

**NOAA
FISHERIES**

Dealing With Scientific Uncertainty from Stock Assessments

Fisheries Forum

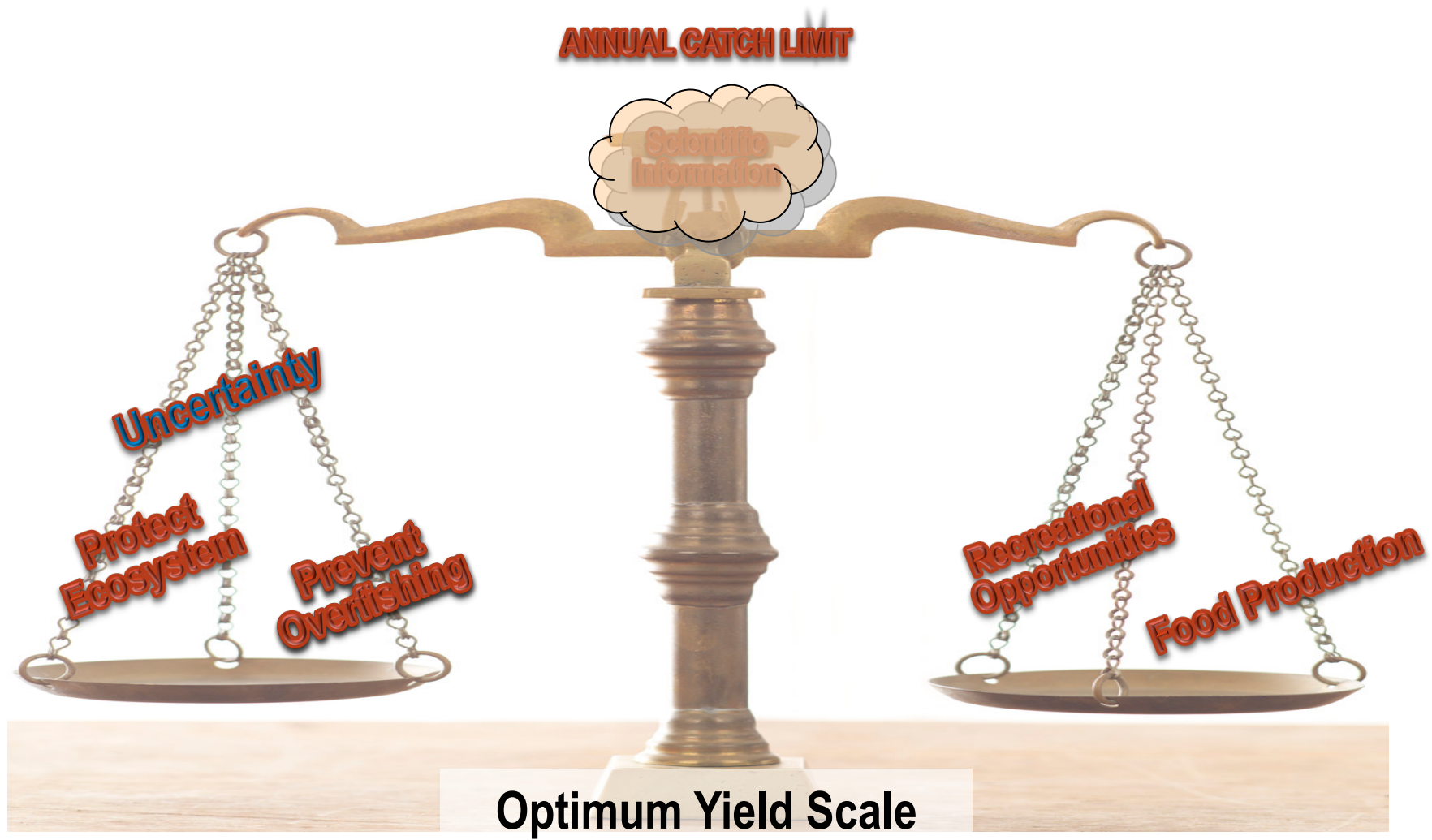
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Richard D. Methot Jr., Ph.D.

