

Characterization of the elasmobranch assemblage in Elkhorn Slough, CA

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Elasmobranchs in Elkhorn Slough



Leopard Shark

Triakis semifasciata

Max size: 198cm TL

Max age: 25-30 years

Mature: 10-15 ♀/7-13 ♂



Bat Ray

Myliobatis californica

Max size: 159cm DW

Max age: 24 years

Mature: 5 ♀/2-3 ♂



Brown Smoothhound

Mustelus henlei

Max size: 100cm TL

Max age: 13 years

Mature: 2-3 ♀/3 ♂



Grey Smoothhound

Mustelus californicus

Max size: 160cm TL

Max age: 9 years

Mature: 2-3 ♀/1-2.5 ♂

Elasmobranchs in Elkhorn Slough



Shovelnose Guitarfish

Rhinobatos productus

Max size: 156cm TL

Max age: 11 years

Mature: 7 ♀/7-8.4 ♂



Round Stingray

Urobatis halleri

Max size: 33.3cm DW

Max age: 14 years

Mature: 3.5 ♀/♂



Thornback Ray

Platyrrhinoidis triseriata

Max size: 91cm TL

Shark derbies

1946 – 1995: May- August
Castroville & Pajaro Valley Rod and Gun Clubs
California Bowmen Hunters



Derby photo credits: Greg Cailliet

EACH DAY:
300-600 fishermen
~100-200 animals per derby



Earl S. Herald (1951-1962)

MLML, etc. help process animals (1971-end)



MLML students help process animals

Weighing



Measuring



Tagging (1988)



Diet Studies



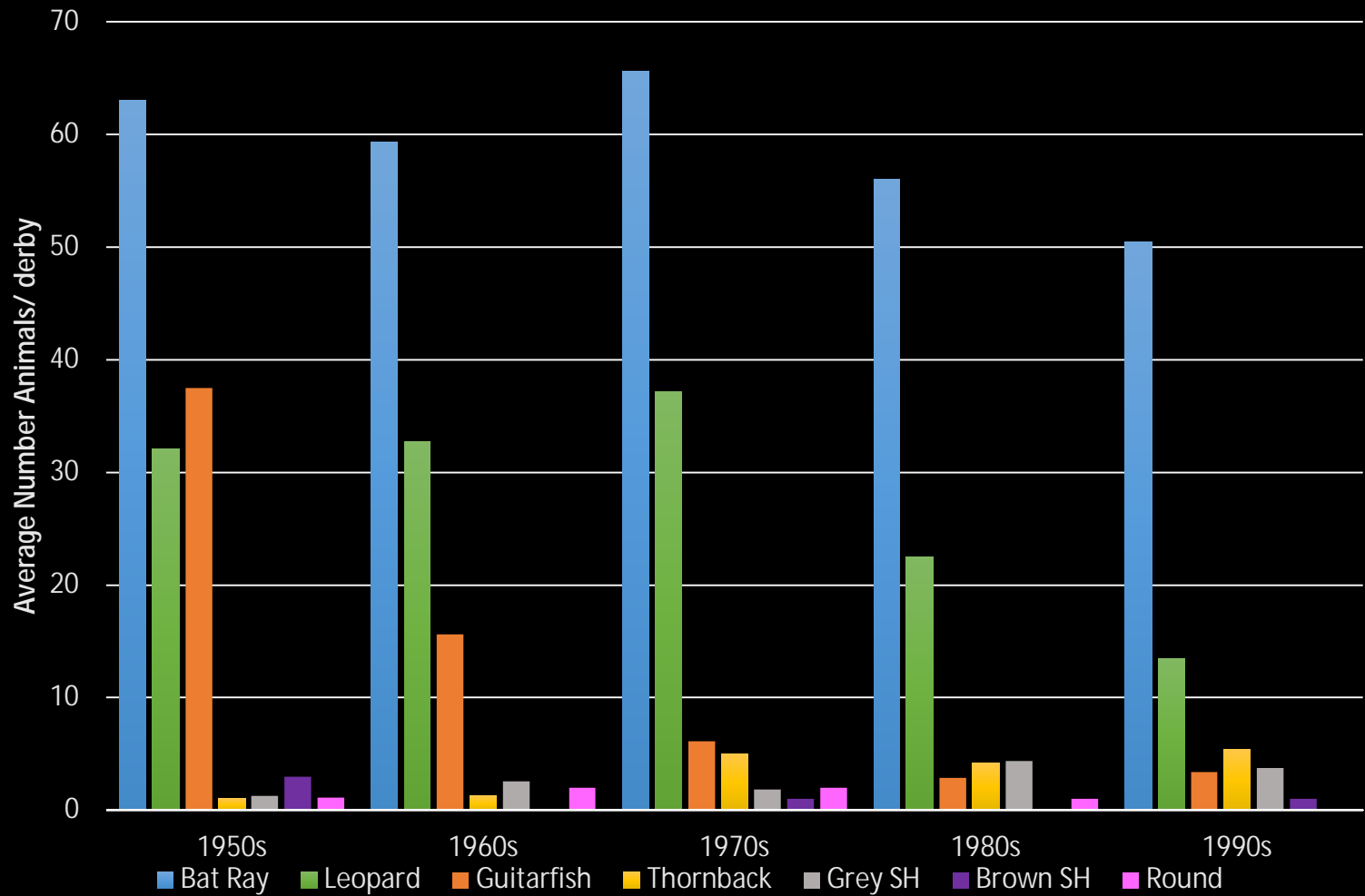
Reproduction studies



Ageing



Historical abundance trends



Current assemblage: Survey



Photo credit: Grant Sainsbury

OBJECTIVES & QUESTIONS

Describe the current distribution (baseline):

Which species are present?

How abundant are they?

Spatial/ temporal patterns?

