OMMEG interpretation of the ASCOBANS conservation objective

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2023-05-16

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Purpose of this presentation

(i) Context in which OSPAR work took place

(ii) Clarify the work done by the OSPAR Marine Mammal Expert Group (OMMEG)

(iii) Highlight the knowledge gap identified in the QSR 2023

OSPAR request to ICES (2014)

Marine Strategy Framework Directive (EC 56/2008)

European Union

« Marine Strategy Framework » Directive (2008/56/EC)

Biodiversity descriptor (D1):

D1C1 – The mortality rate per species from incidental by-catch is below levels which threaten the species, such that its **long-term viability** is ensured.

Regional coordination to be achieved through Regional Sea Conventions such as OSPAR or HELCOM

OSPAR request to ICES (2014)

Marine Strategy Framework Directive (EC 56/2008)

“ICES has provided advice [in 2009] to the European Commission under [now repealed] EU Regulation 812/2004 on setting targets for limits on bycatch using an approach known as the Catch Limit Algorithm. Key choices need to be made at the societal/policy level for this advice to be further developed and ICES has offered to help organize a workshop to consider these choices.”

→ Need for a conservation objective

Conservation Objectives in Europe

→ Resolution 3.3 (2000)

a) “the aim of ASCOBANS can be interpreted as "to restore and/or maintain biological or management stocks of small cetaceans at the level they would reach when there is the lowest possible anthropogenic influence"”

b) “a suitable short-term practical sub-objective” “to restore and/or maintain stocks/populations to **80% or more of the carrying capacity**”

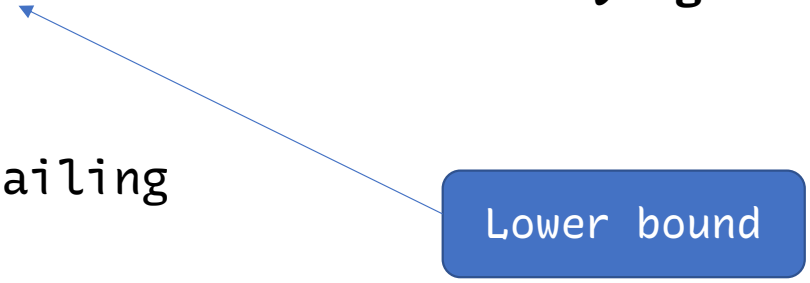
Conservation Objectives in Europe

→ Resolution 3.3 (2000)

a) "the aim of ASCOBANS can be interpreted as "to restore and/or maintain biological or management stocks of small cetaceans at the level they would reach when there is the lowest possible anthropogenic influence""

b) "a suitable short-term practical sub-objective" "to restore and/or maintain stocks/populations to **80% or more of the carrying capacity**"

No time horizon, no associated risk of failing



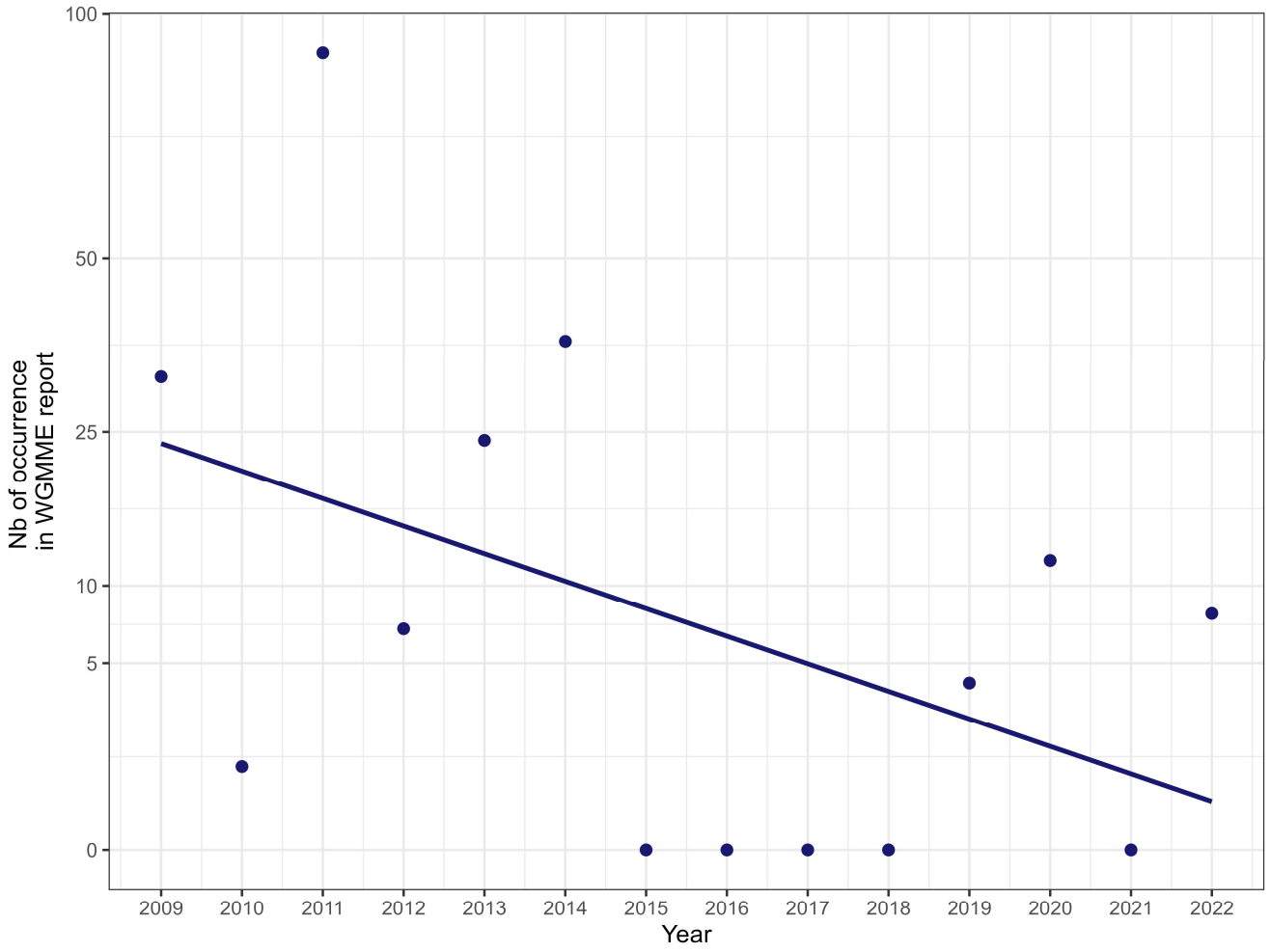
ICES (Working Group Marine Mammal Ecology) reports

Frequencies of regular expression

[conservation objective]

since 2009 advice to EC

→ Decline in mention



OSPAR

Oslo-Paris Convention (1992) for the Protection of the Marine Environment of the North-East Atlantic

The 16 Contracting Parties are

Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom,

together with the European Union

The Convention came into force in 1998.

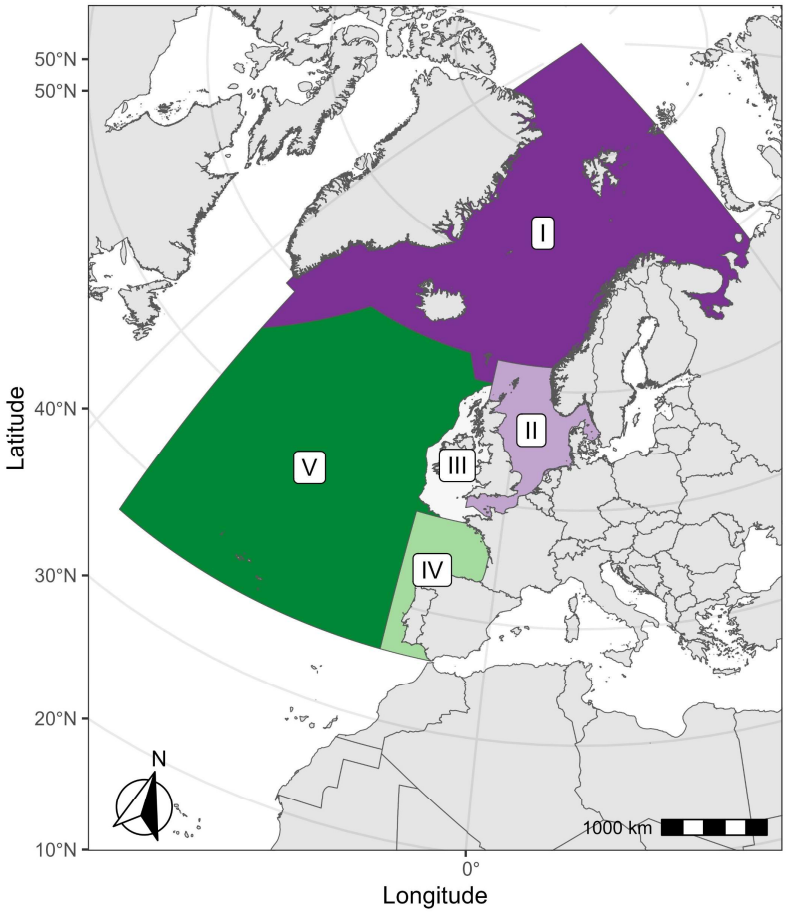
OSPAR

Every 10 years or so, OSPAR issues a Quality Status Report

Intermediate assessment 2017

OSPAR has one agreed common indicator on marine mammal by-catch: M6

(initially M6 was ‘Harbour porpoise bycatch’)



