# Importance of ecolabelling in fishery management

**Giuseppe Scarcella,**

**National Research Council (CNR) – Institute of Marine Biological Resources and Biotechnologies (IRBIM)**

# Few word about me:

**Background**

- <u>PhD in Marine Biology and Ecology</u>
  - Study on age and growth of fish
  - Rockfish

- <u>National Research Council</u>
  - Master thesis
  - Research fellowship on artificial reefs and structures
  - Non permanent position as researcher in study fish assemblages of gas platforms / stock assessment (SoleMon)
  - Permanent position as researcher
  - Senior scientist

**Main areas on interest**

- <u>Fishery management</u>
  - Harvest strategies
  - Stock assessment
  - Survey at sea (SoleMon)
  - Consultant for CABs

# Lecture topics

## Fishery Management

- Status of resources in Mediterranean Sea
- Knowledge based management
- Ecolabelling in fishery

## Ecolabelling

- MSC example
- MSC process
- MSC  P1 training
- Regional Adriatic label (ARFM)

# Status of the resource in the Mediterraenan and Adriatic Sea



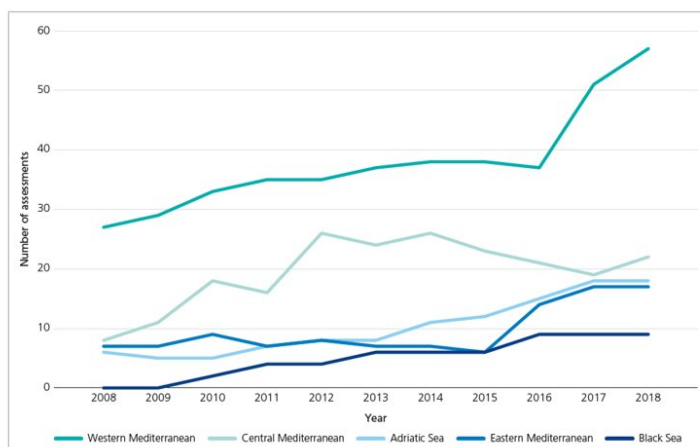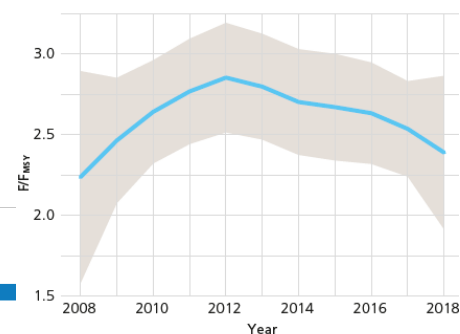**STATUS OF RESOURCES – Commercial stocks**



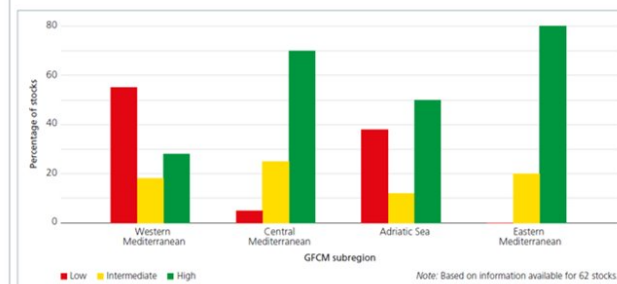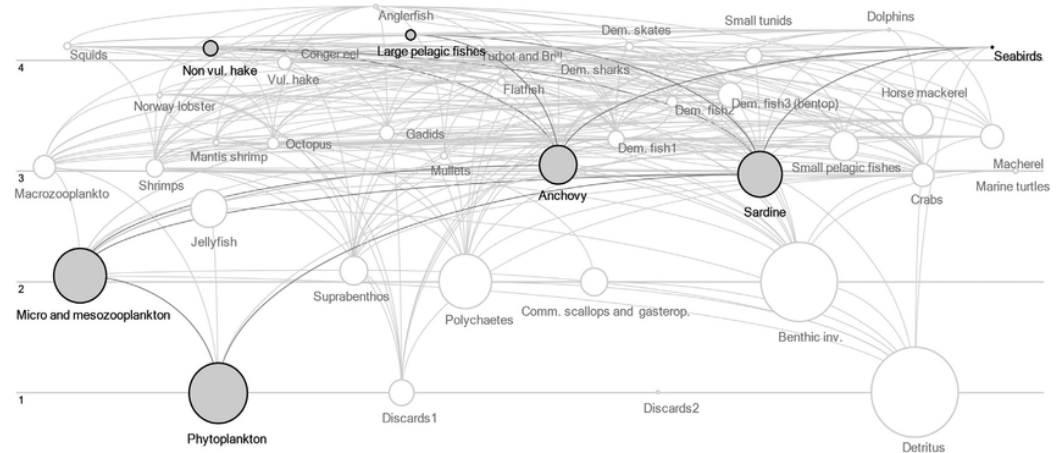FIGURE 74: Number of validated stock assessments per year by GFCM subregion, 2008-2018
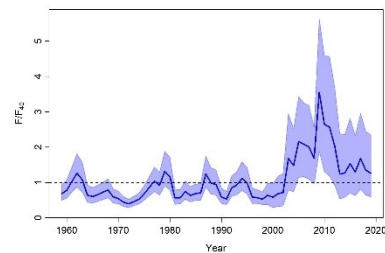
FIGURE 79: Percentage of Mediterranean stocks at low, intermediate and high biomass levels by GFCM subregion

# The available knowledge in the Adriatic basin
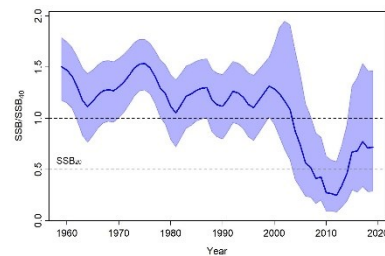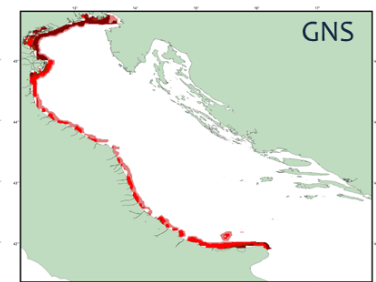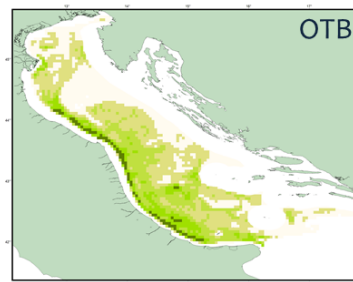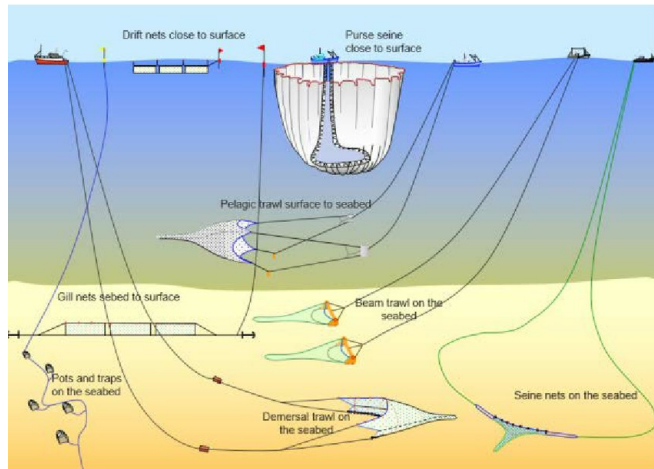
# Leverage this knowledge within certification process
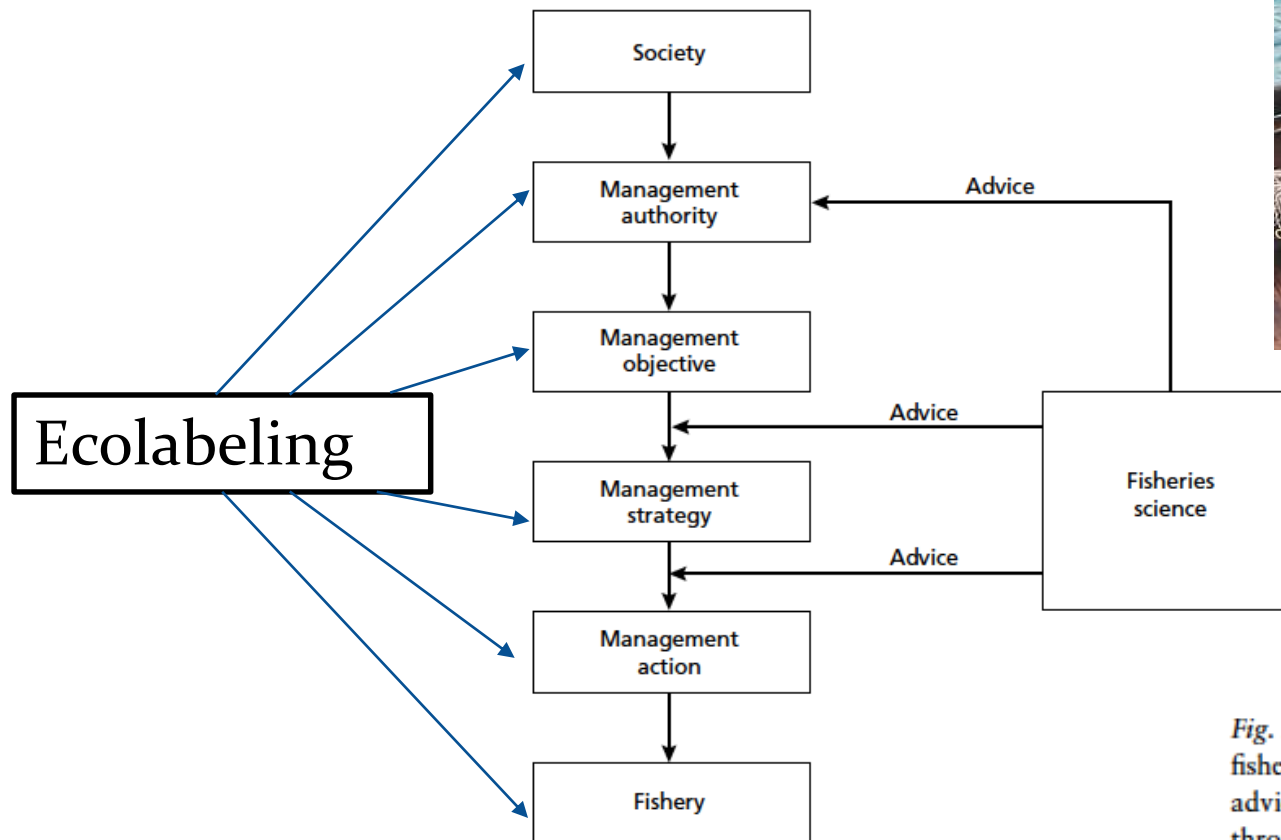


Fig. 1.11 Stages in the management of fisheries where fisheries scientists provide advice. They also receive feedback throughout the management process, especially through monitoring of the fishery.

# BACKGROUND TO ECOLABELLING IN FISHERIES

- Many commercial fish stocks are fully exploited or over-exploited

- Incidental bycatches

- Implementation of conventional fisheries management has not always been effective
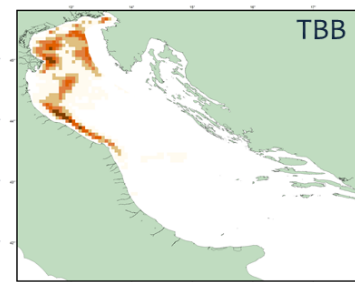
- Increasing awareness by consumers and public

- International instruments and commitments (e.g. 1995 Code of Conduct for Responsible Fisheries IPOAs)

# Ecolabelling

- Voluntary product labelling  conveying environmental information to consumers that seeks to create a market-based incentive for  better management of fisheries

- Certification bodies, for dealing with any complaints and appeals from involved parties in relation to any aspect of certification.

- The procedures should include an independent and impartial committee to respond to any complaint. If possible, the committee should attempt to resolve any complaint through discussion or conciliation.

# Some examples

# The MSC standards

Fishery  →  Fishery Certification  →  Chain of Custody Certification  →  Ecolabel Licensing  →  Consumer Product

Fisheries which meet the MSC Standard are independently certified as sustainable

Retailers, brands & restaurants choose MSC certified sustainable seafood

More fisheries choose to improve their practices and volunteer to be assessed against the MSC Standard

*How the MSC works with fisheries, suppliers and retailers to encourage a more sustainable seafood market.*

A traceable supply chain assures consumers that only seafood from an MSC certified fishery is sold with the MSC ecolabel

Market demand for MSC certified seafood increases

CERTIFIED
SUSTAINABLE
SEAFOOD
MSC
www.msc.org

Consumers preferentially purchase seafood with the MSC ecolabel

**Fisheries Standard**

**Chain of Custody Standard**

**Accreditation Body**

**Certification Body**
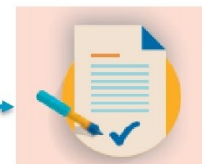
**Assessment Team**

**Fishery**

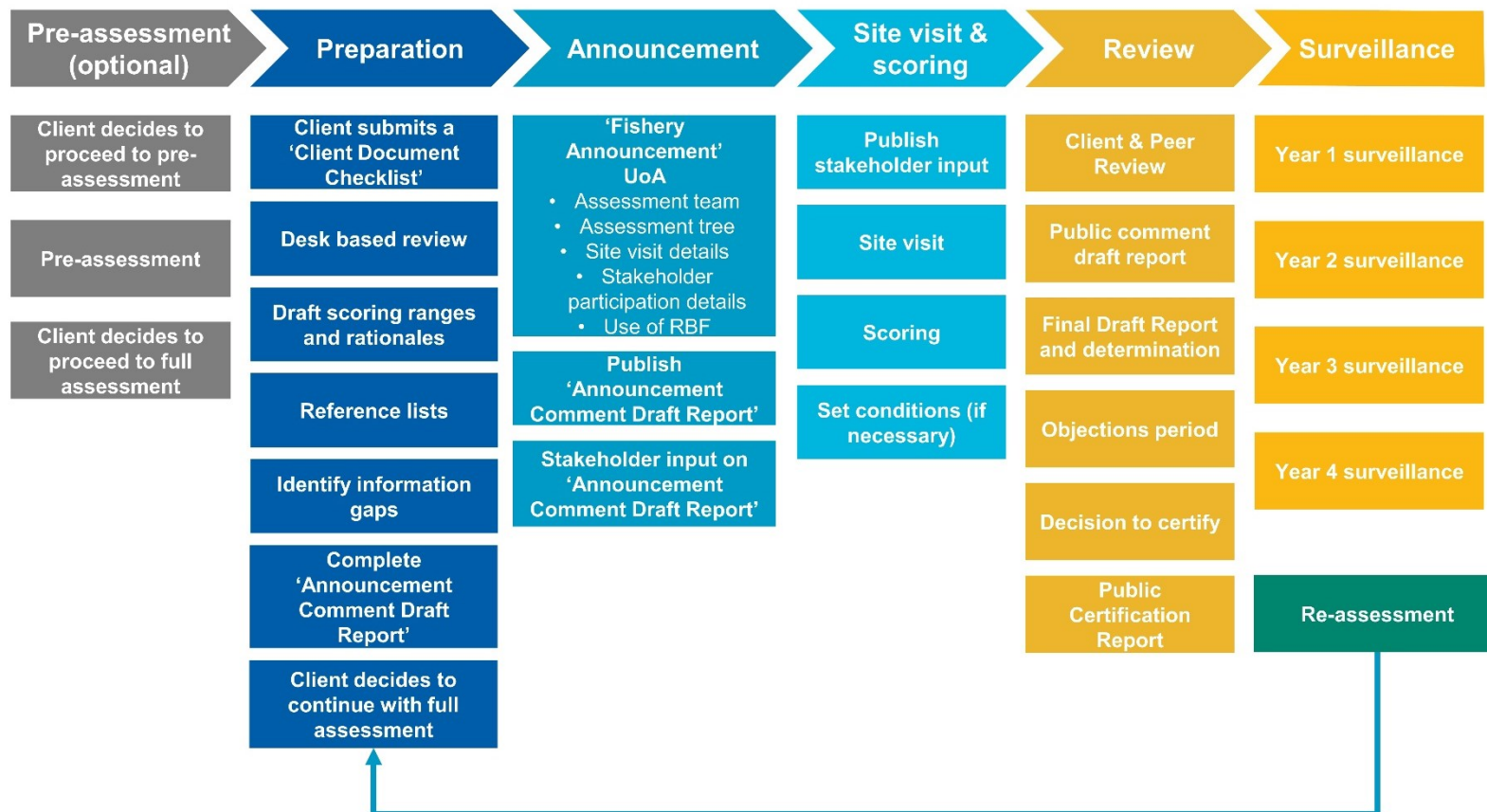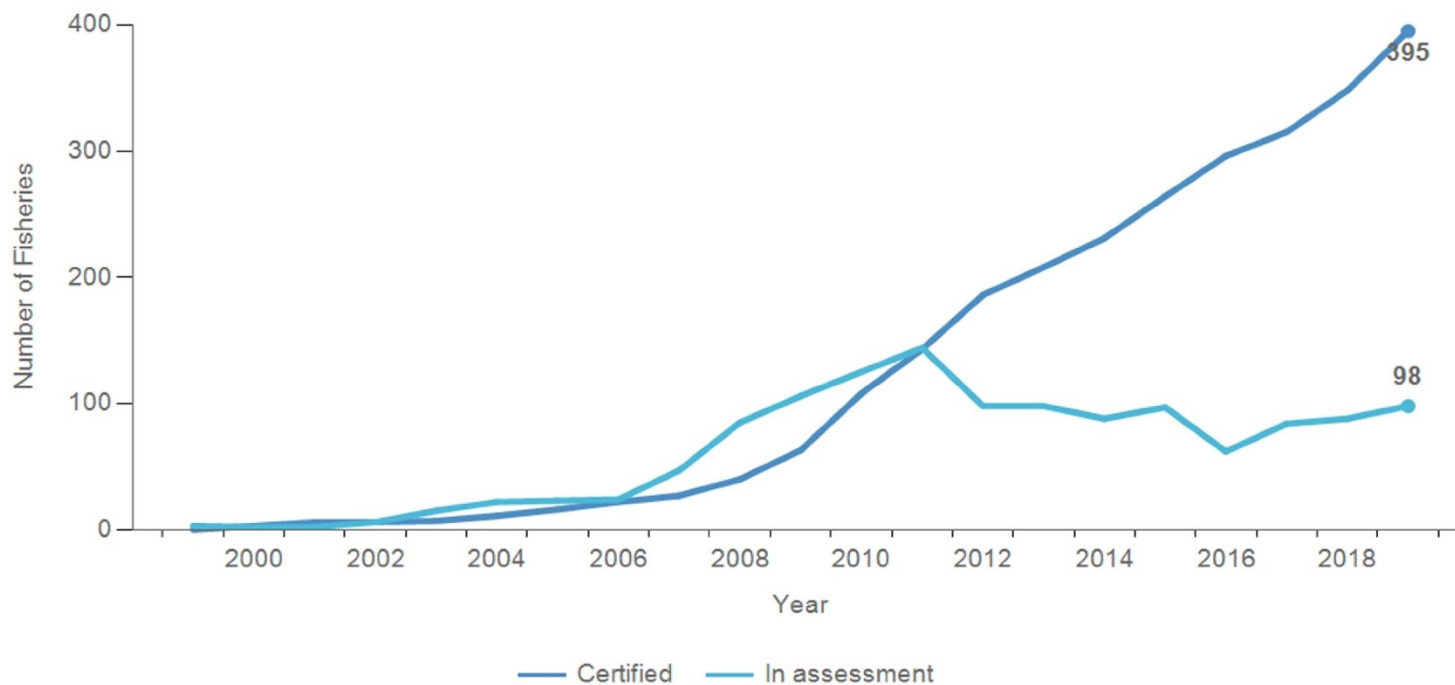| Pre-assessment (optional) | Preparation | Announcement | Site visit & scoring | Review | Surveillance |
|---|---|---|---|---|---|
| Client decides to proceed to pre-assessment | Client submits a 'Client Document Checklist' | 'Fishery Announcement' UoA<br>• Assessment team<br>• Assessment tree<br>• Site visit details<br>• Stakeholder participation details<br>• Use of RBF | Publish stakeholder input | Client & Peer Review | Year 1 surveillance |
| Pre-assessment | Desk based review | | Site visit | Public comment draft report | Year 2 surveillance |
| Client decides to proceed to full assessment | Draft scoring ranges and rationales | | Scoring | Final Draft Report and determination | Year 3 surveillance |
| | Reference lists | Publish 'Announcement Comment Draft Report' | Set conditions (if necessary) | Objections period | Year 4 surveillance |
| | Identify information gaps | Stakeholder input on 'Announcement Comment Draft Report' | | Decision to certify | |
| | Complete 'Announcement Comment Draft Report' | | | Public Certification Report | Re-assessment |
| | Client decides to continue with full assessment | | | | |

**395 certified fisheries**

**98 In Assessment**

**36 countries**

**180 species**

**15.8% of annual global harvest of wild capture fisheries = 12.75M Tonnes**

**Scallops and pectens**

**83%**

**Cods, hakes & haddocks**

**61%**

**Lobsters & spiny rock lobsters**

**67%**

**Krill & planktonic crustaceans**
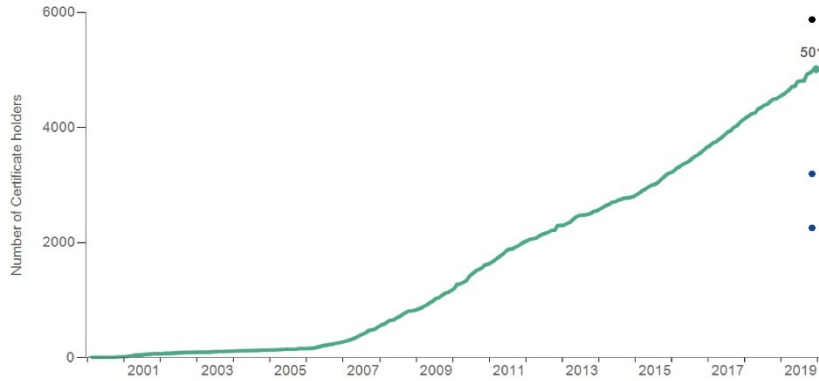
**54%**

**Salmons, trouts & smelts**

**50%**

** MSC certified catch compared with total catch of species grouping according to UN FAO ISSCAAP
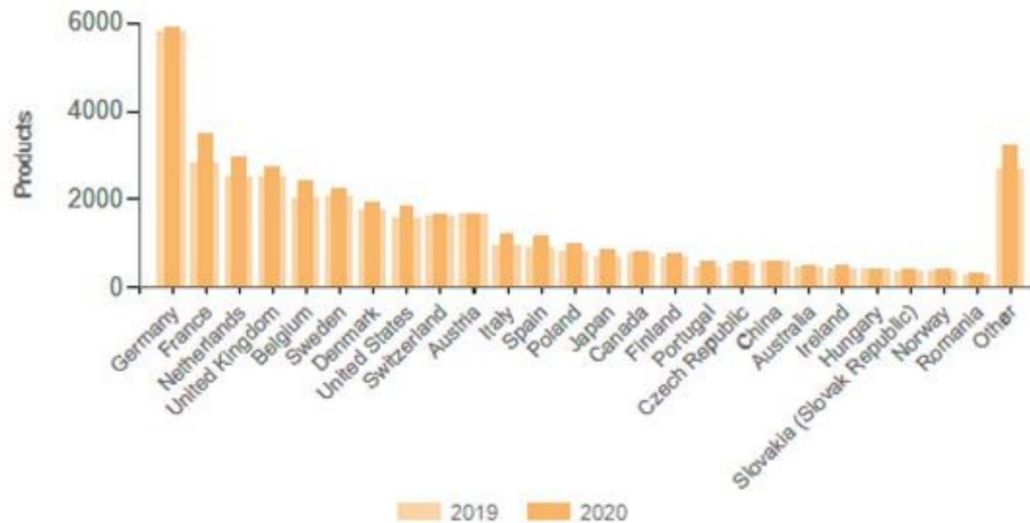
## Growth in CoC certificates



- The first CoC certificate was issued in **February 2000**

- **5,019 CoC holders**

- **100** countries with valid CoC certificate holders

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- **40244** consumer-facing MSC products on the market



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**Over 1400 improvements…**

- **Improved sustainability of fish stocks**

- **Reduction of bycatch**

- **Habitat and ecosystem improvements including gear modifications and introduction of conservation measures**

- **Fishery management improvements including increased compliance with regulations**

- **Increased research into fisheries impacts**

- **Ecosystem based management**
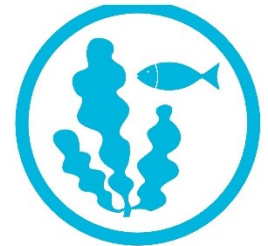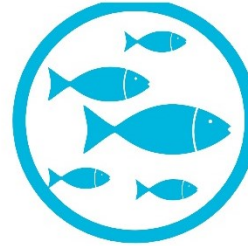
# Protecting habitats

13% of MSC certified fisheries have improved the way they manage their impacts on marine habitats, making change on the water and **funding new scientific research** to inform further improvements

# MSC costs and benefits

Certification and audit **costs** are dependent on the size and complexity of the fishery; the MSC estimates that most certifications cost between US$15,000 and $120,000.

