A Practical Approach to Implementation of

Evidence of Absence:

Use of Pre-Minimization Estimates of Take for Project Take Allocation

<u>EOA Basics</u>

Fundamental Concepts

- EOA is a statistical model that is designed to tell us with a certain degree of confidence (α) how likely it is that take has not exceeded a certain number
- The EOA software package includes short- and long-term triggers that fire when the model indicates that the authorized level of take has likely been exceeded
    - Short-term trigger is a three-year rolling average, designed to make sure that rate of take over project life is not changing significantly from the initial intensive monitoring period. Also serves to prevent excessive impact to local maternity colonies over a short term.
        - *Short-term trigger firing requires adaptive management action (AMA)*
        - *AMA can be incremental increase in cut-in speeds, increased monitoring effort, or both*
    - Long-term trigger represents the total take authorized over the project life.
        - *Long-term trigger firing requires avoidance measures to avoid any further take (i.e., 6.9 m/s)*

EOA Basics

Some Basic Terms

1. tau (τ) – represents expected annual take (total take authorization (T) divided by permit term (30 yrs))
2. lambda (λ) – represents the actual annual take that is occurring – we never know the actual value of λ for a project
3. M – the estimate of mortality from EOA based on results of monitoring for a given year
4. M^* – the cumulative estimate of mortality over a period of years
5. g – detection probability of monitoring effort in a given year
6. g^* – cumulative detection probability over a period of years

The Primary Problem with EOA

When take is exactly as predicted, projects still have to curtail early
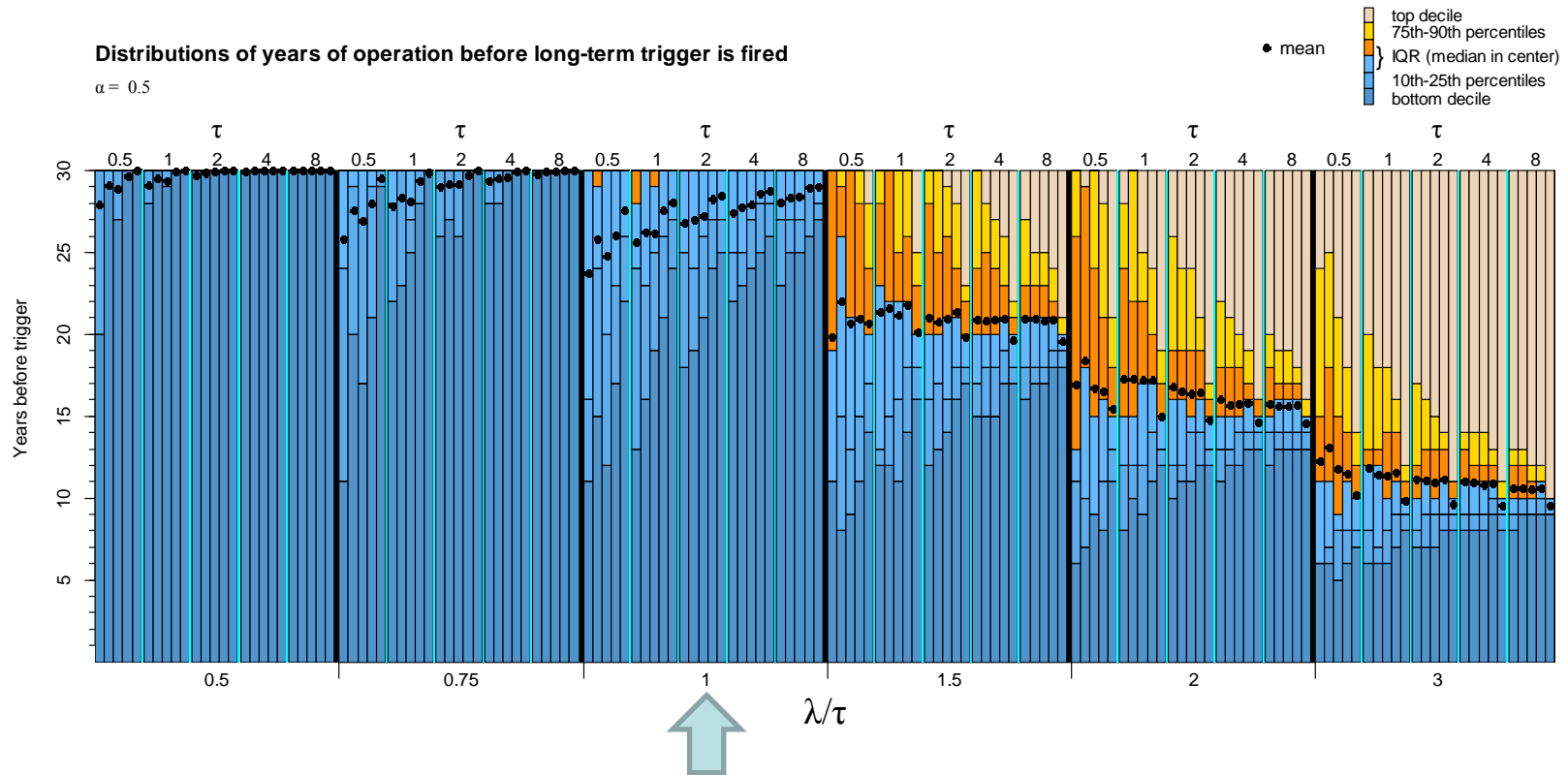
Distributions of years of operation before long-term trigger is fired

