# Common Questions and Misconceptions about Marine Fisheries Science and Management

2024 NC Flounder Symposium

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# TOP 10 LIST

1. What is a stock assessment?
2. Where do you get your data?
3. Why should I tell you what I catch, you will just use it against me.
4. Are surveys useful when biologists don’t know how or where to fish?
5. What is the big deal about ages?
6. How do you know how many fish are in the sea right now?
7. How can the stock be in trouble when fishing is great now in my area?
8. If the stock is rebuilt, why are the regulations so strict?
9. Why bother, population trends are cyclical and driven by the environment
10. Why does my state have stricter regulations than those around me?

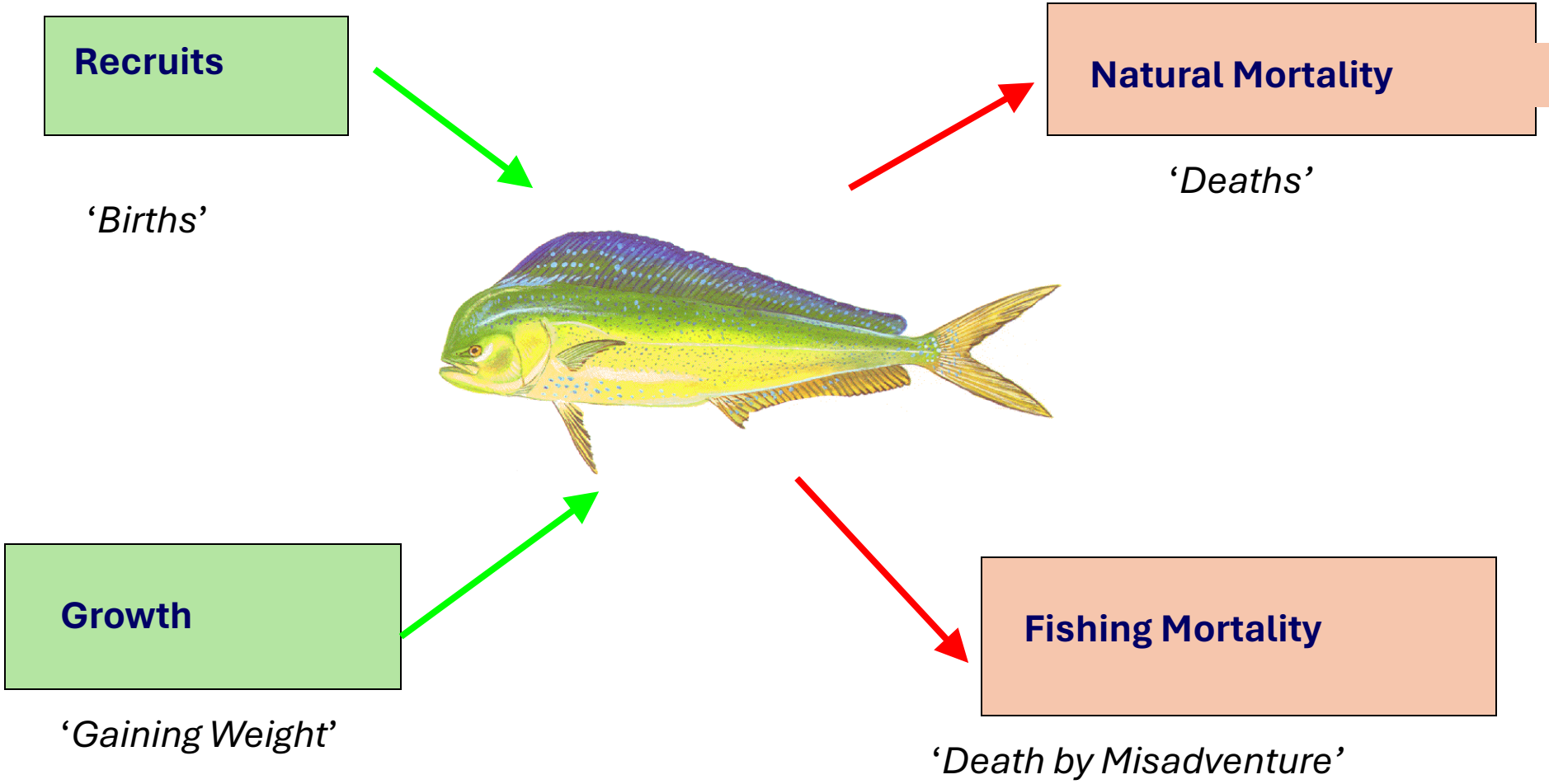
# 1. What is a stock assessment?


"FISH SO THICK YOU CAN WALK ON 'EM"
STOCKS RISING
STOCKS FALLING
FORGET IT
UNKNOWN BIOLOGIST

# Stock Assessment:

- The use of statistical and mathematical calculations to **QUANTITATIVELY**
  - characterize the status of a stock
  - ***PREDICT*** the response of the population to management ***CHOICES***
- Keywords:
  - **QUANTIATIVE, PREDICT, CHOICES**

# Numerically explaining this:



# Answering Key Questions

- Is the removal rate sustainable?
- Is the population at a sustainable level and able to get through inevitable ‘bad years’?
- What can we expect for the future?
- What factors (not just fishing) impact the population?

# 2. Where do YOU get YOUR data???

# From you…Fishermen!

# Types of Fisheries Data


- **Fishery-Dependent**: are derived from the commercial or recreational fisheries.
- **Fishery-Independent**: are collected directly by scientists, i.e., derived from activities that do not involve the commercial or recreational fisheries.

# Fisheries assessments are all about counting kills

- Fish population models are primarily based on tracking dead fish back in time.

How foresters find out how many trees are in their plot

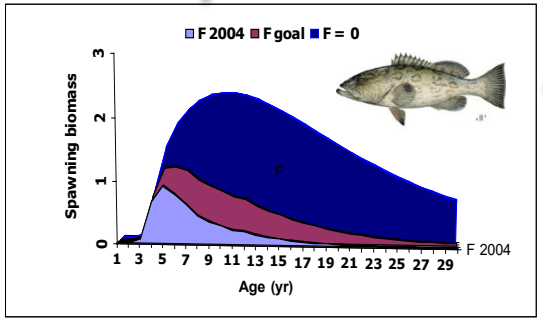
How fisheries scientists find out how many fish are in their stock

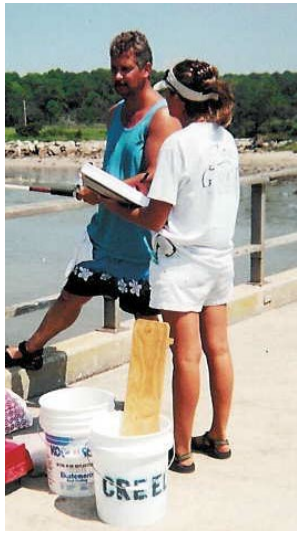
30 tons of logs

# Lots of data sources are considered

Scientific Surveys

Commercial Fisheries Monitoring



Recreational Fisheries Monitoring

Population Structure

Biology and Ecology

# 3. Why should I tell you about my catch, won’t you use it against me and close the fishery?

What did you catch today?

Yeah, Right! I don’t trust that MRIP!

