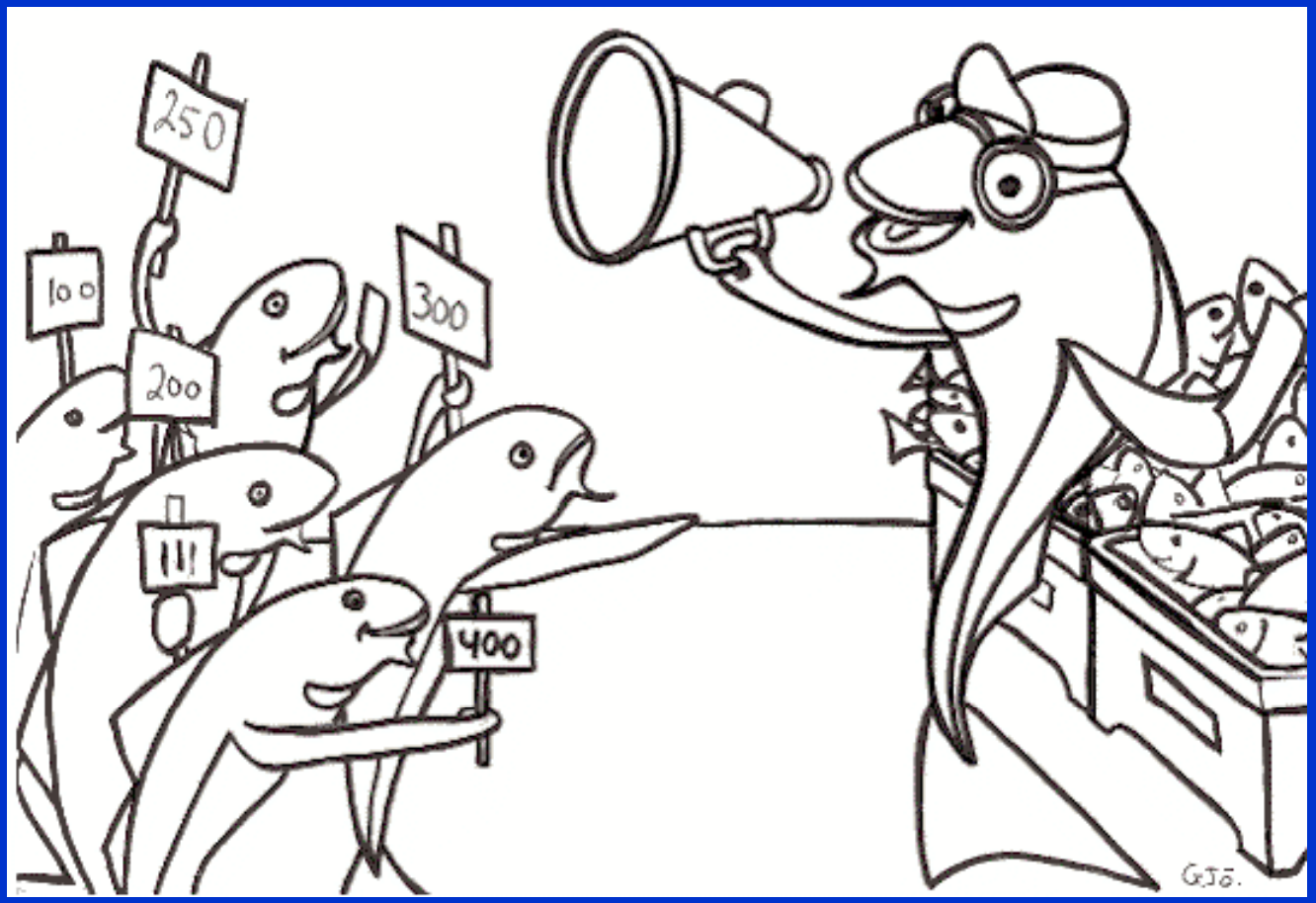
Law, science and managing fisheries



Josh Eagle, Stanford Fisheries Policy Project

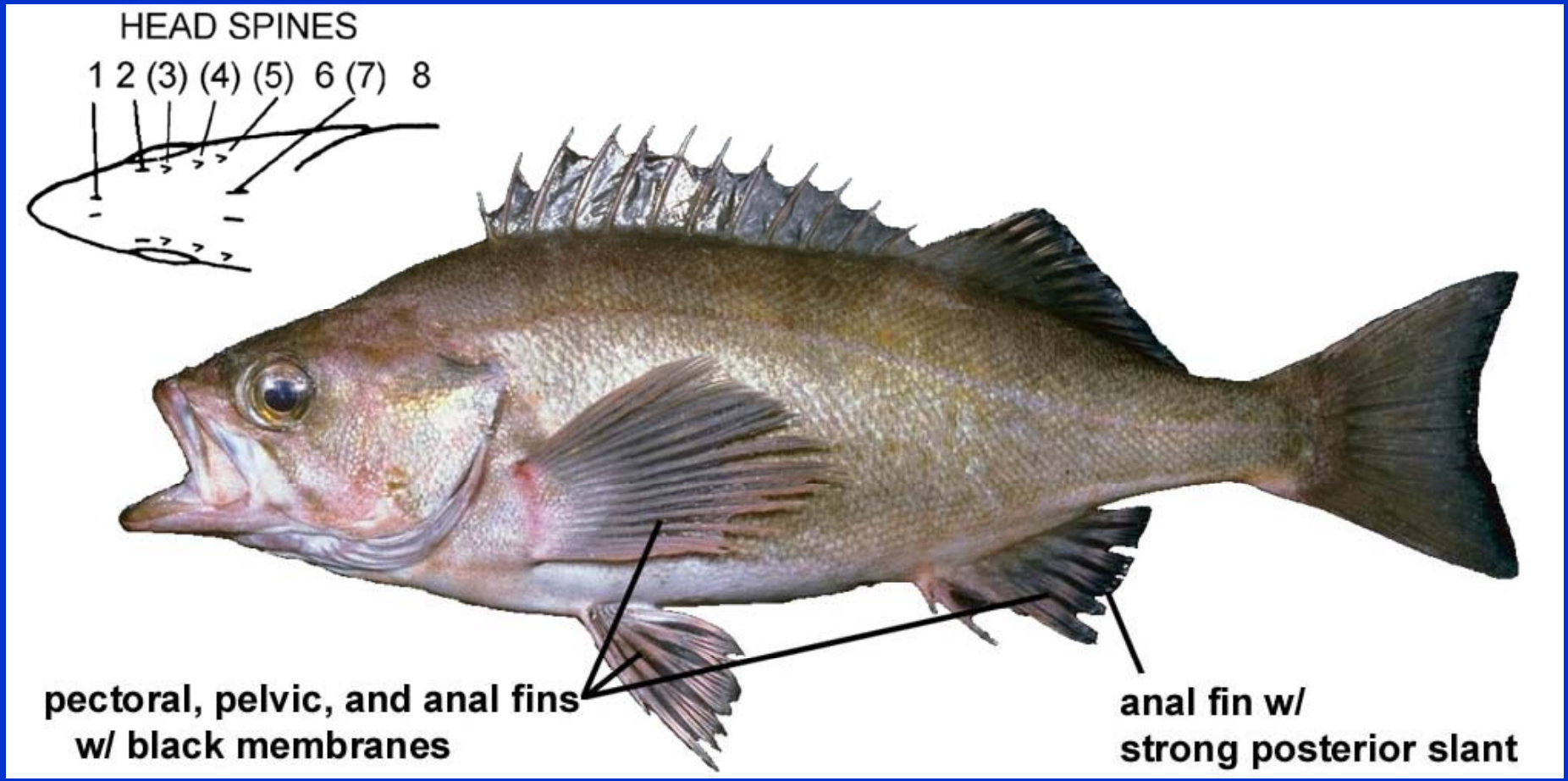
"Conservation and management measures shall be based upon the best scientific information available."
– National Standard Two

- What scientific information should be used in management? What role can law play in assuring that we use the "right" information?

- Should we (or can we) require managers to follow scientific advice? What does "based upon" mean?

Case study #1: King mackerel

Case study #2
Widow rockfish



Species	**King mackerel**	**Widow rockfish**
Council	Gulf of Mexico	Pacific
Primary fishery	Recreational	Mid-water trawl
Quota Management begins	1985	1982
Declared overfished	1985	2001

Gulf king mackerel

"Science"

"Management"