$\alpha = 0.5$

The five columns within each subgroup represent different monitoring protocols and detection probabilities. In the first four boxes, g is 0.3 for each of the first three years and, from left to right, g = 0.08, 0.12, 0.15, and 0.3 in the following 27 years. In the right-most box, detection probability is 1 in all years.

<u>Pre-Minimization Estimate Approach</u>

How it Works

1. Project estimates its take prior to minimization using existing methods
2. Project is issued take authorization (T) based on that number
3. Project is still required to implement normally applicable minimization measures (*i.e.* cut-in speed increases)
4. Project provides financial assurance for mitigation of full amount of authorized take
   - First 5-year mitigation payment based on full 5-year *tau* – to "stay ahead" of take
   - Subsequent 5-year mitigation payments based on increment of estimated actual take per EOA (*i.e.*, the increment of M*) for previous 5 years
   - Remaining financial assurance released at end of Project's 30-year permit

Pre-Minimization Estimate Approach

Result

- Since the project would be applying standard minimization measures, we would expect ~50% reduction in mortality at 5.0 m/s.

- This would result in actual mortality (λ) being about half of the authorized/expected annual take (τ), so that the project can expect $\lambda/\tau = 0.5$

- Projects with $\lambda/\tau = 0.5$ have a very favorable outlook for avoiding hitting both short and long-term triggers over the life of the project – for almost all levels of *tau*
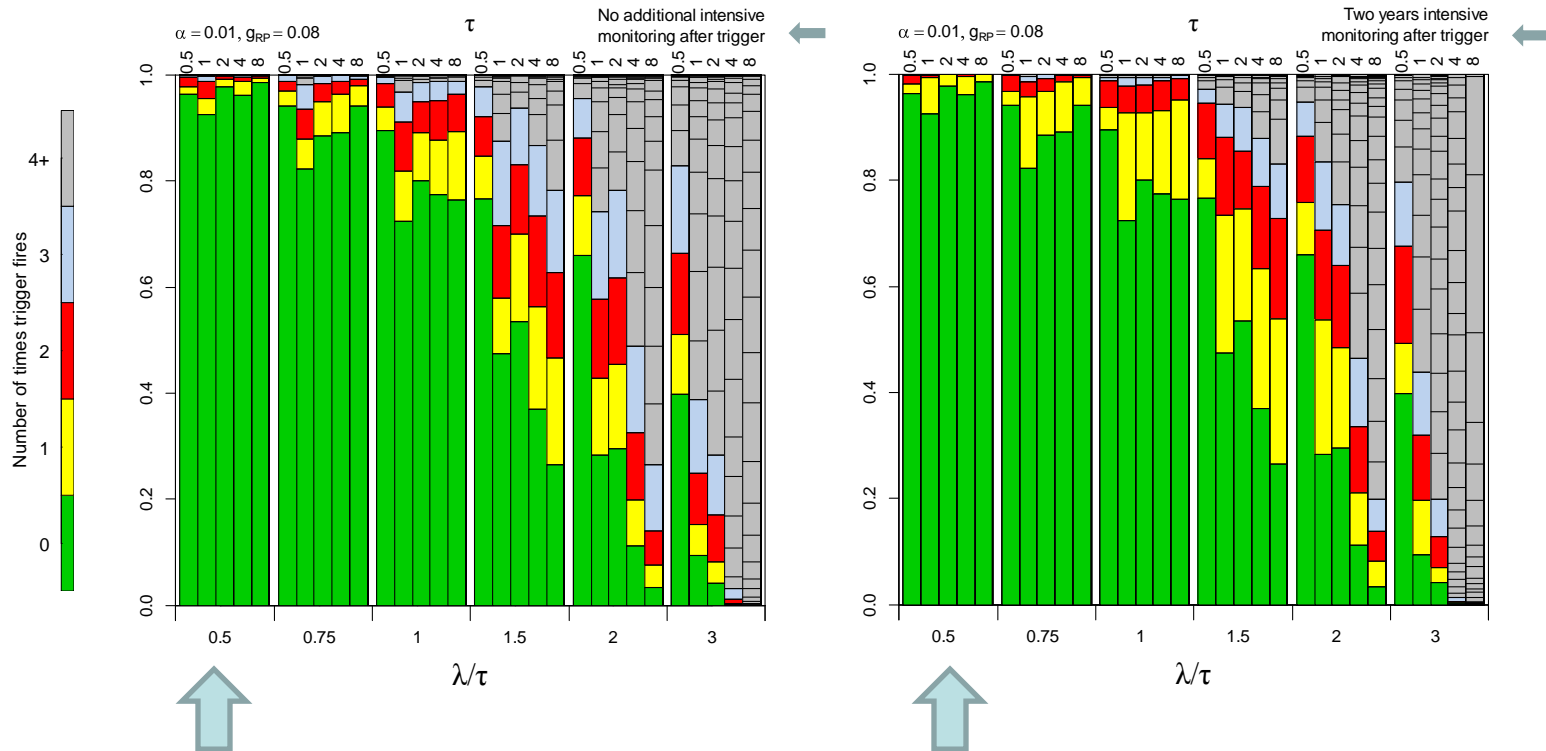
Pre-Minimization Estimate Approach