It’s not that simple

# Fisheries Dependent Data are Critical

- Impossible to game the system
  - outcomes are usually worse when fishermen don't participate or mislead
  - Analyses depend on data over many years – BAD DATA PERSIST!
- More data almost always reduces uncertainty
- Forces that demand regulations and sustainability seldom make exceptions for low data levels
- Reporting can be mandatory

# Everyone loves tags, right?

- Every tagged fish dies
- Returning tag info tells how long the fish lived
- Also important for understanding fish behavior

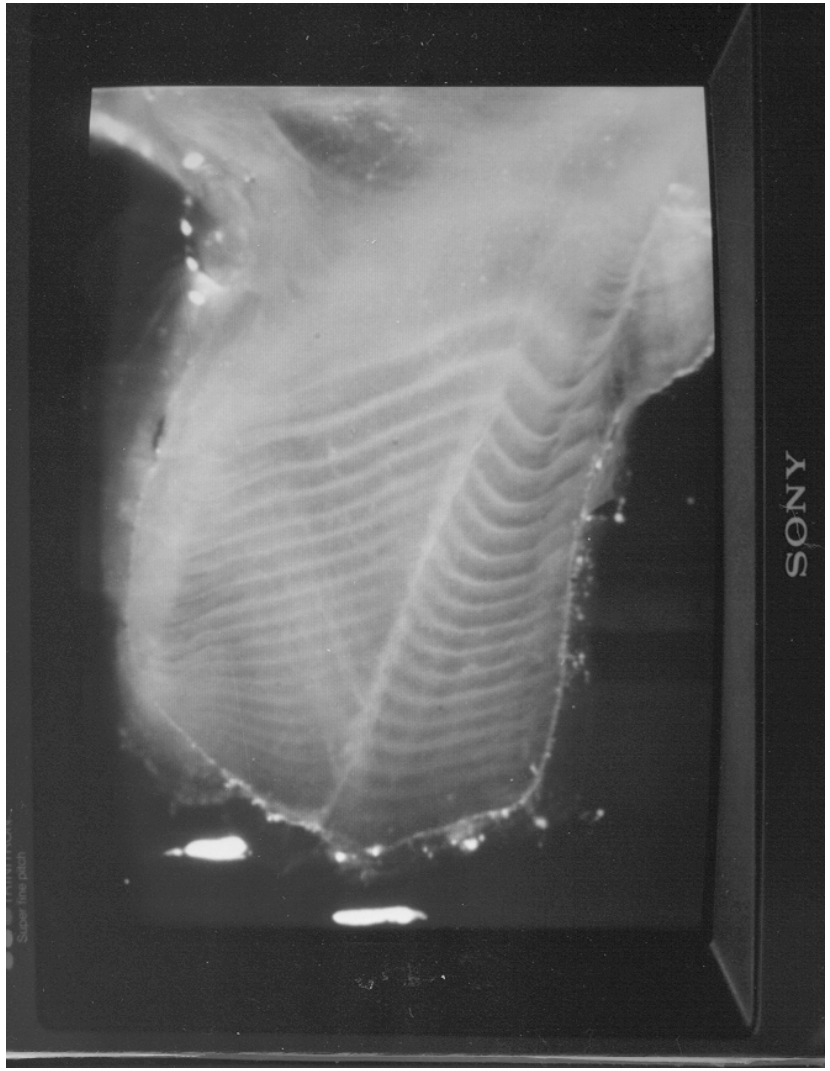

# 4. What is the big deal with ages?

# Age Determination

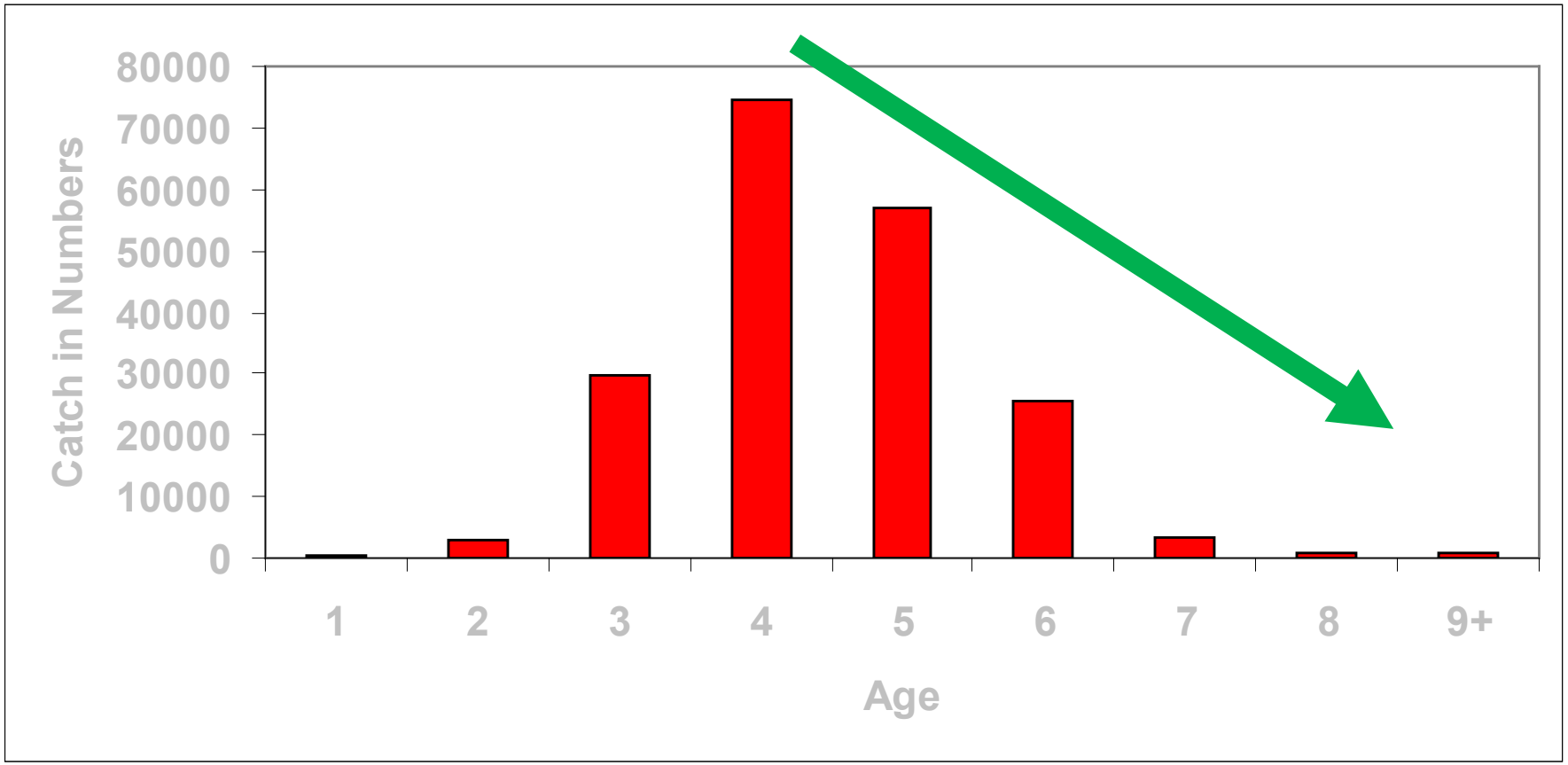
- Bony Structures: Scales, Otoliths, Spines

