Biological Data Collection Programs and Sampling Design

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

N.C. Marine Fisheries Commission| Lee Paramore| May 15-17, 2019

Biological Sampling Programs

Terms

Sampling program–program designed to meet collection needs for biological data to represent information from a specified population

Survey design–the scientific sampling plan used to choose a representative sample of elements from a specified population

Sample–a set of items or measurements drawn from a population

Population–all individuals occurring in wild from which inferences can be drawn

Biological Sampling Programs

- Survey design is critical to providing reliable information that allows stocks to be managed for long-term sustainable harvest.

- This presentation provides an overview of different survey designs used by the DMF.

- The purpose of this presentation is to provide a better understanding of the objectives for, differences between, and limitations of different types of survey designs and methods used by the DMF.

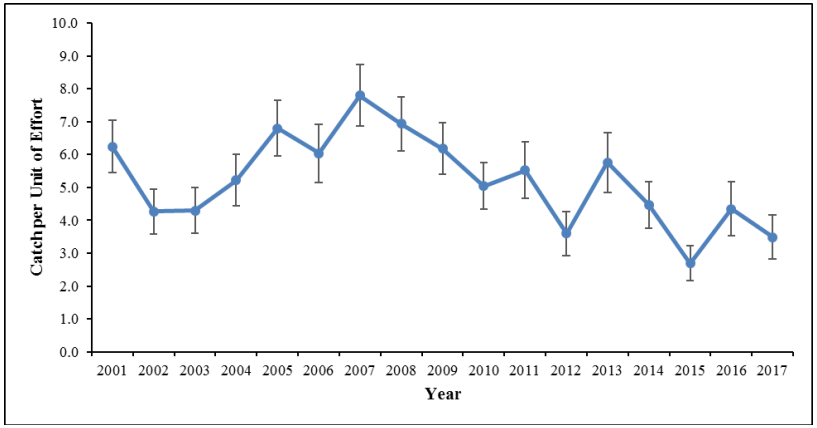
Biological Sampling Programs

Data Collection

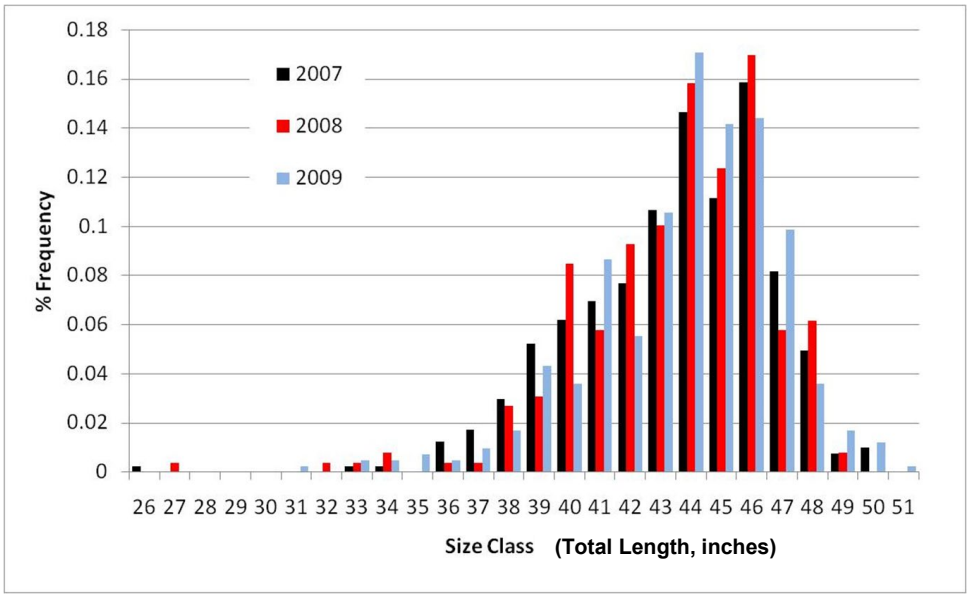
1. Fishery-Independent Data

2. Fishery-Dependent Data

Fishery Independent Data



- Purpose
  - Track trends in abundance
  - Size or age structure of population
  - Biological data (size, age, sex, maturity, genetics, diet)