The **benefits** to fishing companies and their marketers making the investment in certification include access to some markets and, in some cases, a price premium. US albacore tuna (Thunnus alalunga) fishery in the Pacific in 2007, the price fishermen received increased by 32%.

# Post Fishery Certification

- Annual (at least) surveillance audits by the certification body

  - Evaluate progress toward meeting any conditions of certification

  - Evaluate if any changes in fishery performance, stock or ecosystem status, management system or new knowledge might create need for re-assessment

- Full re-assessment every 5 years

- Objection process

# Traceability

## MSC – Chain of Custody

- MSC products can be traced back to MSC certified source fishery through the Chain of Custody certification.

- Chain of Custody is a requirement for any company that wants to sell and promote products as MSC certified.
    - ✓ Primary & Secondary Processors
    - ✓ Distributors and Importers
    - ✓ Retailers (Fresh Department)



**MSC**
www.msc.org

TM†
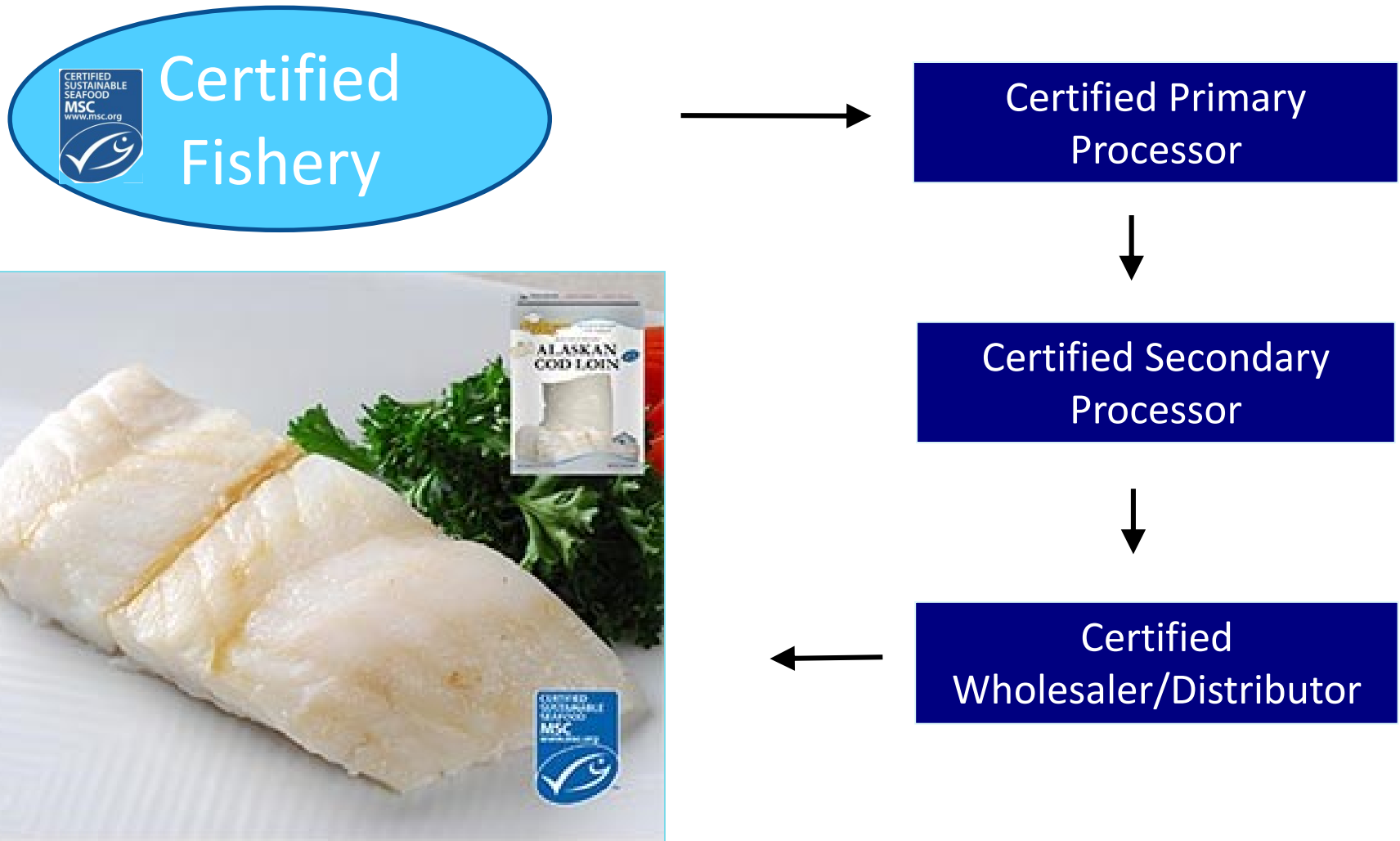
SF-C-1251
Certified
Sustainable Seafood
Pêche durable certifiée

# Product Traceability
## MSC Chain of Custody Certification



Certified Fishery

→ Certified Primary Processor

↓

Certified Secondary Processor

↓

Certified Wholesaler/Distributor

←

# Marine Stewardship Council
### Certified sustainable seafood

Home | About us | Healthy oceans | **Track a fishery** | Get certified! | Global impacts | Cook, eat, enjoy | Where to buy | News & events | Documents

YOU ARE HERE: Home > Track a fishery > Fisheries in the MSC program > Fisheries in assessment > Mediterranean Sea > Northern Adriatic Sea European anchovy and European pilchard pelagic pair trawl

**Fisheries in the MSC program**

Certified fisheries

**Fisheries in assessment**

Arctic Ocean

**Mediterranean Sea**

Northern Adriatic Sea European anchovy and European pilchard pelagic pair trawl

Assessment downloads

Contacts

North-east Atlantic

North-west Atlantic

North Atlantic

South Atlantic

Pacific

Indian Ocean

Inland

# Northern Adriatic Sea European anchovy and European pilchard pelagic pair trawl

**Last Updated:** 15 December 2015

## Species

European anchovy (*Engraulis encrasicolus*)
European pilchard (*Sardina pilchardus*)

## MSC assessment status

For the assessment details, please refer to the **assessment downloads section.**
For further information, contact the **Conformity Assessment Body.**

## Fishery location

Western side of the North Adriatic sea., FAO statistical area 37.

## Fishing method

Pelagic trawl.

## Fishery management

The Italian "Ministro delle Politiche Agricole Alimentari e Forestali" (MIPAAF) is responsible for managing fishing activity in Italy. The "Direzione generale della pesca
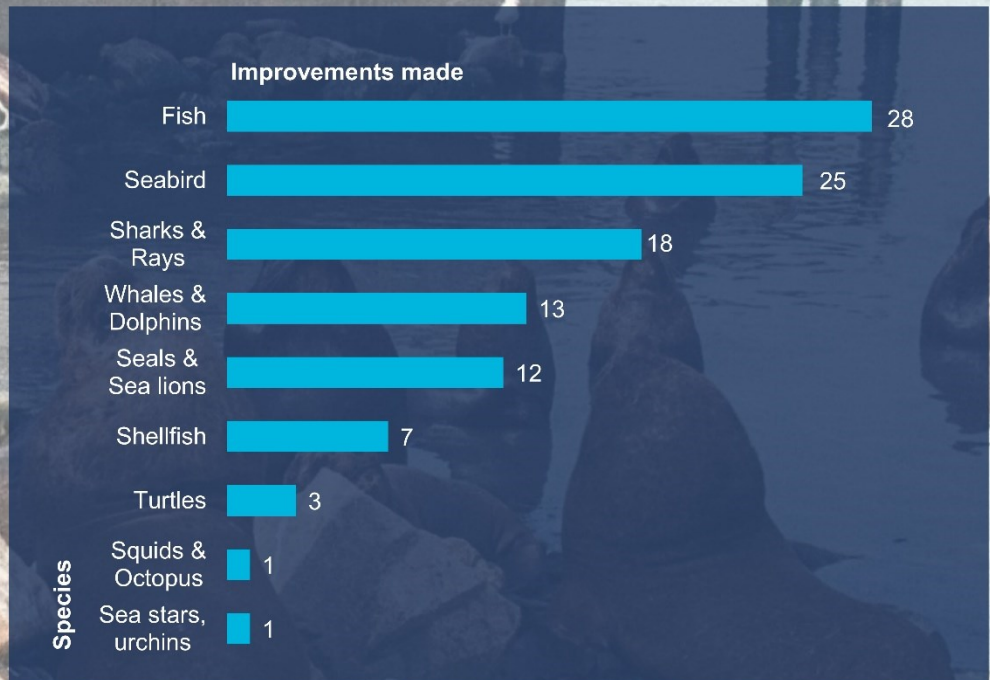
### Related pages

→ Assessment downloads

→ Contacts

# Minimising bycatch

From **2007 - 2013**, **60** fisheries made further improvements to their practices in order to reduce or eliminate bycatch through:

- gear modifications
- impact monitoring and assessment
- changes to management practices

**Improvements made**

| Species | Improvements made |
|---|---|
| Fish | 28 |
| Seabird | 25 |
| Sharks & Rays | 18 |
| Whales & Dolphins | 13 |
| Seals & Sea lions | 12 |
| Shellfish | 7 |
| Turtles | 3 |
| Squids & Octopus | 1 |
| Sea stars, urchins | 1 |

# Benefits for fisheries

## Socio-economic

- **Access to new markets**

- **Protect existing markets**

- **Product differentiation**

- **Improved traceability/marginalise IUU**

- **Potential for price premium**

- **Improved reputation**

- **Long-term availability of seafood**

- **Longer lasting contracts**

There is evidence that certified fisheries have gained a number of socioeconomic benefits, including:
- higher revenues
- beneficial partnerships
- greater influence with governing institutions

Price premium / market access? – price is largely driven by market dynamics and consumer preferences. Certification does not guarantee, but some have received economic benefits. Some examples:

Haddock
**10%**
(UK market)

Alaska pollock
**14.2%**
(UK market)

South African hake

Access to new markets, losing MSC = **38%** loss in net value

# South African Hake

## 95-99%
Drop in seabird bycatch

## Better cooperation between stakeholders

## Tori lines
now mandatory on all trawling vessels in SA

## 12,000
Jobs safeguarded

## New improvements for 2018

To address MSC conditions the fishery has closed part of its footprint so scientists can carry out a unique long-term counterfactual research project to determine the impact of trawling and partnered with WWF on a Fishery Conservation Project to co-manage 10 bycatch species.

# Improvement in Global South fisheries

## Why is this important?

- **Half of world's seafood production from developing countries**

- **Supporting livelihoods of millions**

- **Almost half of this is traded internationally**

- **72% destined for markets in EU, US and Japan**



Fisheries engaged with MSC in Global South

Developing world
**50** fisheries certified
**16** in assessment
**12%** of fisheries in the MSC program

— Certified — In assessment



Number of Developing World fisheries — Region: Africa - Middle East - East Asia (2, 4), Asia Pacific (9, 28), Latin America (5, 18)

In Assessment  Certified
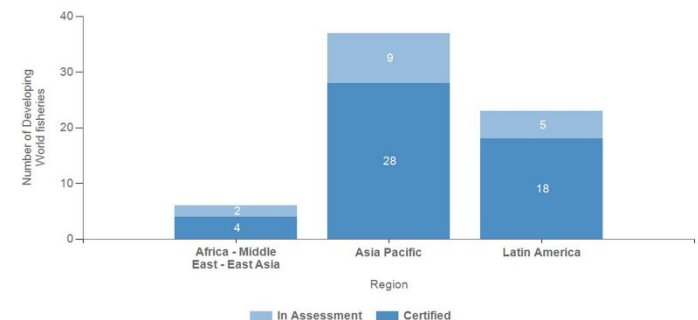
# Challenges

- **Data deficiency**

  - Data collection and monitoring

  - Assessment of stocks

  - Determining stock status relative to target reference points

  - Determining impacts on other species and habitats

- **Fishery management challenges**

  - Harvest strategies & control rules

  - Consultation & decision making processes

  - Compliance & enforcement

- **Costs and Capacity**

# Fisheries Standard development

- Based on the FAO Code of Conduct for Responsible Fisheries

- Developed in consultation with scientists, the fishing industry and conservation groups

- It reflects the most up to date understanding of internationally accepted fisheries science and best practice management.

- Outcome and science based

- Encompasses the precautionary approach

- Globally applicable

# Fisheries within Scope

The scope of the MSC Principles covers:

- Marine and freshwater fisheries.

- Wild-capture fisheries (including but not limited to fish, shellfish, crustaceans, and cephalopods).

- Fishery activities up to, but not beyond, the point at which the fish are landed.

# Fisheries within Scope

**Introduced species**

- **Irreversible**

- **Cannot be eradicated - large population size and distribution beyond the area where first introduced**

- **Introduced prior to 1993 <u>or</u> non-deliberate and occurred at least 20 years prior to assessment**

- **No further introductions of the introduced species**

**Enhanced fisheries**

- **"Catch and Grow"**

  - Linkages to & maintenance of a wild stock

- **"Hatch and Catch"**

  - Feeding and husbandry

- **"Habitat Modified"**

  - Habitat and ecosystem impacts
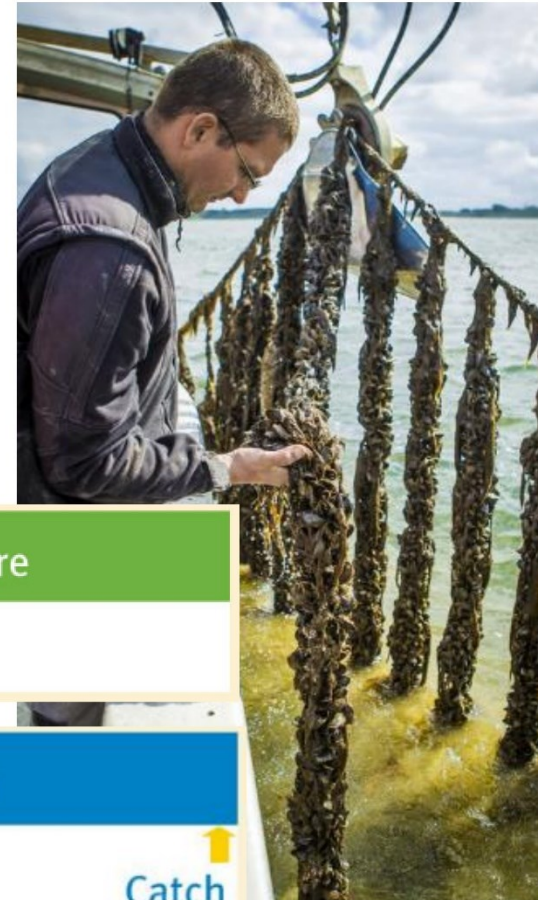
# Fisheries <u>not</u> within Scope

The scope of the MSC Principles does **not** cover:

- **Aquaculture**

- Fishery conducted under a **controversial unilateral exemption** to an international agreement

- Use of **destructive fishing practices**, such as fishing with poisons or explosives

- Fishery targeting **amphibians, reptiles, birds, or mammals**

# MSC Fisheries Standard

**1** The sustainability of stock

**2** Ecosystem impact

**3** Effective management

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# What is a fishery?

## Unit of Assessment (UoA)

- The target stock(s)
- Fishing method/gear and practice
- Vessels or fleets
- Other eligible fishers that are included in an MSC fishery assessment
- Specific fishing seasons and/or areas

## Unit of Certification (UoC)

- The target stock(s)
- Fishing method/gear and practice (including vessel/s)



Defining the Unit of Assessment

UOA

UOC
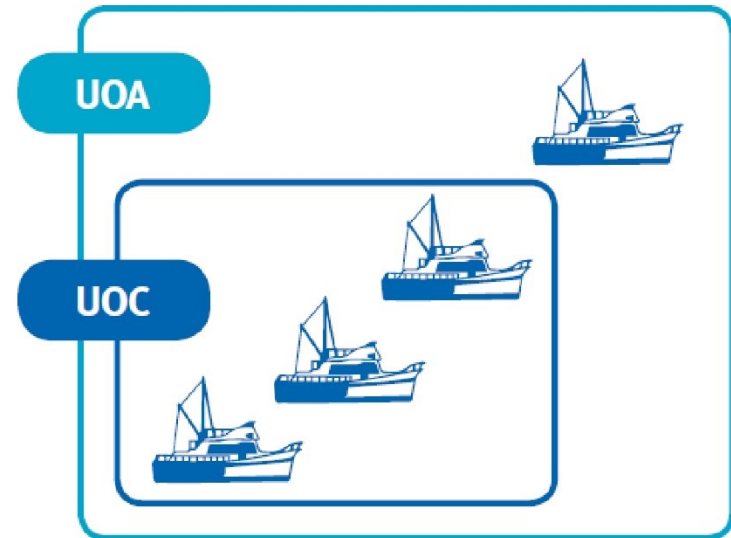
UOA = Unit of Assessment

UOC = Unit of Certification

# What is assessed?
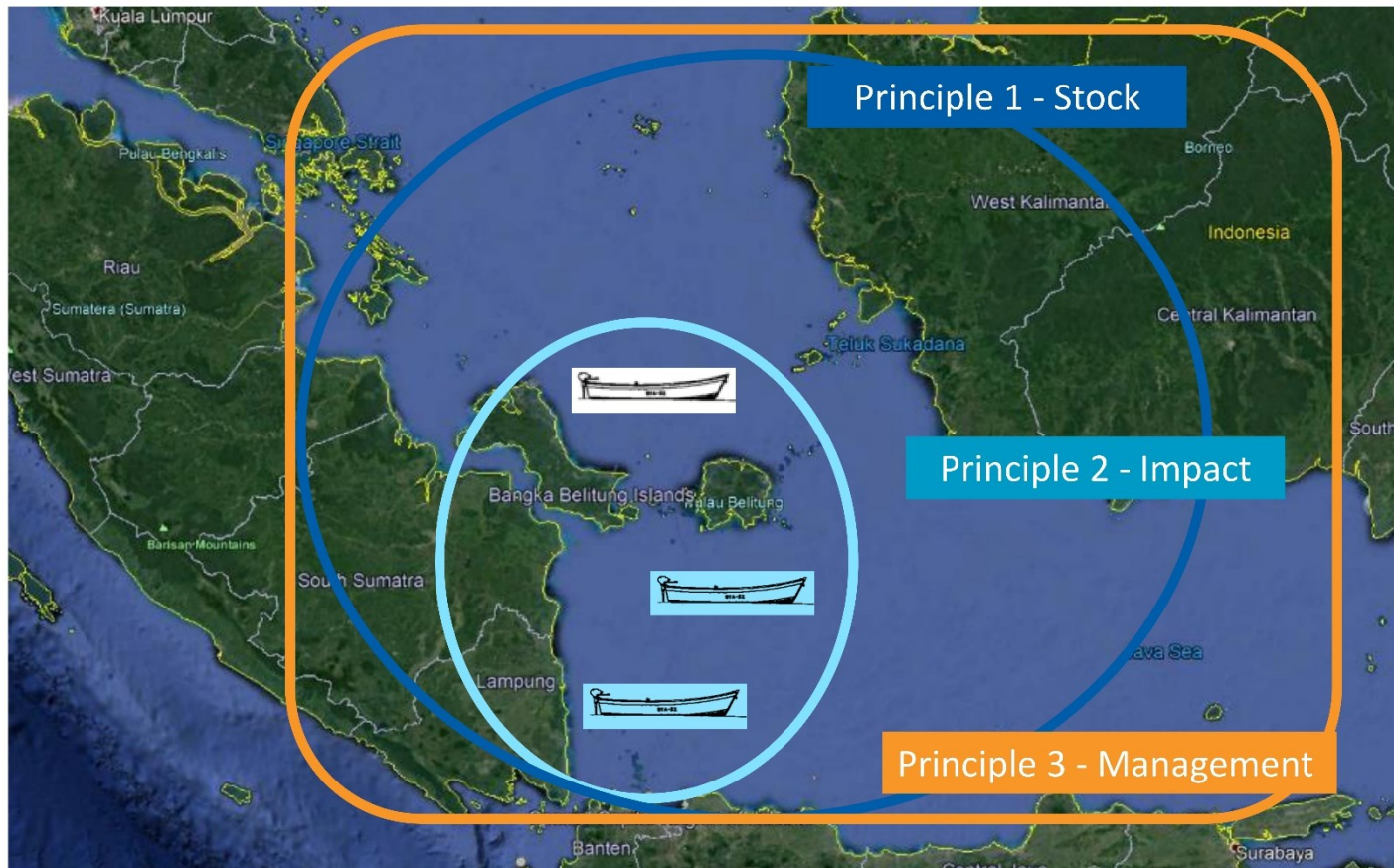
# What is a Unit of Assessment (UoA)?
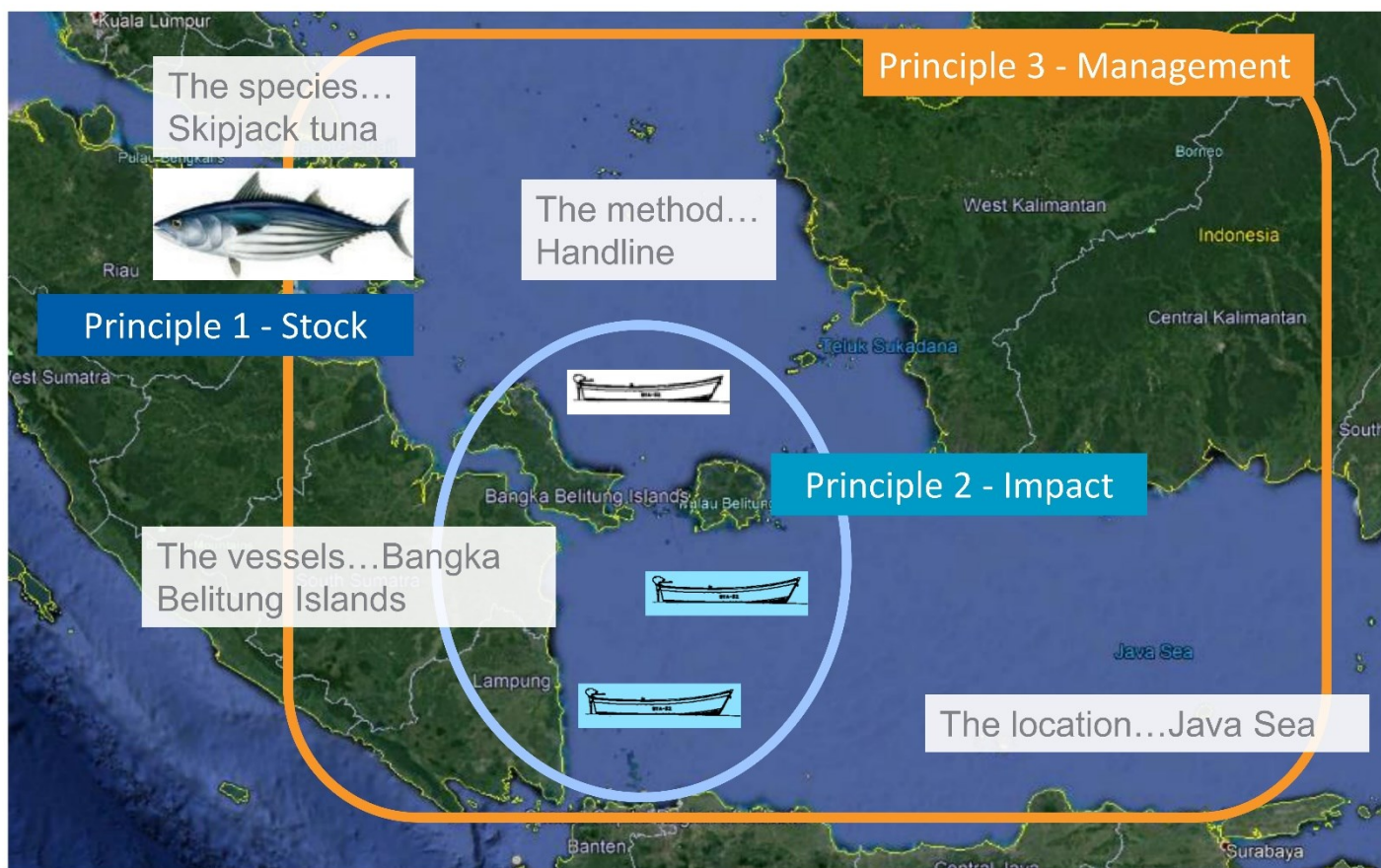
# What is a Unit of Certification (UoC)?



The species… Skipjack tuna

The method… Handline

The vessels…Banka Belitung Islands

UoC is the same as UoA minus any Other Eligible Fishers that are not initially certified but may join by 'certificate sharing'

The location…Java Sea

# General information requirements for assessment

## Which information is gathered?

**Maps of:**

- Distribution of fishing effort within jurisdictional boundaries of the fishery

- Distribution of fishing effort on target stock outside the fishery being certified

- Species, habitat and community distributions

**Descriptions of:**

- Monitoring strategies in place

# Stakeholder involvement

## Gathering data & expert opinion

Conduct stakeholder consultation to gather data and to seek expert opinions.