- Use to determine the age composition of the catch

**Assign Fish to Cohorts**

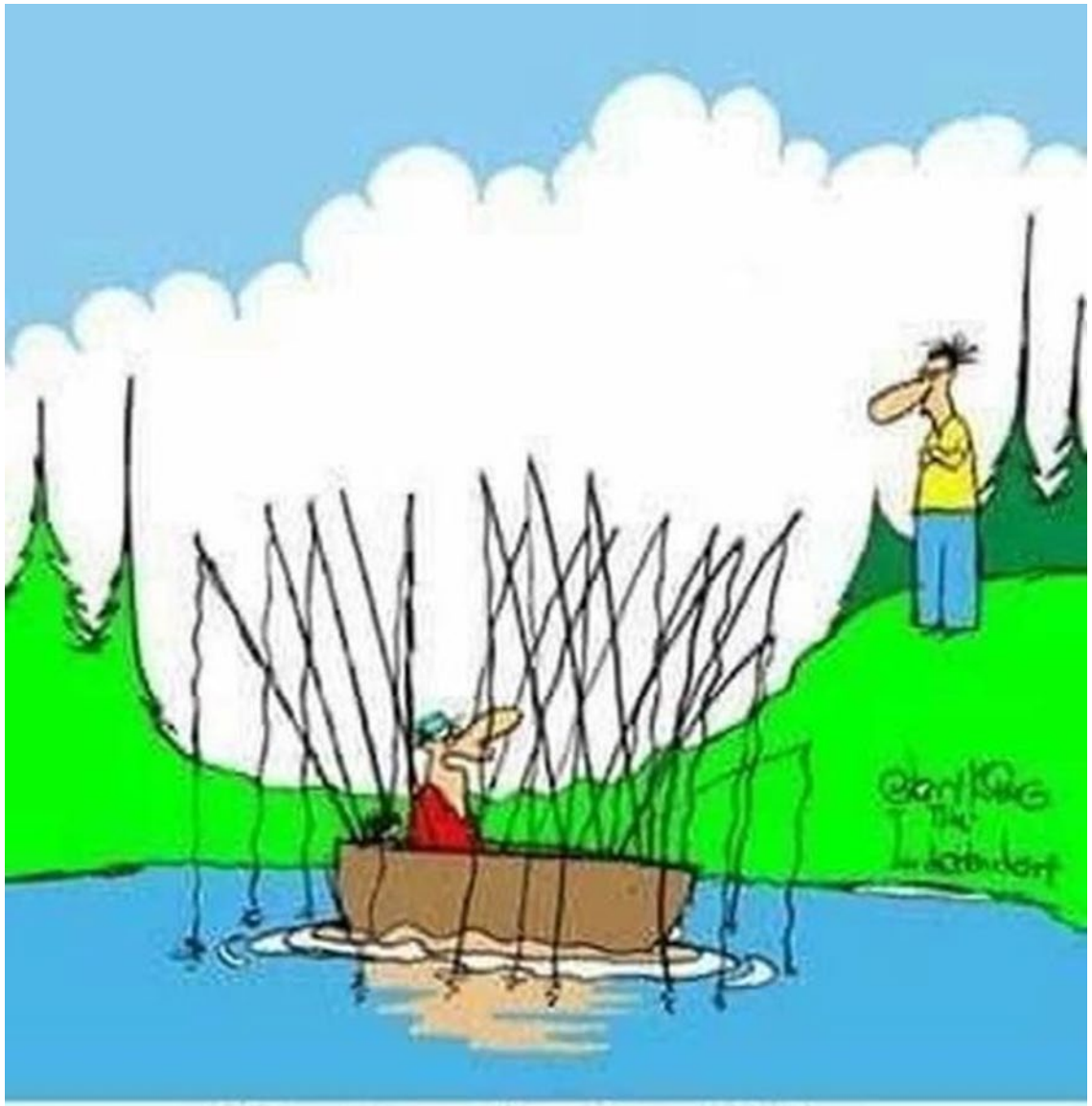


# CATCH at AGE – Critical Input




**Decline in Abundance over Time & Age determines Mortality (F)**

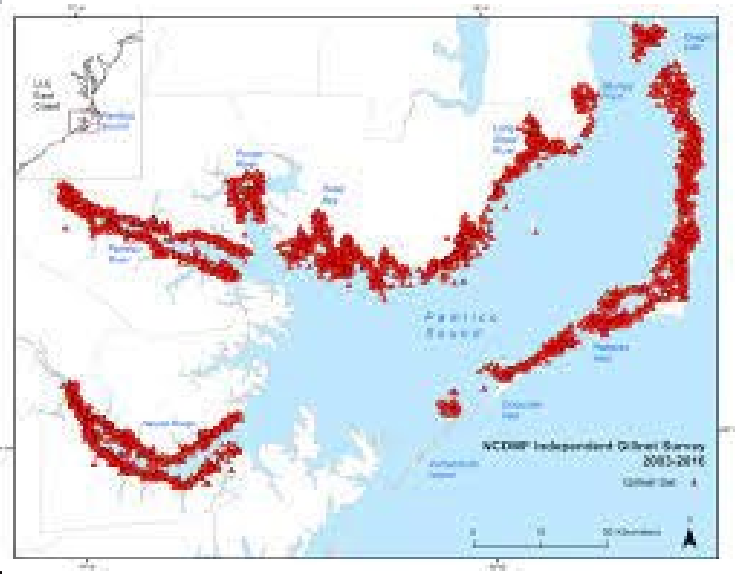
# 5. Are surveys useful? Those scientist don’t know how to catch fish!



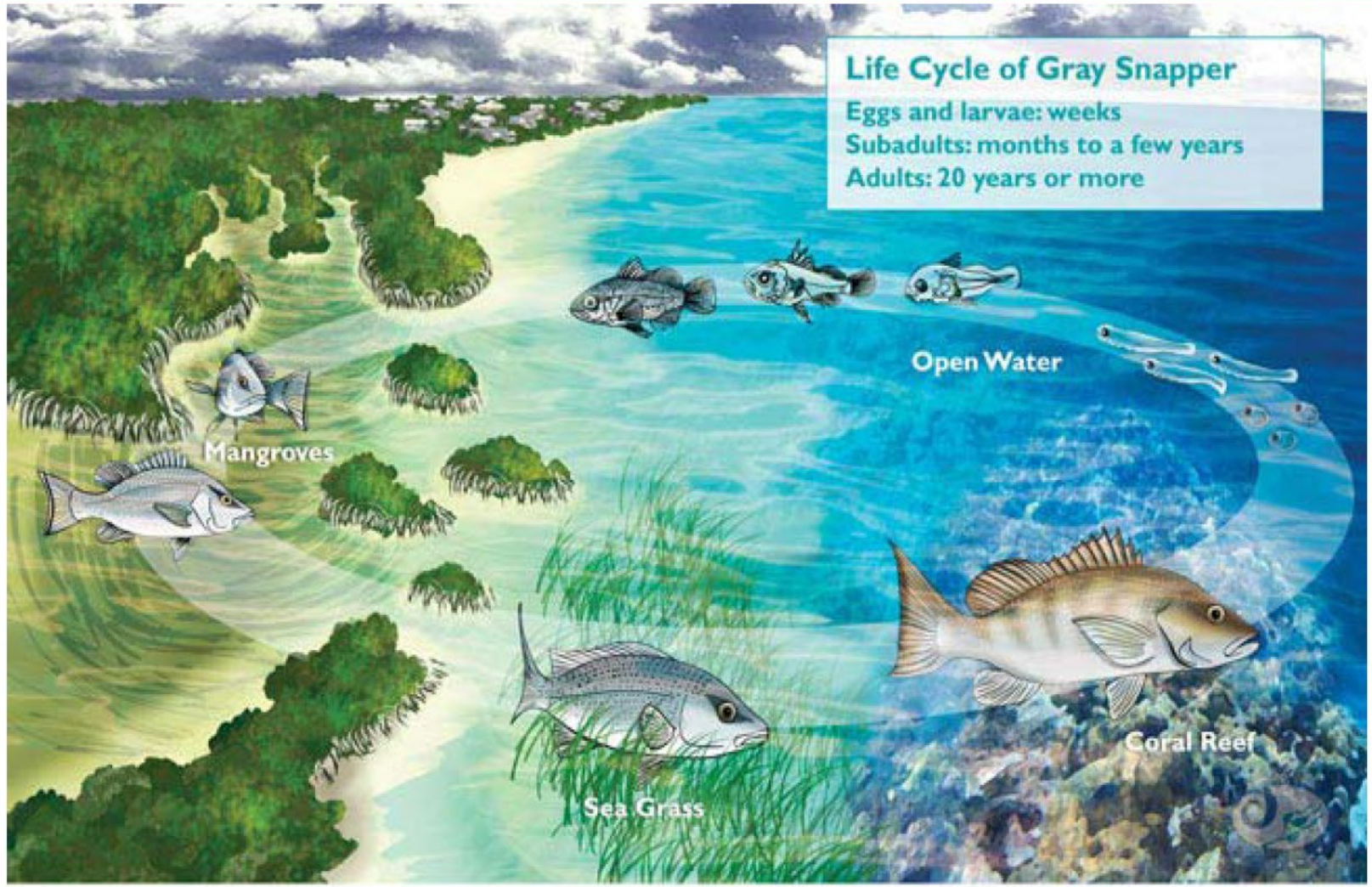
"Trust me when I say I'll be catching SOMETHING today."

