FISHERIES STOCK ASSESSMENT: CAPACITY-BUILDING TRAINING FOR SOMALIA'S MINISTRY OF FISHERIES AND BLUE ECONOMY STAFF

MODULE I
Fundamentals and concepts

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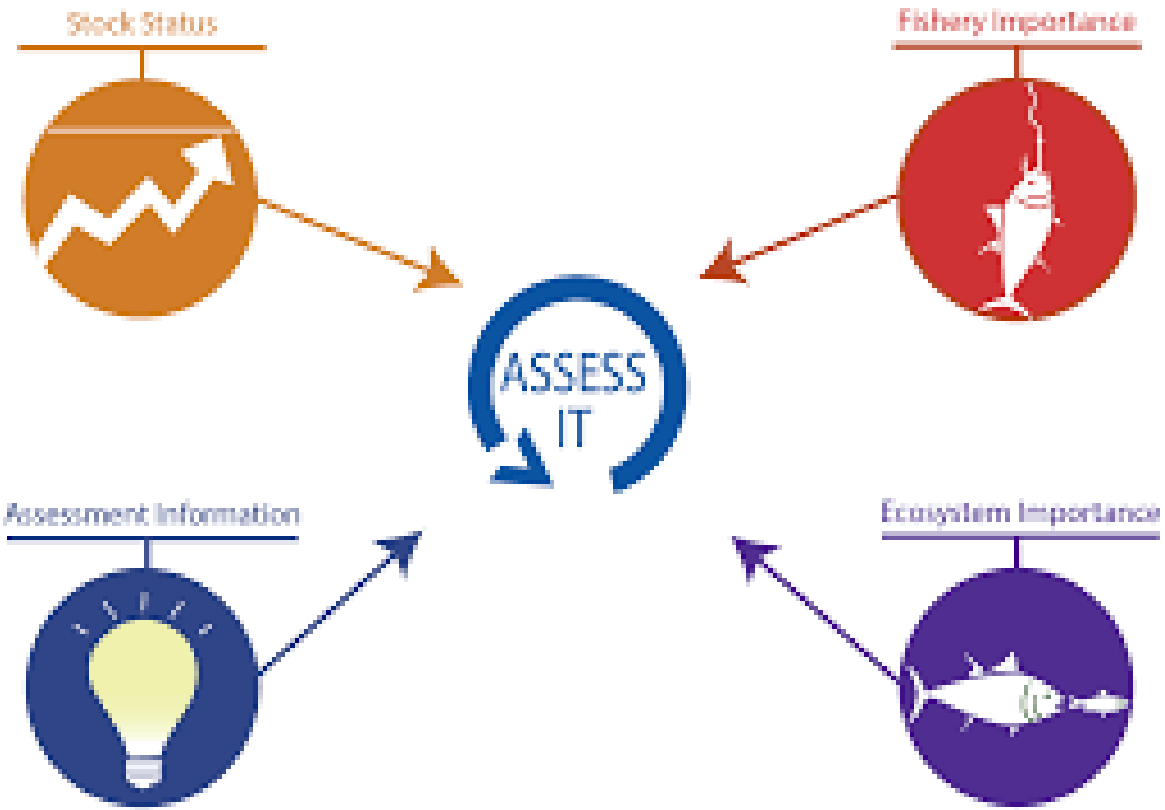
Key guiding questions

- What is sustainable fisheries management?
- What is fish stock assessment, and why is it crucial for sustainable fisheries management?
- Why is fish stock assessment in important in sustainable fisheries?
- Which fisheries to focus on stock assessment?
- How assessment results inform policy, regulations, and conservation efforts.
- What are key requirements (challenges and limitations) to undertake fish stock assessment? Acknowledging the inherent uncertainties and complexities in assessing wild fish populations.
- Ecosystem-Based Fisheries Management (EBFM), an approach to managing fisheries that goes beyond catch data for a single species by considering the entire ecosystem:
- Integrating ecological, social, and economic considerations into fisheries assessment and management.
- Linking stock assessment results to ecosystem management

What is fish stock assessment

- A fishery stock assessment is the scientific process of **collecting**, **analysing**, and **reporting** on the condition of a fish stock and estimating its sustainable yield.
- Stock assessments are the backbone of sustainable fisheries management.