Assist:

- Identification of fishery impacts
- Scoring the fishery

Provide:

- Information to evaluate risks of fishery

# Terminology

Principle

Component

Performance Indicator (PI)

Scoring Guidepost

Scoring issues
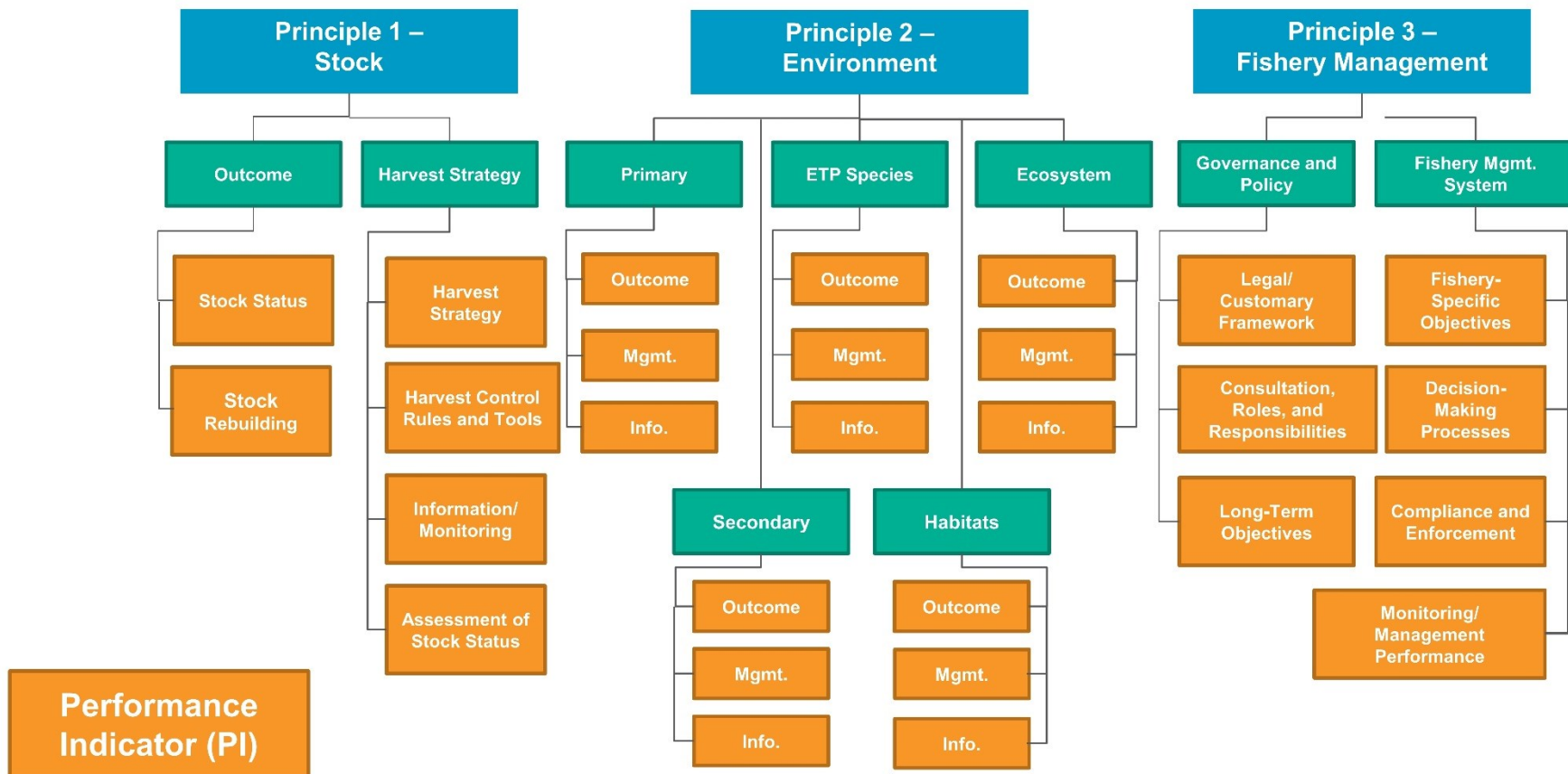
# Assessment against the Fisheries Standard

- **The MSC has 3 scoring levels**
- **Each performance indicator (PI) is assigned a score**
- **Every PI must score ≥60**
- **Average Principle score must be ≥80**

**SG 60**
- Minimum requirements

**SG 80**
- Best practice

**SG 100**
- State of the art

# Structure of the Fisheries Standard

| Component | PI | Scoring issues | SG60 | SG80 | SG100 |
|---|---|---|---|---|---|
| Ecosystem | **Management strategy** **2.5.2** There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function. | a | There are measures in place, if necessary which take into account the potential impacts of the UoA on key elements of the ecosystem. | There is a partial strategy in place, if necessary, which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. | There is a strategy that consists of a plan, in place which contains measures to address all main impacts of the UoA on the ecosystem, and at least some of these measures are in place. |
| | | b | The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems). | There is some objective basis for confidence that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved | Testing supports high confidence that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved |
| | | c | The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ species). | There is some evidence that the measures/partial strategy is being implemented successfully. | There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a). |

# Driving improvements
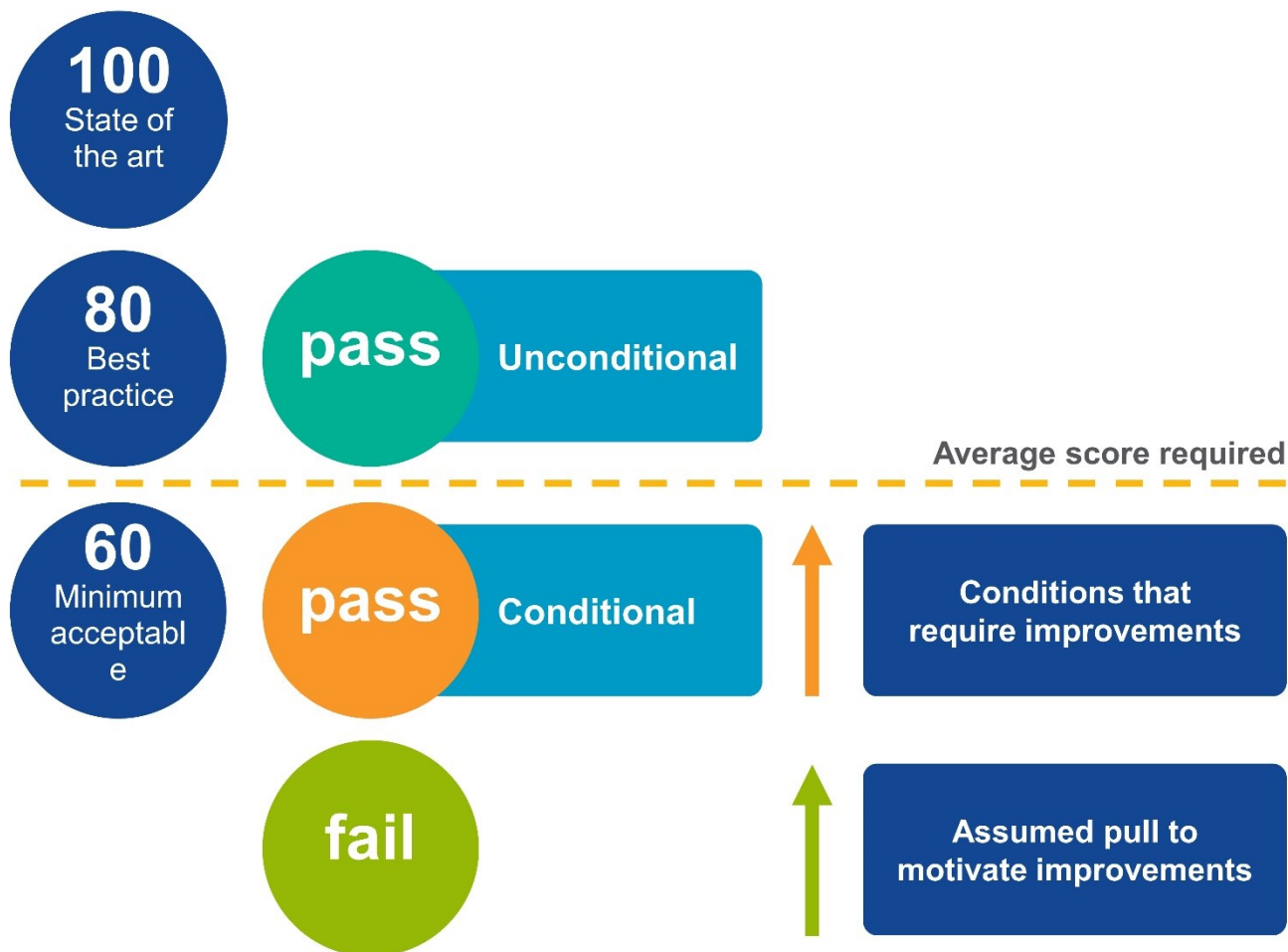
# Condition setting

- Separate condition for every PI scoring less than 80
    - CAB has to consult with external parties should their assistance be required for the fishery client to meet any conditions
- Client action plan
- Aim for improved performance to at least the 80 level within a maximum five-year certification period
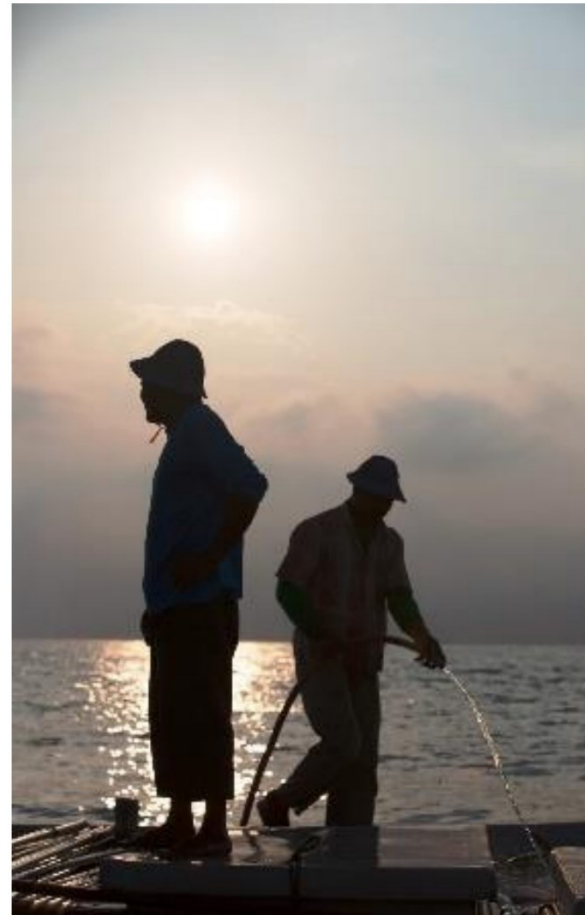
- **First consider all scoring issues at the SG60 level, then those at the SG80 level, and finally those at the SG100 level.**

| Component | PI | Scoring issues | SG60 | SG80 | SG100 |
|---|---|---|---|---|---|
| Ecosystem | Management strategy<br><br>2.5.2<br><br>There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function. | a. Management strategy in place | There are measures in place, if necessary wh take into account the potential impacts of th UoA on key elements the ecosystem. | There is a partial strategy in ce, if necessary, which es into account availab rmation and is expecte estrain impacts of the A on the ecosystem so chieve the Ecosystem come 80 level of formance. | There is a strategy that ists of a plan, in place n contains measures to ess all main impacts of UoA on the ecosystem, at least some of these sures are in place. |
| | | b. Management strategy evaluation | The measures are considered likely to w based on plausible argument (e.g., gener experience, theory or comparison with simil UoAs/ ecosystems). | ere is some objective is for confidence that t asures/ partial strategy work, based on some rmation directly about A and/or the ecosystem lved | ng supports high dence that the partial egy/ strategy will work, d on information directly t the UoA and/or ystem involved |
| | | c. Management strategy implementation | The measures are considered likely to w based on plausible argument (e.g., gener experience, theory comparison with simila UoAs/ species). | ere is some evidence th measures/partial strate eing implemented cessfully. | e is clear evidence that artial strategy/strategy is implemented ssfully and is achieving ctive as set out in ing issue (a). |

## Overall scoring

**To achieve certification,** PIs:

- Each PI must score ≥60, or the fishery scores < 60 (fail)
- Any PI that scores <80 requires an 'improvement action' (condition in full assessment)
- Any PI that scores ≥80 earns an unconditional pass (no change needed)



**To pass,** Principles:

- PIs with each Principle are averaged (weighted)
- Each Principle must score ≥80 or the fishery would fail full assessment.

# Assessment tree scoring example
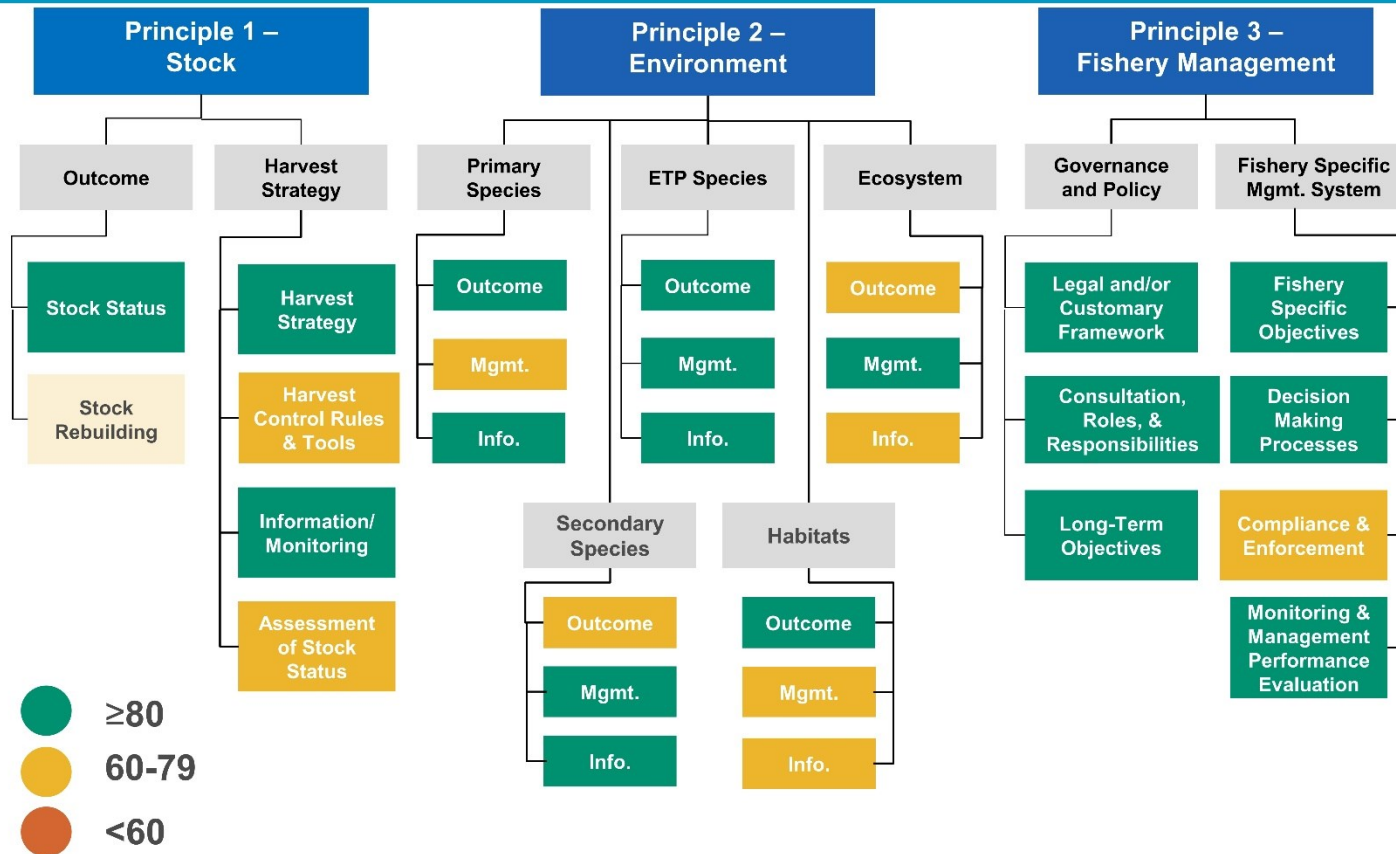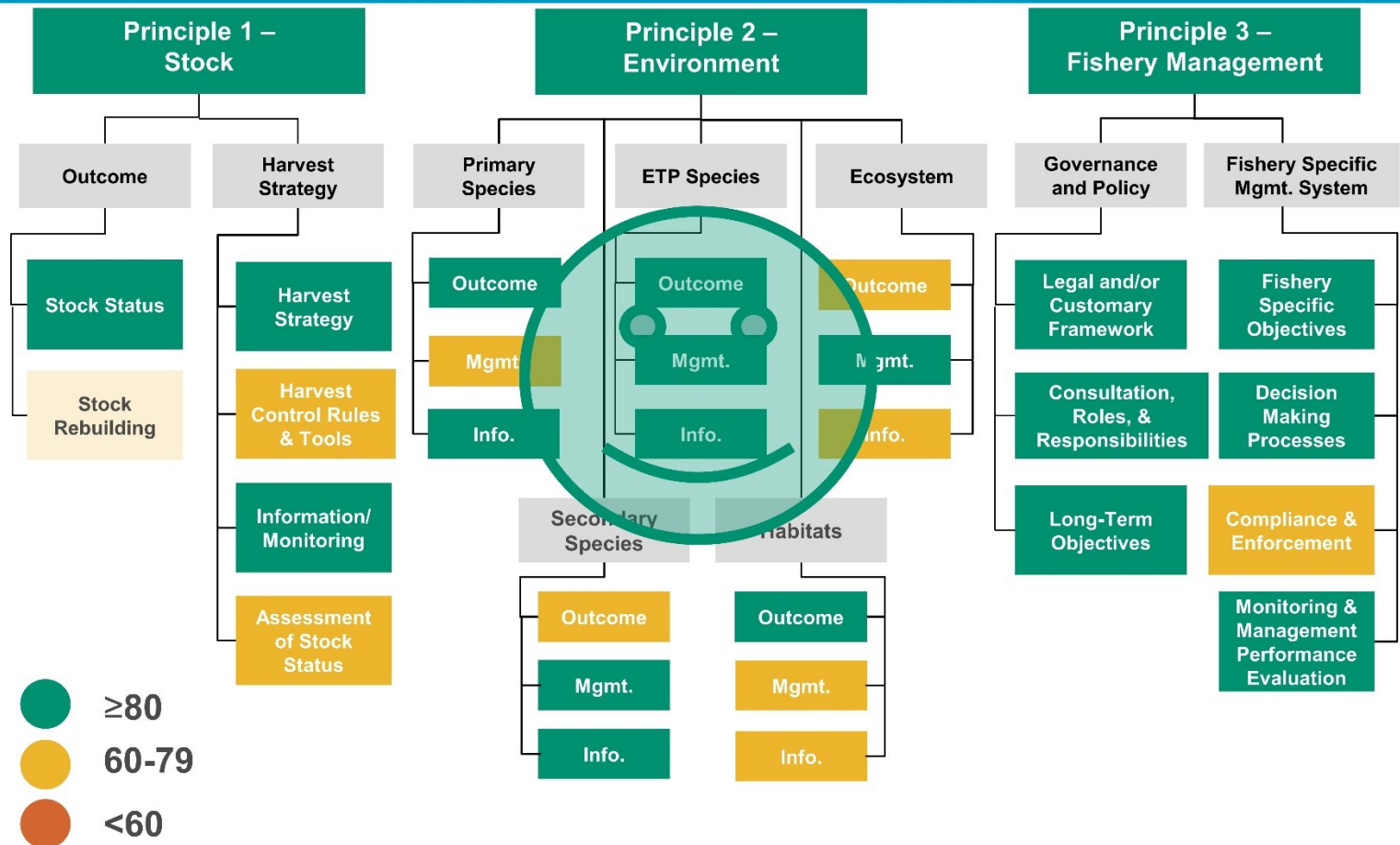
# Assessment tree scoring example

# Assessment tree scoring example

# Assessment tree scoring example



| | Principle 1 – Stock | Principle 2 – Environment | Principle 3 – Fishery Management |

**Legend:**
- ≥80 (green)
- 60-79 (yellow)
- <60 (orange)
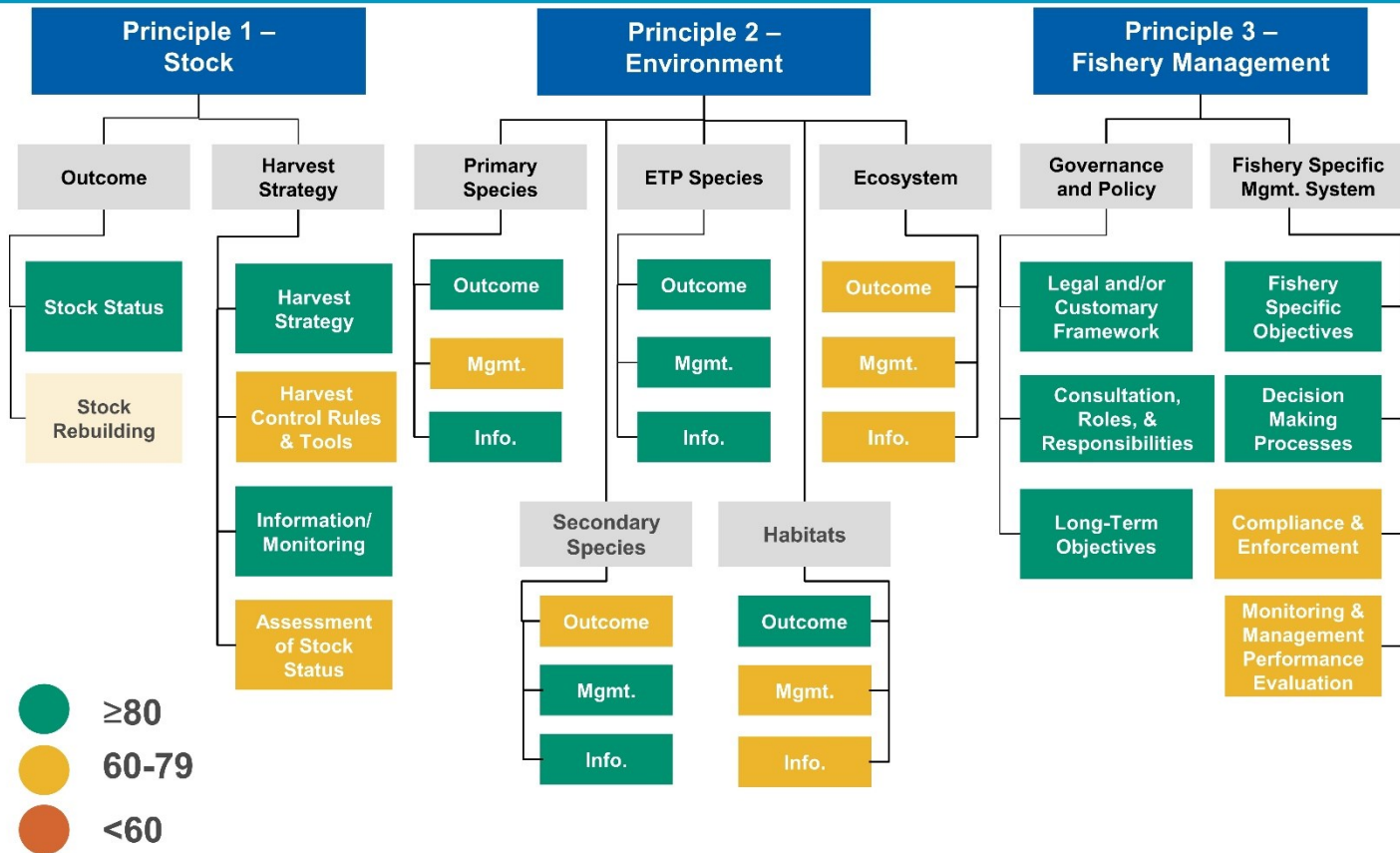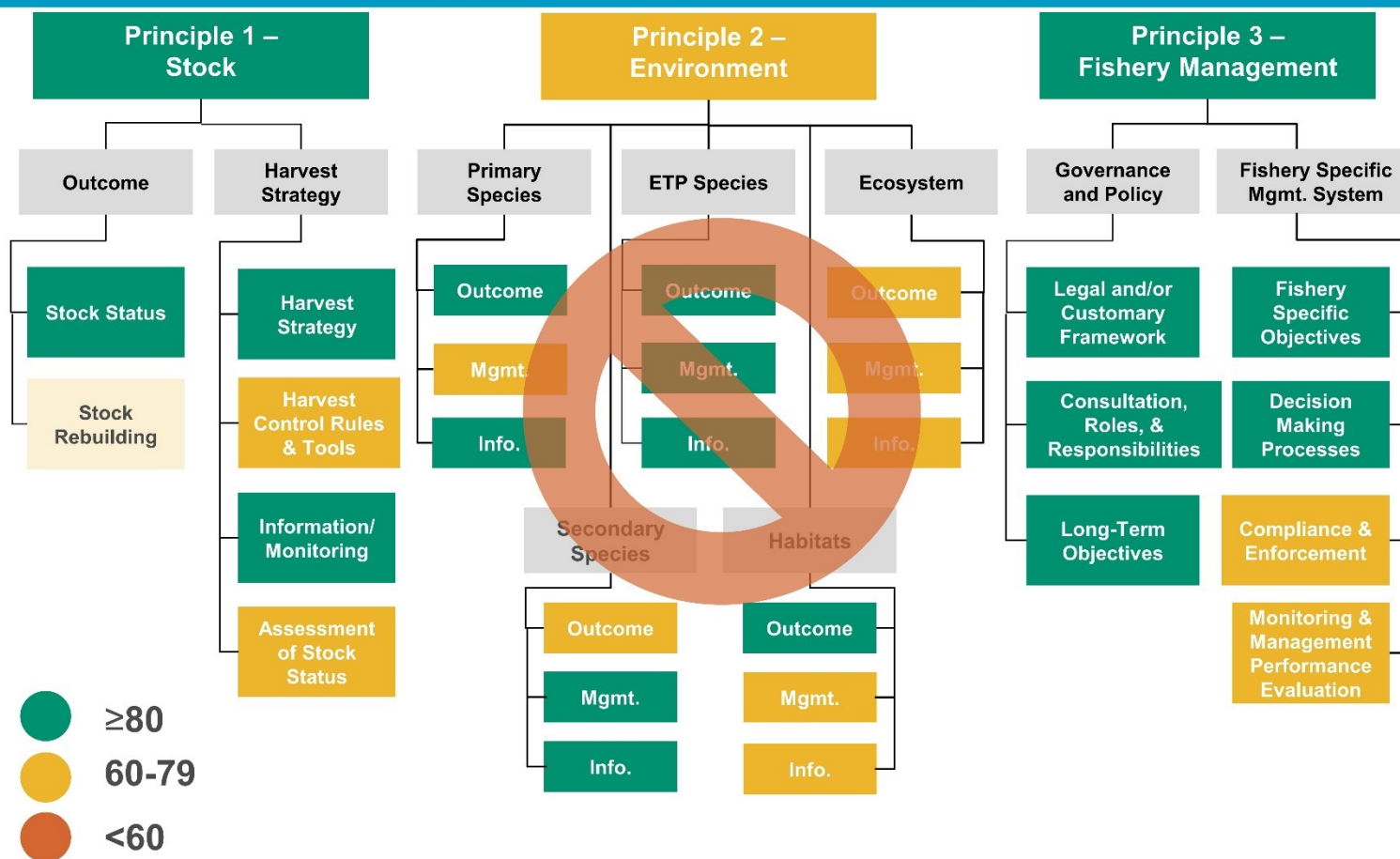
**Basic management feedback**
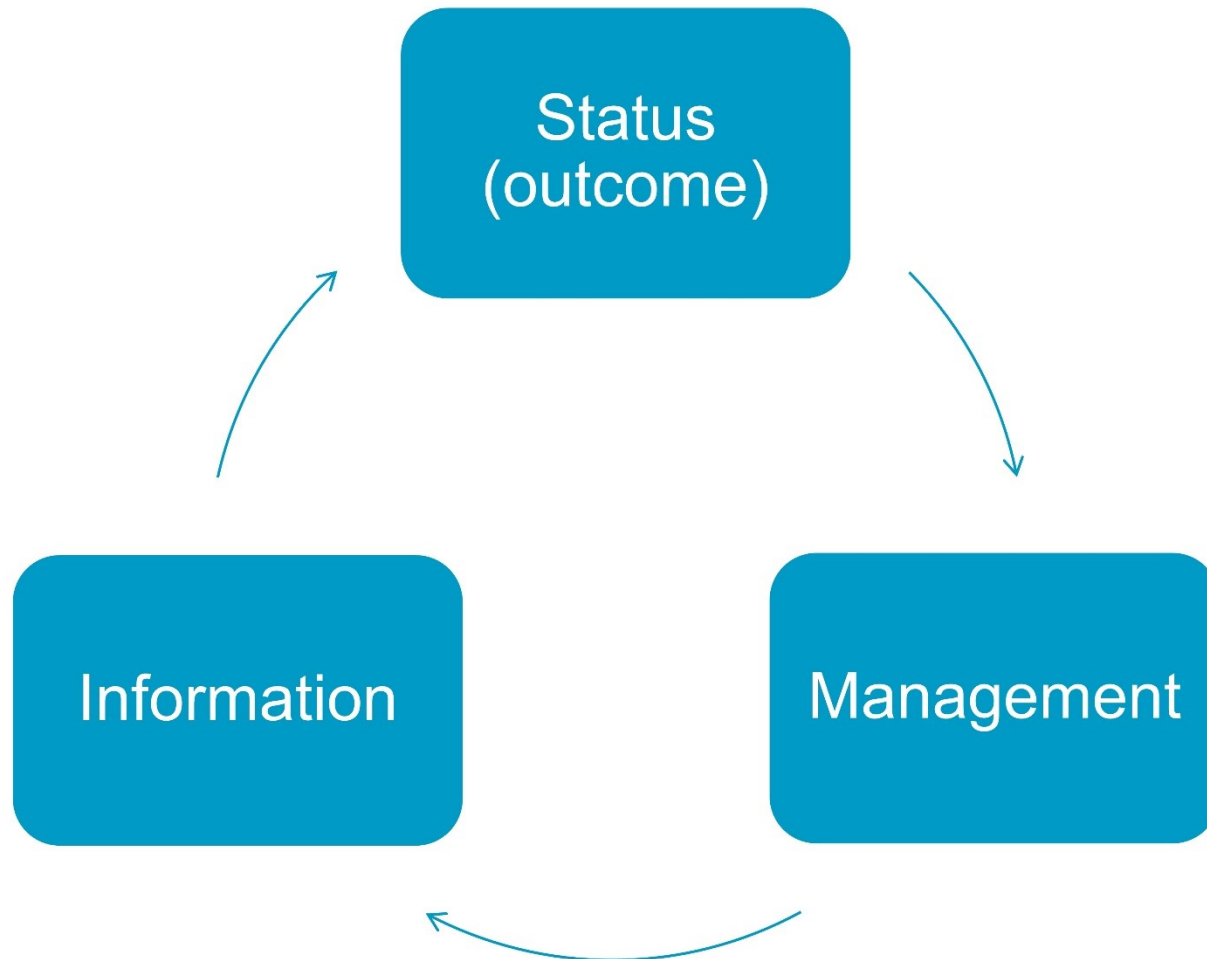
# Principle 1: *Sustainable Fish Stocks*

