

Introduction to Fisheries Performance Assessment Toolkit (FPAT)

Benchmarking and Planning Effective Management

Presenter, Date 2022, Location



Food and Agriculture Organization
of the United Nations



UNIVERSITY of WASHINGTON



openMSE

www.openmse.com

Fishery Performance Indicators

www.fpilab.org

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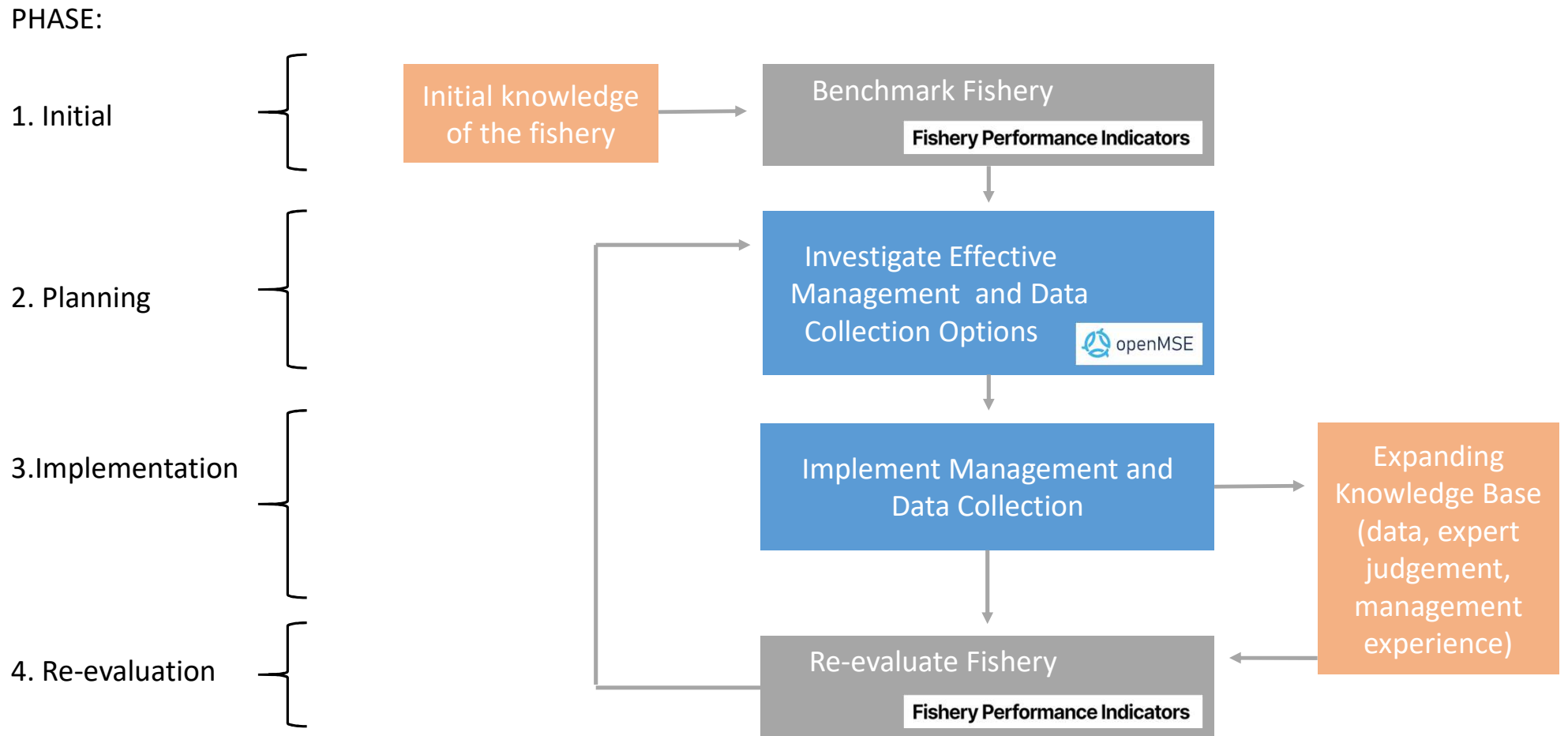
1. The Problem

Establishing economically, socially and ecologically sustainable management is particularly challenging for small-scale coastal fisheries where there may be limited:

- Data
- Management enforcement
- Technical capacity

However these fisheries contribute enormously to the livelihoods and food security for a large number of coastal communities around the world.