Segregation? [sex, size, species]

Pattern of seasonal migration
salinity, temperature



METHODS [Sampling Effort]



~8 days per month

Longlines: 24 hooks per 200-foot line [baited with squid]

Gillnets: 300-foot and 100-foot



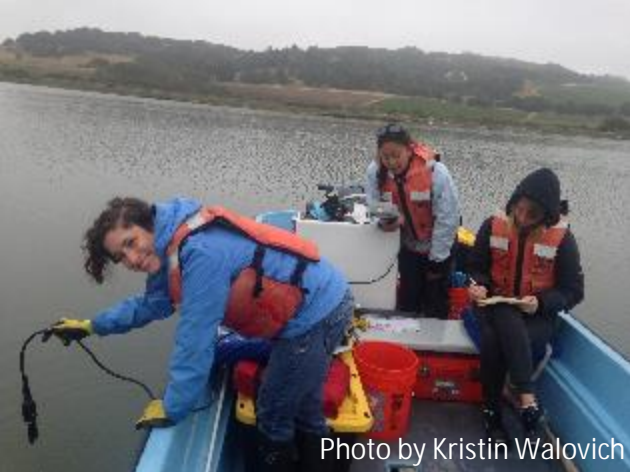


Photo by Kristin Walovich

METHODS [Data Collection]

ABIOTIC [temperature, salinity, pH, dissolved oxygen, depth, secchi depth]

BIOLOGICAL [Sex, size, maturity, parasites]

SPATIAL/ TEMPORAL [Time of day, GPS waypoints, tags, reserve status]



What we caught:

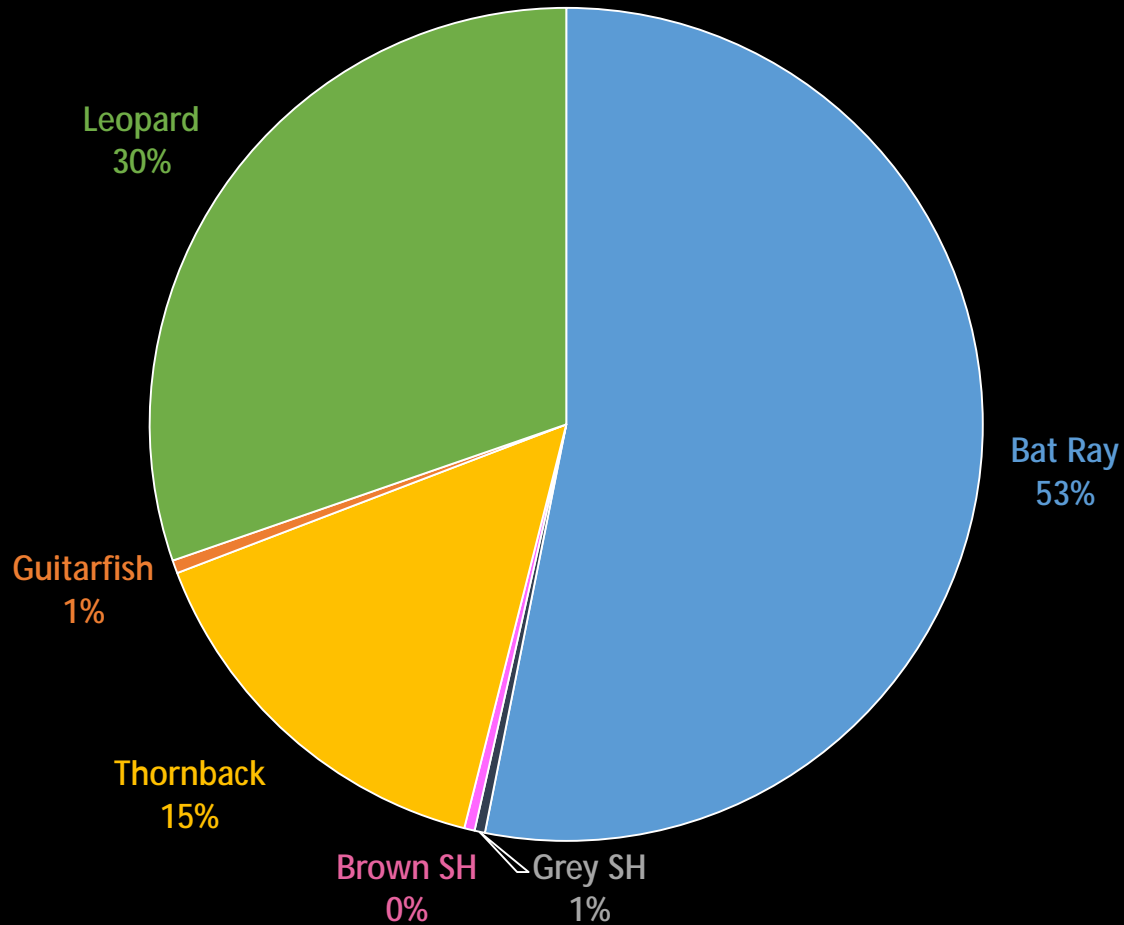


SUMMARY

| SPECIES | COMMON NAME | NUM. CAUGHT | SIZE RANGE (cm) |
|-----------------------------------|-----------------------|-------------|-----------------|
| <i>Myliobatis californica</i> | Bat Ray | 526 | 30-124 (53) DW |
| <i>Triakis semifasciata</i> | Leopard Shark | 300 | 59-146 (117) TL |
| <i>Platyrrhinoidis triseriata</i> | Thornback Ray | 151 | 47-75 (64) TL |
| <i>Rhinobatos productus</i> | Shovelnose Guitarfish | 5 | 99-132 (118) TL |
| <i>Mustelus californicus</i> | Grey Smoothhound | 4 | 86-115 (97) TL |
| <i>Mustelus henlei</i> | Brown Smoothhound | 4 | 88-94 (92) TL |

