PICES/NPRB Indicators Workshop

Points from Background Papers and June 1 Deliberations

SOURCES OF COMMENTS

- SAFE ANNEX AND PICES REPORT
- ALL THE BACKGROUND PAPERS**
- PRESENTATIONS
- DISCUSSION BETWEEN PAPERS**

- CONTEXT OF EXPERIENCE SEVERAL PLACES (ICES, EU, CANADA, FAO etc)

STRUCTURE OF COMMENTS

- OVERALL MESSAGES
- COMMENTS ON MAJOR REPORTS
- FROM PAPERS AND TALKS
  - What is missing
  - What is present but vague
  - Present but needs further discussion

  (Gradient across topics)

  MY OWN IDEAS OF USEFUL WAYS AHEAD

MESSAGE 1

- YOU ARE IN PRETTY GOOD SHAPE!!!
  - A LOT OF WORK ON OBJECTIVES
    - APPRECIATION OF NEED FOR SPECIFICITY
    - OBJECTIVES FROM MANY SOURCES ARE CONVERGING
    - SOME SOCIAL-ECONOMIC OBJECTIVES
  - INDICATORS BEING MATCHED TO OBJECTIVES
  - Acknowledge two modes of use
  - NOT IN DESPERATION MODE

The Major Reports

- Both very good
  - Different audiences match different content
  - Both have enough detail to allow user preconceptions to guide selection of content
- Do not try to put all the detail that any user will want. Aim for a Guidebook not an Encyclopaedia. (motivate and guide)
- Make YOUR big messages clearer.

Papers & Talks – "Missing"

- DPSIR structure – proving useful in
  - Organizing dialogue and reduction in number
  - Matching Indicators to use in the overall processes
- Risk management framework
  - Overall absence of risk language in papers
  - Beth's talk has one good way forward
  - Need more focus on displaying uncertainty

"Missing" or Under-represented

- Of the suites of indicators:
  - Spatial content (missing everywhere)
  - Size-based – under-represented relative to their performance elsewhere (esp. ICES)
- FORMAL SELECTION PROCESSES
  - Needs to be more that a beauty contest
  - Jason and Beth had some impt. points

PRESENT BUT VAGUE

- How to test performance of indicators during selection process
  - NOT the same for indictors used in AUDIT function and indicators used in CONTROL function
  - AUDIT – Targets primary, limits secondary
  - CONTROL – Limits primary, Targets 2ndary
  - METHODS EXIST FOR TESTNG BOTH

Present but Vague

- Where do we get the reference points?
  - Differentiate Indicator [say, SSB] from Reference Points [Bmsy, $B_{35\%}$ etc]
  - Reversibility of impact? Responsiveness to management at all?

  The "classic" three stage model should have ONE biological (or socio-economic) fixed point and the rest is making uncertainty explicit – NOT two biological fixed points.

More Critical Thinking, Perhaps?

- When and how to use absolute vs relative indicators
  - Experience with IUCN decline criterion and marine species
- Reference Points for different regimes
  - Pop Size NO; uses of populations YES
  - Especially if likelihood of prompt detection of regime change is low

More Critical Thinking, Perhaps?

- If you like "traffic light-y" presentation, then biological calibration of cut-points is a crucial research topic
- What to do with tough decisions and multiple indicators
  - EU experience with just B and F
  - US legislation on over-fishing and over-fished won't transfer readily to ecosystem metrics

What other field works with Indicators in similar contexts?

