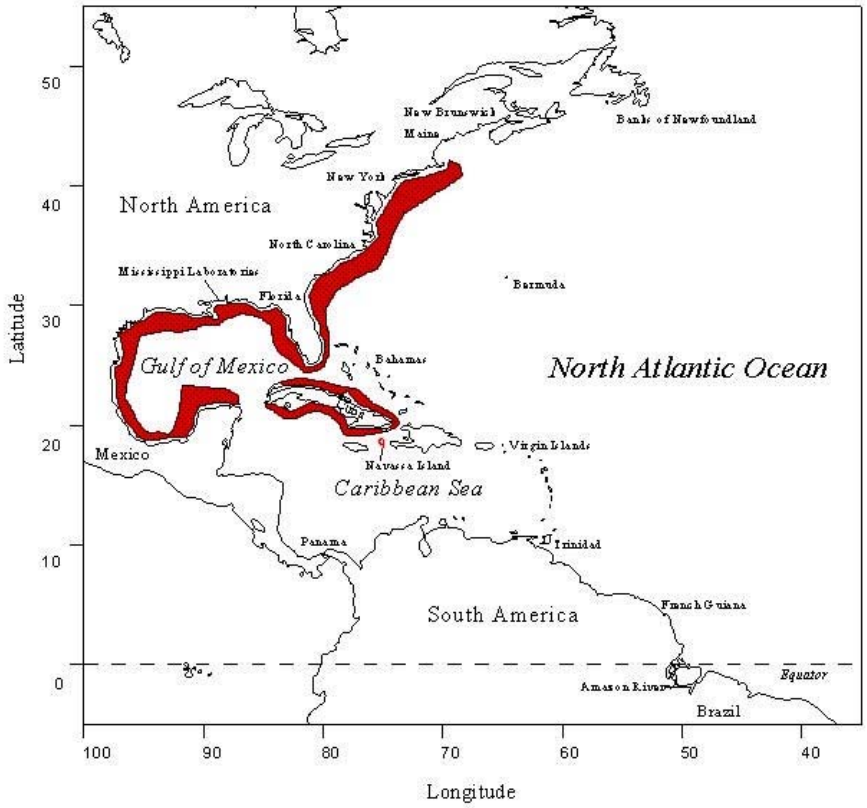
Prevent over-fishing, new rebuilding period

Stock assessments by federal and state agencies and universities

Project Objectives

- **1995 Mississippi Laboratories instituted field studies**
  - Bottom longline gear
  - Standardized survey design
  - Random station selection
  - Repeatable survey
  - Control potential sources of bias
  - Relative abundance
  - Distribution
  - Biological sampling and tagging
  - Associated environmental data
  - 1999 objectives expanded to include red snapper

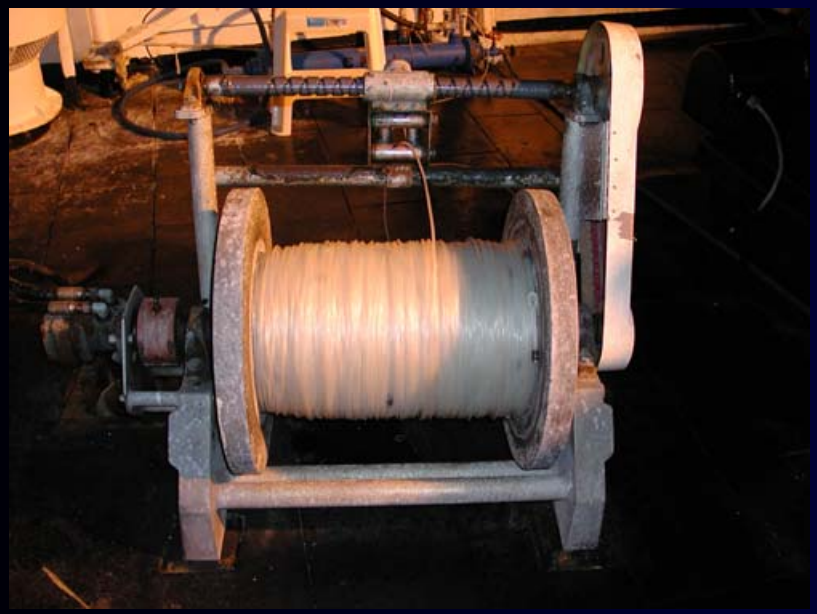
Survey Area



Survey areas for NMFS shark projects (1995 - 2001) in the western North Atlantic Ocean.

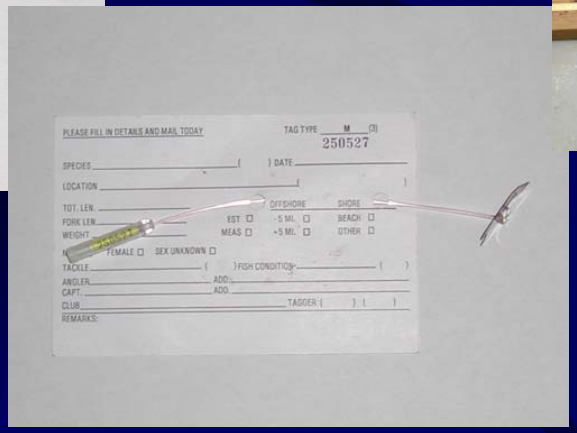
Survey Gear

- Monofilament bottom longline gear
- 1.0 nautical mile of 1000 lb. test monofilament and 100 baited shark hooks with 12ft gangions (leaders, 700 lb. test)
- #3/0 J hooks and #15/0 circle hooks



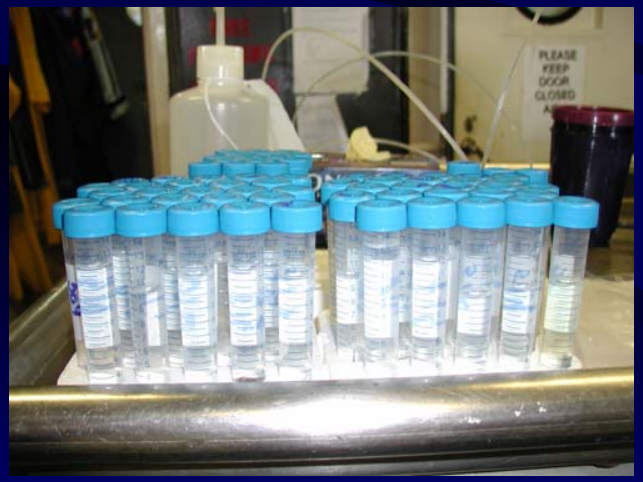
Tagging Studies

- NMFS Panama City, Florida Laboratory tags for small sharks.
- NMFS Narragansett, Rhode Island tags for large sharks.
- For life history studies some sharks were injected with OTC).



