Theory & Practice Of Risk Communication

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BC-WA Chapter of AFS
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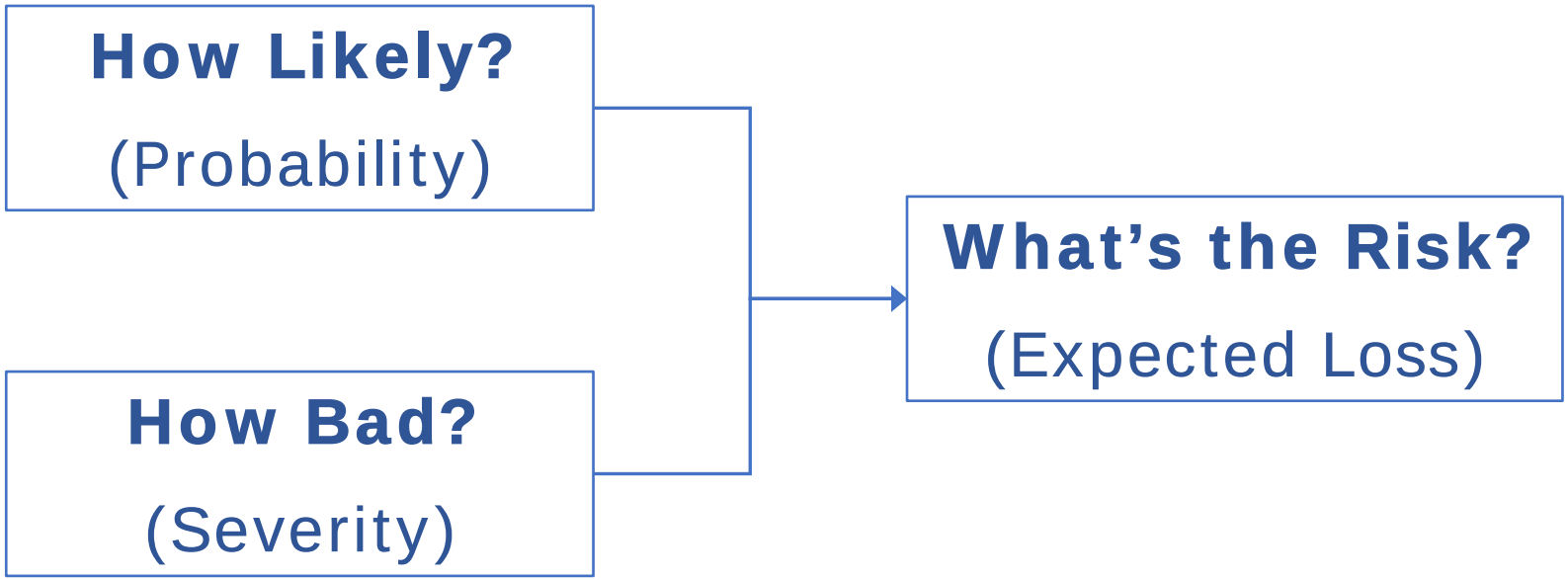
Outline

- Introduce 2 conceptual maps
  - Types of risk assessment
  - Types of presentation
- Go through 2 examples and link them back to the concepts maps
  - loss of hatchery brood in a conservation program
  - Fraser Sockeye harvest rule simulations

Concept Map 1:
Types of Risk Assessment

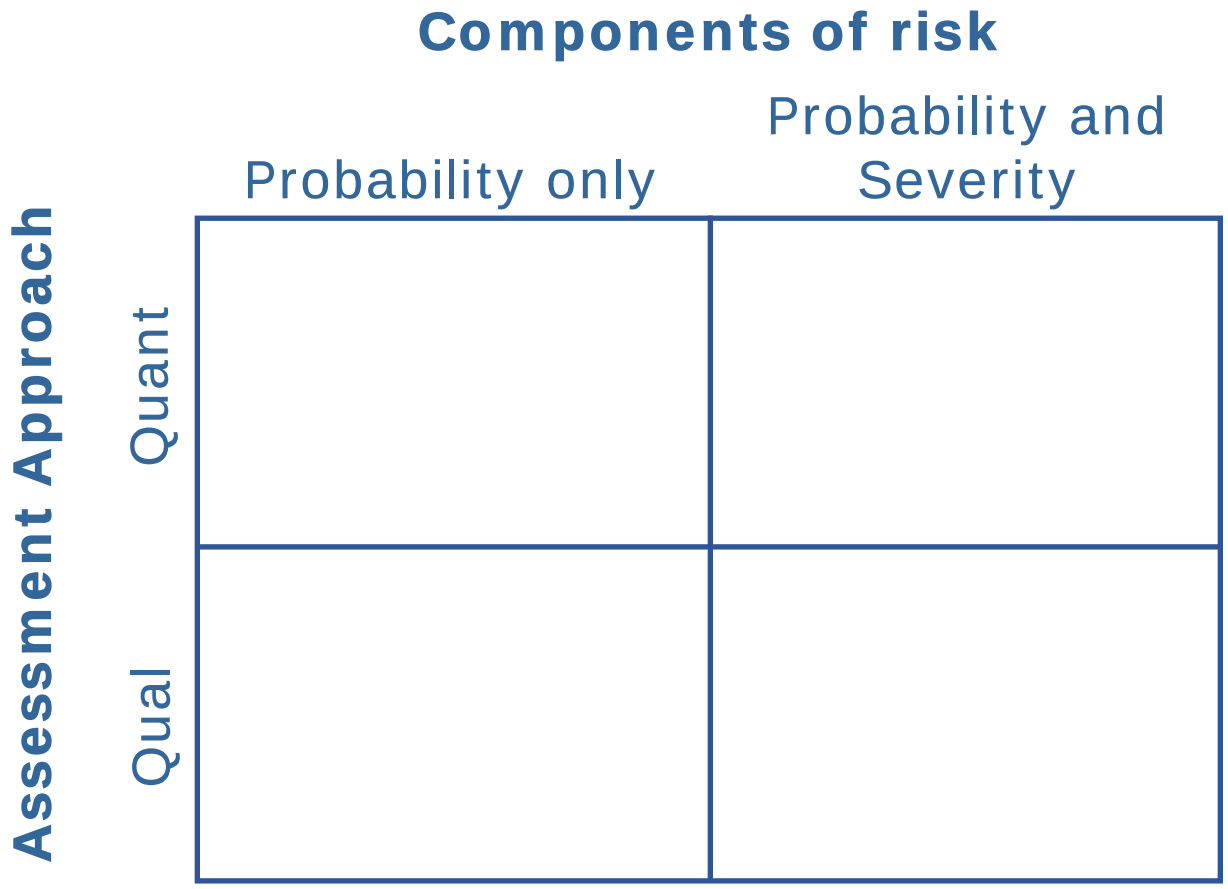
Components of Risk: 4 Big Questions



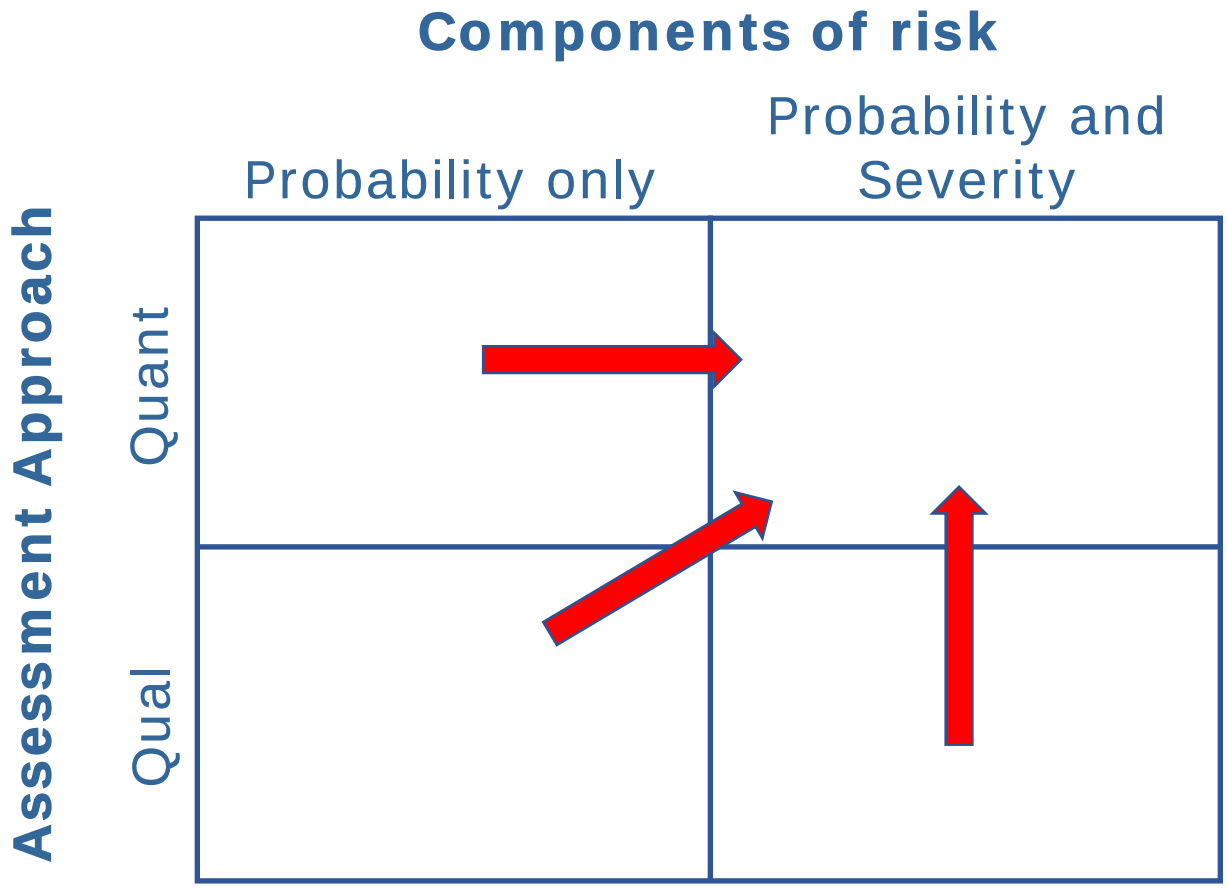
How sure are we?