NOAA Senior Scientist for Stock Assessments

Seattle, WA

Balance Conservation and Utilization



How does Overfishing Occur?

Intentional Overfishing
Ended with accountable
ACLs required by MSA

Pre-Fishing Year

Management Uncertainty
In-season controls did not
prevent catch from
exceeding limit

Fishing Year

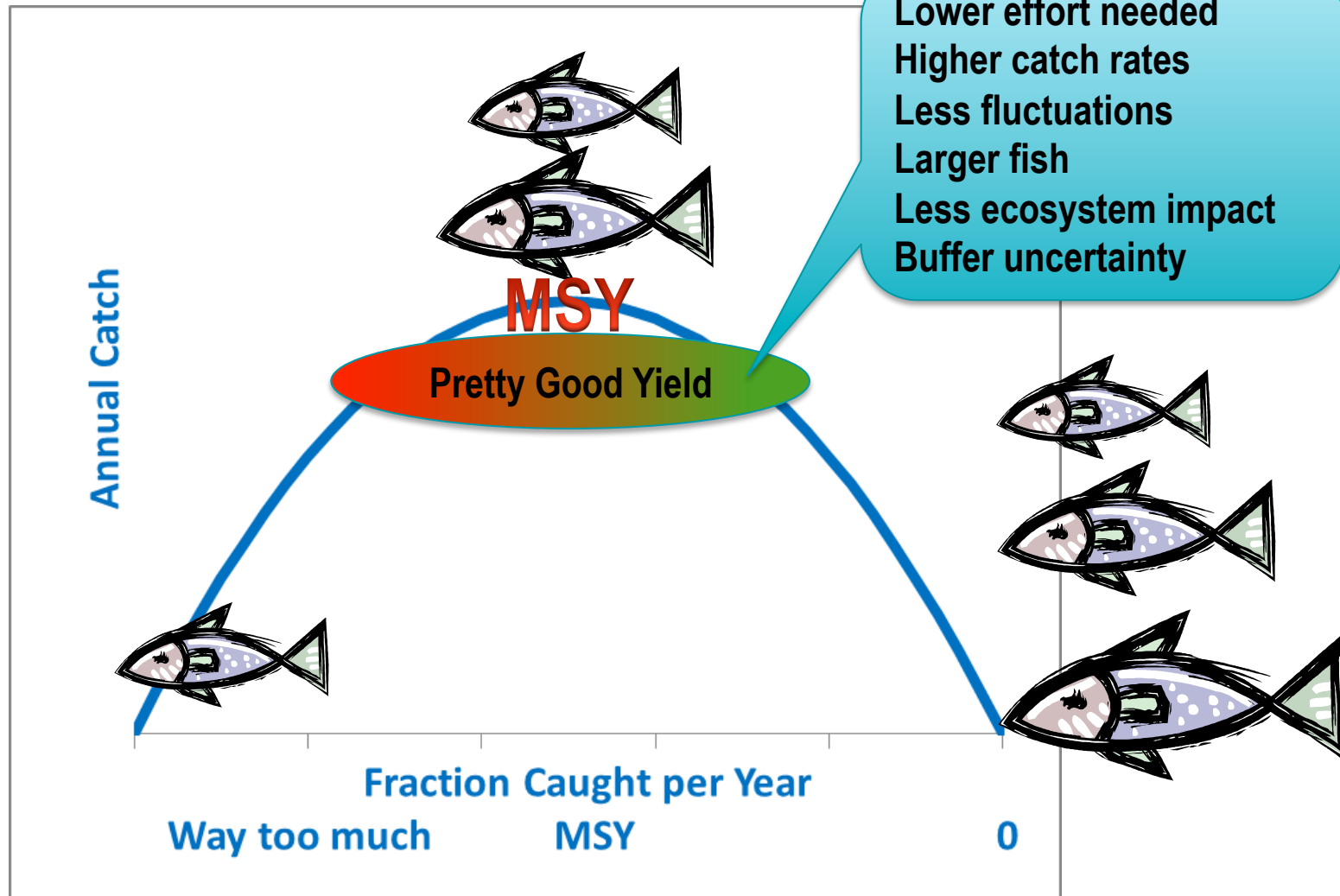
Scientific Uncertainty
Catch was controlled below
limit, but limit was not
accurate