What is fish stock assessment

Stock assessment rely on two data

(1) **fishery-dependent data**, or information

collected from fishermen and dealers on catch, landings and effort;

and

(2) **fishery-independent data**, or information collected by scientists via a long-term research survey or other scientific study.

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Why Assess Fish Stocks?

To determine their status, to evaluate how they may be affected by potential management actions, and to forecast their future conditions.

To define desirable conditions or benchmarks which indicates status, derived from estimation of either abundance or weight (biomass) references

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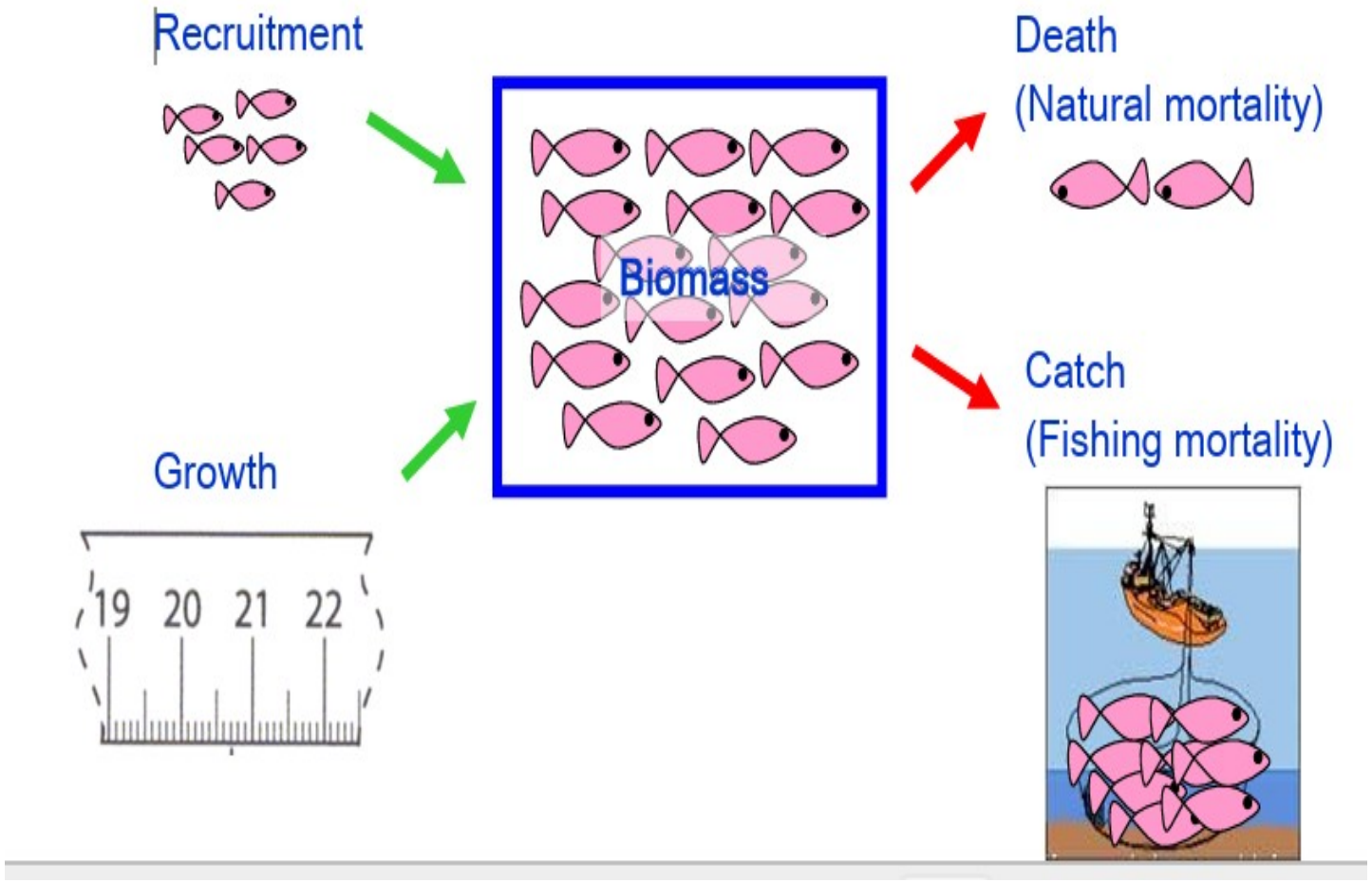