(Uncertainty in estimates of probability and severity)

MAP 1: TYPES OF RISK ASSESSMENT

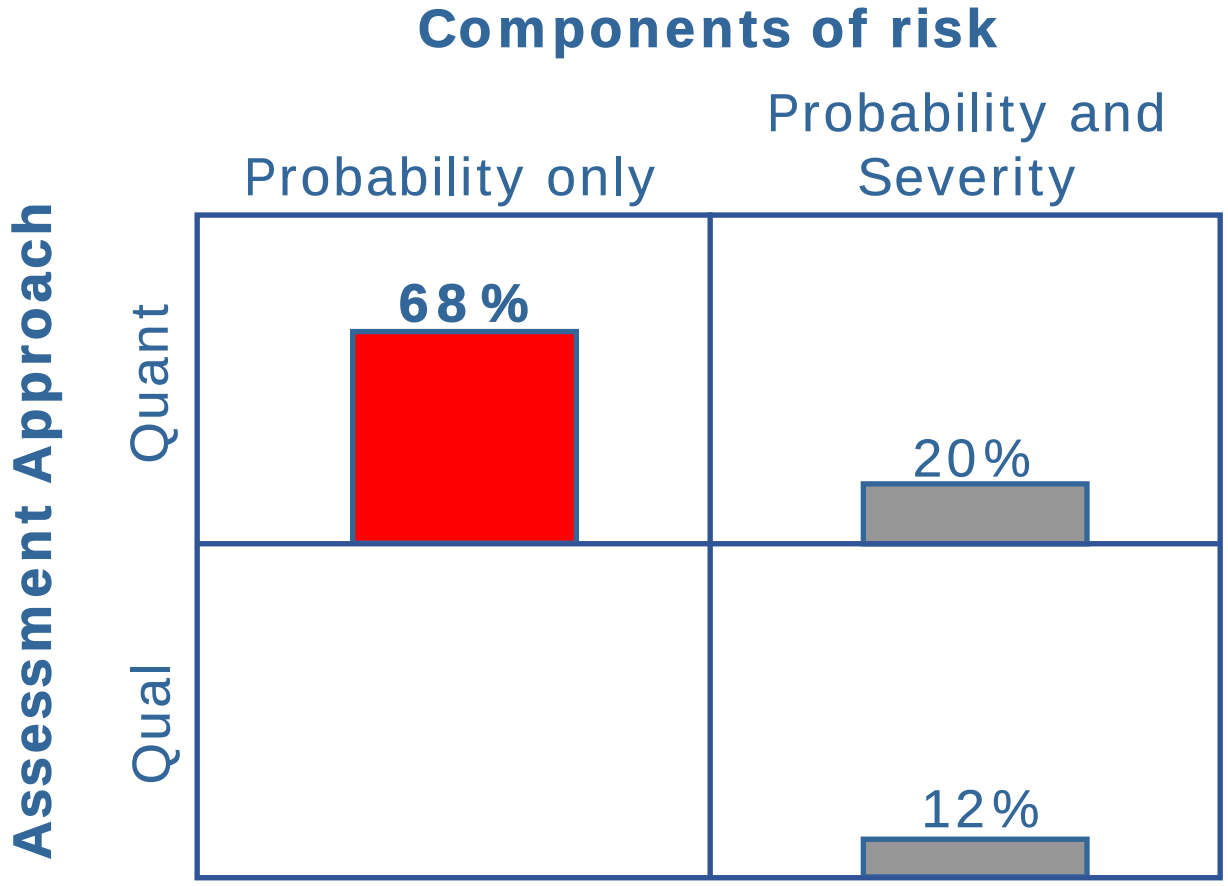


In Theory: Quantify all the components

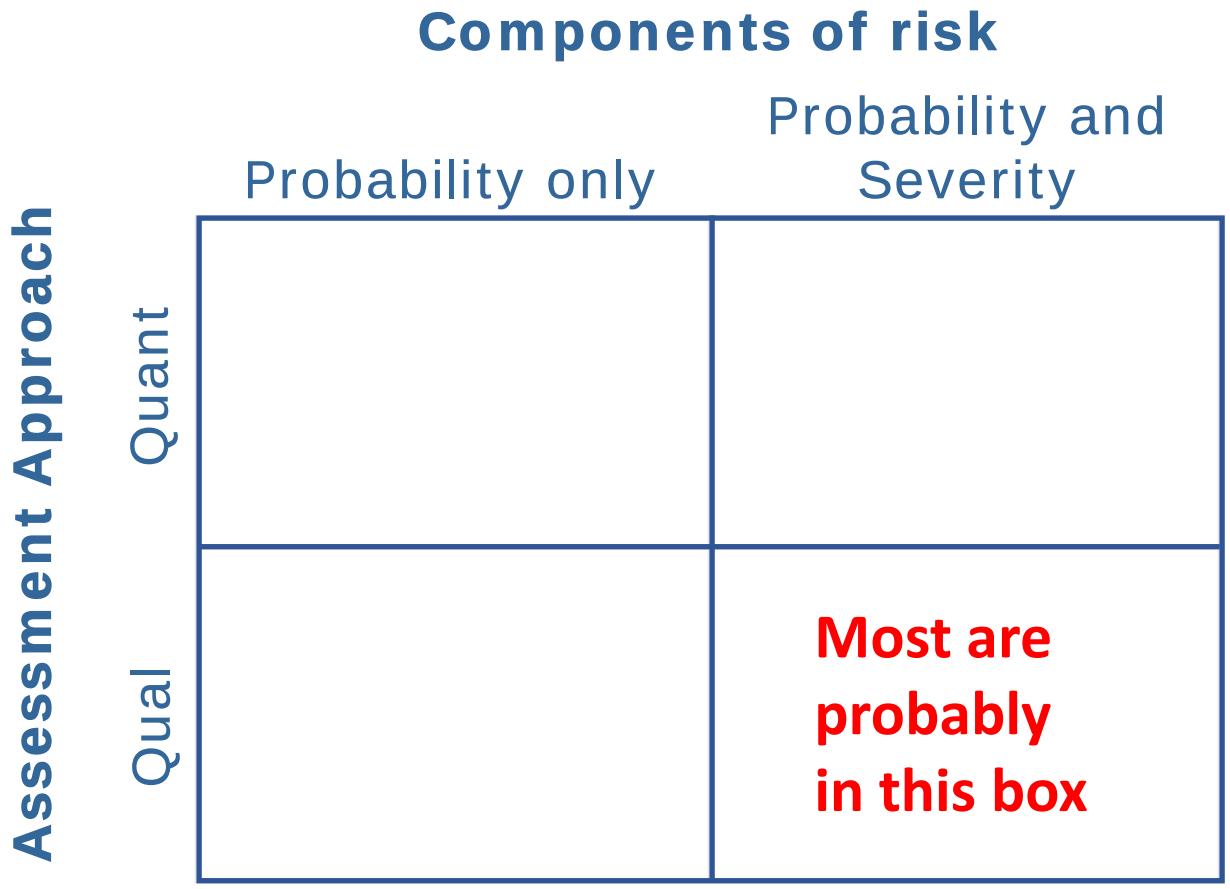


In Practice – Published Research

Risk assessments published in *ICES Journal of Marine Science* and *Canadian Journal of Fisheries and Aquatic Sciences* from release of the PA2F (1995) until 2007.



In Practice – Operational Decisions

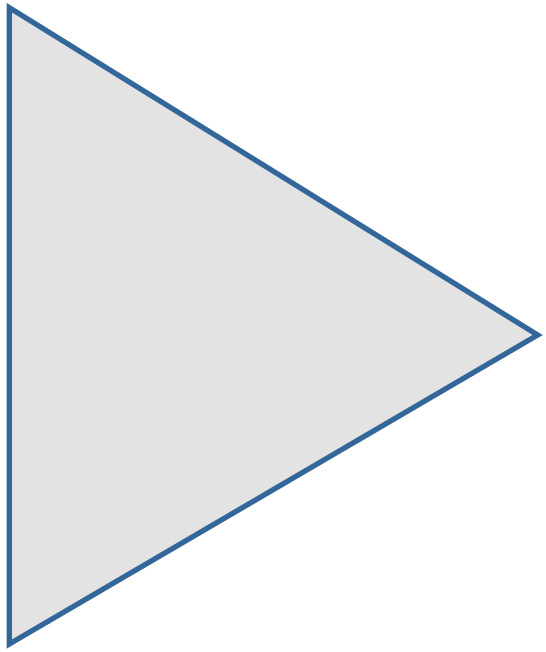


Concept Map 2:
Types of Presentation

Types of Presentations

Lecture

Convey a body of knowledge



Decision Support

Neutral packaging of information

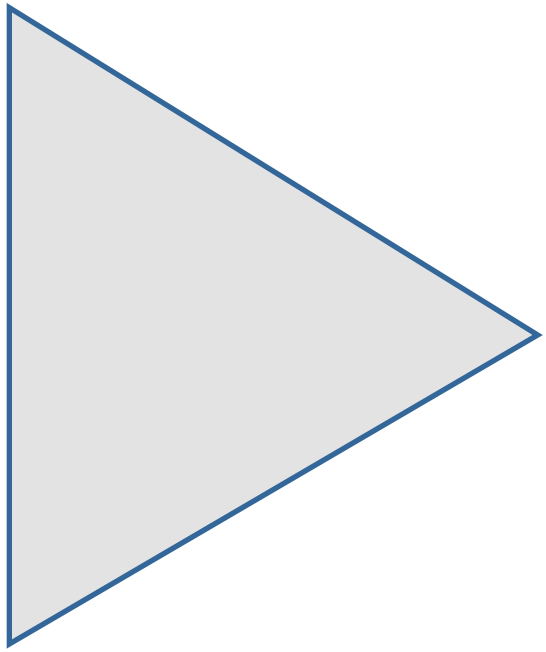
Sales Pitch

Trigger a course of action in the audience

Types of Presentations

Lecture

Audience obligation to grasp material



Decision Support

Introduce decision - support tools, point out key results and major sources of uncertainty

