Ecosystem Service Tradeoff Analysis for Engaging Stakeholders and Supporting Managers

Ben Halpern, Ph.D.

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Sitka, Alaska
herring seine fishery
Photo: S. Anderson

LNG

Shipping

Fisheries

Conservation

Desalination

Marine ecosystems face growing number of uses

Management plans need to balance all these uses in our finite ocean environment

In theory, this is OY

Wave energy

Coastal property

Recreation

Wind energy

Aquaculture

Tradeoffs among ocean uses

- Activities interact to affect values of different ocean uses
- Ignoring interactions or not communicating their effects creates unanticipated consequences and conflicts
- Managers make decisions about tradeoffs, whether explicitly or implicitly

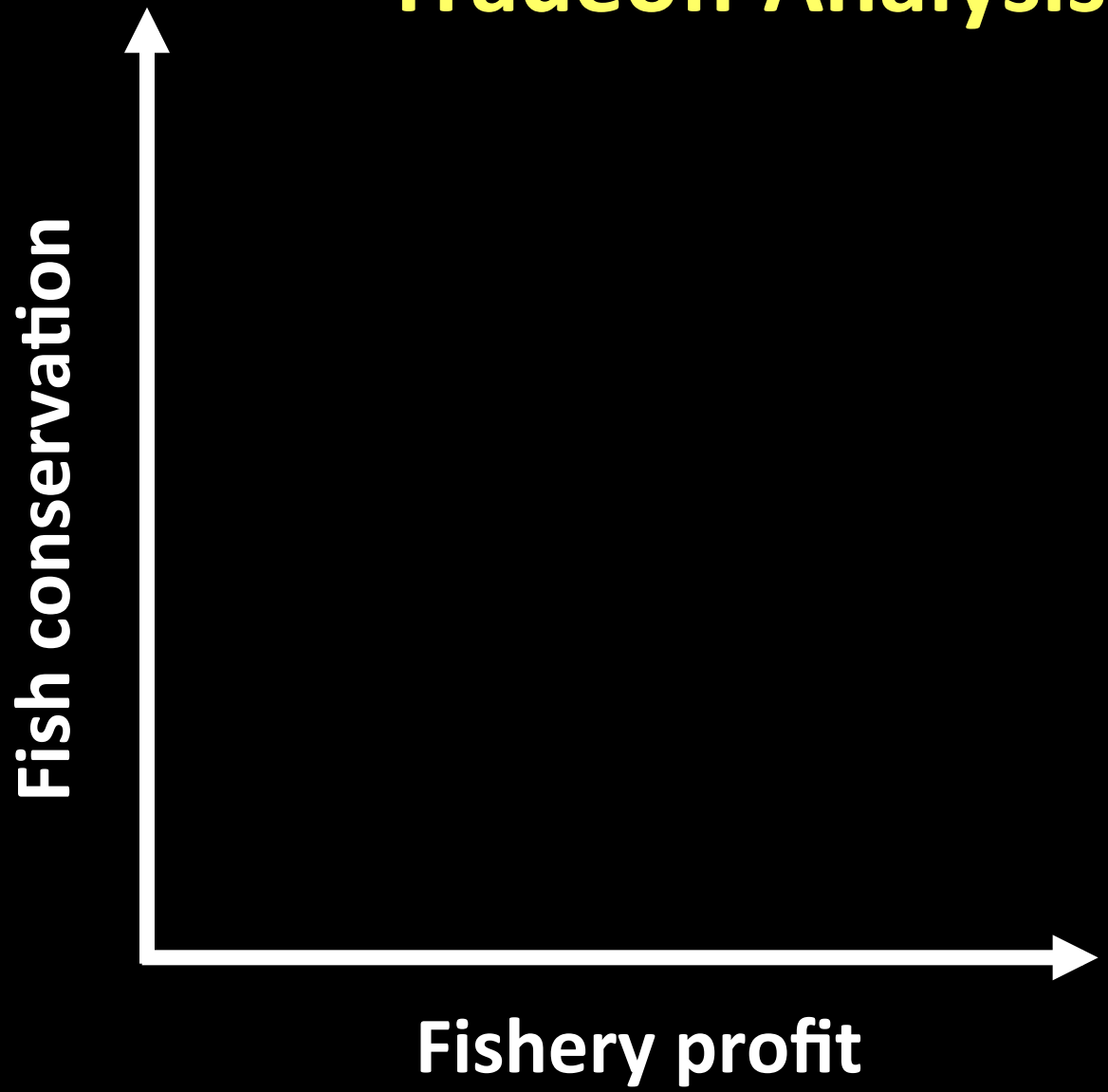
Tradeoffs among ocean uses

To find agreeable plans that minimize conflicts, need to:

- <u>Engage at the onset</u> stakeholders representing different ocean uses

- Measure (estimate) and <u>communicate to all the tradeoffs</u> caused by different plans

Tradeoff Analysis



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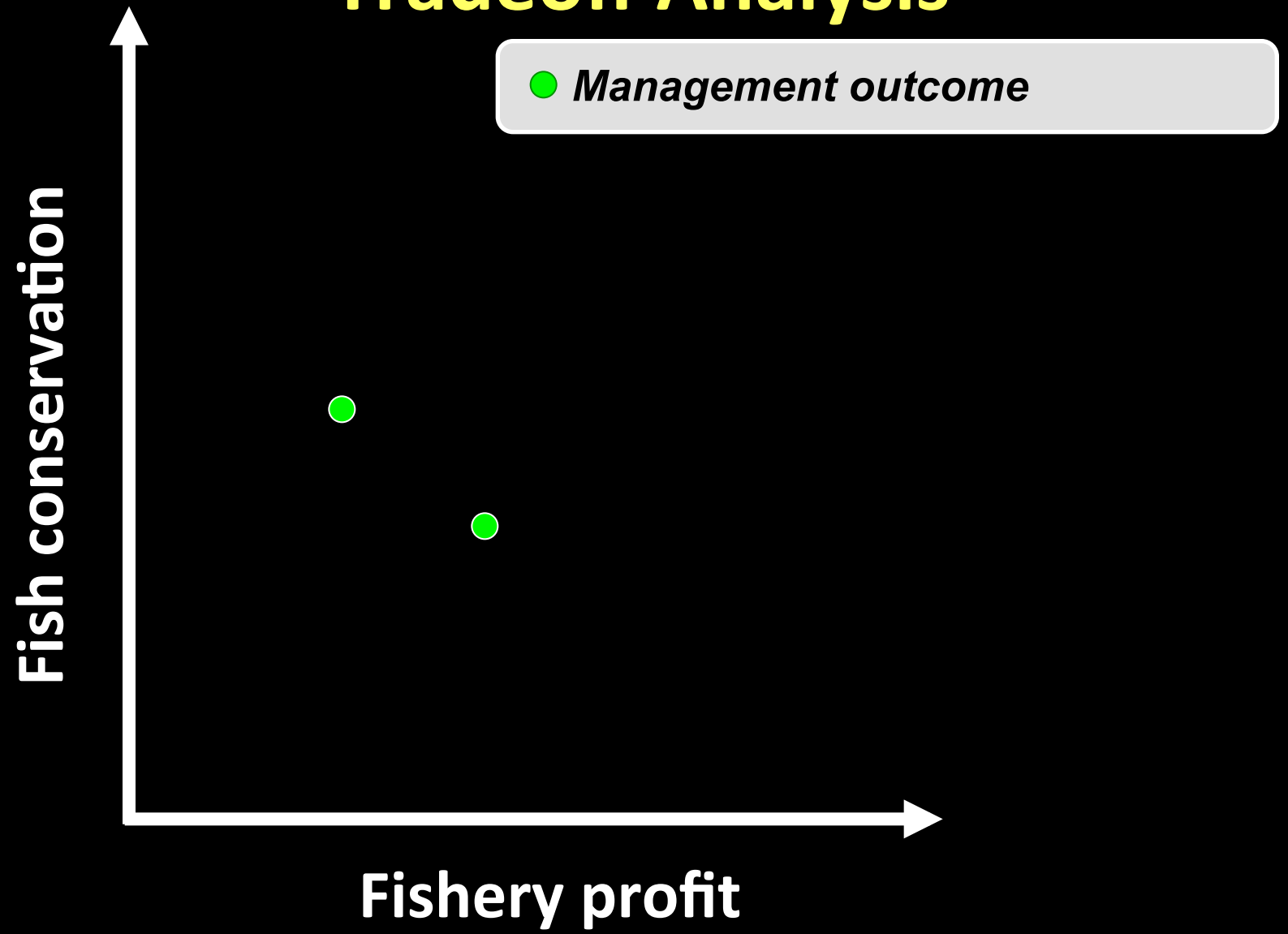