Fishery Independent Data

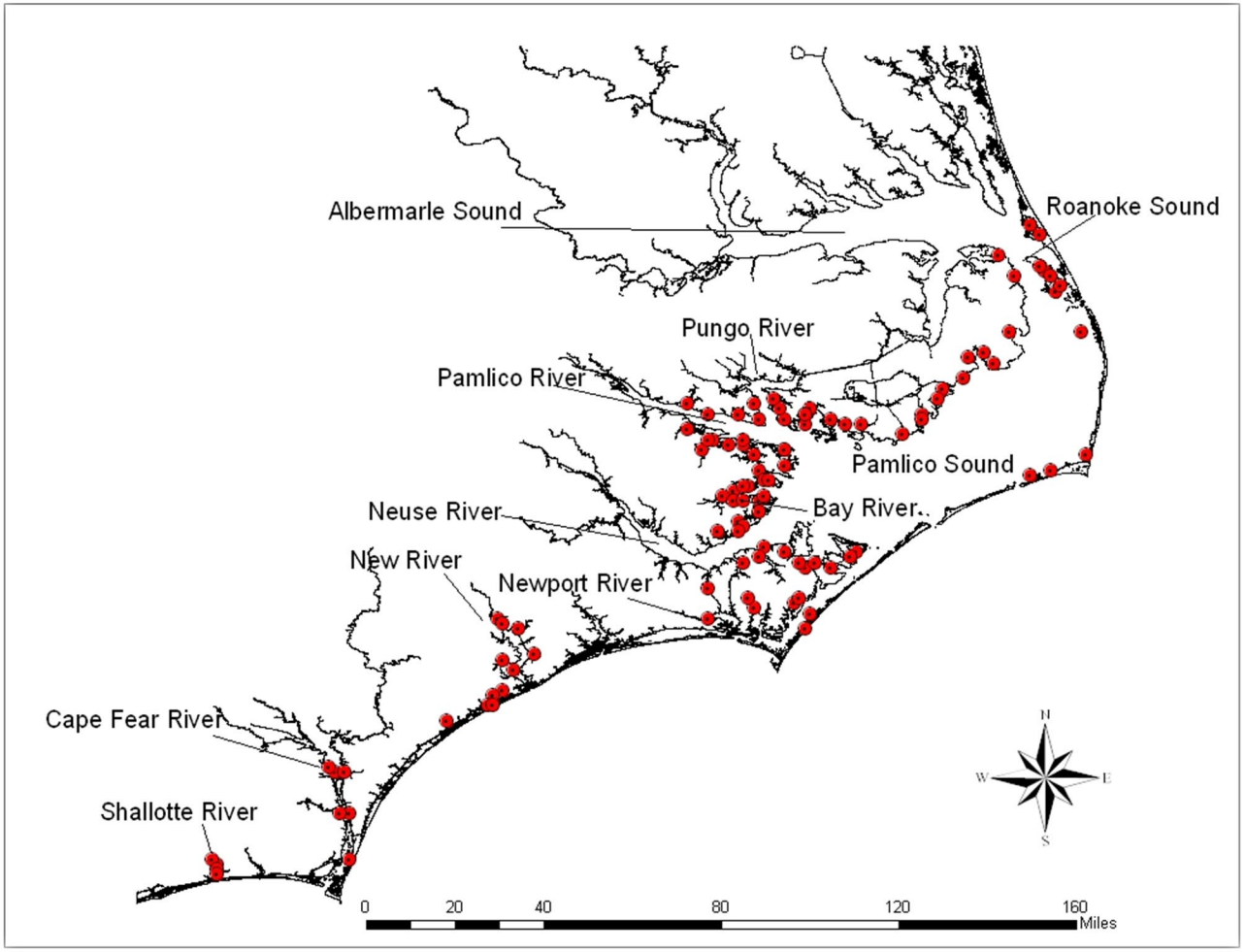
- Sample Design
  - Designed to encompass area and season
  - Standardized sampling effort
  - Standardized gear configuration
  - Standardized deployment and fishing methods
  - Predetermined sample areas

Fishery Independent Data

- Sample design is critical because it reduces potential for bias.
- Standardizing methods mean survey results reflect population changes not sampling changes.
- Sampling can't be based on judgment or convenience sampling or based on inherent skill or ability of sampler.