Concepts-Life history

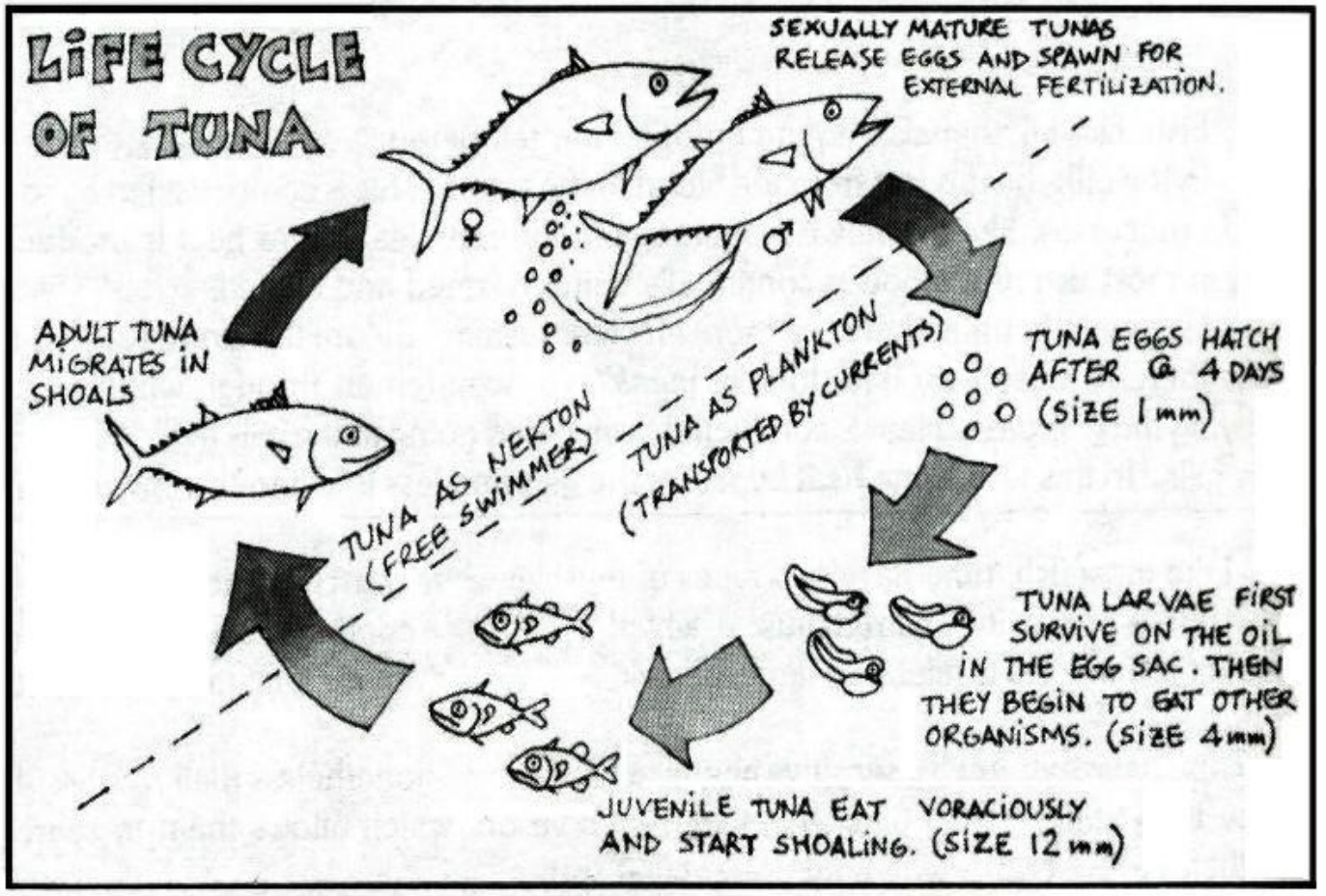
Age & Growth:. Understanding rate at which approaching maximum size

Feeding: Understanding feeding trophic levels and strategies

Reproduction: Fecundity, reproductive peaks tracing life cycles

Habitat: Loss of habitat and water quality significantly affects the health of fish stocks. Habitat considerations need to be included in management plans.