2. A Framework for Fishery Development



3. The FPAT application

FPAT Fisheries Performance Assessment Toolkit

Home

1. Load

2. FPI Scores

3. Fishery Dynamics

4. Projections

The Coastal Fisheries Initiative (CFI)

The Coastal Fisheries Initiative ([CFI](#)) is a global effort to preserve marine resources and ensure that coastal fisheries can continue to play their crucial role in society, contributing to food security, as well as economic and social development.

Funded by the Global Environment Facility ([GEF](#)) the initiative rallies UN agencies and international conservation organizations behind the common goal of promoting the sustainable use and management of coastal fisheries, championing innovative approaches to, improve governance and strengthening the seafood value chain.

The CFI provides financial and hands-on technical support to coastal fisheries in six countries across three geographic regions: Indonesia, Latin America (Ecuador and Peru) and West Africa (Cape Verde, Cote d'Ivoire and Senegal).

The Fishery Performance Assessment Toolkit (FPAT)

To measure the impact of the Coastal Fisheries Initiative, future performance must be compared to a baseline starting point. The measurement tool chosen by the CFI is the Fisheries Performance Assessment Toolkit (FPAT), a browser-based application designed to evaluate the ecological, economic, and social performance of a wide range of fisheries.

FPAT relies on data from a variety of sources ranging from the technical to the informal, and was developed specifically for monitoring and evaluation of the CFI and built on the notion that an effective management system is one that is ecologically sustainable, socially acceptable, and generates sustainable resource rents or profits ([Anderson et al., 2015](#)).

The FPAT Process

FPAT includes two tools: the [Fisheries Performance Indicators](#): a tool designed to determine how fisheries management systems are performing in

Load FPAT data file

An FPAT - formatted
Microsoft Excel spreadsheet

FPAT Fisheries Performance Assessment Toolkit

The screenshot shows the FPAT web application interface. On the left is a navigation sidebar with four items: 'Home', '1. Load', '2. FPI Scores', '3. Fishery Dynamics', and '4. Projections'. The '1. Load' item is highlighted with a blue arrow. The main content area is titled 'Load an FPAT Data File'. Below the title is a paragraph: 'The FPAT data file is a specially formatted Excel Workbook that contains the FPI scores and any available fishery data from an existing FPAT case study.' Below this is another paragraph: 'Once the data file is loaded, FPAT will build an operating model (OM) and simulate the historical fishing dynamics.' There are two main interactive panels. The first, titled 'Load an FPAT Data File (.xlsx)', is highlighted with a red box and contains a 'Browse...' button and the text 'No file selected'. The second panel, titled 'Select an existing FPAT case study', contains a dropdown menu showing 'Demo_1' and a 'Load case study' button with an upload icon. A red arrow points from the text 'An FPAT - formatted Microsoft Excel spreadsheet' to the 'Browse...' button.

Home

1. Load

2. FPI Scores

3. Fishery Dynamics

4. Projections

Load an FPAT Data File

The FPAT data file is a specially formatted Excel Workbook that contains the FPI scores and any available fishery data from an existing FPAT case study.

Once the data file is loaded, FPAT will build an operating model (OM) and simulate the historical fishing dynamics.

Load an FPAT Data File (.xlsx)

Browse... No file selected

Select an existing FPAT case study

Demo_1 ▼ Load case study

FPAT Excel input file

Worksheets for:

1. Instructions
2. Introduction
3. Cover Page
4. Summary
5. Output-table
6. Input-table
7. Governance Supplement
8. Output-graph by TBL
9. Output-graph by Sector
10. Input-graph
11. Volatility
12. Historical Data
13. Fishery Data
14. FPAT App Questions
15. Effort Dynamics

The screenshot shows an Excel spreadsheet titled "FPAT vBeta+DR_MahiTemplate.xlsx". The active worksheet is "FPIs Works". The spreadsheet contains the following text:

Filling out the Fishery Performance Indicators (FPIs)

FPIs Works

1. Be sure to fill in the first tab of the worksheet "Cover Page" with country, location, fisher...
2. It is essential to fill in the column of quality scores for both the input and output tables. M
A: Reviewer is highly confident (95%) the 1-5 score is correct. Confidence can come from
based on reliable data, or large ranges of the underlying metric for the given score that ma
5 score that matters, and thus wide ranges for the underlying metric associated with a scor
level of the underlying metric is poor.
B: Reviewer feels 1-5 score is more likely than others, and reviewer is highly confident (9
C: Reviewer is making an educated guess based on best available information, but review
3. All metrics should be scored with a 1, 2, 3, 4, 5 or NA. Intermediate scores of 1.5, 2.5, etc
NA is only acceptable if the metric truly does not apply to the fishery (example: in a fishe

Note that uncertainty about the interpretation of the metric should be resolved through co
lower quality. Interpretations can be explained in the notes.