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and…….

…… for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery

## Sounds simple – but is it?

### Ideally / biologically:

- "All the individuals of fish in an area, which are part of the same reproductive process. It is self-contained, with no emigration or immigration of individuals from or to the stock. It occupies a well-defined spatial range and is independent of other stocks of the same species (FAO – Stock definition).

### But Practically:

- "Fraction of the (biological) unit stock may be considered a "stock" **for management purposes**, as long as the entity is distinct enough for the results of the assessments and management to remain close enough to what they would be on the unit stock" (FAO – Stock definition).

- "Group within a species population which have **sufficient** spatial and temporal integrity to warrant consideration as self perpetuating units" (Pawson 1995).

- "Arbitrary groups of fish, large enough to be **essentially** self-reproducing, with members of each group having similar life history characteristics" (Hilborn and Walters, 1992).
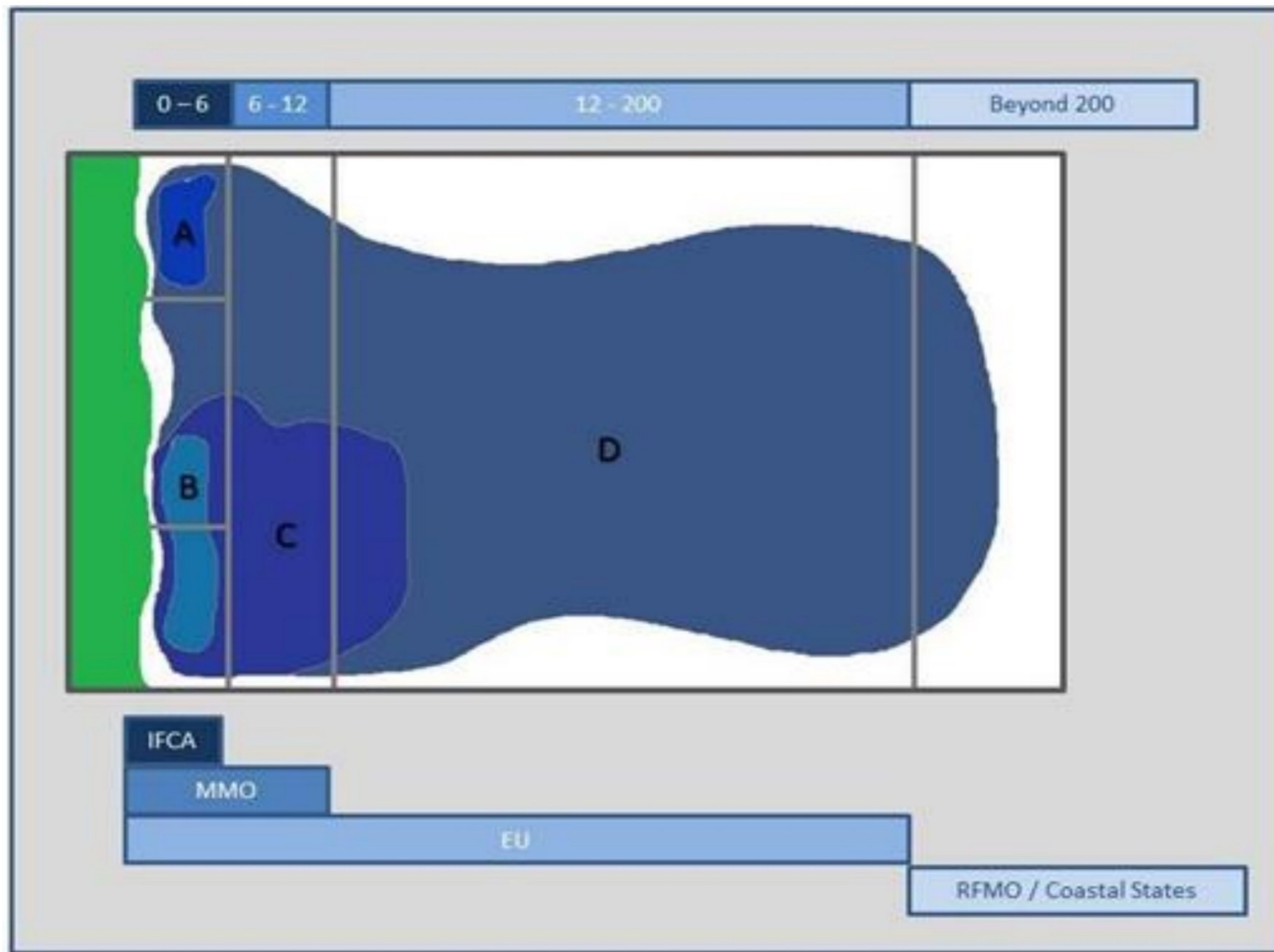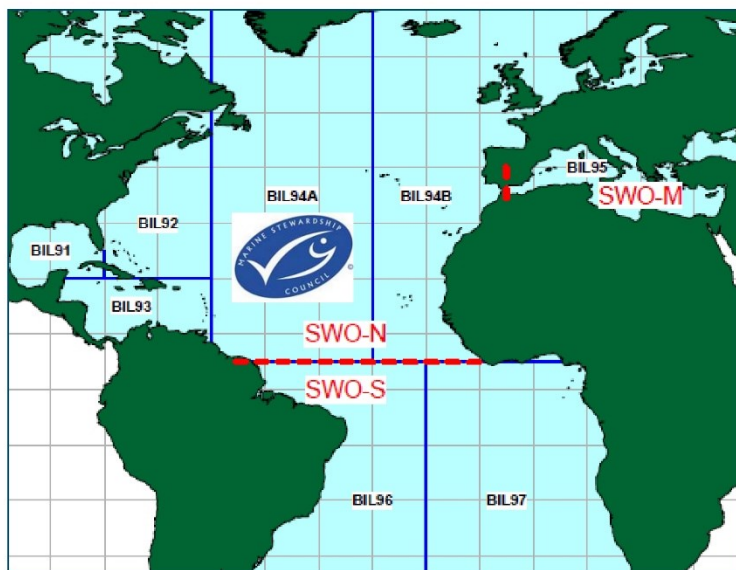
**Atlantic Swordfish**
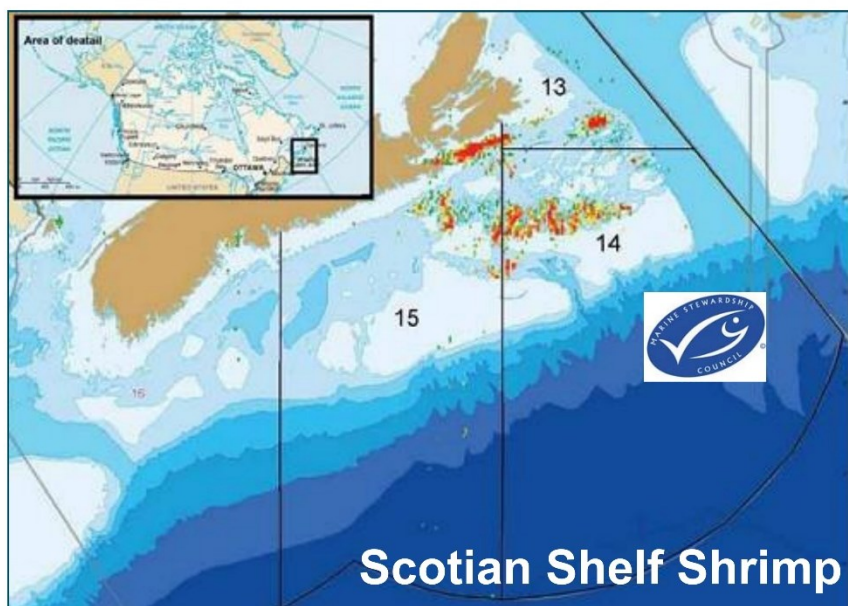

**Scotian Shelf Shrimp**
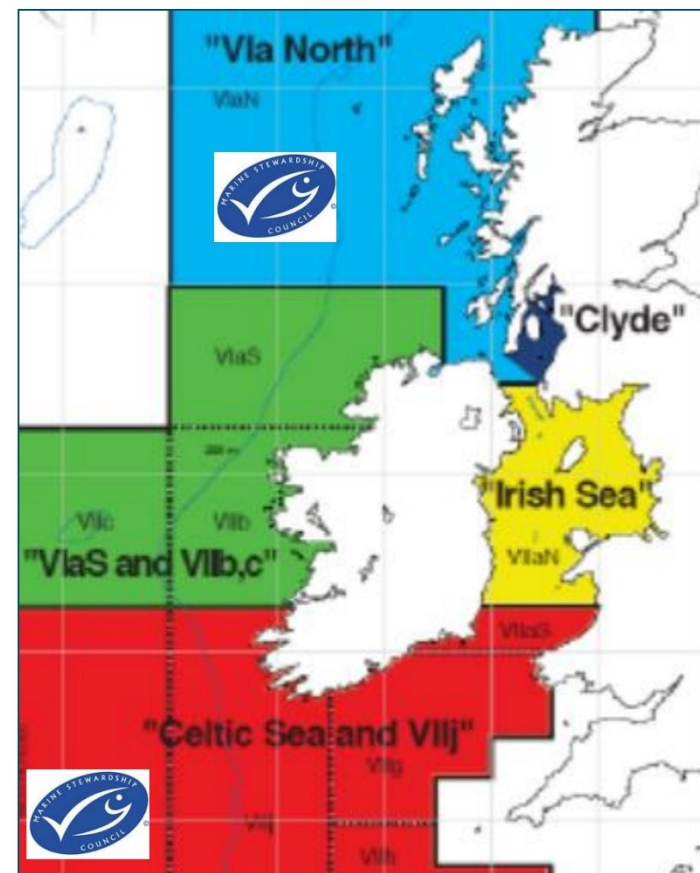

**Herring**

# Characteristics of good management – P1

- Clear management units – clearly defined stock definition (and underlying rationale / assumptions)

- Supported by appropriate information (computerised, time series, tailored to HCR)

- Understanding of stock status – appropriate to life history / exploitation rate

- Adaptive management response

- Transparent (stakeholder buy-in) decision rules.

- Timely Review & Evaluation

*Initial & periodic review*

Agree Mgt Strategy & HCR

Undertake mgt. actions as defined in HCR

**It all starts with data**

Compare to reference points

**The management system**

Monitoring and information

Set reference points

Determine Stock status

Stock assessment

*The essential baseline*
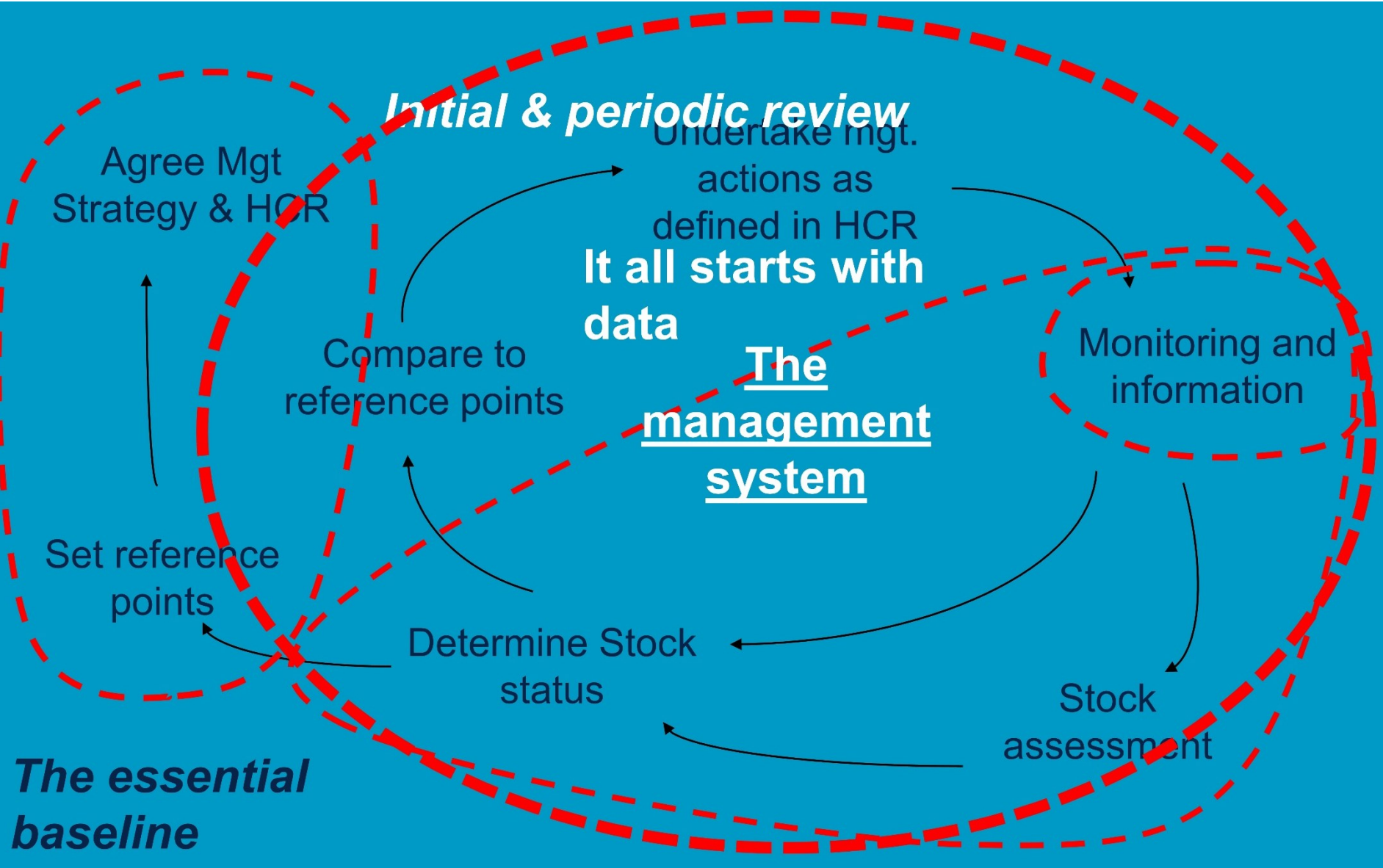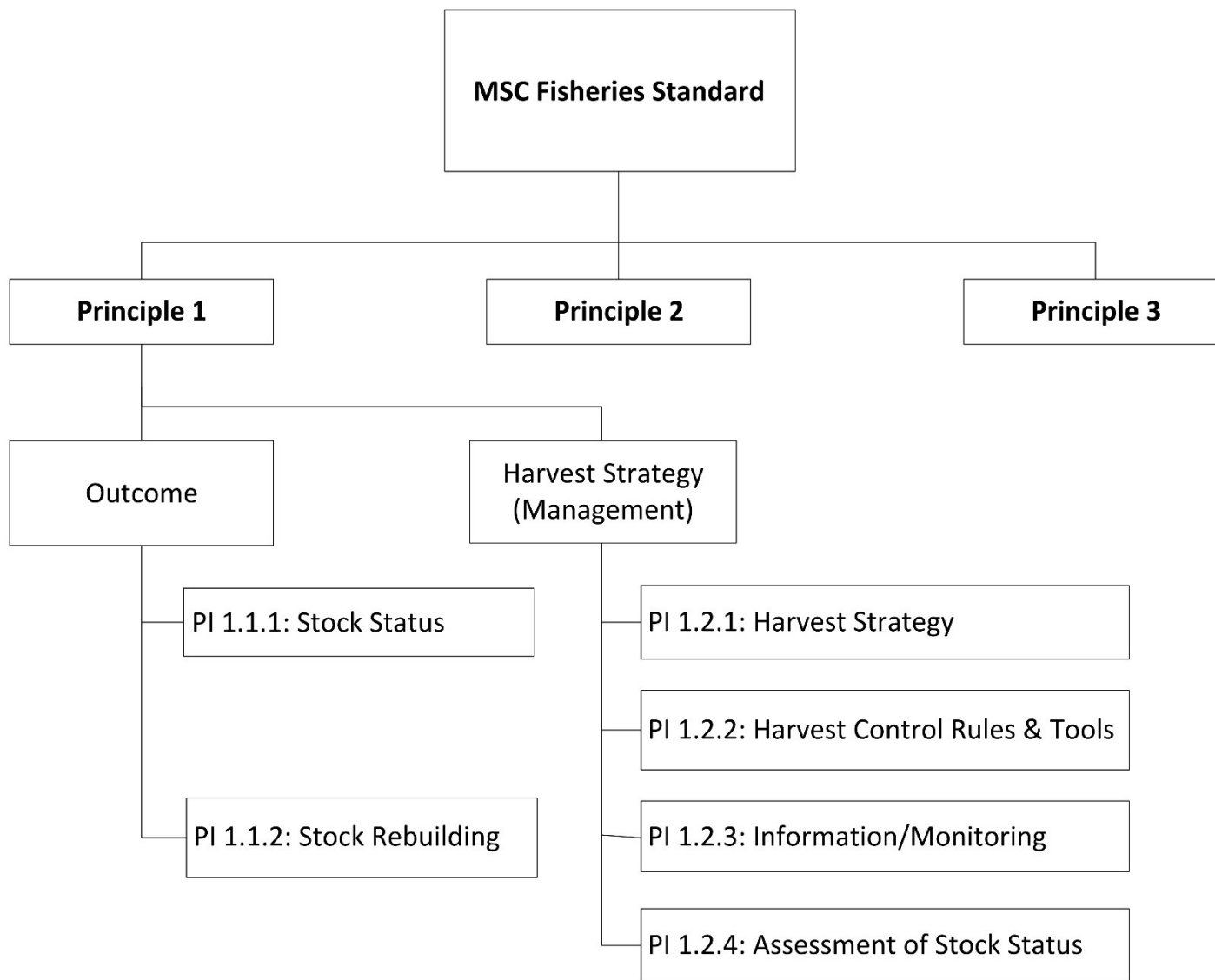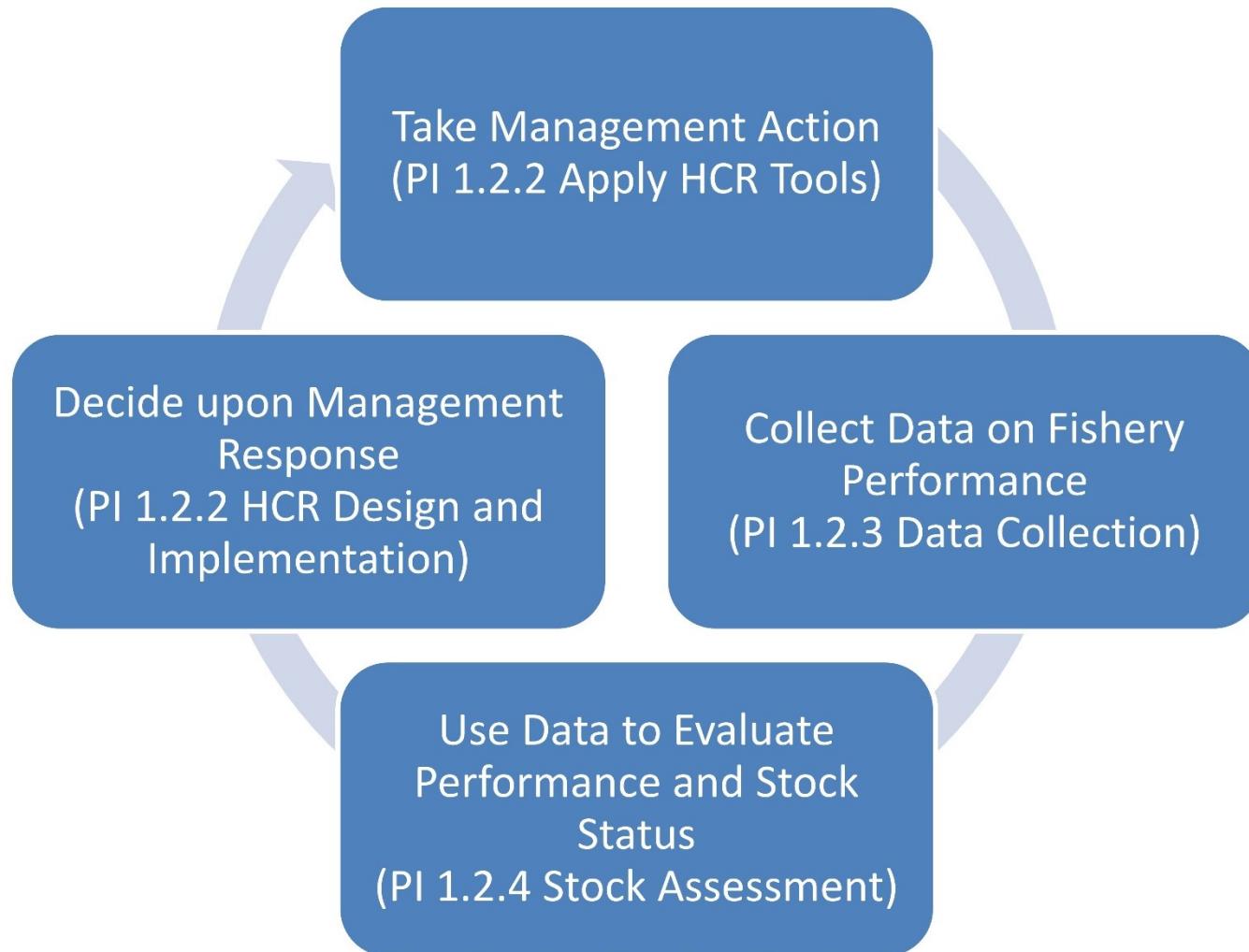
## Stock Status

- Examines the impact of <u>all</u> fisheries / gears on the target stock

- 2 scoring issues:

  a) Likelihood of fishery being above Point of Recruitment Impairment (PRI)

  b) Likelihood of stock being at Maximum Sustainable yield (MSY)

- **Enshrines objectives of UN Fish Stocks Agreement**

- **Implies some empirical understanding of stock status, but:**

  - Phrased in terms of 'likelihood' therefore allows some scope for qualitative approaches which are probabilistic.