- **PSYCHOMETRICS**
- SIMILARITIES
  - Fundamental underlying processes matter but are NOT accessible to direct measurement
  - INDIRECT indices proliferate quickly and (if flexible) easily
  - "Normal" is not a fixed point on ANY scale
  - A LOT hinges on decisions
  - Abuse and/or mis-interpretation is easy

Selection – Control function

- SIGNAL DETECTION THEORY
  - From Human Factors Research
  - 70 year history (WWII was first flowering)
  - REQUIRES
    - Reconstruction of history of values of indicator(s)
    - RECONSTRUCTION OF HISTORY OF WHAT GOOD DECISIONS WOULD HAVE BEEN!!!
      - If we can't do that retrospectively how can we support decision-making into the future

SIGNAL DETECTION THEORY

- History of indicator gives direct record of what the decision would have been, had that indicator been used
- History of what good decisions would have been gives standard for whether the decision IN HINDSIGHT would have been right or wrong
  - (Piet and Rice – Lower or not lower quota)

SIGNAL DETECTION THEORY

- Four possible Outcomes:
- HIT (something should have been done and Indicator said DO IT)
- TRUE NEGATIVE (no mgmt response needed and indicator said status quo OK)
- MISS (something should have been done but indicator did not say action was needed)
- FALSE ALARM (nothing needed to be done but indicator called for management intervention)

SIGNAL DETECTION THEORY

- Results presented as 2 X 2 tables
- Perfect indicator has no Misses and False Alarms
- COSTS of Misses and False Alarms not the same!!!! (nor equal to different perspectives)
- Simple method to choose decision point on indicator ("reference point") to
  - Minimize overall error rate
  - Control ratio of Misses and False Alarms (medical)
- Easy to compare performance of Indicators

AUDIT FUNCTION- PSYCHOMETRIC DIAGNOSTICS

- History of over a century
- Many mistakes (and advocacy abuses), many lessons already learned
- Uses are numerous
  - Career aptitude testing
  - Legal competency for actions
  - Personality disorders and counselling
- Extensive validation testing and codification of professional standards