Samples

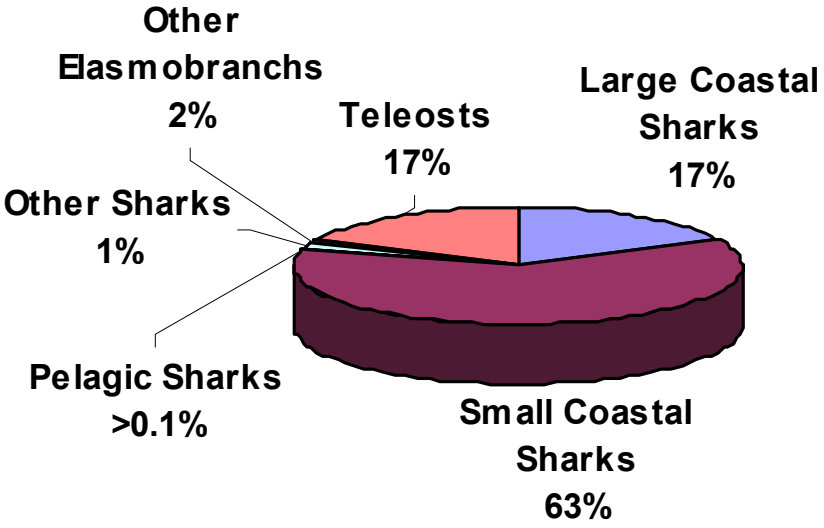
- DNA (fin clips)
- Tissue
- Blood
- Otoliths
- Parasites

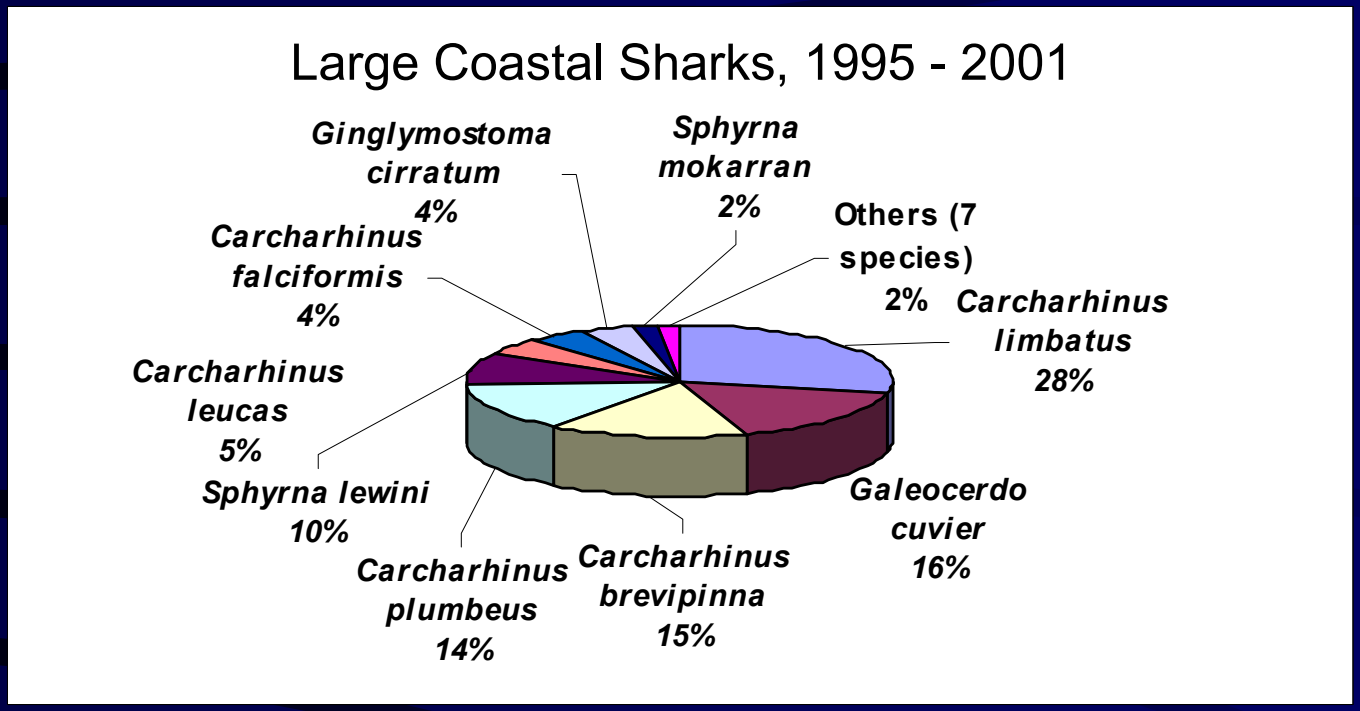


Effort

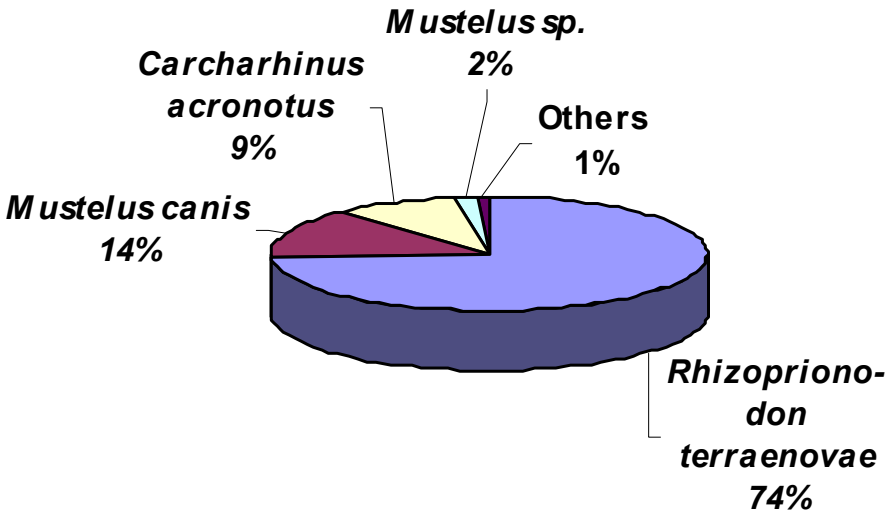
- *14 surveys over 7 years*
- *1660 longline sets*
  - **1660 nautical miles of gear**
- *391 survey days*
- *9788 captures*
  - **8069 sharks**
  - **1719 teleosts**