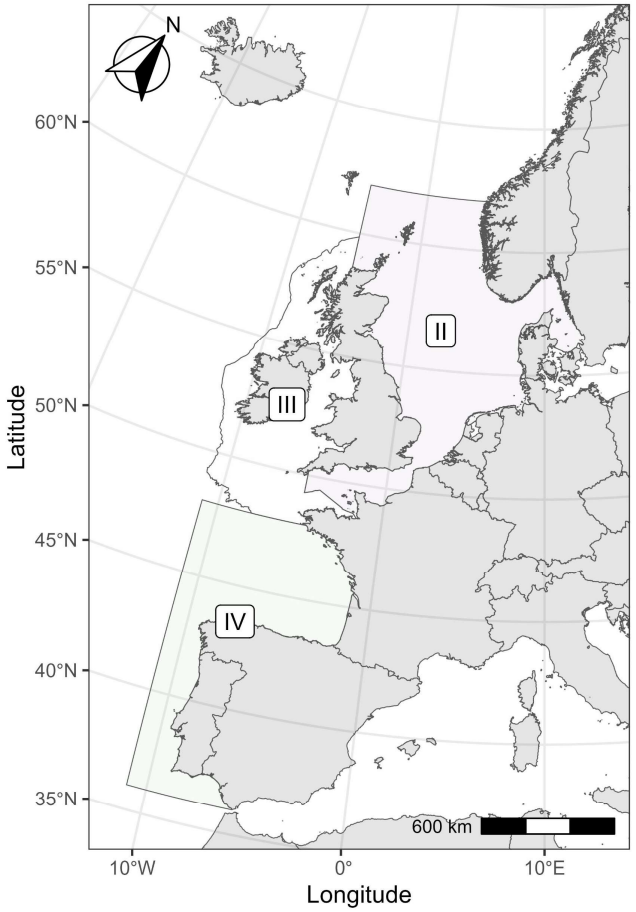
OSPAR

→ M6 common to Contracting Parties in Regions II, III and IV

https://oap.ospar.org/en/ospar-assessments/quality-status-reports/

No assessment of harbour porpoise by-catch in IA 2017 because of a lack of threshold for by-catch

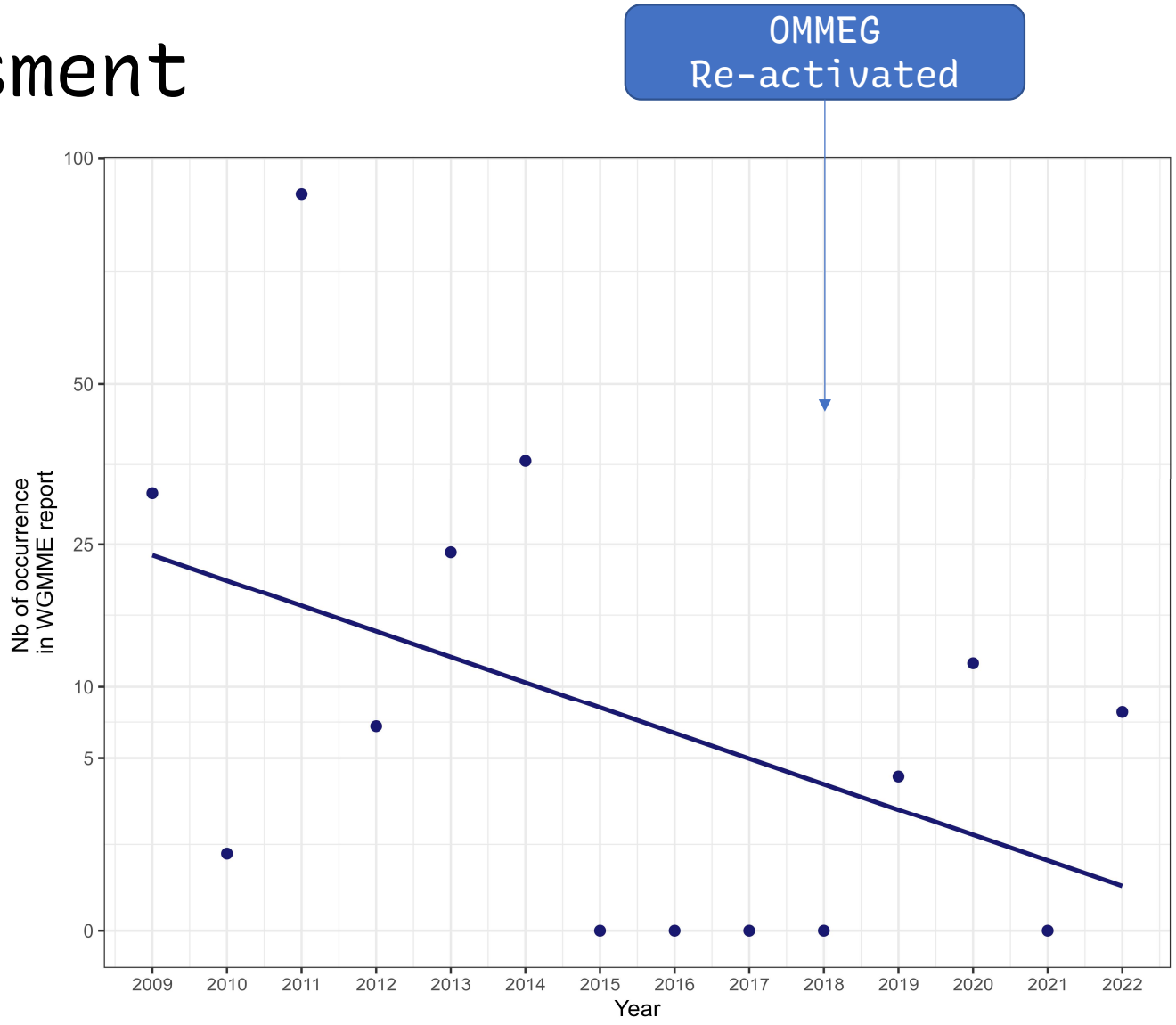
→ Assessment in 2023 (QSR2023)



By-catch assessment

Since 2009, no progress on conservation objective specification in the Northeast Atlantic

2015: ASCOBANS workshops (?)



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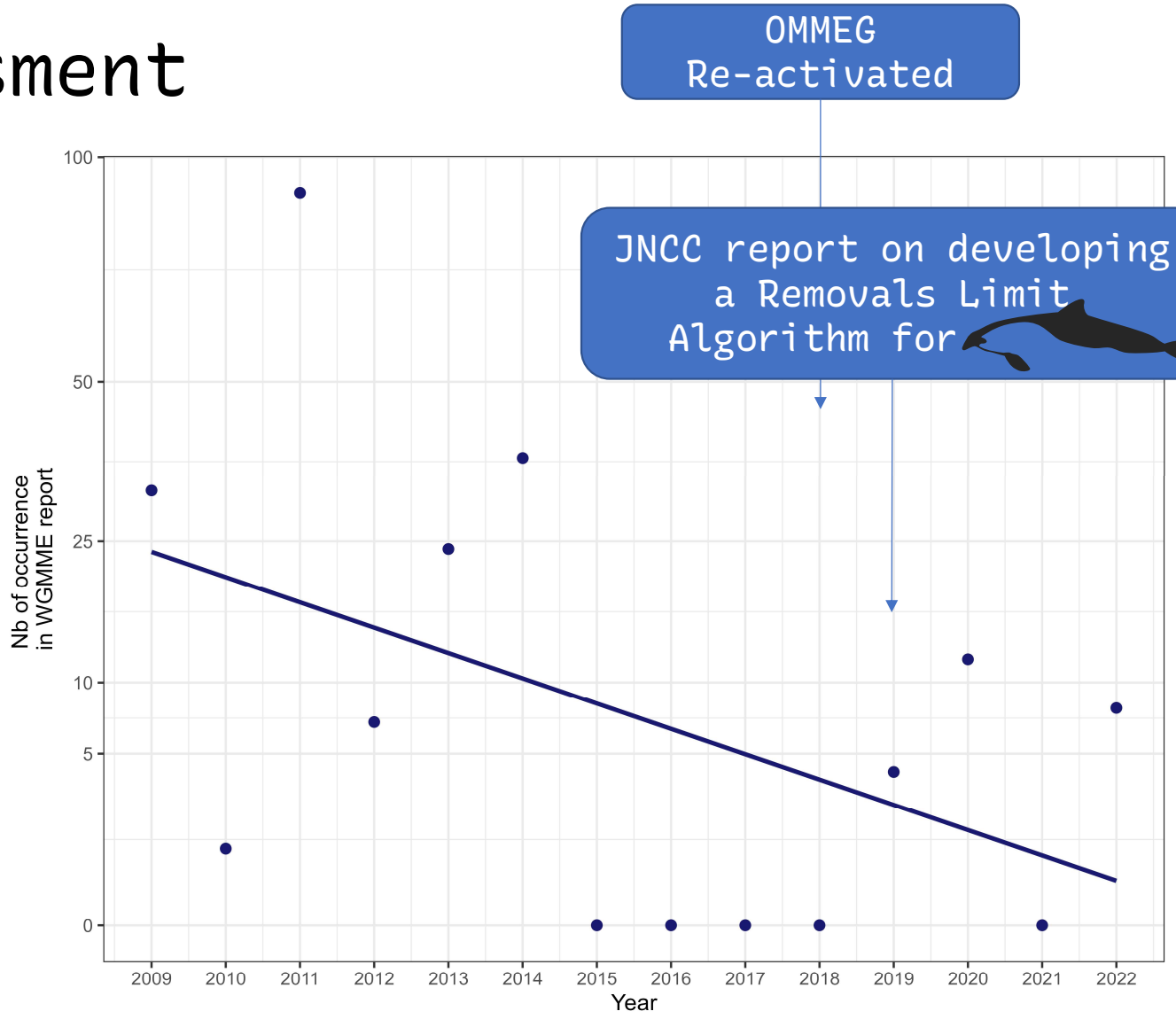
Hammond et al. (2019):

