Interpreting Management Strategy Evaluation Results

Meeting #5 November 21, 2019

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My goals for this talk:

- Provide a primer for understanding how to interpret MSE results

- Provide guidance on making sound judgements for selecting a management strategy

What has the modeling group been focusing on?

- Ensuring that the population model is suitably realistic
- Examining red abalone recovery rates
- Technical specification of the 2-zone strategy
- Presenting de minimis trade-offs

Agenda

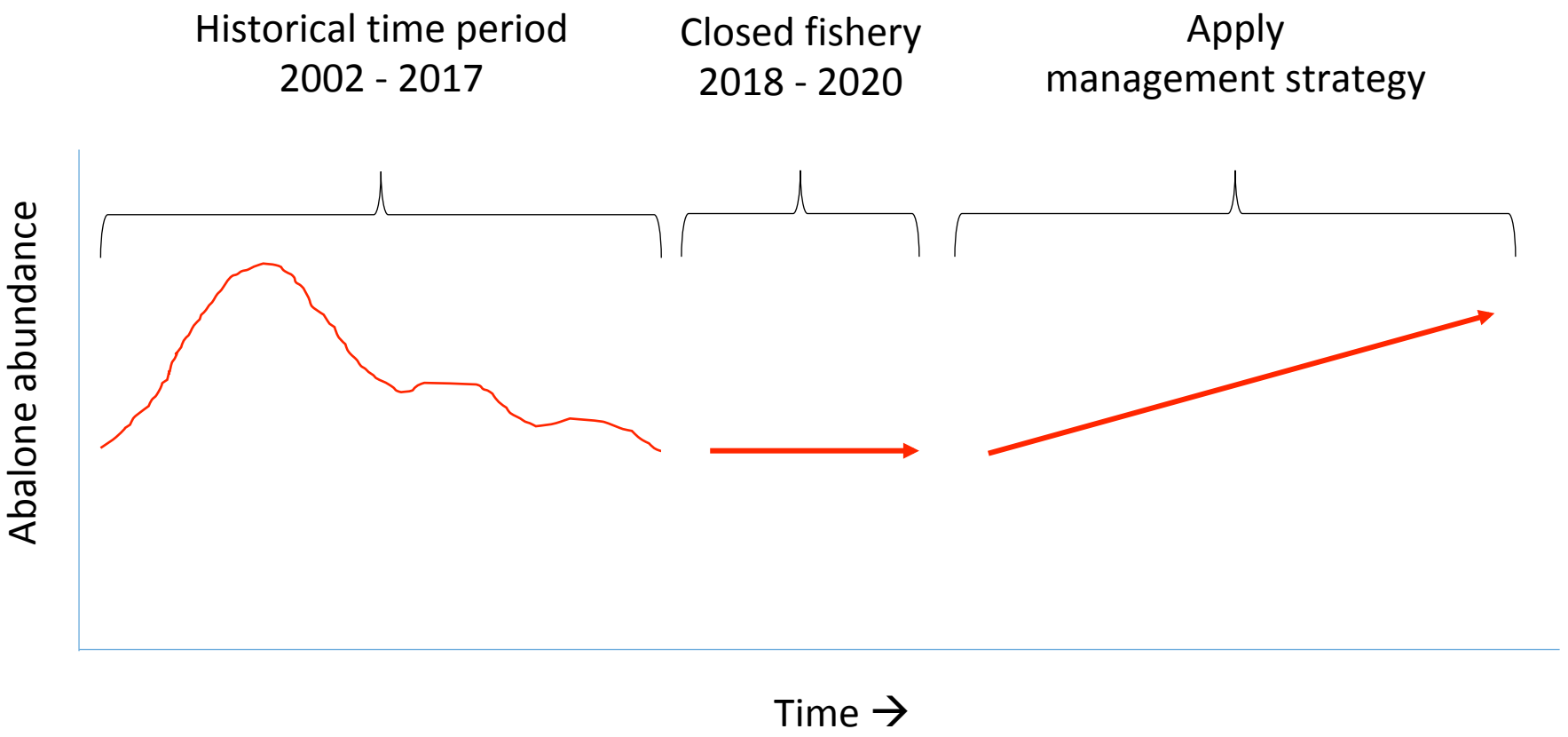
1. Model tuning to real data
   - Ensuring that the population model is suitably realistic

2. Red abalone recovery rates
   - Examining red abalone recovery rates

3. Summary of the 2-zone strategy
   - Technical aspects to the 2-zone strategy

4. Primer for understanding trade-offs
   - Presenting de minimis trade-offs

1. Model tuning to real data



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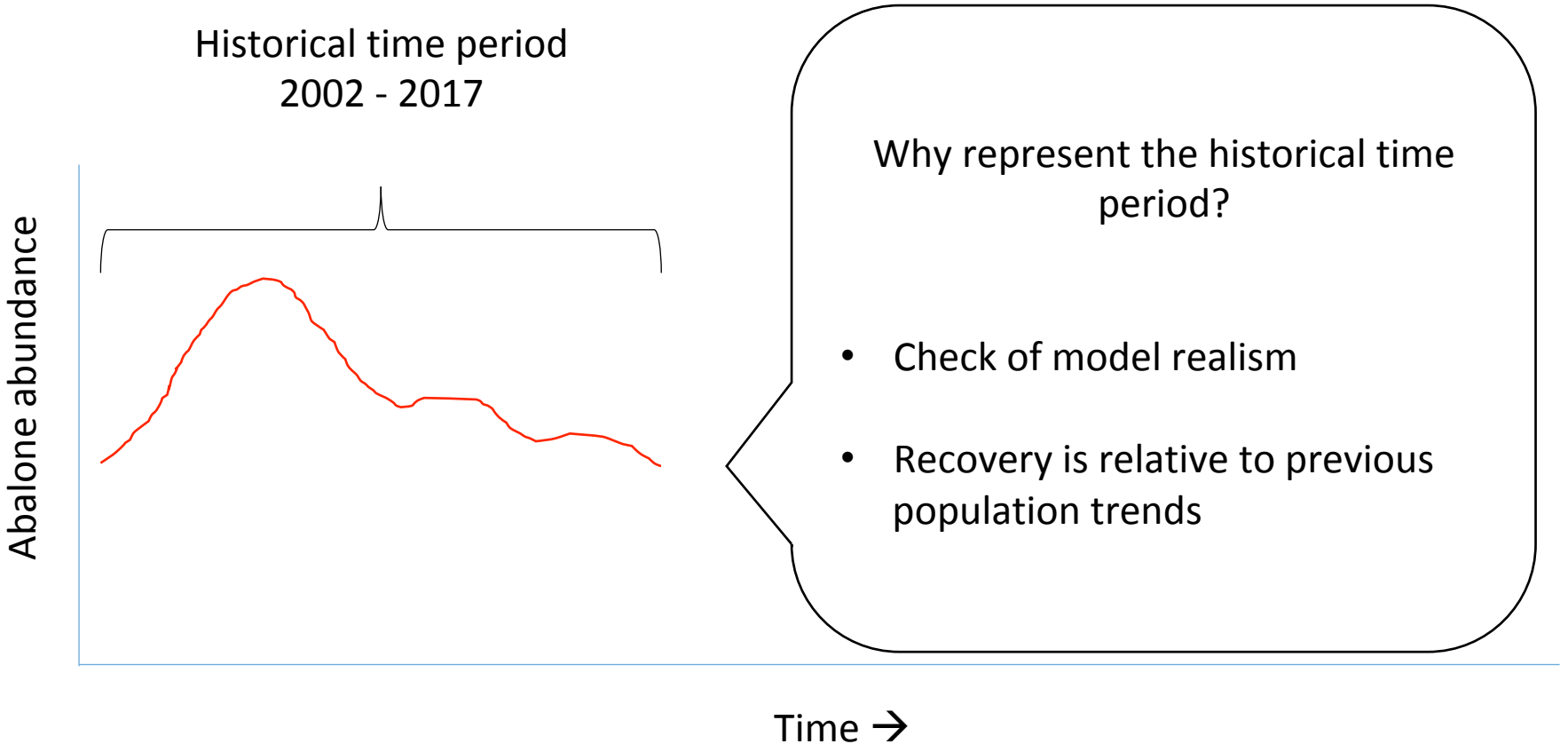