The spreadsheet interface includes a ribbon with tabs for "1. Instructions", "2. Introduction", "3. Cover Page", "4. Summary", and "5. ...". The status bar at the bottom shows "Ready" and "Accessibility: Investigate".

Load FPAT data file

An existing FPAT case study
available in the App

FPAT Fisheries Performance Assessment Toolkit

Home

1. Load

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Load an FPAT Data File

The FPAT data file is a specially formatted Excel Workbook that contains the FPI scores and any available fishery data from an existing FPAT case study.

Once the data file is loaded, FPAT will build an operating model (OM) and simulate the historical fishing dynamics.

Load an FPAT Data File (.xlsx)

Browse... No file selected

Select an existing FPAT case study

Demo_1 ▾ Load case study

3a. Fishery Benchmarking using FPI+

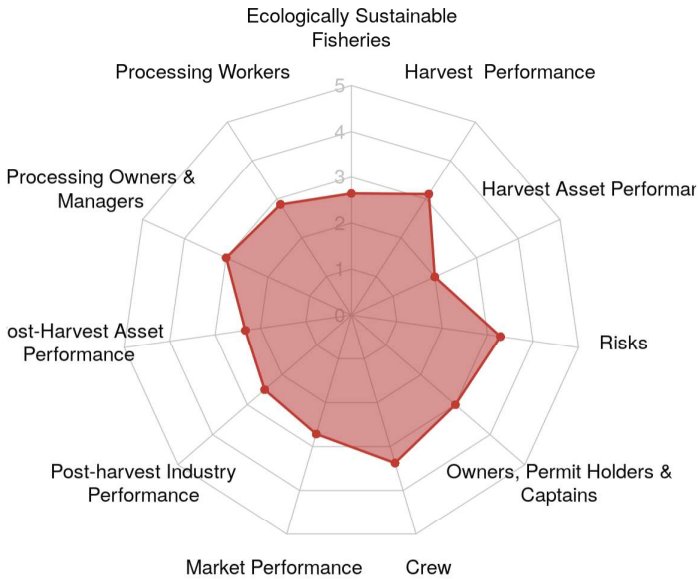
- Home
- 1. Load
- 2. FPI Scores
- 3. Fishery Dynamics
- 4. Projections

Fishery Performance Indicators

FPI Scores

Outputs: Sector

Outputs: Triple Bottom Line Inputs: Enabling Conditions



Outputs: Sector

FPI output scores measure the fishery's performance based on where wealth is accumulating in the fishery. Higher scores are better, reflecting that more wealth is being generated in the stock resource, among fishermen and the harvest sector, or in the processing sector.

This graph is used to identify the dimensions where the fishery is performing well, and to target dimensions for improvement. Different fisheries may have different, locally identified performance priorities.

As a general rule, scoring levels have been chosen so that scores below 3 reflect the need for improvement. The fishery may also be compared to benchmark scores for select

FPI Metadata

A. Country	Costa Rica
B. Location (State, City, Etc...)	Norht Pacific, Guanacaste
C. Fishery	Small-scale
D. Single or Multi-species	Multi-species
E. Species (top 5 if multi)	Lobster, Octopus, Parrotfish
F. Date	8/21/2019
G. Reference/Base Year of Scores	2007-2011
H. Author(s)	Helven Naranjo Madrigal
I. Author Contact Info	helvenn@hotmail.com

FPI Comparisons

3a. Fishery Benchmarking using FPI+

- Home
- 1. Load
- 2. FPI Scores
- 3. Fishery Dynamics
- 4. Projections

Fishery Performance Indicators

FPI Scores

Outputs: Sector
Outputs: Triple Bottom Line
Inputs: Enabling Conditions

Dimension	Score
Stock Health	4.5
Harvest	4.5
Harvest Assets	3.5
Risk	3.5
Trade	3.5
Product Form	3.5
Post-Harvest Asset Performance	3.5
Managerial Returns	3.5
Labor Returns	3.5
Health & Sanitation	3.5
Community Services	3.5
Local Ownership	3.5

Outputs: Triple Bottom Line

FPI output scores measure the fishery's performance on the pillars of the triple bottom line. Higher scores are better, reflecting that the fishery is attaining more success on ecological, economic or community pillars.