80% of K over 100 years with probability 0.5

2019: Joint OSPAR-HELCOM workshop on by-catch



By-catch assessment

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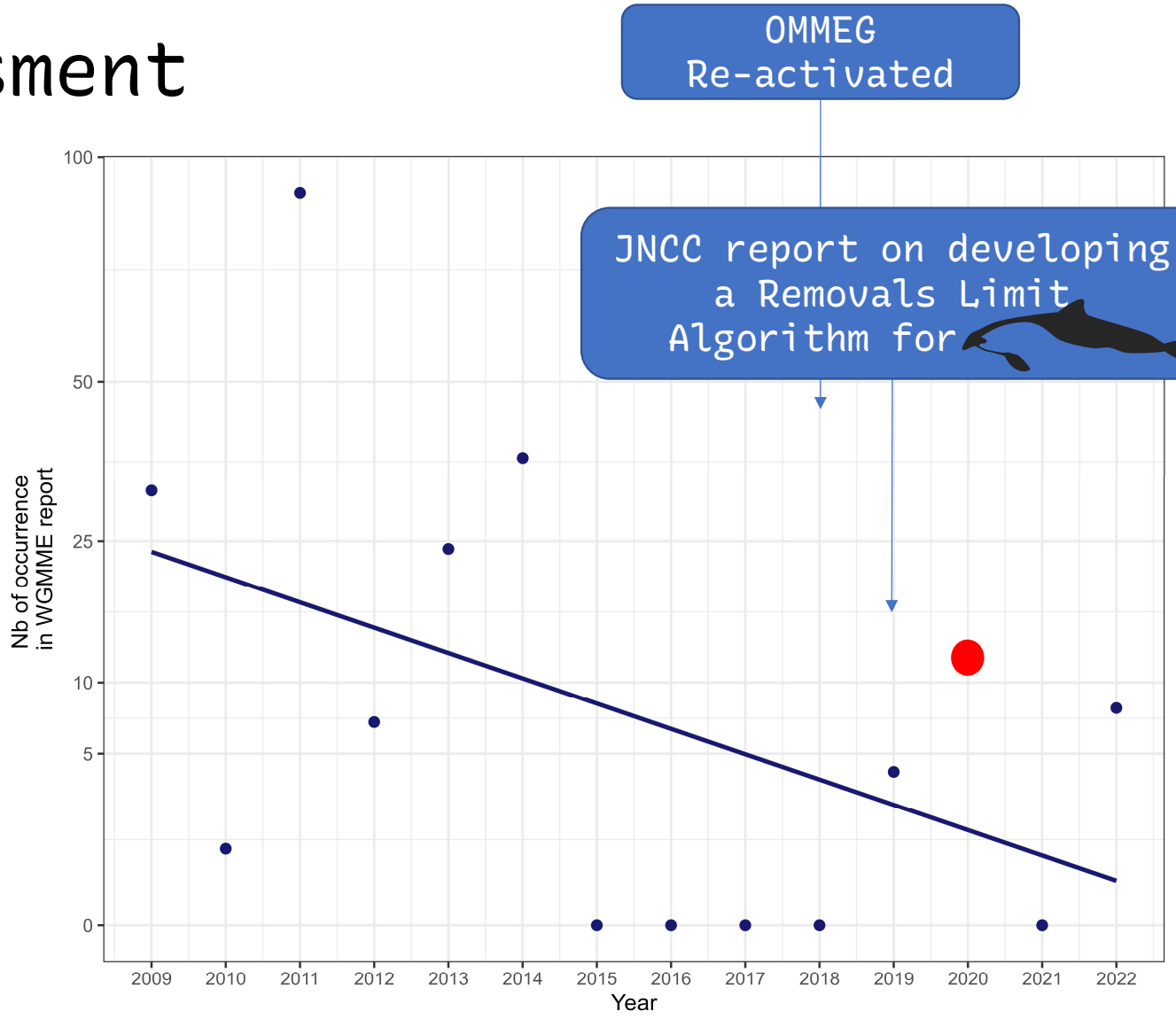
2020: DG Env request to ICES for evaluating by-catch

ICES (WGMME 2020) agreed to use Potential Biological Removal (PBR)



Control rule: PBR

Mathematical formula:

$$\mathrm{PBR} = \frac{r_{\max}}{2} \times \mathrm{N}_{\min} \times \mathrm{F}_R$$

Inputs are

$r_{\max}$ = maximum growth rate
$\mathrm{N}_{\min}$ = estimate of minimum population size
F_R = recovery factor

Control rule

A control rule is a formula to compute a reference point/threshold

→ management milestones for reaching a conservation objective (in the long-term)

A control rule should only depends on data that are available now

A control rule should be robust against bias or and uncertainties in the data

Control rule: PBR

Marine mammal populations should be at their Optimum Sustainable Population (OSP)

Using simulations, Wade (1998) found the values

$r_{\max}$ = 4%,

$\mathrm{N}_{\min}$ = 20% quantile of log-normal distribution of N_{SCANS}

F_R = 0.5

in the formula

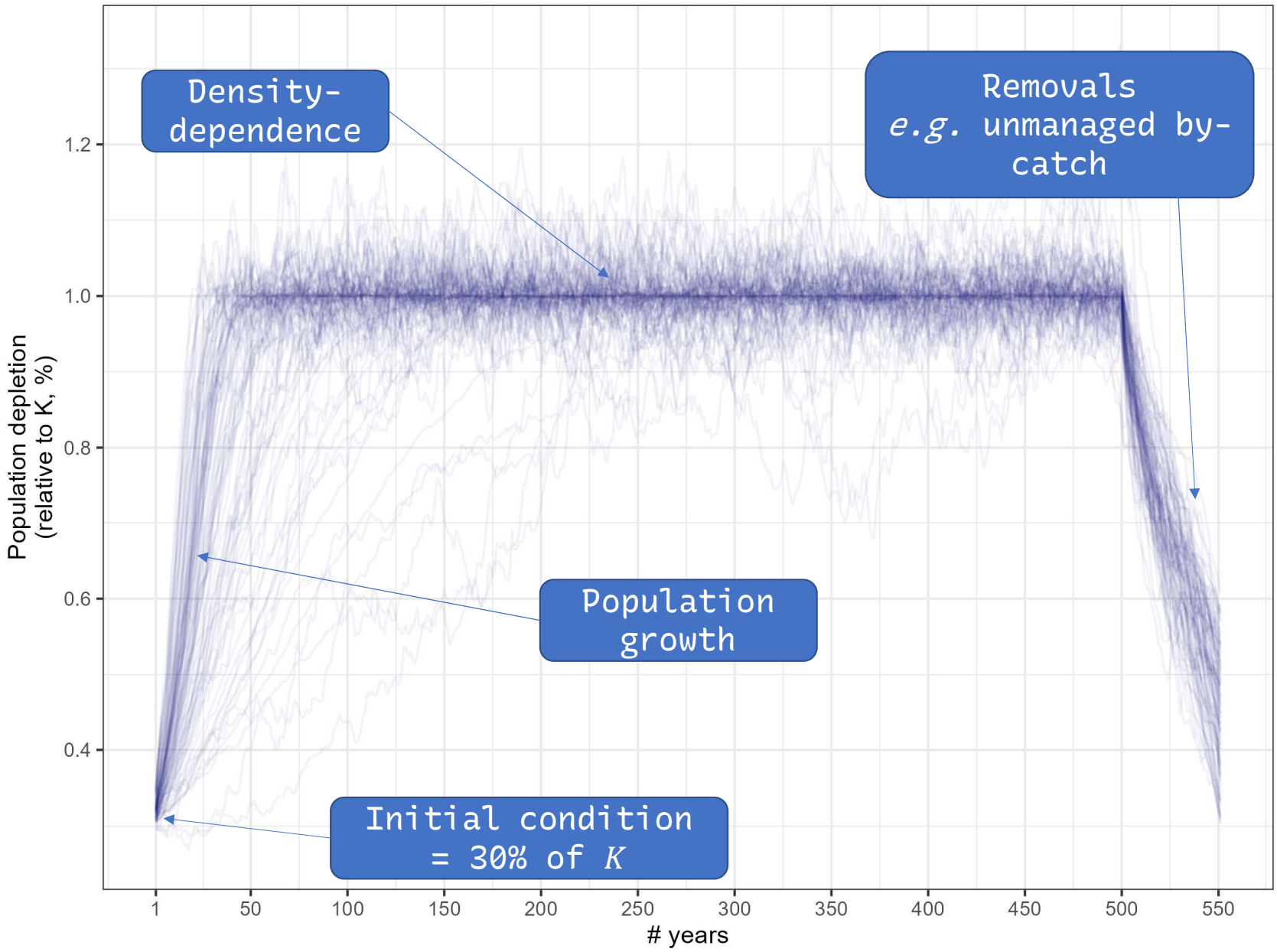
$$\mathrm{PBR} = \frac{r_{\max}}{2} \times \mathrm{N}_{\min} \times \mathrm{F}_R$$