Long-Term Trigger Firings (total take authorization exceeded)
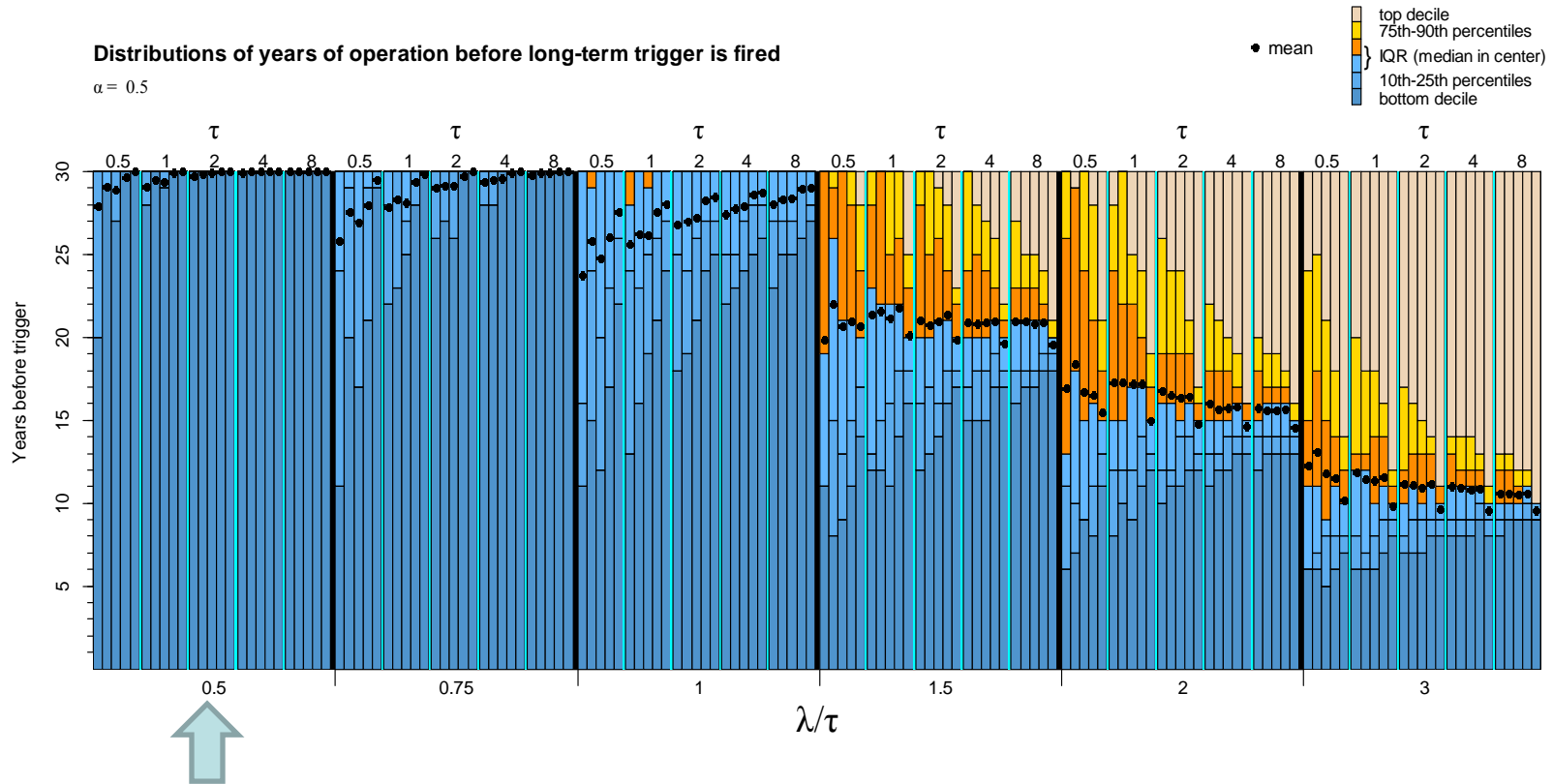
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Pre-Minimization Estimate Approach

Short-Term Trigger Firings (adaptive management)

Distribution of number of trigger firings in 30-year projects, $\alpha = 0.01$, $g = 0.3$ in years 1-3 and $g = 0.08$ in years 4-30.

Pre-Minimization Estimate Approach

Advantages

- Simple to apply

- Relatively predictable expected outcome

- Can be applied to every project, regardless of location and regardless of authorization type (COI or individual permit)

- Does not involve any loss of autonomy for individual projects

Pre-Minimization Estimate Approach

Advantages (cont.)

- Results in GREATER protection for the species:
  - Plan-wide take authorization is not increased (but see Issues section)
  - Section 7 consistency reviews account for effect of Project's full take allocation on maternity colonies
  - Likely that HALF of the take actually authorized for Plan and allocated to individual Projects will never occur
  - The un-utilized take will be "reserved" for the species
    - Not available to be reallocated to other projects because enrollment window is only 15 years
    - Becomes part of baseline for section 7 reviews for non-MSHCP ITP's
  - Thought about another way, this approach provides much greater confidence in compliance with the take authorization even using an alpha of .5 (confidence level of 50%)

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