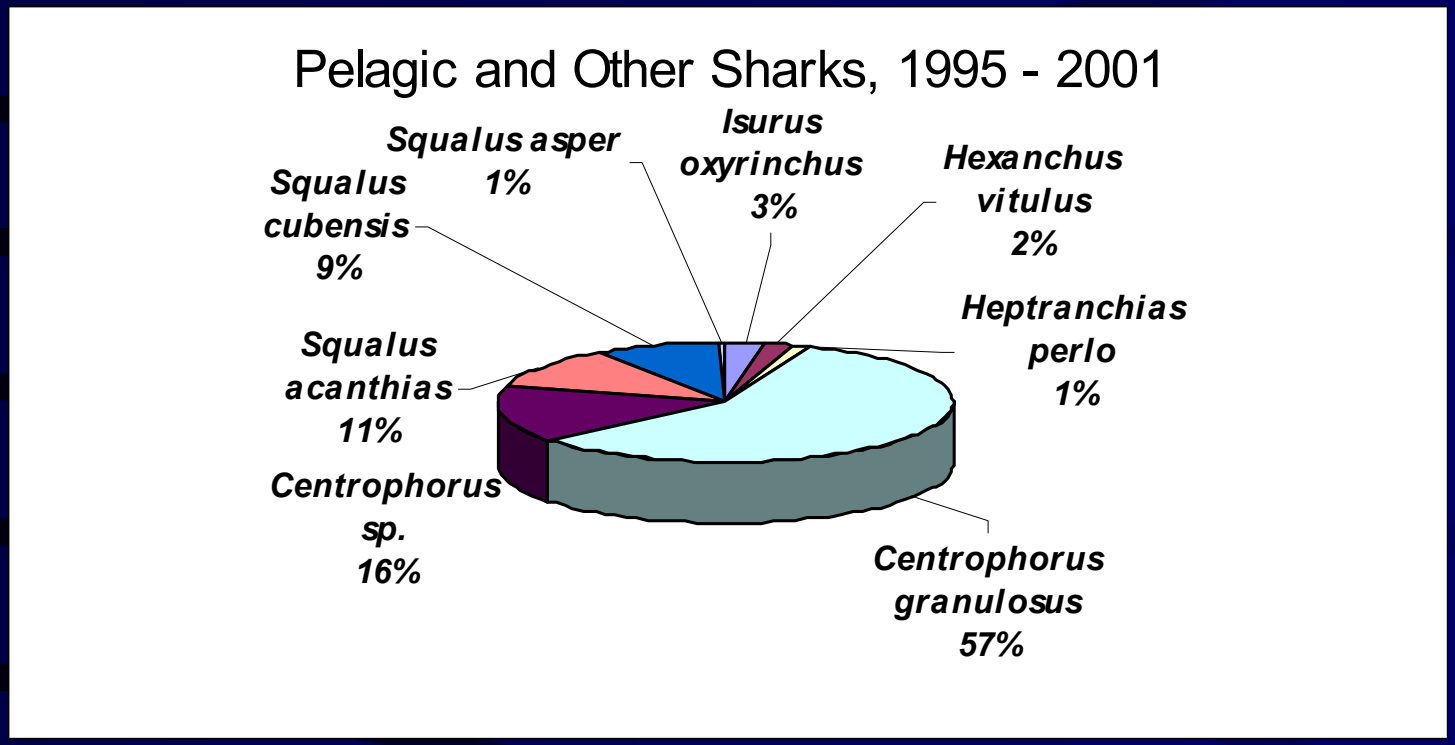
Bottom Longline Catch, 1995 - 2001

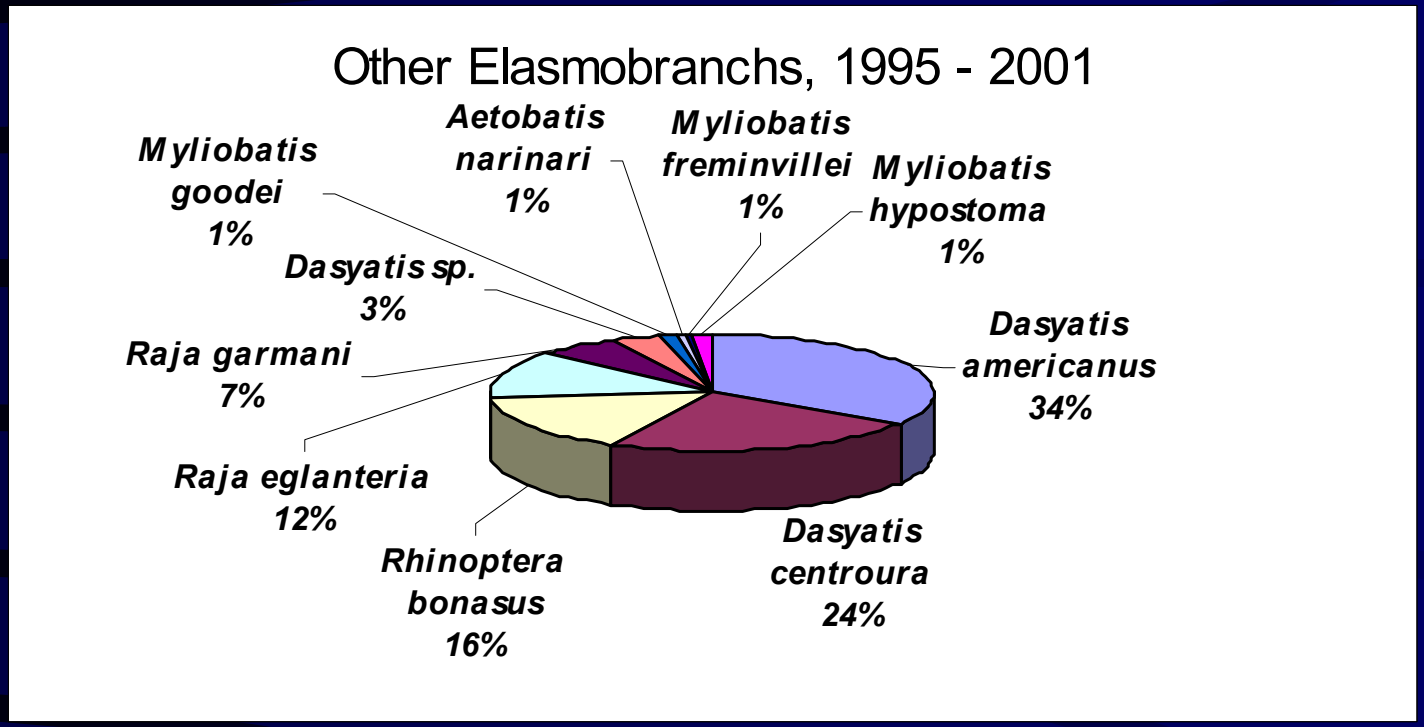


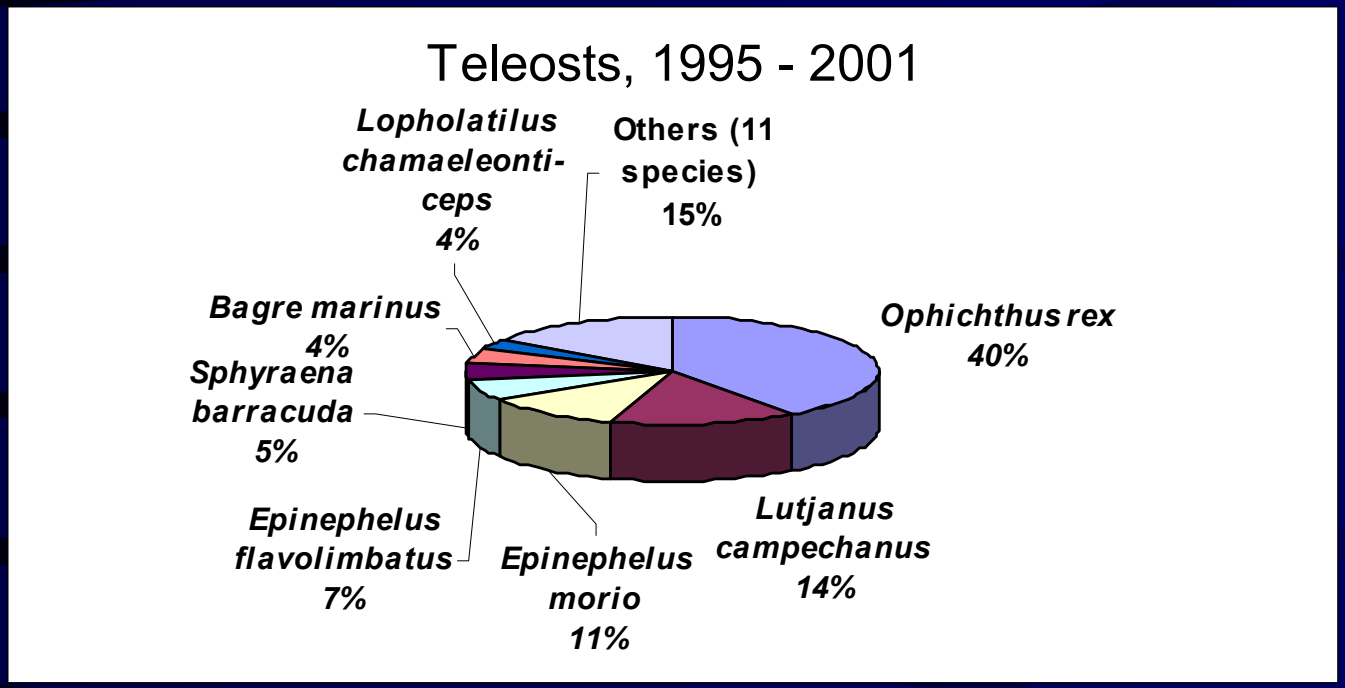

Large Coastal Sharks, 1995 - 2001
Ginglymostoma cirratum 4%
Sphyrna mokarran 2%
Others (7 species) 2%
Carcharhinus limbatus 28%
Carcharhinus falciformis 4%
Carcharhinus leucas 5%
Sphyrna lewini 10%
Galeocerdo cuvier 16%
Carcharhinus plumbeus 14%