to allow marine mammal population to be at or above OSP

Tuning

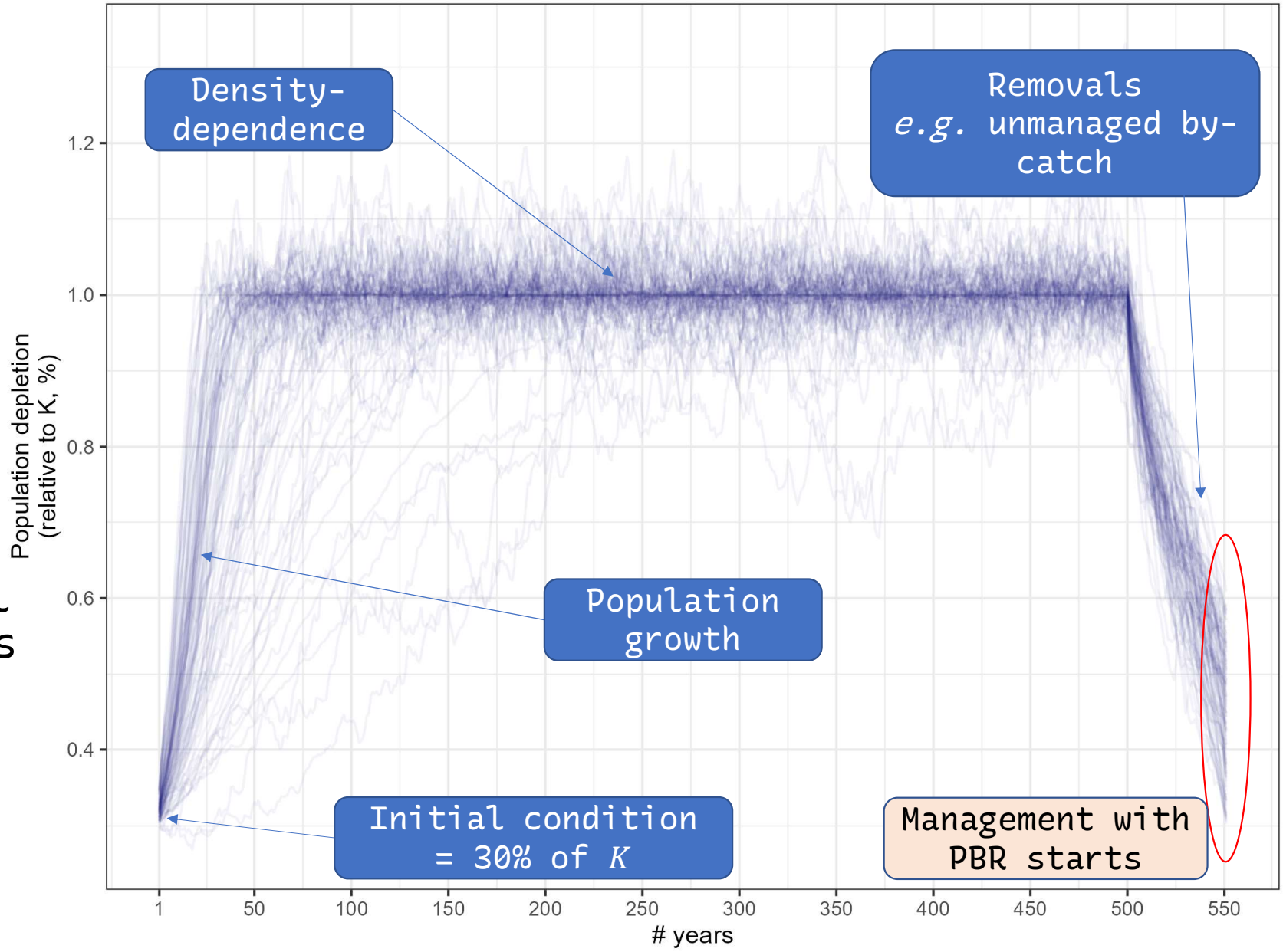
Operating model = population dynamics model (based on the best available knowledge)

100 'virtual populations'



Tuning

100 virtual populations



Tuning

Need to define what is success?

→What is the Conservation Objective to achieve?

In the US, the Marine Mammal Protection Act (US MMPA) defines the CO as:

Marine mammal populations should be at their Optimum Sustainable Population

→ Qualitative statement

Conservation Objectives (US MMPA)

Marine mammal populations should be at their Optimum Sustainable Population (OSP)

Optimum Sustainable Population:

a population should recover to or be maintained at or above 50% of carrying capacity

with 95% probability

over 100 years

Conservation Objectives (US MMPA)

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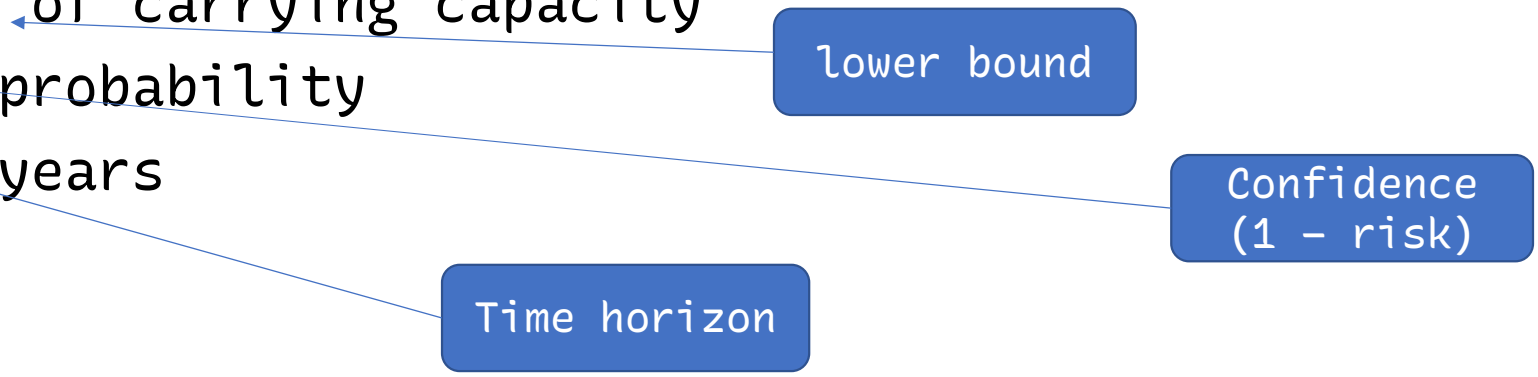