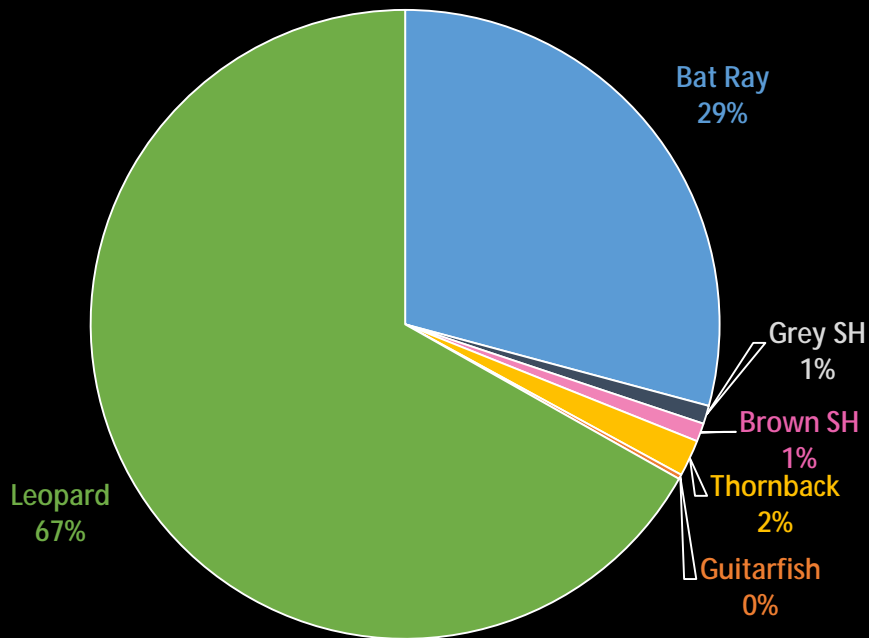


Proportional Catch

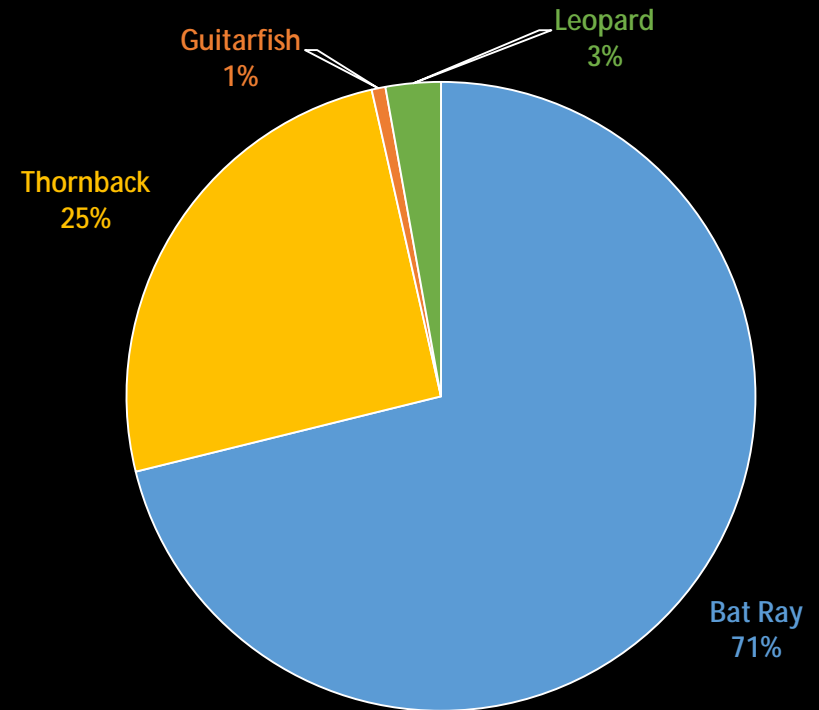


Proportional Catch: Methods

CATCH PROPORTION - GILLNET

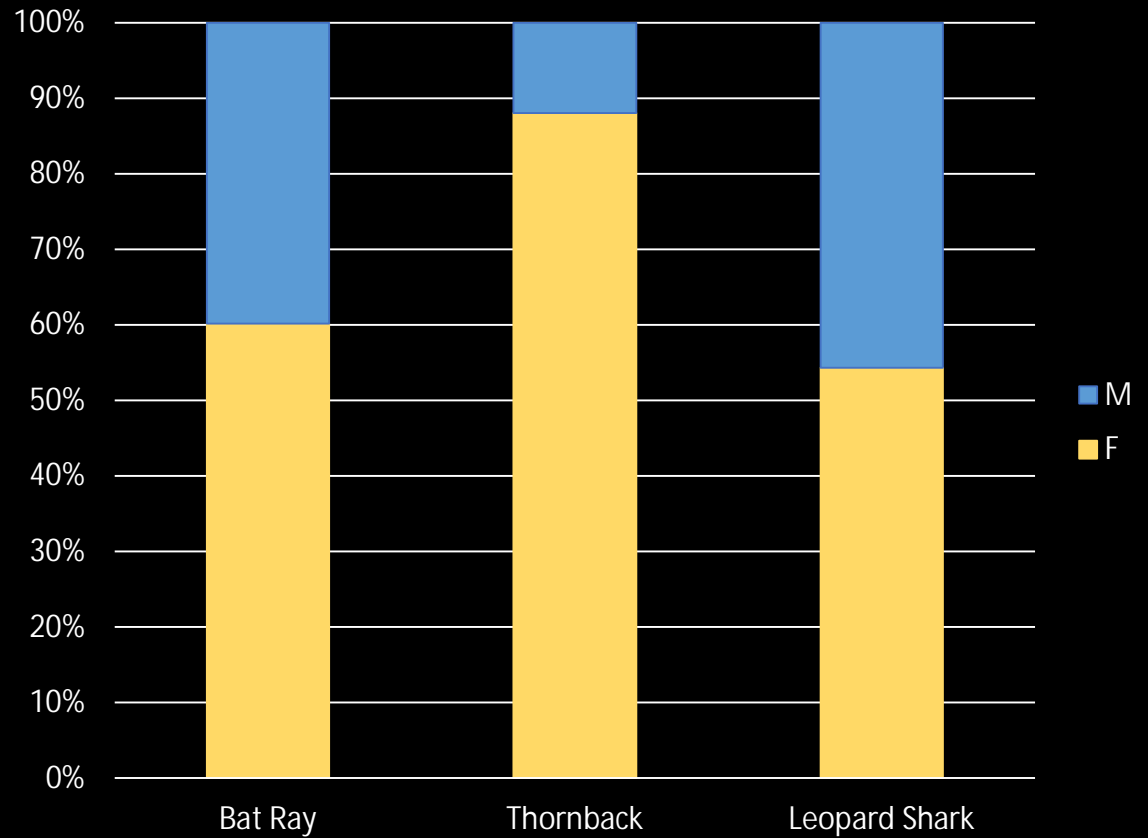


CATCH PROPORTION - LONGLINE



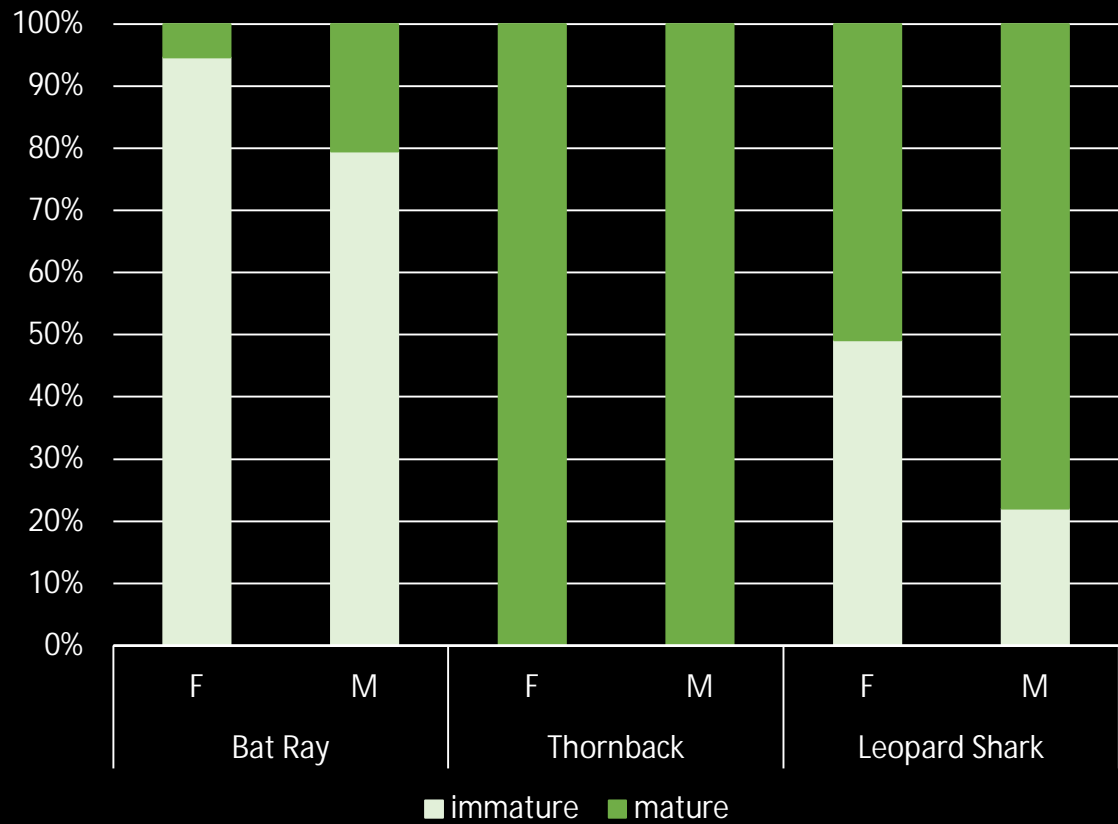


Sex Percentages



Consistent with idea of nursery?