Natural Mortality: M is critical and therefore incorporated into most population dynamics models.



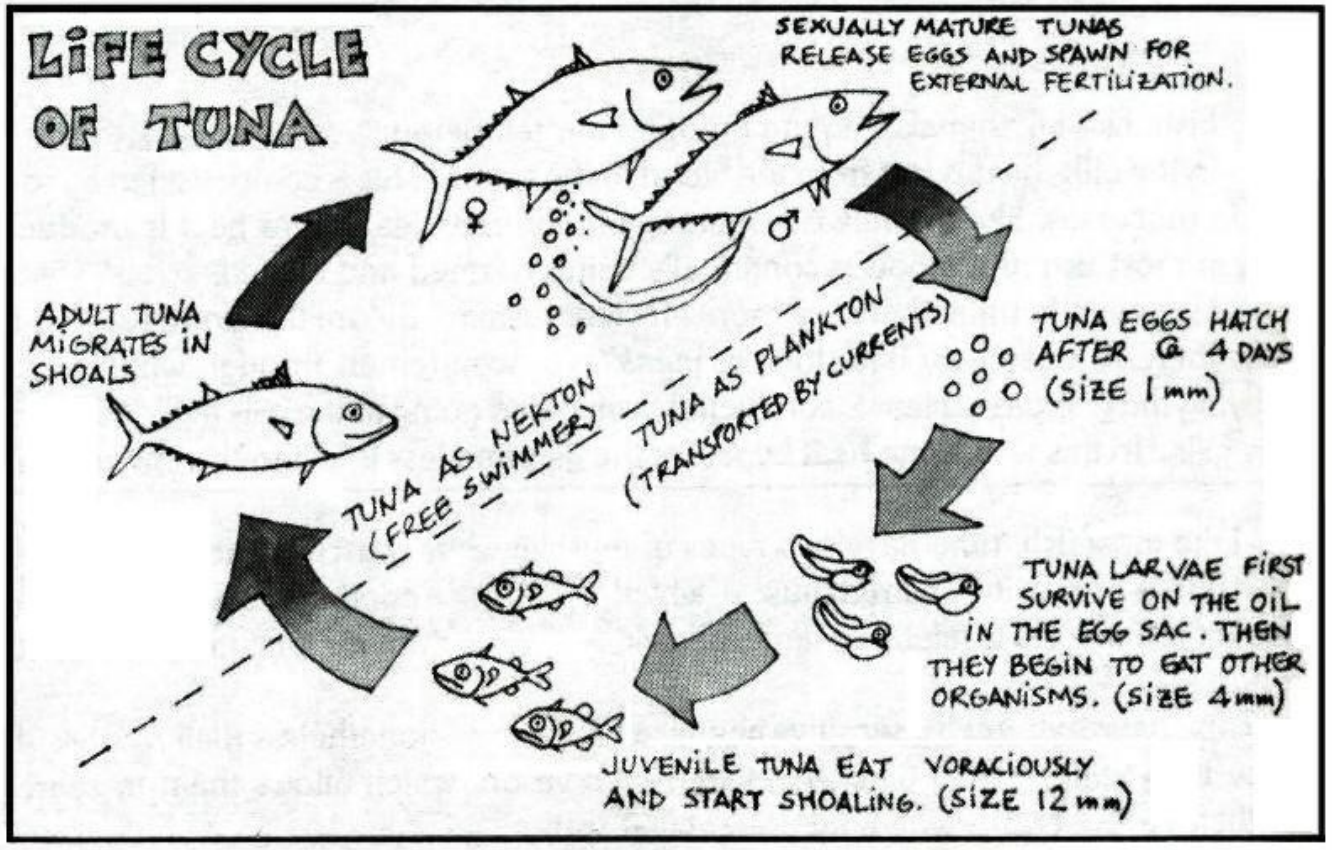
Concepts – population dynamics