Carcharhinus brevipinna 15%

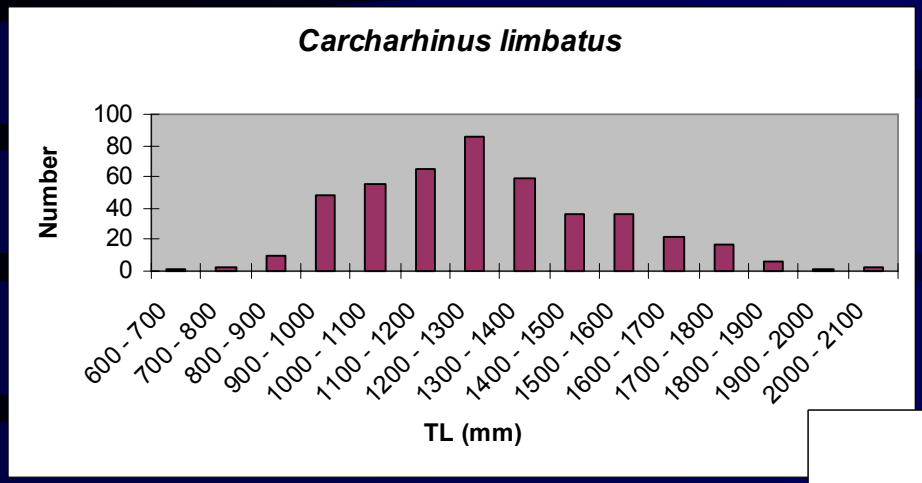
Small Coastal Sharks, 1995 - 2001

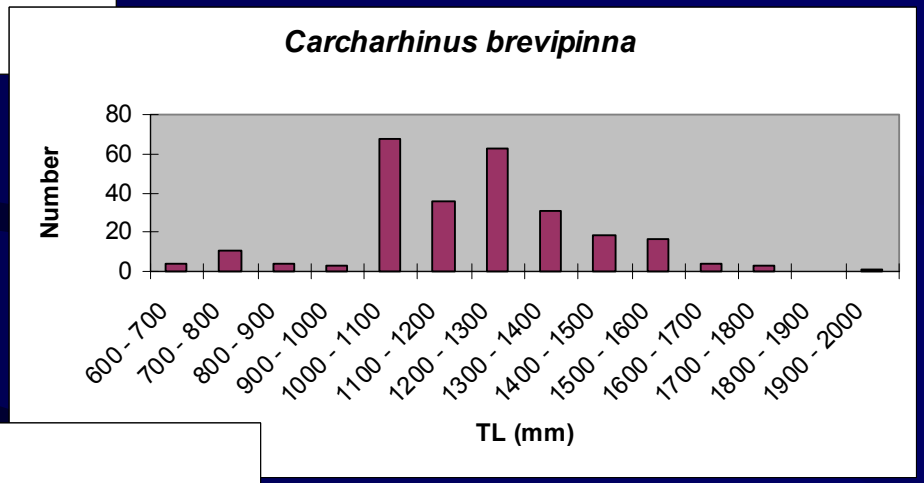


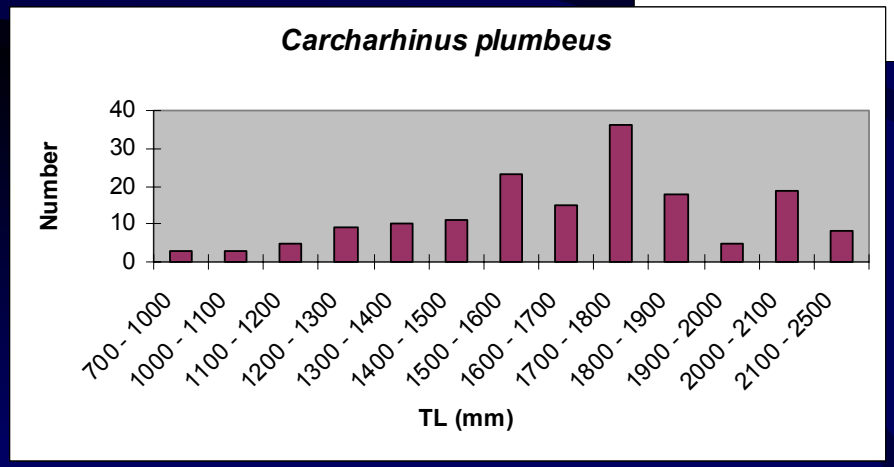

Pelagic and Other Sharks, 1995 - 2001
Squalus asper 1%
Isurus oxyrinchus 3%
Hexanchus vitulus 2%
Squalus cubensis 9%
Heptranchias perlo 1%
Squalus acanthias 11%
Centrophorus sp. 16%
Centrophorus granulosus 57%