observations → model → predictions → decision

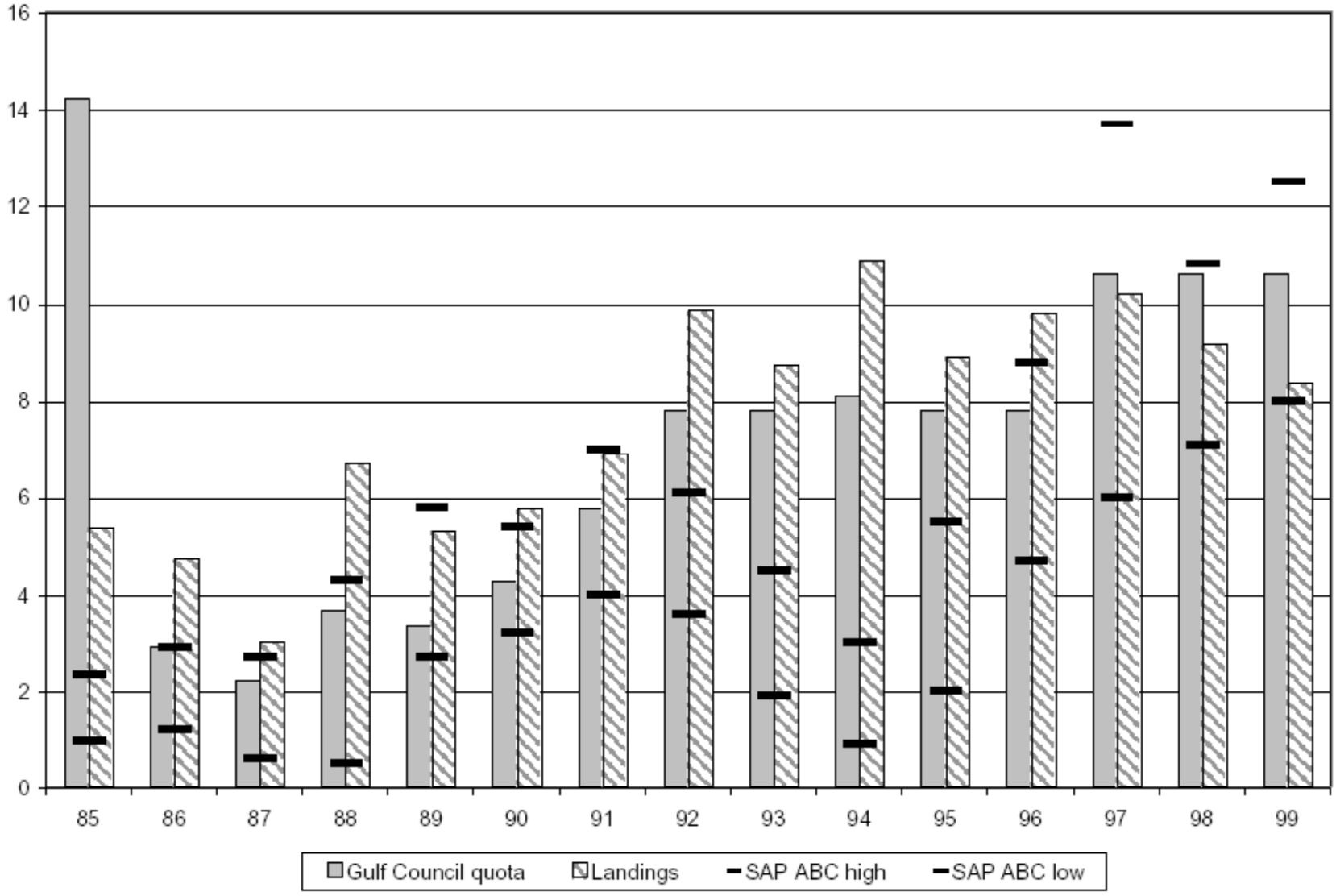
E.g., catch-at-age

E.g., Beverton-Holt

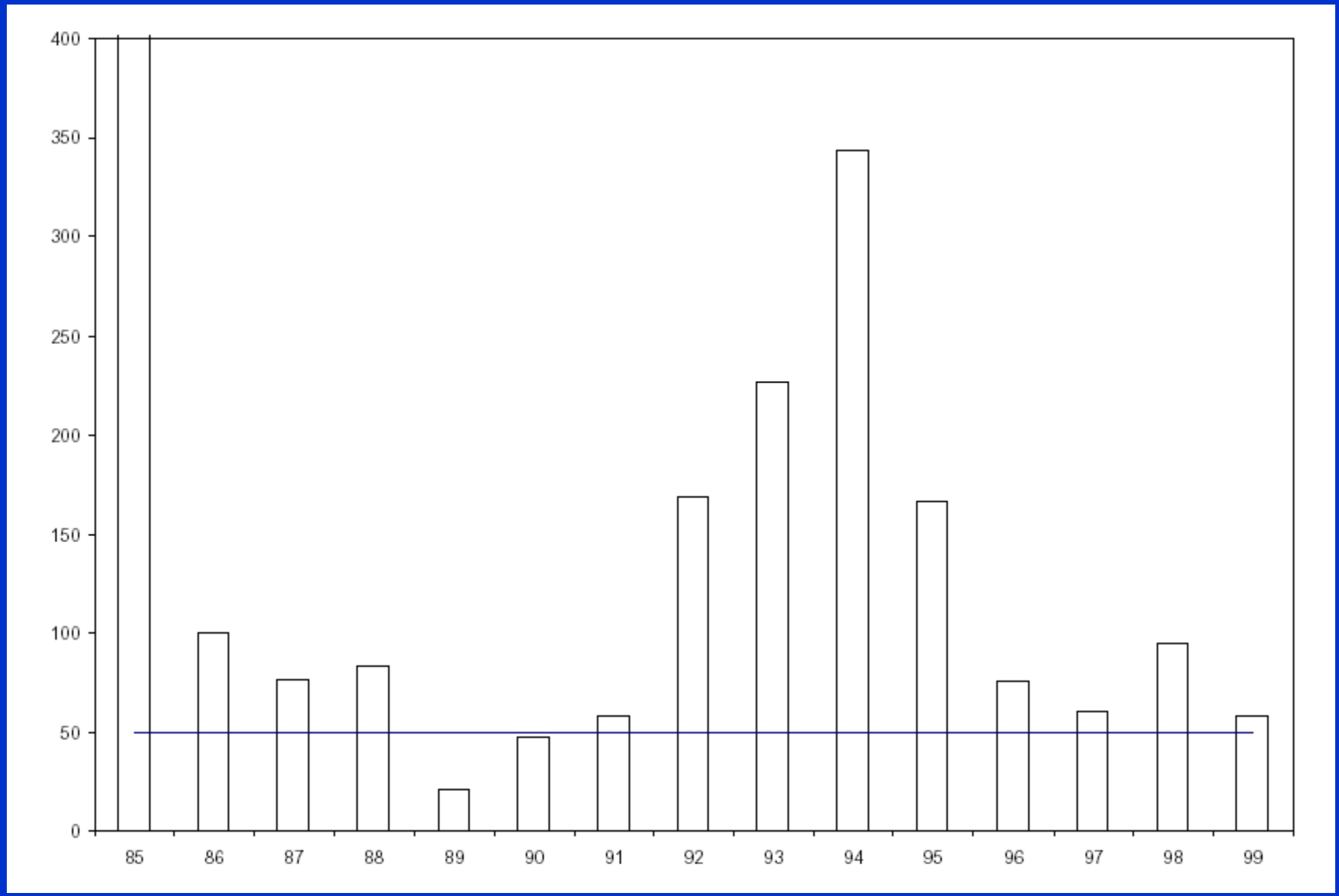
E.g., X > ABC > Y

ABC = Z