- **Can be scored using MSC's Risk Based Framework (RBF):**

- **Also allows proxies to be used in place of direct biomass indicators**

# What will assessors be looking for?

- Most recent stock assessment

- Any long term or strategic stock assessments, reviews, evaluations or benchmark assessments

- Any other proxy indicators of stock status

Although 1.1.1 is only scoring outcome status, assessors will also consider:

- the quantity and quality of information,

- the robustness and validity of the assessment

- The suitability of reference point.

*In the absence of the stock assessment, assessors may carry out RBF exercise with local stakeholders.*

# 1.1.1 Basic scoring theory
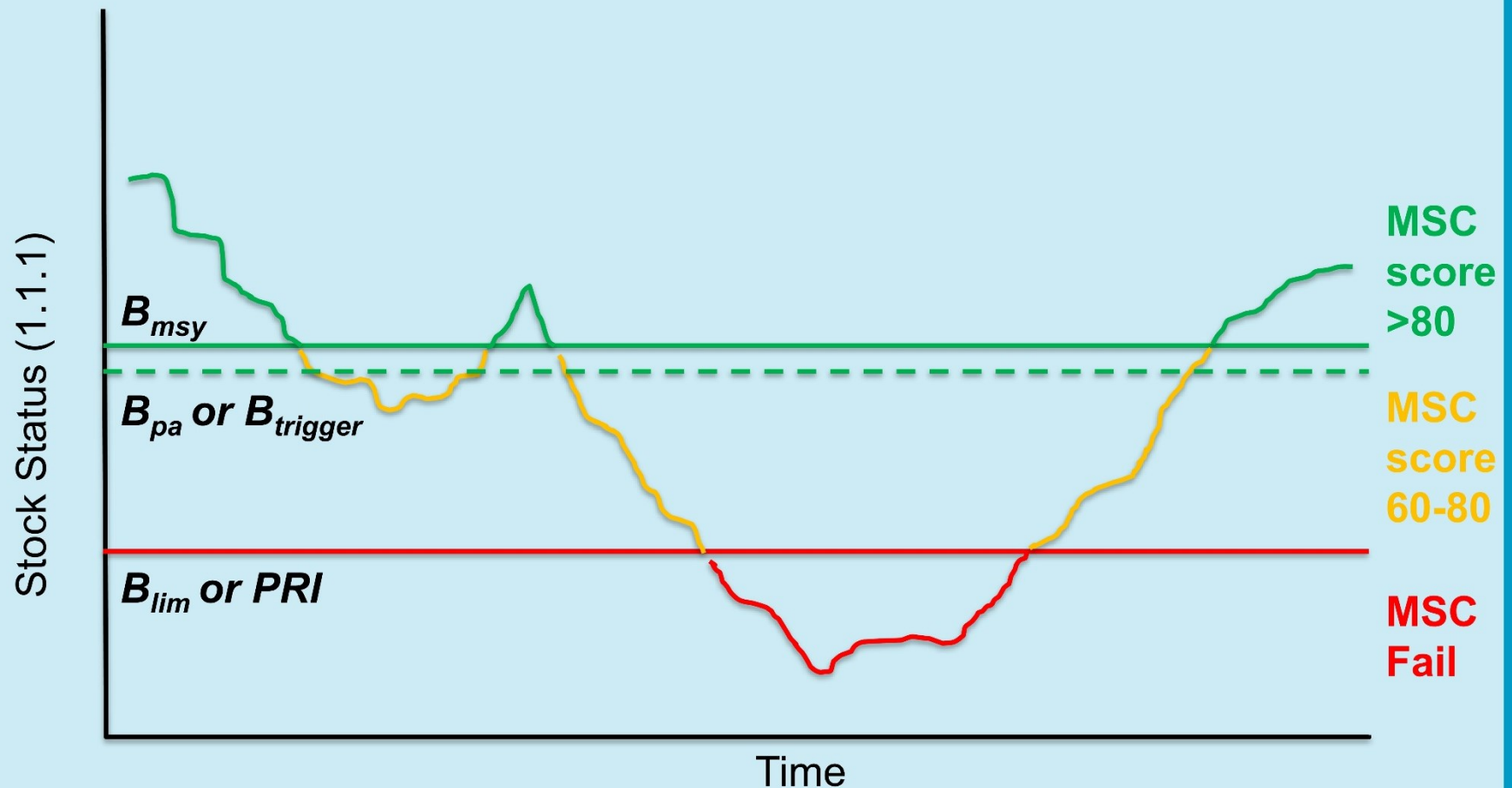
# Stock Status Relative to Recruitment Impairment

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (a) Stock status relative to recruitment impairment | It is **likely** that the stock is above the point where recruitment would be impaired (PRI). | It is **highly likely** that the stock is above the PRI. | There is a **high degree of certainty** that the stock is above the PRI. |

Best practice requires both good stock status (above PRI) and a high degree of certainty of that status (above 95th percentile)

## Stock Status Relative to Recruitment Impairment

**Mexico Baja California Red Rock Lobster (Certified 2011):**

- Biomass Dynamic Model Stock Assessment

- Current biomass ($B_{now}$) 1.5 times larger than biomass at MSY ($B_{MSY}$)

- $B_{now}$ has been fluctuating round $B_{MSY}$ for the last 5 years

- PRI not explicitly defined - level of recruitment not evaluated, nor included in the stock assessment model

- Previous stock assessments indicate that stock is above the point at which recruitment would be impaired

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- Previous stock assessments indicate that stock is above the point at which recruitment would be impaired

*Score: 80*

# 95% Confidence Limits
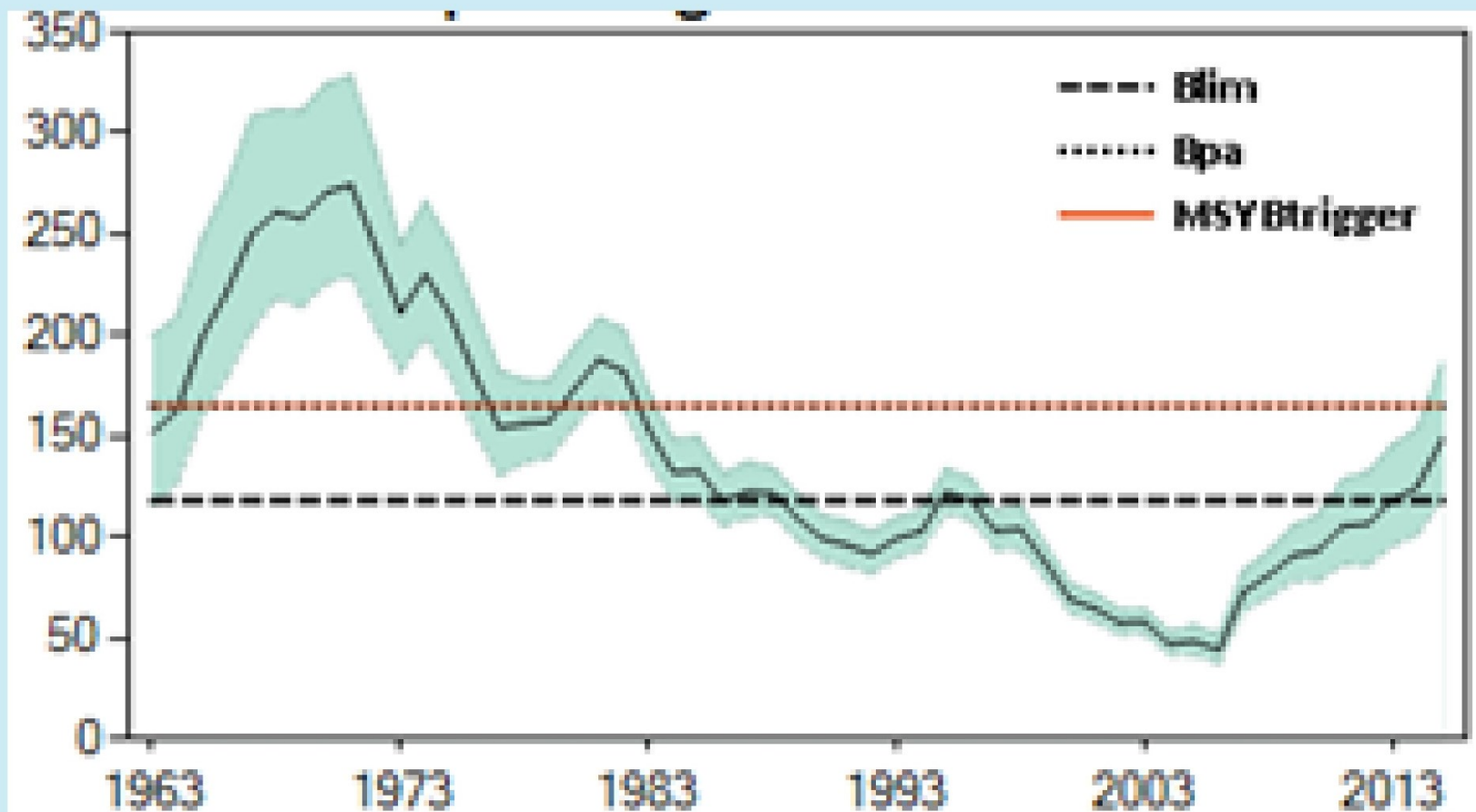
# Stock Status in relation to achievement of MSY

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (b) Stock status in relation to achievement of Maximum Sustainable Yield (MSY) | | The stock is at or fluctuating around a level consistent with MSY. | There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years. |

Best practice requires both good stock status (at or above MSY) and a high degree of certainty of that status (above 95th percentile)

## Example – Suriname Atlantic Seabob (Certified 2011)

- **Assessment assumes CPUE is a reasonable index of abundance / proxy for biomass.**

- **There is only a single assessment (no benchmarking) with a number of model assumptions and some data quality issues**

- **Target reference point set at just below 120% of $B_{msy}$**

- **Current biomass is estimated to be at 122% of $B_{msy}$**

- **Recent CPUE have been stable**

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- **Current biomass is estimated to be at 122% of $B_{msy}$**

- **Recent CPUE have been stable**



*Score: 80*

# Stock status considerations during a FIP?

- Has the stock boundary been considered / defined?

- Is there an up to date stock assessment which indicates relative to PRI / MSY? And what does this show?

- Can probability of stock status be determined?

- Are there any additional proxy indicators of stock status? And what do these show?

- In the absence of stock assessment, what does RBF indicate?

## Overall Challenges & Solutions

- **Biggest challenge may be biological:**

  - If stock below PRI, no substitute but to allow time (and apply management) for rebuilding. The fishery cannot (yet) pass.

  - Even if stock is above PRI but below MSY (i.e. would score 60-80) it may still be difficult to pass, depending on scoring elsewhere in P1.

- **Another challenge may be availability of a stock assessment, or even suitable time series data to serve as potential proxies**

  - Stock assessments may require significant resources and capacity.

  - Other appropriate and less data-intensive methods may be available and appropriate to the scale and intensity of the fishery.

- **Potential to use RBF – but this is inevitably more precautionary.**

Figure: Stock Status (1.1.1) versus Time, showing a biomass trajectory relative to reference points $B_{msy}$, $B_{pa}$ or $B_{trigger}$, and $B_{lim}$ or PRI. The red portion below $B_{lim}$ or PRI is labeled "Rebuilding Required."
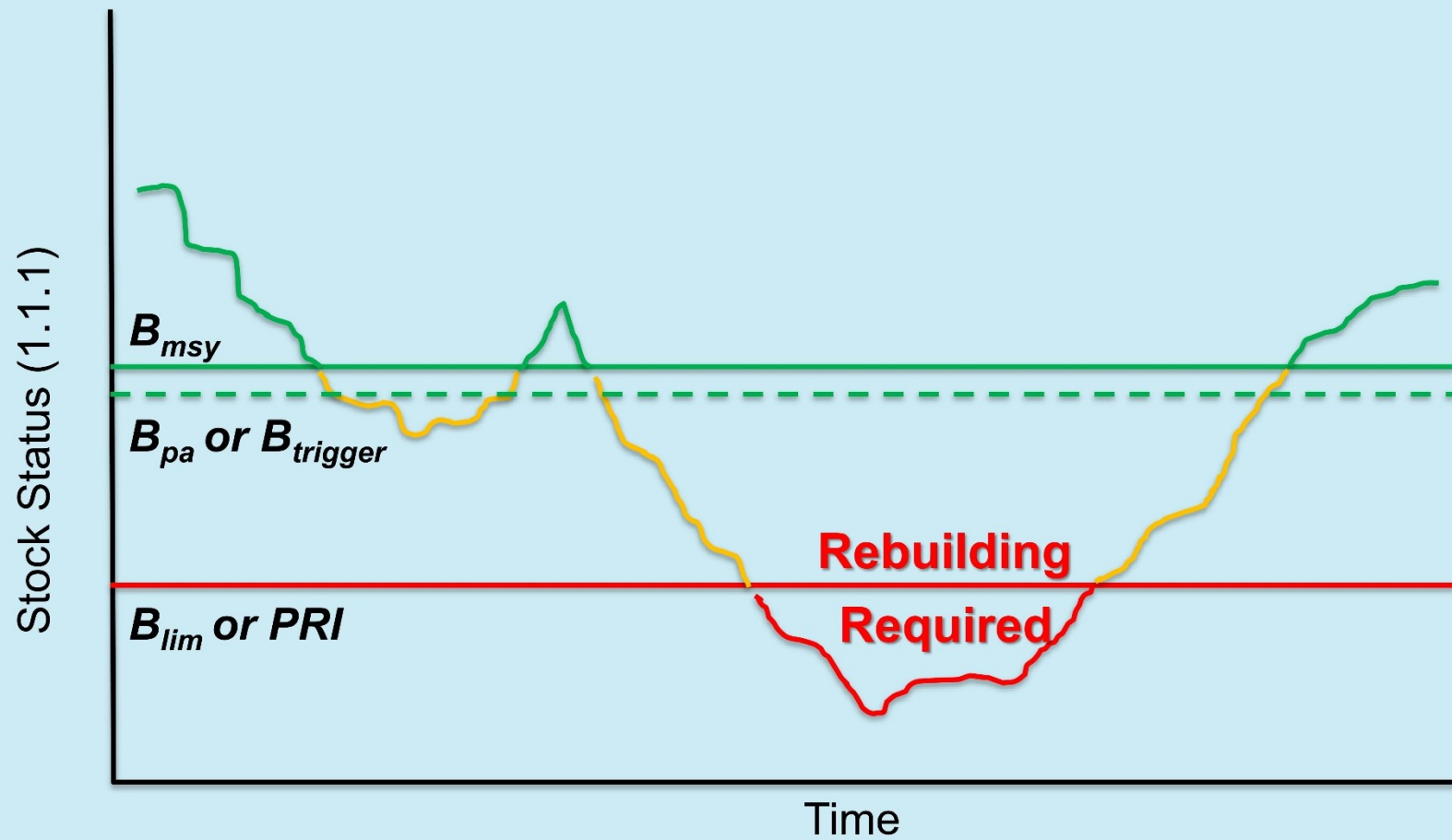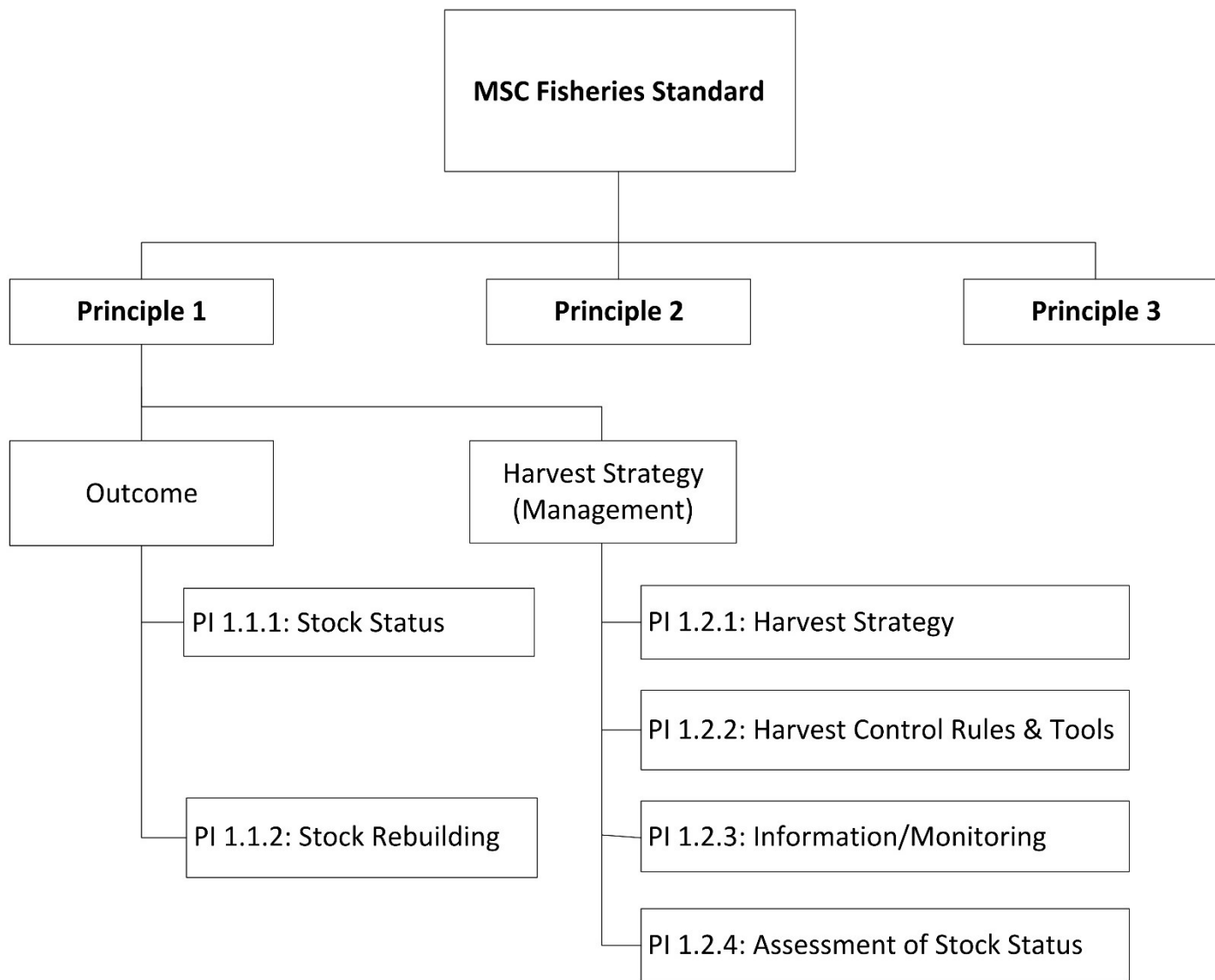
# Stock rebuilding

## Quick overview only:

- **Only applies where stocks fail to achieve 80 under PI (1.1.1) – i.e. when stock status is below B$_{msy}$ or equivalent target.**

- **Requires a rebuilding plan which details measures to be applied to ensure rapid rebuilding of stock**

  a) Scoring issue a scores the rebuilding timeframe – the shorter the better – within 1 stock generation

  b) Scoring Issue b requires that the plan has been evaluated and there is evidence that it is working.

**Harvest Strategy**

- ## What is a Harvest Strategy?

   *"combination of: monitoring, stock assessment, harvest control rules and management actions - required to bring about the sustainable management of the fishery".*

- ## Harvest strategies should be:

   Pragmatic (given economic and data limitations), cost effective, easy to understand to all stakeholders and adaptive.

- ## This PI has between 4 – 6 scoring issues

   - Design / Evaluation / Monitoring / Review

   - In certain cases - (Shark Finning) / (Review of Alternative measures)

# What will assessors be looking for?

- **Component parts of the harvest strategy – what are they and how do they function together?**

- **Key documents, including:**

  - Stock assessment report (since strategy implemented)

  - Fishery management plan

  - Fishery legislation and technical regulations

  - Past reviews and evaluations of the fishery or its management component parts

# Additional considerations in traditional / informal situations.

- What are the elements of a traditional / informal harvest strategy?

  - Do these work together?

  - Are they understood by all?

  - Is there a clear objective?

  - Is there a recognition of relative risk?

  - Is the management adaptive / responsive?

**The MSC standard allows for: Traditional & Informal Approaches (mainly in relation to management).**

- In P1 this applies to 1.2.1 & 1.2.2

- Recognises that management may be undocumented and uncodifed - but still be effective.

- Assessors need to look beyond documents / regulation etc....

- And use different stakeholder consultation methods to collect information, map approaches in use and evaluate the effectiveness of these.

Photo credit: MSC Stock library

# Harvest Strategy Design

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (a) Harvest strategy design | The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80. |

Best practice requires "responsiveness". Best practice also requires that the strategy is designed to suit the specific needs of the fishery and is linked to management objectives.

## Example – Sian Ka'an and Banco Chinchorro Biosphere Reserves spiny lobster (Certified 2012)

**The harvest strategy includes:**

- Access controls, seasonal and area closures, effort controls, gear restrictions, and size limits

- Good monitoring and control at the local scale through the fishing cooperatives (although federal monitoring and enforcement is considered to be less effective).

- All elements of harvest strategy have been examined and updated over time to meet the main management objective: maintain the reproductive stock and recruitment at levels close to maximum productivity.

- All the information available, including stock assessments, trends in relative abundance, and catch levels suggest that the harvest strategy is achieving stock management objectives.

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- All the information available, including stock assessments, trends in relative abundance, and catch levels suggest that the harvest strategy is achieving stock management objectives.

*Score: 80*

# Harvest Strategy Evaluation, Monitoring, Review

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (b) Harvest strategy evaluation | The harvest strategy is **likely** to work based on prior experience or plausible argument. | The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives. | The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. |
| (c) Harvest strategy monitoring | Monitoring is in place that is expected to determine whether the harvest strategy is working. | | |
| (d) Harvest strategy review | | | The harvest strategy is periodically reviewed and improved as necessary. |

## Example – a lobster trap fishery

**The harvest strategy is newly designed and implemented, therefore there is no direct evidence the strategy is working.**

**But……**

• the results seen in fisheries of similar size and scale managed by the same management body

• and on generic analyses of fisheries of this type reported by other researchers

**…….. the strategy should work.**

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• the results seen in fisheries of similar size and scale managed by the same management body

• and on generic analyses of fisheries of this type reported by other researchers

**…….. the strategy should work.**

*Score: 60*

Photo credit: MSC Stock library

# Review of Alternative Measures

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| **(f) Review of alternative measures** | There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock. | There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate. | There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate. |

(***Only applies if fishery has unwanted catches of target species – biological / economic / regulatory etc***).

• Alternative measures should be regularly reviewed.

• And implemented, as appropriate.

## Example – Tropical Sole Gillnet

- A fishery managed by quota with minimum landing size.

- So potential for unwanted catches below MLS or after annual quota allocation is finished.

- Mesh size has gradually increased in response to increased MLS (although some perceive this has lead to loss of marketable fish).

- Management has also given some consideration to whether allocating quota to vessels individually may enable them to plan their fishing opportunity spread over a year.

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- Management has also given some consideration to whether allocating quota to vessels individually may enable them to plan their fishing opportunity spread over a year.

*Score: 60*

# Key harvest strategy considerations during a FIP?

- What is the harvest strategy – are all the component parts in place?

- Does the stock assessment / scientific advice provide advice on overall management controls?

- Is there a management plan which sets objectives and outlines how these will be achieved across all component parts of the harvest strategy.