# Fishing for science is different

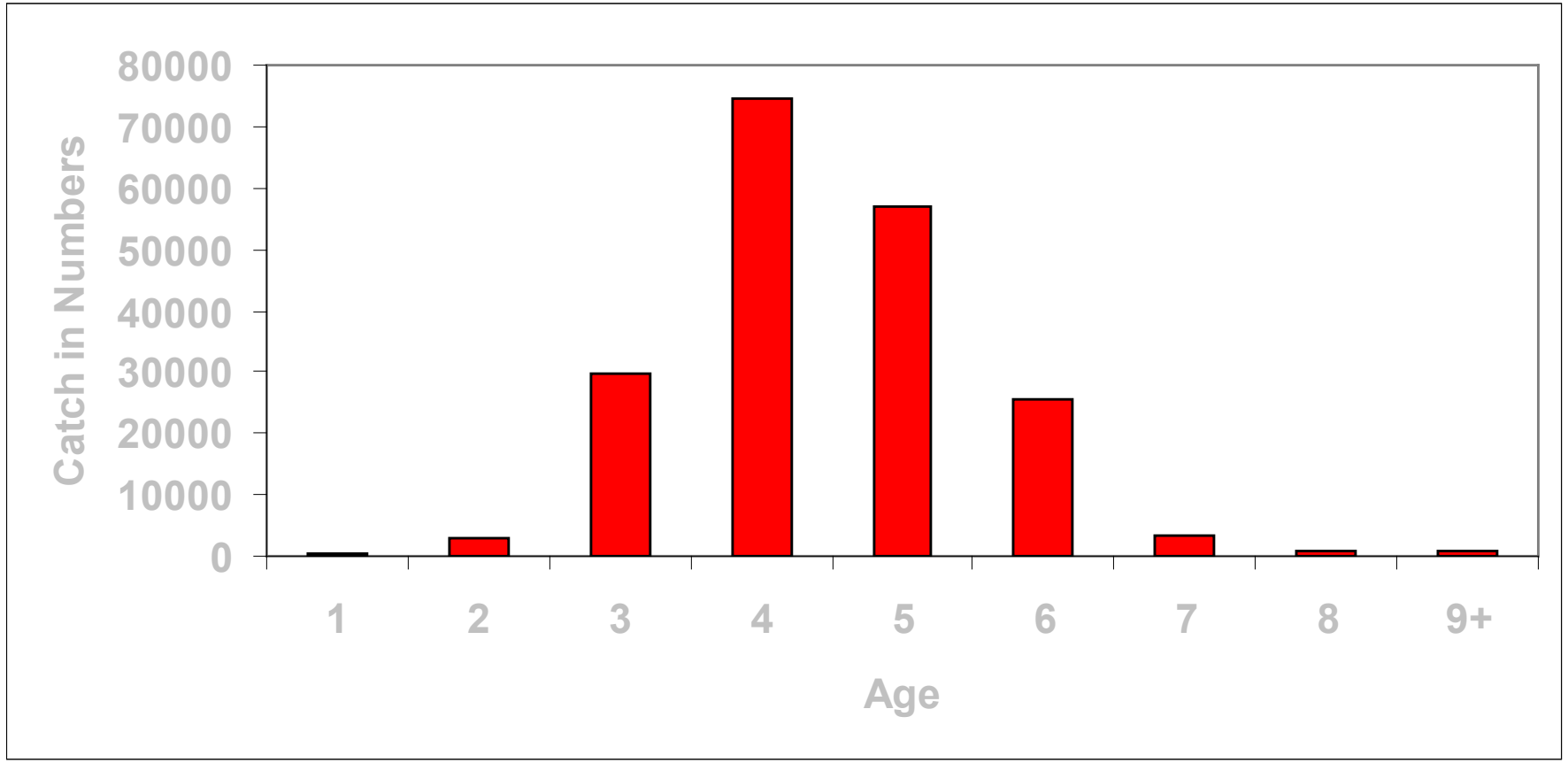
- Consistent Gears and Sites and Effort over time
- Go where fish are as well as where they could be (or may be tomorrow)
- Reduces variables
- Goal is to be REPRESENTATIVE of the population