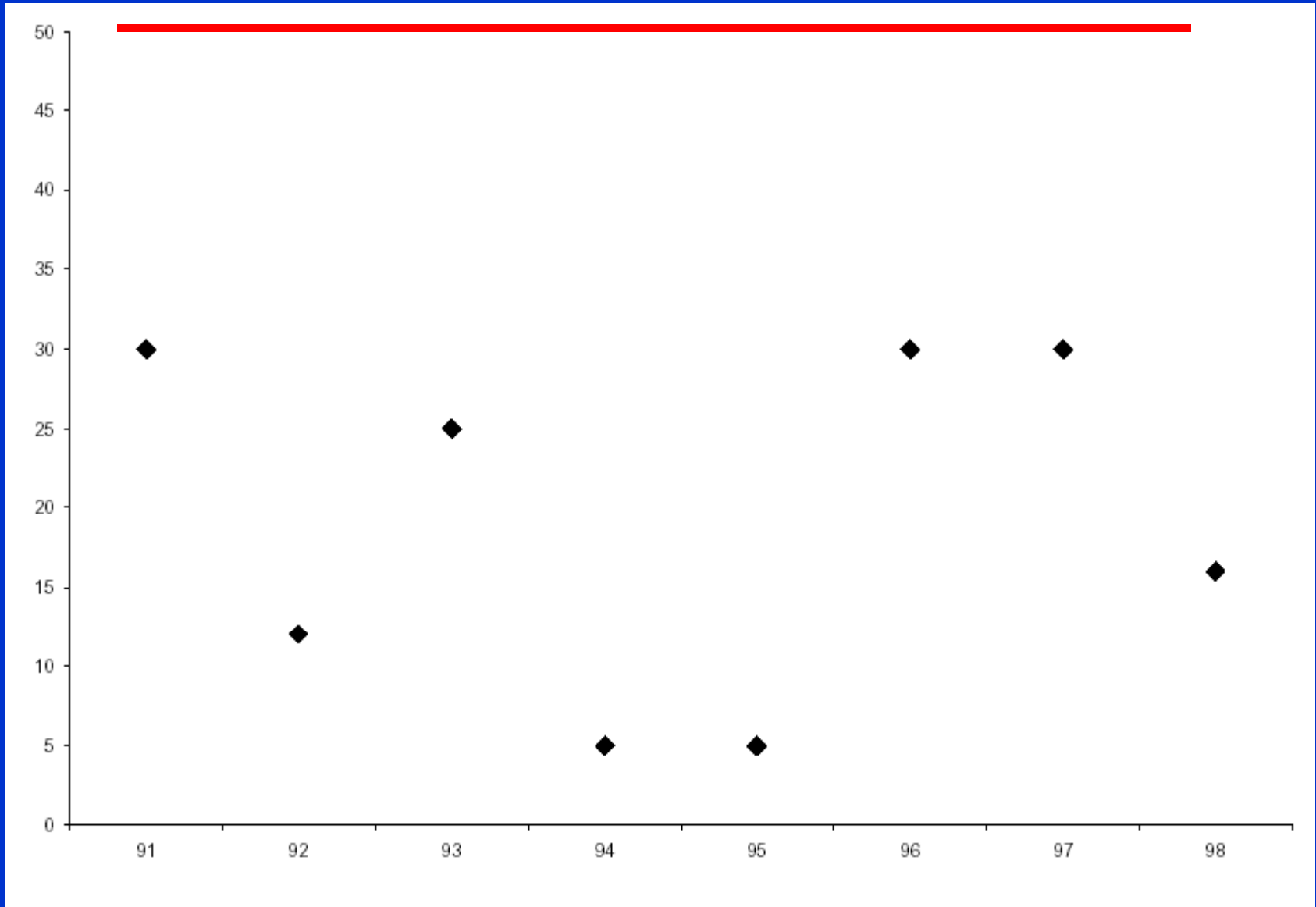
King mackerel management, 1985-1999



Gulf Council quota as a percentile of the recommended ABC range



Likelihood that Gulf Council quota would achieve target F



Widow rockfish

"Science"