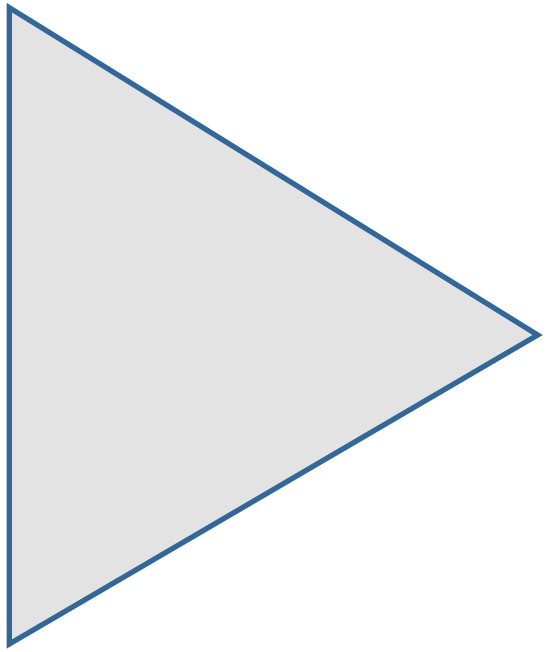
Sales Pitch

Filter content based on anticipated audience reaction

Types of Presentations

Lecture

1 day seminar on restoration techniques for salmon habitat



Decision Support

30 min intro to an interactive tool for prioritizing habitat restoration projects in a watershed

Sales Pitch

5 min pitch to solicit funding for a specific salmon habitat restoration project

Example 1:
Loss of Hatchery Brood in a Conservation Program

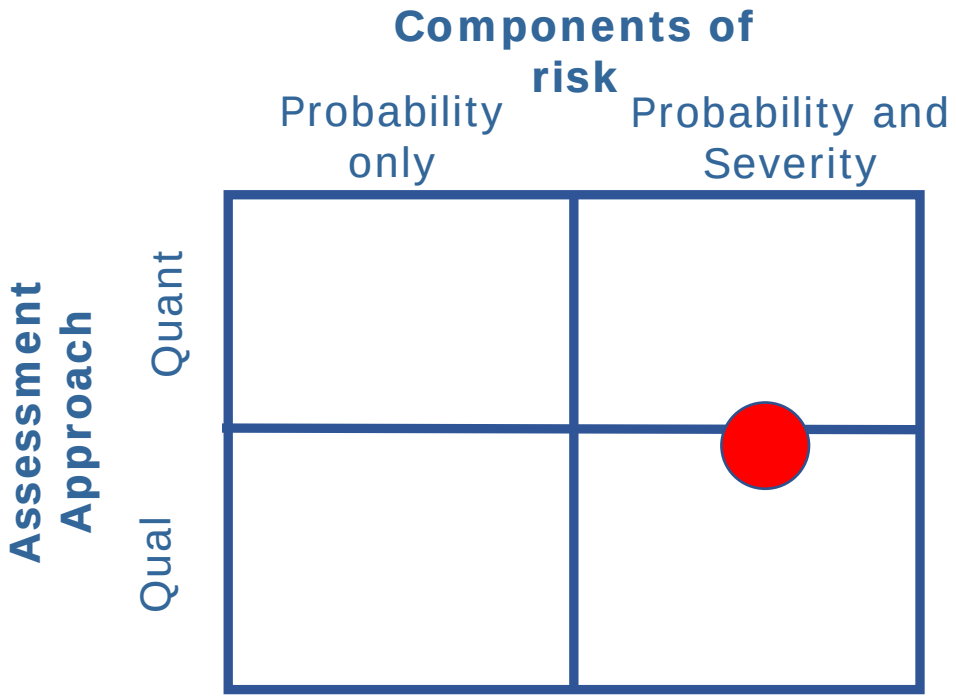
Background

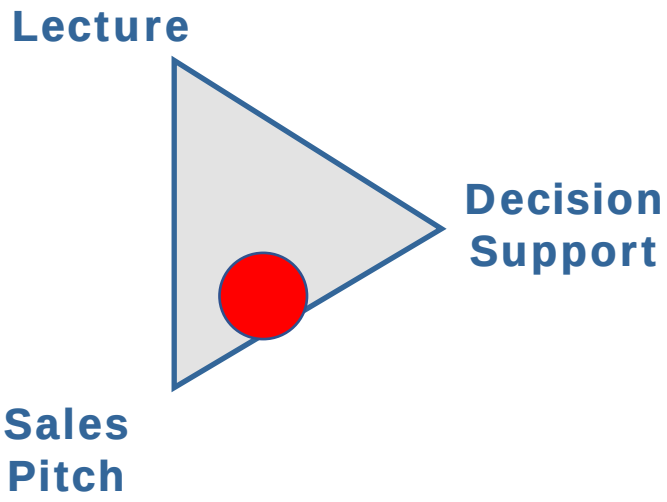
- Community-operated hatchery program as key part of a recovery effort, coordinated by a multi-stakeholder round table
- Power failure in February resulted in total loss of hatchery juveniles
- Short time window to decide whether to trap wild fry and either:
  - Rear and release larger juveniles
  - Rear as a captive brood until adult stage

⇒ Tech team wanted to communicate the pro/con for each option.

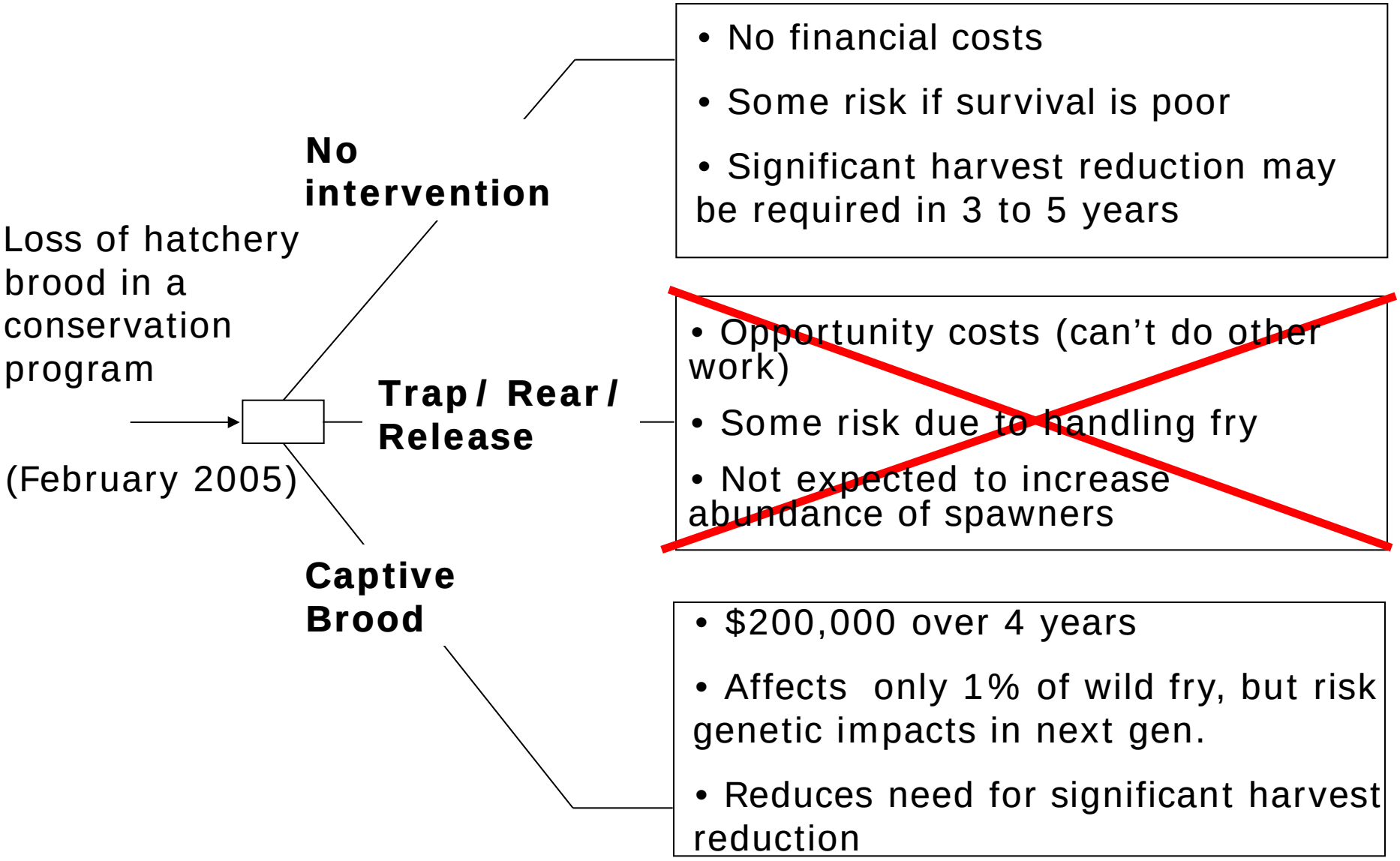
⇒ Only project in 15yrs that neatly fit the textbook decision tree (3 options, 4 outcomes each)

Where Does It Fit?