# Fishery-Independent Sampling: Focus on the Whole Population



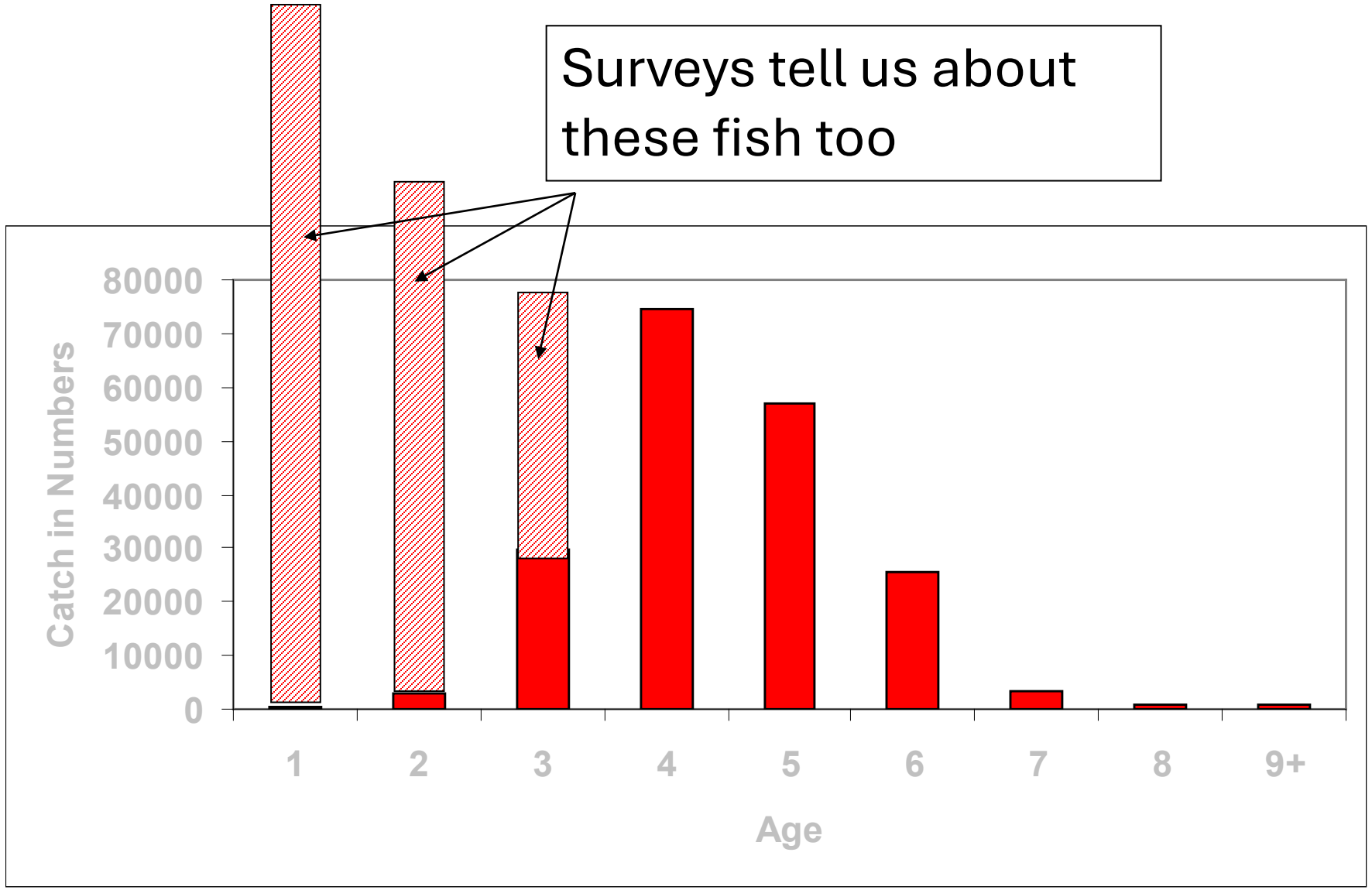
# Our Catch at age Picture…




Fishery Independent Surveys help provide a complete picture of the population

Can be CRITICAL to determining how factors other then fishing impact the stock

# Our Catch at age Picture…




**Fishery Independent Surveys help provide a complete picture of the population**

**Can be CRITICAL to determining how factors other then fishing impact the stock**

# 6. How do you know how many fish are in the sea right now?

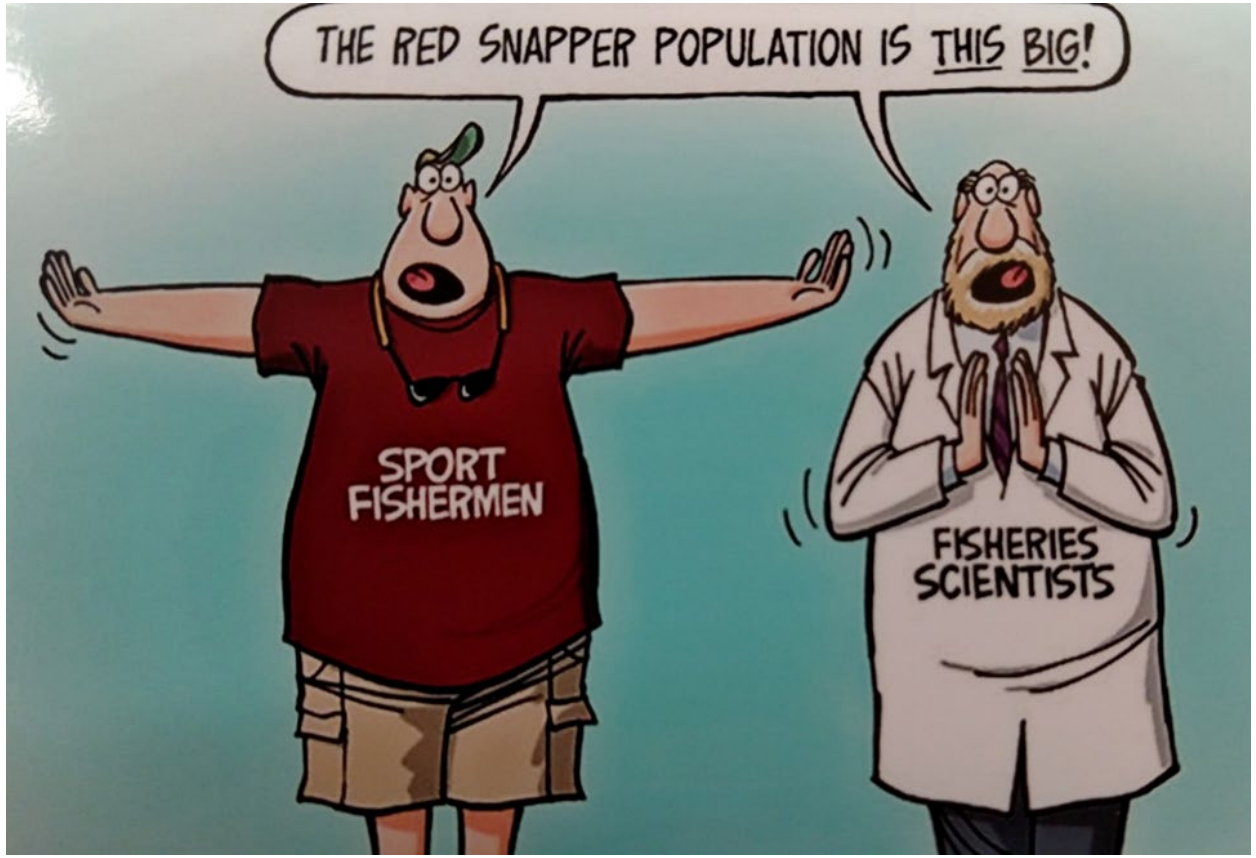

HOW MANY FISH ARE HERE??

# Absolutes are tough, but relative is robust

- The COHORT & descending limb – enables us to estimate mortality rates well
- Scaling to absolute population size requires
  - ACCURATE CATCH – all removals
  - SELECTIVITY – vulnerability by age
- Models do well with relative measures
  - Mortality relative to a target (F/Fmsy)
  - Biomass relative to a target (SSB/SSBmsy)

# Assessments tell us about the past – Knowing next year is harder

- Need to know future births (recruits) to PREDICT (project) the future population
- Fishermen's behavior may change
- The environment may change
- Important to take action and monitor the response




**If we truly reduce fishing mortality, populations improve**

# TRACKING COHORTS

| YEAR | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1982 | **0.0** | 38.5 | 27.8 | 8.9 | 4.8 | 2.6 |
| 1983 | 0.0 | **26.6** | 32.8 | 14.9 | 6.2 | 3.4 |
| 1984 | 0.0 | 107.7 | **6.4** | 25.1 | 19.8 | 3.3 |
| 1985 | 11.9 | 85.5 | 32.7 | **2.5** | 1.8 | 0.8 |
| 1986 | 0.0 | 56.5 | 10.8 | 6.6 | **0.0** | 0.5 |
| 1987 | 0.0 | 41.8 | 18.2 | 15.8 | 5.4 | **0.3** |
| 1988 | **0.0** | 21.1 | 15.3 | 12.9 | 13.3 | 2.9 |
| 1989 | 0.0 | **17.8** | 14.8 | 11.9 | 4.6 | 0.5 |
| 1990 | 0.0 | 53.0 | **10.7** | 7.7 | 3.2 | 0.7 |
| 1991 | 0.0 | 16.1 | 51.2 | **5.1** | 1.5 | 0.3 |
| 1992 | 0.0 | 0.4 | 29.7 | 24.5 | **0.4** | 0.2 |
| 1993 | 0.0 | 0.2 | 8.2 | 38.8 | 13.1 | **0.9** |