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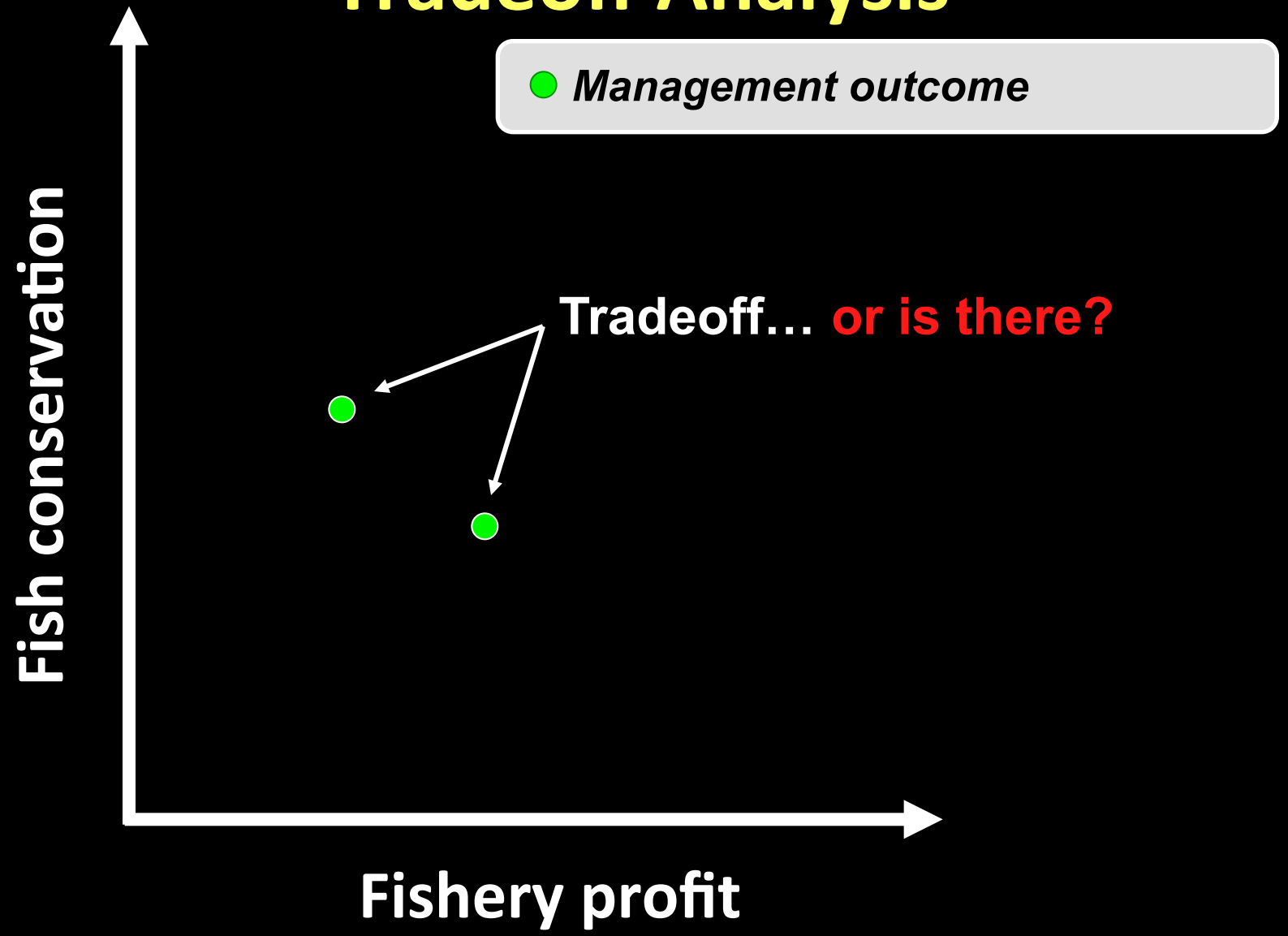

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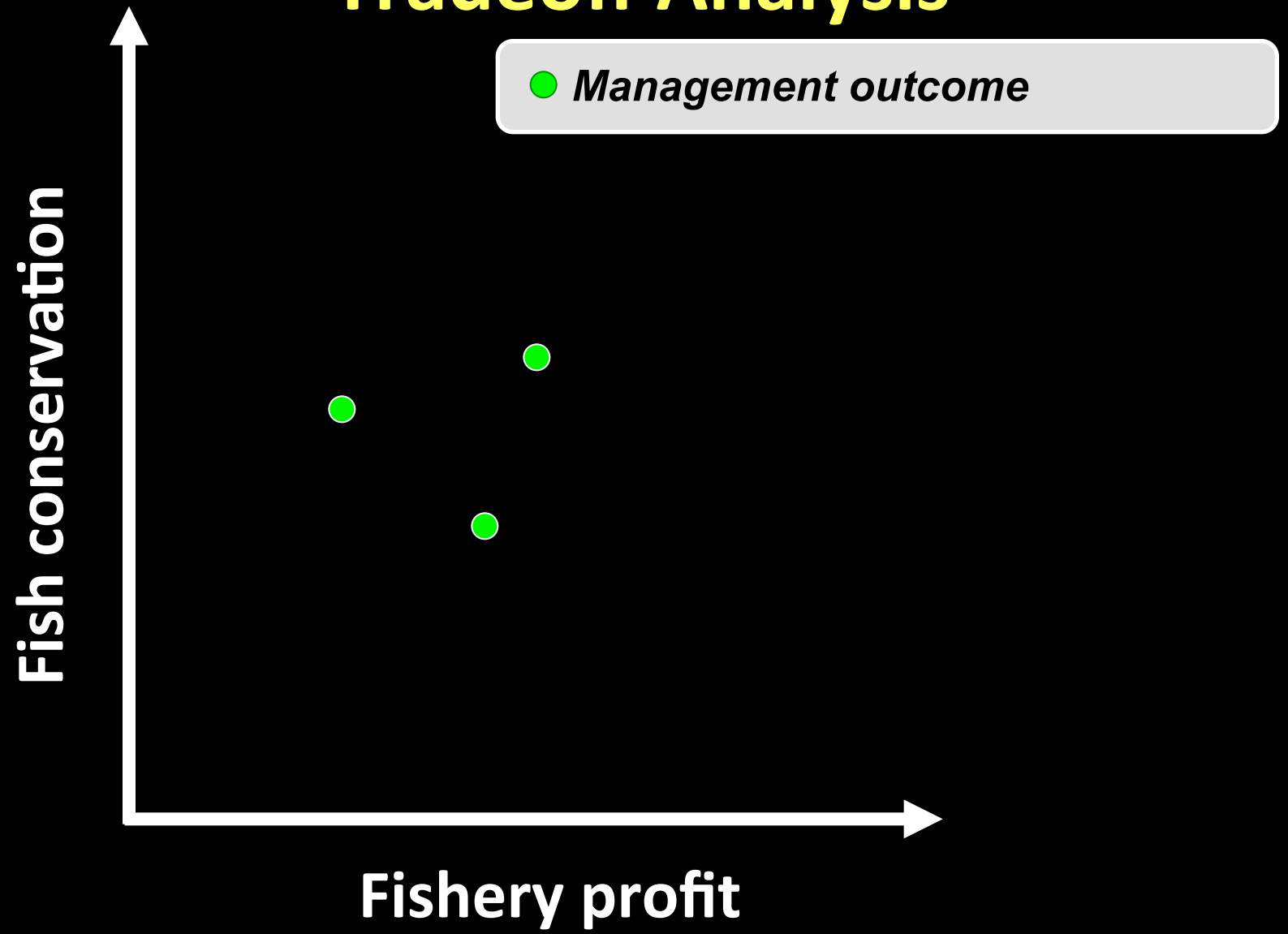

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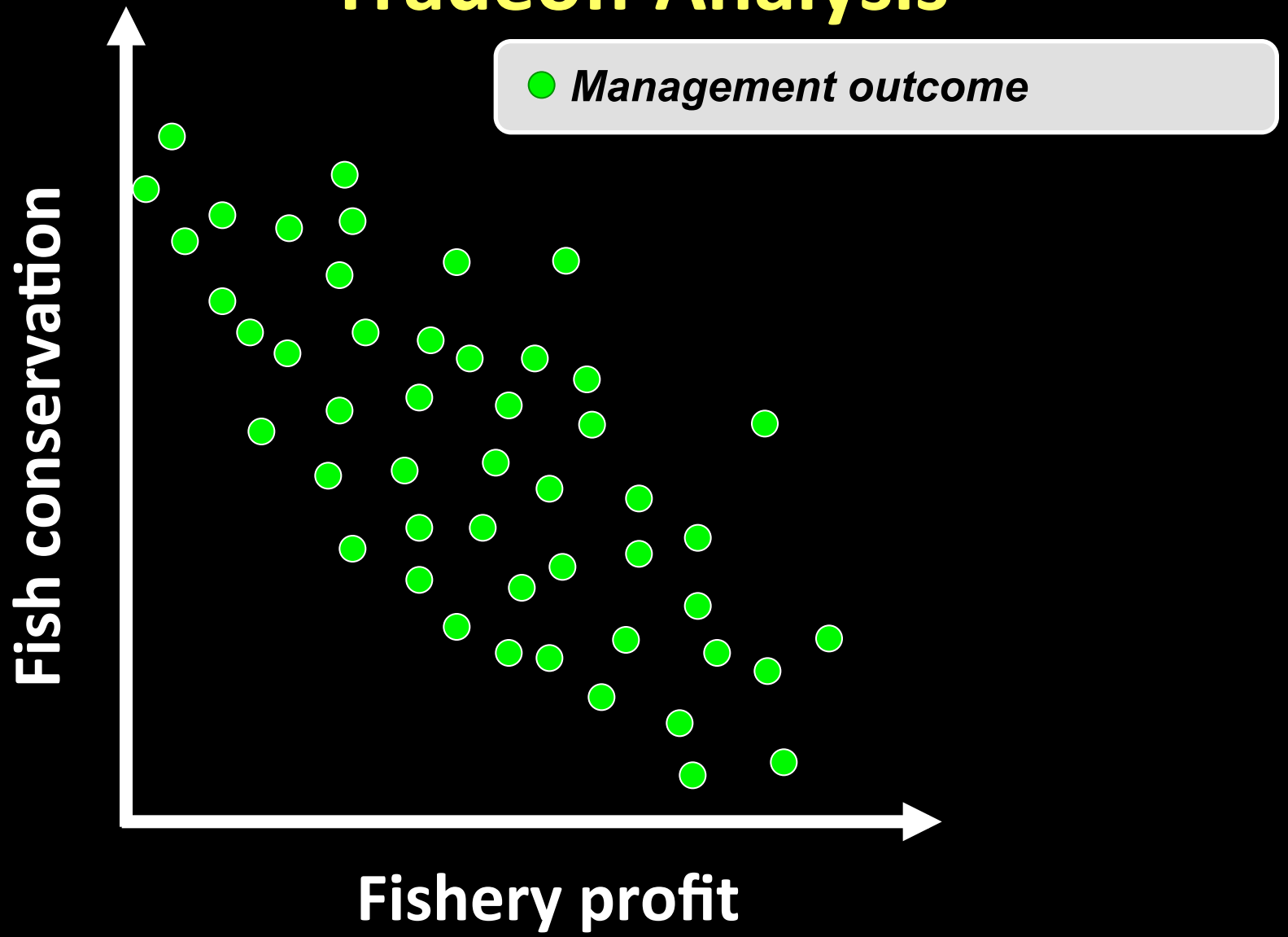