Example 3: Decision Tree



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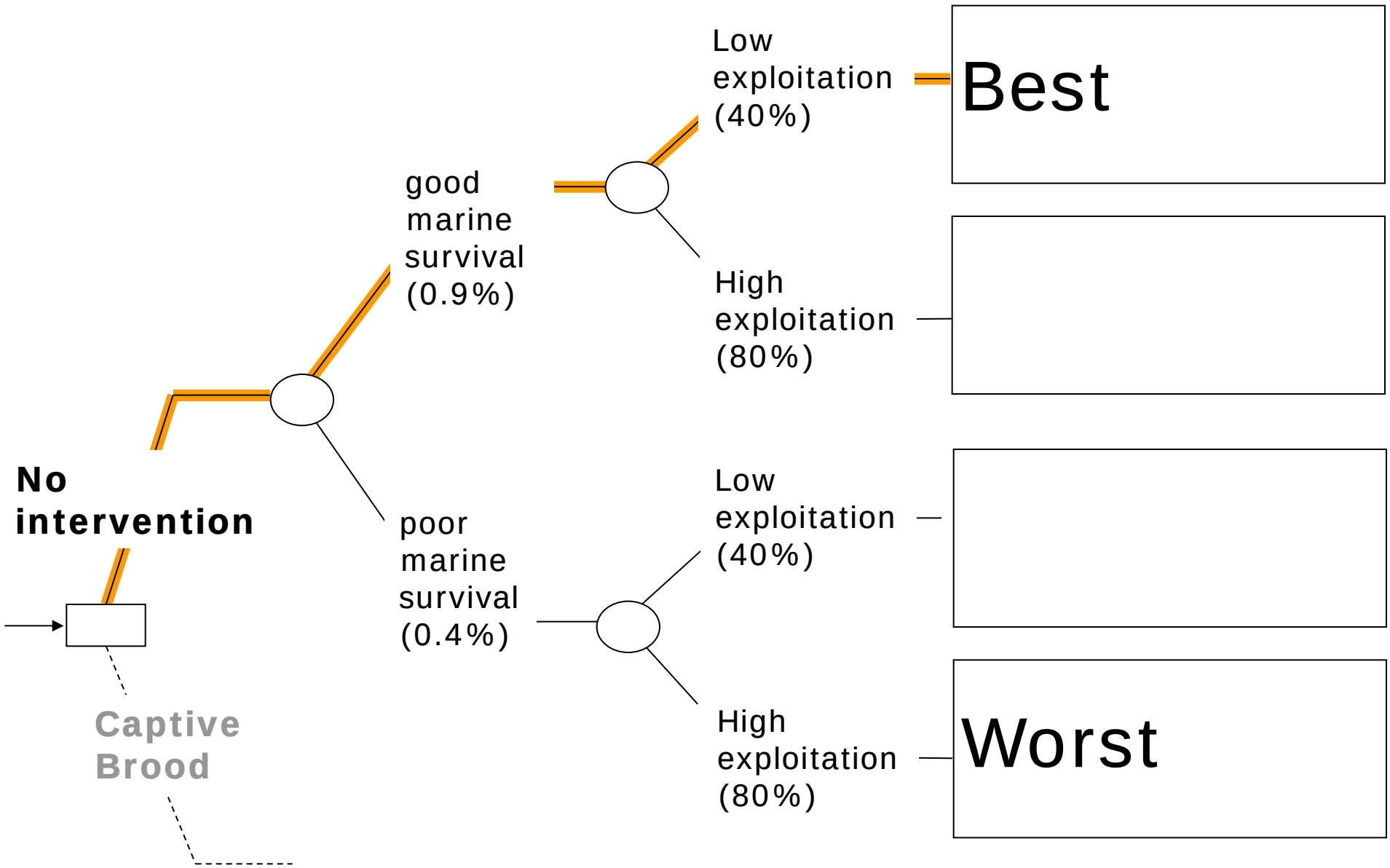

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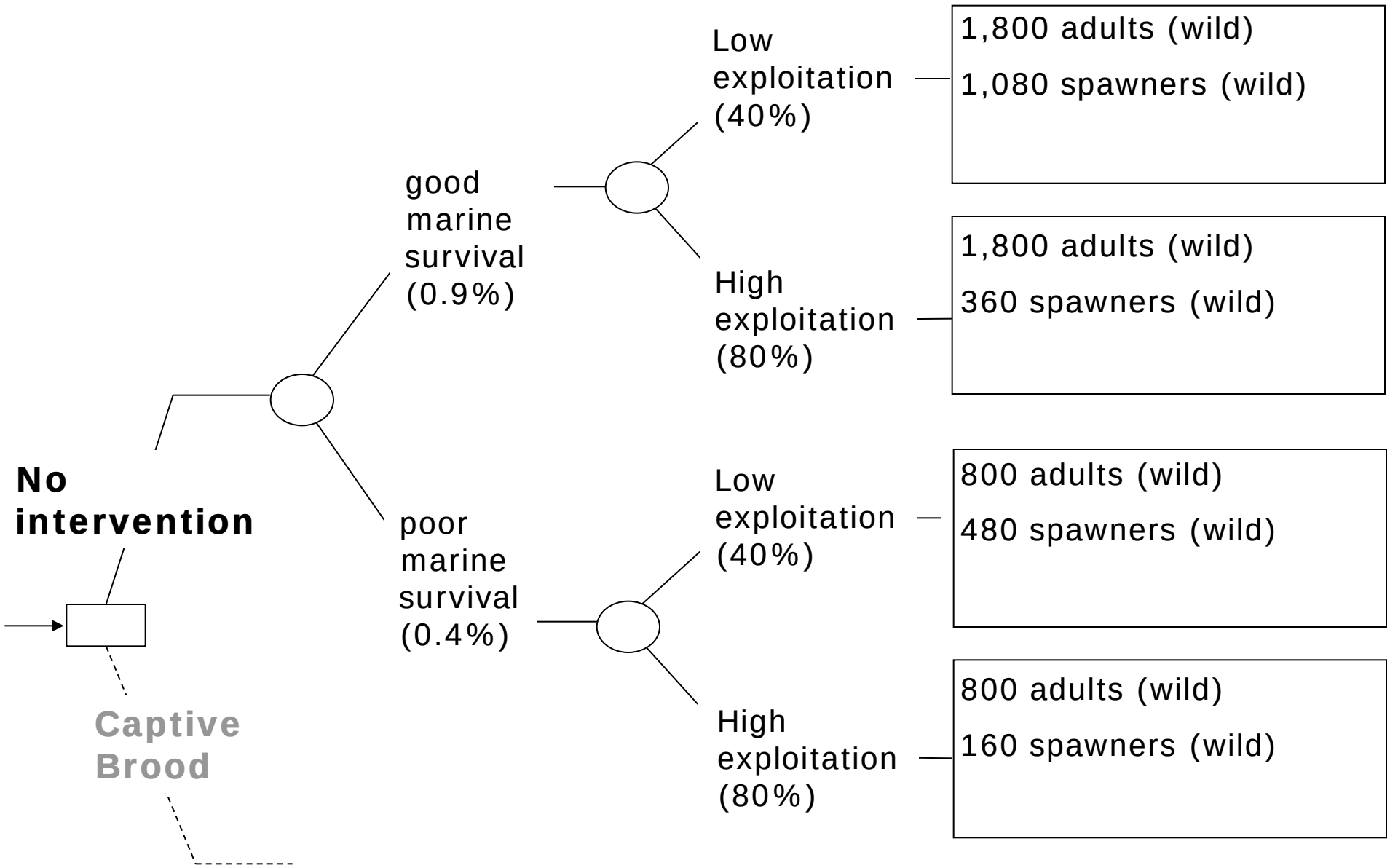