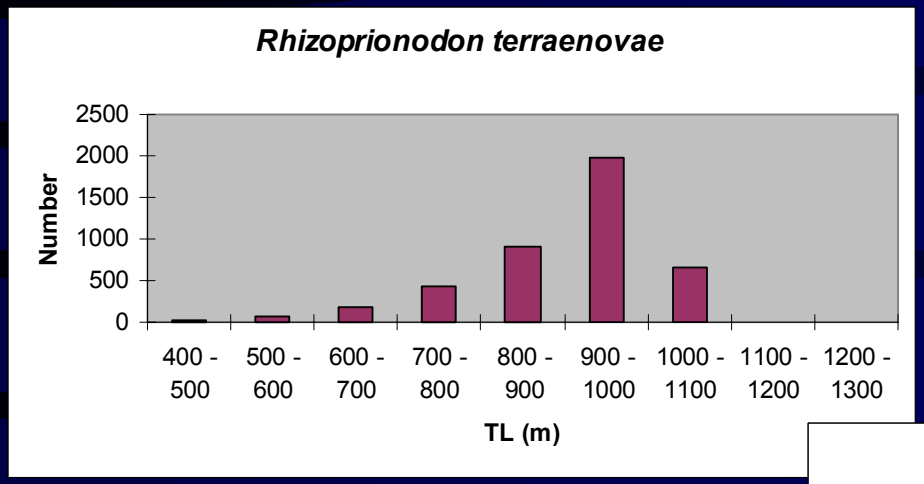

Other Elasmobranchs, 1995 - 2001
Aetobatis narinari 1%
Myliobatis freminvillei 1%
Myliobatis goodei 1%
Myliobatis hypostoma 1%
Dasyatis sp. 3%
Raja garmani 7%
Dasyatis americanus 34%
Raja eglanteria 12%
Rhinoptera bonasus 16%
Dasyatis centroura 24%

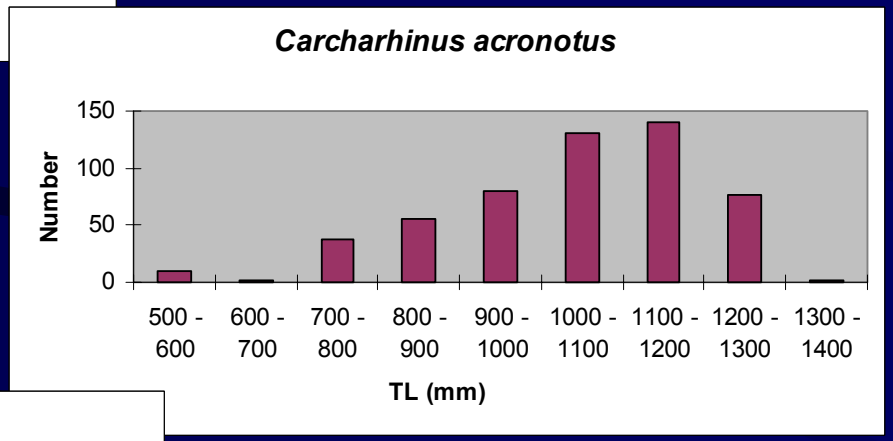

Teleosts, 1995 - 2001
Lopholatilus chamaeleonti-ceps 4%
Others (11 species) 15%
Bagre marinus 4%
Ophichthus rex 40%
Sphyraena barracuda 5%
Epinephelus flavolimbatus 7%
Epinephelus morio 11%
Lutjanus campechanus 14%

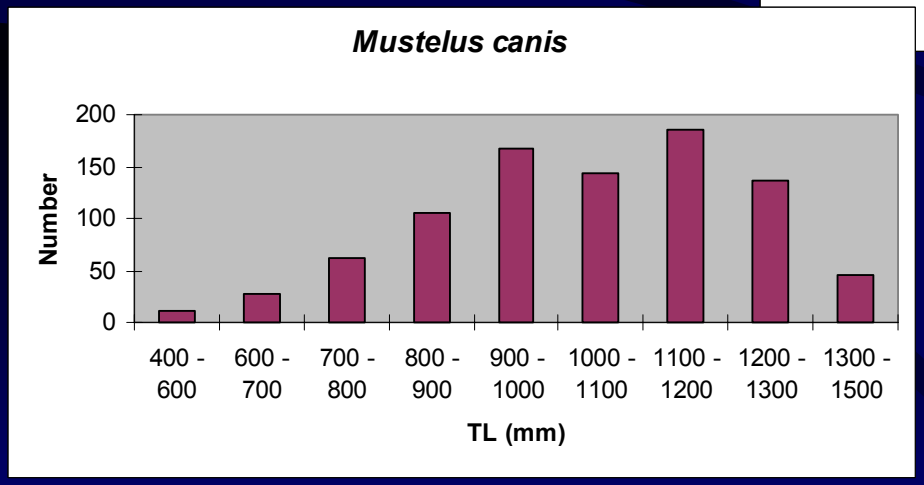

Carcharhinus limbatus
Number
100
80
60
40
20
0
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
TL (mm)

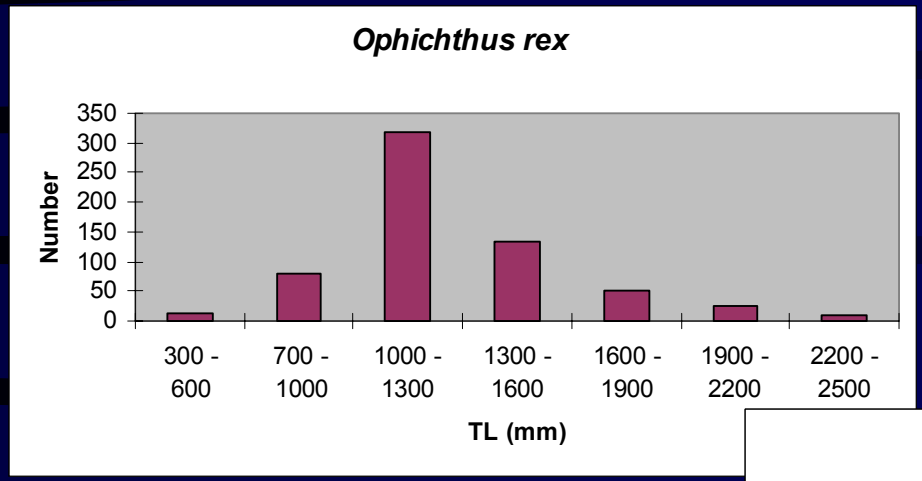

Carcharhinus brevipinna
Number
80
60
40
20
0
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
TL (mm)

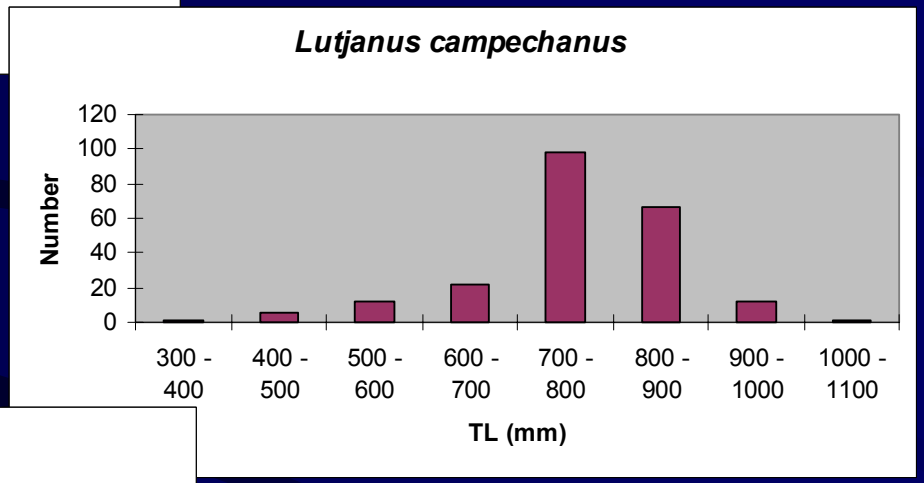

Carcharhinus plumbeus
Number
40
30
20
10
0
700 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
1400 - 1500
1500 - 1600
1600 - 1700
1700 - 1800
1800 - 1900
1900 - 2000
2000 - 2100
2100 - 2500
TL (mm)