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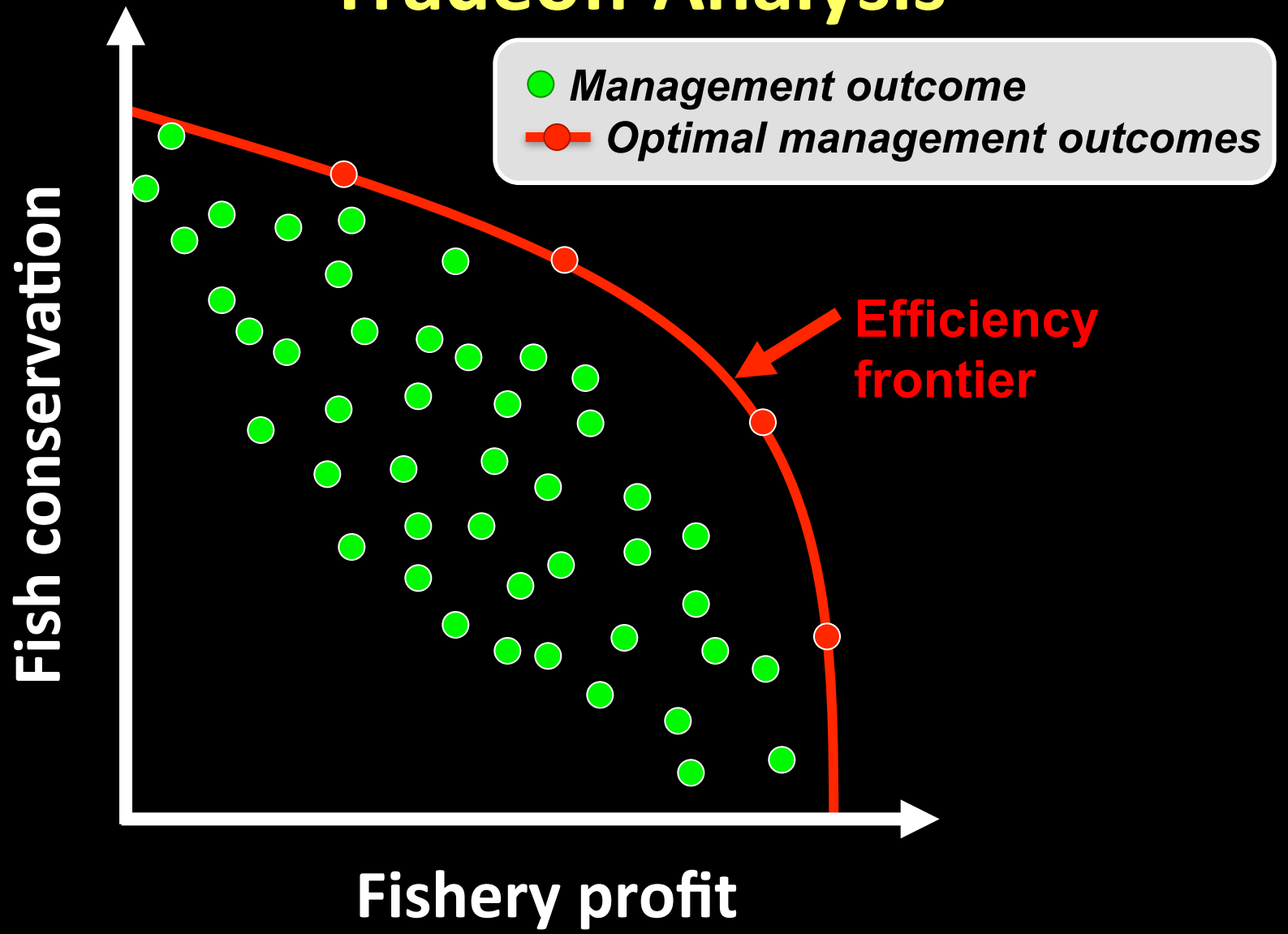

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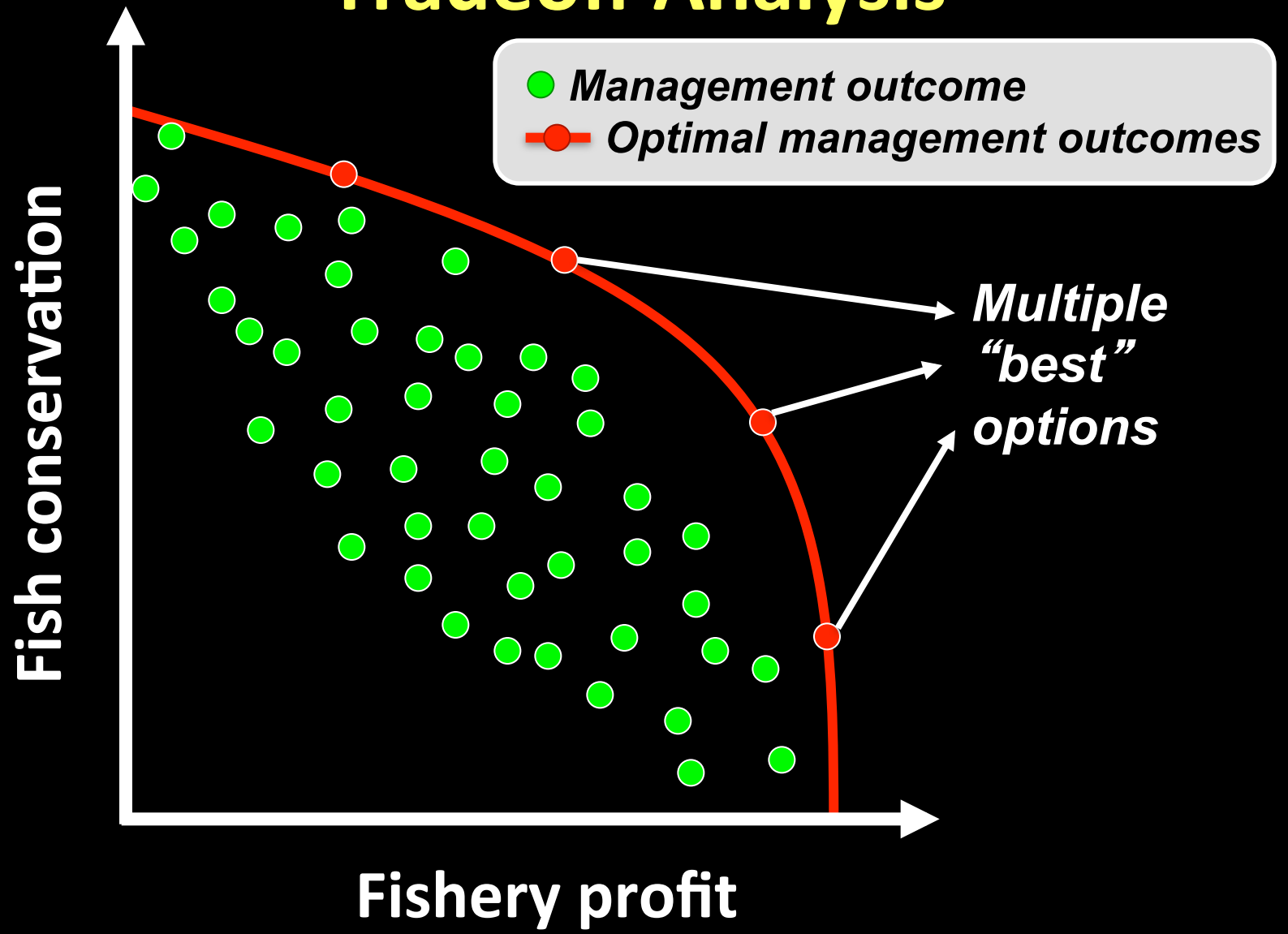
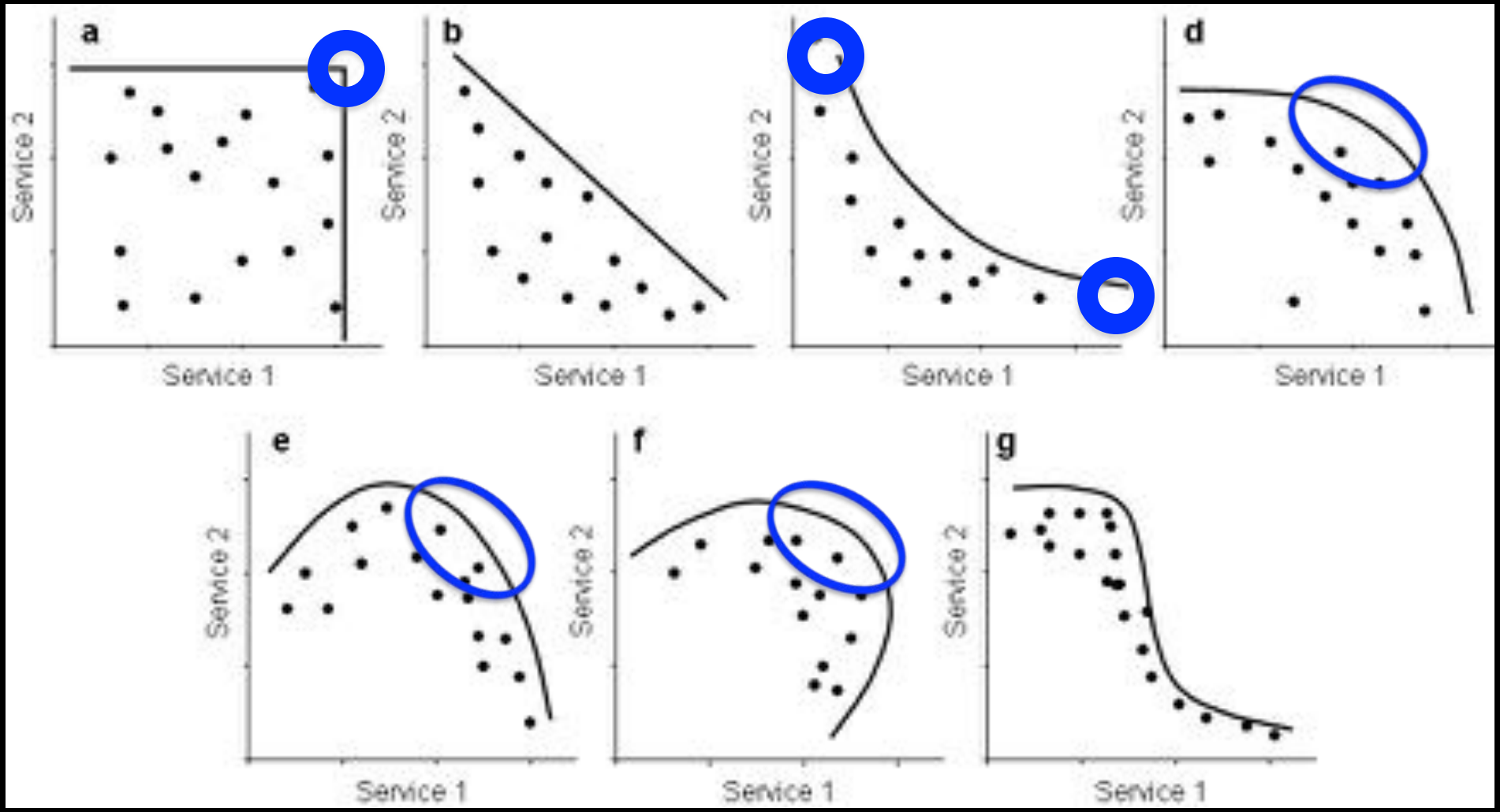
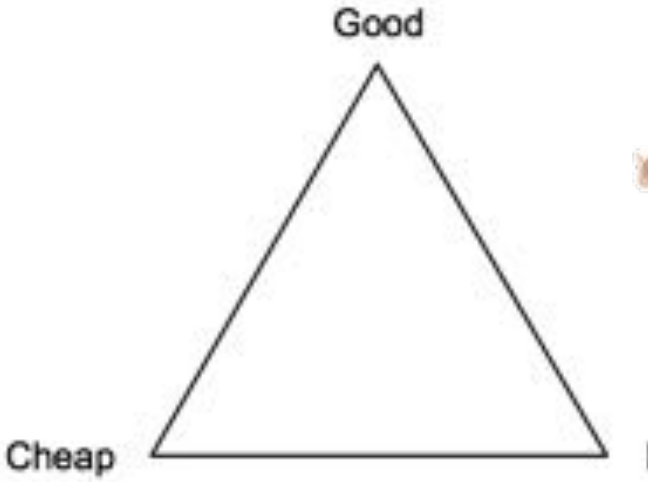