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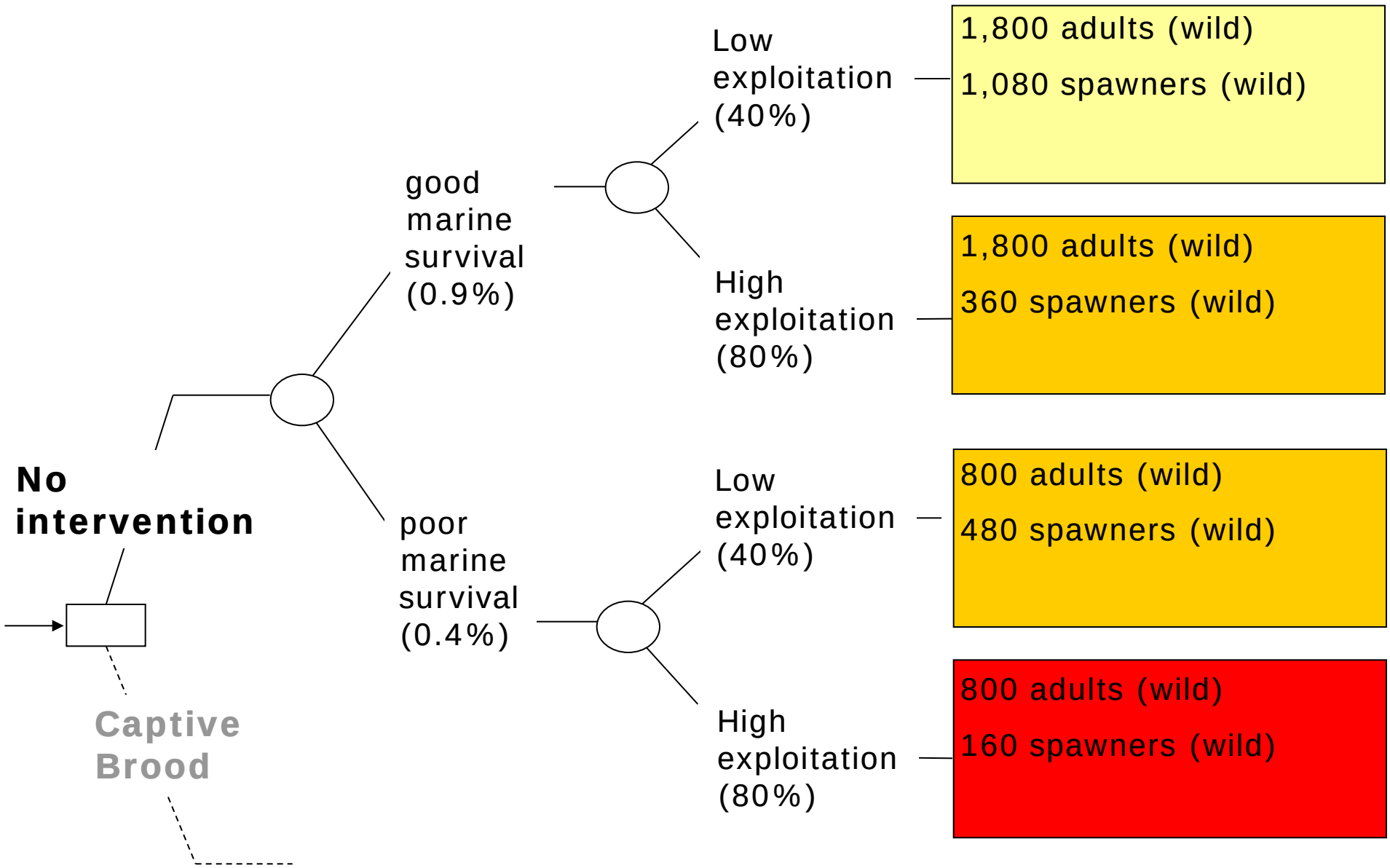

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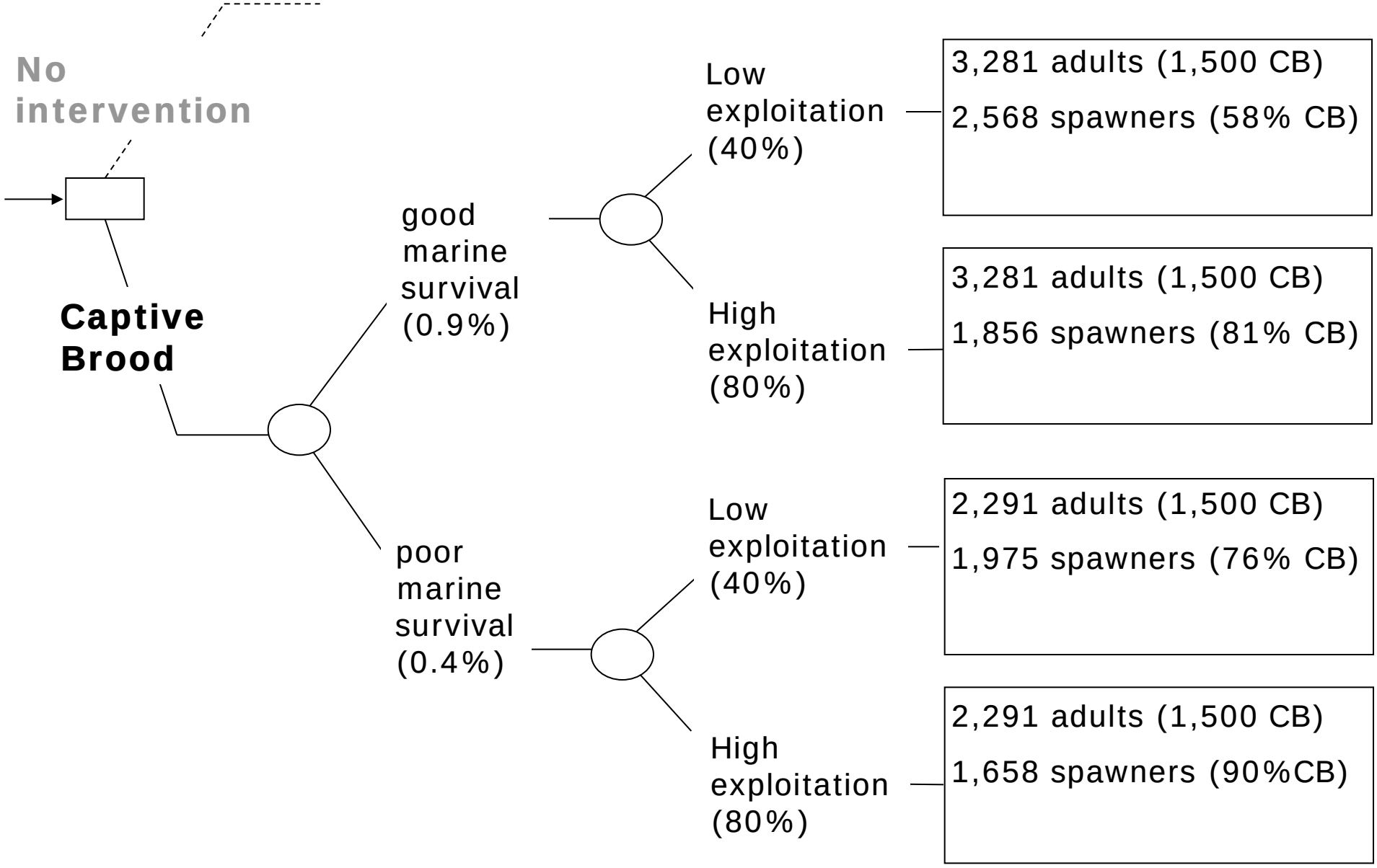

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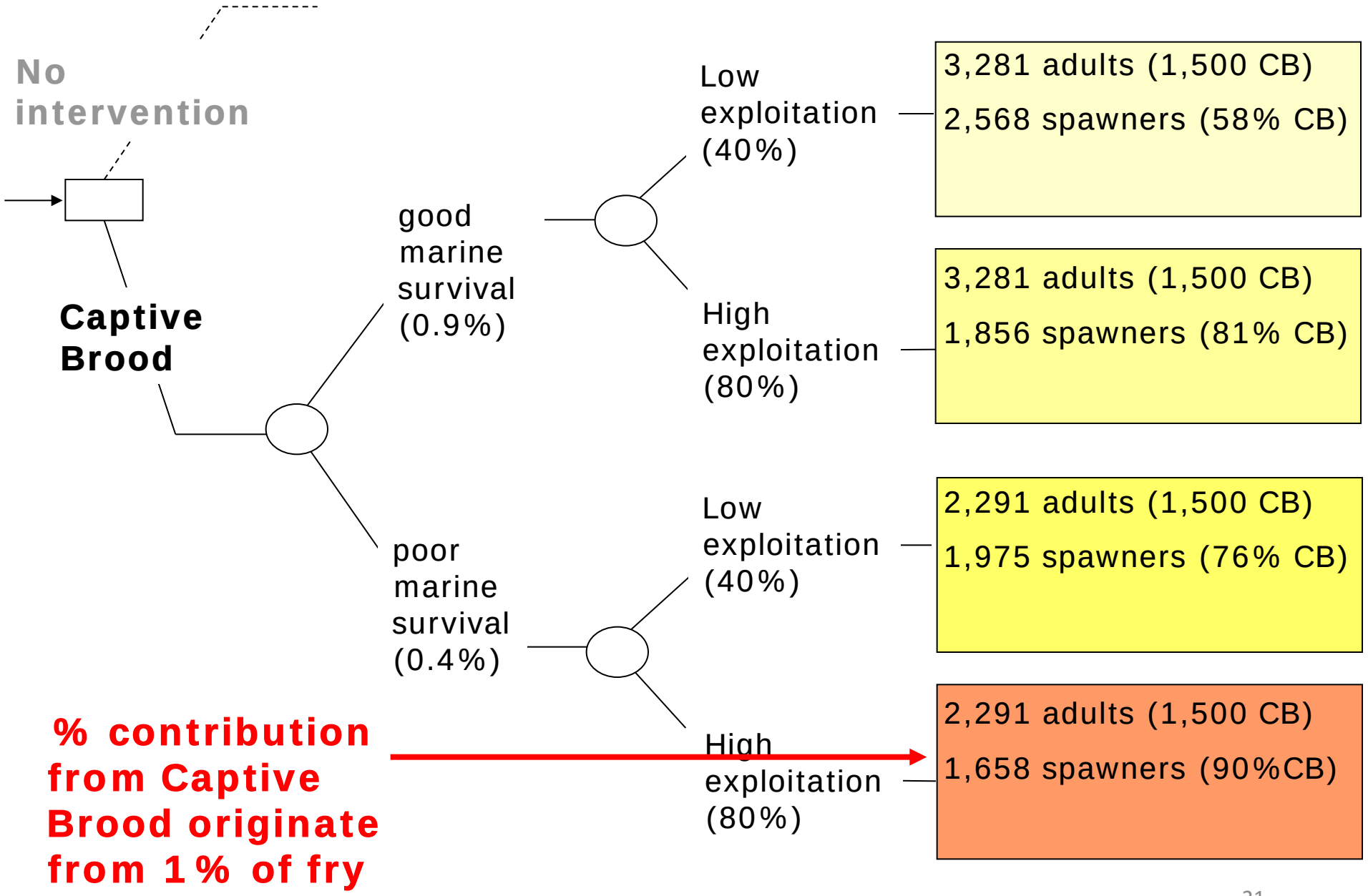