- Is there evidence strategy is working or should work?

- If the target species is shark – has consideration been given to shark finning requirements?

- If the target species is sometimes unwanted, have alternative measures been reviewed?

# Overall Challenges & Solutions

- **Needs holistic management oversight:**

  - Understanding of stock boundaries / jurisdiction overlap

  - Plus all component parts: monitoring, stock assessment, HCRs, management actions

  - Understanding of relative merits of different control approaches & tools

- **Likely to require good cooperation between agencies.**

- **Needs a culture of monitoring and review to enable responsive / <u>adaptive management</u> – this may require on-going investment.**

- **If component parts of management strategy are in place – developing appropriate oversight need not be expensive.**

## Example Actions

**Step 1**
- Identify components of **existing harvest strategy** & **review** how these contribute to management of the stock
- Detail how overall strategy performance is **monitored & evaluated**.
- **Determine gaps** strategy

**Step 2**
- Develop or refine strategy – with appropriate engagement / expertise
- Increase monitoring & periodic review to demonstrate effectiveness of strategy (simulation testing).
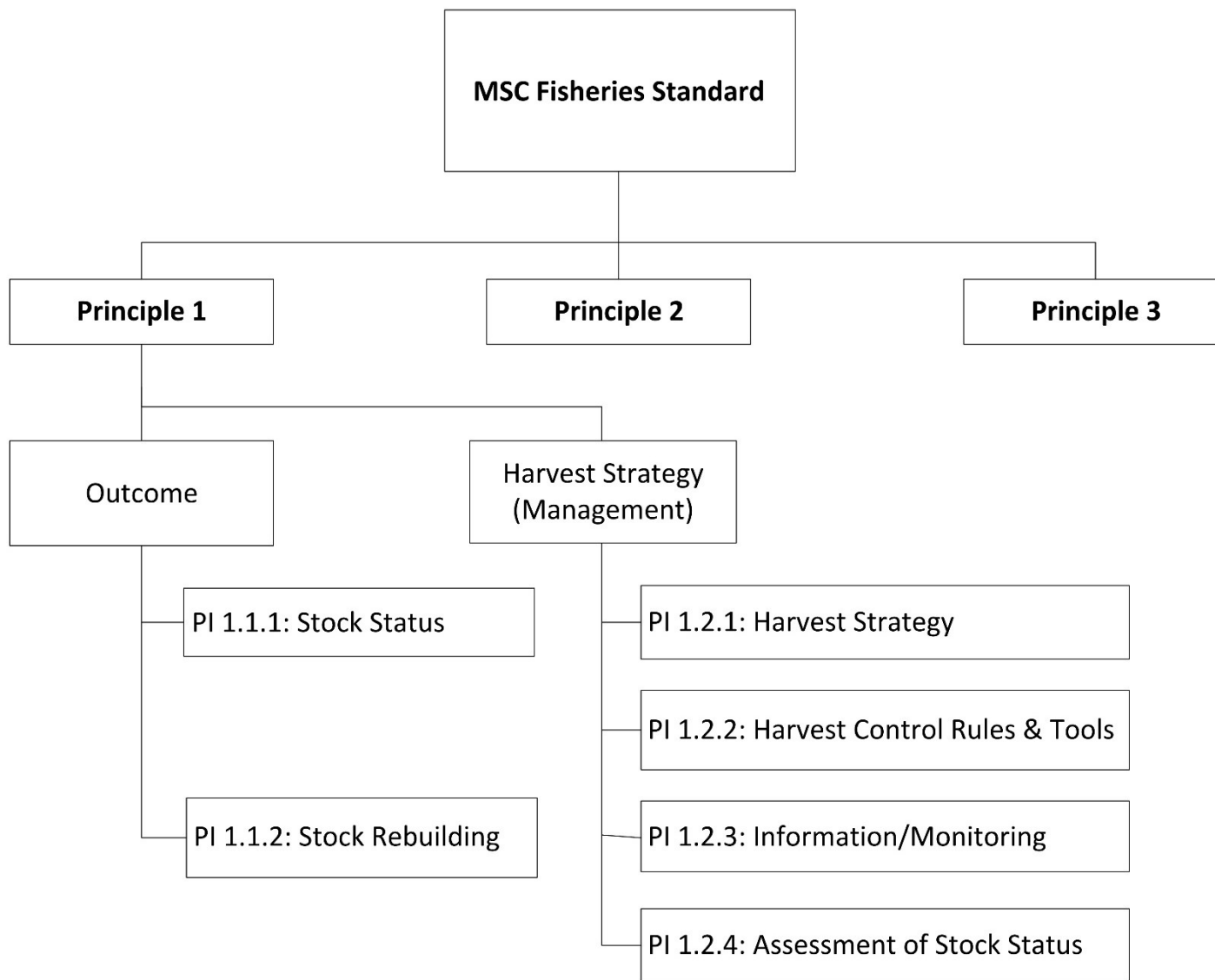- Address shark finning / alternative measures as required.

**Step 3**
- Undertake **consultation** on proposals
- **Implement** / enact component parts of management strategy
- Ensure appropriate **staff / resources**

**Step 4**
- Follow timetable of **review and evaluation**
- Implement changes based upon results of evaluation / review.

## What is an HCR?

- A **set of pre-agreed rules** used to determine a management action in response to changes in indicators of stock status with respect to defined tripper reference points

- Define circumstances that will lead to management responses

- *If the stock falls to 'x', then the management will do 'y'*

## What are 'Tools' in the context of HCRs?

- Actions taken to achieve desired exploitation rates i.e. management measures – such as:

  - Quota, fishing effort restrictions, spatial restrictions, tech measures etc.

# *Pre-agreed* "if & then" rules
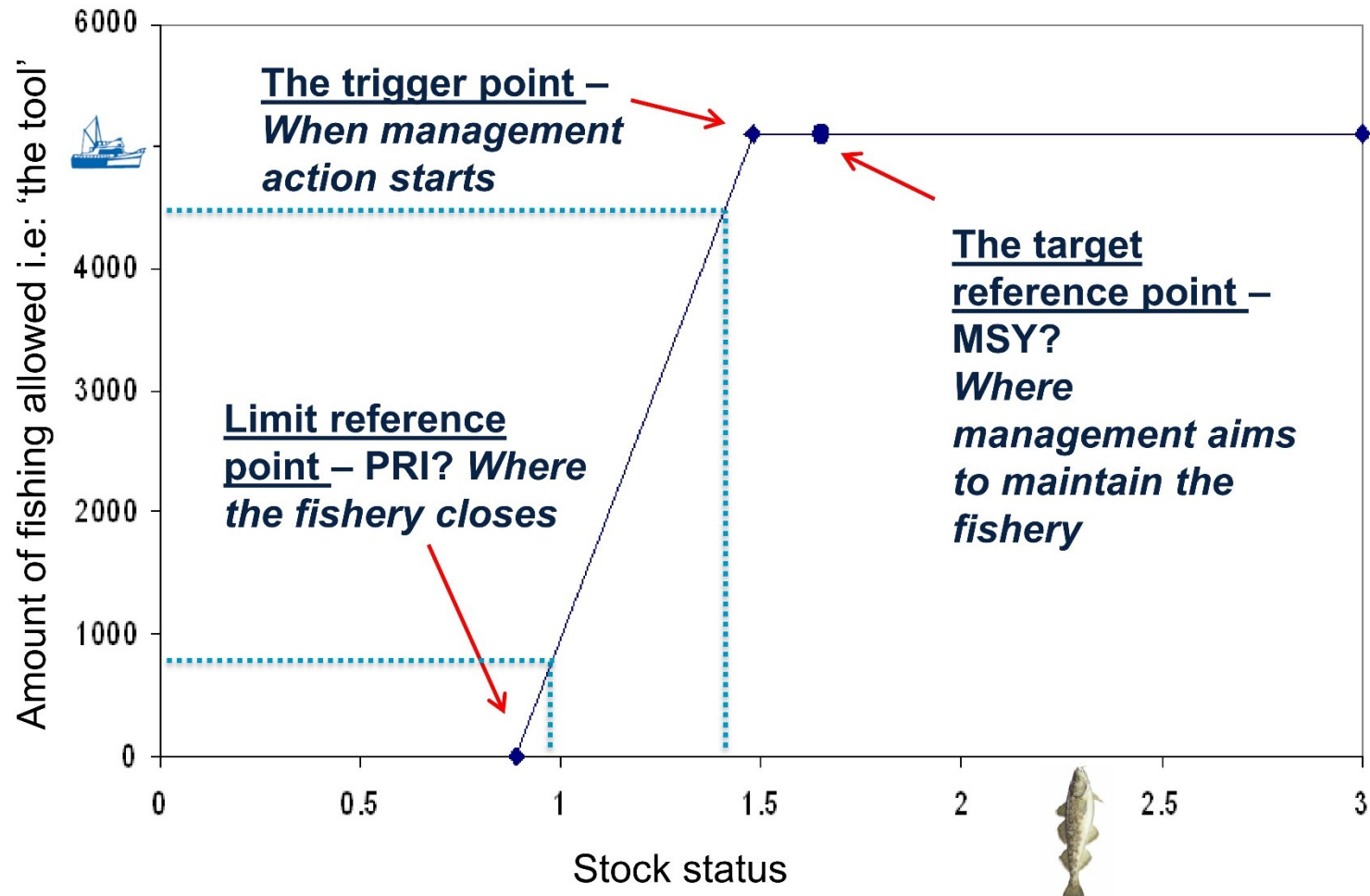
# Another HCR control mechanism

# Harvest Control Rules (HCR) & Tools

- **Assesses if a fishery has defined & effective HCRs in place which:**

- Describe the **management response** to different stock circumstances

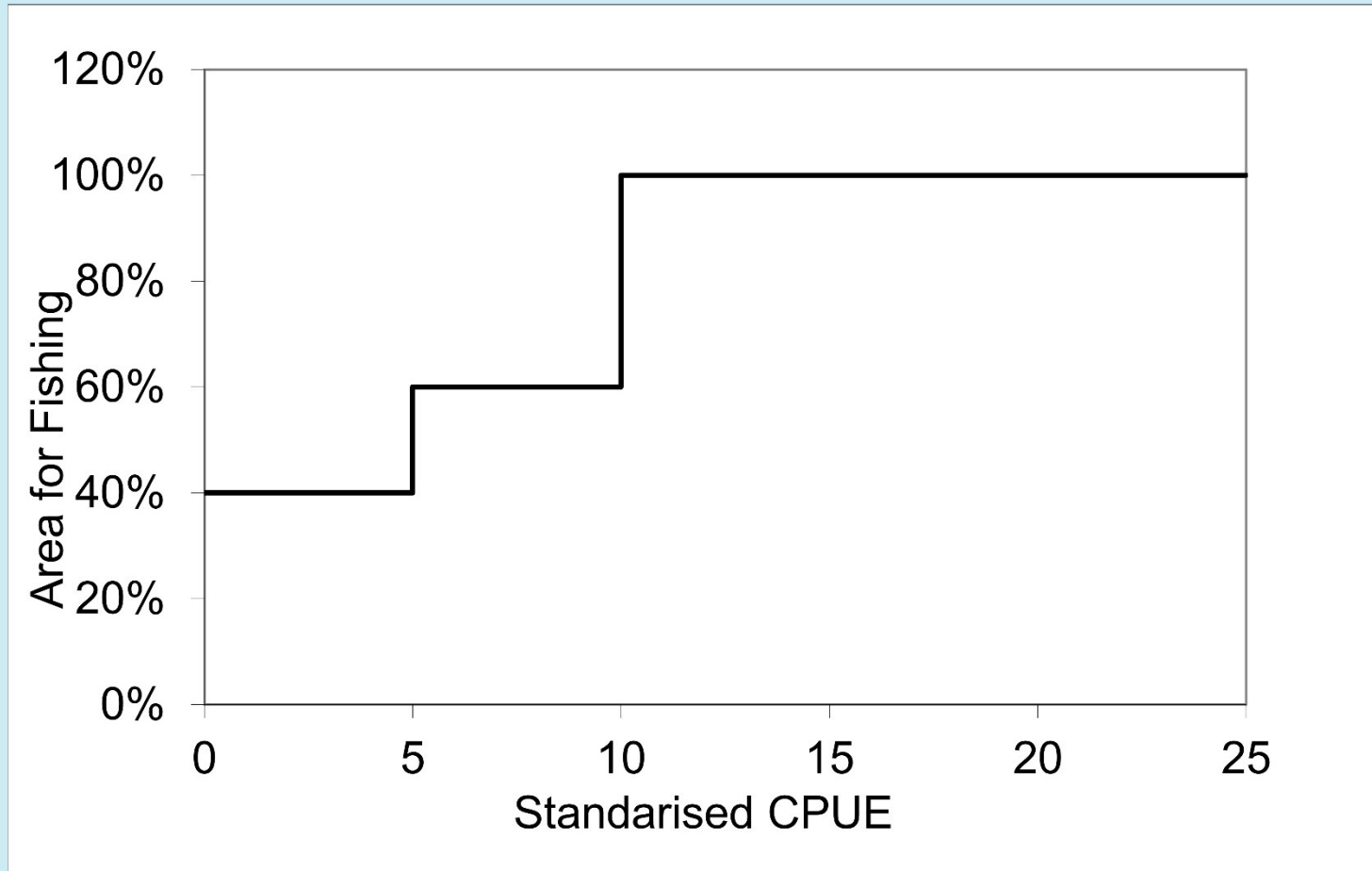- Aim to achieve medium to long term target reference point and avoid limit reference point

- Are based on plausible hypothesis of stock dynamics & compatible with target species biology

- Are **reasonable and practical** in the context of the fishery

- Are economically sound and compliant with national & international regulations & agreements

- Recognise wider ecosystem functionality (inc Low Trophic Level species).

- **Enable transparent, predictable and precautionary decision making**.

# HCR Design & Application

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| **(a) HCRs design and application** | **Generally understood** HCRs are in place **or available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached. | **Well defined** HCRs are **in place** that **ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock **fluctuating around** a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. | The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, **most** of the time. |

Best practice requires that an HCR that aims to keep the stock above MSY is in place and takes account of the ecological role of the species.

**An HCR is in place is in the Management Plan which:**

- Is well-defined and consistent with the agreed harvest strategy

- Aims to maintain the seabob stock at or above the MSY level.

- Has trigger point set at $B_{MSY}$, which is intended to propel management to implement corrective action (through limiting days at sea) so as to maintain the fishery safely above the limit reference point and move it again towards the target point that is slightly above $B_{MSY}$.

## Example – Suriname Atlantic seabob shrimp (Certified 2011):

**An HCR is in place is in the Management Plan which:**

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Photo credit: T. Southall

*Score: 80*

# HCR Robustness to uncertainty

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (b) HCRs robustness to uncertainty | | The HCRs are likely to be robust to the main uncertainties. | The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties. |

- Best practice requires that the HCR is shown to be robust to a wide range of uncertainties (i.e. through simulation testing).

## Example – a tuna pole and line fishery

- **Although there are no well-defined HCRs in place, tools to control the rate of exploitation are in place. These include:**

  - quota restriction

  - supporting measures such as licencing and logbooks.

- **This has been effective in controlling exploitation in other fisheries so should also be appropriate for the application of the new HCR.**

- **The status of the stock provides some evidence that the approach used is controlling stock levels.**

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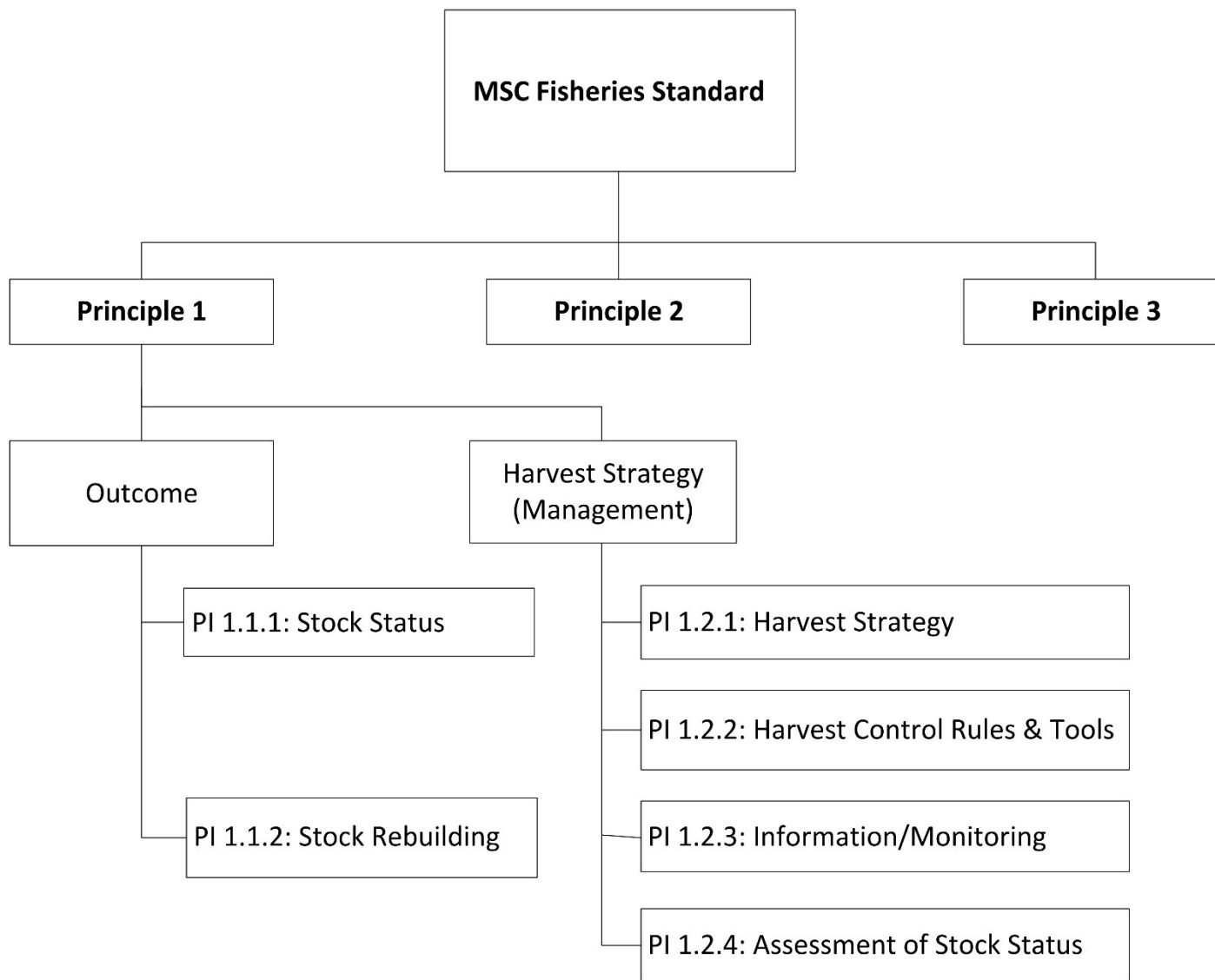
*Score: 60*

# Key HCR considerations during a FIP?

- Is there a binding HCR agreed and implemented?

- Or are there any more informal / generally understood HCRs in place? Or examples from other fisheries under the same jurisdiction?

- Does the target reference point take account of the wider ecology (i.e. predator – prey interactions)?

- Was simulation testing carried out to test its robustness to uncertainties and show the HCR will work?

- Are the tools for limiting exploitation rate already in use? Are they appropriate? Will they achieve the desired outcome?

- Is F currently less than FMSY?
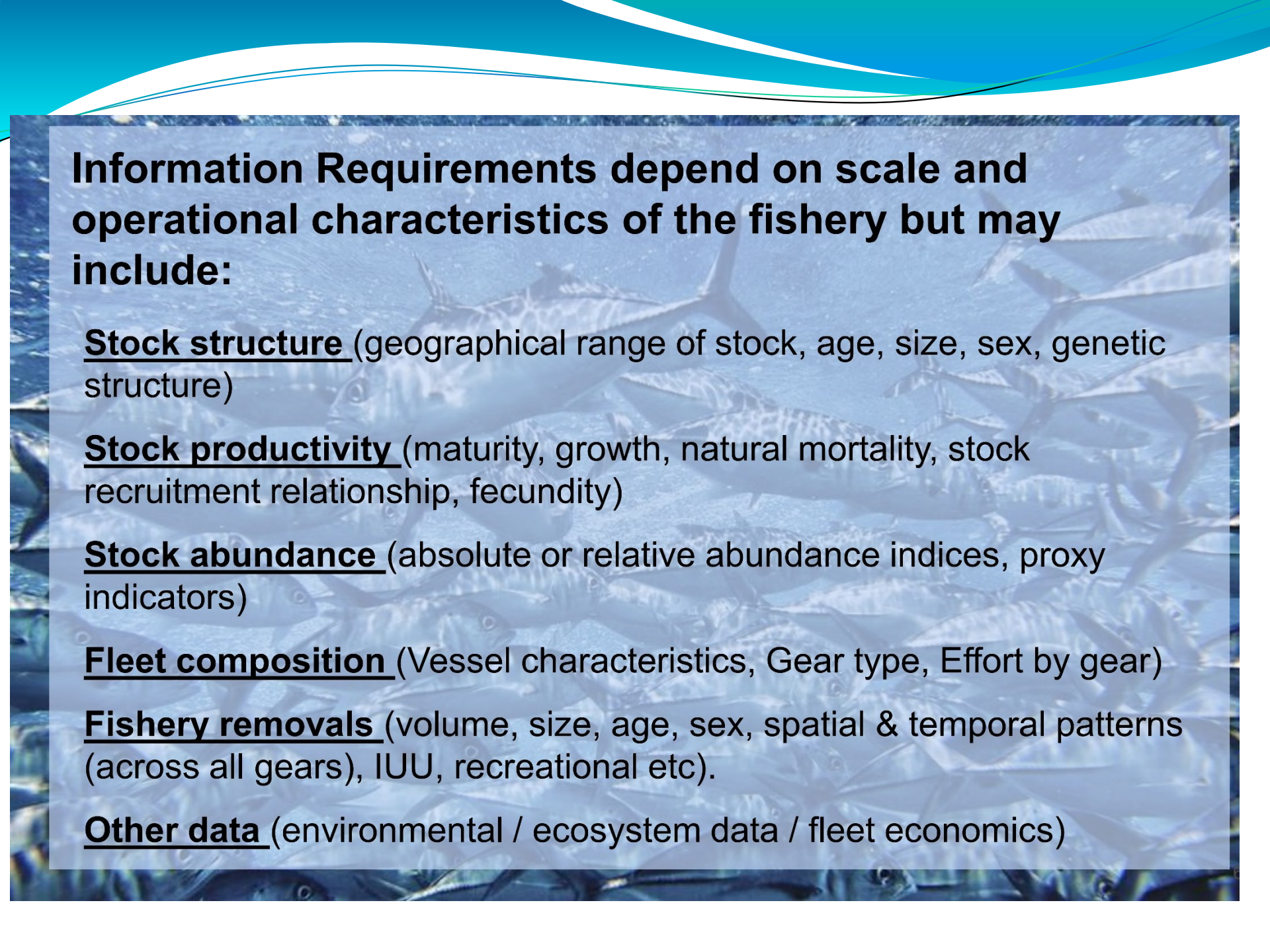
**Overall Challenges & Solutions**

- HCR implies need for a quantitative stock assessment & reference points

  - *Which requires empirical data and technical capacity.*

- **But HCRs can be based on more simple rules and monitored by appropriate indicators**

- Monitoring and testing are likely to require economic and technical resources.

- **A good HCR should include participatory development and consultation between fishers and managers.**

- If HCR requires significant and unpopular reduction in exploitation, it may require appropriate investment in enforcement capacity

## Information & Monitoring

- **Good information is the foundation of adaptive management**

- Management requires **sufficient / adequate** relevant information to support the harvest strategy.

- **For example information is required to:**

  - Undertake stock assessment

  - Inform design of harvest strategy and effective HCR

  - Operate HCRs

- **Monitoring provides:**

  - Operational intellect for evidence based decisions.