The shape of the frontier provides important information

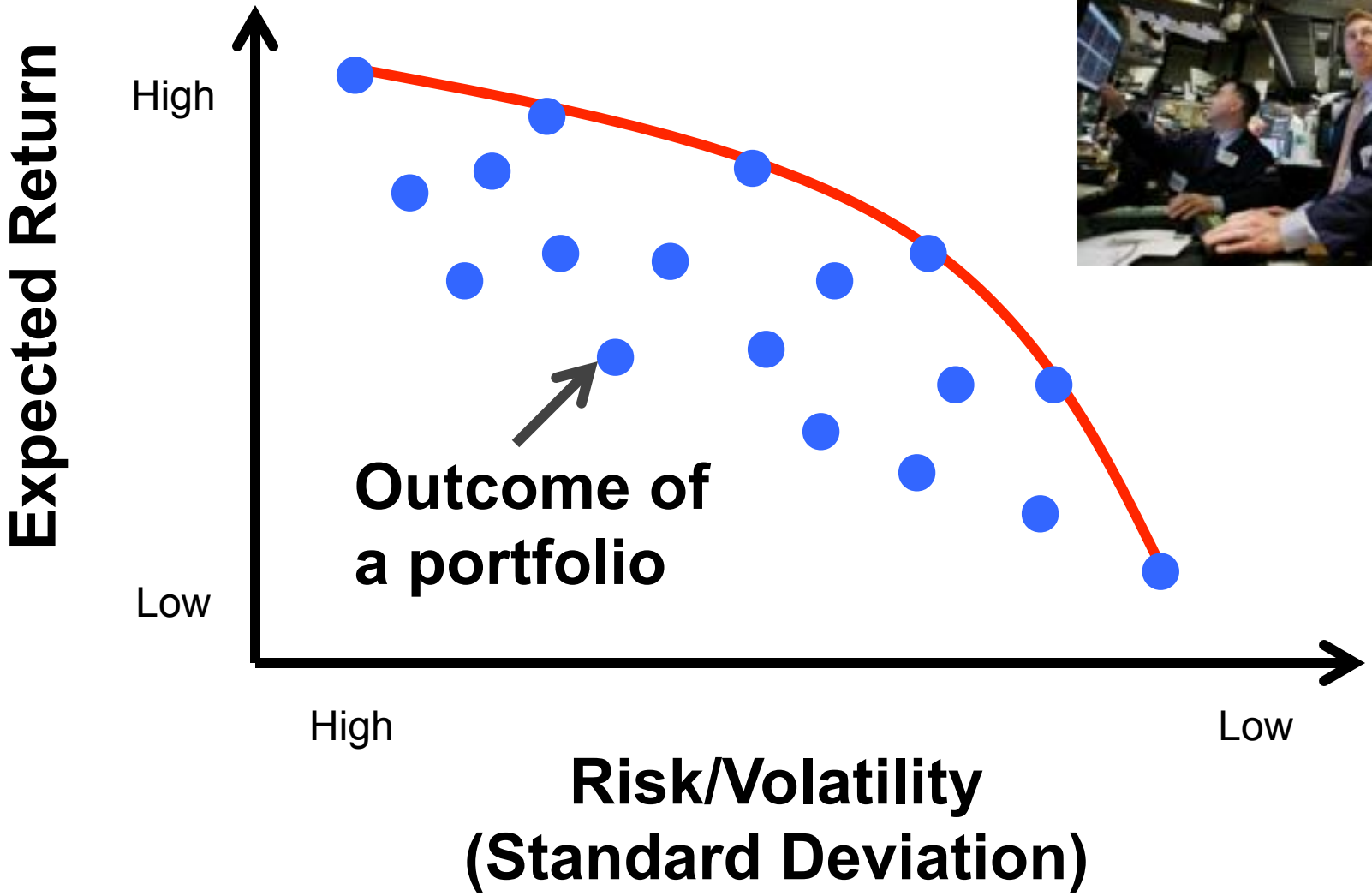


TRADEOFFS



They are everywhere

Portfolio Theory: strategic management of investments for mediating the risk-return tradeoff



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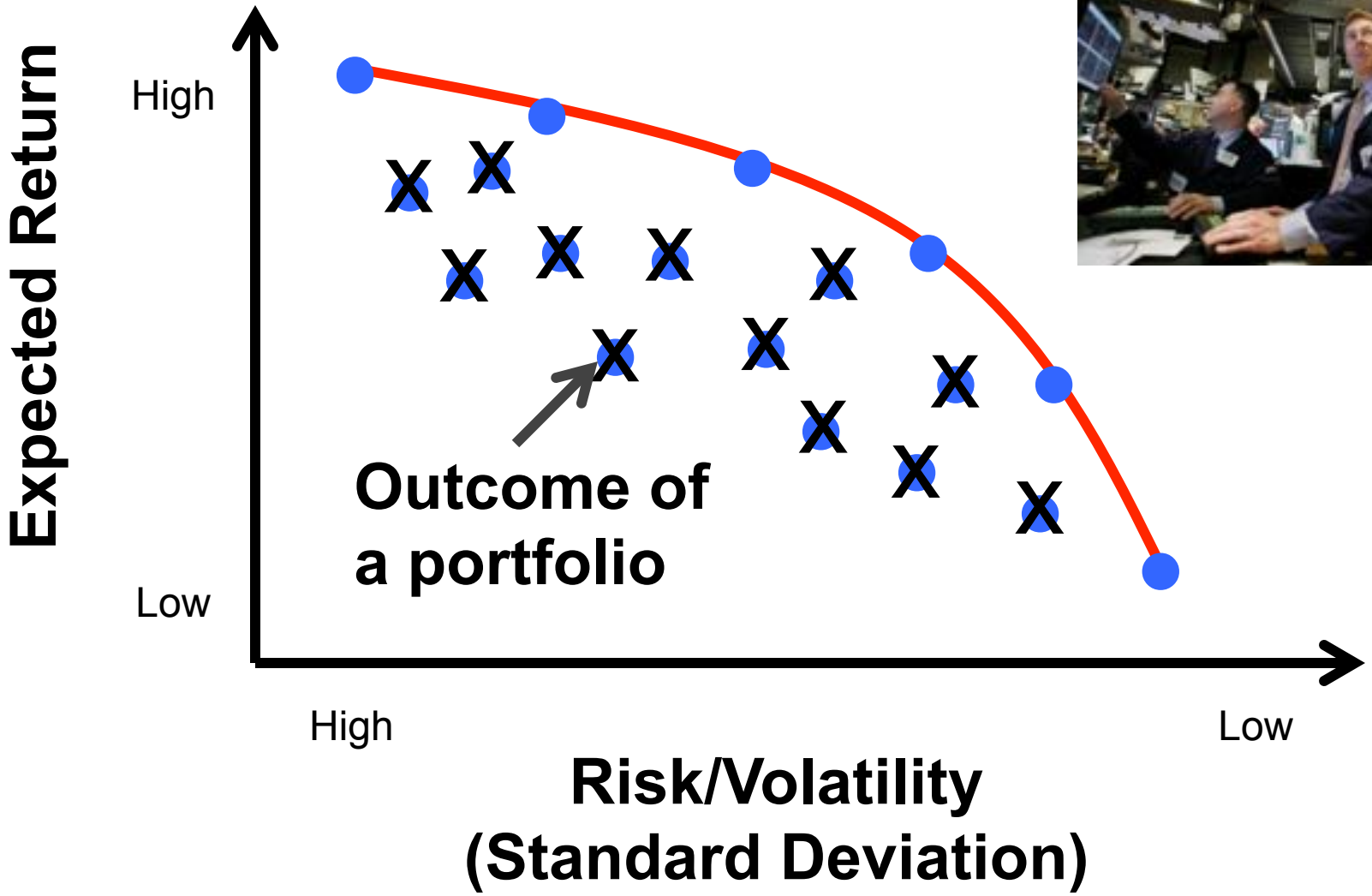
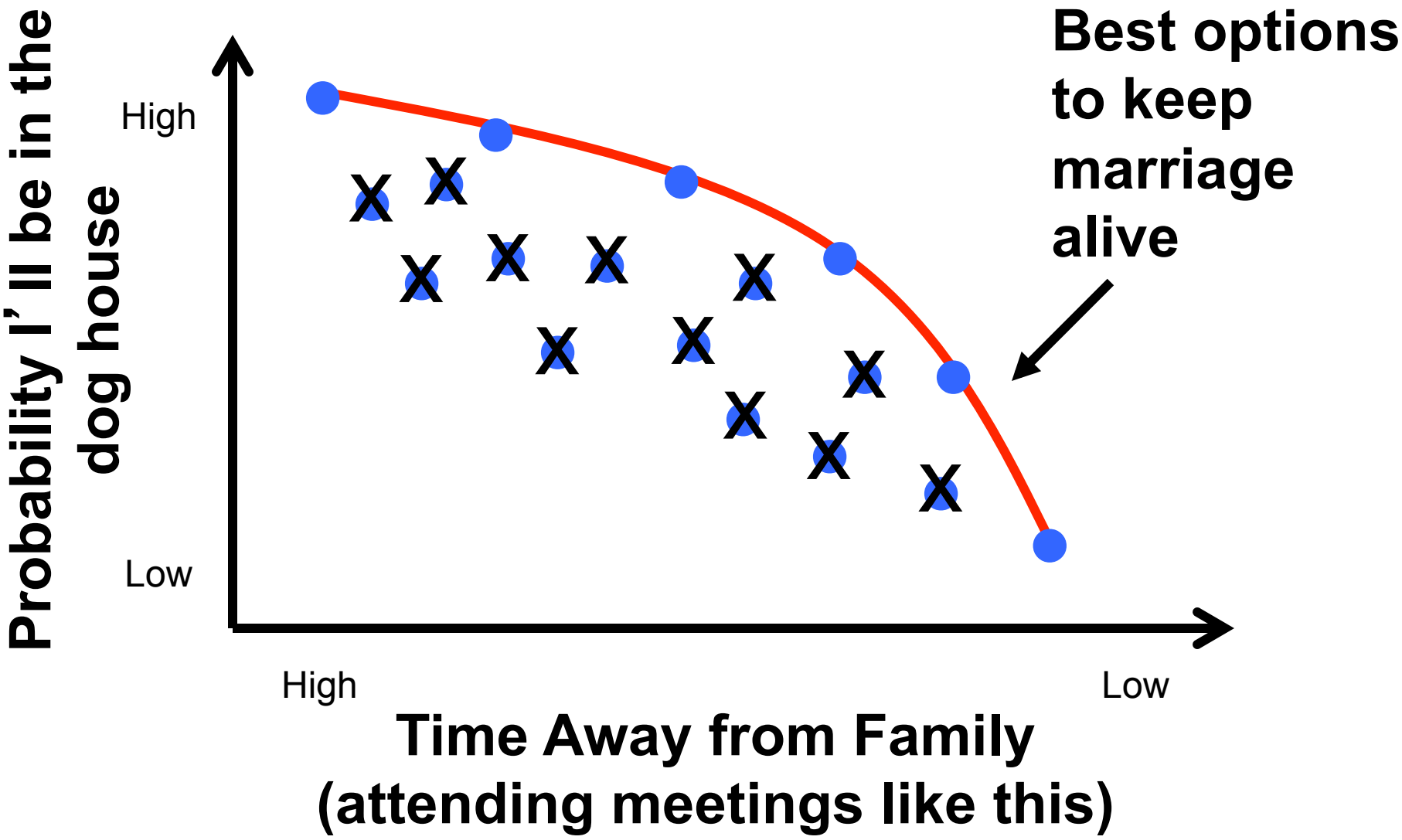