Few Years Hindsight

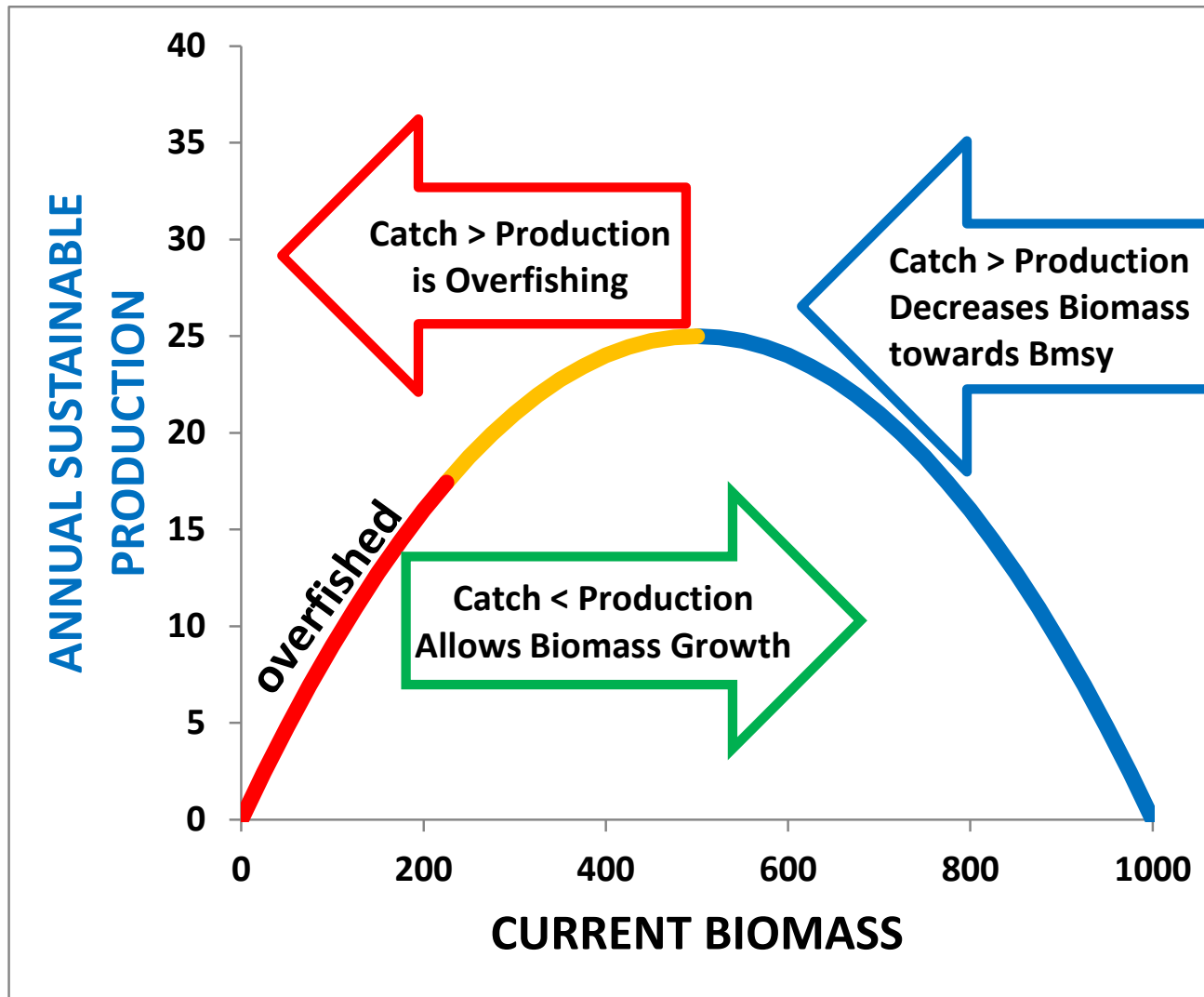
Ecosystem Uncertainty
Assessment missed some
important factor