Fishery Independent Sample Design

➢ Fixed Station Survey



Program 120
Juvenile Trawl

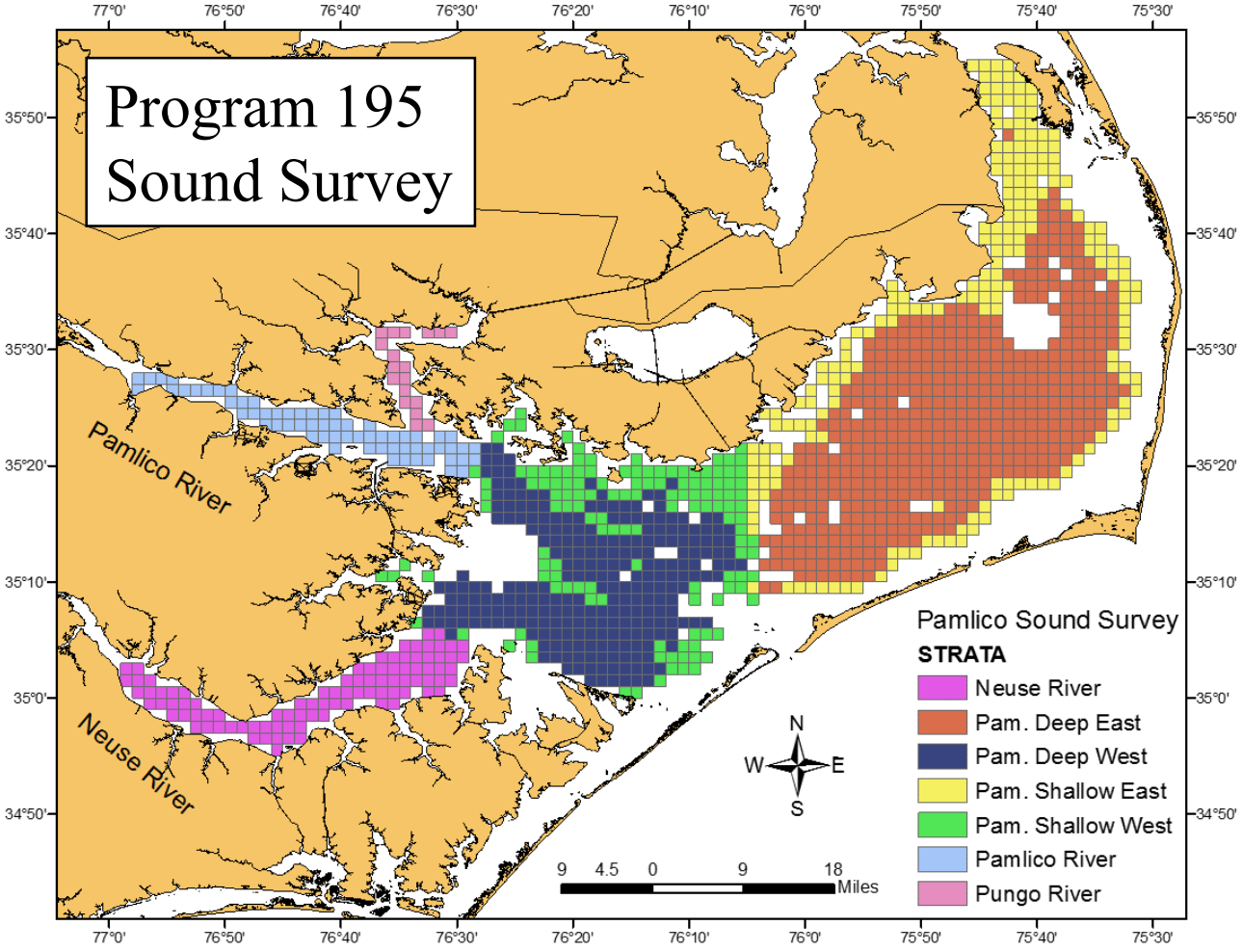
Fishery Independent Sample Design

Examples of fixed station surveys

- Juvenile trawls
  - Anadromous trawl
  - Shallow water trawl
- Juvenile Seines
  - Red drum seines
  - Anadromous seines

Fishery Independent Sample Design

- **Stratified Random Survey**



Fishery Independent Sample Design