Maturity

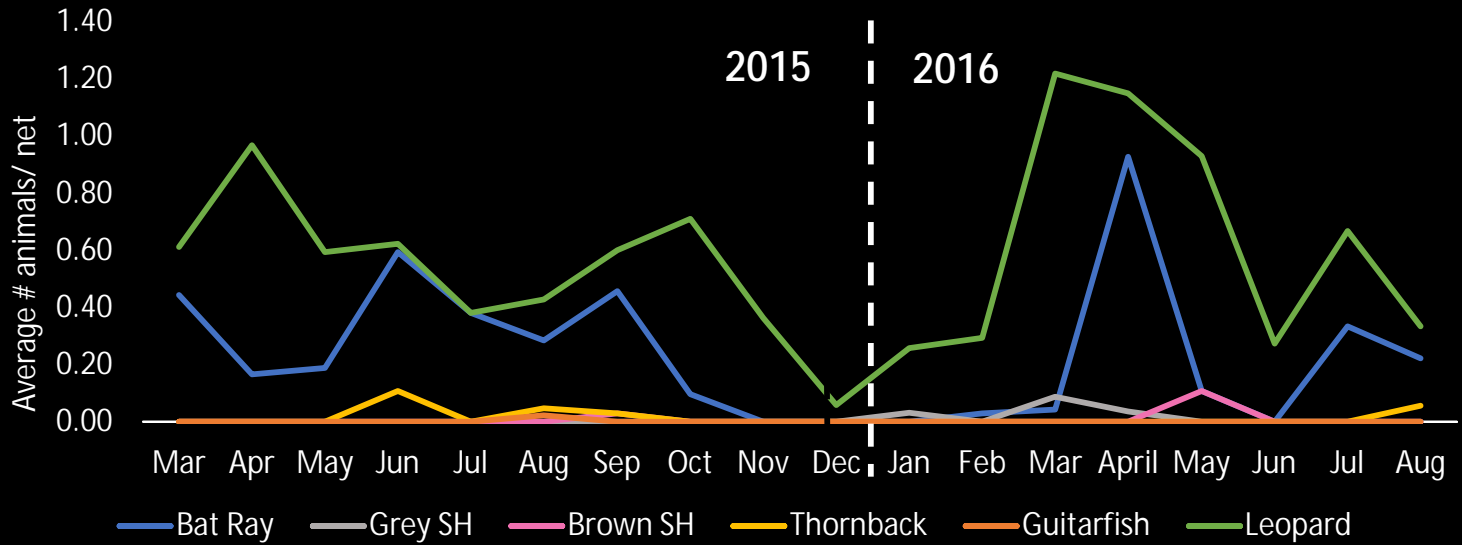


Temporal Patterns

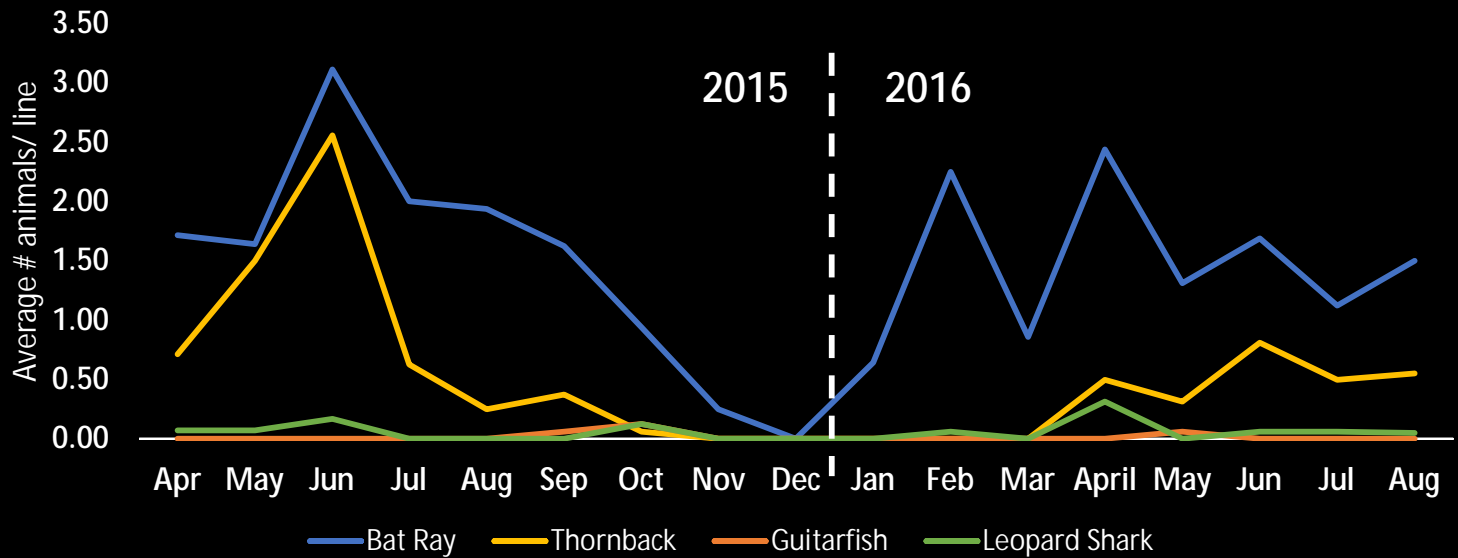


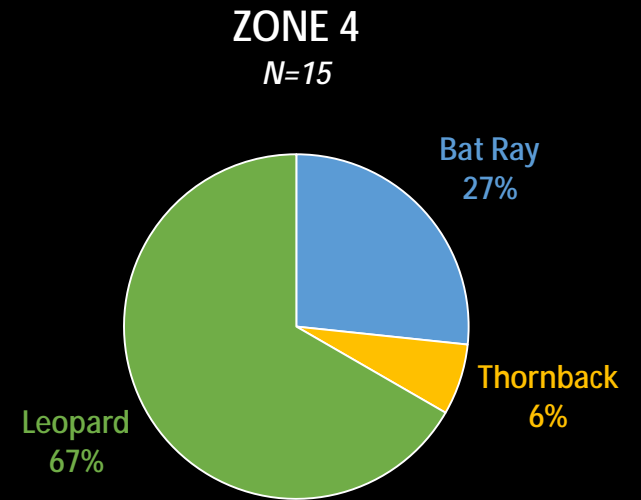
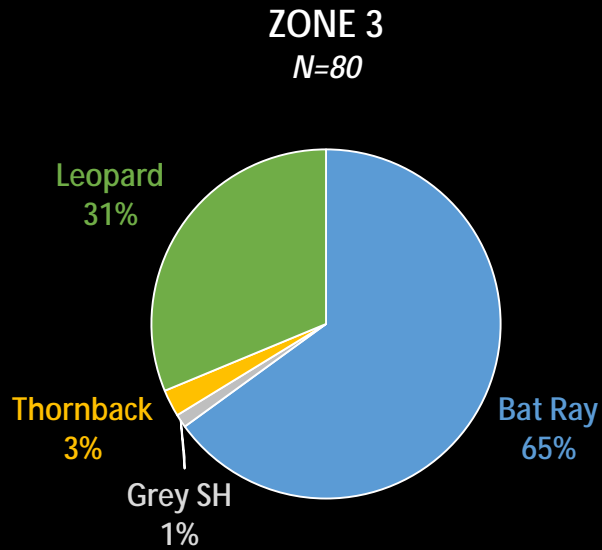
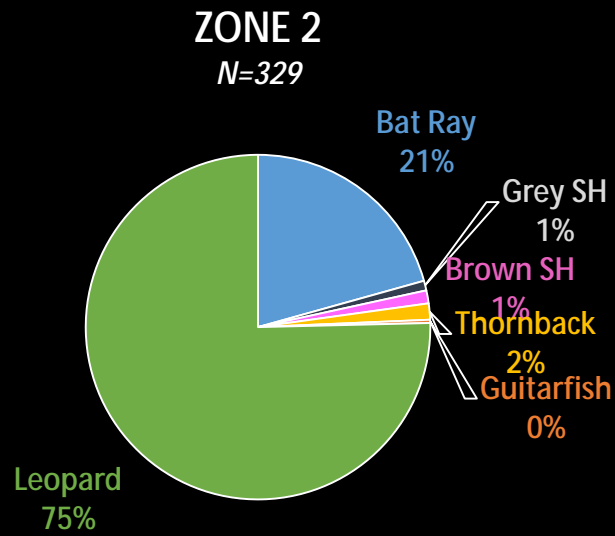