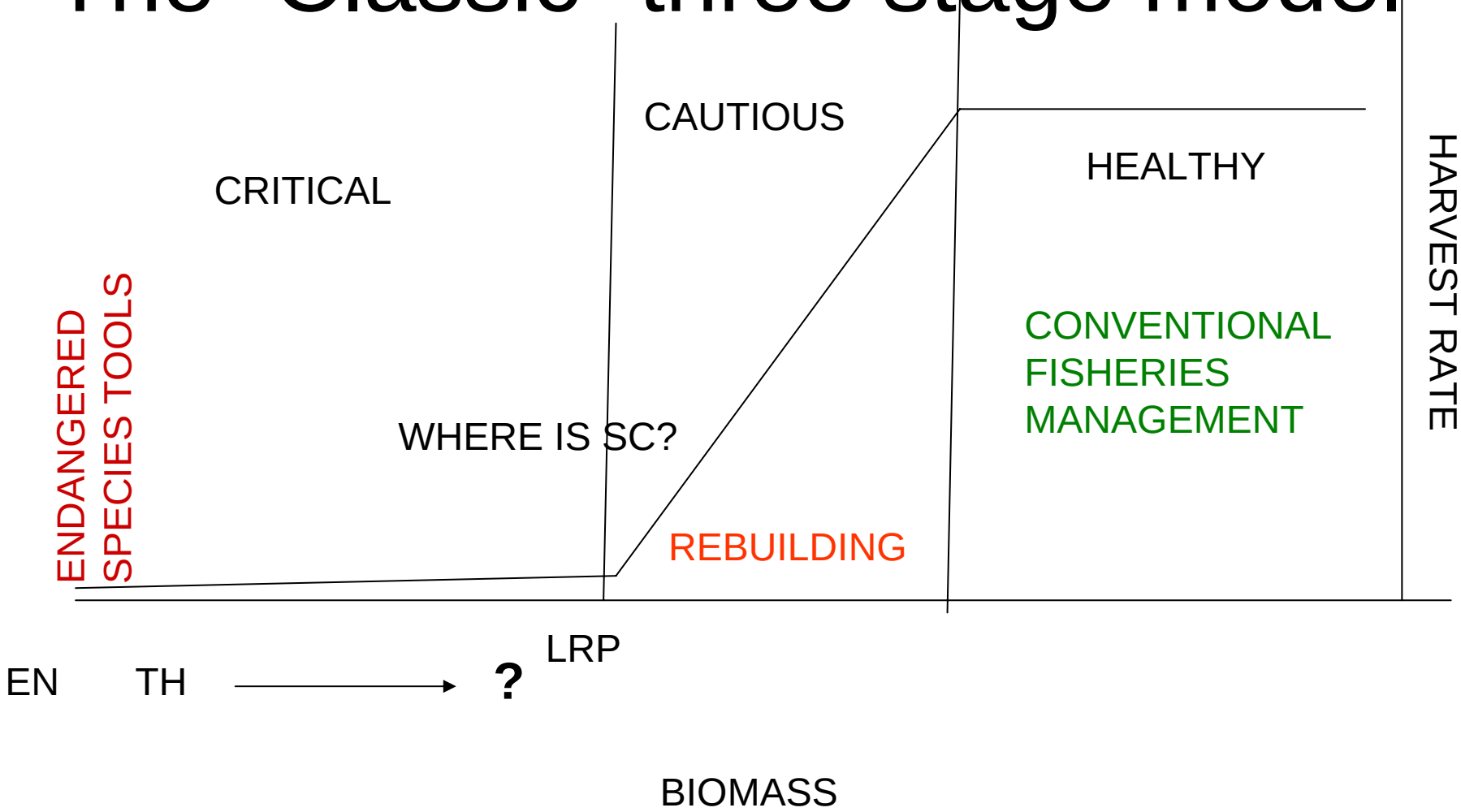
PSYCHOMETRIC DIAGNOSTICS

- Reminder : Dealing with all the same problems:
  - Fundamental underlying processes matter but are NOT accessible to direct measurement
  - INDIRECT indices proliferate quickly and (if flexible) easily
  - "Normal" is not a fixed point on ANY scale
  - A LOT hinges on decisions
  - Abuse and/or mis-interpretation is easy

PSYCHOMETRIC DIAGNOSTICS

- General Approach
  - Have large battery of "questions" (= "suites of indicators") – Binet, MMPI, Rorschach etc
  - Test a large populace on the battery
  - Test sets of individuals KNOWN with confidence to have specific disorders.
  - WHAT COMBINATION OF QUESTIONS IN WHAT WEIGHTING MAXIMALLY GROUPS AS DISTINCT THE KNOWN PATHOLOGIES WHILE LEAVING **MOST** OF POPULACE IN A CENTRAL CLOUD
- NOT TRIED IN ECOLOGY (that I know of)

The “Classic” three stage model



ONE Fixed Point in 3-stage model

- Some govt responsibility – law or policy
  - "Serious or Irreversible harm" (CBD & PA)
- 1. Best biological estimate of that point (ICES is B_{lim} – damaged productivity)
- 2. Estimating current status relative to that point has uncertainty, so buffer is needed- B_{pa}
  - Point where PROBABILITY that true stock may be at the limit is > 0.05
  - Risk averse management relative to makes whole system precautionary
- Gets F pairs from F which implies equilibrium B_{lim}

The Issue of PREDICTABILITY

- "Scenario Exploration" [use your favourite term] in Climate Change and Marine Ecosystem Dynamics have an important difference:
  - CC - NO EXPECTATION OF ACCURACY ON TIME SCALES >30 DAYS OR < 30 YEARS
  - ECOSYSTEM – 3-7(10?) YEAR PATTERN IS CORE OF DECISION SUPPORT
  - CC – key decisions are long-term strategic
  - Ecosystem " " medium-term tactical

What to Predict?

- Don't try to capture the inter-annual flutter
- How does probability of a an extreme event (good or bad) vary with natural or anthropogenic forcers?
- Multi-factor non-parametric probability density estimation methods DO show inflections in plot of P(extreme event) as f (specified forcers)
- Easy to use and interpret
- DO require decisions about what is "extreme"