Rhizoprionodon terraenovae
Number
2500
2000
1500
1000
500
0
400 - 500
500 - 600
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
TL (m)


Carcharhinus acronotus
Number
150
100
50
0
500 - 600
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1400
TL (mm)


Mustelus canis
Number
200
150
100
50
0
400 - 600
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
1100 - 1200
1200 - 1300
1300 - 1500
TL (mm)


Ophichthus rex
Number
350
300
250
200
150
100
50
0
300 - 600
700 - 1000
1000 - 1300
1300 - 1600
1600 - 1900
1900 - 2200
2200 - 2500
TL (mm)


Lutjanus campechanus
Number
120
100
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60
40
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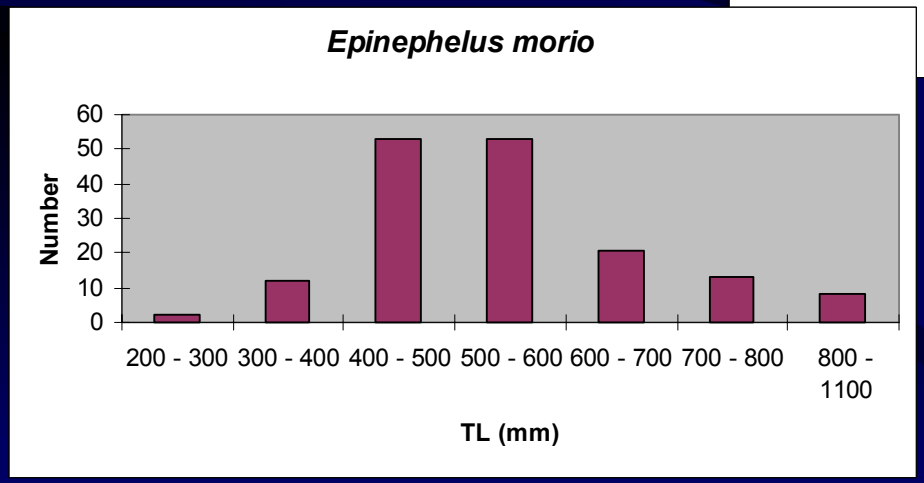
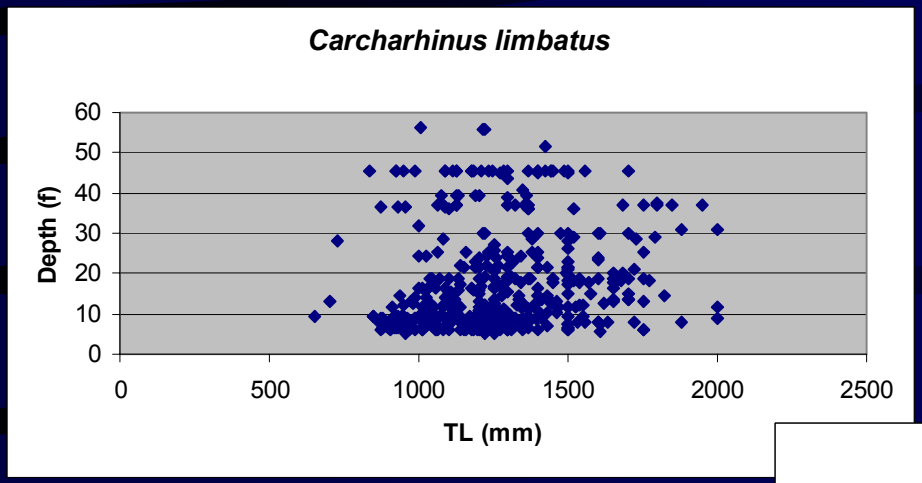
300 - 400
400 - 500
500 - 600
600 - 700
700 - 800
800 - 900
900 - 1000
1000 - 1100
TL (mm)


Epinephelus morio
Number
60
50
40
30
20
10
0
200 - 300
300 - 400
400 - 500
500 - 600
600 - 700
700 - 800
800 - 1100
TL (mm)


Carcharhinus limbatus
Depth (f)
60
50
40
30
20
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0
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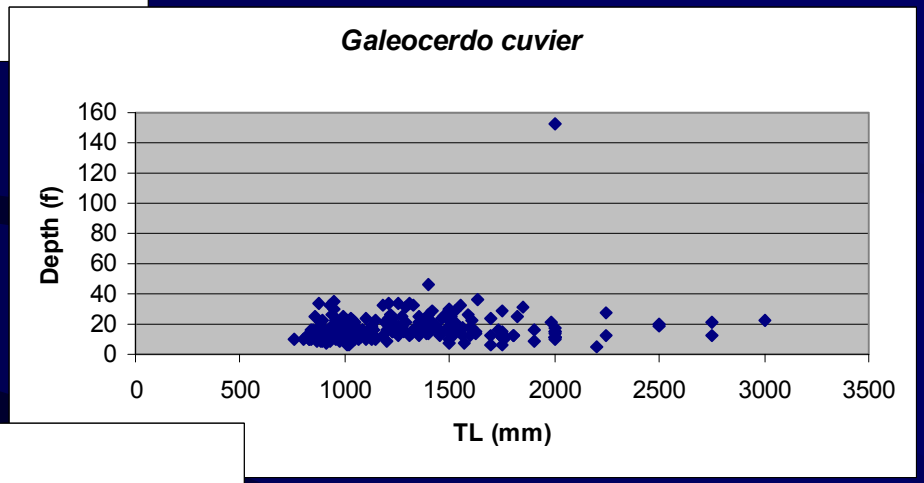
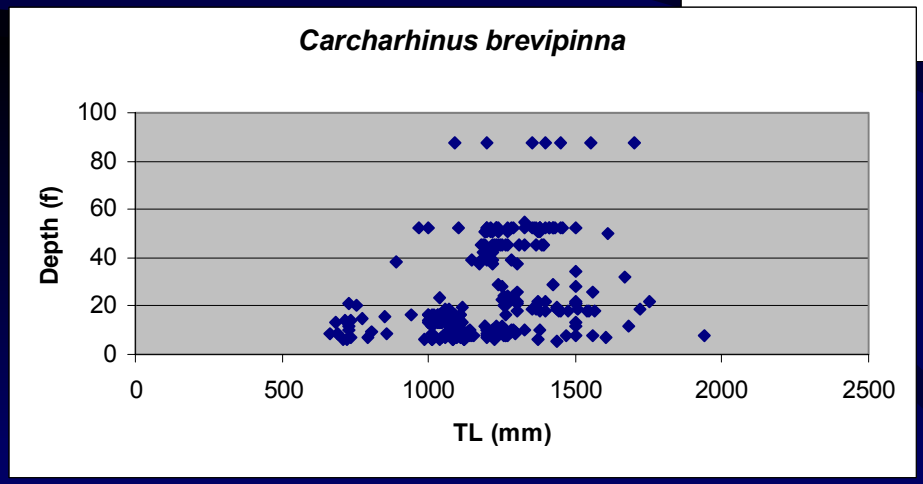
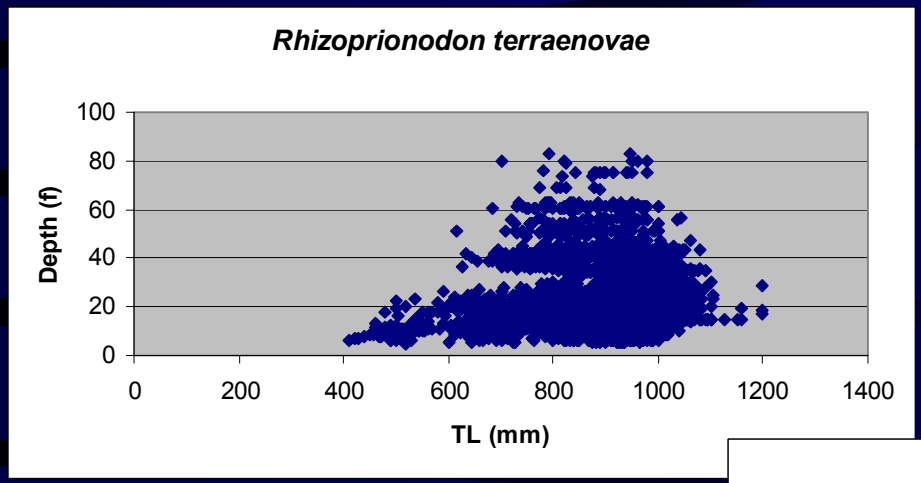
500
1000
1500
2000
2500
TL (mm)