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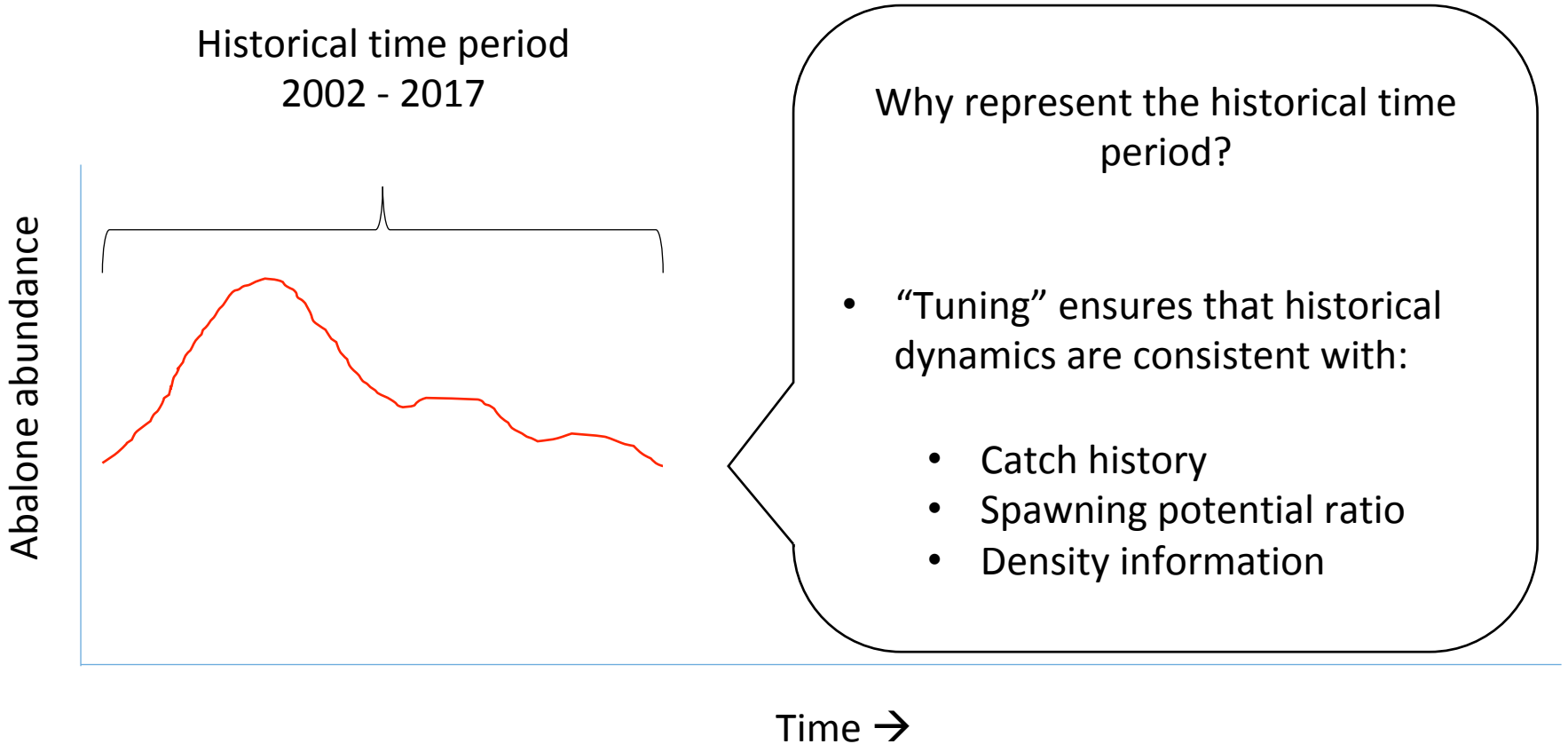

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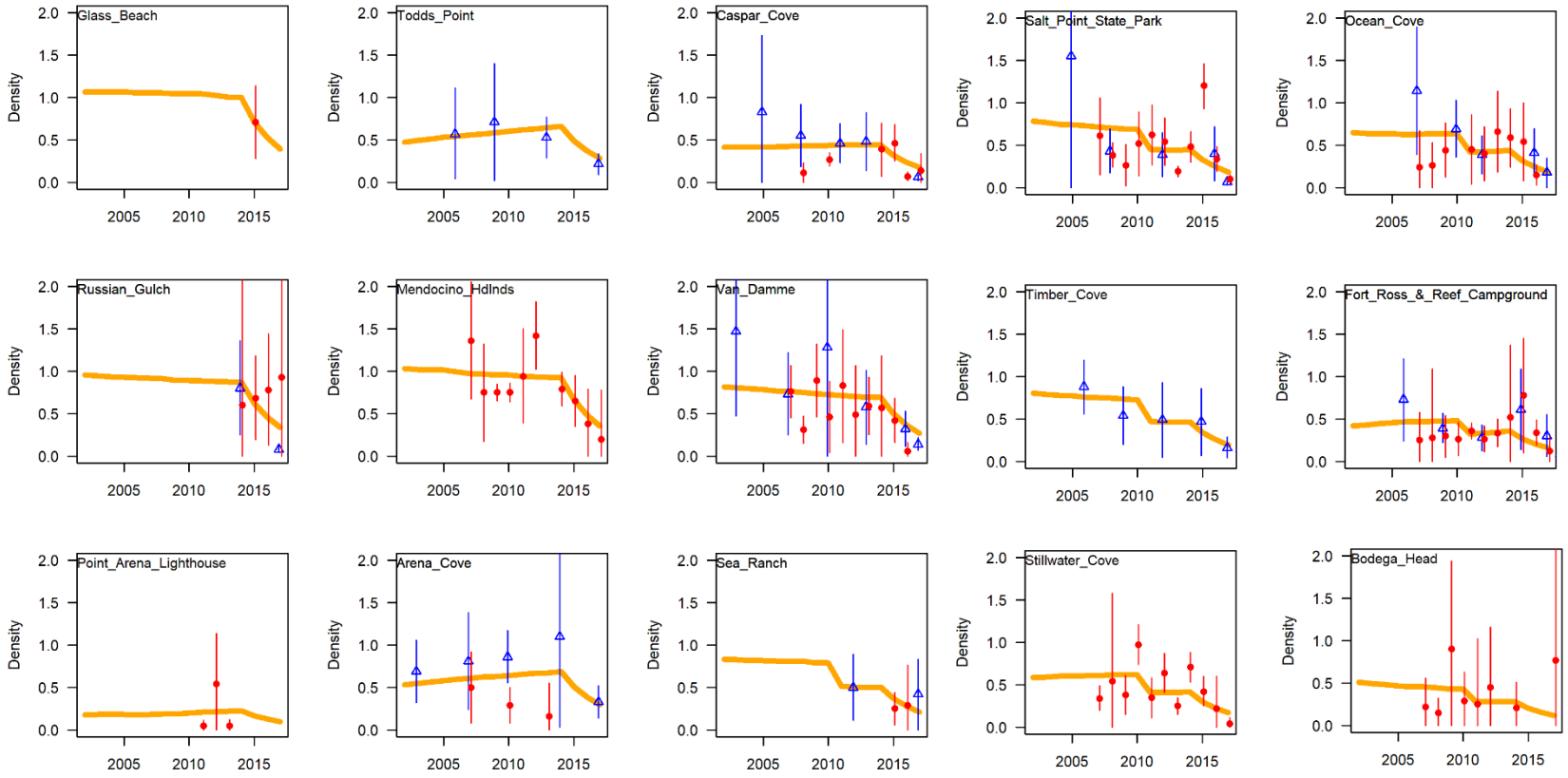

CDFW density

RCCA density

Population model

Density: number per m^2

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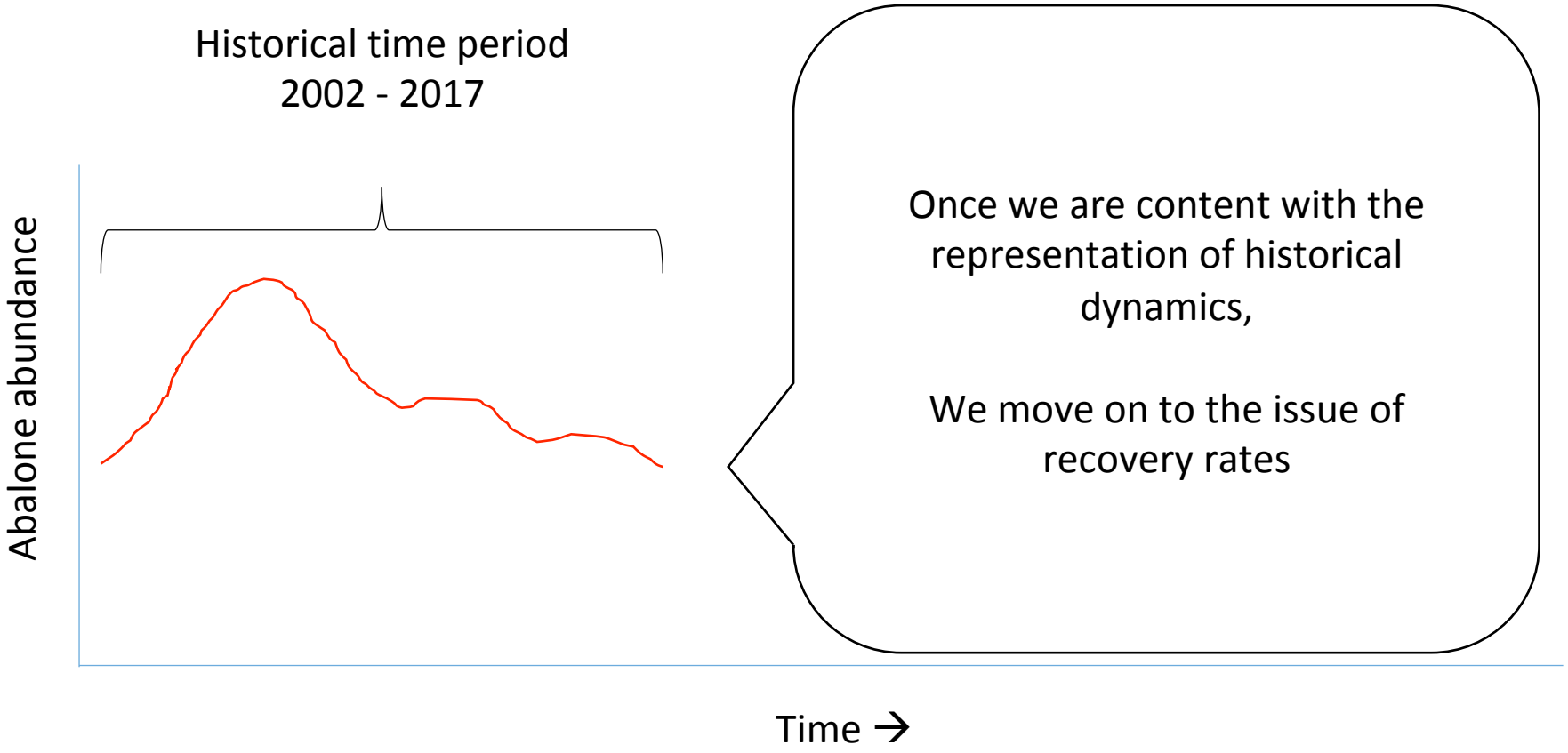
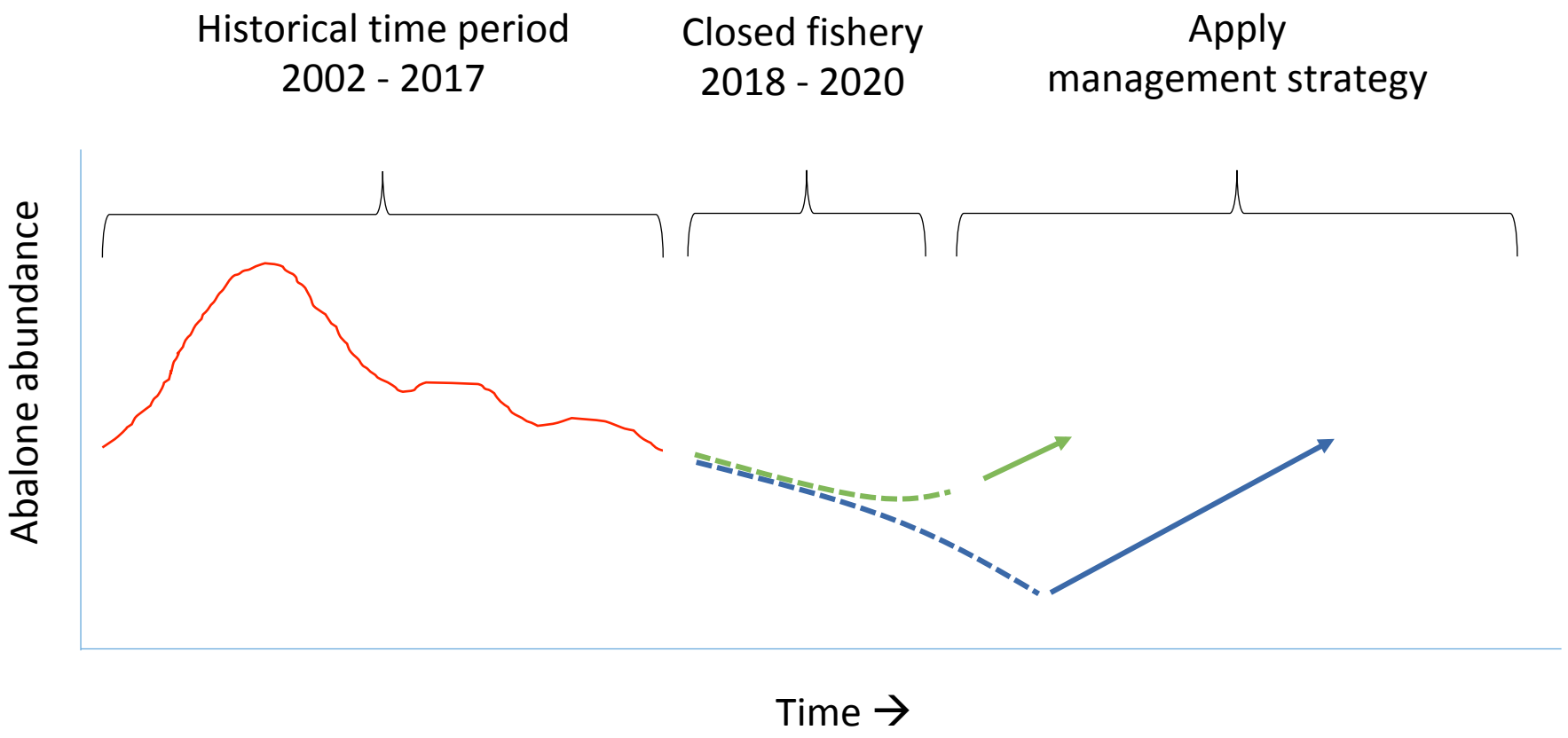