Examples of stratified random surveys

Pamlico Sound Trawl Survey

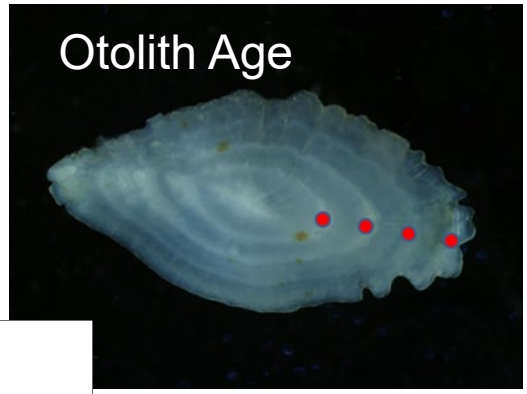
Independent Gill Net Surveys

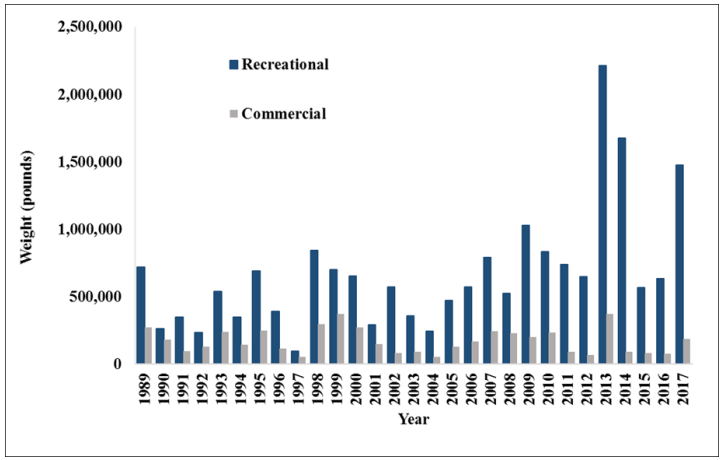
Red Drum Longline Survey

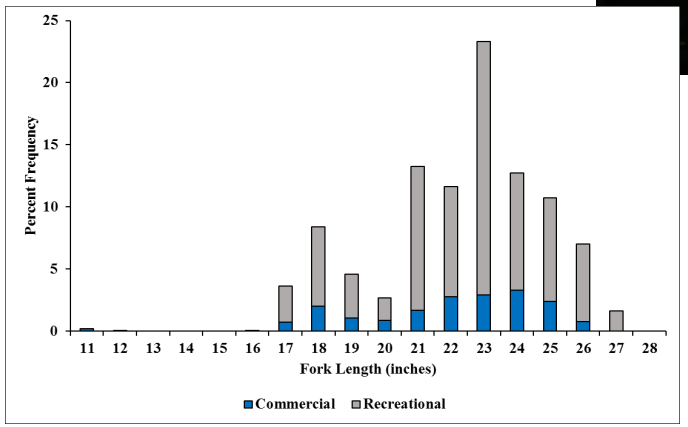
Biological Sampling Programs

Fishery Dependent Data

- Purpose
  - Track catch (harvest and discards)
  - Characterize size/age of catch
  - Biological data
    (size, age, sex, maturity, genetics, diet)