INPUT

CATCH AT AGE

OUTPUT

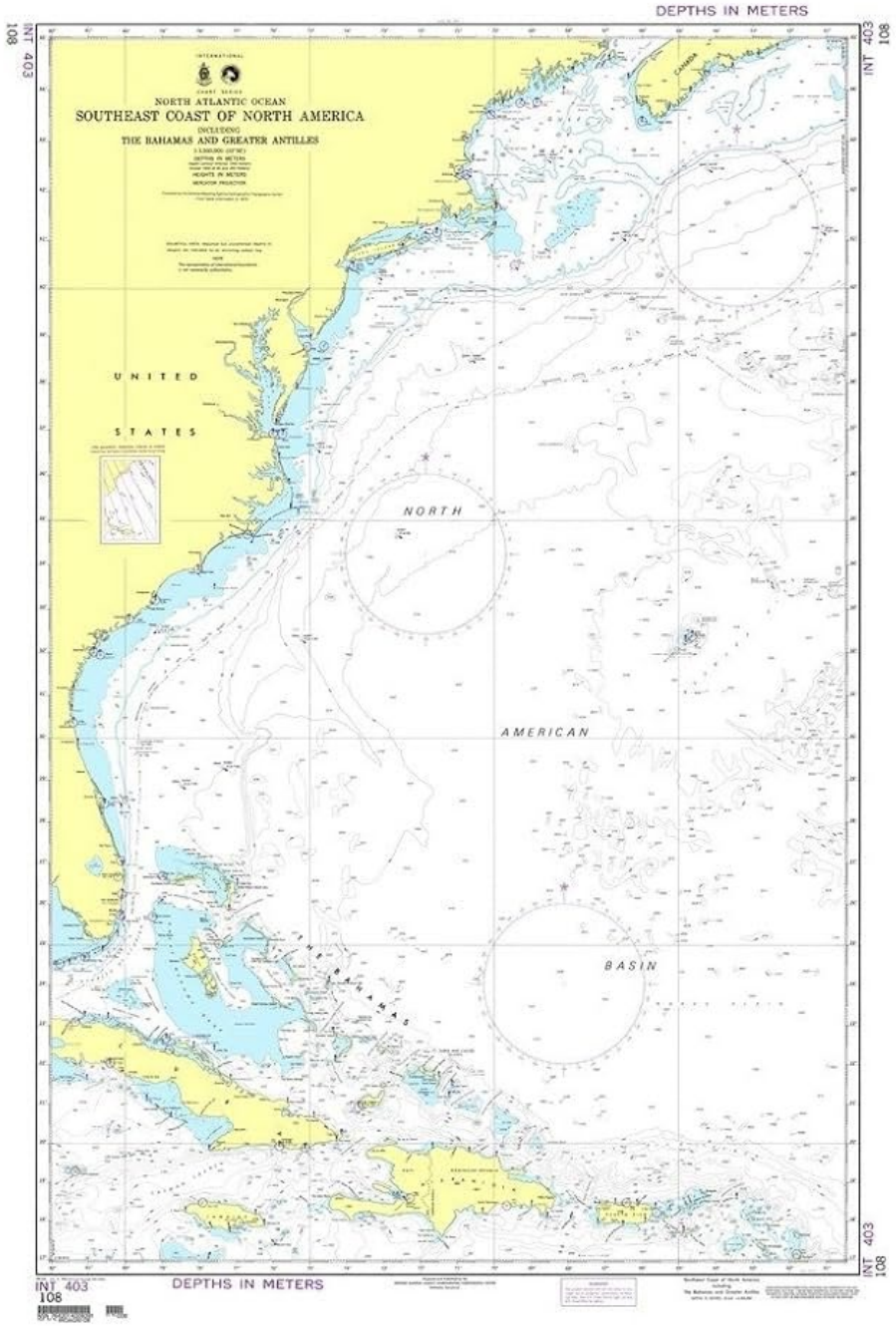
ABUNDANCE AT AGE

# 7. How can the stock be in trouble when fishing is great in my area?

# It’s a big coast

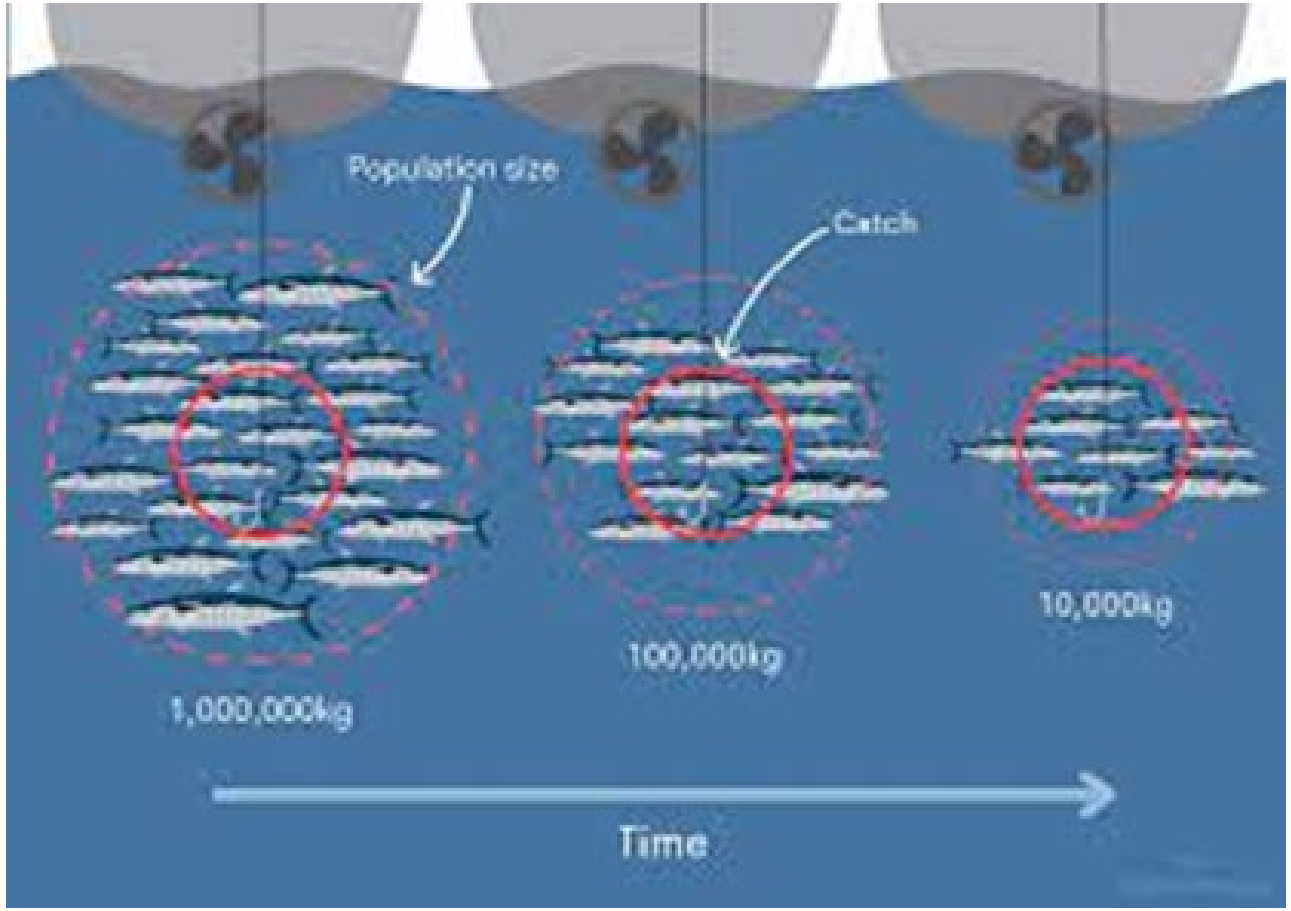
- Fish are often spread over a wide area
- Assessment covers entire stock range
- Any fisherman is only seeing small area

- You might just be a great fisherman!