observations → model → predictions → decision

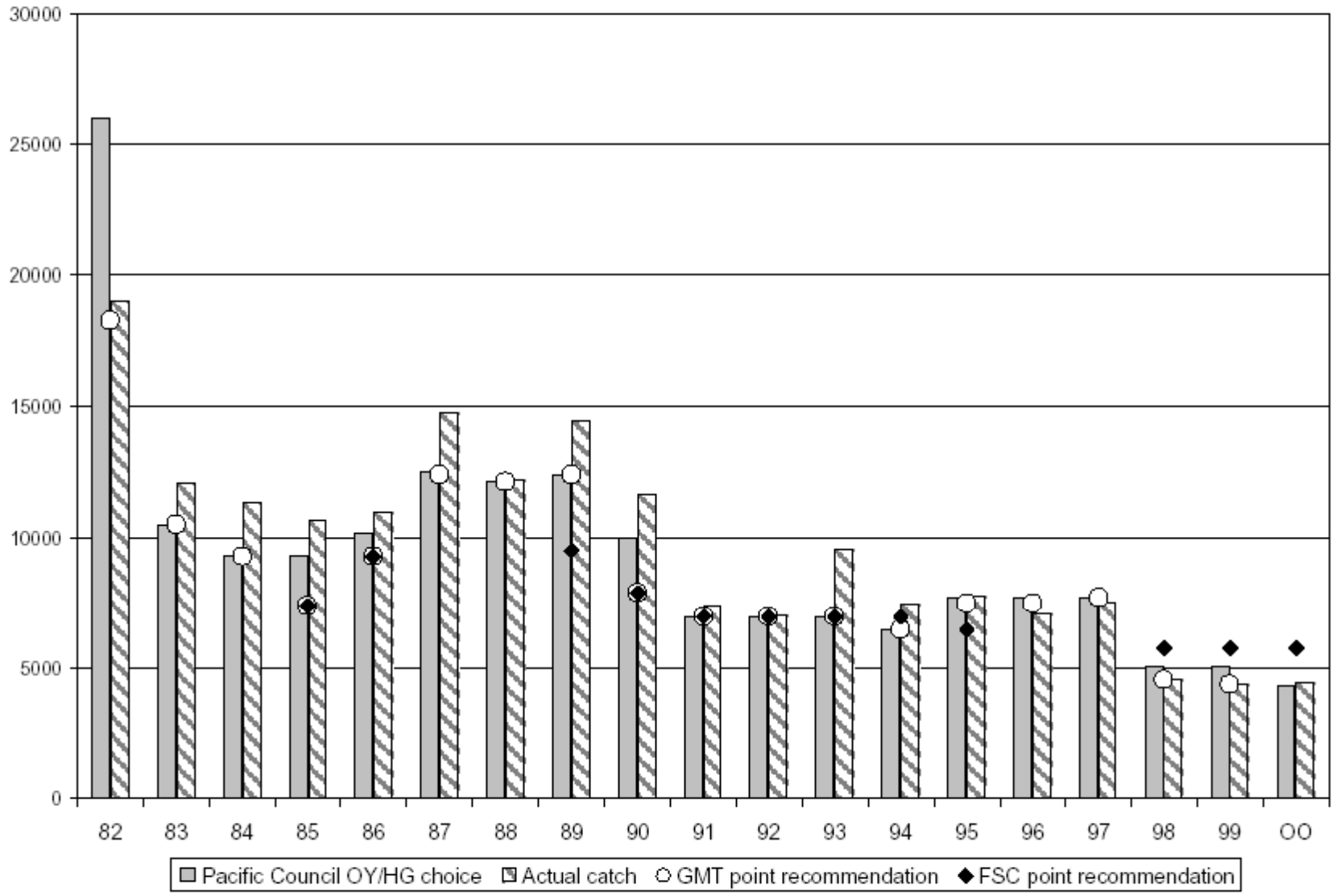
E.g., catch-at-age

E.g., Beverton-Holt

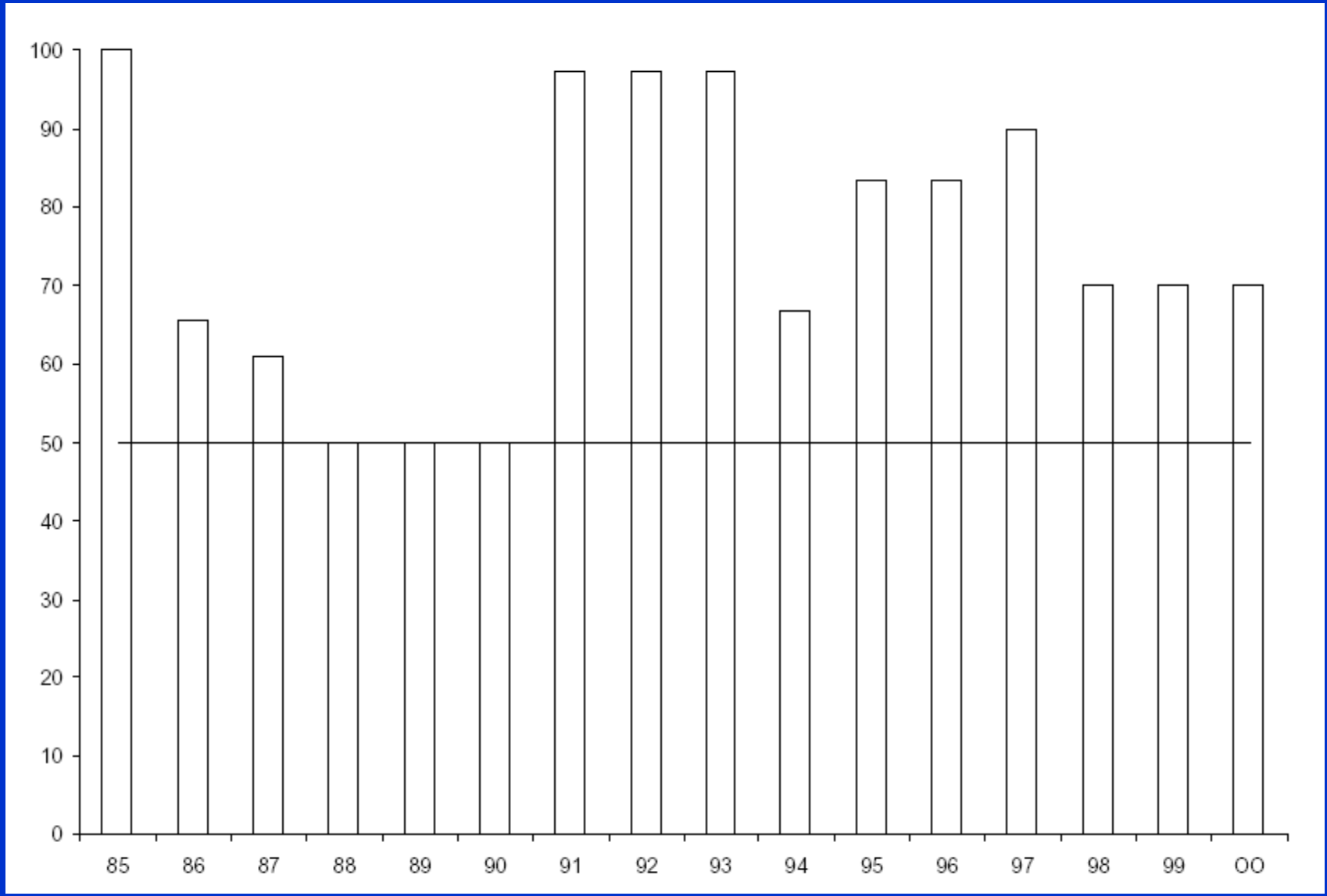
E.g., X > ABC > Y

Most likely ABC = Z

Widow rockfish management, 1982-2000



Stock assessment authors' recommendations with respect to the range



This discretion exists in all “pre-decision decisions”:

1. Choice of data
2. Choice of model
3. Choice of life history parameters

The myth of the insulated scientist:

1. Pressure from decision-makers
2. Experiential influences
3. Cognitive biases

Bluefin tuna

"Science"

"Management"

observations → model → predictions → decision

E.g., catch-at-age

E.g., Beverton-Holt

E.g., X > ABC > Y

ABC = Z

Using the two-line model, maximum sustainable yield is estimated to be 2,800 mt, and current spawning stock biomass is estimated to be at approximately 48 percent of levels necessary to produce maximum sustainable yield. The two-line model assumes that recruitment will not increase with spawning stock biomass.

Using the Beverton-Holt model, maximum sustainable yield is estimated to be 7,700 mt,and the current spawning stock biomass is estimated to be at approximately seven percent of levels necessary to produce maximum sustainable yield. This model indicates higher chances of good recruitment as spawning stock biomass increases.