Decadal Hindsight

Response to Fishing



Fishery Production Concepts

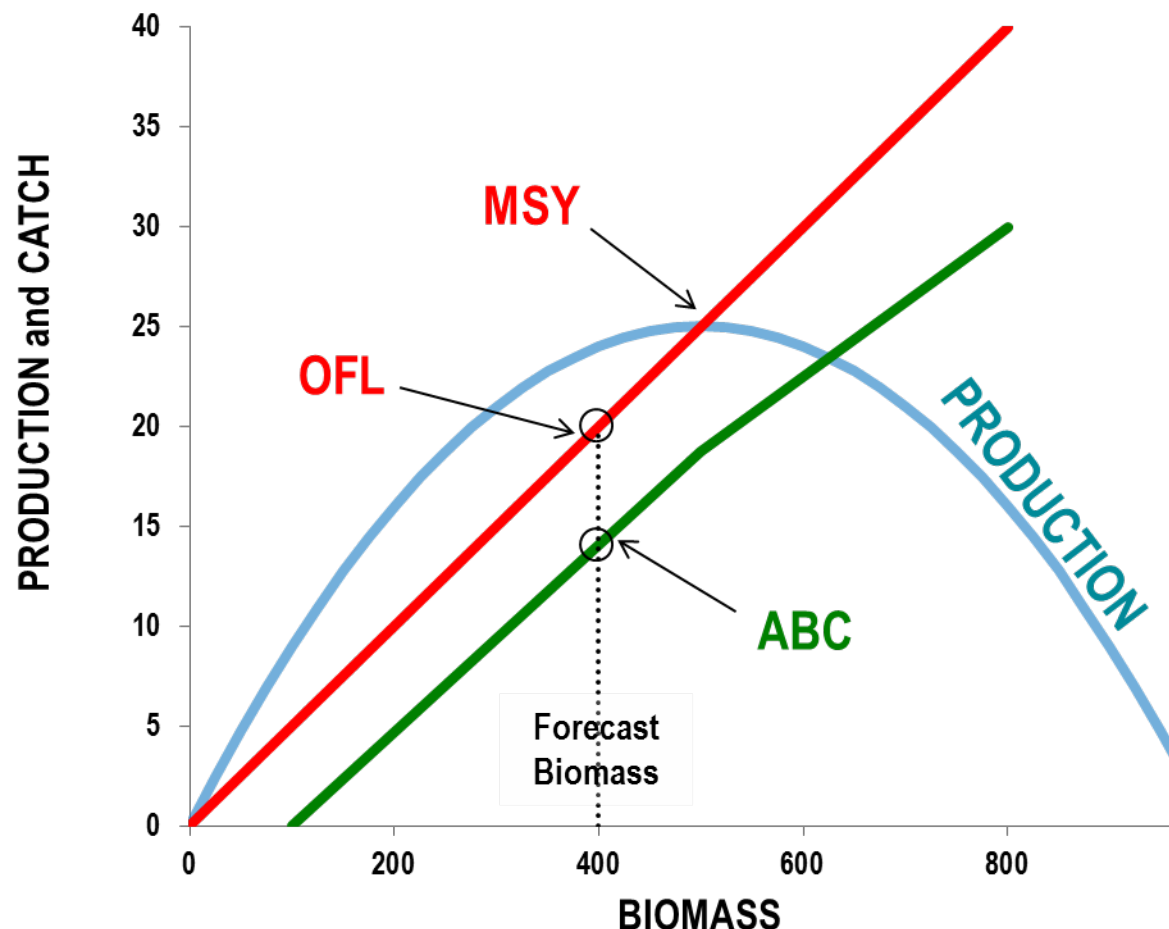


Approaching Theoretical MSY

- Catching MSY over the long-run means controlling annual fishing mortality exactly to the control rule, but:
- We can't know the real shape/level of the production curve and matching control rule exactly
- We can't forecast next fishing season's fishable stock abundance exactly
- So, we'll always be slightly over- or under-fishing relative to the real MSY
- “Pretty Good Yield” approaches, but cannot attain, theoretical MSY over the long-term
- Better assessments help us get pretty good yield and pretty good overfishing prevention
- Climate/Ecosystem studies needed to keep short-term targets relevant to longer-term changes