Standardized Monthly Abundance

Gillnet

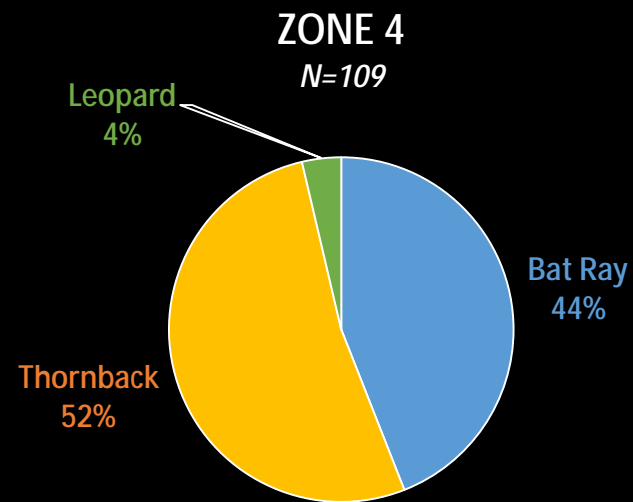
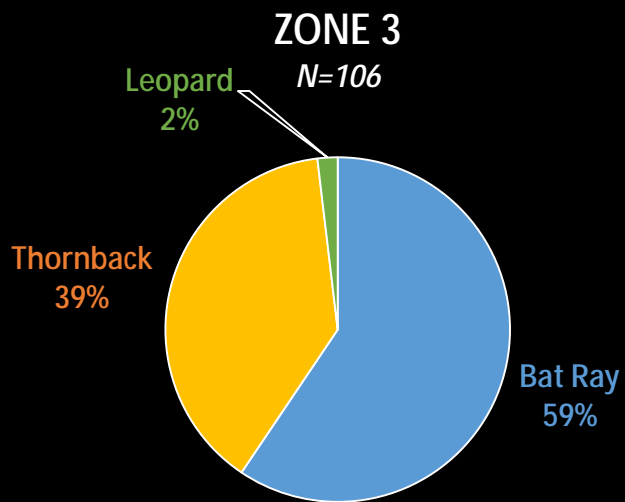
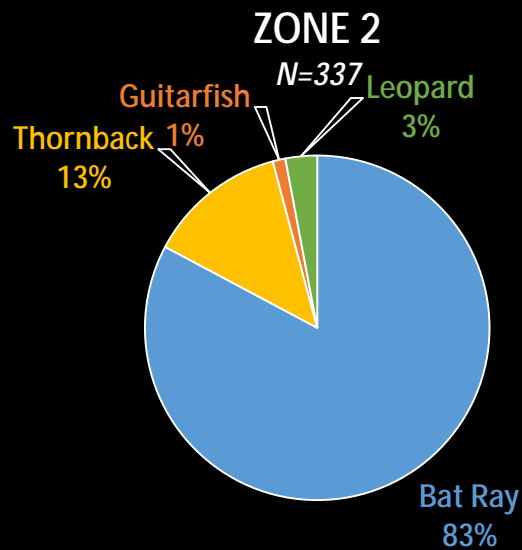
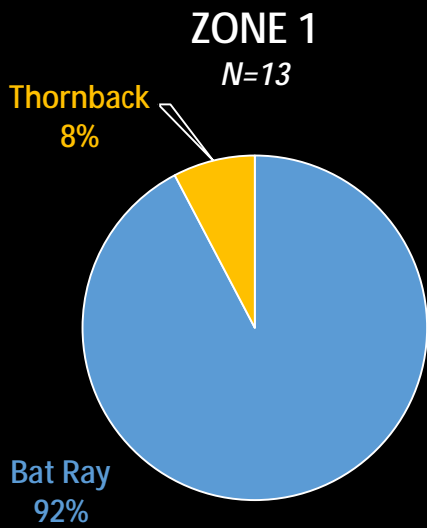