  - Detection of trends

  - Baseline to understand future performance

**Information Requirements depend on scale and operational characteristics of the fishery but may include:**

**Stock structure** (geographical range of stock, age, size, sex, genetic structure)

**Stock productivity** (maturity, growth, natural mortality, stock recruitment relationship, fecundity)

**Stock abundance** (absolute or relative abundance indices, proxy indicators)

**Fleet composition** (Vessel characteristics, Gear type, Effort by gear)

**Fishery removals** (volume, size, age, sex, spatial & temporal patterns (across all gears), IUU, recreational etc).
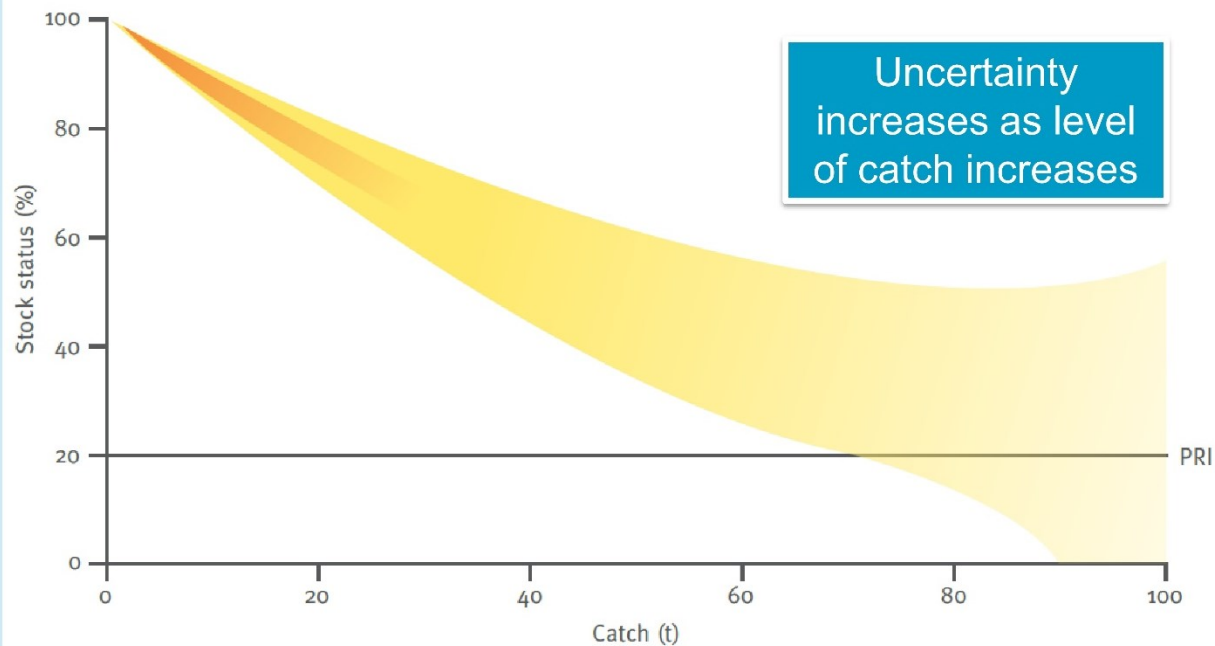
**Other data** (environmental / ecosystem data / fleet economics)

# Catch v Stock Status



More knowledge = tighter probability = greater confidence
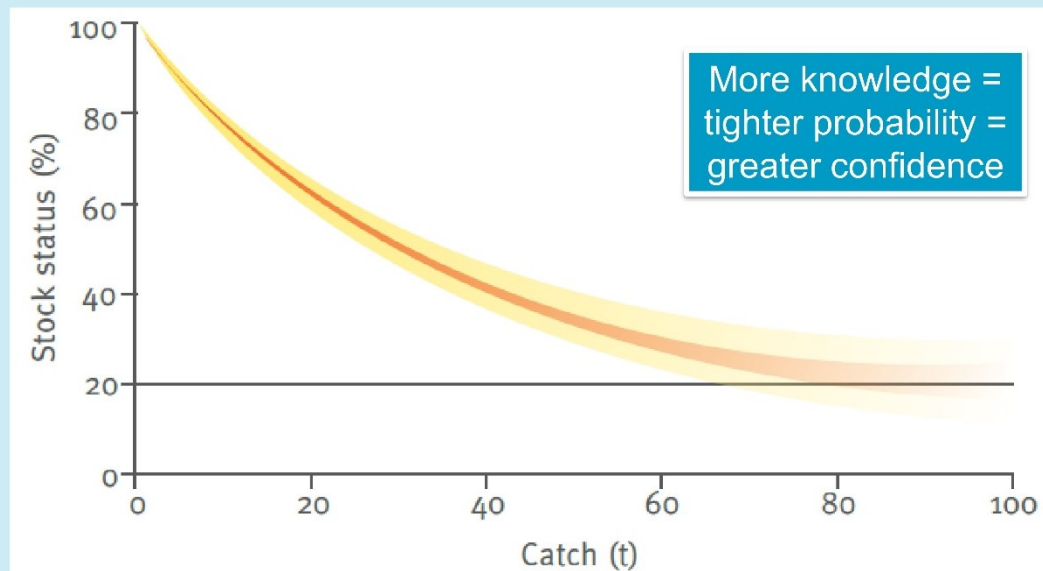
**What will assessors be looking for?**

- Stock assessments / benchmark assessments which should discuss data availability

- Details of monitoring and data collection requirements in the management plan (or other legislation) – what is collected by who?

- Other sources of data – observer programmes, dedicated research?

- Evaluation of data collection and monitoring programmes

- Evidence of "other fishery removals" being monitored and included in assessment.



Uncertainty increases as level of catch increases

# Range of Information

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (a) Range of information | **Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. | **Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. | A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly relevant to the current harvest strategy, is available. |

Best practice requires more comprehensive range of information, including stock abundance, fishery removals & environmental data.

# Example – Maldives Pole & Line Skipjack tuna (Certified 2

**Information collected includes:**

- stock structure (age, size and sex),

- stock productivity,

- growth curves

- fleet composition

- tagging data

- catch data

- size frequency data

**However, some limitations to the data available:**

- e.g. effect of environmental variability on the stock.

*Score:*

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**However, some limitations to the data available:**

- e.g. effect of environmental variability on the stock.

*Score: 80*

# Monitoring & comprehensiveness

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| **(b) Monitoring** | Stock abundance and UoA removals are monitored and **at least one indicator** is available and monitored with sufficient frequency to support the harvest control rule. | Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule,** and **one or more indicators** are available and monitored with sufficient frequency to support the harvest control rule. | **All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty. |

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| **(c) Comprehen-siveness of information** | | There is good information on all other fishery removals from the stock. | |

## Example – Faroe Islands queen scallop (Certified 2013):

**Authorities require skippers to:**
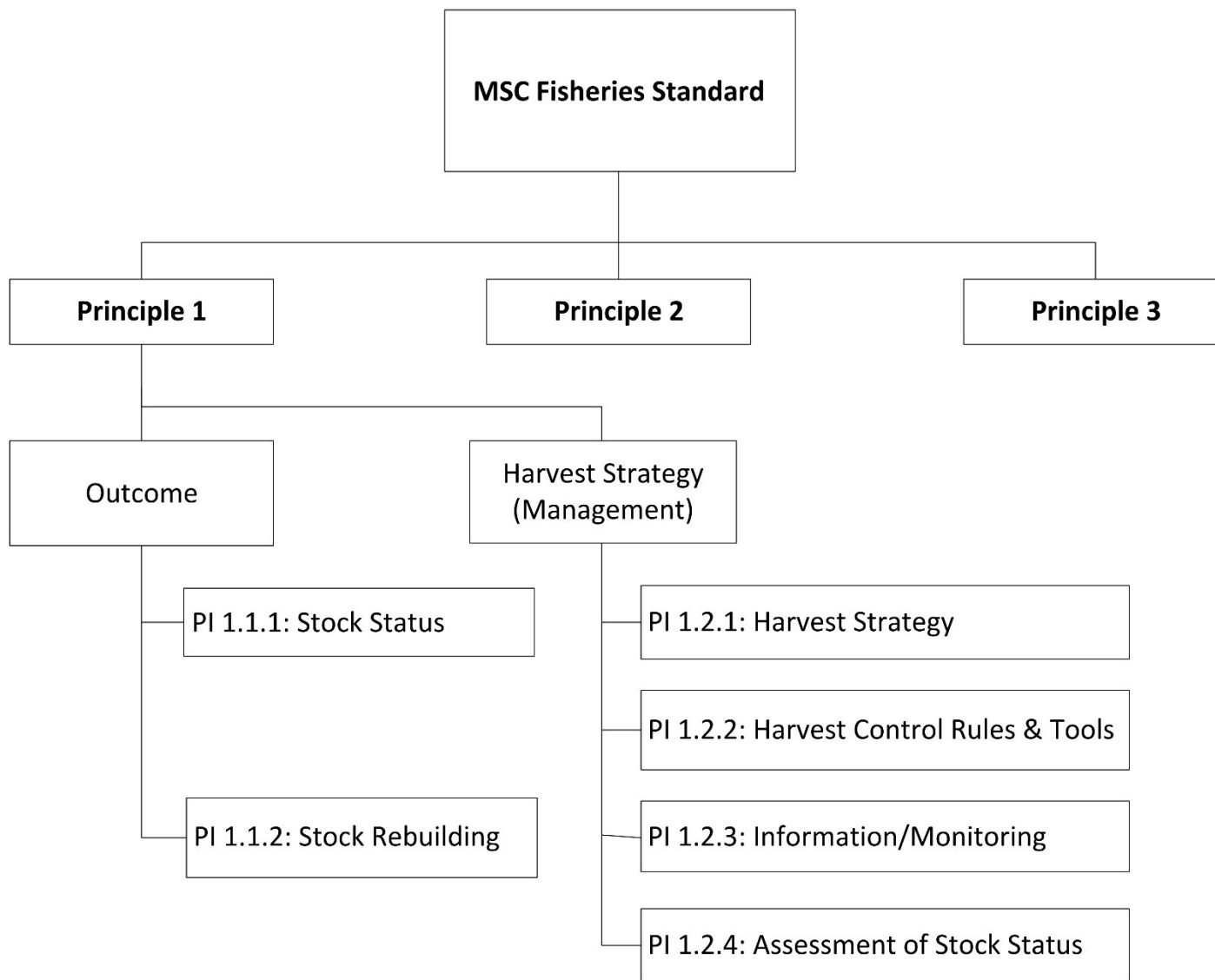
maintain log books (date, fishing location and catch).

**Data on CPUE (or any other abundance proxy):**

- Is not actively monitored by the authorities (although data theoretically available)

- Was monitored for an experimental northern fishery for 1 season

- Monitored by fishermen who apply informal 'move on' rule (based on kg/hour) when a local scallop bed shows signs of depletion.

**VMS data available to monitor areas fished, including closed areas.**

**Example – Faroe Islands queen scallop (Certified 2013):**

**Authorities require skippers to:**

maintain log books (date, fishing location and catch).

**Data on CPUE (or any other abundance proxy):**

- Is not actively monitored by the authorities (although data theoretically available)

- Was monitored for an experimental northern fishery for 1 season

- Monitored by fishermen who apply informal 'move on' rule (based on kg/hour) when a local scallop bed shows signs of depletion.

**VMS data available to monitor areas fished, including closed areas.**



*Score: 60*

## Assessment of Stock Status

- Examines the *appropriateness and adequacy* of stock assessment and review mechanisms.

- Does not necessarily require highly sophisticated, complex, expense and data hungry assessments.

  - A wide range of methods are available requiring different levels of data

- But does require a reliable understanding of stock status trends relative to (either analytical or empirical) reference point.

- And consideration of uncertainty, and appropriate (peer) review and evaluation.

- 5 Scoring issues.

    **Where RBF is used to score stock status – this PI scored @ 80.**

# What will assessors be looking for?

- Not just the stock assessment report.

- But also:

  - Background documents (benchmarking assessment)

  - Evaluations of the assessment (peer review etc).

- The assessment team will typically seek to speak with scientists involved in the stock assessment.

# Assessment Appropriateness and Approach

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (a) Appropri-ateness of assessment to stock under consideration | | The assessment is appropriate for the stock and for the harvest control rule. | The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA. |

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (b) Assessment approach | The assessment estimates stock status relative to generic reference points appropriate to the species category. | The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated. | |

## Example - Gulf of California, Mexico – sardine (Certified 2011):

- **Spawning stock biomass and recruitment are assessed systematically using a stochastic age structured model with density-dependent recruitment.**

- **This is appropriate for the stock, taking into consideration its biology and the possible SSB-R relationship.**

- **However, a published review stated about this model:**

    "The model matched the observed catch trends fairly well. Recognition that environmental factors impact recruitment is included in the model, which also considers possible uncertainties. However, potential trends in life history characteristics and natural mortality rates are not included".

- **Given the above, it is recommended that MSY reference point calculated from this model should be treated with caution.**

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*Score: 60*

# Uncertainty, evaluation & review of the assessment

| Scoring issue | SG60 | SG80 | SG100 |
|---|---|---|---|
| (c) Uncertainty in the assessment | The assessment **identifies major sources** of uncertainty. | The assessment **takes uncertainty into account**. | The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way. |
| (d) Evaluation of assessment | | | The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. |
| (e) Peer review of assessment | | The assessment of stock status is subject to peer review. | The assessment has been **internally and externally** peer reviewed. |

## Example – Argentine Anchovy (Certified 2011):

**There is a stock assessment.**

**The main uncertainties are:**

- The recruitment variability

- Previous years numbers at age



**These uncertainties are taken into account in the future projection.**

**However, the assessment stops short of evaluating stock status relative to reference points in a probabilistic way.**

## Example – Argentine Anchovy (Certified 2011):

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The main uncertainties are:

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These uncertainties are taken into account in the future projection.

However, the assessment stops short of evaluating stock status relative to reference points in a probabilistic way.

*Score: 80*

## Overall Challenges & Solutions

- Requires **funding and technical expertise**

- Sometimes funding and outside expertise is available for occasional stock assessment exercises, which provide a useful snapshot but do not enable on-going informed adaptive management.

- Less understanding / awareness of **simpler, more cost-effective methodologies** (i.e. data limited).

- Even with simpler methods, still need access to robust time series data.

- Even data limited methods require some technical capacity, funding and management buy-in.

Example of Regional Ecolabelling

PRIZEFISH project
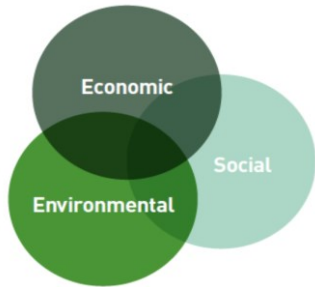
**"Work Package 3"** (*WP3: Piloting of sustainable and eco-certified fishery productions* **)**, il

**PROGRAMMA ARFM**
**(Adriatic Responsible Fisheries Management)**

FAO guidelines

Other ecolabelling (Alaska RFM)

Stakeholder consultatio
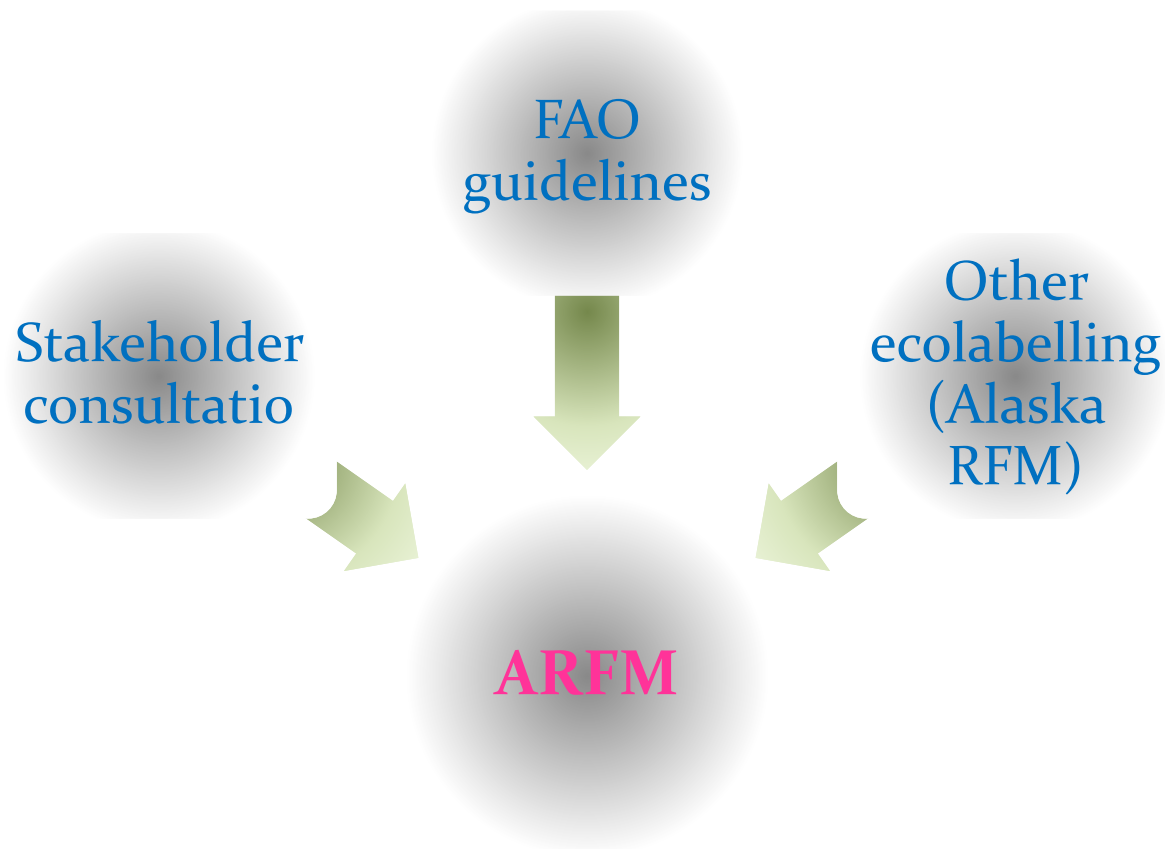
**ARFM**

# ADRIATIC RESPONSIBLE FISHERIES MANAGEMENT (ARFM)

- Simple

- Responsible rather than Sustainable

- 3 dimension
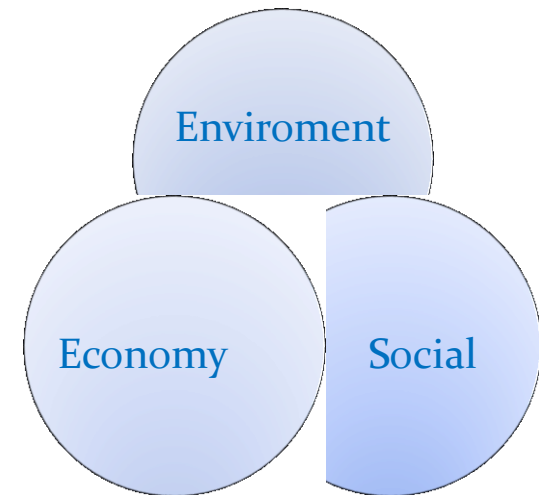


**D3.2.3: Sustainability guidelines**

# STANDARDS

| PILLARS | Supporting Articles (SA) | Specific Indicators (SI) |
|---|---|---|
| GOVERNANCE (1) | 1.1. There shall be a structured and legally mandated management system based upon and respecting international, national, and local fishery laws, for the responsible utilization of the target stock and conservation of the marine environment. | **1.1.1. Legislation** <br><br> **1.1.2. Cooperation** |
| | 1.2. A clear decision-making process is part of the management system to achieve the objectives foreseen by international, national, and local fishery laws and has an appropriate approach to avoid conflicts. | **1.2.1. Environmental policies** <br><br> **1.2.2. Management plan or a set of management measures** |
| ENVRIONMENT (2) | 2.1. There shall be an effective fishery data (dependent and independent) collection and analysis system for stock management purposes. | **2.1.1. Data collection/ Statistics** |
| | 2.2. To support its optimum utilization, there shall be regular stock assessment activities appropriate for the fishery resource—its range, the species biology, and the ecosystem—all undertaken in accordance with acknowledged scientific standards. | **2.2.1. Institutional framework** <br><br> **2.2.2. Data limited approach** |
| | 2.3. Management actions and measures for the conservation of stock and the aquatic environment shall be based on the precautionary approach. Where information is deficient, a suitable method using risk assessment shall be adopted to take into account uncertainty. | **2.3.1. Precautionary approach** <br><br> **2.3.2. Absence of information** |
| | 2.4. Considerations of fishery interactions and their effects on the ecosystem shall be based on best available science, local knowledge where it can be objectively verified, and a risk-based management approach to determine the most probable adverse impacts. Adverse impacts on the fishery on the ecosystem shall be appropriately assessed and effectively addressed. | **2.4.1 Ecosystem impacts** <br><br> **2.4.2. Food web** |
| SOCIO-ECONOMIC (3) | 3.1. The economic, social, and cultural value of resources (e.g. where a fishery is based on local traditions) shall be assessed in order to assist decision making on their use. | **3.1.1. Economic conditions** |
| | 3.2. Excess fishing capacity shall be avoided and exploitation of the stocks shall remain economically viable. | **3.2.1. Capacity indicators** |
| | 3.3. The fishery activity shall work in full compliance with international laws on labour and human rights. | **3.3.1. Human rights and safety on board** |

# Double level of evaluation
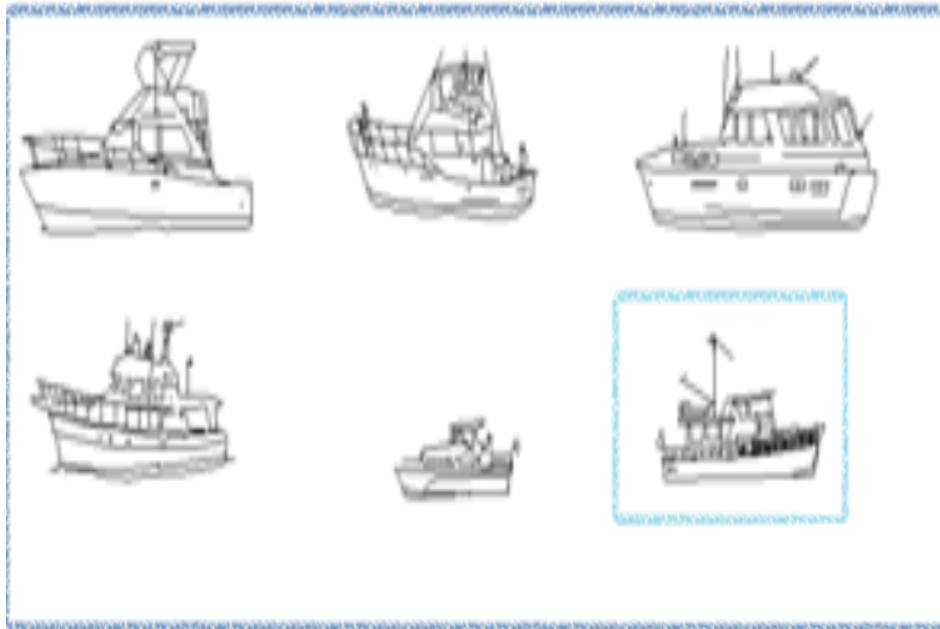


Component of Evaluation, CoE)

Component of Accreditation, CoA

# Specific indicators

**GOVERNANCE**

- **1.1.1. Legislation:** quadro giuridico della *fishery* a livello UE e internazionale/applicazione delle norme da parte del singolo operatore;
- **1.1.2. Cooperation:** meccanismi di cooperazione a livello UE e internazionale per la gestione degli stock;
- **1.2.1. Environmental policies**: legislazione in materia ambientale in grado di garantire approccio ecosistemico;
- **1.2.2. Management plan or a set of management measures:** piani di gestione pluriennali ovvero altre misure per la gestione delle attività di pesca.

# Specific indicators

**ENVIRONMENT**

- **2.1.1. Data collection and statistics:** misure per la raccolta dati**;**
- **2.1.2. Institutional framework:** ricerca scientifica**;**
- **2.2.2. Data limited approach:** applicazione approccio precauzionale alla piccola pesca;
- **2.3.1. Precautionary approach:** approccio precauzionale nella valutazione degli stocks;
- **2.3.2. Absence of information:** misure/inziative/progetti per far fronte a *knowledge gaps*;
- **2.4.1. Ecosystem impacts:** misure di mitigazione ed effettività dell'applicazione dell'approccio ecosistemico;
- **2.4.2. Food web:** modello per l'analisi delle reti trofiche marine.

**2.4.1 Ecosystem impacts**
**The most probable adverse impacts of fishery on the ecosystem/environment, shall be assessed and,** where appropriate, addressed and/or corrected, taking into account available scientific information. This may take the form of an immediate management response or a further analysis of the identified risk. In the absence of specific information on the ecosystem impacts of fishery under assessment, generic evidence based on similar fishery situations can be used for fisheries with low risk of severe adverse impact. However, the greater the risk, the more specific evidence shall be necessary to ascertain the adequacy of mitigation measures.
FAO Eco (2009) 30.4, 31, 31.4
 FAO Eco (2011) 41.4

**2.4.2 Food web**
**The role of the stock under consideration in the food web shall be considered**, and if it is a key prey species in the ecosystem, management objectives and measures shall be in place to avoid severe adverse impacts on dependent preys and predators.
FAO Eco (2009) 31.2
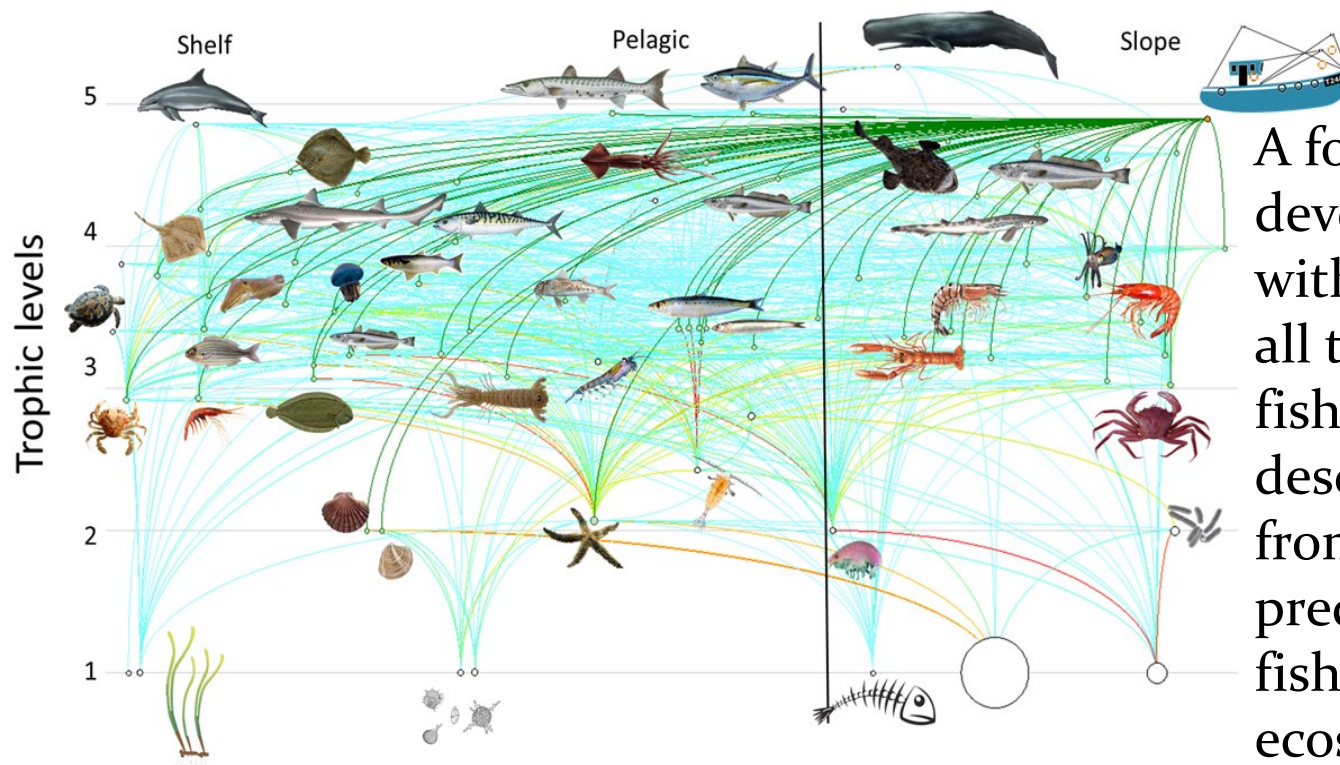
A food web model developed with Ecopath with Ecosim integrating all the ecological and fisheries information for describing the ecosystem from plankton to top predators, and placing fisheries in the ecosystem.