2. Red abalone recovery rates



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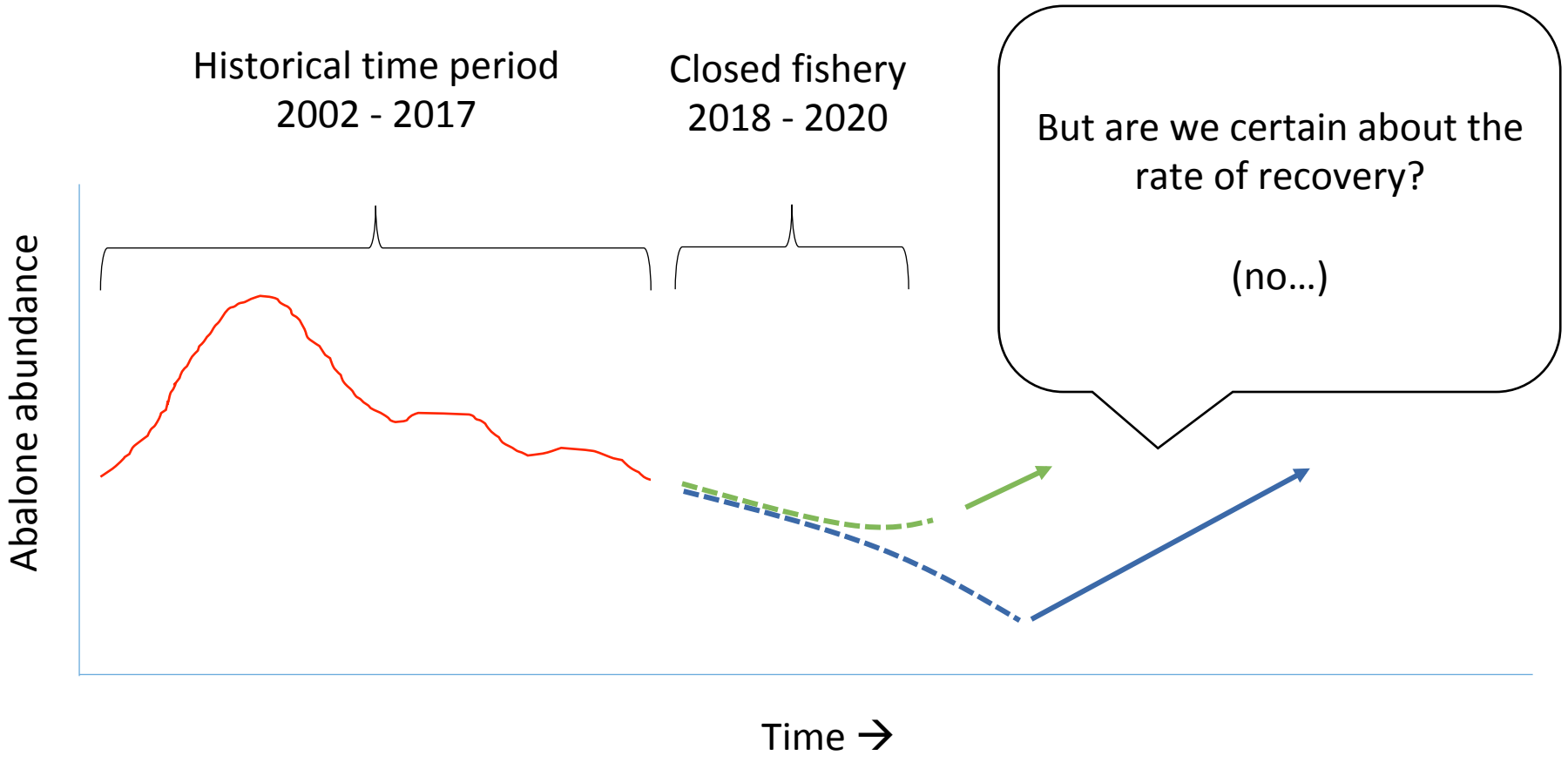