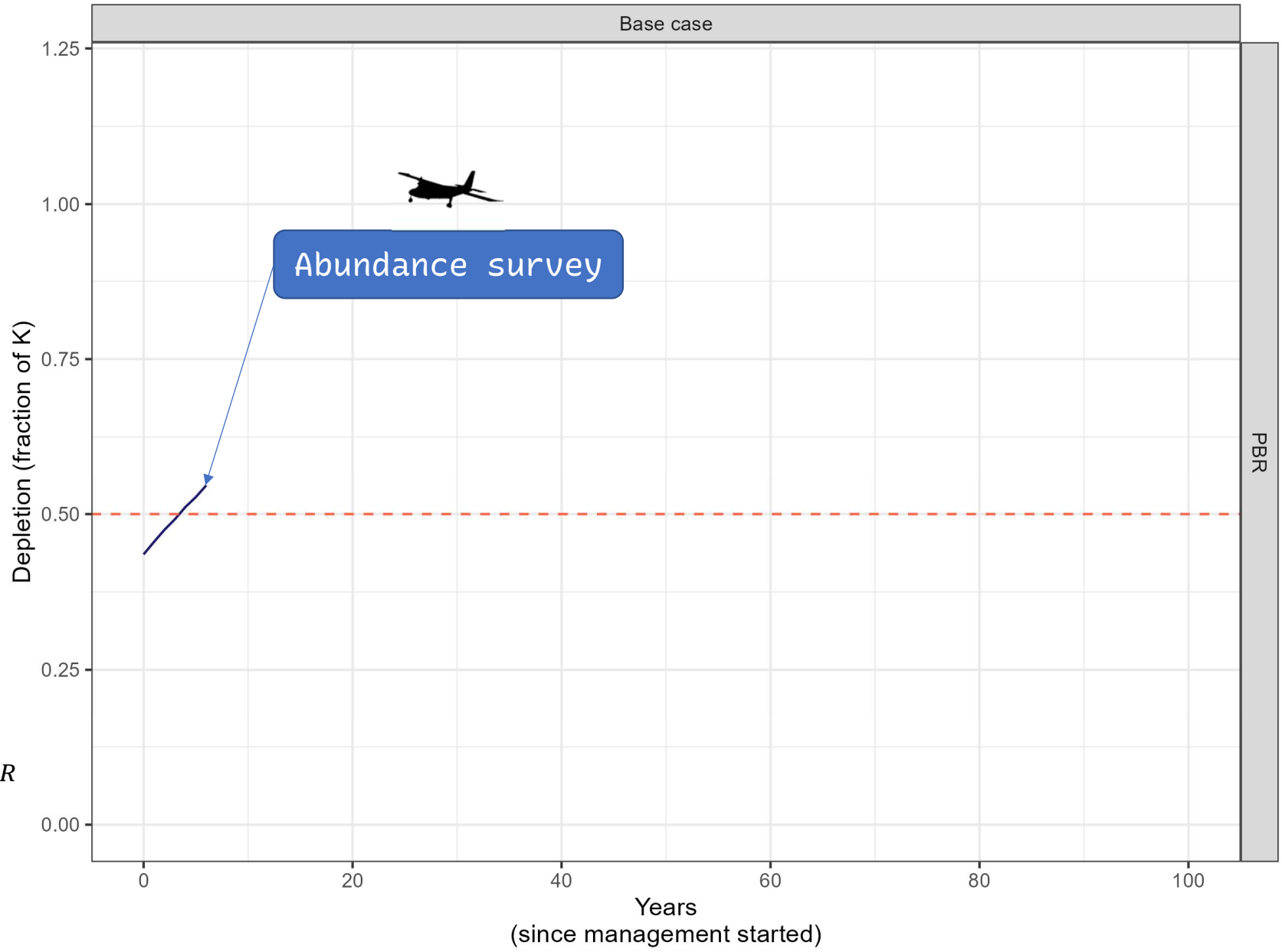
Management milestones with PBR

Assumptions

Removals do not exceed PBR

New survey to update PBR every 6 years

$$\text{PBR} = \frac{r_{\max}}{2} \times \text{N}_{\min} \times \text{F}_R$$



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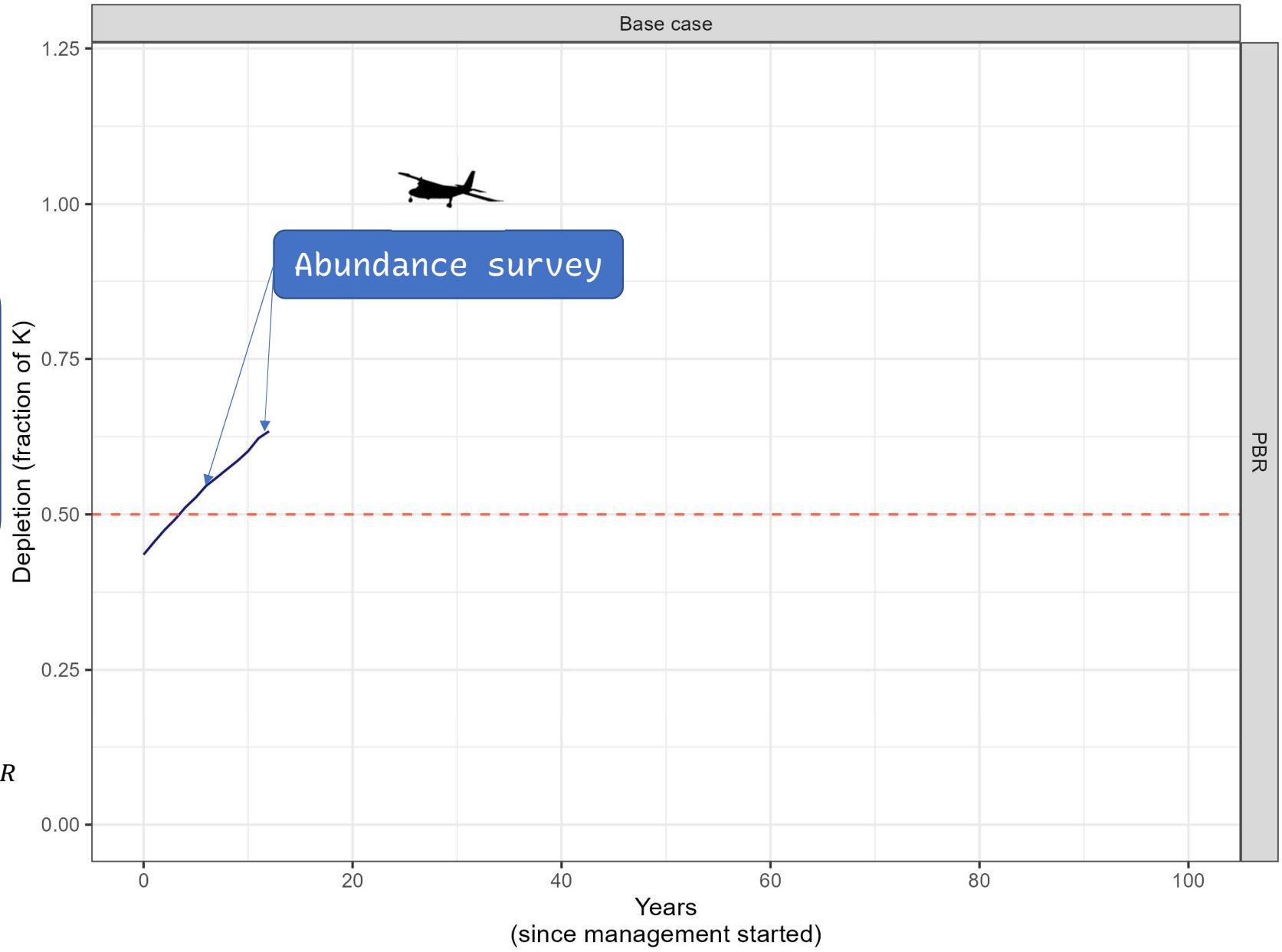

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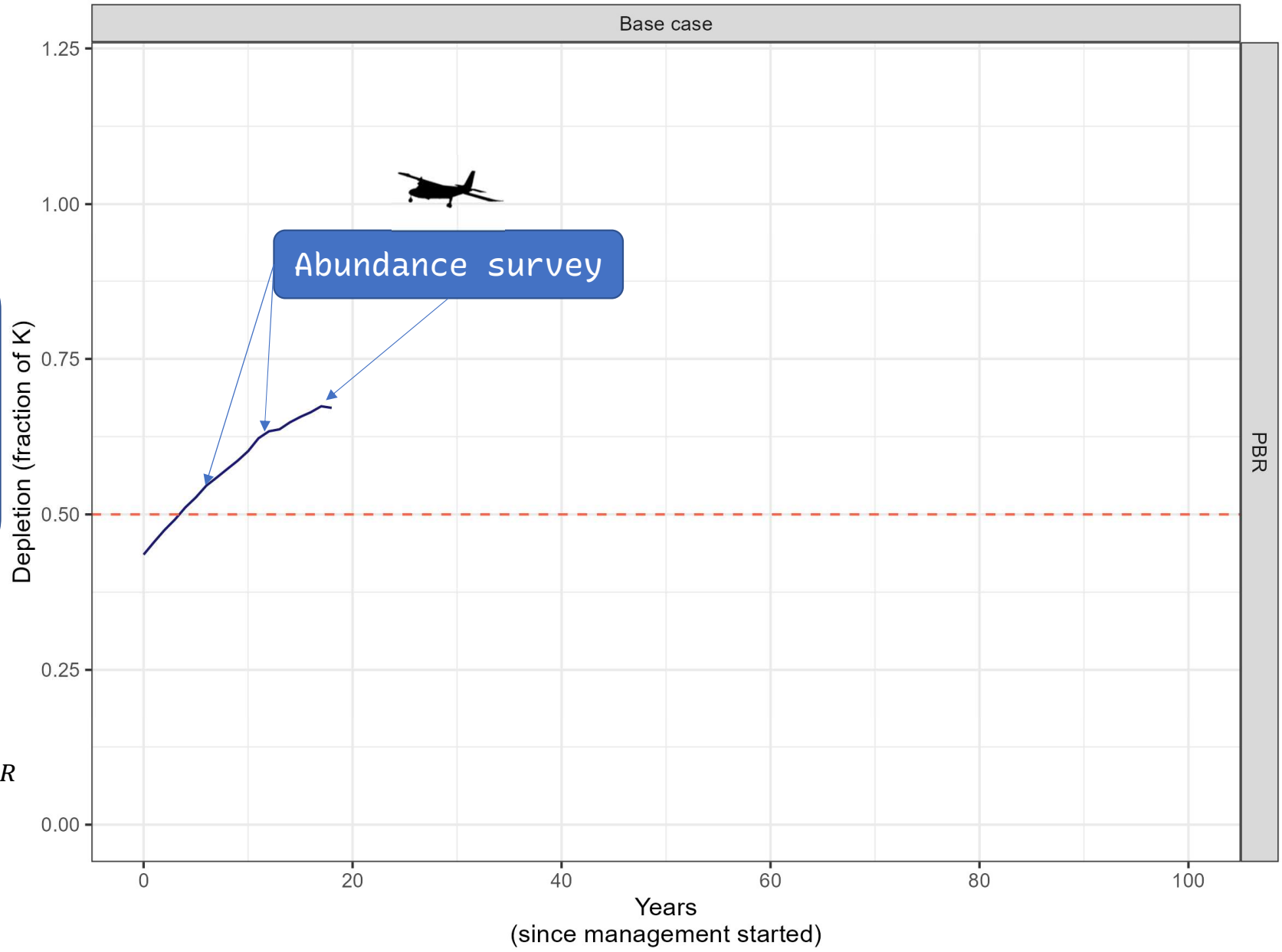