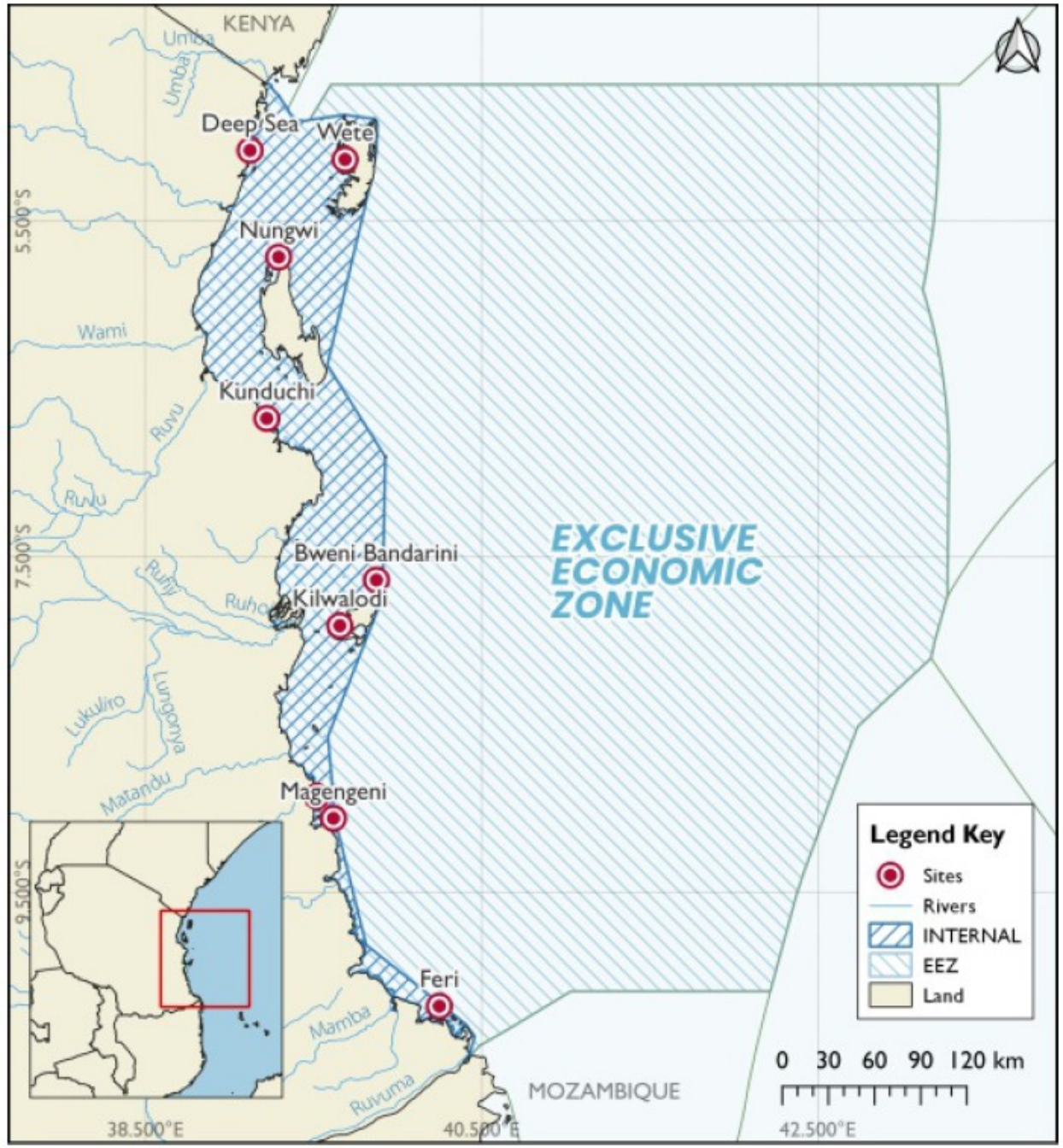
Recruitment: is the number of fish born within a given time period that survive to the juvenile stage.