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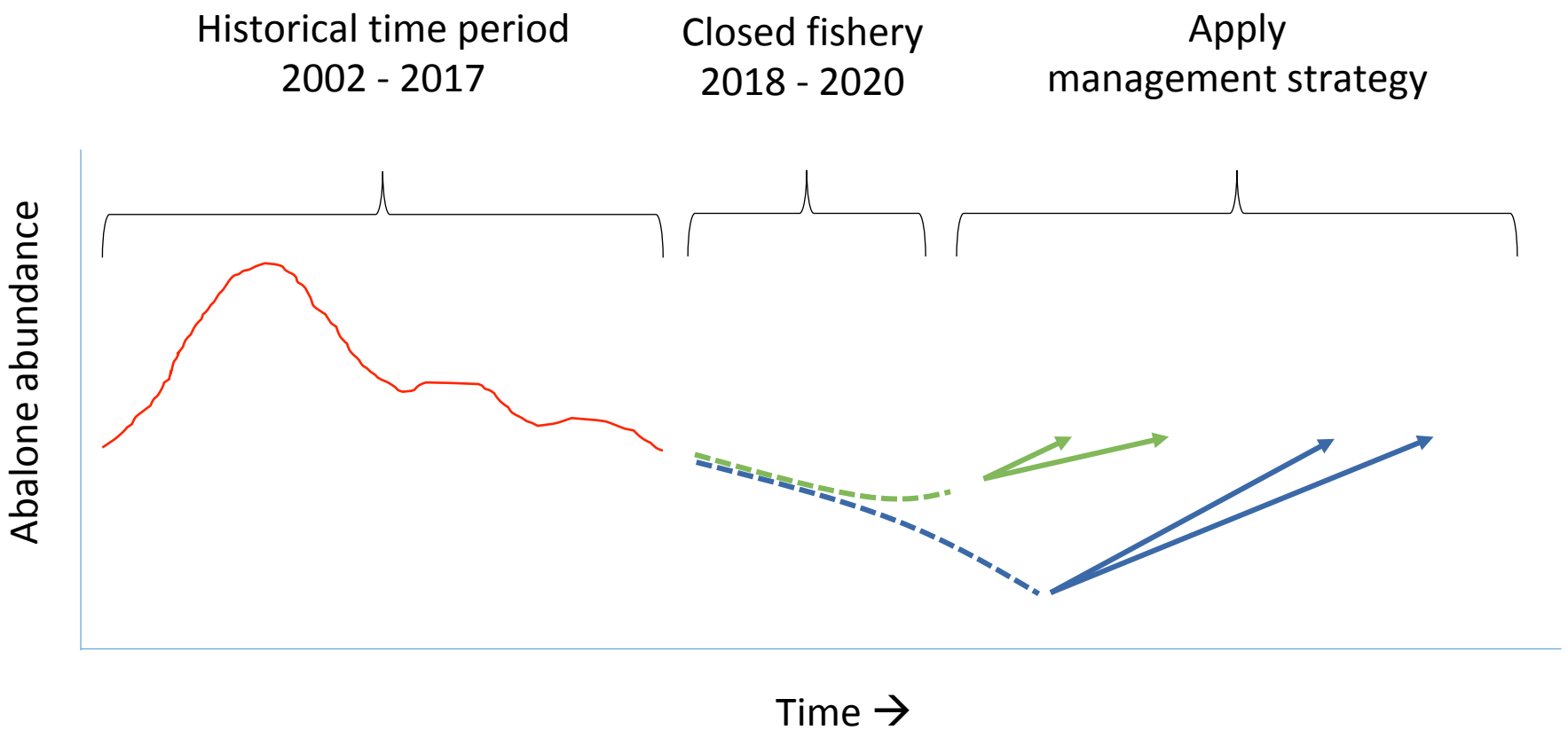
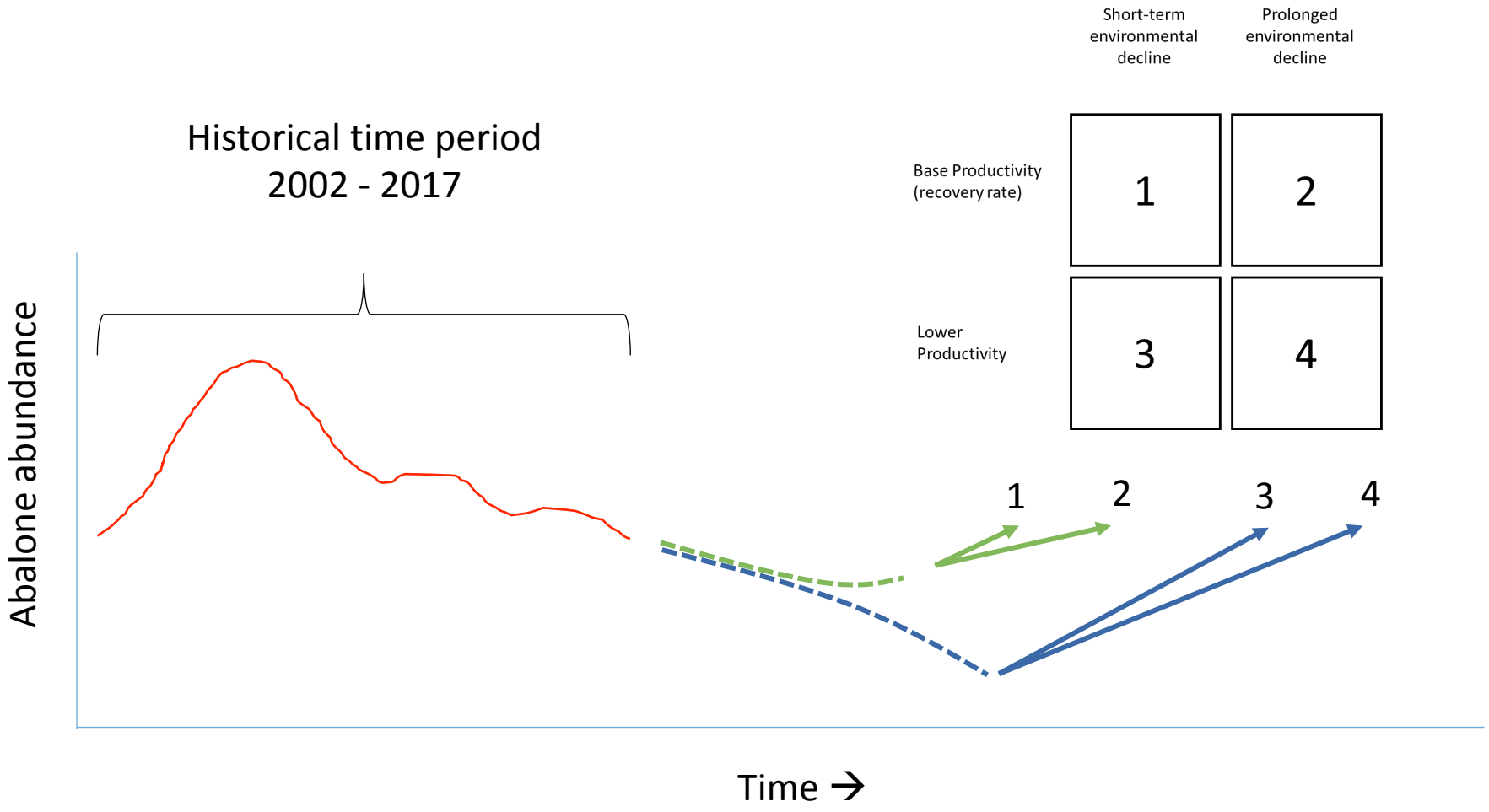