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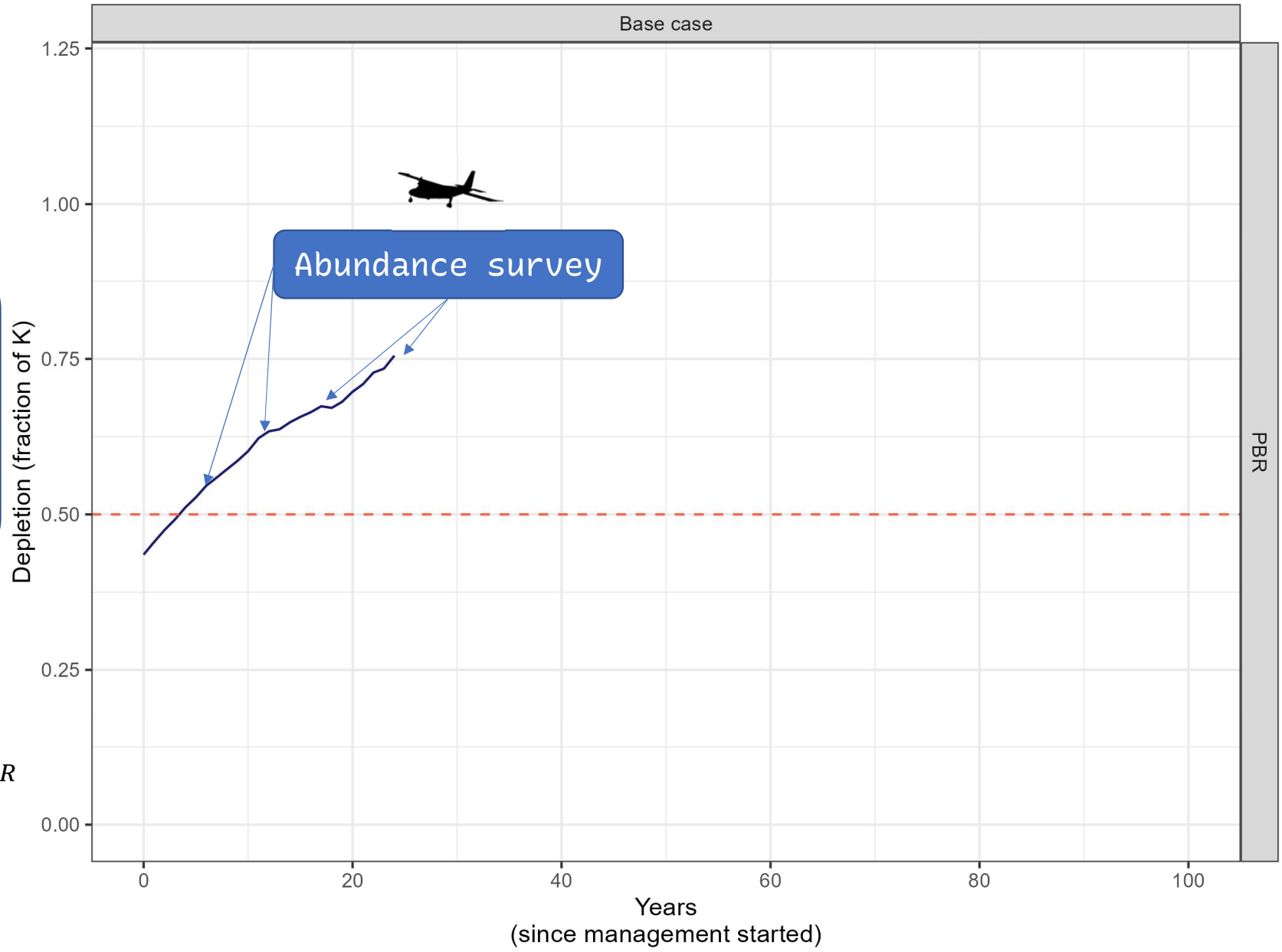

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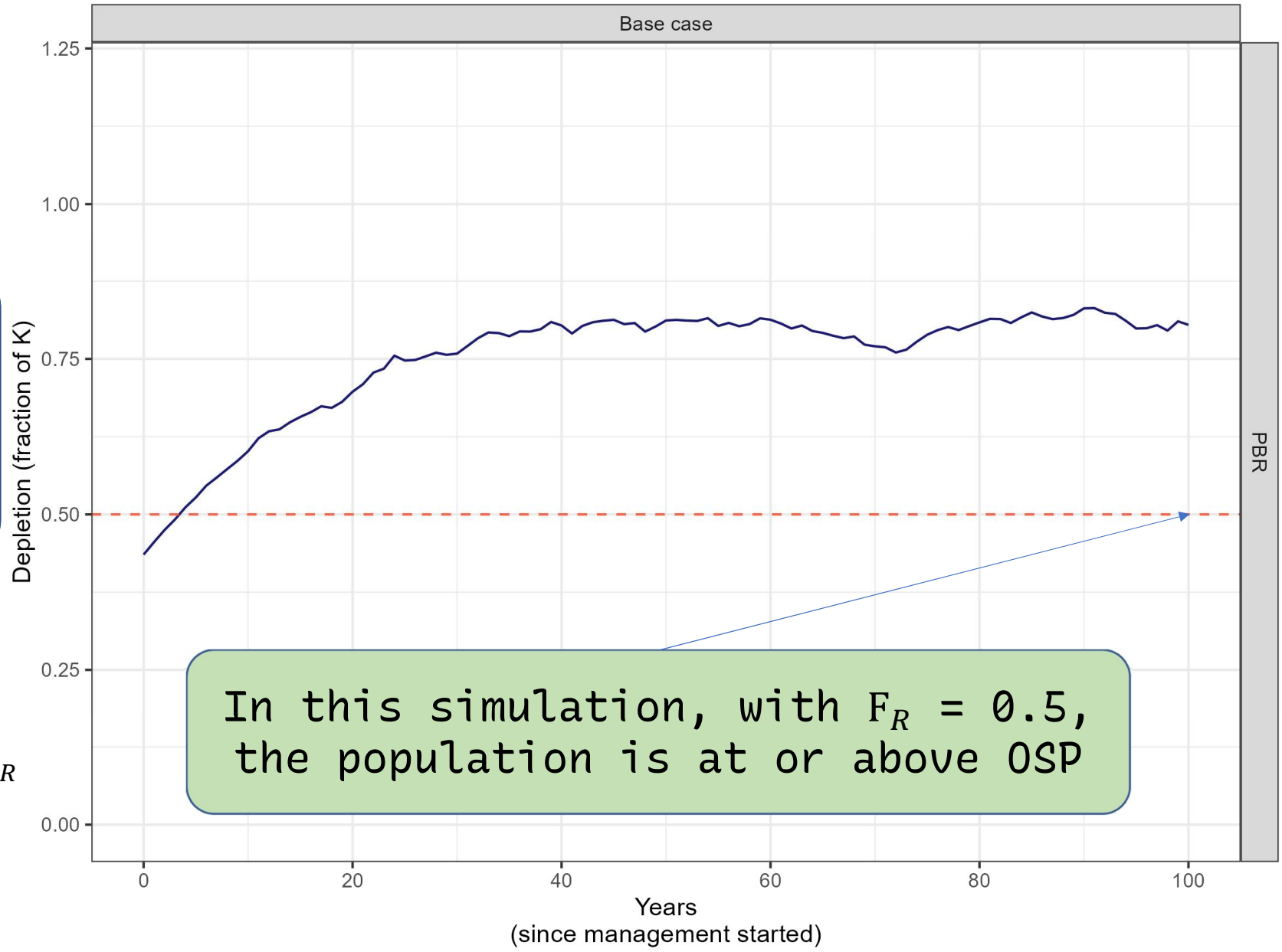