Bluefin tuna

"Science"

"Management"

observations → model → predictions →

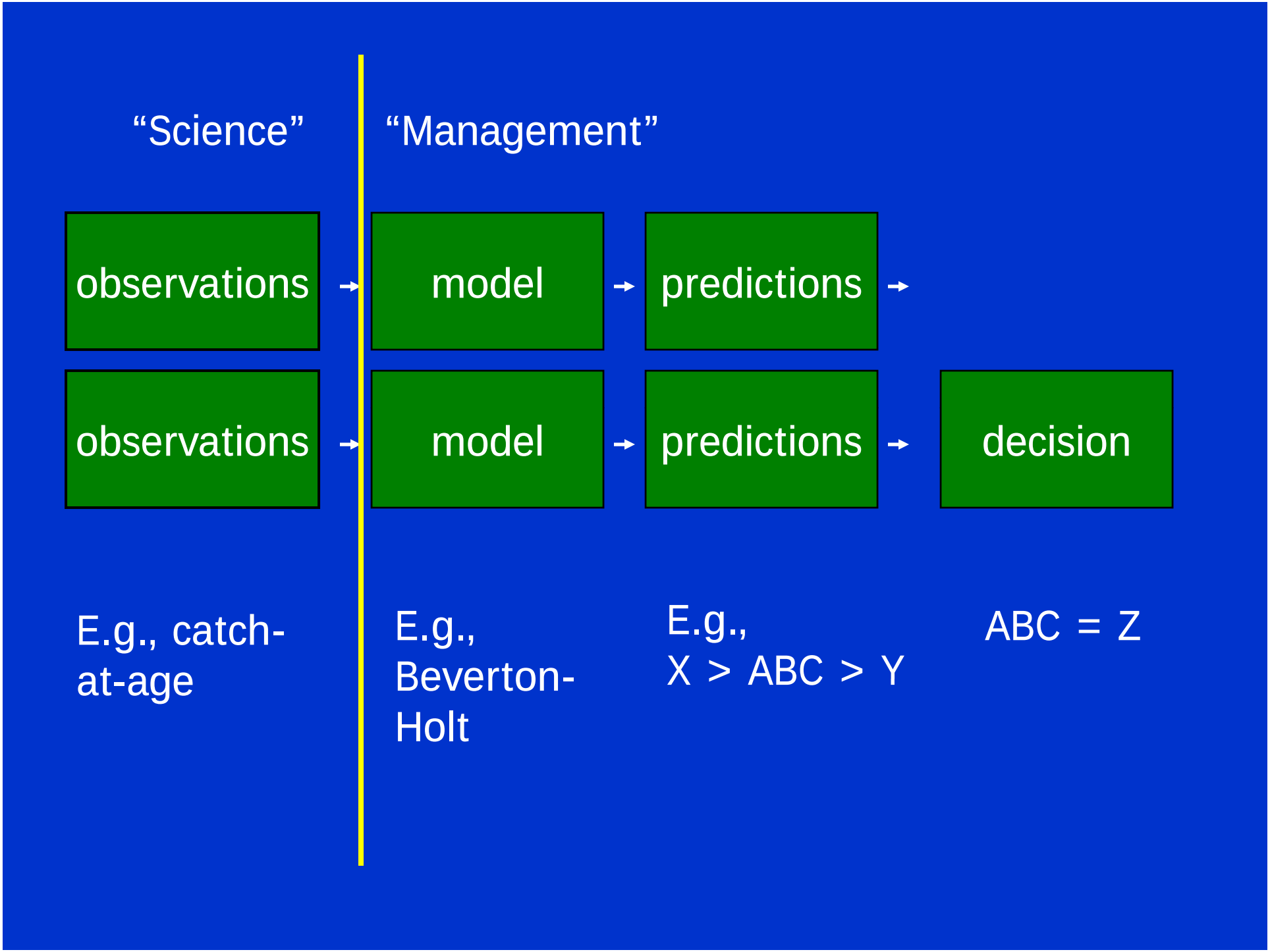
observations → model → predictions → decision

E.g., catch-at-age

E.g., Beverton-Holt

E.g., X > ABC > Y

ABC = Z


“Science”
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observations
model
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E.g., catch-at-age
E.g., Beverton-Holt
E.g., X > ABC > Y
ABC = Z

Why clarifying the respective roles of science and management in the decisionmaking process *ex ante* might be important:

1. Integrity of the management process
2. Accountability
3. Review is difficult and impractical

Why clarifying the respective roles of science and management in the decisionmaking process *ex ante* is impossible:

1. Linguistic uncertainty inherent in legislation
2. Line between policy and science is not clear
3. Cannot isolate science from influence of politics