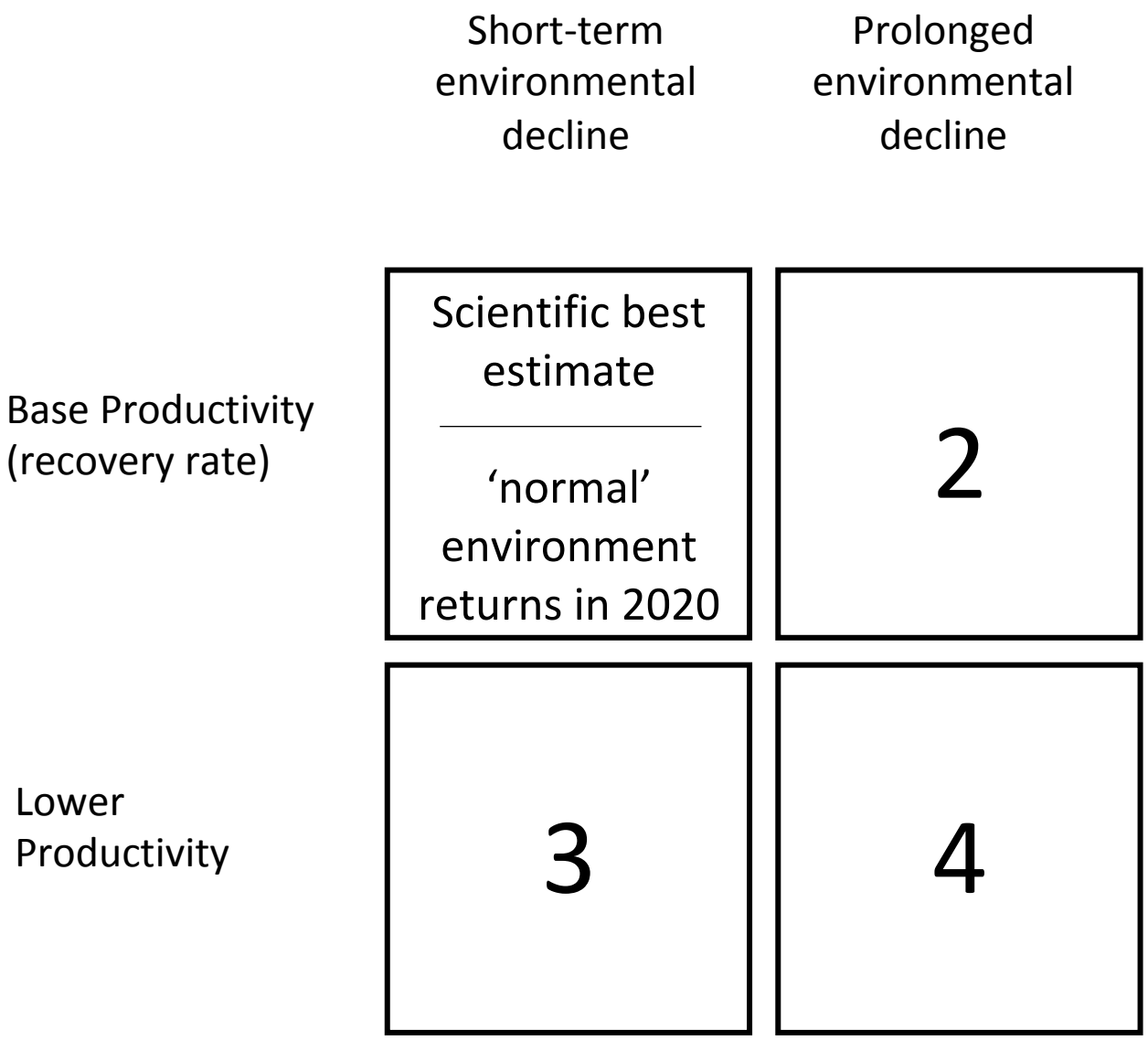
2. Red abalone recovery rates

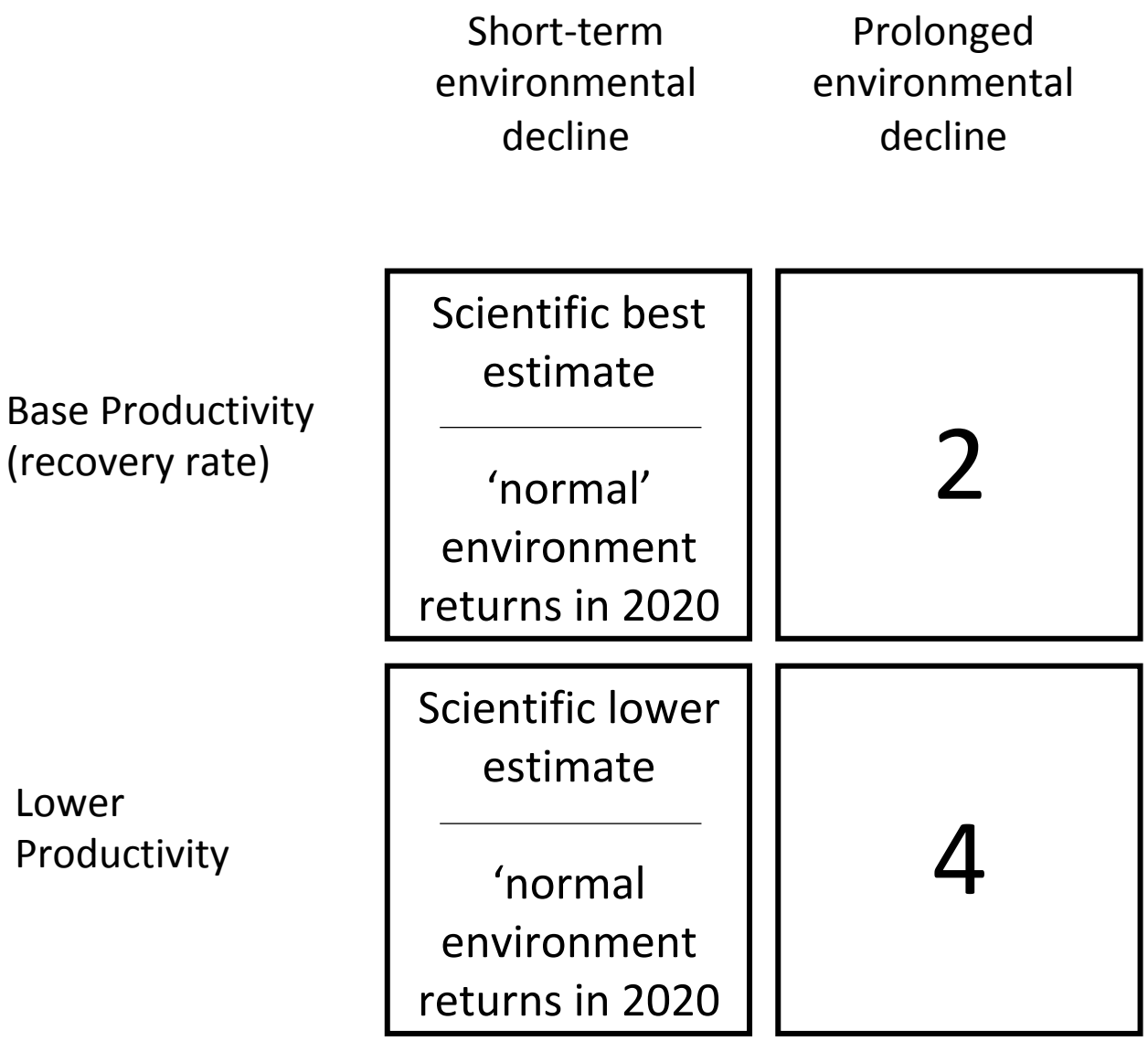
A primer for understanding MSE:

- Biology and environment will affect recovery time
- We need to explicitly recognize these uncertainties, as they may affect decision-making
- We do so by specifying multiple scenarios about red abalone biology and recovery.

2. Red abalone recovery rates




Short-term environmental decline
Prolonged environmental decline
Base Productivity (recovery rate)
Lower Productivity
Scientific best estimate
'normal' environment returns in 2020
2
3
4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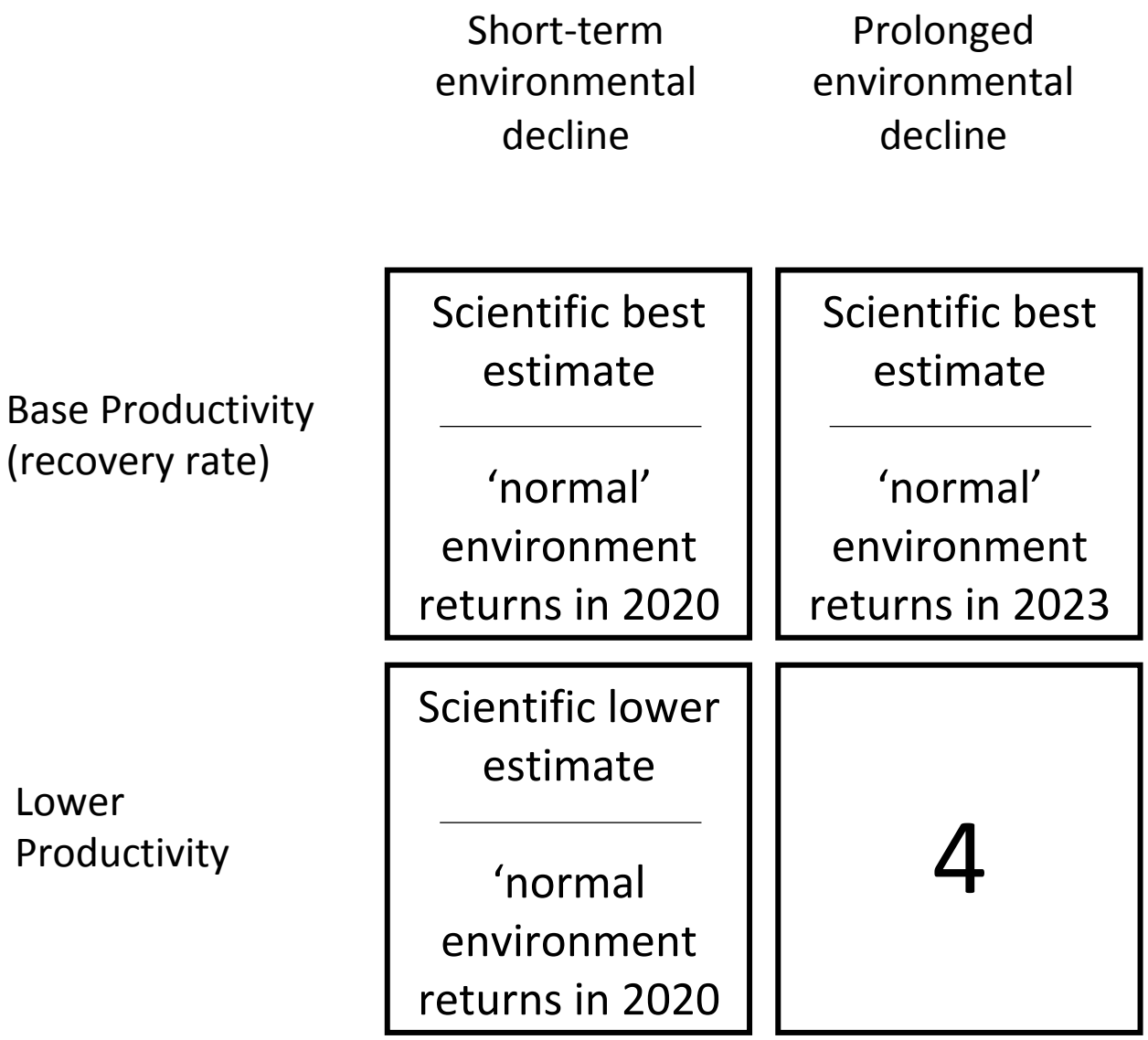
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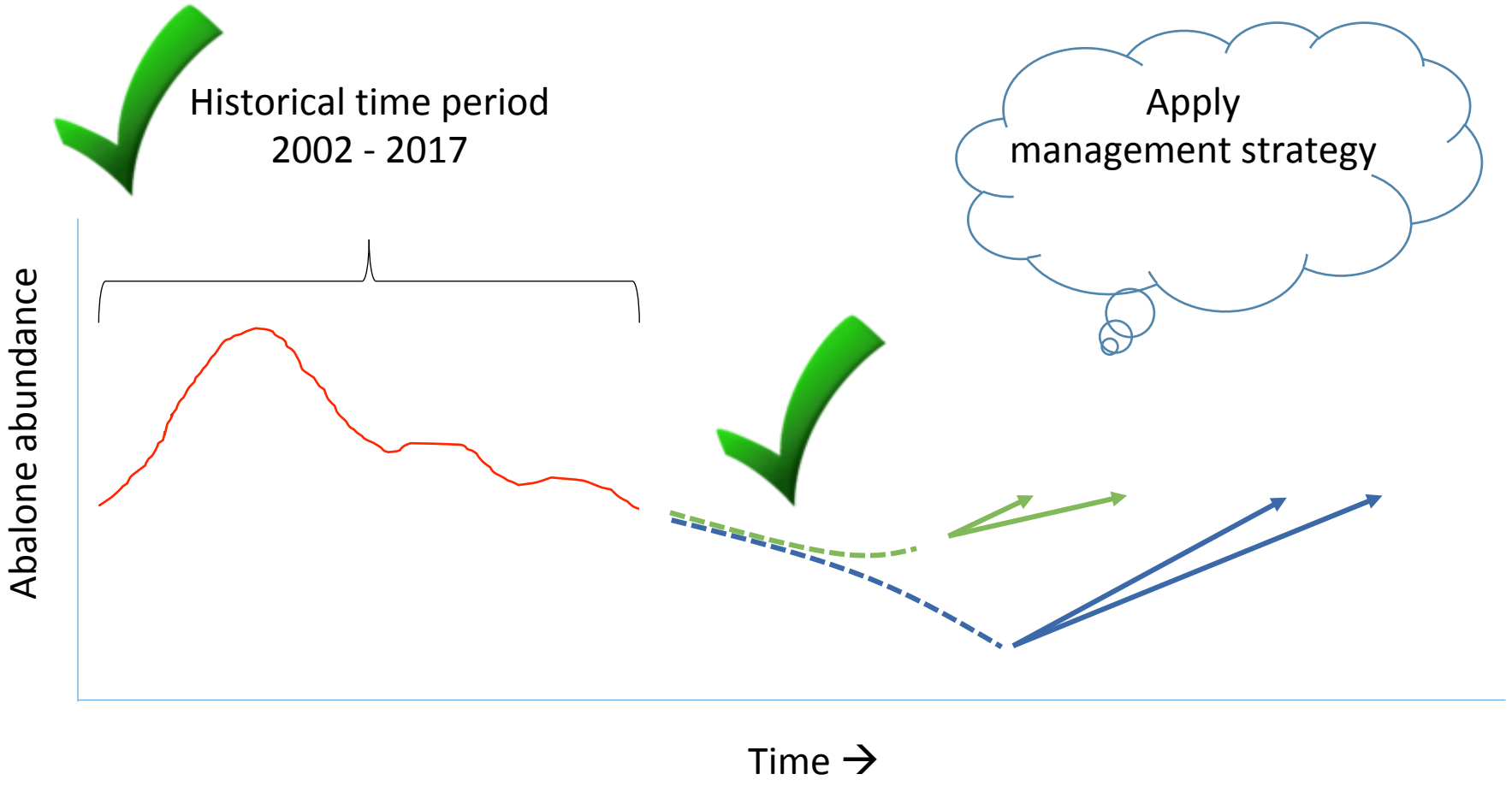
	Short-term environmental decline	Prolonged environmental decline
Base Productivity (recovery rate)	Scientific best estimate ‘normal’ environment returns in 2020	Scientific best estimate ‘normal’ environment returns in 2023
Lower Productivity	Scientific lower estimate ‘normal’ environment returns in 2020	Scientific lower estimate ‘normal’ environment returns in 2023