This graph is used to identify the dimensions where the fishery is performing well, and to target dimensions for improvement. Different fisheries may have different, locally identified performance priorities.

As a general rule, scoring levels have been chosen so that scores below 3 reflect the need for improvement. The fishery may also be compared to benchmark scores for select categories of fisheries, average scores for

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FPI Comparisons

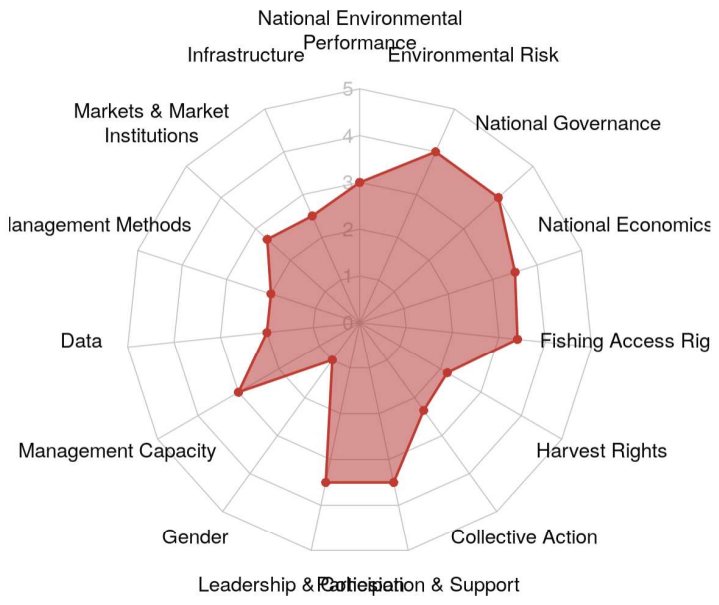
3a. Fishery Benchmarking using FPI+

- Home
- 1. Load
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Fishery Performance Indicators

FPI Scores

Outputs: Sector
Outputs: Triple Bottom Line
Inputs: Enabling Conditions



Inputs: Enabling Conditions

FPI input scores measure the level of enabling conditions which support fishery performance. Higher scores reflect more of the enabling condition, though whether or how each input affects fishery performance is an empirical question. In some cases, these relationships can be complex, and depend on the presence of several enabling conditions at once.

One way to evaluate the fishery's enabling conditions is to compare them to benchmark scores for select categories of fisheries, the average scores for those fisheries in the FPI database.

Another use of enabling condition data is to select the enabling conditions that will be

FPI Metadata	
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FPI Comparisons

3b. FPI comparisons

Select a comparison, here the 'High Income' FPI example

- 1. Load
- 2. FPI Scores**
- 3. Fishery Dynamics
- 4. Projections

FPI Scores

Outputs: Sector
Outputs: Triple Bottom Line
Inputs: Enabling Conditions

Ecologically Sustainable Fisheries

Processing Workers Harvest Performance

Processing Owners & Managers Harvest Asset Performan

Post-Harvest Asset Performance Risks

Post-harvest Industry Performance Owners, Permit Holders & Captains

Market Performance Crew

● Fishery ● High Income

Outputs: Sector

FPI output scores measure the fishery's performance based on where wealth is accumulating in the fishery. Higher scores are better, reflecting that more wealth is being generated in the stock resource, among fishermen and the harvest sector, or in the processing sector.

This graph is used to identify the dimensions where the fishery is performing well, and to target dimensions for improvement. Different fisheries may have different, locally identified performance priorities.

As a general rule, scoring levels have been chosen so that scores below 3 reflect the need for improvement. The fishery may also be compared to benchmark scores for select categories of fisheries, average scores for those fisheries in the FPI database.

Select the desired benchmark from the drop down menu or load another FPI database to compare scores to identify dimensions where other fisheries have found ways to perform better.

Individual FPI Scores

Dimension

Comments

Discussion Text

FPI Metadata

A. Country	Costa Rica
B. Location (State, City, Etc...)	Norht Pacific, Guanacaste
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FPI Comparisons

Baseline Comparison

High Income |

Overall

All (non-tuna)