Linguistic Uncertainty

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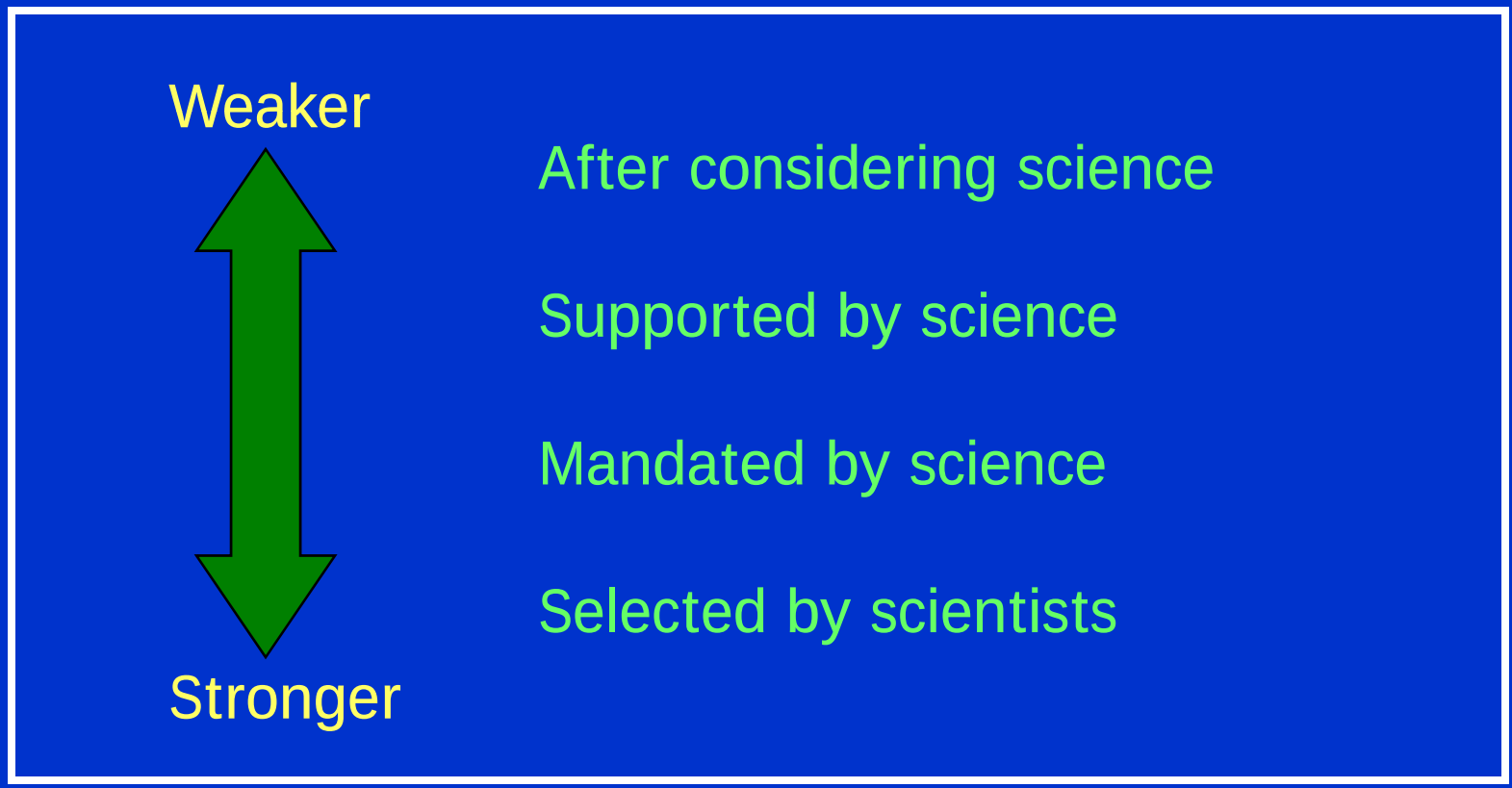

- **Insofar as it is a decision about the level of acceptable risk, we can paint nearly any decision, even one regarding which data to accept or which model to use, as a political decision.**

  This becomes less true as scientific consensus is approached, and more true in areas characterized by scientific disagreement.

- **There are influences that cross the "line" in both directions:**

  King mackerel – scientists attempt to shape decision
  Widow rockfish – managers pressure scientists to make higher recommendations

Some legislative options for governing scientific advice:

1. **Define "best available science"**
   - Grey literature
   - Anecdotal information
   - Peer review
2. **Establish protocol for identifying best available science**
   - Identify scientists
   - Consensus, majority, other voting rules
3. **Fund particular kinds of science**
4. **Incentives**
5. **Establish review procedures**
   - Who, when, how

Some legislative options for governing management decisionmaking:

1. **Identify decisionmakers**
   - Councils
   - Agency
2. **Process**
   - Public
   - Trustee
3. **Substantive guidelines**
   - National standards
   - The 51% rule
   - The precautionary approach
4. **Incentives**
5. **Review procedures/standards**

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