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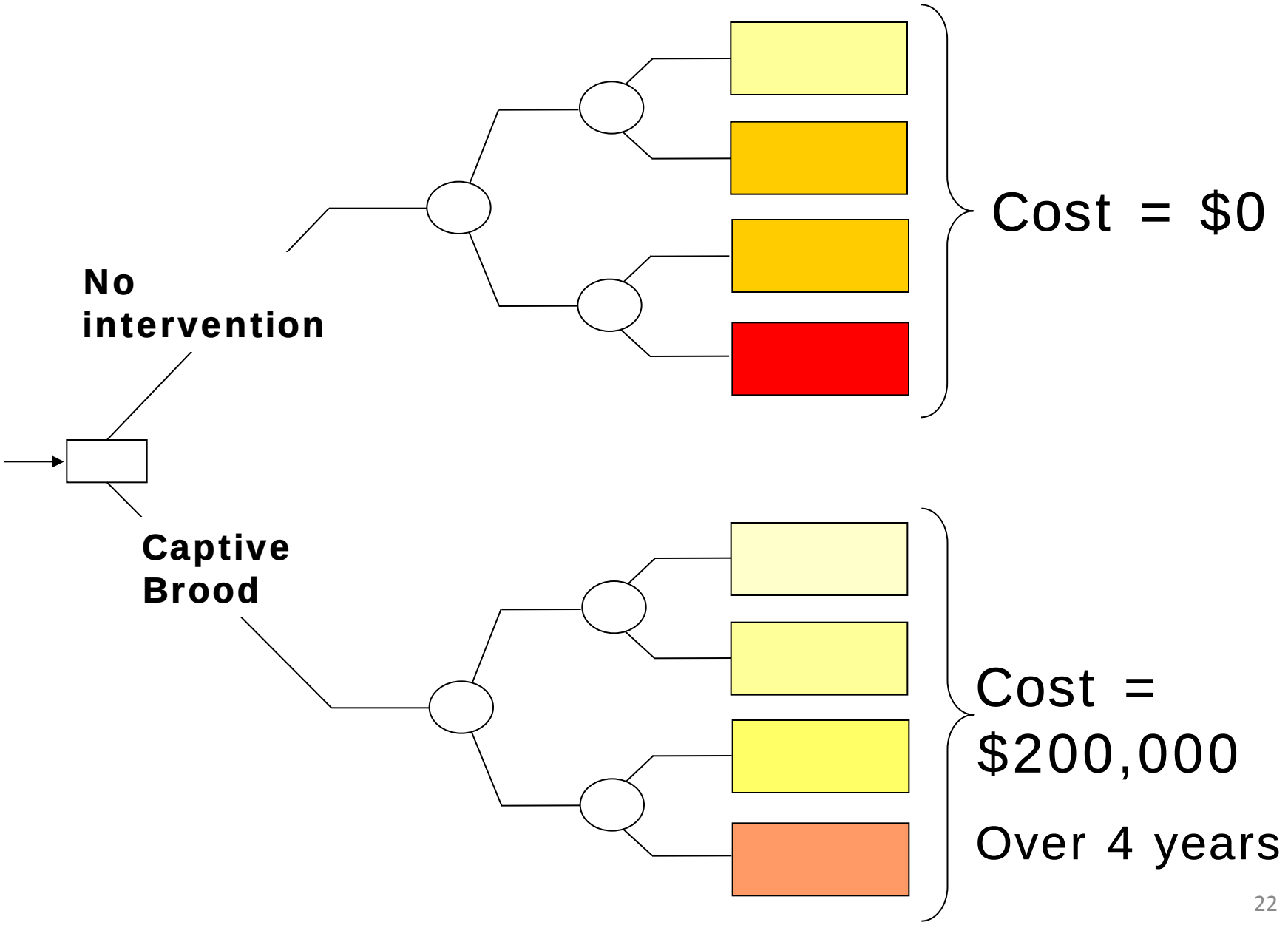


Example 2:
Fraser Sockeye Harvest Rule Simulations

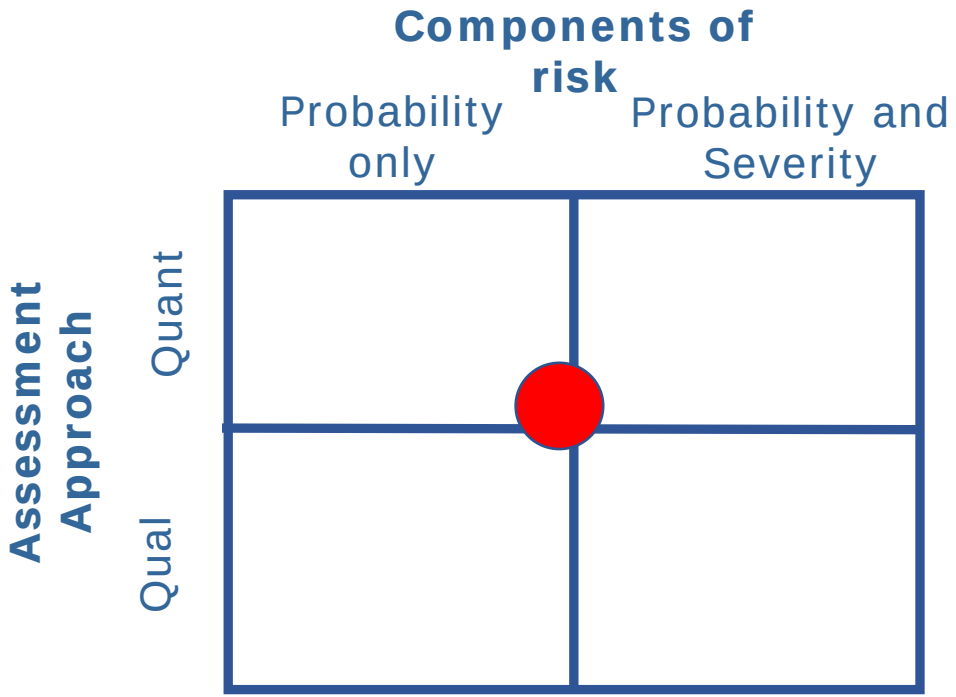
Background

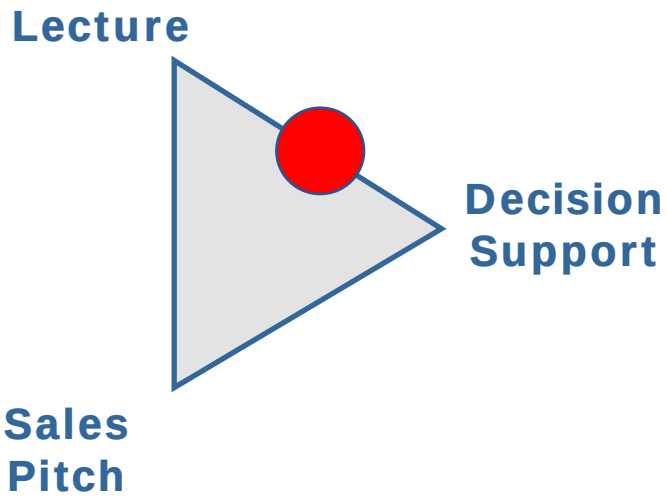
- Long-running process & model to forward simulate alternative harvest strategies
- Many options to test:
  - Different types of harvest strategy
  - Different specifics for each type of strategy
- Many alternative assumptions to test:
  - Population dynamics (19 stocks)
  - Harvest dynamics
- Many random trajectories into the future

=> Each variation is a branch on the decision tree

=> Many, many, many branches on that tree

Where Does It Fit?





Communication Challenge

How to show the difference in expected future patterns for many individual parts and groupings?

- Choice of key variables:
  - 19 stocks, 11 fishery groups
  - Spawners, run size, catch
- Choice of performance measures:
  - Avg vs range vs. variability
  - Time window (3 Gen Avg? Annual Pattern?)
- Choice of scenarios to compare:
  - Different strategies
  - Different assumptions

Lessons Learned (The Hard Way)

- Process vs. Information -> iterative!
- Analysts and Participants learning from each other

  -> Talk by Ann-Marie Huang
- Different plots for different phases of the process
- For a single meeting, try to pick 1 type of plot and stick with it!
- Less is more?