# Hyperstability

- Catches often stay strong while a population declines – Fishermen are good at catching fish

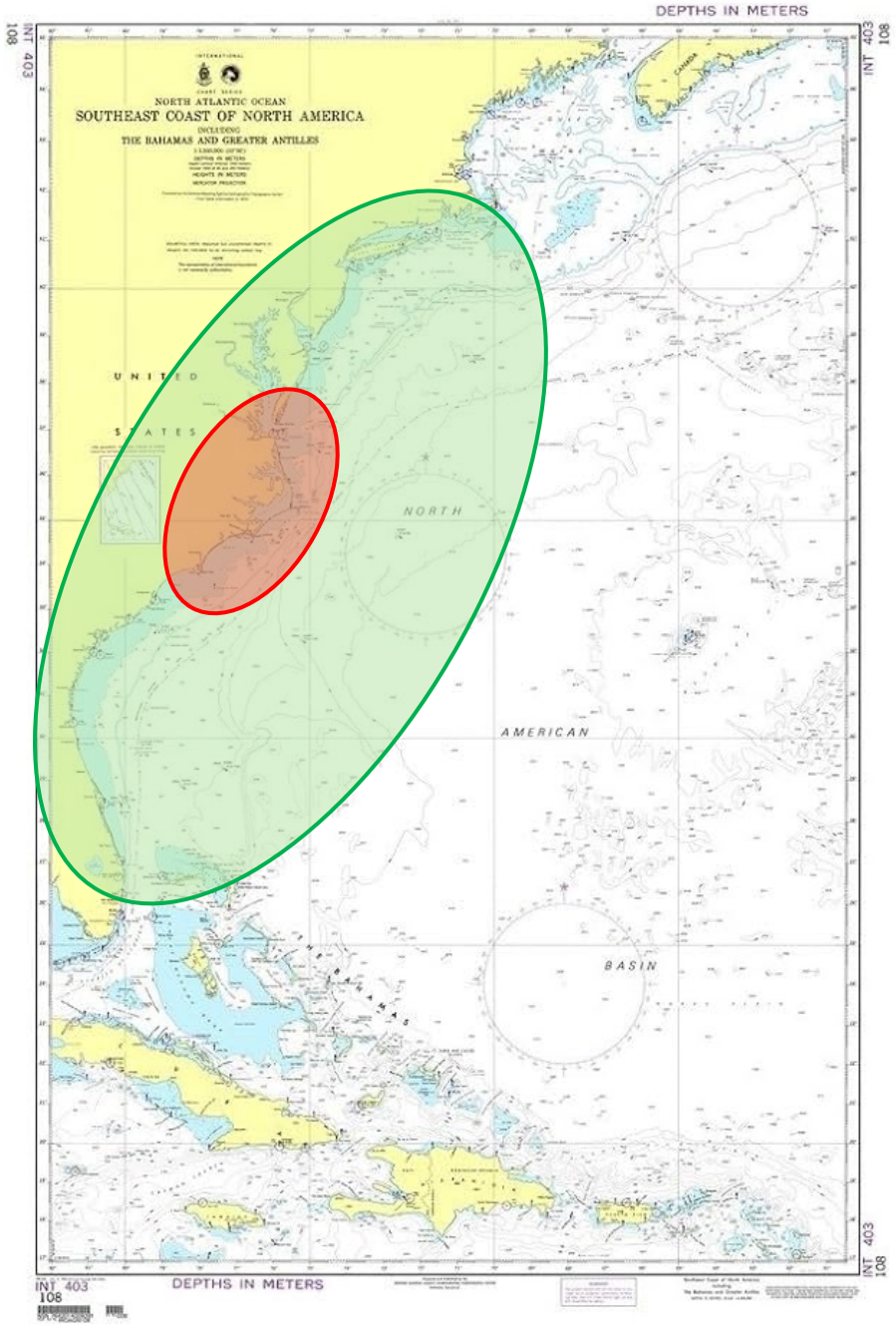


# Range Contraction

- Populations contract to their core range as they decline
- If you are in this area, you may not perceive the decline that others see