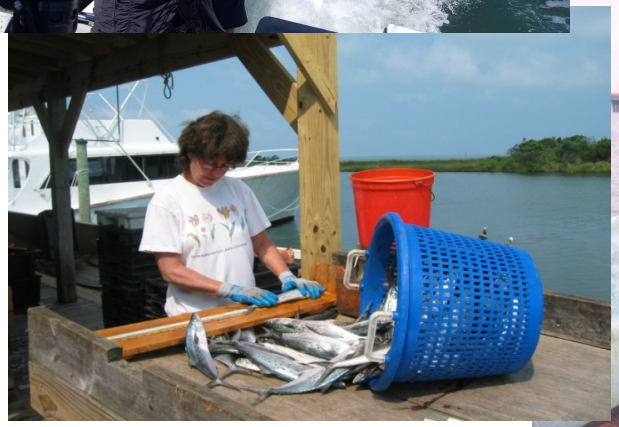




Fishery Dependent Data

Tagging Program

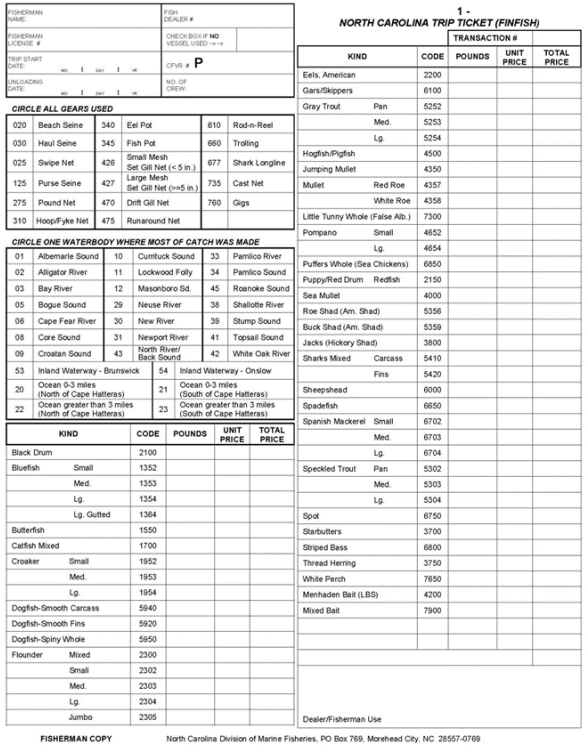
Recreational Survey



Fish House Program

Observer Program

Trip Ticket Program



FISHERMAN NAME:
FISHERMAN LICENSE #:
TRIP START DATE: MO | DAY | YR
UNLOADING DATE: MO | DAY | YR
FISH DEALER #:
CHECK BOX IF NO VESSEL USED →
CFVR # P
NO. OF CREW:

1 -
NORTH CAROLINA TRIP TICKET (FINFISH)
TRANSACTION #

CIRCLE ALL GEARS USED

020	Beach Seine	340	Eel Pot	610	Rod-n-Reel
030	Haul Seine	345	Fish Pot	660	Trolling
025	Swipe Net	426	Small Mesh Set Gill Net (< 5 in.)	677	Shark Longline
125	Purse Seine	427	Large Mesh Set Gill Net (>=5 in.)	735	Cast Net
275	Pound Net	470	Drift Gill Net	760	Gigs
310	Hoop/Fyke Net	475	Runaround Net		

CIRCLE ONE WATERBODY WHERE MOST OF CATCH WAS MADE

01	Albemarle Sound	10	Currituck Sound	33	Pamlico River
02	Alligator River	11	Lockwood Folly	34	Pamlico Sound
03	Bay River	12	Masonboro Sd.	45	Roanoke Sound
05	Bogue Sound	29	Neuse River	38	Shallotte River
06	Cape Fear River	30	New River	39	Stump Sound
08	Core Sound	31	Newport River	41	Topsail Sound
09	Croatan Sound	43	North River/ Back Sound	42	White Oak River
53	Inland Waterway - Brunswick			54	Inland Waterway - Onslow
20	Ocean 0-3 miles (North of Cape Hatteras)			21	Ocean 0-3 miles (South of Cape Hatteras)
22	Ocean greater than 3 miles (North of Cape Hatteras)			23	Ocean greater than 3 miles (South of Cape Hatteras)