The GSA 17-18 are represented with 75 functional groups and 34 fleets (explicitly described)

**OGS**

- *PLANKTON*: Copernicus Marine Monitoring System;
- *DEMERSAL SPECIES*: trawl surveys (Medits; Solemon);
- *TARGET SPECIES*: Stock assessments (from SAC GFCM assessments); OBIS datasets;
- *LANDINGS DATA*: EUMOFA, FDI data sets, JRC datasets, FishstatJ, Mably, other data;
- *EFFORT*: VMS analysis, Fleet register, FDI data
- *DISCARDS*: Past projects and other collected data;
- *ECOLOGICAL PARAMETERS*: Empirical relations, FishBase, SeaLifeBase...
- Many others.....

The accuracy and realism of the model are guaranteed by a fitting with data 2004-2018 and by comparison with ancillary data.
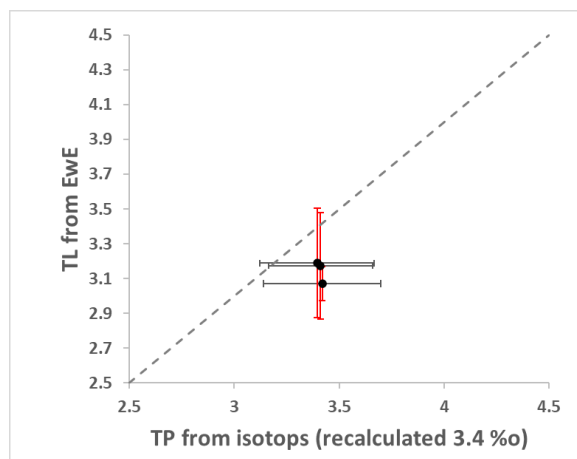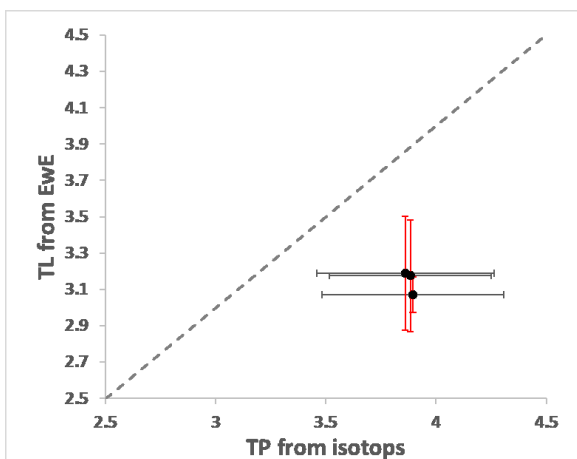


Example: the trophic position by the model and by stable isotopes (courtesy E. Fanelli, UNIVPM)

OGS
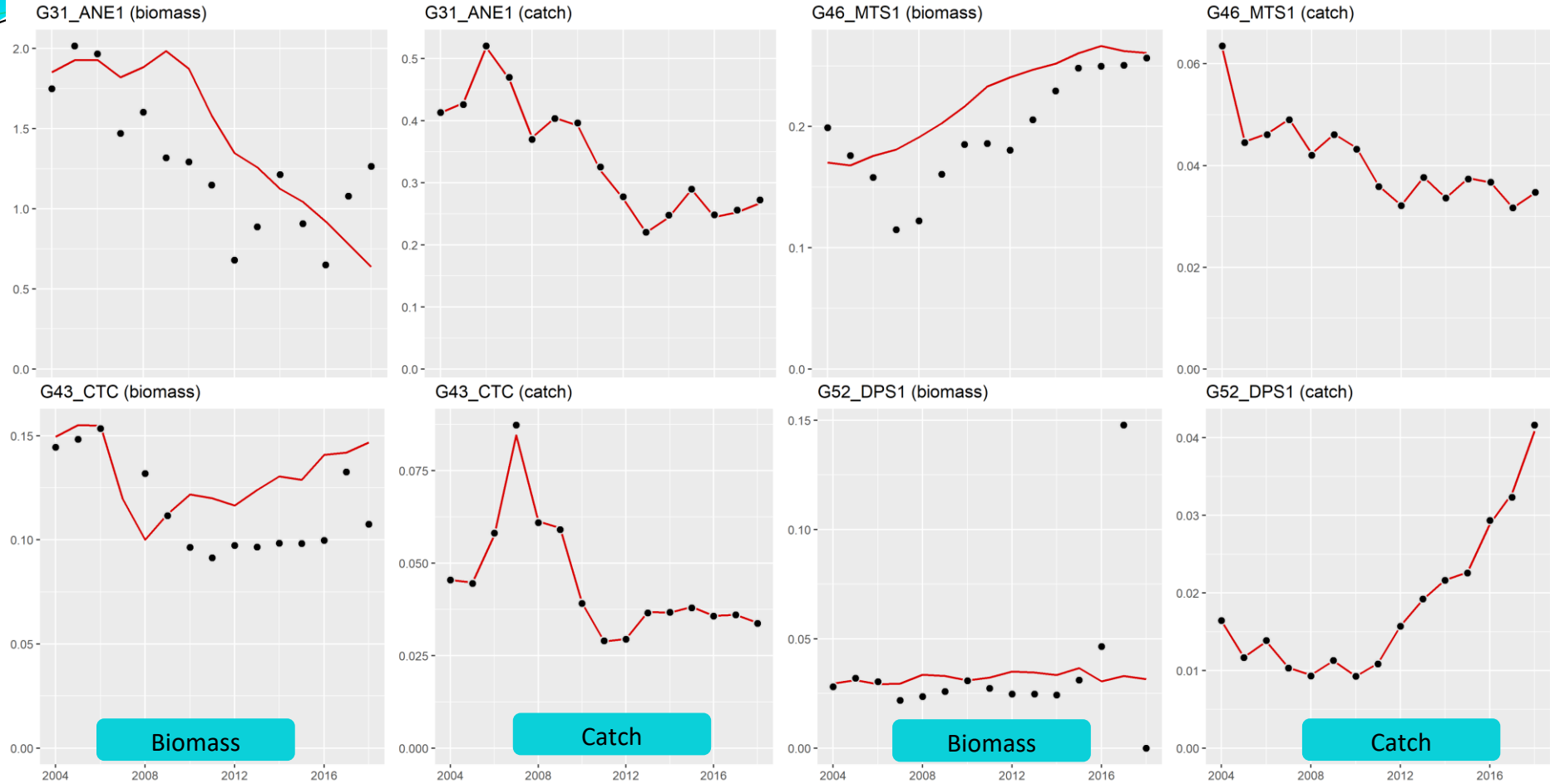
Food web: a comprehensive view of flows

Determine the quantitative effect (both direct and indirect) of each element of the food web on any other. Incorporates trophic cascade effects.

Assess both positive effects: e.g., the beneficial effect of a prey for a predator;
e.g., the beneficial indirect effect of a fishery for a prey (because removing a predator)
and negative effects:
e.g., trophic competition; predation effect on the prey;
e.g., fishing mortality

**IMPACTED Species nodes**

**IMPACTING Species**

|  | G19_DEMs | G20_DEMh | G21_FLX | G22_FTB | G23_GUR | G24_GDX | G25_SPX | G26_MCK | G27_LOP | G28_PIL0 | G29_PIL1 | G30_ANE0 | G31_ANE1 | G32_SOL0 | G33_SOL1 | G34_SOL2 | G35_MUT0 | G36_MUT1 | G37_HKE0 | G38_HKE1 | G39_HKE2 | G40_CPXs | G41_CPXh | G42_SQD | G43_CTC | G44_OCM | G45_MTS0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G28_PIL0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G29_PIL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G30_ANE0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G31_ANE1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G32_SOL0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G33_SOL1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G34_SOL2 | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Adriatic sea

Keystoness
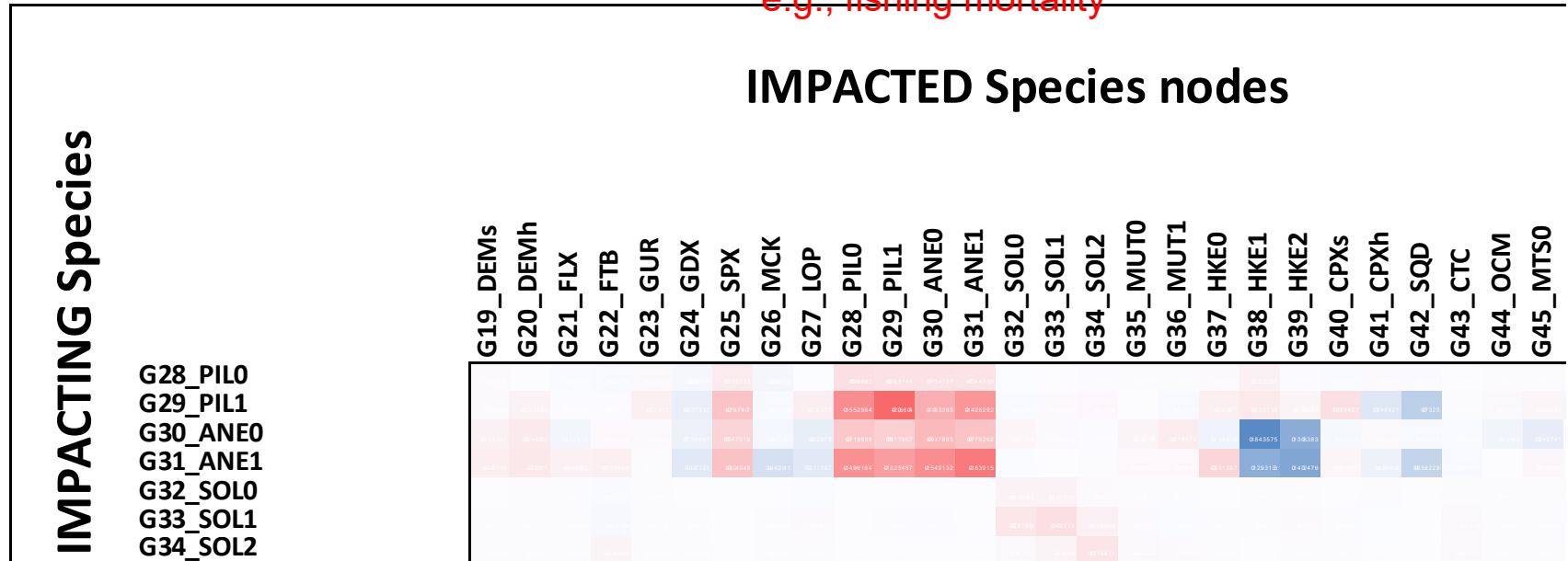
| FG | KS #1 |
|---|---|
| G61_BIX | 0.128 |
| G41_CPXh | 0.091 |
| G66_ZME | 0.005 |
| G20_DEMh | 0.002 |
| G42_SQD | -0.010 |
| G55_REPh | -0.038 |
| G65_ZMA | -0.070 |
| G58_SBT | -0.161 |
| G15_DPSh | -0.176 |
| G69_PDM | -0.191 |
| G16_EPI | -0.198 |
| G56_NATs | -0.206 |
| G49_ARA | -0.211 |
| G54_REPs | -0.245 |
| G44_OCM | -0.283 |
| G67_ZMI | -0.287 |
| G25_SPX | -0.328 |
| G31_ANE1 | -0.338 |

The sum of all negative impacts produced by a fleet (total ecosystem impact by fleet) on the living nodes of the food web (i.e., excluding impacts on detrital forms) is considered the overall negative impact of the fleet on the ecosystem.

Total ecosystem impact by fleet in the Adriatic highlighting the contribution Croatian trammel net (HRV_GNX, highlighted in grey). Negative and positive Impacts on the sole (G34_SOL2) are highlighted in red and green, respectively, for all fleets.



**Score CoE: 4**      **[low** overall negative impact of the fleet on the ecosystem**]**

**Score CoA: 4**      **[low** impact of the fleet to the target species**]**
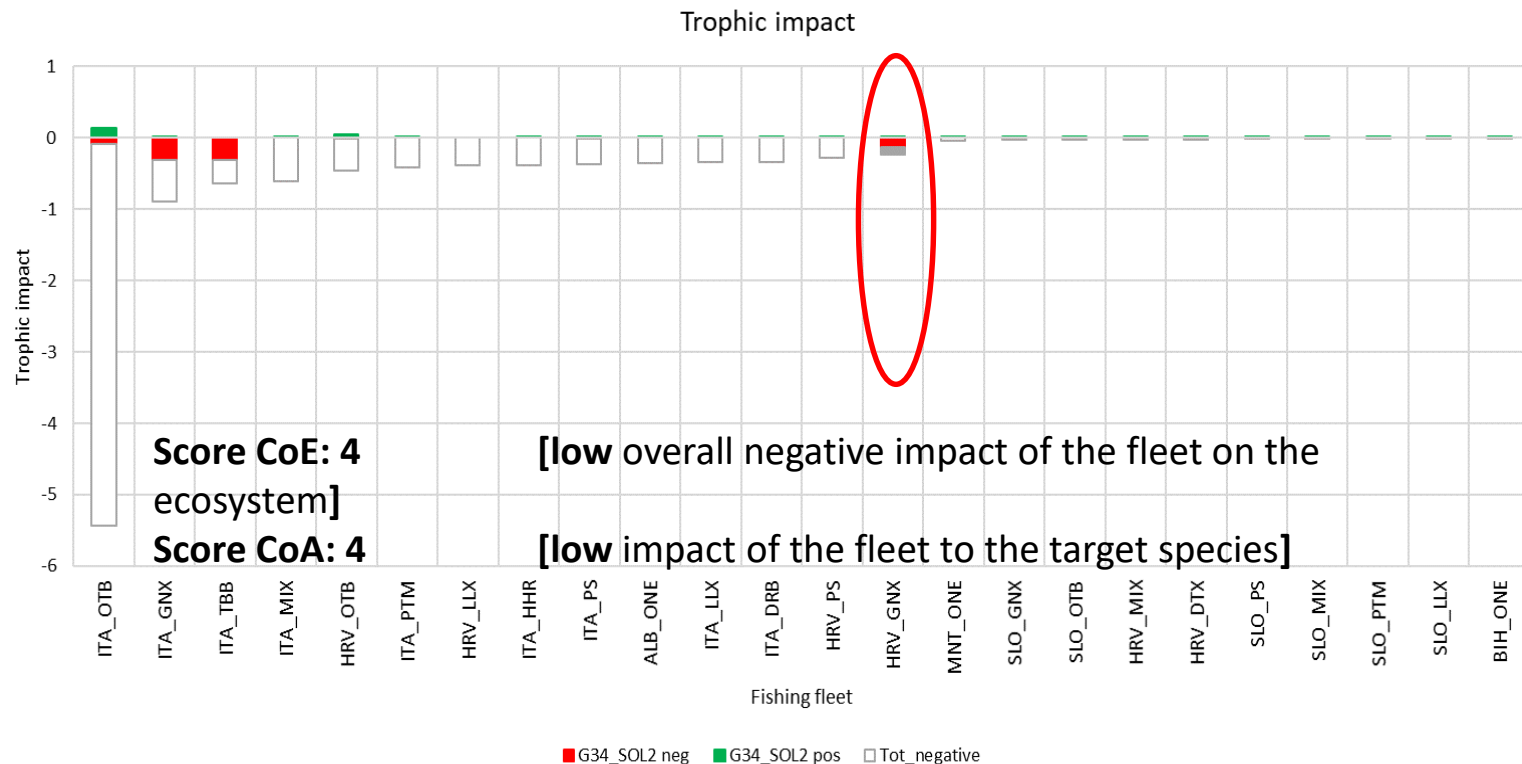
The **sum of positive and negative** impacts produced by a species node on all other living nodes of the food web (using absolute values to avoid eliciting negative and positive effects) is considered a measure of the overall impact of a species in the food web
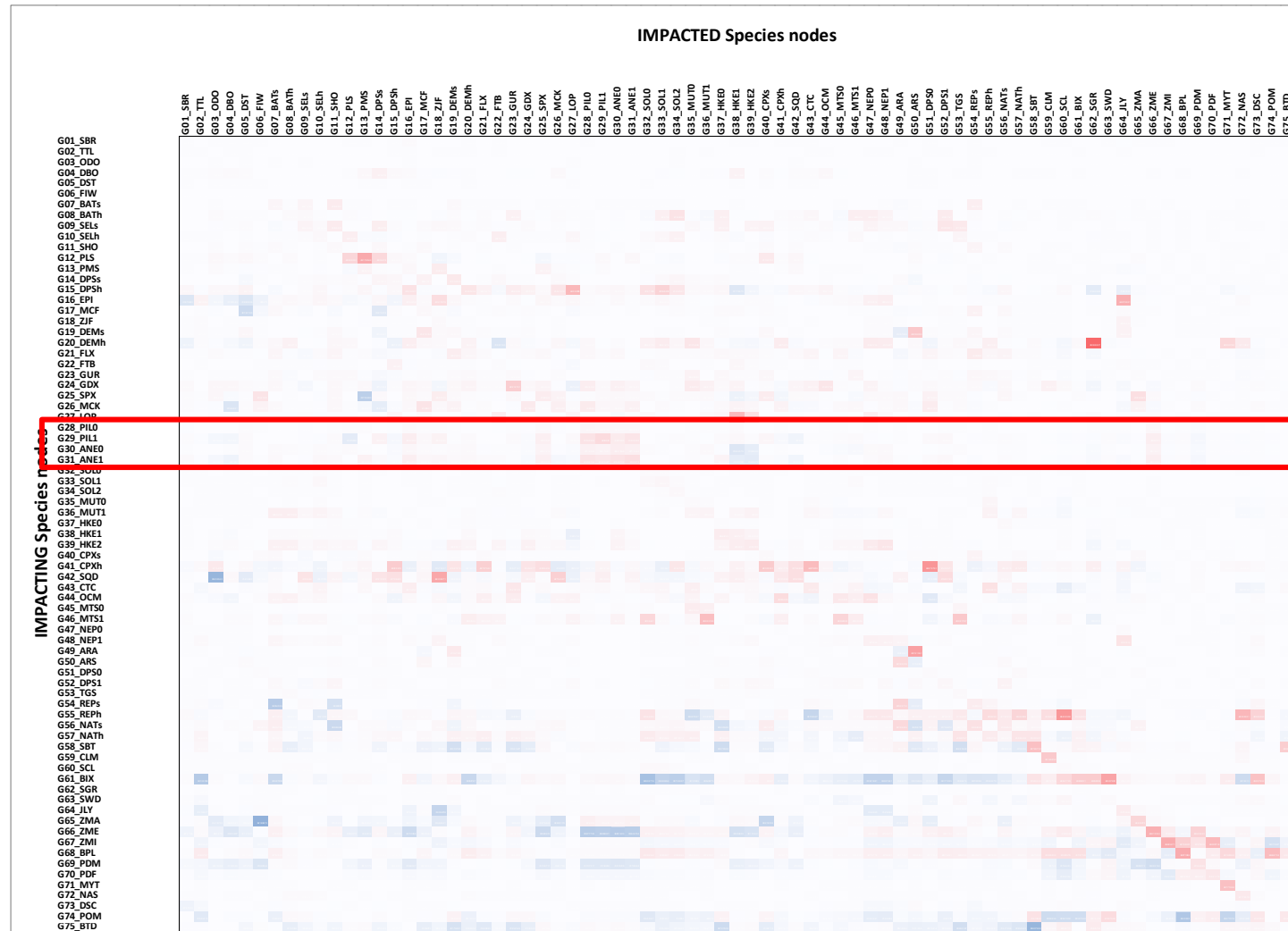
Representation of trophic impact of trophic groups on the ecosystem. Trophic groups' total negative and positive impacts (white bars) are represented and the ratio of impact they have on the target specie (negative in red, positive in green). The assessed trophic group is highlighted in grey.



**Anchovy, 2.4.2 Food web role:**
**Score CoE: 3**          **[medium-high** overall impact of the species in the food web**]**

| | 2.4.1 Ecosystem impacts | | 2.4.2 Food web role |
| | Score CoE | Score CoA | Score CoE |
|---|---|---|---|
| **Relevant fisheries in CROATIA** | | | |
| **Purse Seine for anchovy and sardine** | **4** | **3** | **3** |
| | **low** overall negative impact of the fleet on the ecosystem | **medium-high** impact of the fleet of the target species | **medium-high** overall impact of the species in the food web |
| **Trammel net for common sole** | **4** | **4** | **5** |
| | **low** overall negative impact of the fleet on the ecosystem | **low** impact of the fleet to the target species | **low** overall impact of the species in the food web |
| **Rampon for queen scallop** | **5** | **3** | **5** |
| | **very low** overall negative impact of the fleet on the ecosystem | **low** impact of the fleet to the target species, but precautionary value due to poorly quantified discards | **low** overall impact of the species in the food web |
| **Bottom trawl for deep-water rose-shrimp** | **3** | **4** | **4** |
| | **medium-high** overall negative impact of the fleet on the ecosystem | **low** impact of the fleet to the target species | **medium to low** overall impact of the species in the food web |

| | 2.4.1 Ecosystem impacts | | 2.4.2 Food web role |
|---|---|---|---|
| | Score CoE | Score CoA | Score CoE |
| **Relevant fisheries in ITALY** | | | |
| **Hydraulic dredges for striped venus clam** | **4** | **4** | **5** |
| | **low** overall negative impact of the fleet on the ecosystem | **high** impact of the fleet to the target species, but **highly** selective | **low** overall impact of the species in the food web |
| **Traps for common cuttlefish** | **3** | **5** | **3** |
| | **moderate** overall negative impact of the fleet on the ecosystem | **very low** impact of the fleet to the target species | **moderately high** overall impact of the species in the food web |
| **Small pots for spottail mantis squillid** | **3** | **5** | **3** |
| | **moderate** overall negative impact of the fleet on the ecosystem | **low** impact of the fleet to the target species | **moderately high** overall impact of the species in the food web |
| **Small pots for changeable nassa** | **3** | **3** | **5** |
| | **moderate** overall negative impact of the fleet on the ecosystem | **medium-high** impact of the fleet to the target species | **very low** overall impact of the species in the food web |
| **Hand-harvesting for mediterranean mussel** | **4** | **3** | **5** |
| | **low-medium** overall negative impact of the fleet on the ecosystem | **medium-high** impact of the fleet to the target species | **very low** overall impact of the species in the food web |

**OGS**

## SOCIAL AND ECONOMIC ASPECTS

- **3.1.1. Economic conditions**: capacità di creare valore aggiunto e operare nelle migliori condizioni di mercato, orientare offerta a domanda di mercato;
- **3.2.1. Fishing capacity:** equilibrio tra capacità di pesca e opportunità di pesca;
- **3.3.1. Human rights and safety on board:** rispetto delle condizioni previste dalla domensione sociale della PCP e normativa internazionale ILO.

# Common cuttlefish exploited with traps

| ARFM PILLARS | INDICATORS | Evaluation level | Rationale | Points |
|---|---|---|---|---|
| 1. GOVERNANCE | 1.1.1 Quadro normativo | CoE | Ricognizione norme specifiche PCP e quadro nazionale (decreti ministeriali, piano di gestione, piani locali e ordinanze) e norme internazionali | 5 |
| | | CoA | Non conformità ad alcune misure di gestione (es. numero trappole per imbarcazione) | 3 |
| 2. AMBIENTE | 2.1.1. Raccolta dati | CoE | Completezza e attendibilità fonti relative a raccolta dati | 4 |
| | | CoA | Azioni pilota sviluppate, progetti di partenariato e di ricerca con scienziati | 5 |
| 3. ASPETTI SOCIO- | 3.1.1. Diritti e sicurezza a bordo | CoE | Ratifica (in corso) e adattamento del diritto interno a fonti interazionali , implemnentazione dimensione | 4 |