Responding to Uncertainty



- **OFL control rule** is annual overfishing limit
- Slope of control rule is a fishing rate, F
- Where control rule intersects **PRODUCTION** is long-term outcome
- Lower **ABC control rule** accounts for uncertainty

Where Does Cloud of Uncertainty Come From?

- Noisy data
- Uncertain model conditions/assumptions/priors
- Natural drift since last assessment

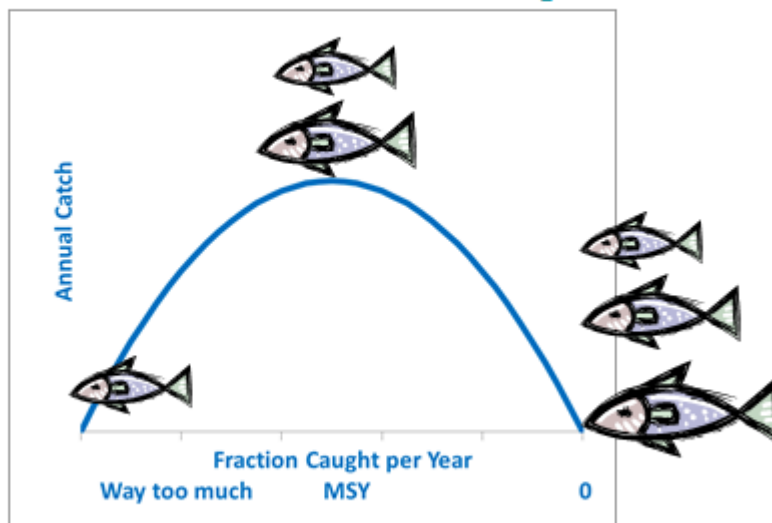
Why Redo An Assessment?

1. Another few years of (still noisy) data could stabilize trend estimates
2. A new kind of data/study provides better calibration of some factor
3. Assessment is due/past due
4. Some indicator indicates drift off previous forecast
5. Past assessment was uncertain so, heck, try again

Which Stocks Need Assessments?