  -> Depends (Decision Support vs. Sales Pitch)

First Hurdle: Summarizing trajectories

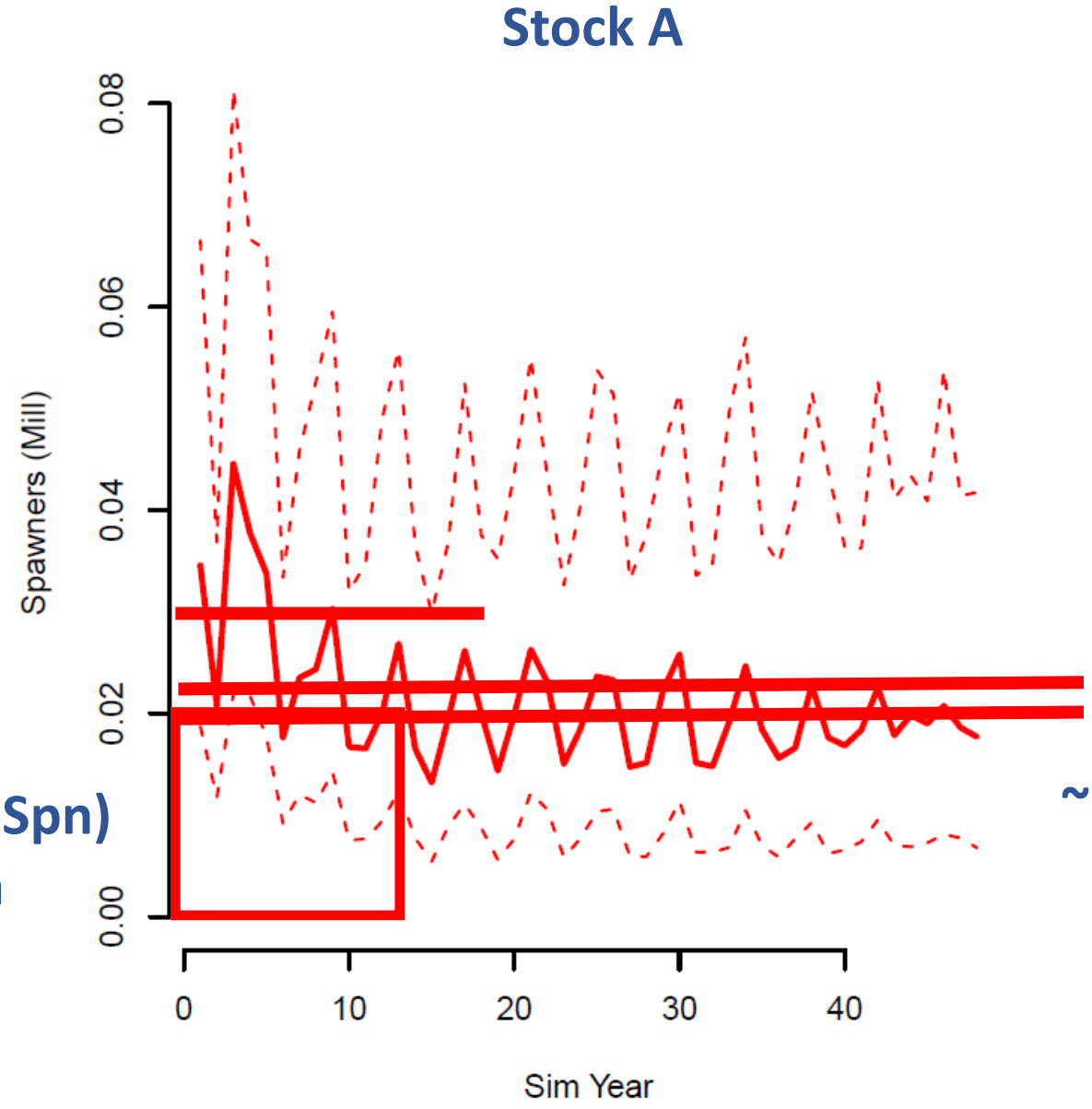


Illustration 1

- changing **1 setting**, show effect on **1 metric**

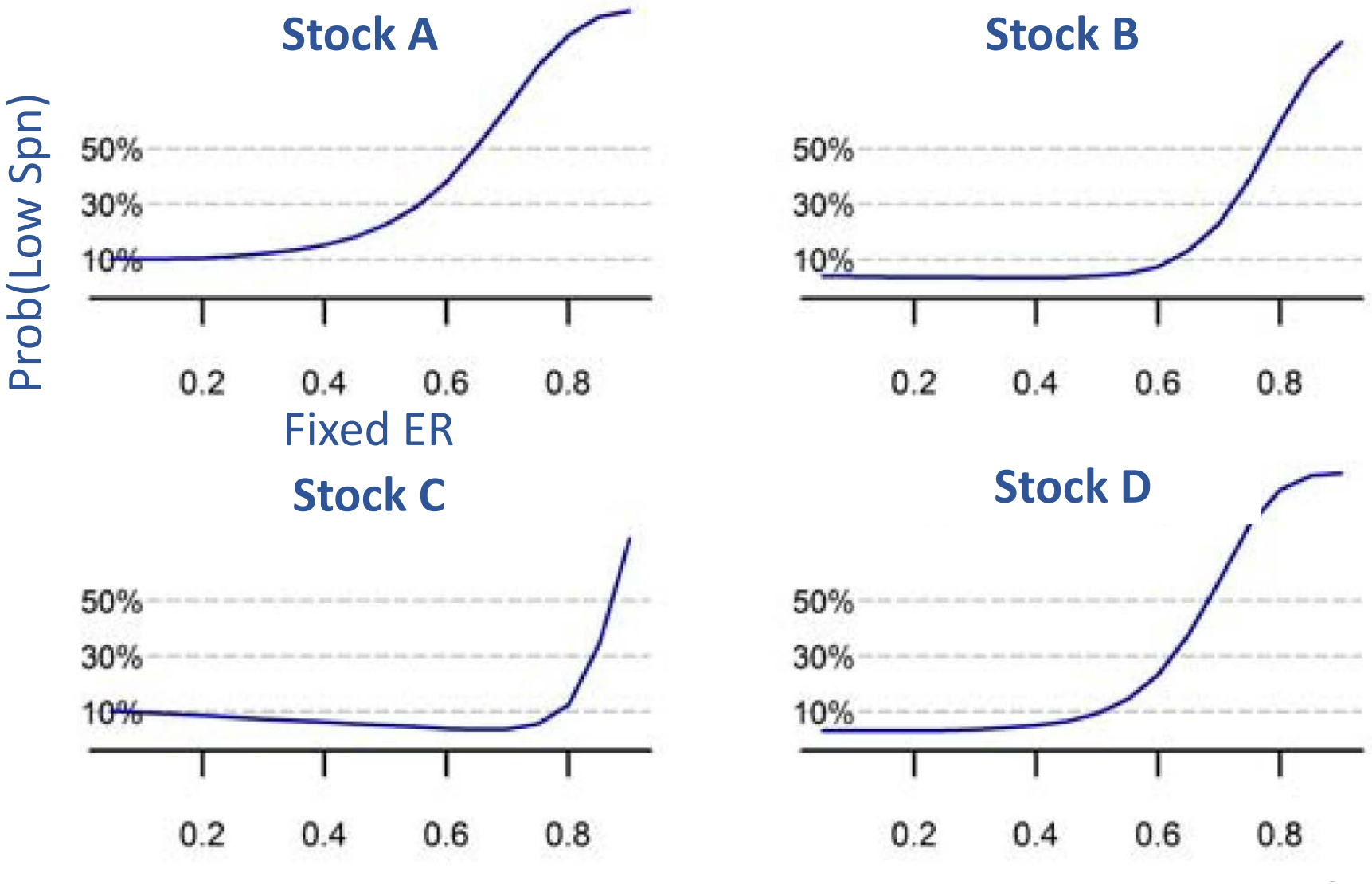
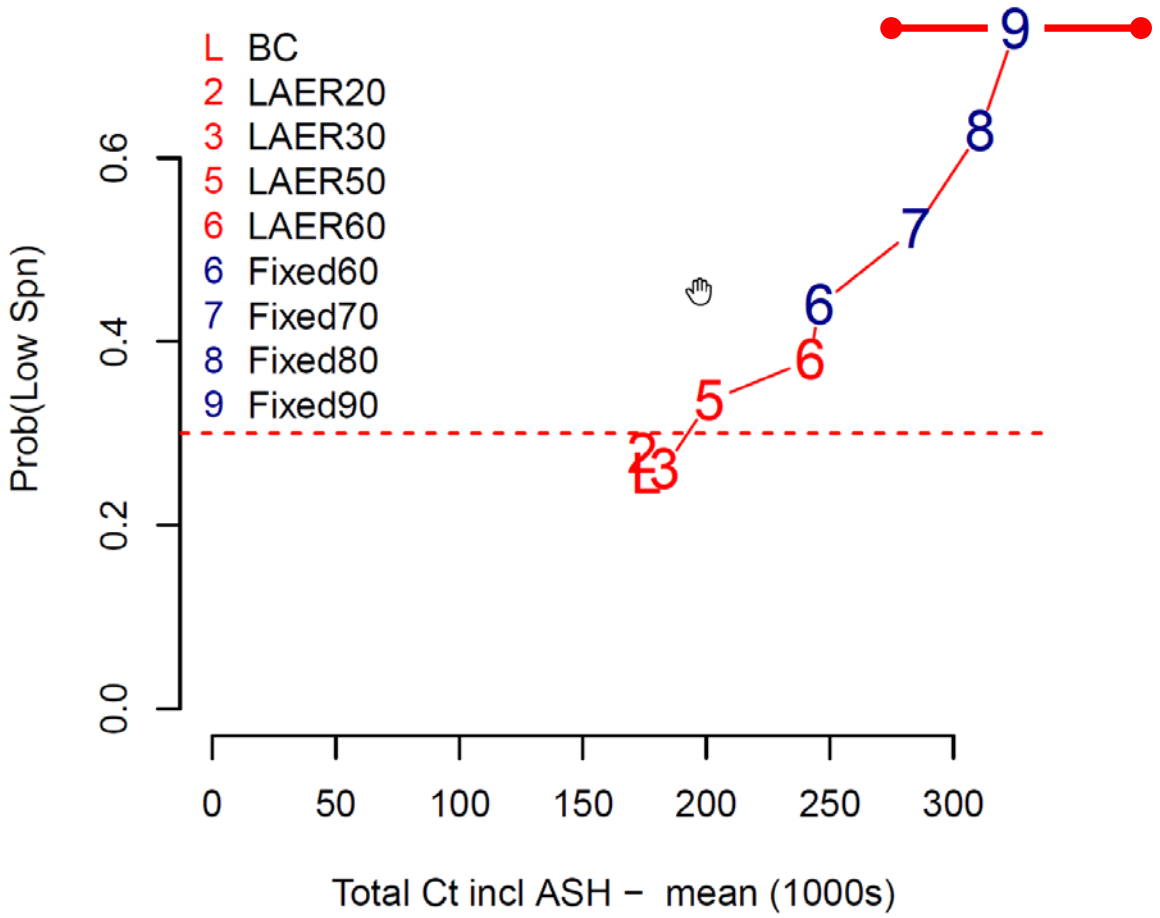