Longline





Longline

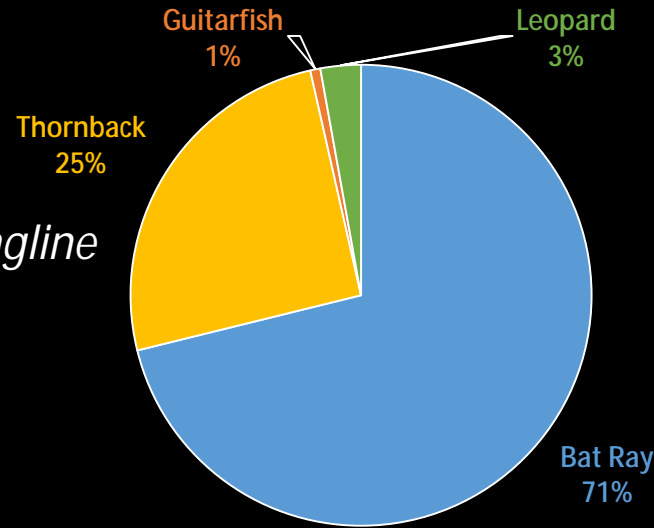


Historical Comparisons

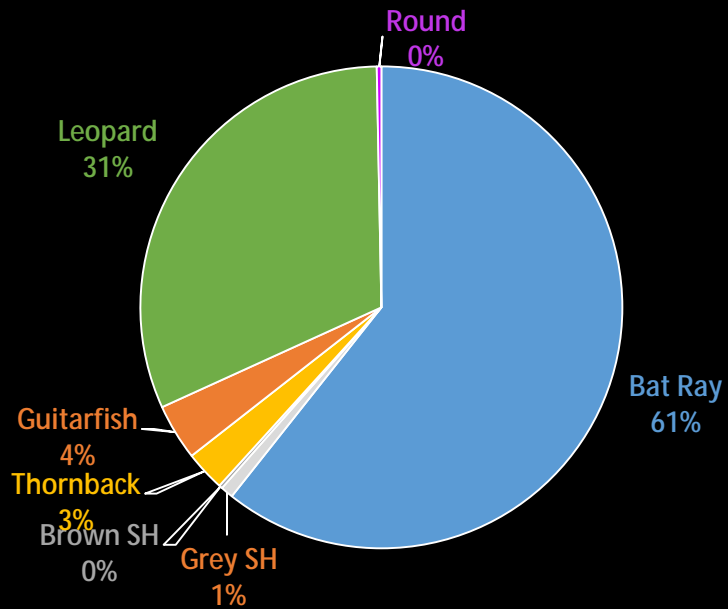


Hooks

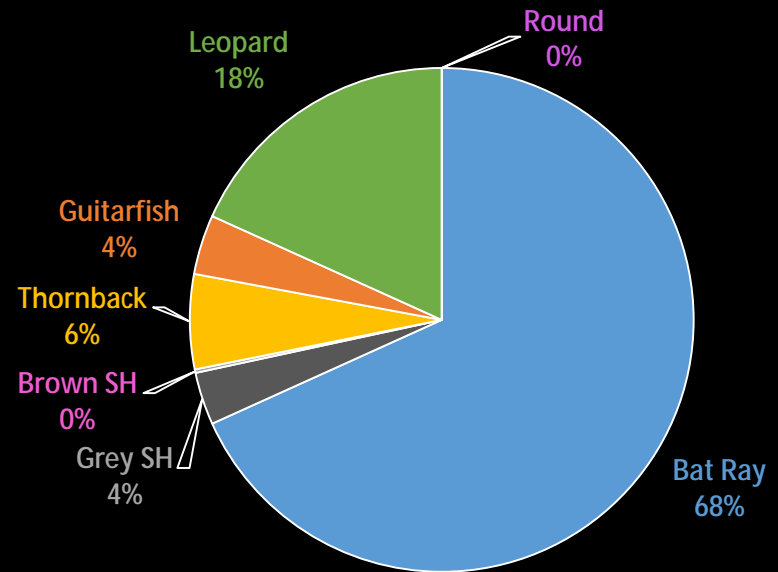
2015-2016 Longline



1970s Hook and Line

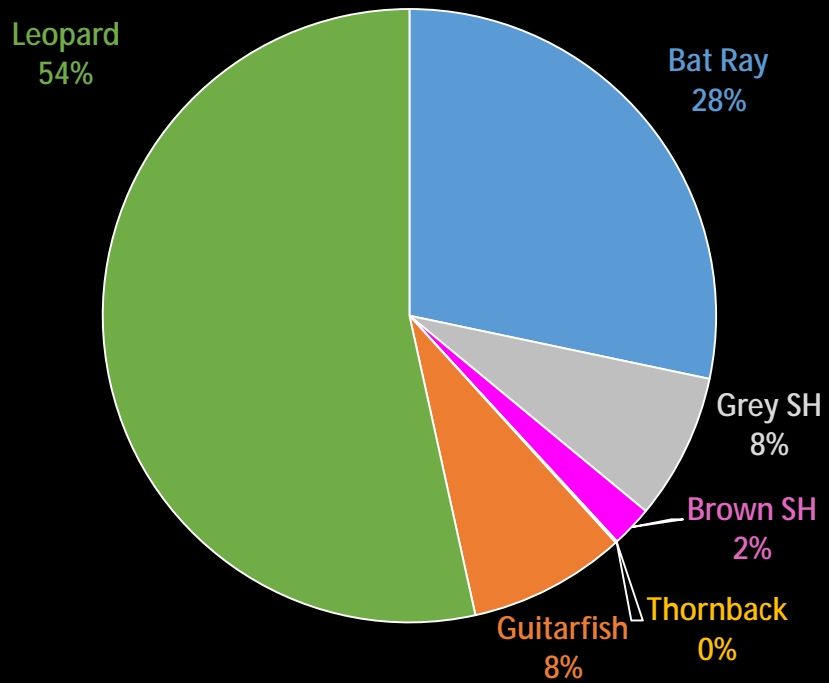


1990s Hook and Line

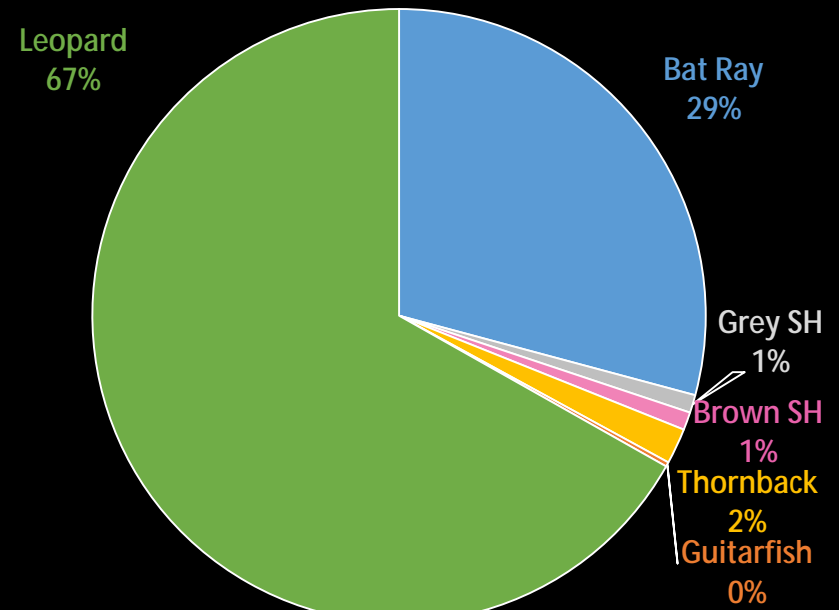


Net

1971-2 Gillnet
(Larry Talent)