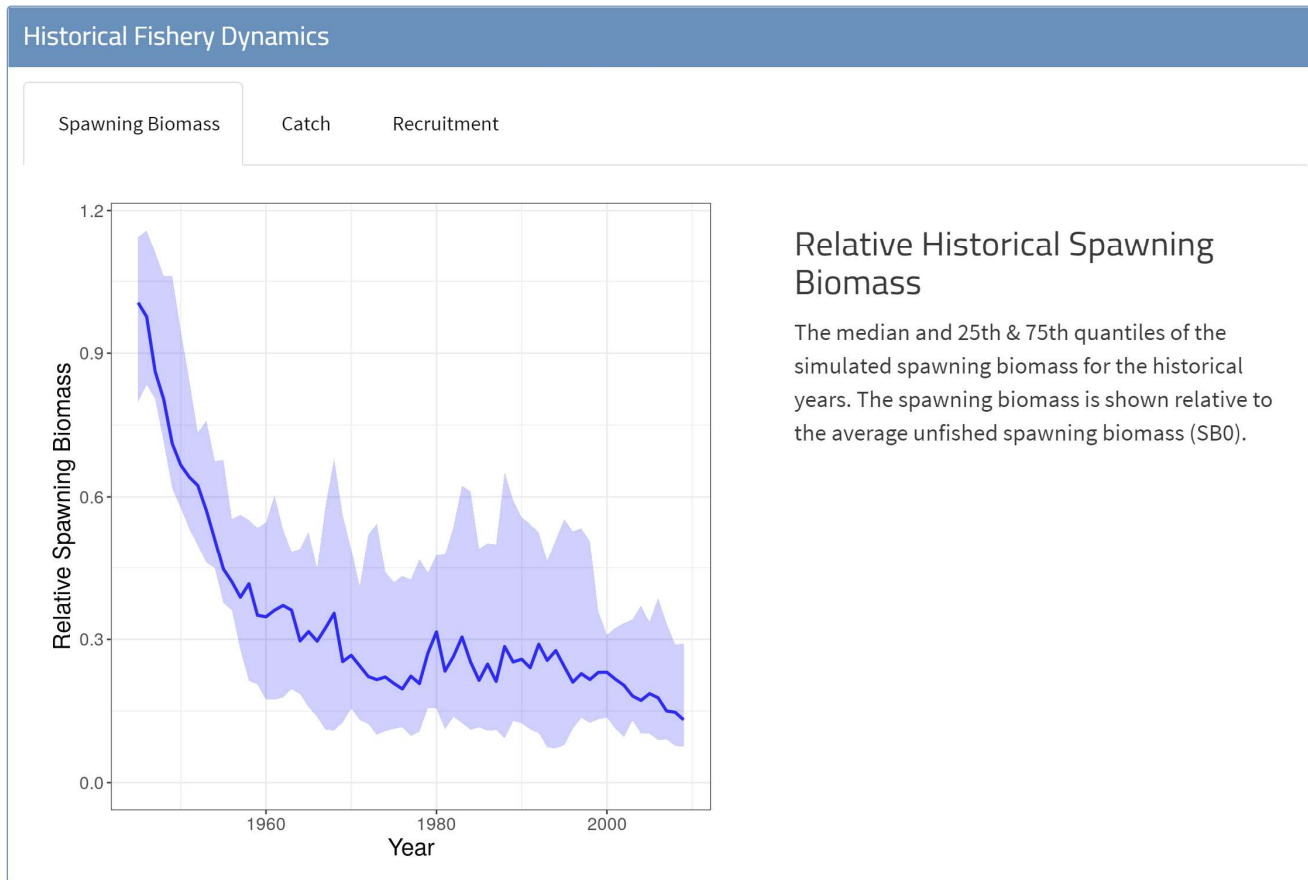
Non-industrial

By country-level development

3c. Identifying Effective Management Options using openMSE

- Home
- 1. Load
- 2. FPI Scores
- 3. Fishery Dynamics**
- 4. Projections

Simulated Historical Fishery Dynamics



Fishery Simulation Metadata

Name: Example Lobster Data

Species: *Panulirus gracilis*

Common Name: Green Lobster

Region: North Pacific

Historical Years: 1946-2010

Assumptions

Download OM Report

An Operating Model Report with plots of all simulated fishery dynamics and parameters can be downloaded by clicking the button below.

Download OM Report

Advanced

Download OM

Load an OM from file

3c. Identifying Effective Management Options using openMSE

4. Projections

Length-at-retention is set to size-of-maturity and 10% higher than size-of-maturity.

Length-based

Two management procedures that adjust the annual catch limit based on the trend in mean length in the catch.

Index-based

Two management procedures that adjust the annual catch limit based on the trend in the index of abundance.