Growth: How fish size and weight change over time,

Mortality: is the number of fish dying within a given time period. .

- Natural Mortality (M):
- Fishing Mortality (F):
- Total Mortality (Z): The sum of natural and fishing mortality




KENYA
Umba
Deep Sea
Wete
Nungwi
Kunduchi
Bweni
Bandarini
Kilwalodi
Magengeni
Feri
Wami
Ruvu
Ruvu
Ruhuhu
Lukuliro
Lungonya
Matandu
Mamba
Ruvuma
MOZAMBIQUE
EXCLUSIVE ECONOMIC ZONE
5.500°S
7.500°S
9.500°S
38.500°E
40.500°E
42.500°E
Legend Key
Sites
Rivers
INTERNAL
EEZ
Land
0 30 60 90 120 km

Concepts –reference points

Biological

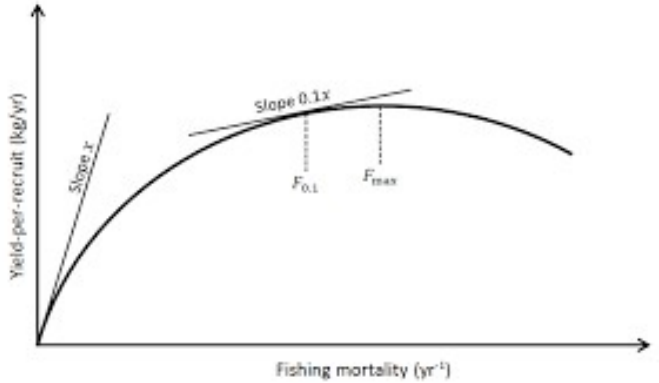
Exploitation

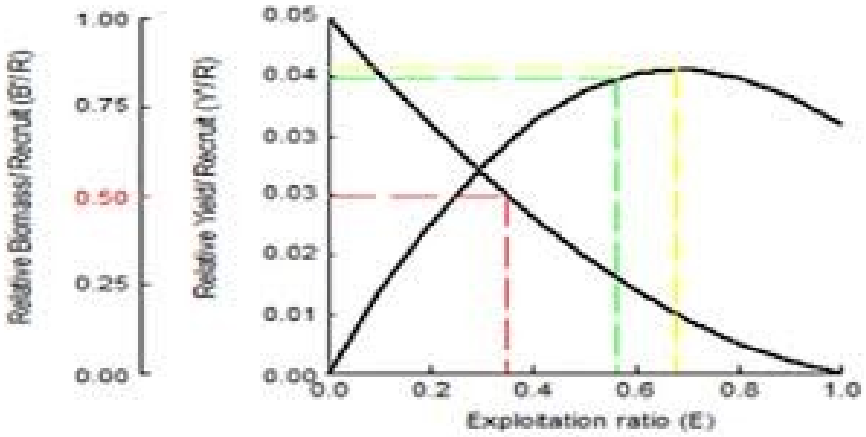
Parameter	Value	Description
Biological		
L_{inf} (cm)	97.0	Asymptotic length, theoretical maximum length fish can reach.
K (year-1)	0.5	Von Bertalanffy growth coefficient
M/K Ratio	1.1	Ratio of natural mortality (M) to the growth coefficient (K).
L_{50} (cm)	82.0	Length at which 50% of the fish are sexually mature.
L_{95} (cm)	99.5	Length at which 95% of the fish are sexually mature.
t_{50} (years)	2.3	Age at which 50% of the fish are sexually mature.
t_{95} (years)	2.7	Age at which 95% of the fish are sexually mature.
Exploitation		
Z (year-1)	0.6	Total mortality rate (Z = F + M).
SL_{50} (cm)	62.7	Length at which 50% of the fish are vulnerable to the fishing gear.
SL_{95} (cm)	69.1	Length at which 95% of the fish are vulnerable to the fishing gear.
F/M Ratio	0.8	Ratio of fishing mortality (F) to natural mortality (M)

Concepts- Exploitation –Yield per recruits

- Yield per recruit:

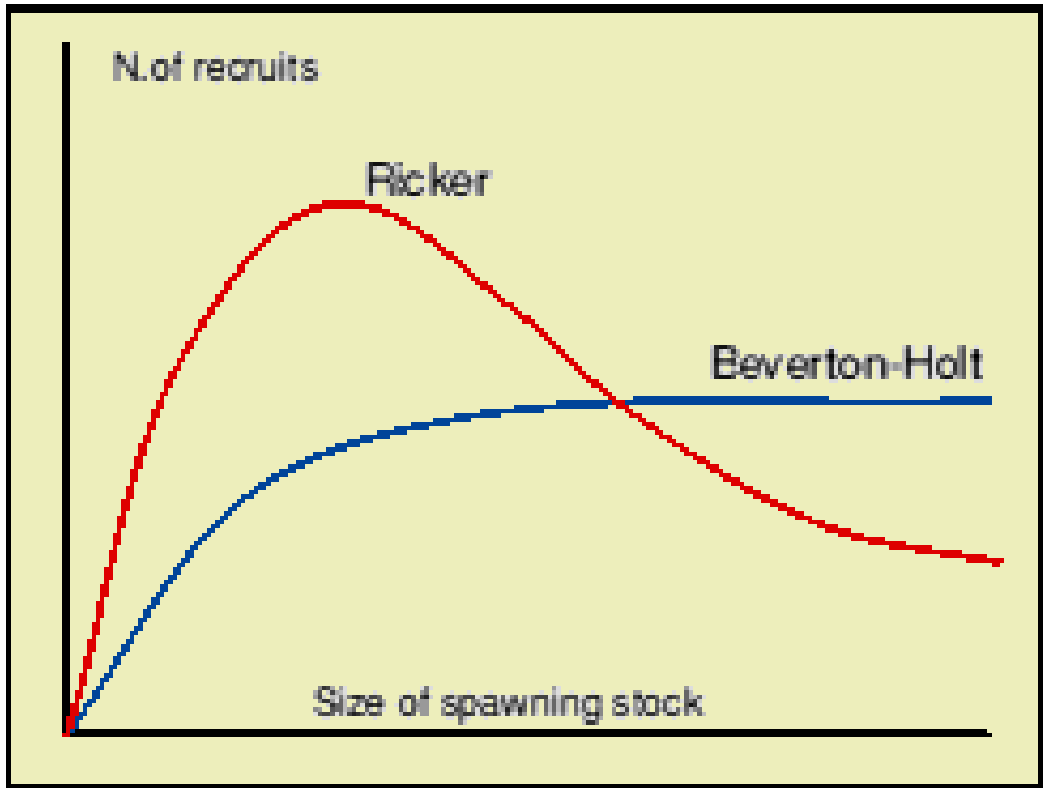
  Understanding how fishing pressure affects the catch from a cohort.





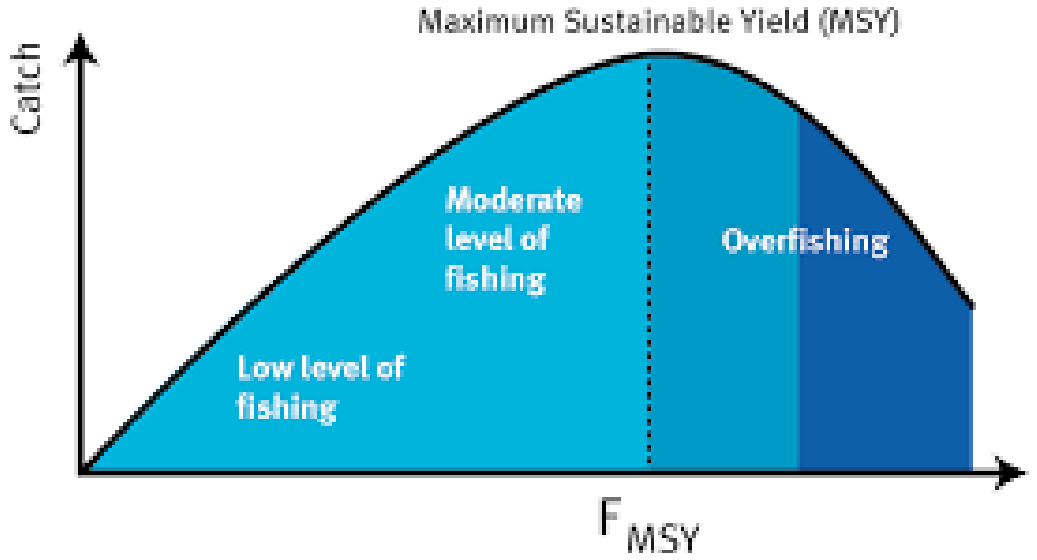
Concepts- Exploitation –Stock-recruitment relationship