Family Happiness Theory: managing the professional-personal tradeoff



Tradeoff Theory: strategic management of resources for mediating stakeholder tradeoffs

Value to Stakeholder group 2

High

Low

Outcome of management plan

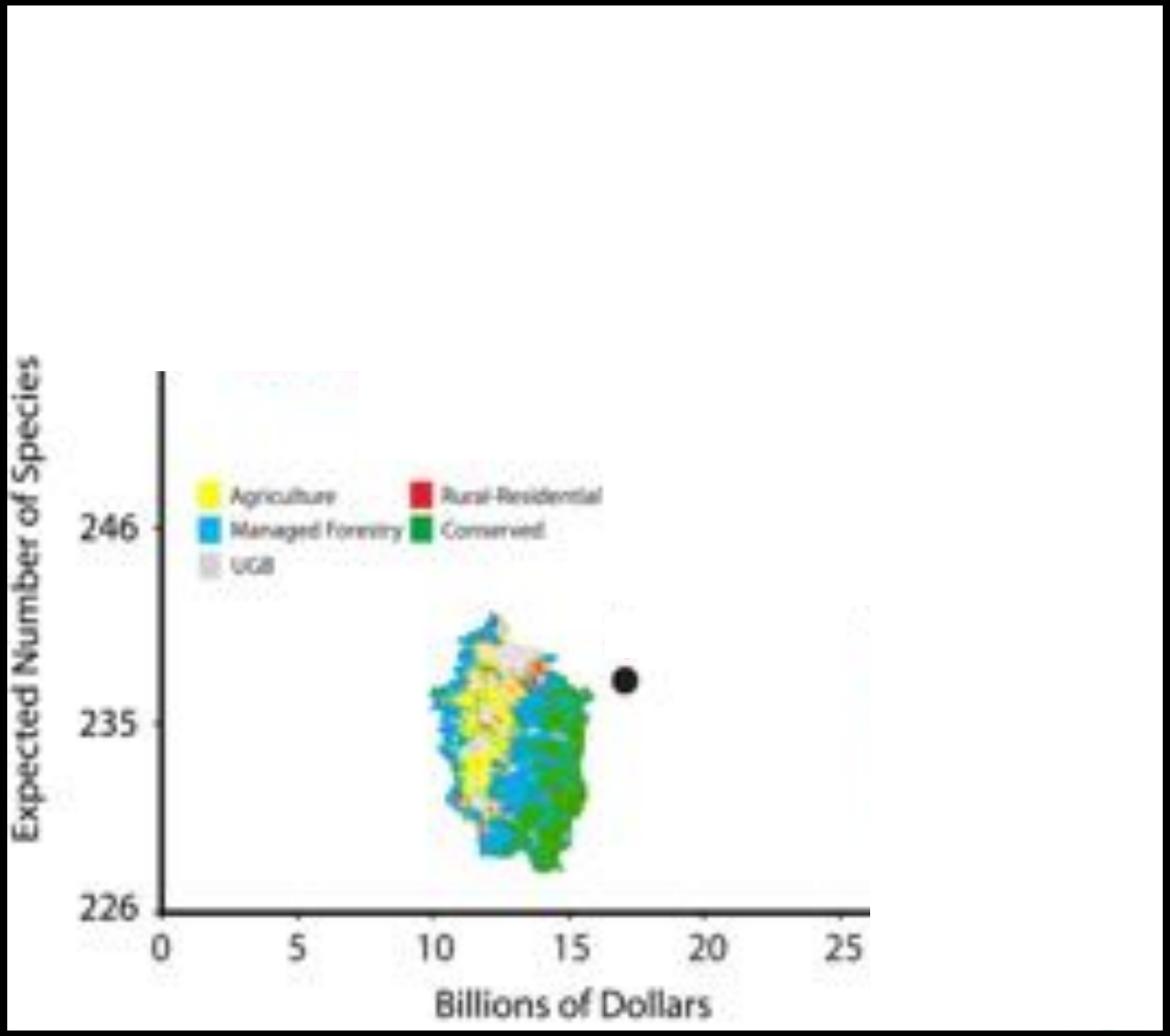
Low

High

Value to Stakeholder group 1

Some real world examples

Tradeoff analysis for balancing conservation and profit from land use planning in Willamette Valley, Oregon



Polasky et al. 2008

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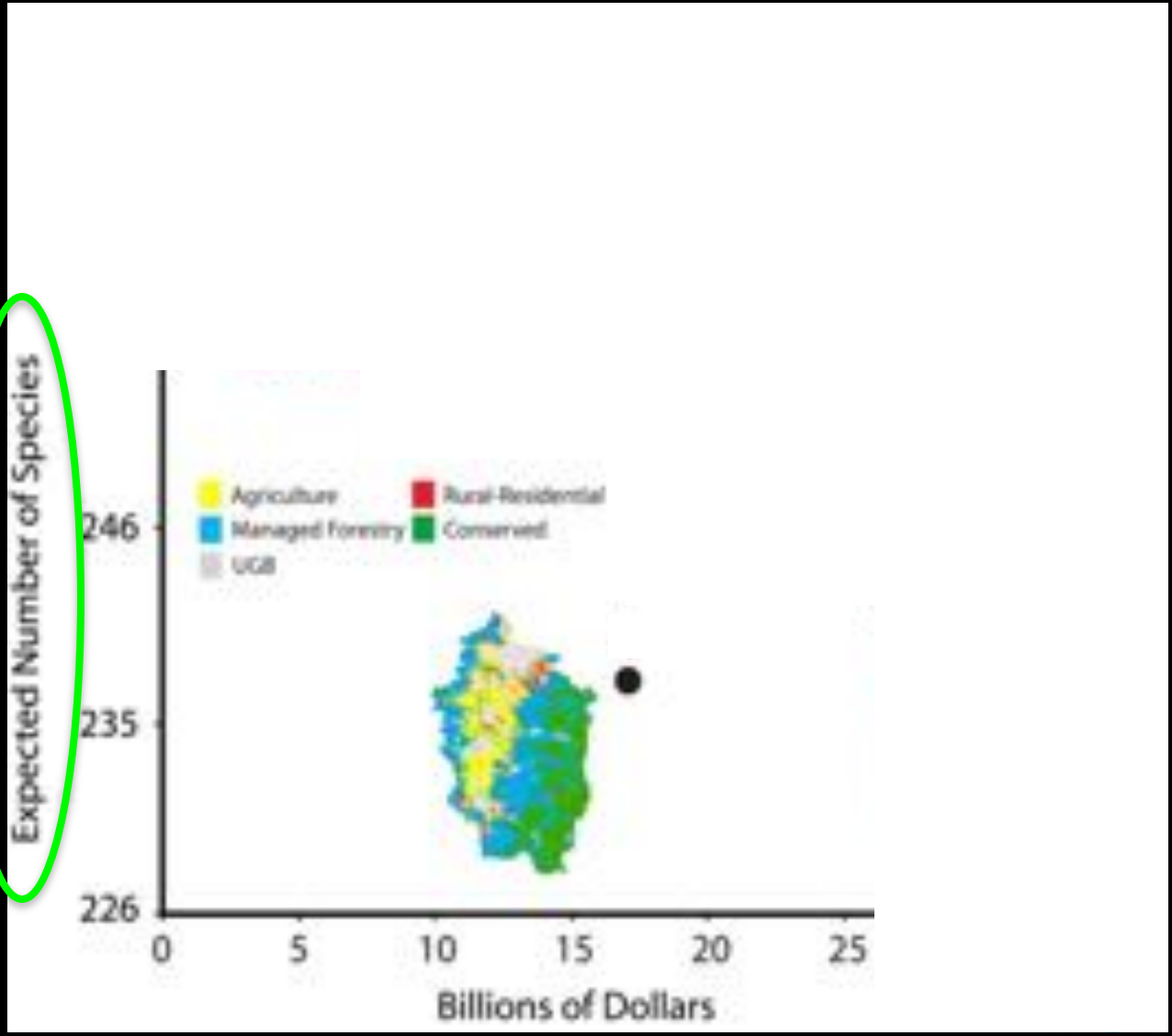
Note that ecosystem service need not be measured in $s