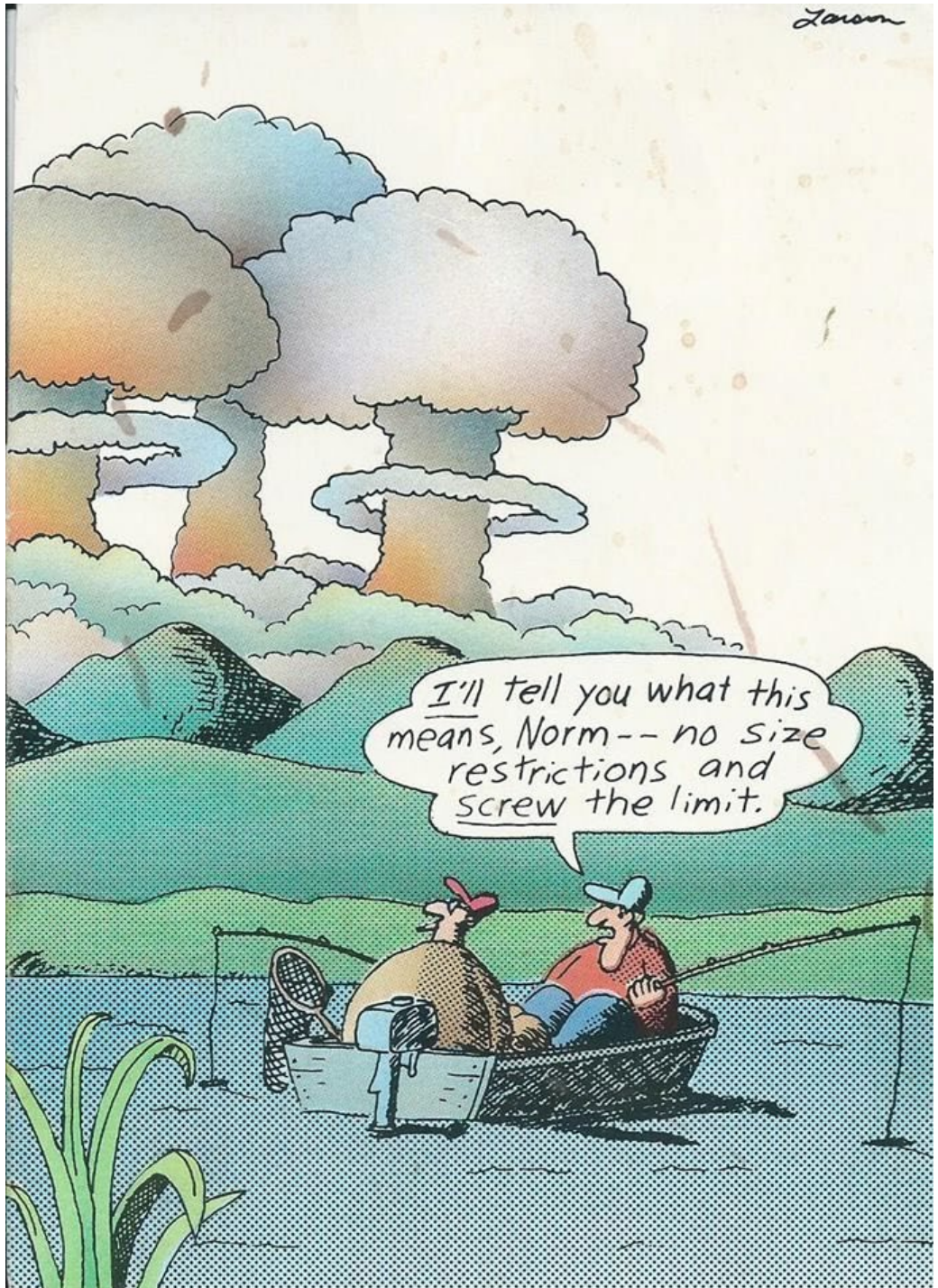
Healthy Stock Range

Reduced Stock Range



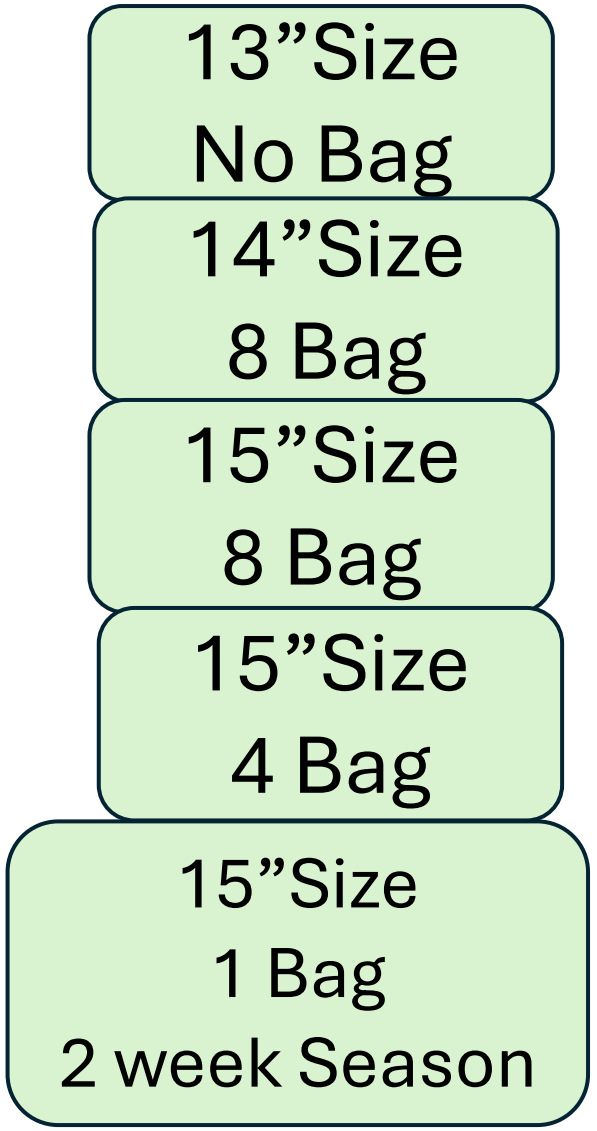
# 8. The stock is rebuilt,

# So why are the regulations so strict?!?



# A Typical Progression

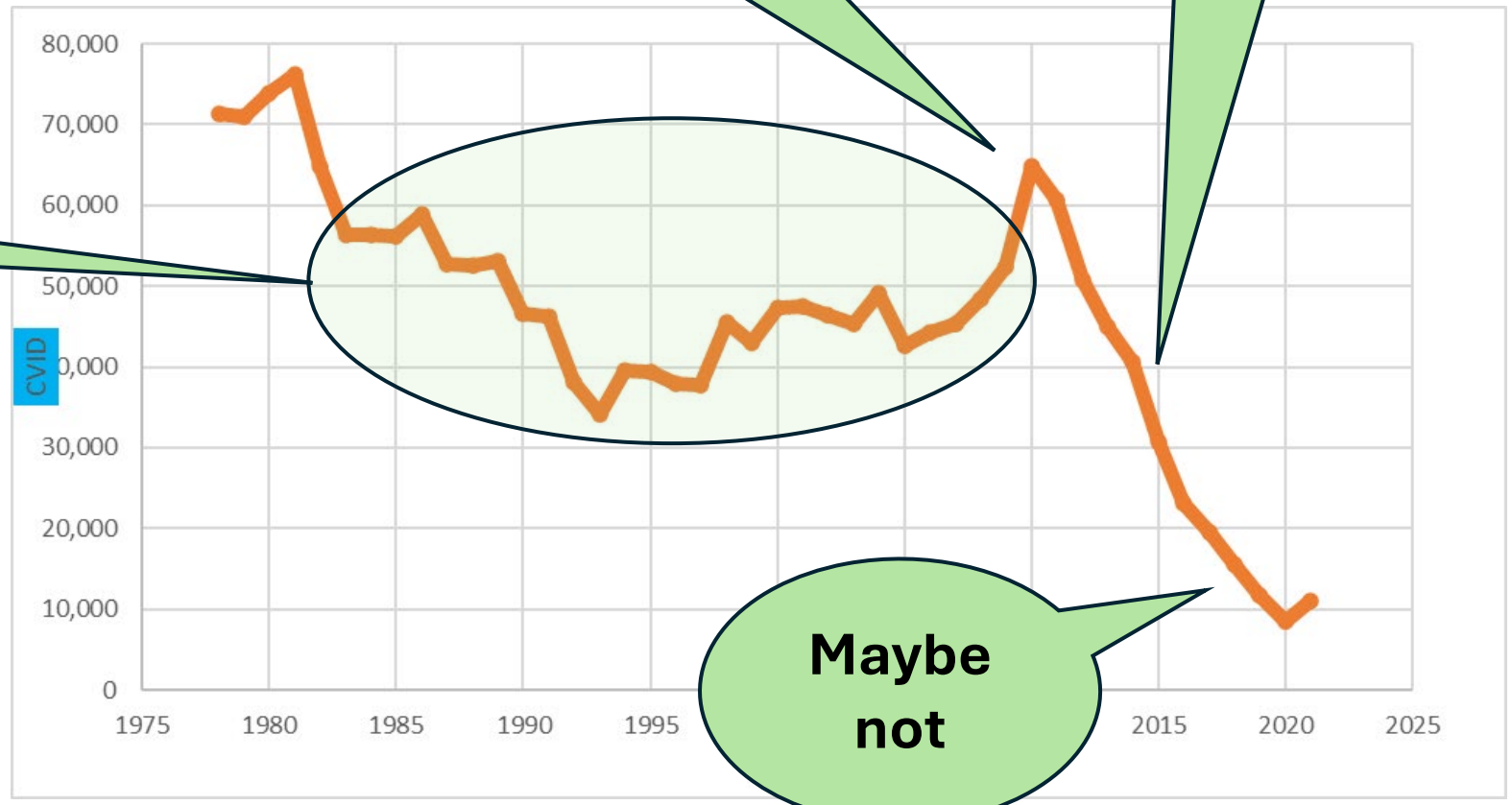
- **Liberal regulations initially**
  - Size limits that allow harvest of immature fish
  - Landings limits that allow overharvest
  - Failure to protect spawning fish
- **Regulations often don’t matter when a stock declines: few catch the bag limit anyway.**
  - Low abundance, availability, catch per effort
- **Regulations increase to try and recover a stock**
- **When a stock recovers (and often does so with a big recruitment spike), suddenly everyone is catching the limit**
  - Even casual fishermen start catching some



# 9. Why bother with management when populations are cyclical ?

# You cannot rely on cycles to solve problems

- Oft heard criticism of management
- Dangerous sense of security that things will bounce back



# Are populations just cyclical ???

- There is some truth – populations are certainly not stable
- If fishing pressure does not adapt to downward trends, stocks can be pushed too far to recover – and usually we don't know until it is too late
- The environment is a big factor. It is changing.
- Humans are a huge factor – we disrupt pretty much every natural event we touch.

# 10. Why does my state have stricter regulations than those around me?

# Why does my state have stricter regulations than those around me?


**Fish don’t care about state borders!**

Biological: where is the state in the species range?

Fishery: How much effort is the state?

Political: Is the state interested in the stock?

Management: Is there a regional authority?

# Regional Management


**ACFCMA**
**Atlantic Coastal Act**

**Fisheries Reform Act**

**Atlantic States Marine Fisheries Commission**

- Manages stocks in State waters Maine to Florida
- Only Commission with binding regulatory authority
- Love/Hate relationship often
- Important for stocks that cross state lines
- Strives for fairness in impacts


- T