KIND		CODE	POUNDS	UNIT PRICE	TOTAL PRICE
Black Drum		2100			
Bluefish	Small	1352			
	Med.	1353			
	Lg.	1354			
	Lg. Gutted	1364			
Butterfish		1550			
Catfish Mixed		1700			
Croaker	Small	1952			
	Med.	1953			
	Lg.	1954			
Dogfish-Smooth Carcass		5940			
Dogfish-Smooth Fins		5920			
Dogfish-Spiny Whole		5950			
Flounder	Mixed	2300			
	Small	2302			
	Med.	2303			
	Lg.	2304			
	Jumbo	2305			

KIND		CODE	POUNDS	UNIT PRICE	TOTAL PRICE
Eels, American		2200			
Gars/Skippers		6100			
Gray Trout	Pan	5252			
	Med.	5253			
	Lg.	5254			
Hogfish/Pigfish		4500			
Jumping Mullet		4350			
Mullet	Red Roe	4357			
	White Roe	4358			
Little Tunny Whole (False Alb.)		7300			
Pompano	Small	4652			
	Lg.	4654			
Puffers Whole (Sea Chickens)		6850			
Puppy/Red Drum	Redfish	2150			
Sea Mullet		4000			
Roe Shad (Am. Shad)		5356			
Buck Shad (Am. Shad)		5359			
Jacks (Hickory Shad)		3800			
Sharks Mixed	Carcass	5410			
	Fins	5420			
Sheepshead		6000			
Spadefish		6650			
Spanish Mackerel	Small	6702			
	Med.	6703			
	Lg.	6704			
Speckled Trout	Pan	5302			
	Med.	5303			
	Lg.	5304			
Spot		6750			
Starbutters		3700			
Striped Bass		6800			
Thread Herring		3750			
White Perch		7650			
Menhaden Bait (LBS)		4200			
Mixed Bait		7900			