Spatial Management

Two management procedures that 1) open an existing spatial closure (if one exists) and 2) close the planned spatial closure (if any)

Select Management Procedures

- Status Quo Catch and Effort
- Size limits
- Length-based
- Index-based
- Spatial Management

Custom MPs (click to expand)

Selected MPs:

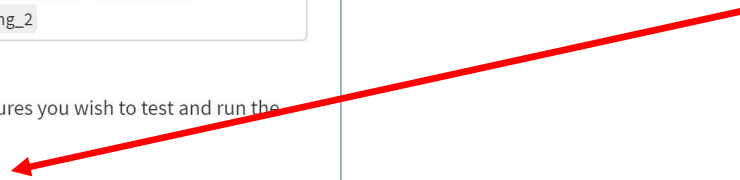
Current_Catch Current_Effort Size_Limit_1 Size_Limit_2
Index_Targeting_1 Index_Targeting_2

Select the management procedures you wish to test and run the MSE projections.

 Run MSE Projections

Select Management Procedures
or define a custom MP

Calculate performance of
management procedures



3c. Identifying Effective Management Options using openMSE

Home

1. Load

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MSE Projection Results

Management Strategy Selection

Status Quo Catch and Effort

Fishing in the projection years is fixed at the current catch and current effort.

Size limits

Length-at-retention is set to size-of-maturity and 10% higher than size-of-maturity.

Length-based

Two management procedures that adjust the annual catch limit based on the trend in mean length in the catch.

Index-based

Two management procedures that adjust the annual catch limit based on the trend in the index of abundance.

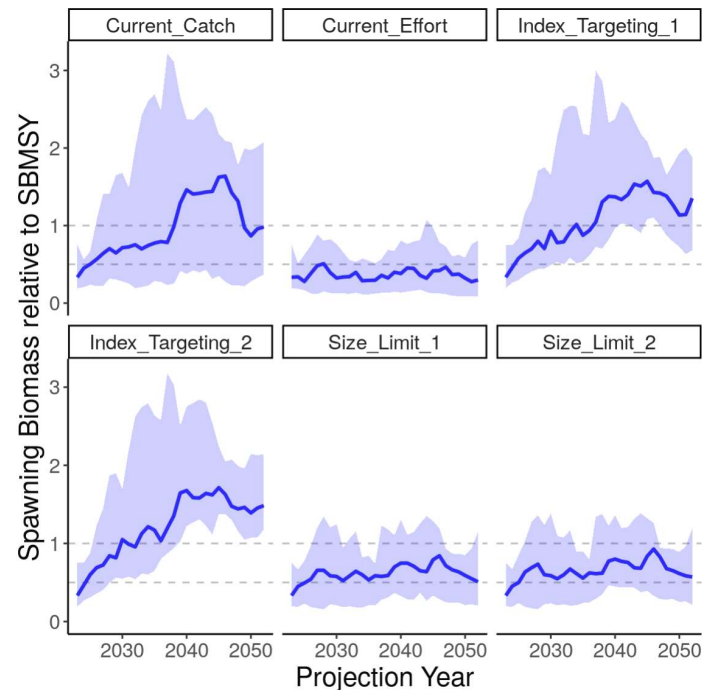
Spatial Management

Two management procedures that 1) open an existing spatial closure (if one exists)

MSE Results

Projection Plots

Trade-Off Plots



Projection Plot

Projection Variable

Spawning Biomass

Relative to:

- SB0
- SBMSY

Projection plots showing the median (line) and 25th and 75th percentiles (shading) of spawning biomass relative to spawning biomass corresponding with maximum sustainable yield (SBMSY) for each MP.

3c. Identifying Effective Management Options using openMSE

home

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MSE Projection Results

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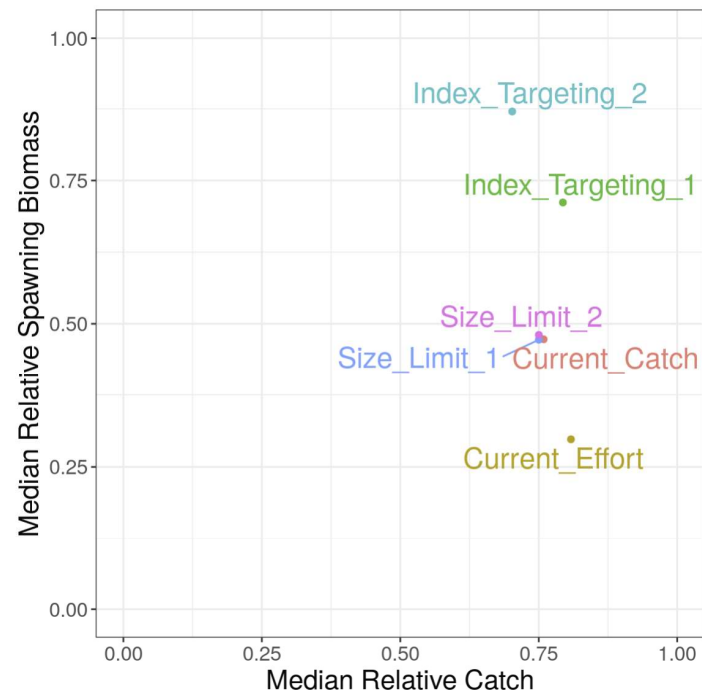
Spatial Management