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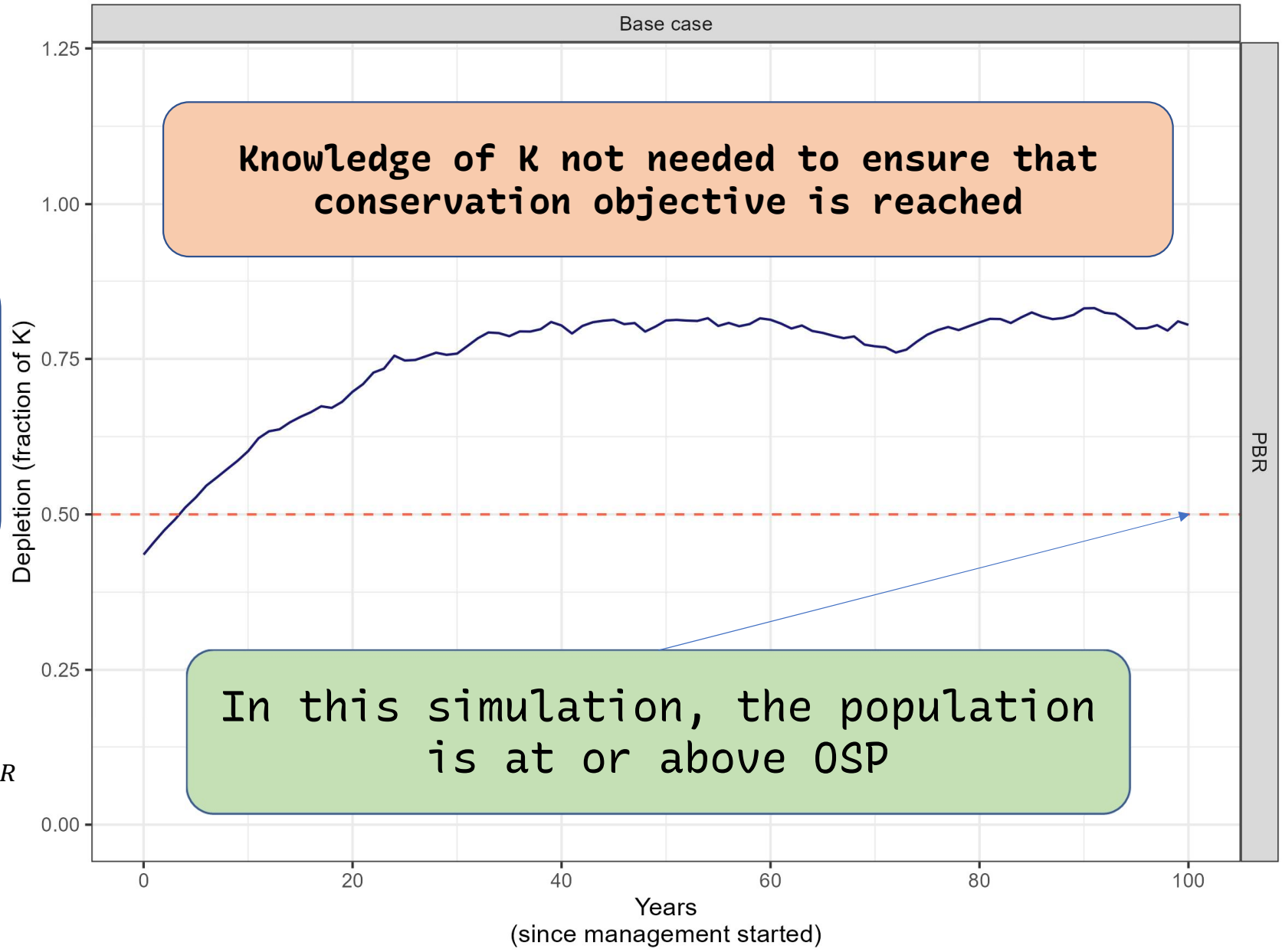


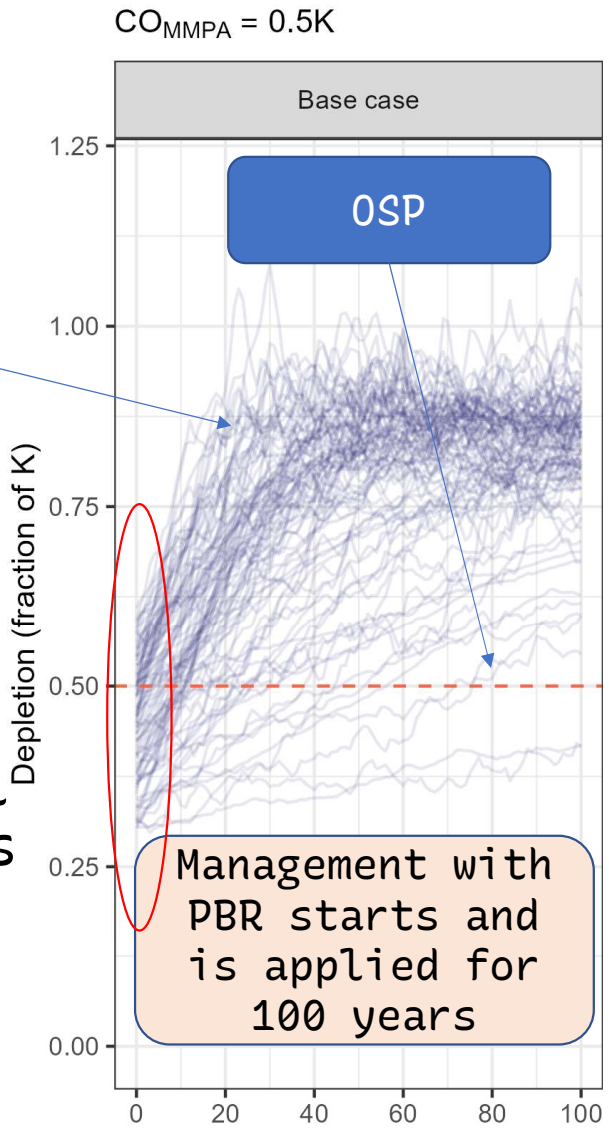
Tuning

Assumptions

Removals do not exceed PBR

New survey to update PBR every 6 years

100 virtual populations



Risk = 5%

Tuning

Assumptions

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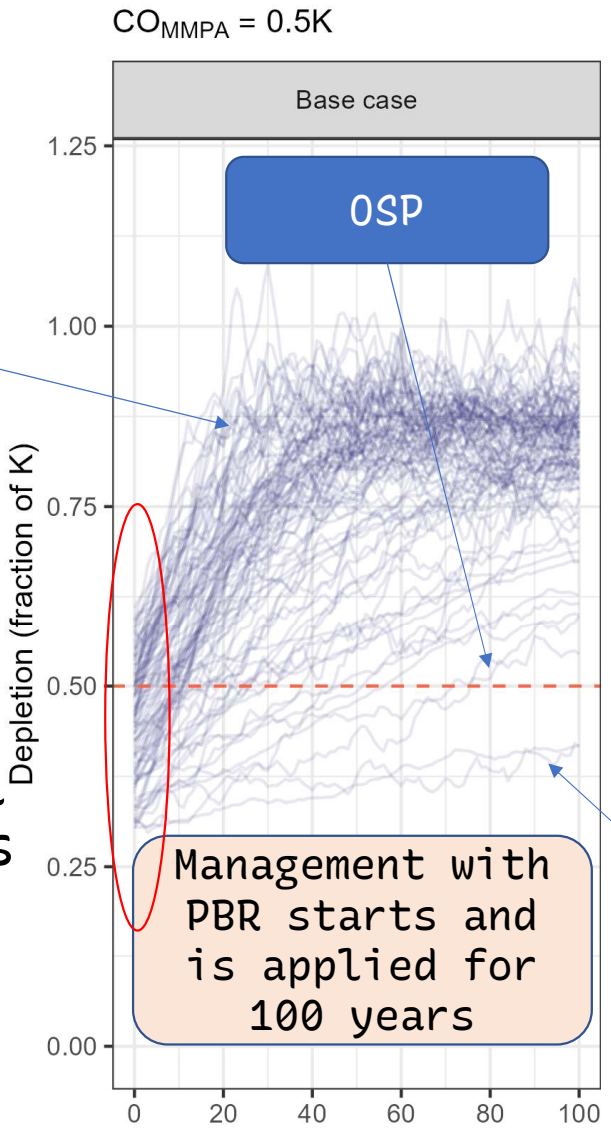

Failure (5%)

Years (since management started)

Risk = 5%

Tuning

Assumptions

Removals do not exceed PBR

New survey to update PBR every 6 years

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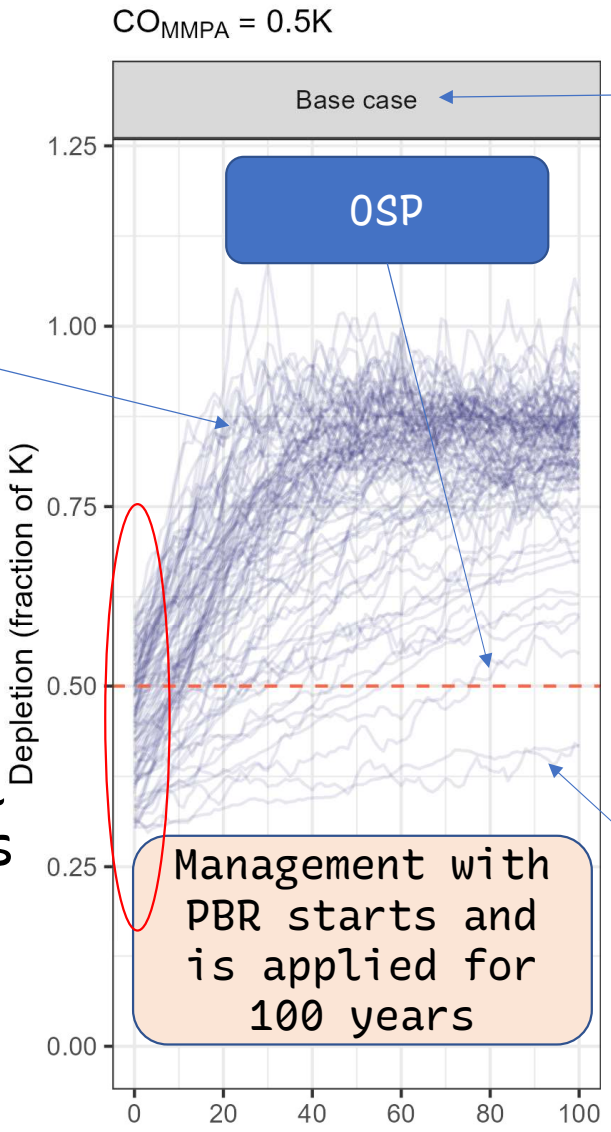