Dealer/Fisherman Use

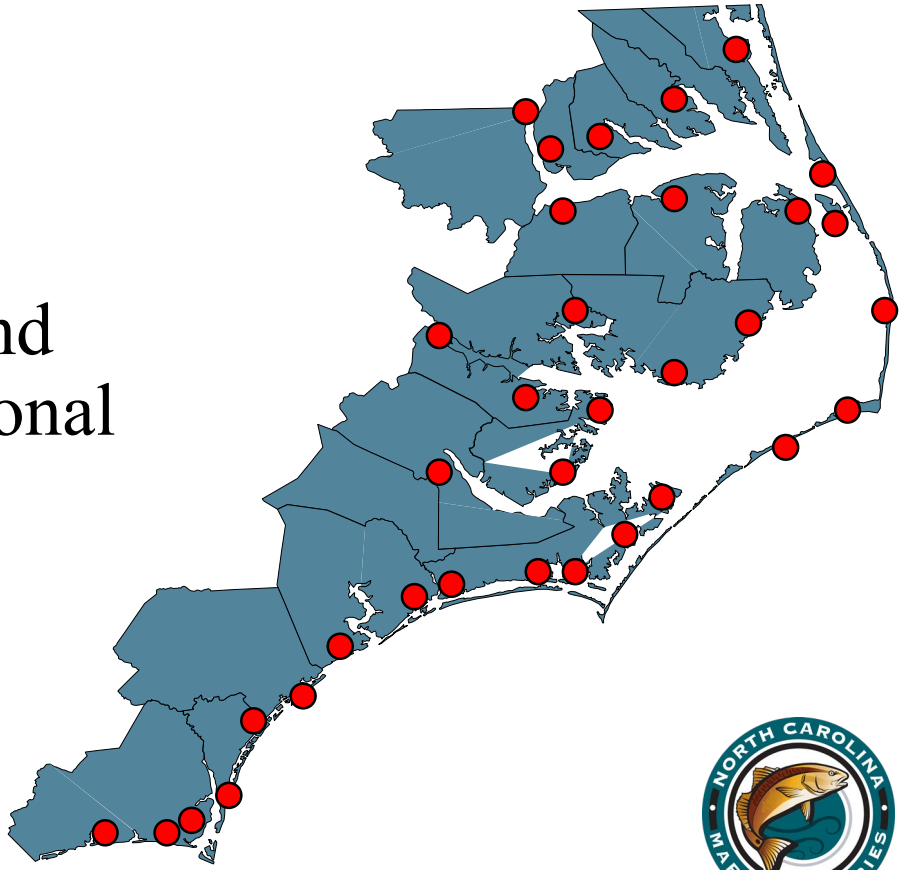
FISHERMAN COPY

North Carolina Division of Marine Fisheries, PO Box 769, Morehead City, NC 28557-0769

Fishery Dependent Data

- Sample Design
  - Samples must be representative of catch
  - Sampling effort by area and season should be proportional to catches

Fish Houses Sampled



Fishery Dependent Data

- Fishery dependent data
  - Used to monitor removals, effort
  - Characterize catch by size and age

- Limitations of fishery dependent data
  - Gear and effort is not standardized
  - Deployment and fishing methods are not standardized
  - Locations based on maximizing catch of target species
  - Judgment and skill are key factors in success

- For these reasons, fishery dependent data is not used for tracking population trends or size of fish in population

Fishery Independent and Dependent Data

- Both data sources are critical to assessing stock conditions and for providing the most sound management advice

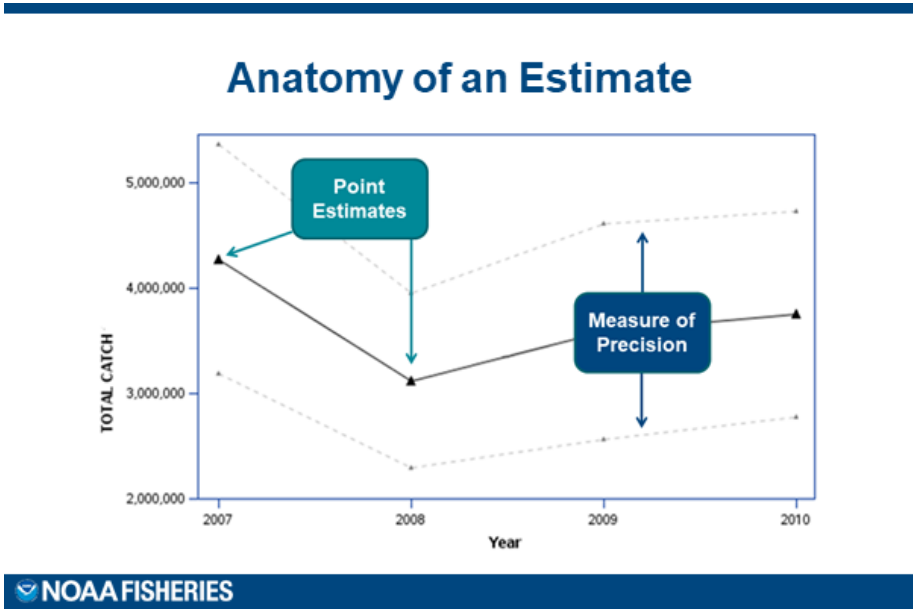
- Fishery independent data
  - Track trends in abundance over time
  - Size or age structure information for the population
  - Biological Data (size, age, sex, maturity, genetics, diet)

- Fishery dependent data
  - Monitor effort and removals from population
  - Characterize catch by size and age
  - Biological Data (size, age, sex, maturity, genetics, diet)