Galeocerdo cuvier
Depth (f)
160
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
2500
3000
3500
TL (mm)


Carcharhinus brevipinna
Depth (f)
100
80
60
40
20
0
0
500
1000
1500
2000
2500
TL (mm)


Rhizoprionodon terraenovae
Depth (f)
100
80
60
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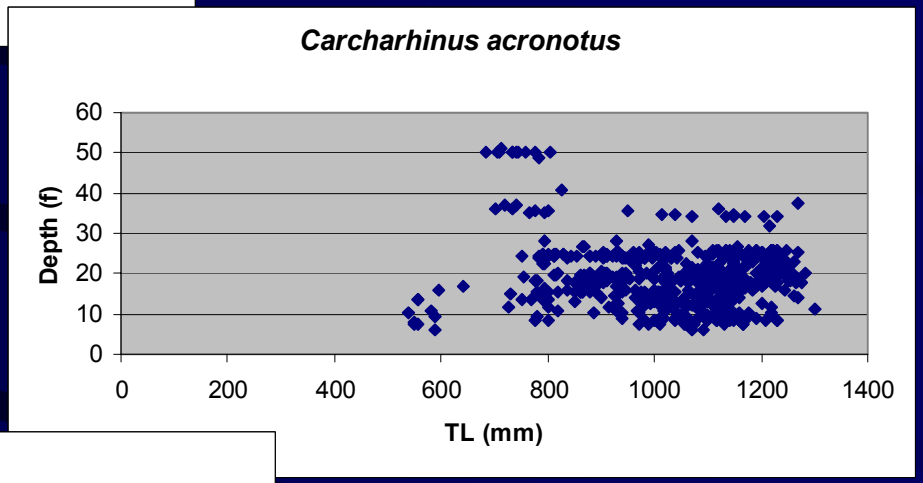
TL (mm)


Carcharhinus acronotus
Depth (f)
60
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800
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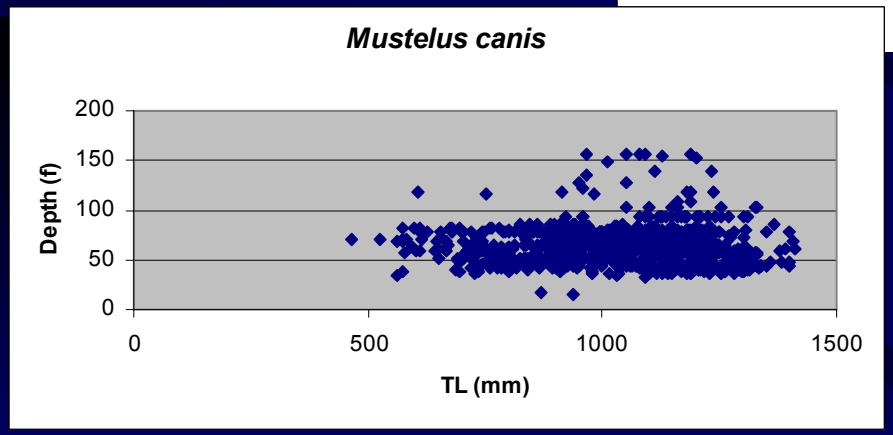
1200
1400
TL (mm)


Mustelus canis
Depth (f)
200
150
100
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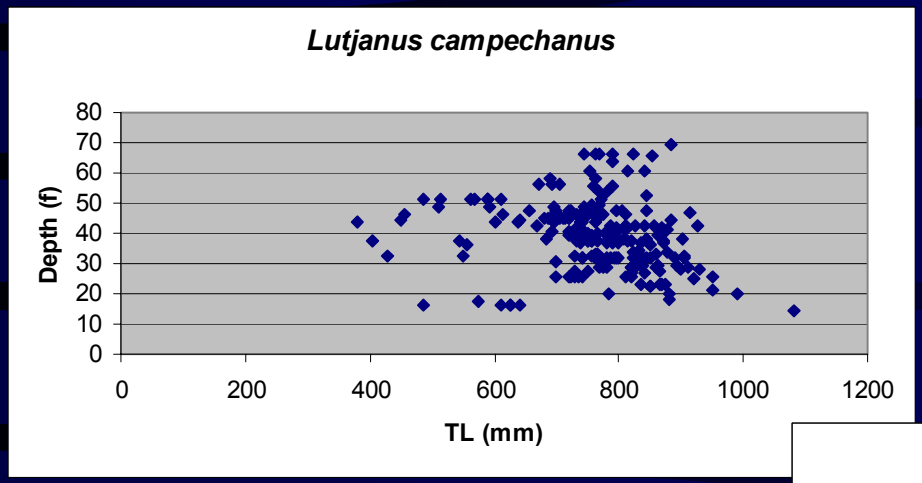
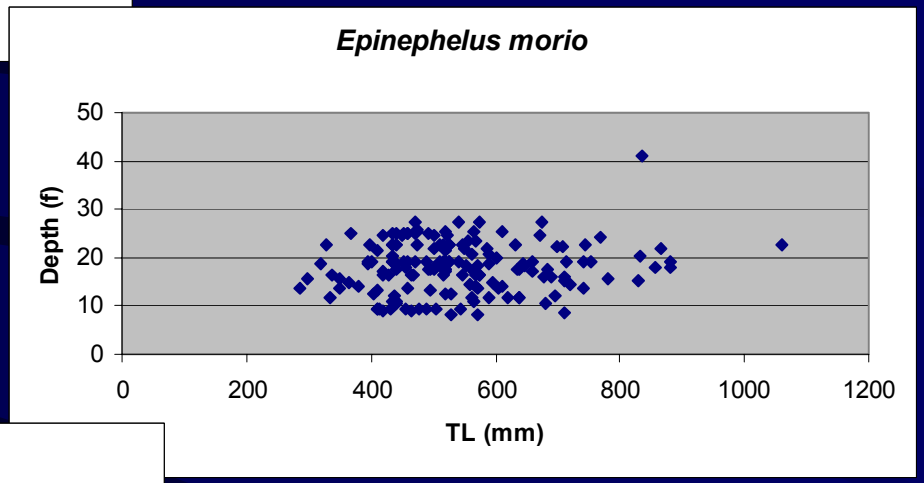
0
0
500
1000
1500
TL (mm)