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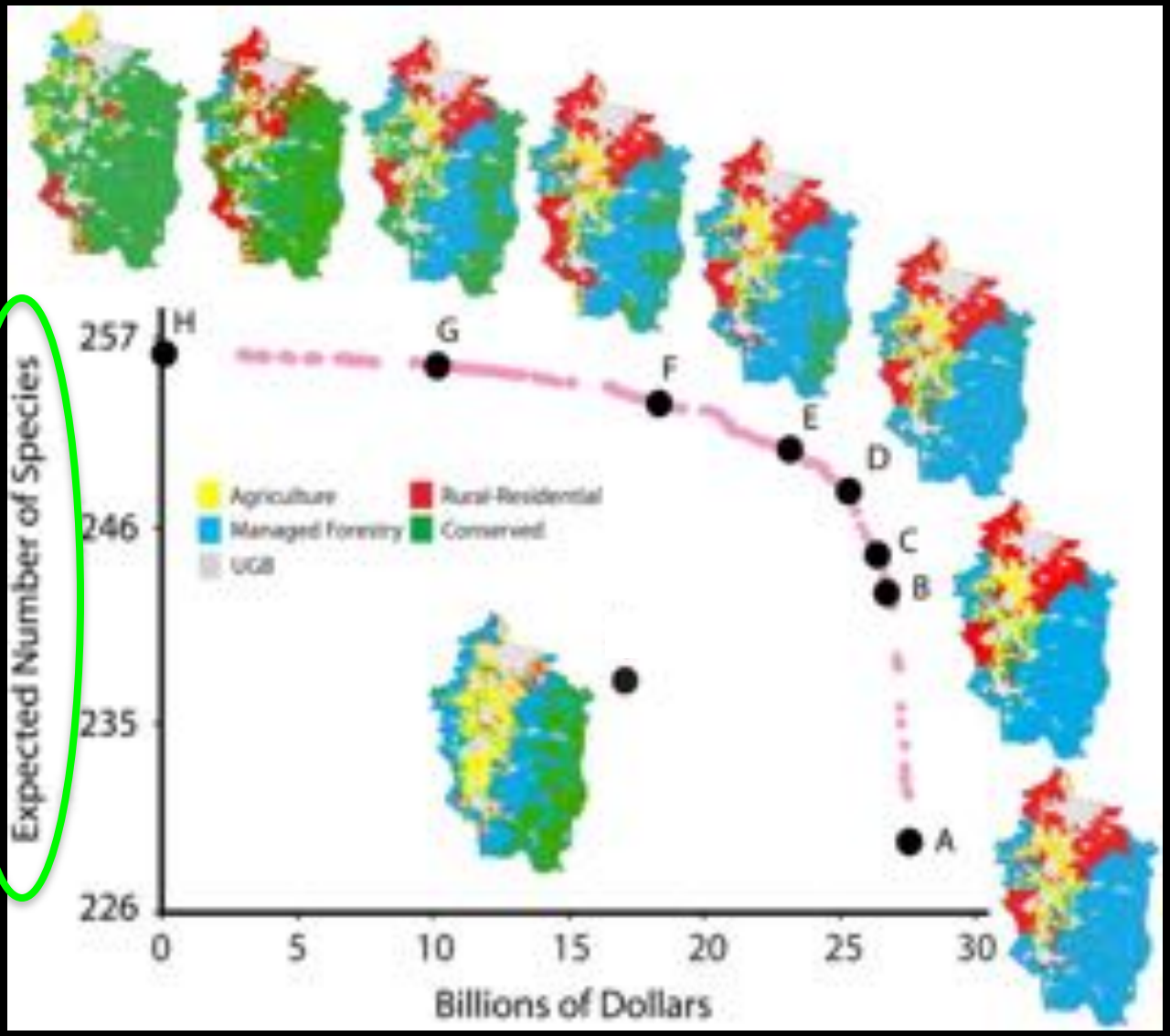

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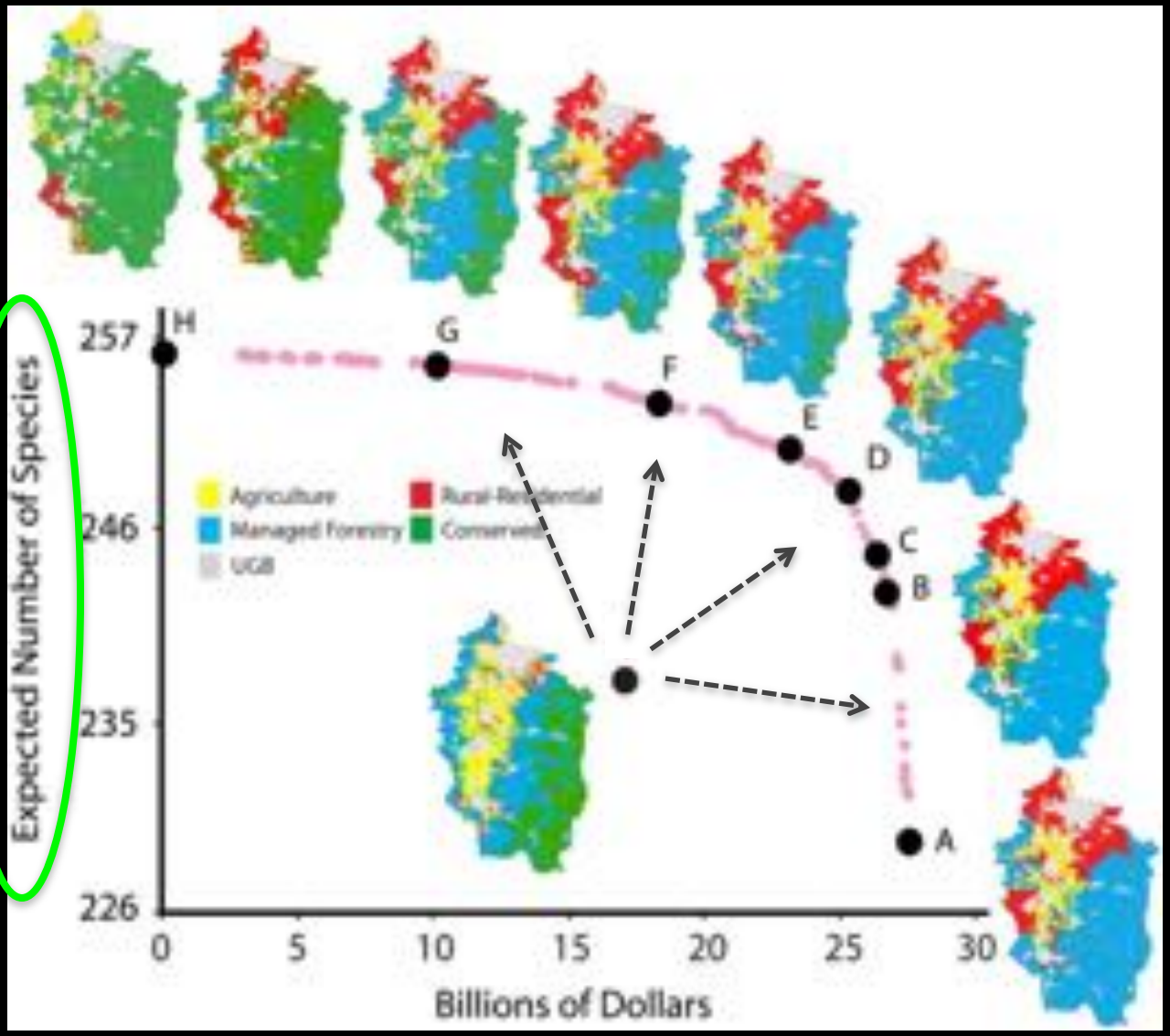

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Tradeoff Analysis for informing wind farm development in Massachusetts Bay


Photo: Maxfield


Photo: Feeney

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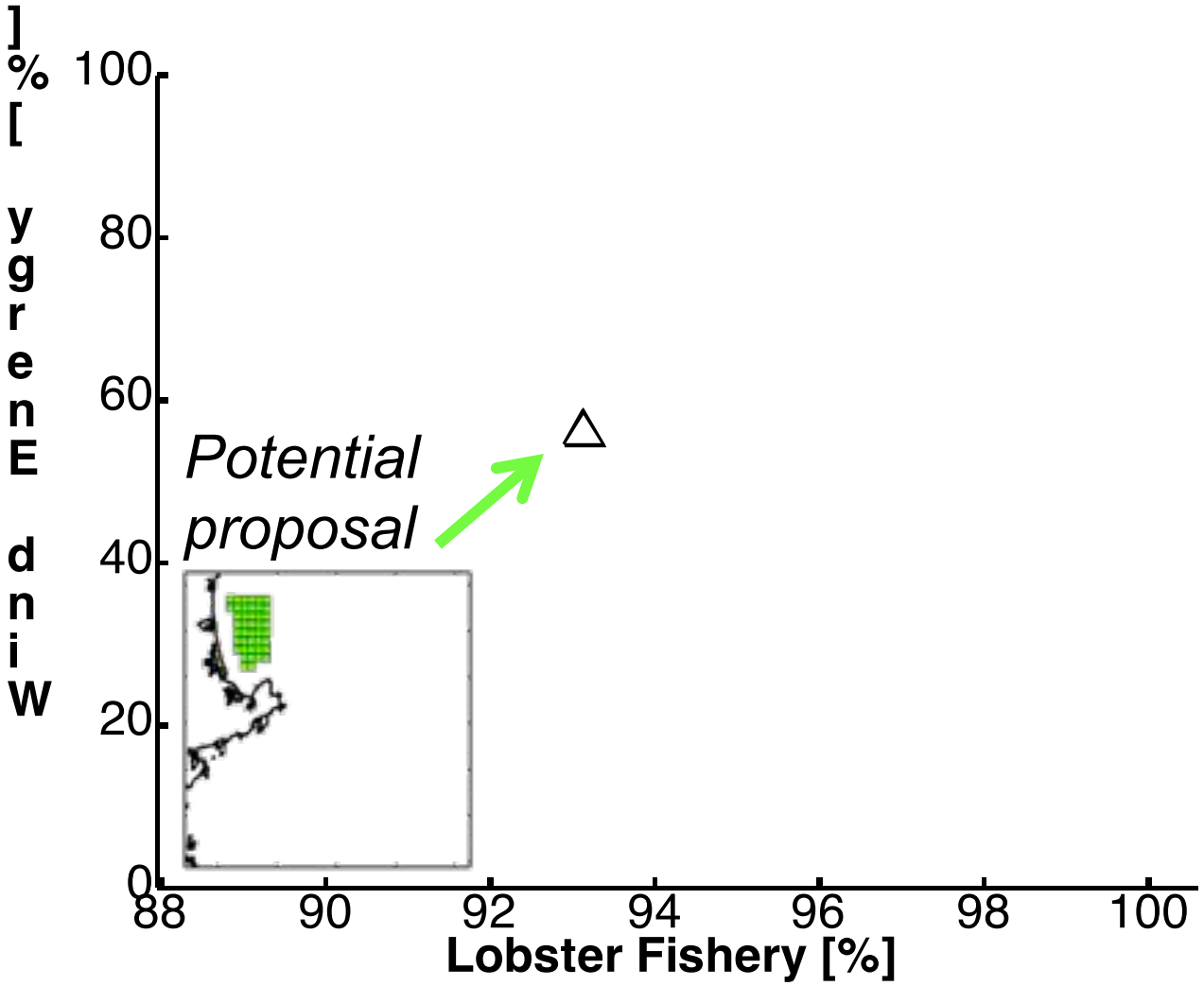