No bias in data

OSP

Management with PBR starts and is applied for 100 years

Failure (5%)

Risk = 5%

Biases

In practice,

Data samples that can be collected may be biased

- Biased value for estimated abundance (e.g. over-estimation)
- Biased values for estimated by-catch (e.g. under-estimation)
- *etc*…

→ Little scope to change sample collection

→ Choose a value for F_R that is robust against biases

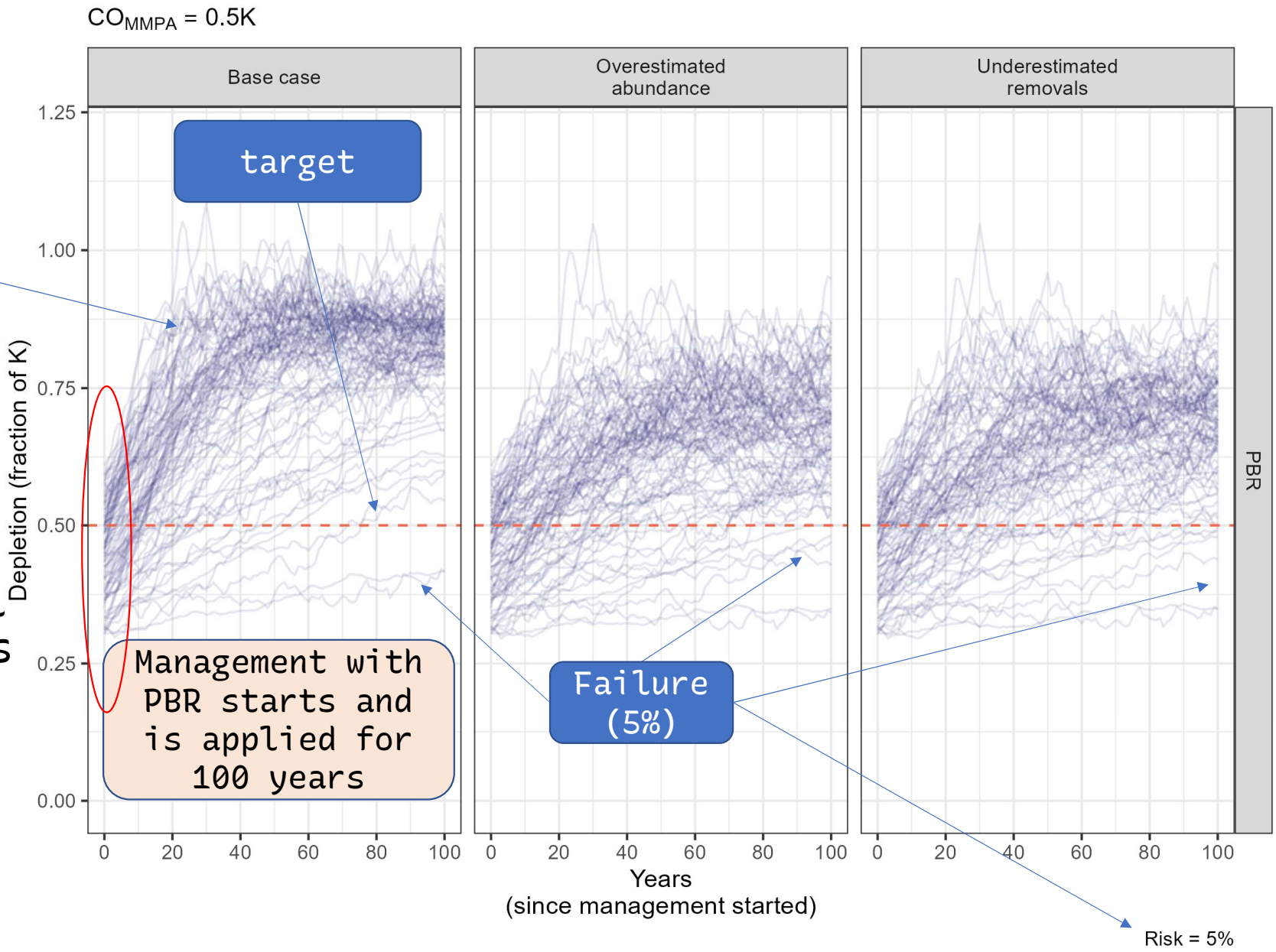
Tuning

Assumptions

Removals do not exceed PBR

New survey to update PBR every 6 years

100 virtual populations



Tuning PBR to the US MMPA

Marine mammal populations should be at their Optimum Sustainable Population (US MMPA)

Using simulations, Wade (1998) showed that, under reasonable assumptions, the values work well

$r_{\max}$ = 4%,

$\mathrm{N}_{\min}$ = 20% quantile of log-normal distribution of N_{SCANS}

F_R = 0.5

in the formula

$$\mathrm{PBR} = \frac{r_{\max}}{2} \times \mathrm{N}_{\min} \times \mathrm{F}_R$$

Tuned to the US MMPA

Conservation Objective

ASCOBANS agreed on an objective of 80% of K

ICES (WGMME 2020) agreed to compute a PBR for common dolphins

and noted that PBR was not aligning with EU conservation objectives (namely 80% of K)

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From 2021, OMMEG held a series of meeting to discuss M6 and thresholds for by-catch, building on previous work

(in particular Wade 1998, ASCOBANS, Winship 2009; and Hammond *et al.* 2019)

OSPAR Quality Status Report

OSPAR Marine Mammal Expert Group (OMMEG)

Expert group decided to use in spring 2021 the Conservation Objective:

a population should recover to or be maintained at or above 80% of carrying capacity

with 0.80 probability

over 100 years

Lower bound

Confidence (1 – risk)

Time horizon

Management Strategy Evaluation

a population should recover to or be maintained at or above 80% of carrying capacity

with 0.80 probability

over 100 years

In late 2020, LRUniv undertook to develop an R-package (Genu et al. 2021)

in R:

```
remotes::install_gitlab(
  host = "https://gitlab.univ-lr.fr",
  repo = "pelaverse/RLA"
)
```

Tuning a modified PBR (mPBR)

a population should recover to or be maintained at or above 80% of carrying capacity

with 0.80 probability

over 100 years

$r_{\max}$ = 4%,

$\mathrm{N}_{\min}$ = 20% quantile of log-normal distribution of N_{SCANS}

$\mathbf{F}_{R}$ **= 0.1**

in the formula

$$\mathrm{PBR} = \frac{r_{\max}}{2} \times \mathrm{N}_{\min} \times \mathrm{F}_{R}$$

(modified) PBR (OSPAR CEMP guidelines M6)

1 – Compute $N_{\min}$ from the best available abundance estimate N and its coefficient of variation cv

if $N_{\min} < 2500$, $m\mathrm{PBR} = 0$

if $N_{\min} \geq 2500$, go to step 2

2 – Values for $R_{\max}$ and F_R

If no information on the target small cetacean population $\begin{cases} R_{\max} = 0.04 \\ F_R = 0.1 \end{cases}$

If well-studied population and no biases in parameters $\begin{cases} R_{\max} = 0.04 \\ F_R = 0.35 \end{cases}$

3 – Plug-in the values of $N_{\min}$, $R_{\max}$ and F_r to compute the threshold/reference point

$$m\mathrm{PBR} = N_{\min} \times 0.5 \times R_{\max} \times F_R$$

OSPAR timeline

Meeting of Bio-Diversity Committee (BDC)

Spring 2021 : Agreement on conservation objective and methods to use

Autumn 2021 : Values for removals limits produced

Spring 2022 : Values for removals limits provisionally agreed pending caveats in QSR assessment

Summer 2022 : text for M6 for QSR assessment agreed

QSR 2023: By-catch assessment

https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/marine-mammal-bycatch/

« The assessment is underpinned by a conservation objective attempting to capture European ambition for by-catch levels, subject to adjustment for future assessments to accommodate new evidence. »

→ Highlight the need for **a quantitative conservation objective**

Thanks for your attention

Agreement on methods (control rules)

	PBR (Potential Biological Removal)	RLA (Removals Limit Algorithm)
Formula	$\mathrm{PBR} = N_{\min} \times 0.5 \times R_{\max} \times F_{\mathrm{R}}$	$\mathrm{RLA} = \widehat{N} \times r \times \max(0, \mathrm{depletion} - \mathrm{IPL})$
Abundance estimate (with associated uncertainty)	1	>= 1
Bycatch estimates (historical)	∅	>> 1
Data requirements	minimal	larger
Estimation method	∅	Bayesian

Agreement on methods (OSPAR 2021)

For Harbour porpoise in the North Sea AU:

Removals Limit Algorithm (RLA)

All other AUs:

(modified) Potential Biological Removal

For Common dolphin in the Northeast Atlantic:

(modified) Potential Biological Removal