Lutjanus campechanus
Depth (f)
80
70
60
50
40
30
20
10
0
0
200
400
600
800
1000
1200
TL (mm)


Epinephelus morio
Depth (f)
50
40
30
20
10
0
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200
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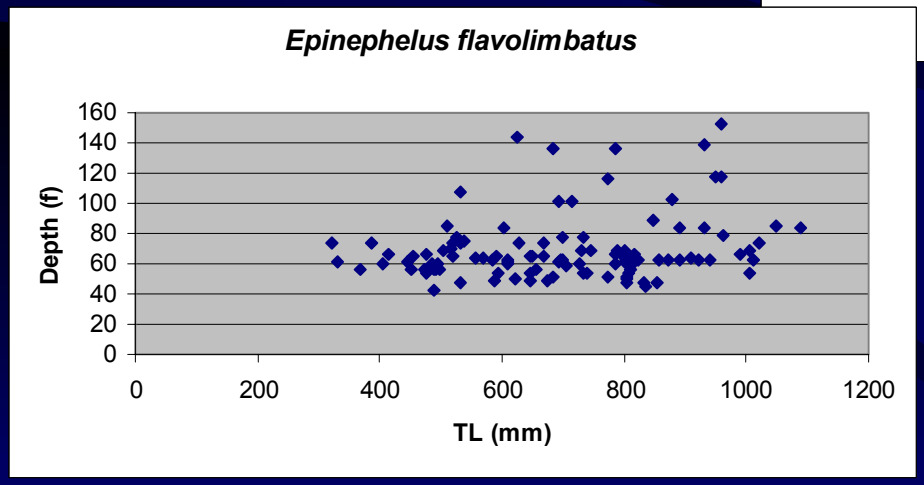
TL (mm)


Epinephelus flavolimbatus
Depth (f)
160
140
120
100
80
60
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200
400
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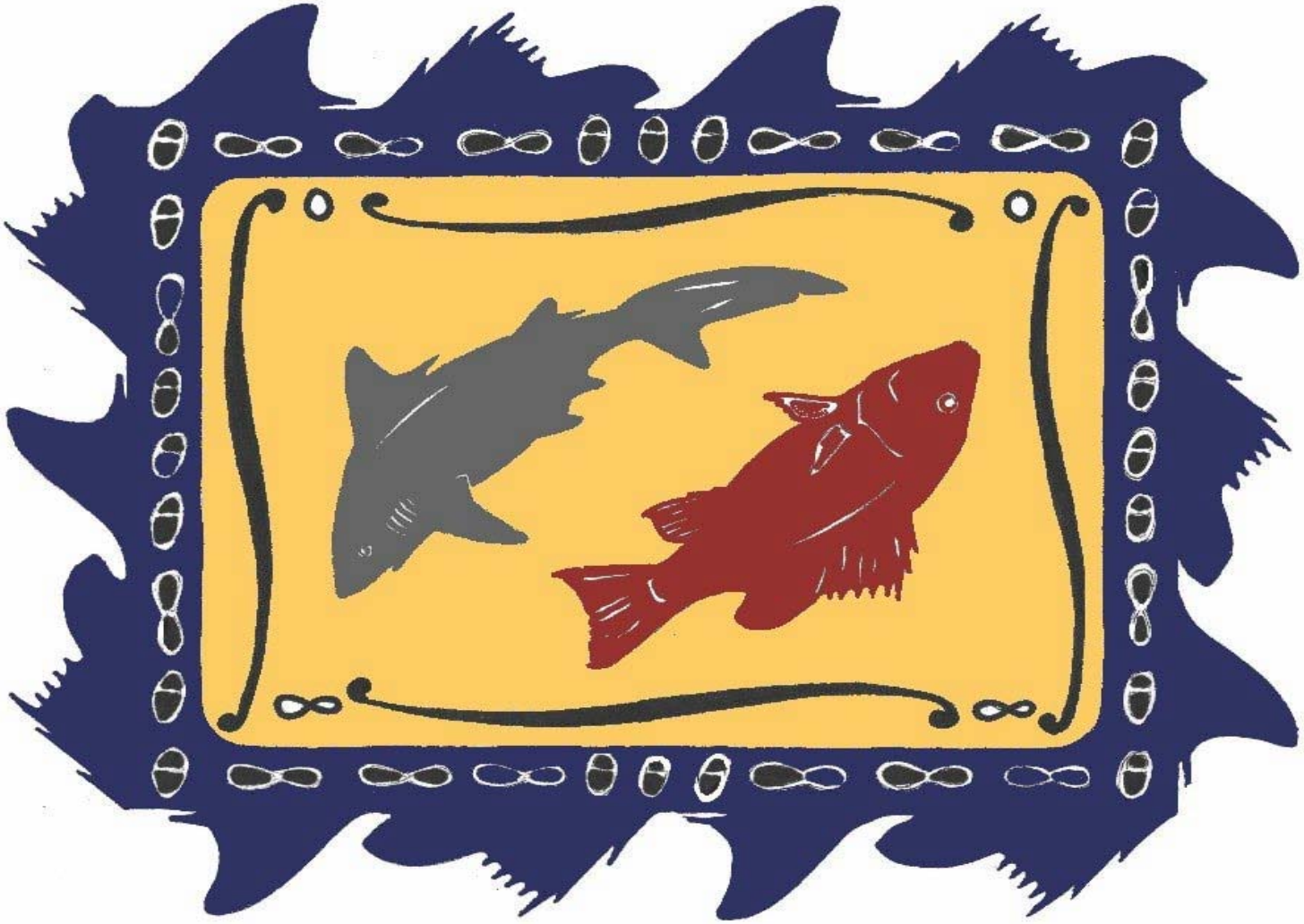
800
1000
1200
TL (mm)

Summary

- Surveys demonstrate populations can be sampled with longline gear.
- Size and catch rates for sharks are similar to commercial effort.
- Size ranges include minimum sizes at maturity for key species.
- Survey includes primary depth ranges and geographical distributions for most species.
- Achieving reasonable precision for several key species (CV of the mean CPUE; <0.4).
- Identifying and controlling bias is achieved by manipulating survey options (i.e., gear).

NMFS MISSISSIPPI LABORATORIES LONGLINE PROJECT