Recap of agenda items 1 & 2

A primer for understanding MSE:

- Historical tuning serves as a departure point for application of a management strategy (as a model-based forecast)
- Abalone biology and environment are uncertain, but each will affect recovery rates
- By developing multiple biological/environmental scenarios we provide a more comprehensive analysis of potential recovery patterns

Recap of agenda items 1 & 2



3. Summary of the 2-zone strategy

Current specification of 2-zone strategy:

Mendocino county + northward

Sonoma county + southward

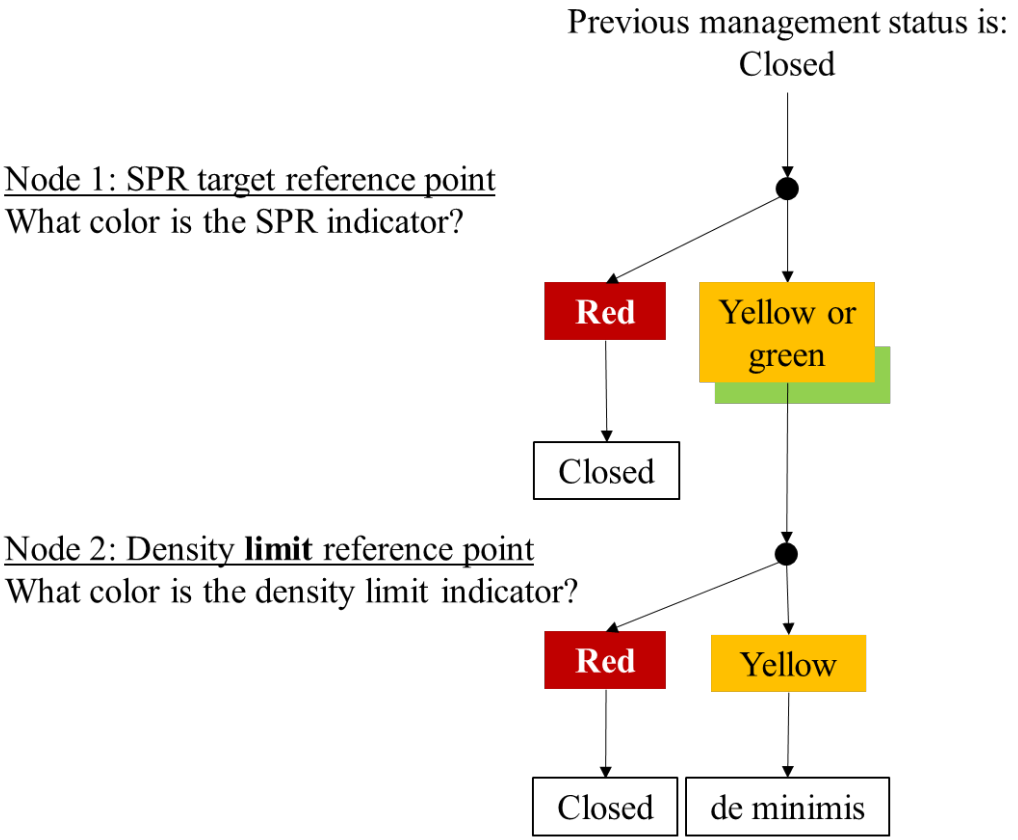
3. Summary of the 2-zone strategy

Current specification of 2-zone strategy:

- Part A: exceptional circumstances is bypassed in MSE
- Part B: De minimis management strategy is specified as a computer algorithm
- Part B uses two indicators in a set of three decision trees: density and spawning potential ratio

3. Summary of the 2-zone strategy

As a refresher…one of the three decision-trees



3. Summary of the 2-zone strategy

The specified algorithm simulates field sampling from CDFW and Reef Check

CDFW:

- Length measurements simulated
- Density measurements simulated
- Simulated according likely level of sampling reliability and precision
- 3 of 10 index sites visited each year

3. Summary of the 2-zone strategy

The specified algorithm simulates field sampling from CDFW and Reef Check

Reef Check:

- Length measurements simulated
- Density measurements simulated
- Simulated according likely level of sampling reliability and precision
- 9 of 14 abalone report-card sites visited each year

3. Summary of the 2-zone strategy

- Density and spawning potential ratio estimates obtained from CDFW and Reef Check are both used in management strategy
- Maximizes site coverage used in decision-making
- The management strategy is applied each year.

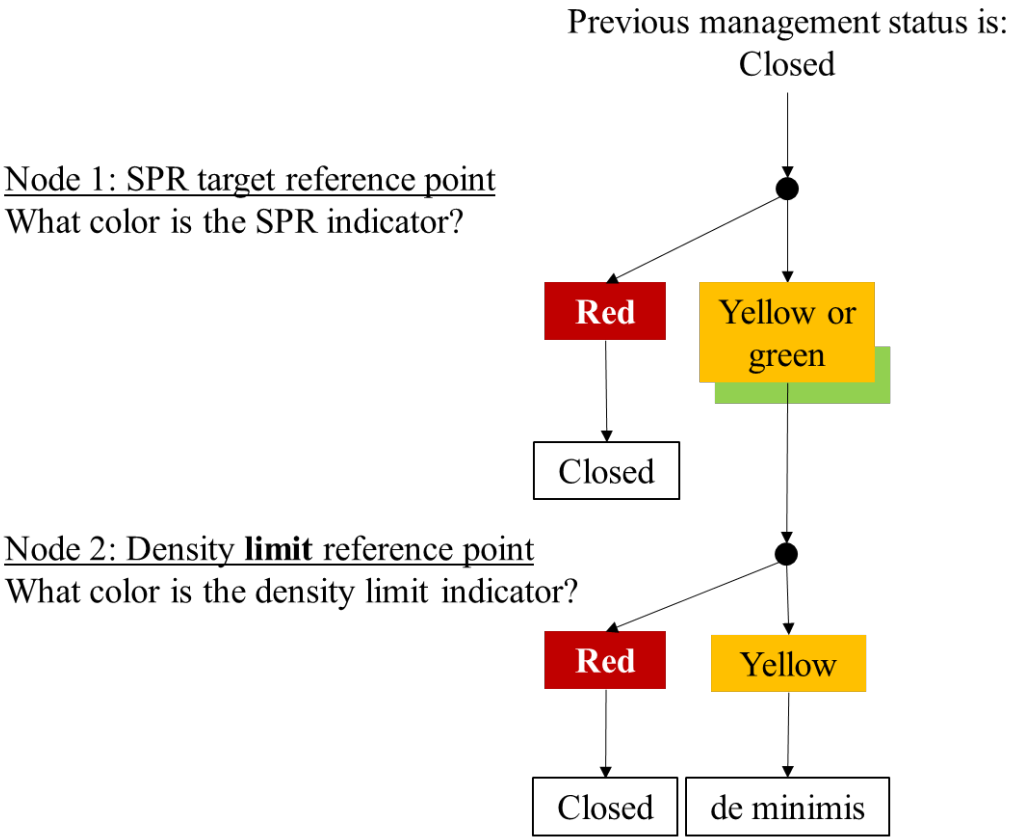
3. Summary of the 2-zone strategy

Triggering changes in fishery status:

- One spawning potential ratio reference point
- Three density reference points
- Several criteria for determining when those reference points have been reached or exceeded, thus enabling various levels of fishing

3. Summary of the 2-zone strategy

As a refresher…one of the three decision-trees



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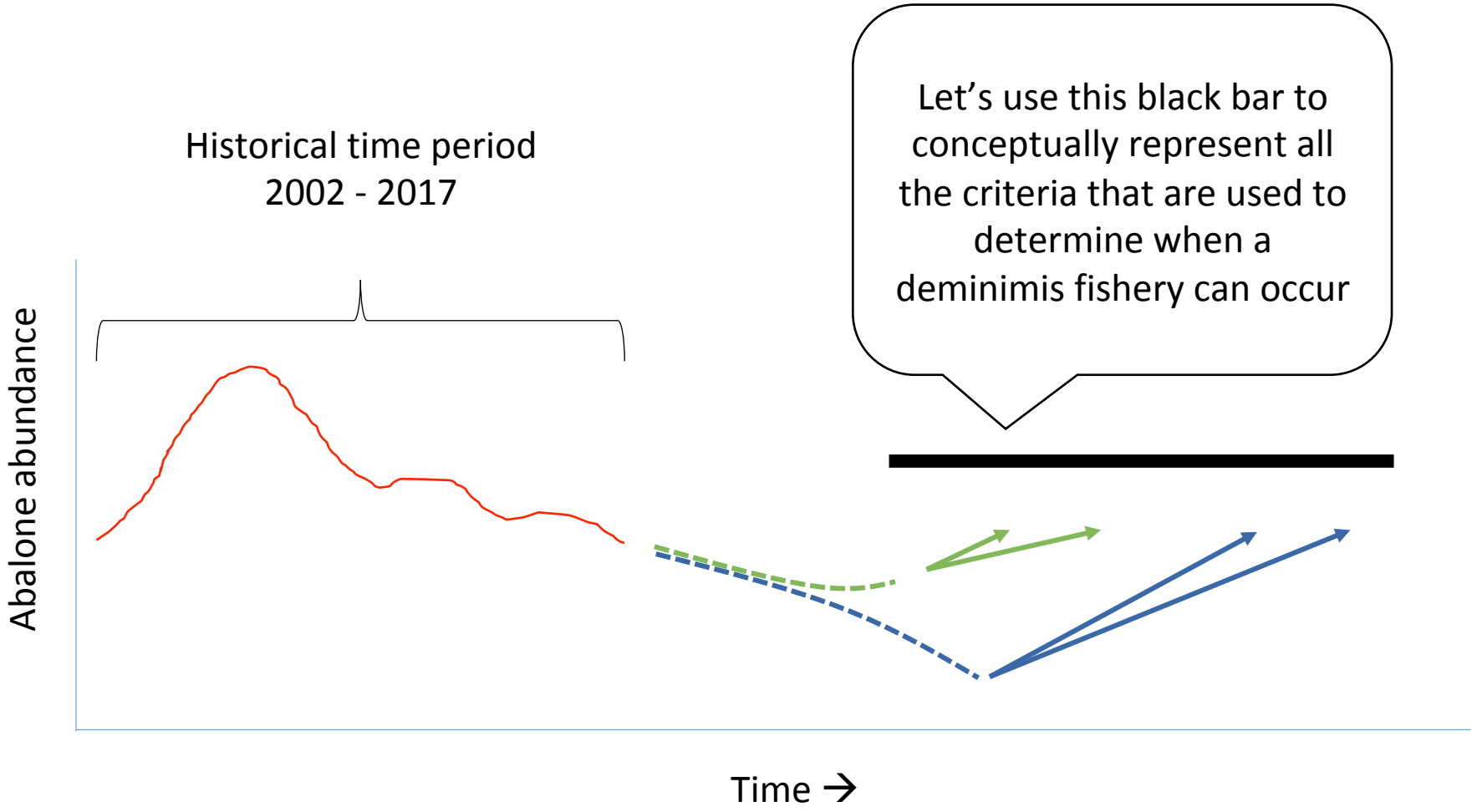