Two management procedures that 1) open an existing spatial closure (if one exists)

MSE Results

Projection Plots

Trade-Off Plots



Trade-Off Plot

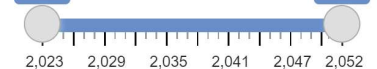
X-Axis

Variable

Catch

Years

2,023



Metric

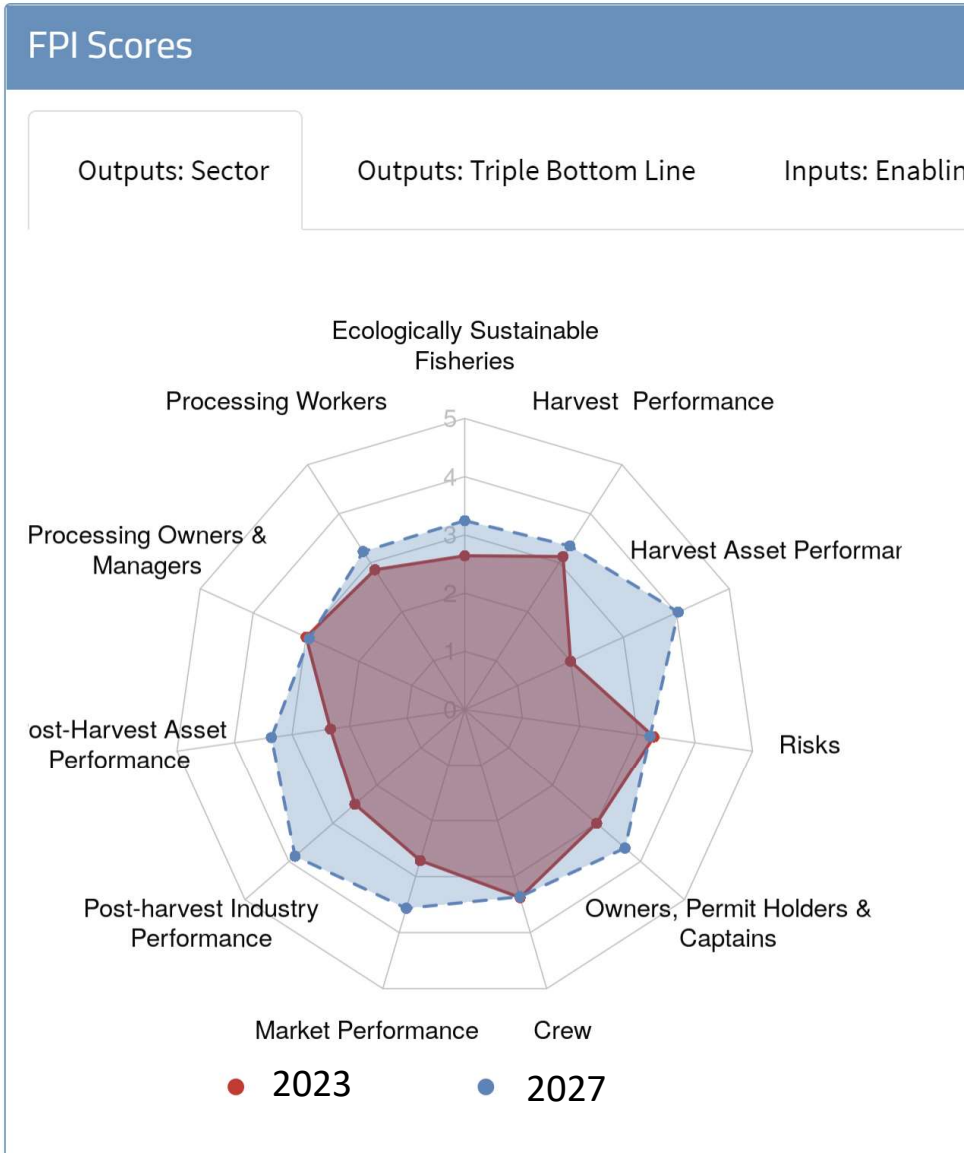
Median

Include error bars?