White et al. 2012 *PNAS*

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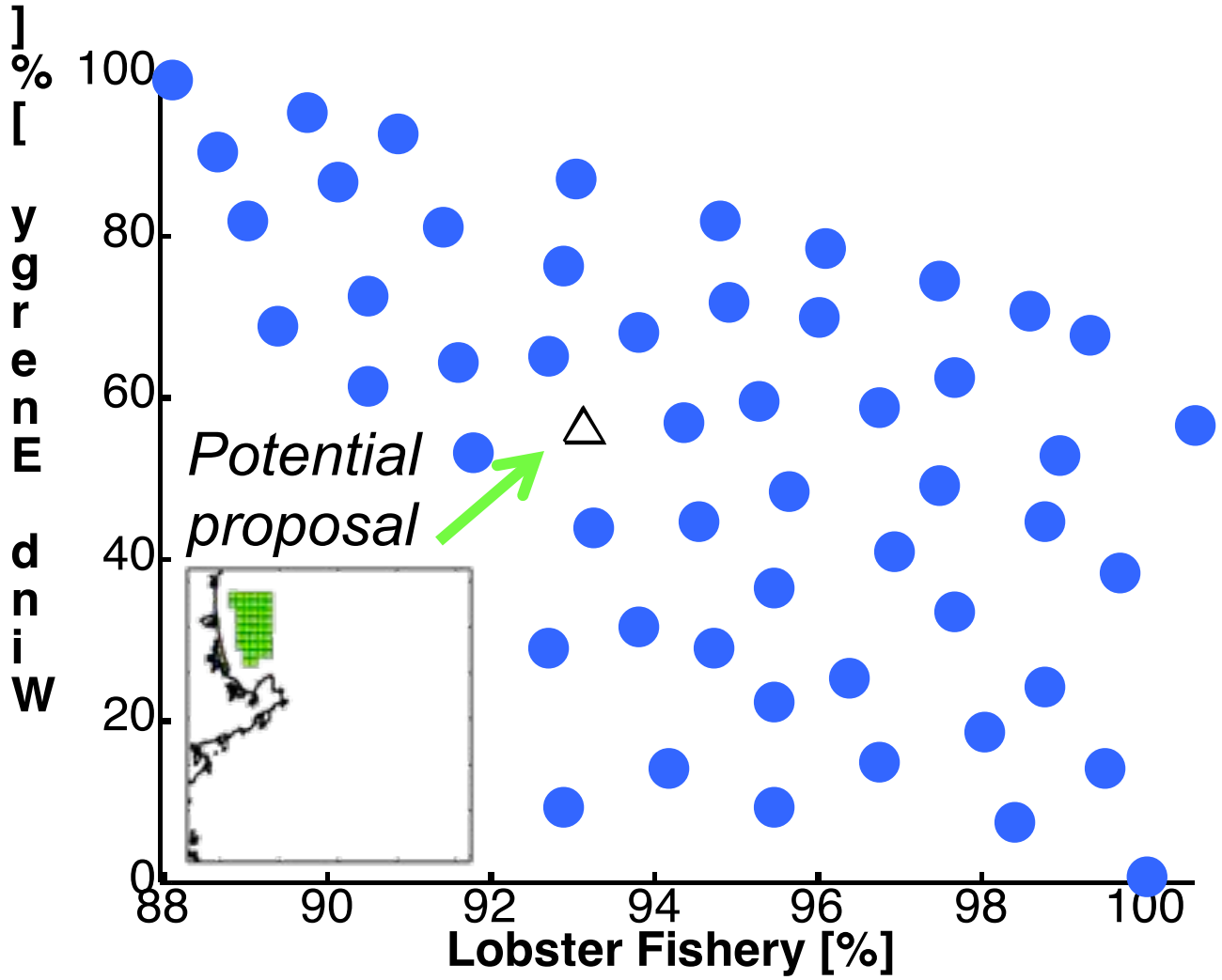

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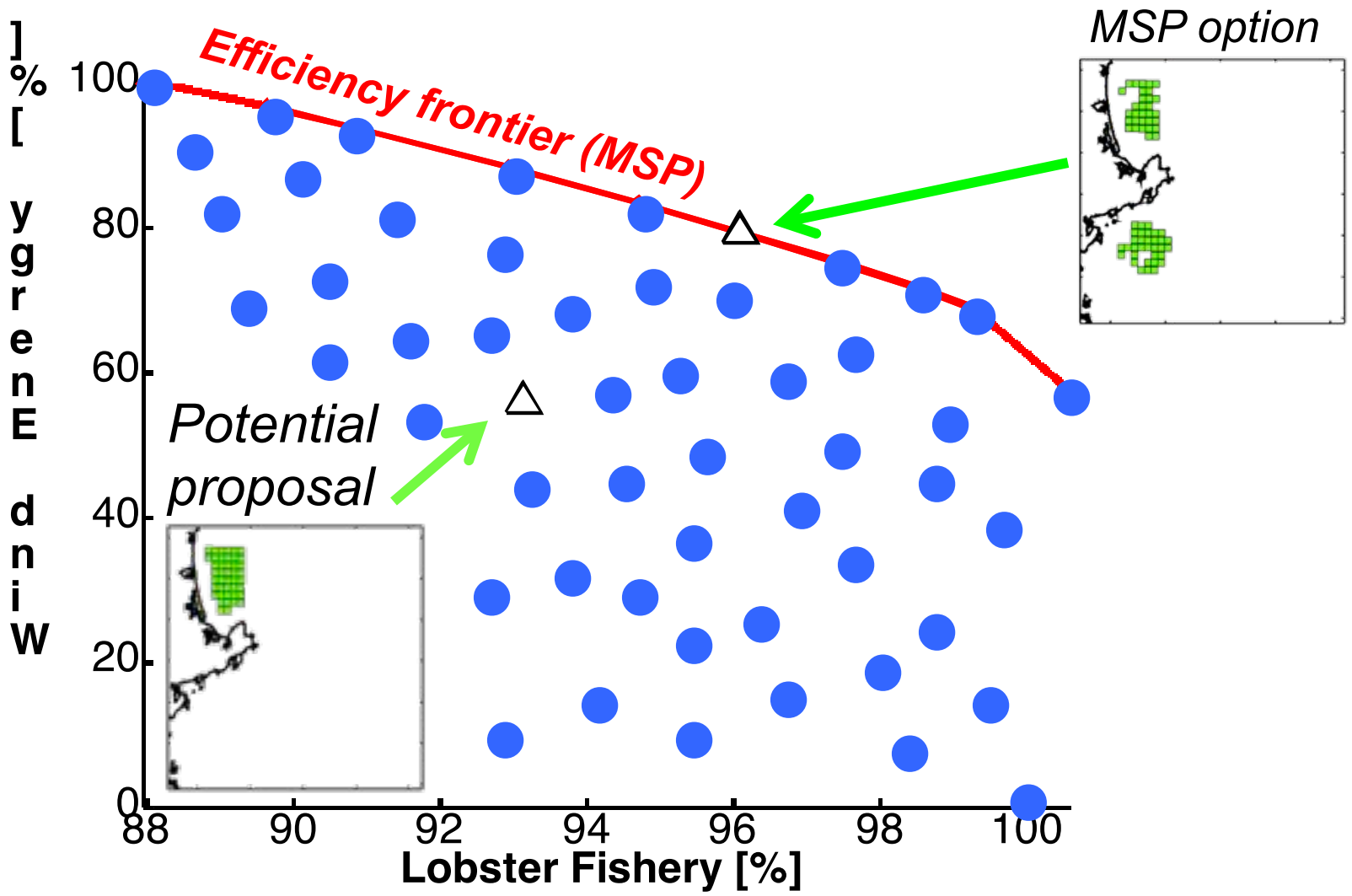