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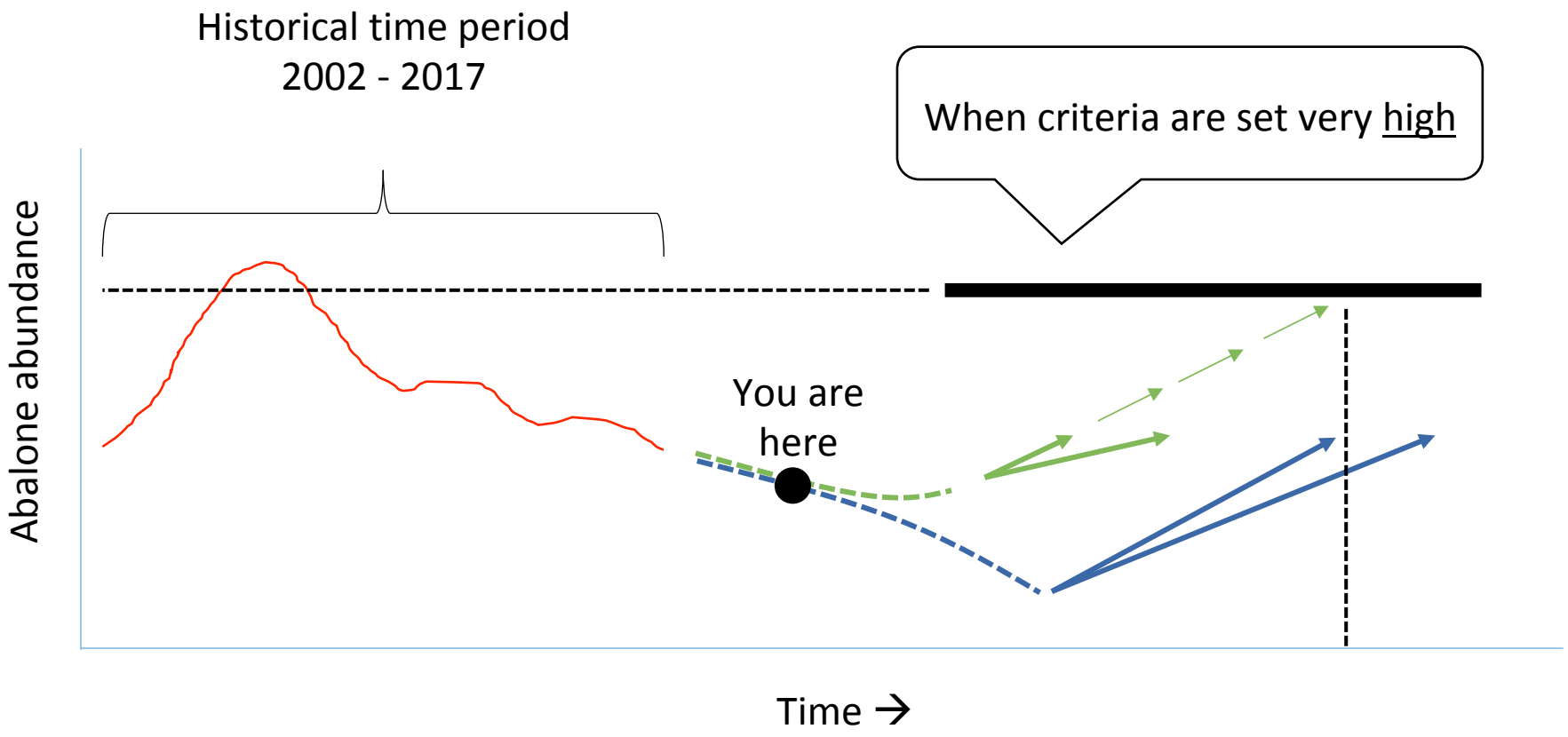

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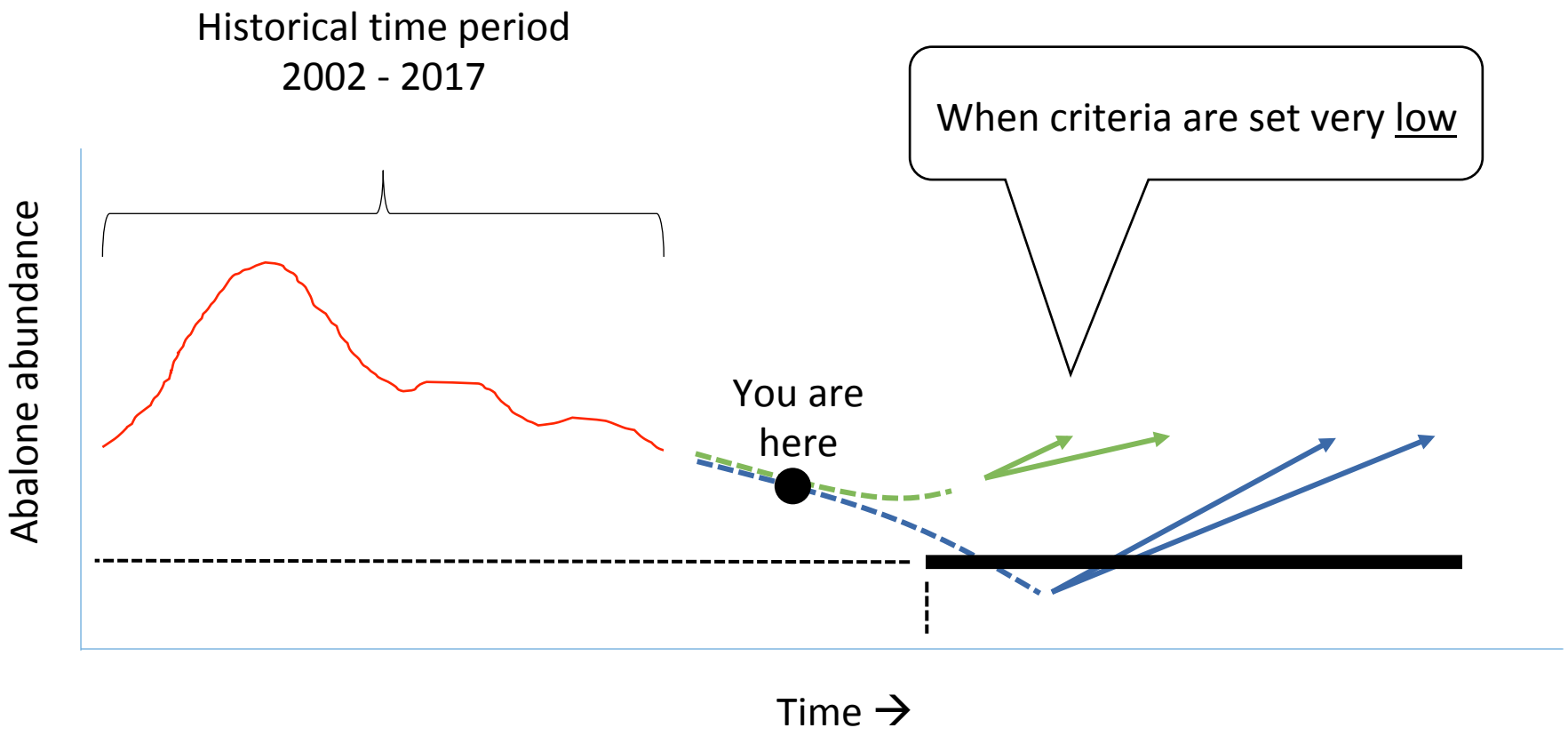
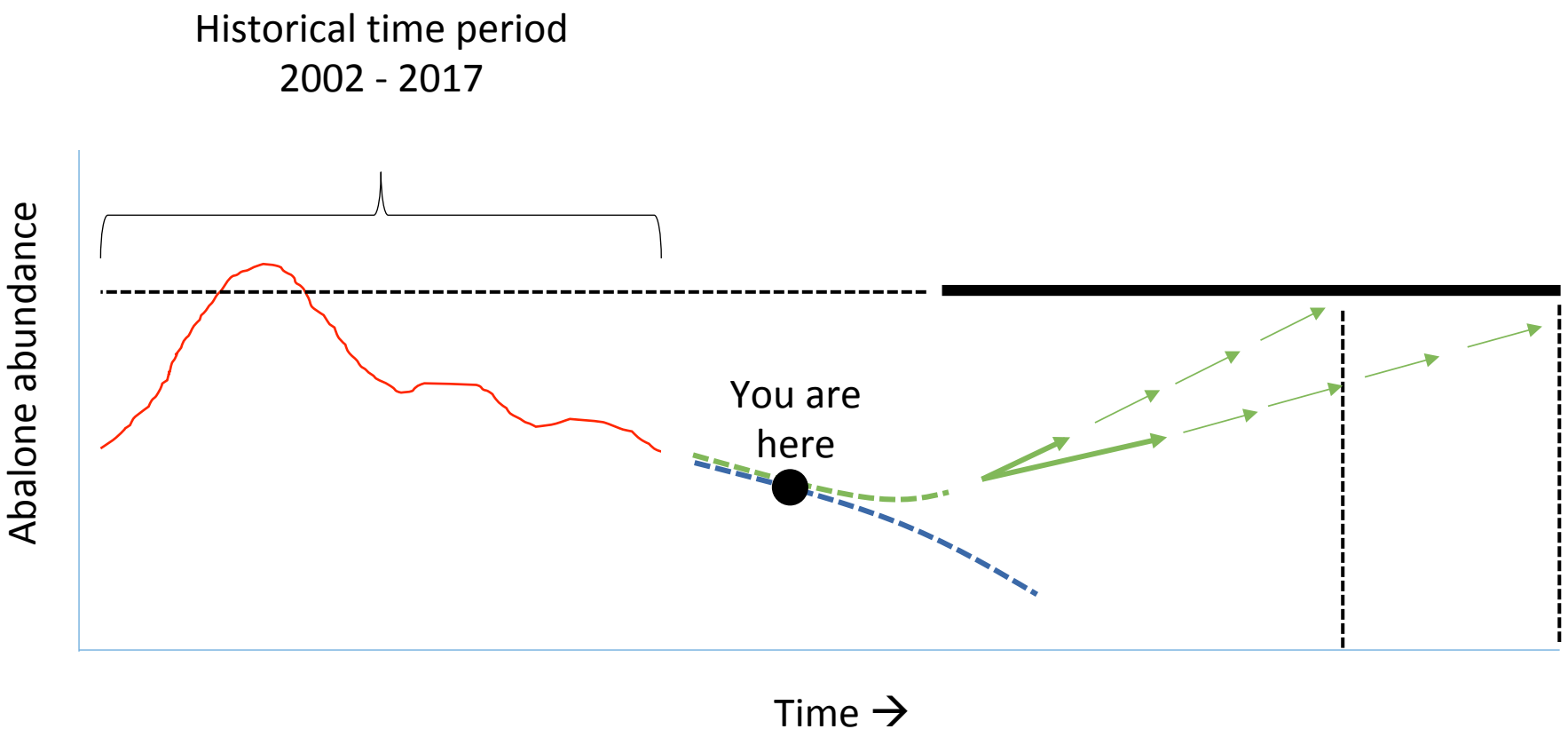