Illustration 2

- Compare **9 variations** of harvest strategy
- Show effect on **2 metrics**

Stock A – Cycle Line 1 – 3 Gen



Conclusions

- There is no single magic plot!
- Process, process, process
- As analysts:
  - Need to find a balance between the 3 types of presentations (sometimes in the same workshop)
  - Listen to process participants and learn from their frustrations
- As participants:
  - Be patient, and please play along if the analysts are trying to get creative (Marbles!).
  - Provide sound constructive criticism on the process and the communication.

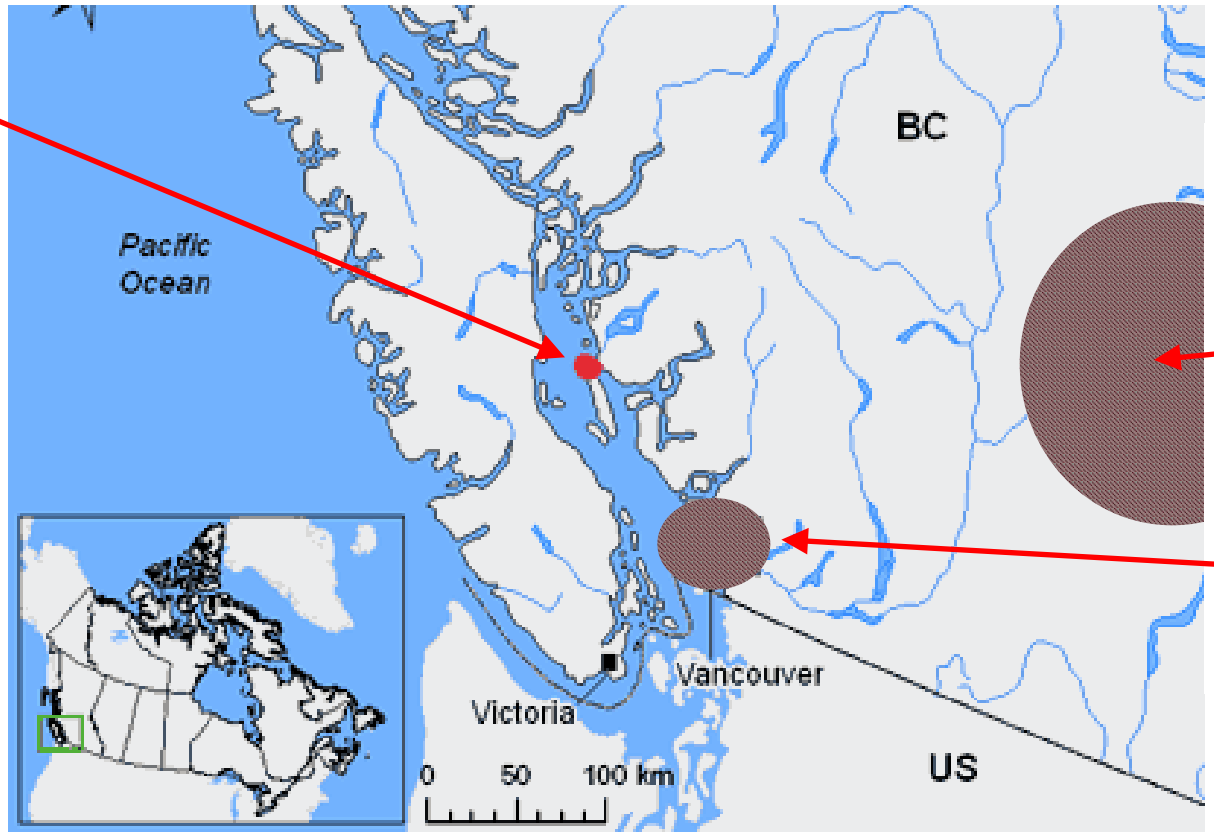
Appendix:
Extra Slides

Implicit Assumptions

Probability only => assume equal consequences

- "risk of extinction"
- works well for similar cases (different harvest strategies)
- serious pitfalls when comparing diverse cases (species at risk)

Benthic Vananda Creek Stickleback (3 lakes)



Interior Fraser Coho Salmon

Spawning

Juveniles

Implicit Assumptions

Probability and Severity => assume equal quality of information for both

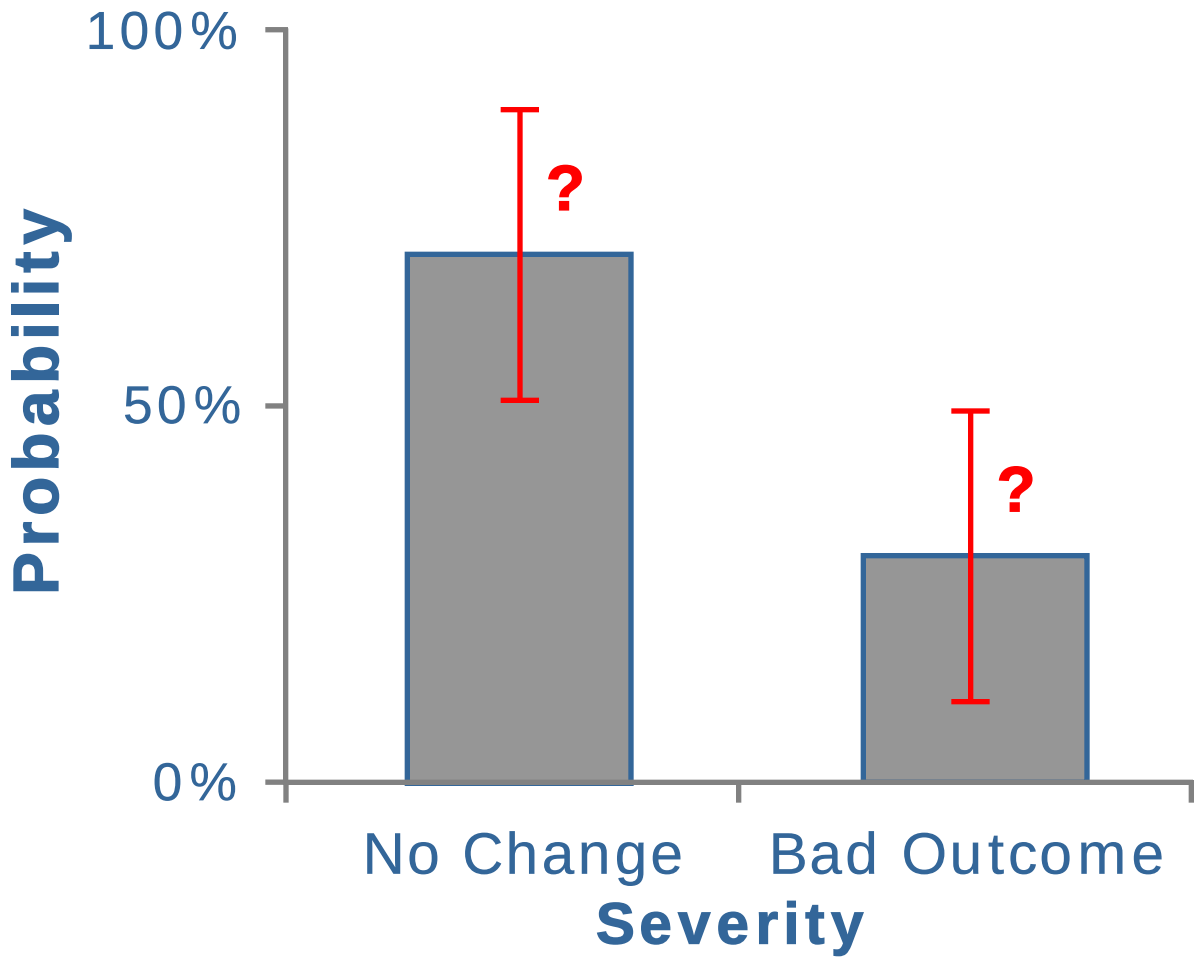
- Typically not true
- Difficult questions of scope (i.e. which consequences) and distribution (i.e. who suffers the consequences) and trade-offs
- Estimates of severity can differ by many orders of magnitude
- Methods for estimating probability more established, and more defensible in public debate

Quantitative => assume sufficient information & resources

- Holds true only for large-scale/high-priority issues (Columbia River salmon recovery plans)
- Not feasible for majority of day-to-day operational decisions

Text Book Example: 2 Possible Outcomes

Risk = Sum (Probability * Severity)
= (70% * $0) + (30% * $100) = $60 ± **?**



Typical: Range of Outcomes

Risk = ∫ f (μ, σ) = function of peak and spread