Additional considerations on sample design

- All surveys have sampling error

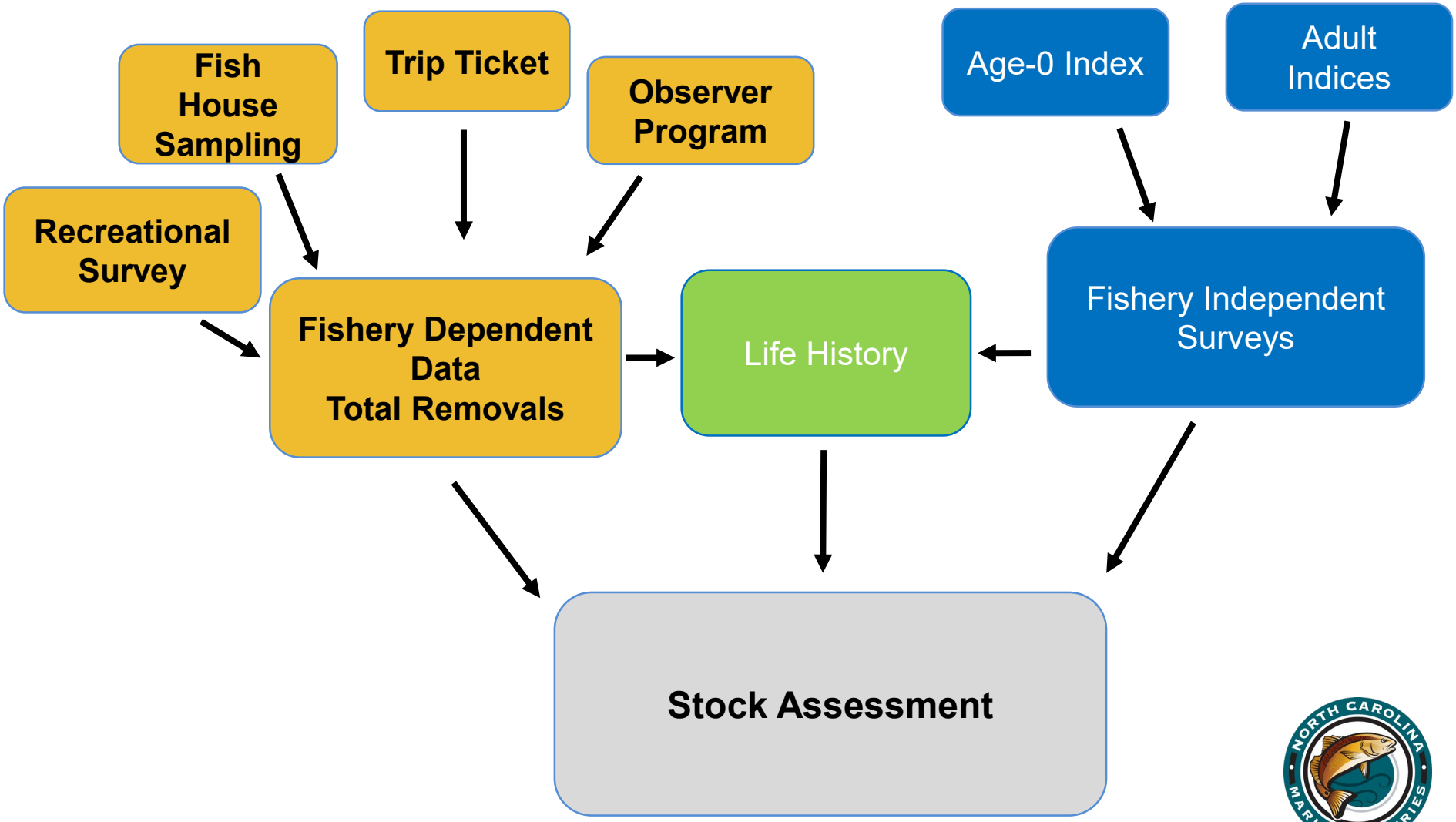
- Size of sampling error depends on:
  - Sample design
  - Sample size
  - Natural variability in population



- Larger sample size equals greater precision (less sample error)
- Logistics and funding are limiting factors
- Stock assessment models allow for uncertainty in measurements as part of input

Biological Sampling Programs

Summary of how it all comes together:



Questions?