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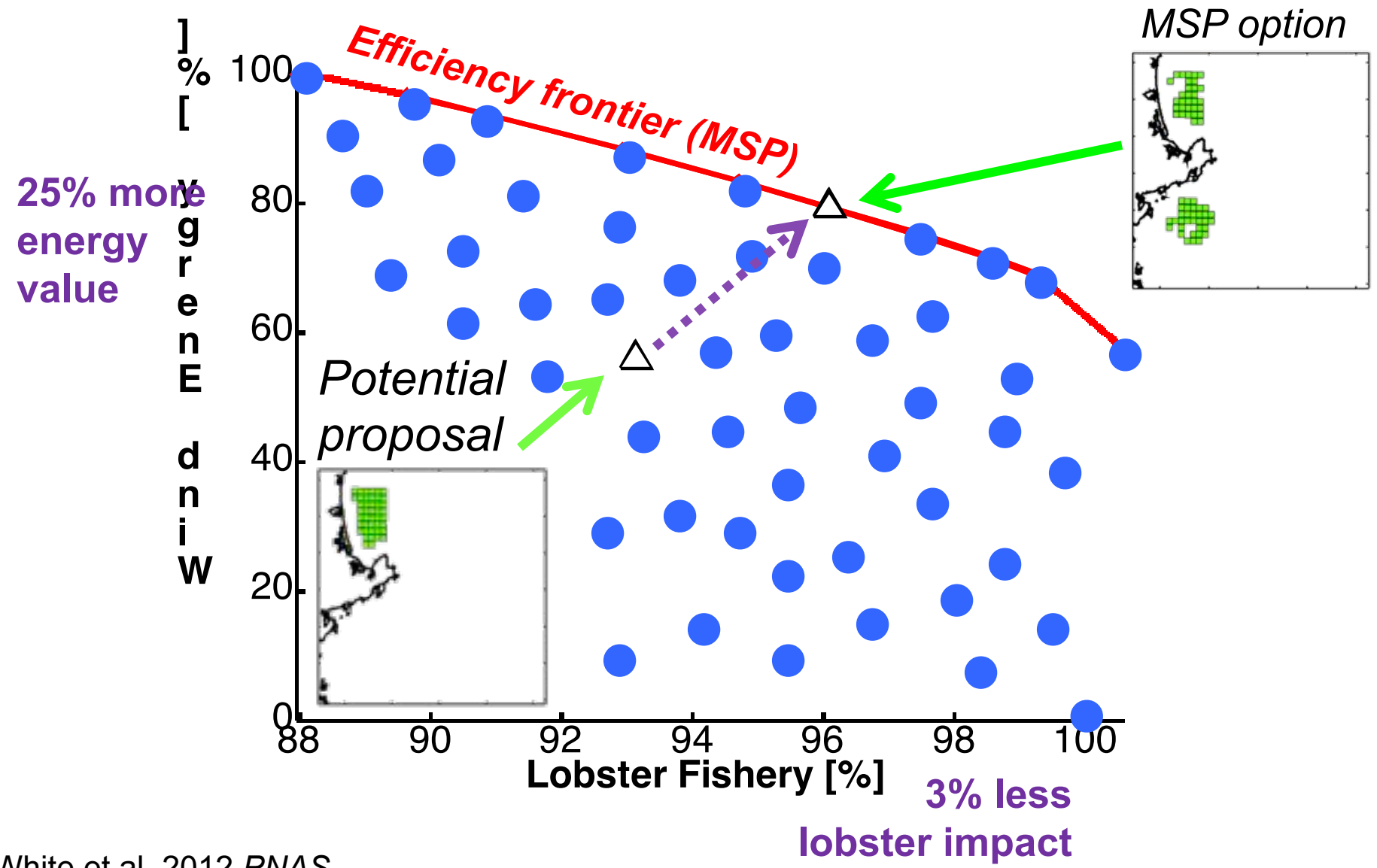

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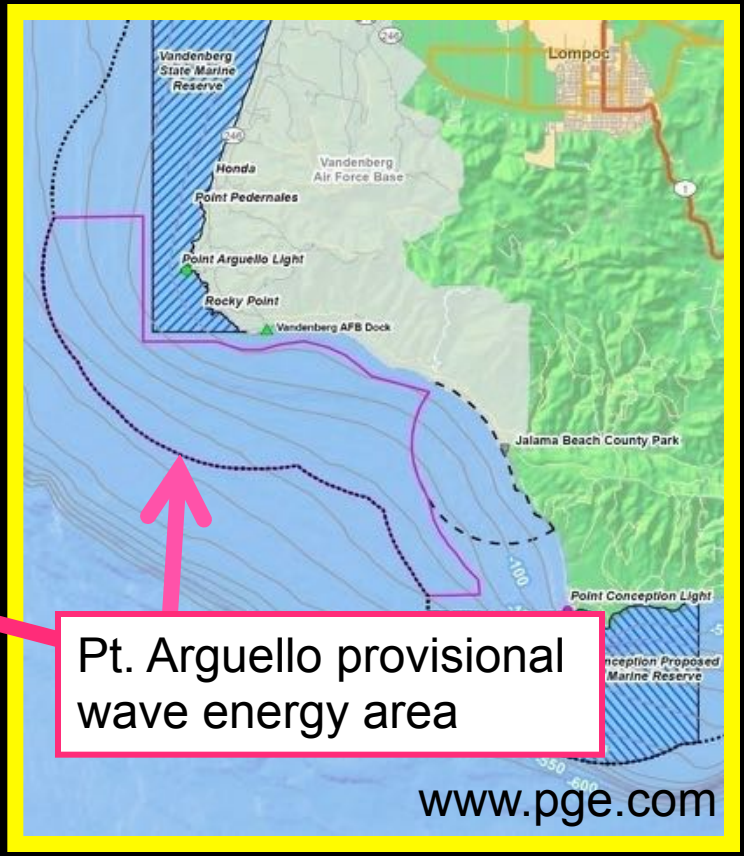
Wave Energy siting along the California coast

Pacific Gas and Electric Company®

WaveConnect™



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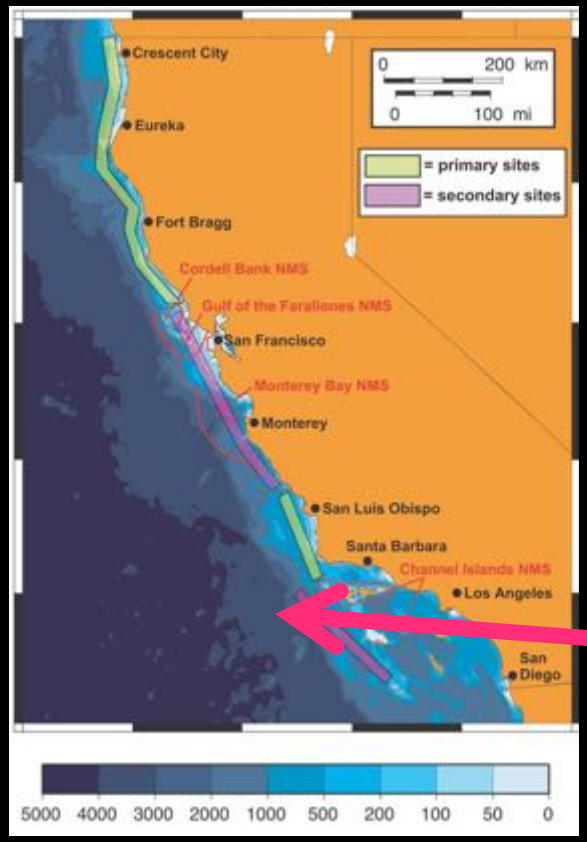
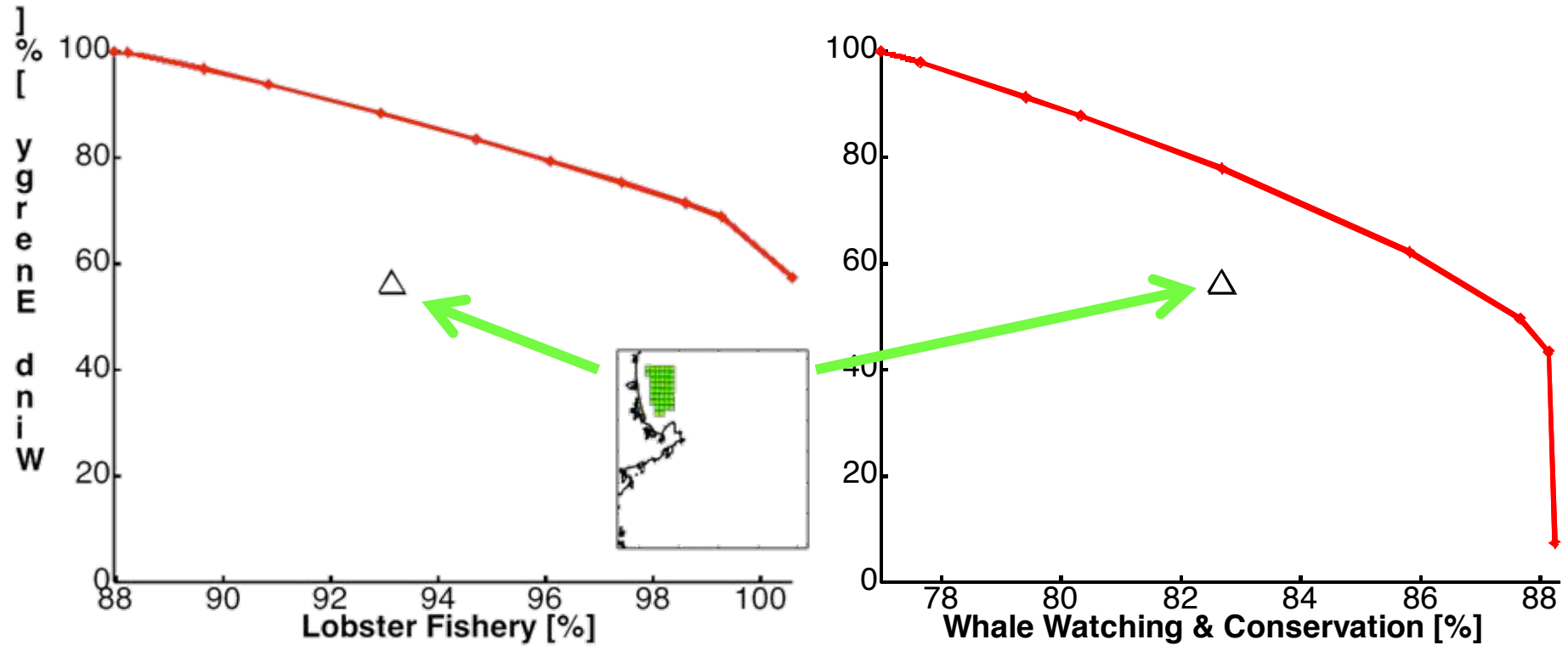


Use groups of Tradeoff Plots to compare >2 Ecosystem Services



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Tradeoff Analysis Framework Engages Stakeholders and Supports Managers

- **Flexible for including varying ecosystem services**
  - *Can compare apples & oranges*
- **Lays bare consequences of management options**
  - *Shows conflicts and how they can be reduced*
- **Goal:**
  - *Promote rational negotiation*
  - *Guide informed decision-making*
  - *Result in good and acceptable plans*

Ben Halpern

halpern@nceas.ucsb.edu

Crow White, Carrie Kappel, Sarah Lester, and the Sustainable Fisheries Group

SUSTAINABLE FISHERIES GROUP