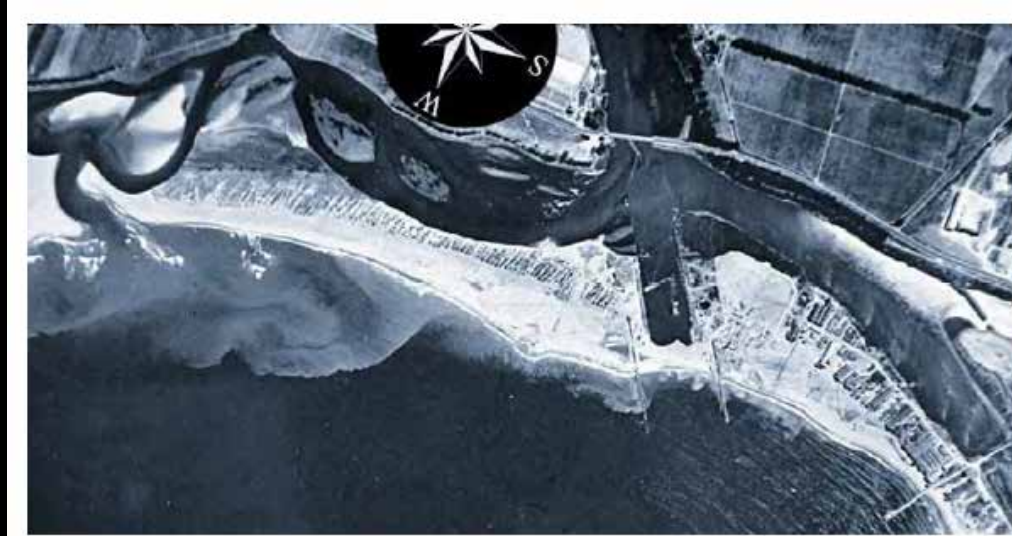


2015-2016 Gillnet



1946-7: Dredging of Moss Landing Harbor

Source: ESNERR



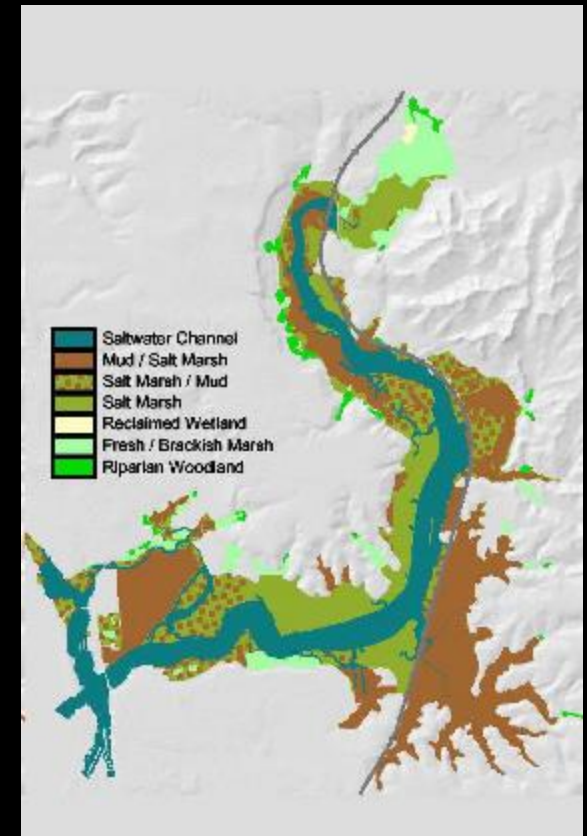
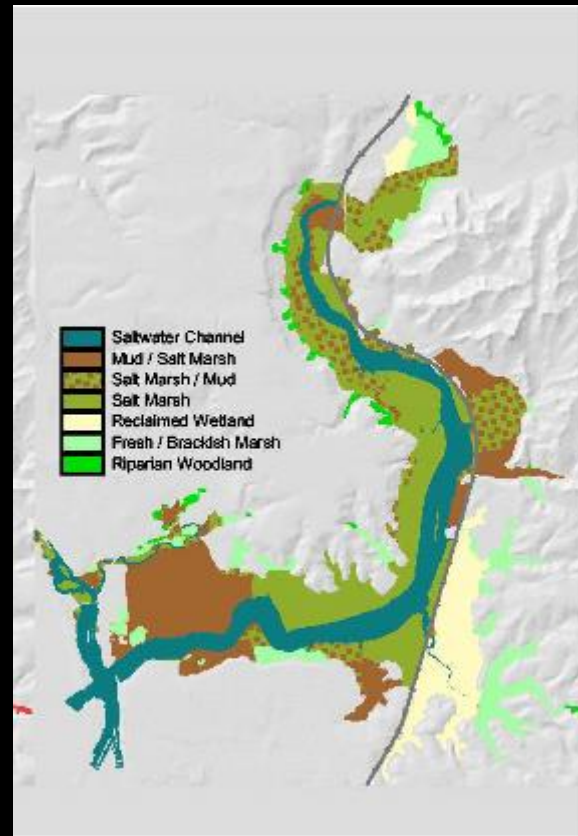
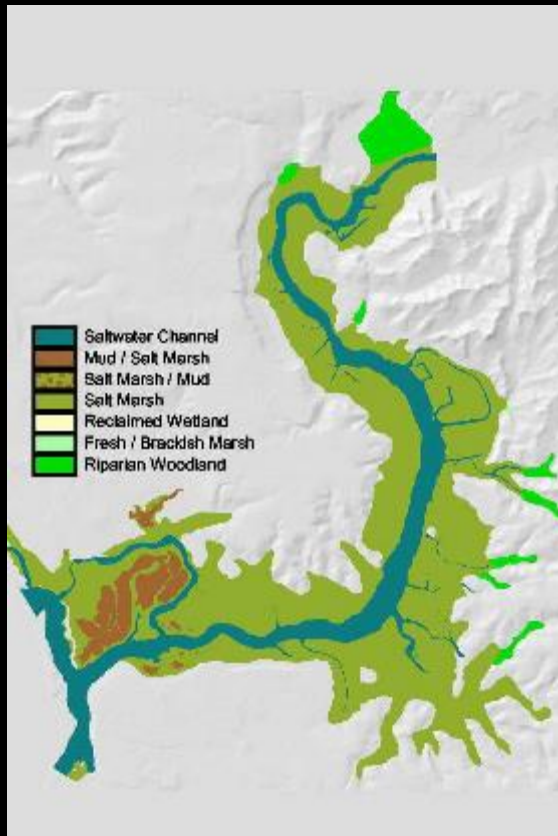
Saltwater-dominated estuary
Increase in tidal energy -- Highly erosive

Decrease in healthy salt marsh habitat Increased mud flat

1870

1980

2000



Further Exploration

Environmental Indices

Which variables correlate?

time of day | season | tidal height | moon phase

habitat type | reserve status

depth | location | distance from mouth

salinity | temperature | pH

dissolved oxygen | secchi depth (turbidity)

Prey??

A photograph of a sunset over a body of water, likely an estuary. The sun is low on the horizon, casting a golden glow across the sky and water. In the foreground, the back of a person wearing a white cap and a dark jacket is visible, sitting in a boat. The text is overlaid on a semi-transparent blue box in the center of the image.

Many elasmobranchs in the slough, low diversity

Changes in species proportions

Possible positive story for Thornbacks – nursery?

Continue monitoring
Top predators

Other areas, long-term

Manage/ improve estuary
as estuaries evolve

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CSU Council on Ocean Affairs, Science &
Technology (COAST)



Questions?



| | MAXIMUM | FEMALE | MALE | RANGE | References |
|--|-----------------------------------|--|--------------------|--|--|