Recap of agenda item 3

A primer for understanding MSE:

- Criteria and reference points determine management strategy functioning
- Criteria/reference points define what is considered recovered and/or triggering of fishing
- Both abalone recovery rate and criteria/reference points will together affect time to recovery

Recap of agenda item 3



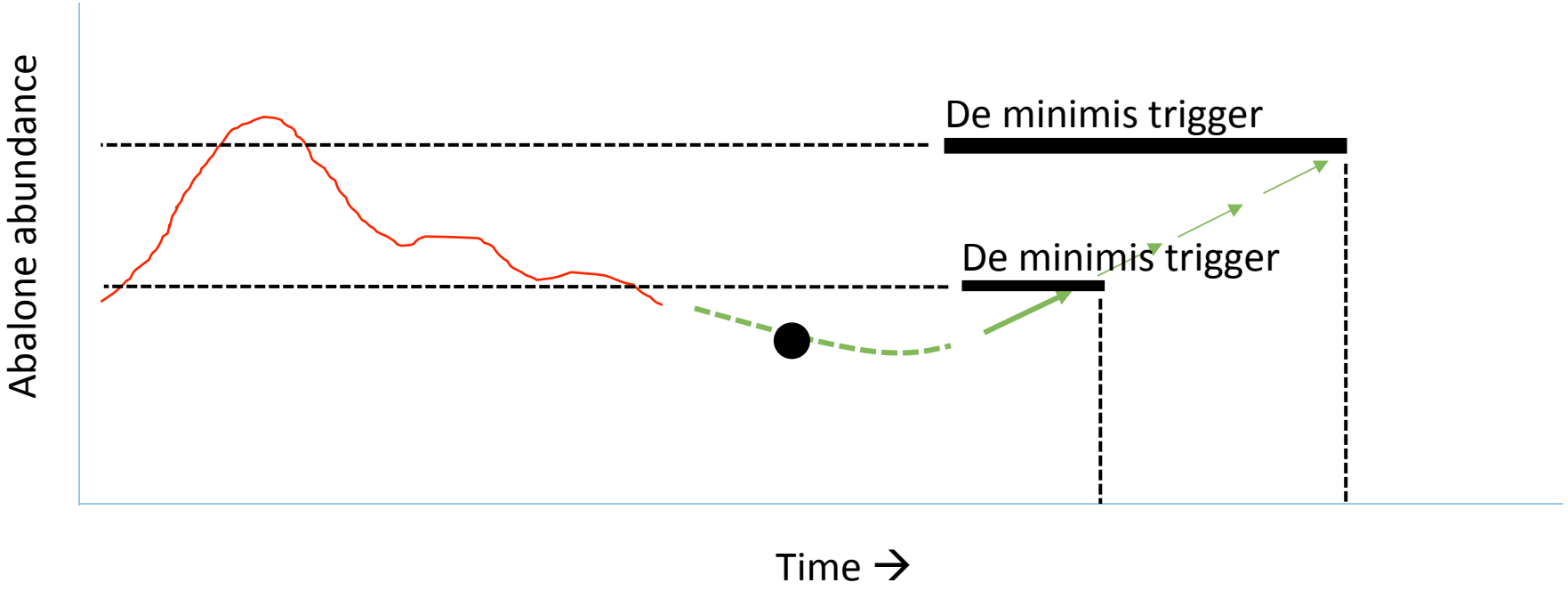
4. Primer for understanding trade-offs

- Many trade-offs exist in managing abalone, MSE highlights those trade-offs
- Trade-offs are a way to translate scientific analysis into value-based judgements about fishery management
- In MSE, trade-offs are presented as performance metrics

4. Primer for understanding trade-offs

Trade-off #1:

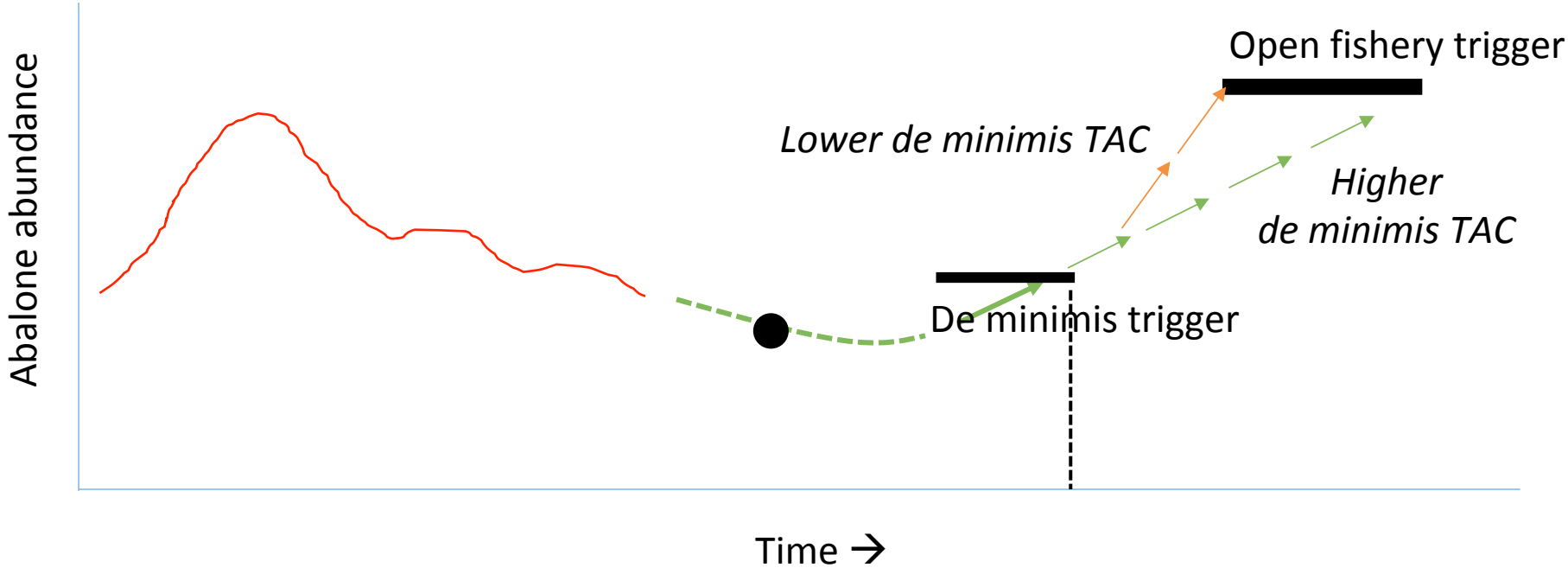
De minimis fishery sooner
or
afford more protection to abalone?



4. Primer for understanding trade-offs

Trade-off #2

Catch more, prolonging the de minimis phase
or
Catch less, achieving open fishery sooner



4. Primer for understanding trade-offs

Modeling team has been thinking about performance metrics:

- Time to de minimis fishery
- Abalone stock status at time of de minimis fishery

- Time from de minimis to open fishery
- Abalone stock status at time of open fishery

- Cumulative catch during de minimis fishery

- Probability of possible Allee effect events during recovery

Questions?

Are there other trade-offs the PT would like to highlight?