Stock-recruitment relationships:
How spawning stock size influences future recruitment



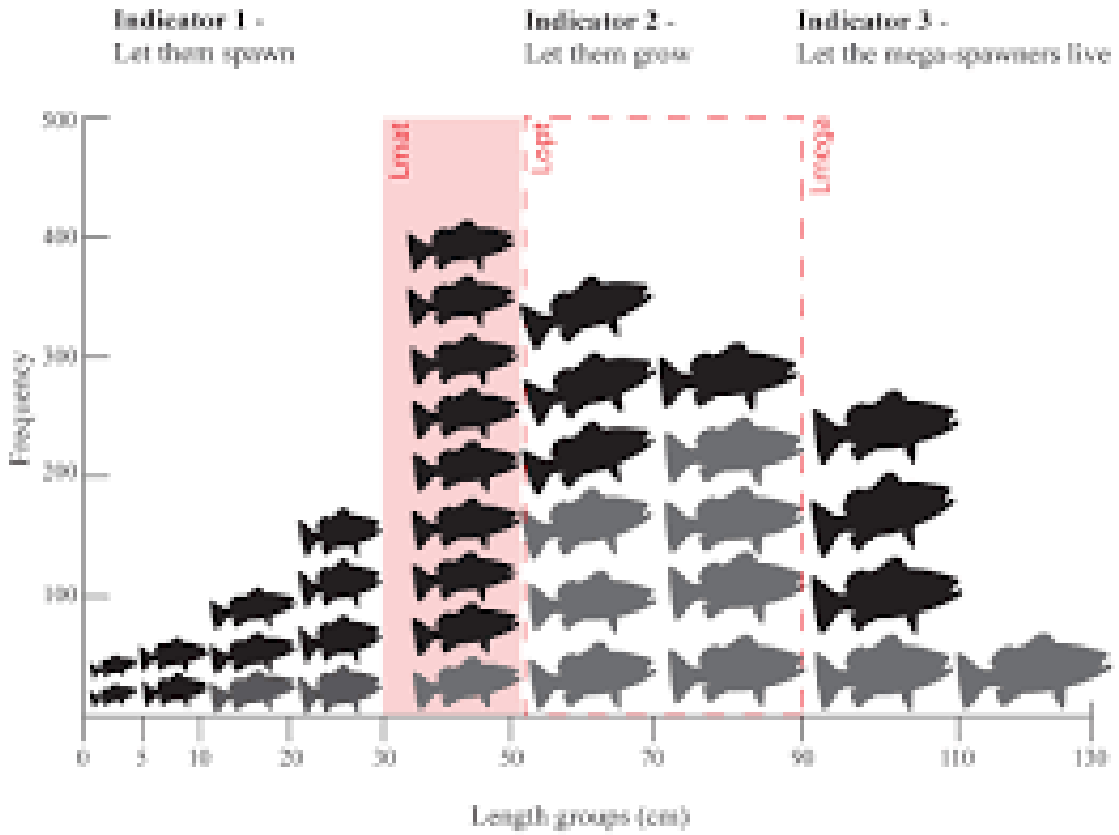
Concepts- Exploitation –Maximum sustainable yield (MSY)

Maximum sustainable yield (MSY):
The theoretical maximum catch that can be taken from a fish stock indefinitely without impairing its ability to replenish.



Concepts- Exploitation –Overfishing

Growth overfishing:
Catching fish before they have had a chance to grow to their optimal size.



Concepts- Exploitation –Overfishing

Recruitment overfishing: Reducing the spawning stock to a level where it cannot produce enough recruits to sustain itself.