| Triakis semifasciata (Leopard Shark) | Size: 198 cm Age: 25-30 years | 10-15/ 105-135cm 7-36 offspring/yr Gestation: ~1 year Size at birth: 17-25 cm | 7-13/ 100-105cm | San Pedro Bay to Humboldt Bay | Ackerman 1971 Kusher et al. 1992 Smith 2001 Cortes 2002 |
| Myliobatis californica (Bat Ray) | Size: 159 cm DW Age: 24 years | 5/ 88.1cm (50%) 12 offspring Gestation: 9-12 months Size at birth: 22-35.6cm | 2-3/ 45-62.6 (50%) | Baja California to Oregon | Martin & Cailliet 1988a,b |
| Platyrrhinoidis triseriata (Thornback Ray) | Size: 91 cm TL | 48cm TL Gestation: ~ 1 year Size at birth: 11cm TL | 37cm TL | Bahia Magdalena (Baja California to Tomales Bay) | |
| Mustelus henlei (Brown smoothhound) | Size: 100 cm Age: 13 years | 2-3/ 51-66cm 1-10 pups in California Gestation: 10-12 months Size at birth: 19-30cm | 3/ 52-66cm | Washington to Peru | Yudin & Cailliet 1990 Perez-Jimenez 2006 |
| Mustelus californicus (Gray smoothhound) | Size: 160 cm Age: 9 years | 2-3/ 70-90cm 3-16 pups Gestation: 10-12 months Size at birth: 20-30cm | 1-2.5/ 57-65cm | Mazatlan to Cape Mendocino | Yudin & Cailliet 1990 Perez-Jimenez 2006 Sosa-Nishizaki 2010 |
| Rhinobatos productus (Shovelnose guitarfish) | Size: 156 cm Age: 11 years | 7/ 57-99cm 1-16 pups Gestation: 4-5 months Size at birth: 20-24 cm TL | 7-8.4/ 63-110cm | Central California to the Gulf of Mexico | Baxter 1966 Timmons and Bray 1997 Villavencio-Garyazar 1993 Marquez-Farias 2007 Downton-Hoffman 1996 |
| Urobatis halleri (Round stingray) | Size: 33.3 cm DW Age: 14 years | 3.5/ 15 cm Gestation: 3 months Size at birth: 6-8cm DW | 3.5/ 15 cm | Northern California to Panama | Babel 1967 Lyons and Lowe 2013 |