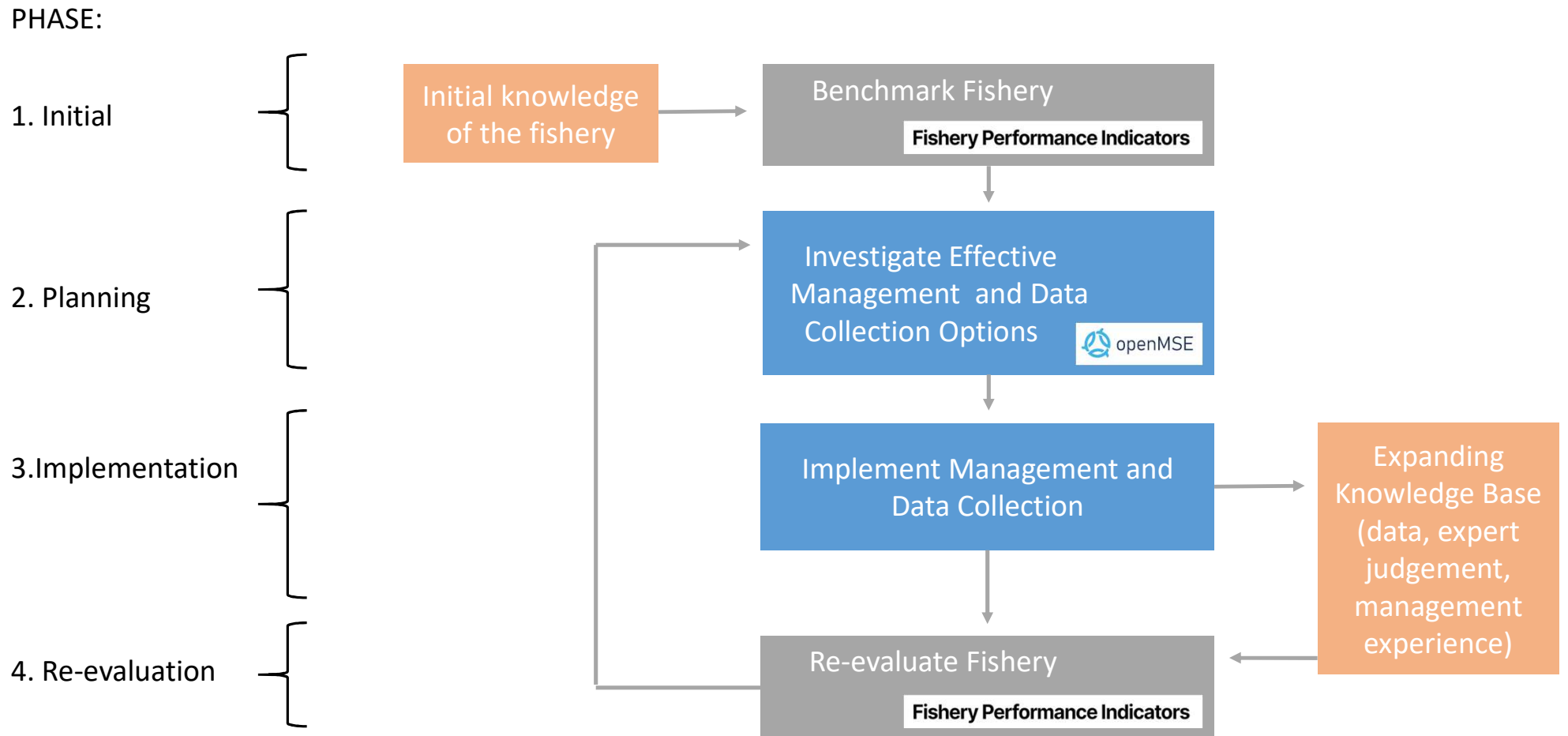
3d. Re-evaluation against benchmarks

Use the FPI comparison tool to compare latest FPI scores to the previous benchmark.

- 1. Load
- 2. FPI Scores**
- 3. Fishery Dynamics
- 4. Projections



2. A Framework for Fishery Development



4. Summary

Fishery Performance Assessment Toolkit (FPAT)

1. Benchmarking: initial Fishery Performance Indicators
2. Planning: simulate fishery and compare expected outcomes from alternative management options
3. Decision-Making: select a management option and implement in fishery
4. Monitoring: expand knowledge base (research), re-evaluate FPIs, and repeat process