CONCERN



PROTECTION

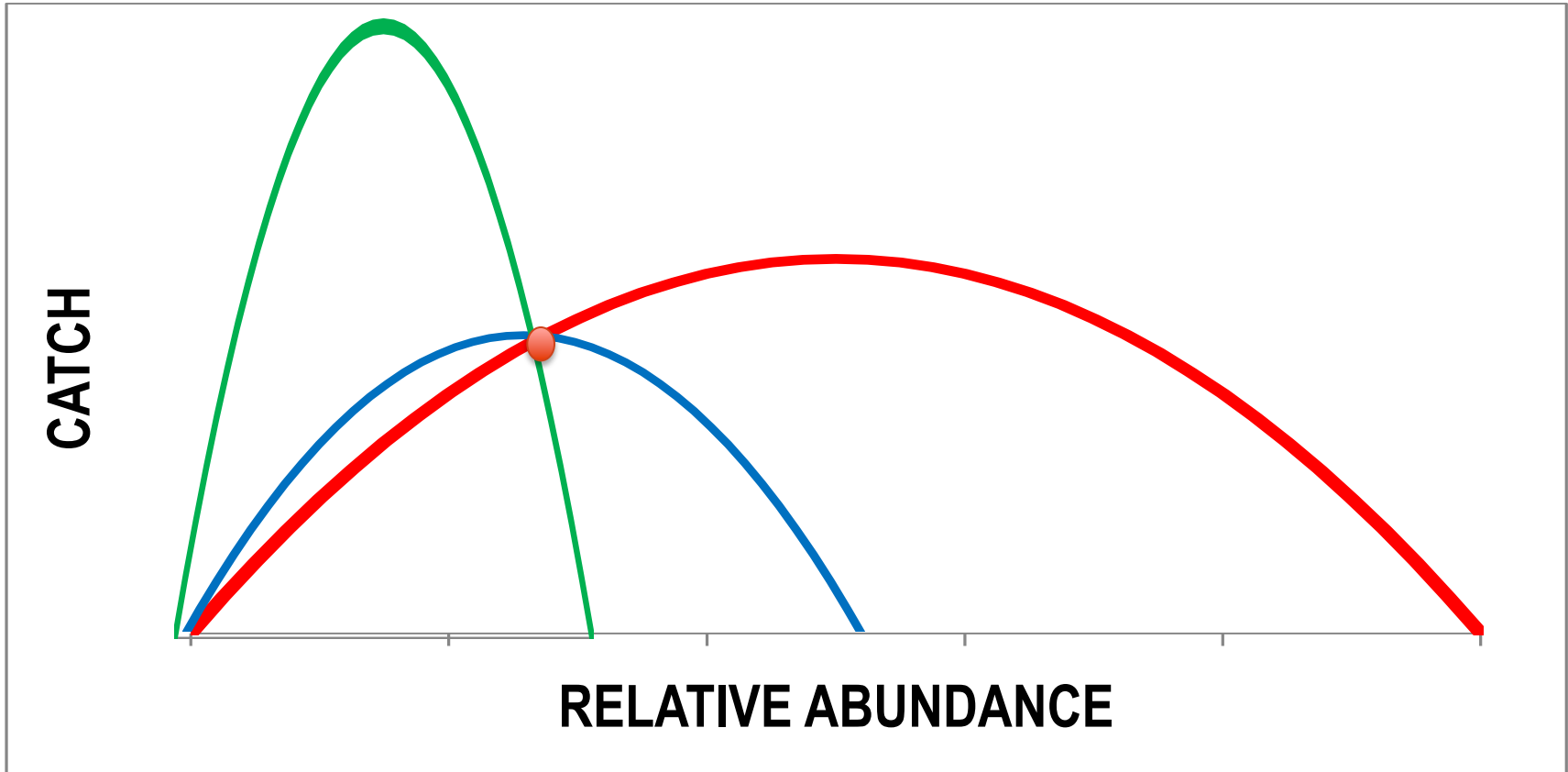


DEMAND

Prioritizing Assessment Efforts

- We cannot afford data-intensive, annually updated assessments for all stocks
- Some fisheries have high constituent demand for catch that approaches biological limits
- Some stocks naturally fluctuate more
- Some stocks are more important to ecosystem
- Some stocks have lower constituent tolerance for overfishing

Triage for Data-Limited Stocks



Is there a direct indicator of relative abundance?

Is there a biological indicator of catch/abundance (e.g. F)?

Tradeoffs in Prioritizing Assessments

Annual, High Quality
Assessment for Key
Stocks

Baseline for All Stocks

Rapid Annual
Updating

Thorough, Holistic
Investigation

Standardized,
Operational Methods

Tailored Investigations

Investigate New, Resolvable Issues

Don't Re-examine Every Aspect,
Every Time

Assessment Level

Data-Rich

Data-Limited

Assessment Frequency

Frequent Enough to Track Signal

Infrequent Enough to Avoid Noise



Prioritization Goals

- **At least baseline monitoring for all stocks vulnerable to fisheries**
- **Good enough and timely enough assessments for stocks targeted by fisheries**
- **Best and most timely assessments for high value, high vulnerable stocks**
- **Intermediate goals for good enough and timely enough can be set through a structured process**
- **Really well-informed goals/timeliness needs fuller understanding of system through Management Strategy Evaluations**
- **Attention to ecosystem/climate/habitat effects across the spectrum of assessments**