

# **Pesticide Regulation: Unintended Consequences of Over-Conservative Risk Assessment on the Agricultural & Food Sector**

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# Conservative (Uncertain) Risk Standards

- \* May impose significant unintended risks (and costs) on the food economy
- \* Why have a different risk standard for listed species than for the plethora of risks and uncertainty facing the human species?
- \* Are FQPA (and other) risks additive as implied by the policy framework?

# The Macro or Aggregate World

- \* ***“Everything is Connected to Everything Else”***

- \* A fundamental ecological principle
- \* But also a fundamental characteristic of the aggregate economic system

- \* **Unintended Consequences**

- \* May result from a focus on only one part of the household, critters or humans
  - \* some negative, some positive consequences
- \* May result from a focus on static, current impacts, rather than dynamic, long-run impacts
- \* May result from a micro policy focus when a macro focus is appropriate

# The Macro or Aggregate World

## \* **Micro-Macro Paradoxes**

- \* Tendency to reason or analyze issues at the micro level
- \* But what appears true at the micro level may have the opposite macro effect
  - \* e.g. Introduction of a new pesticide that increases crop yield and is profitable for a farmer to use
    - \* But widespread adoption increases production which lowers crop price
    - \* In the aggregate, farmers as a group may be **worse** off
    - \* While consumers may be **better** off

## \* **Unintended and Paradoxical Consequences**

- \* May apply to “expected” economic and ecological impacts
- \* But also apply to “risk” considerations

# The Macro or Aggregate World

## \* ***Pesticide and ESA risk assessment***

- \* While “*everything may be connected to everything else,*” there is often a total disconnect between aggregate economic models, and ecological and environmental models
  - \* Ecologists and economists are seemingly on different planets!
- \* Often a disconnect between FQPA or ESA risk assessment, and more mundane economic risks affected by policy
  - \* e.g. Higher food prices resulting from ESA or FQPA action that bans use of a pesticide or takes land out of crop production
    - \* May result in an inadequate diet for low income people, with attendant health risks
    - \* Typically results in increased food imports that may have higher residues or unhealthy contaminants
  - \* Disconnect partly due to legislation, but may also be due to agency and court interpretations

# Risk or Uncertainty?

- \* A Distinction
  - \* **Risk:** Can assign probabilities and use decision models grounded in economics and statistics
  - \* **Uncertainty:** Difficult or impossible to assign probabilities, even subjective
- \* Considerable rhetoric about using the “best science” in pesticide decisions
  - \* But there is considerable “uncertainty” about that science (including social science)
  - \* Uncertainty about validity of some ecological (and economic) theories

# Are Risks Additive, as Implied by the Risk Cup?

- \* **NO!**
- \* *“Everything connected to everything else”* strongly suggests joint probability distributions
  - \* Risks to species or to the food system arising from different sources are not additive as implicitly assumed in the FQPA (and other) Risk Cup
- \* In terms of uncertain risks, broadly defined, the whole may be greater than the sum of the parts .... or it may be less!

# Common View of the FQPA Risk Cup





Non-additivity of risks can be likened to a chemical reaction that occurs in the cup



# The Risk Cup is Best Viewed as an *Uncertain Risk Cup*

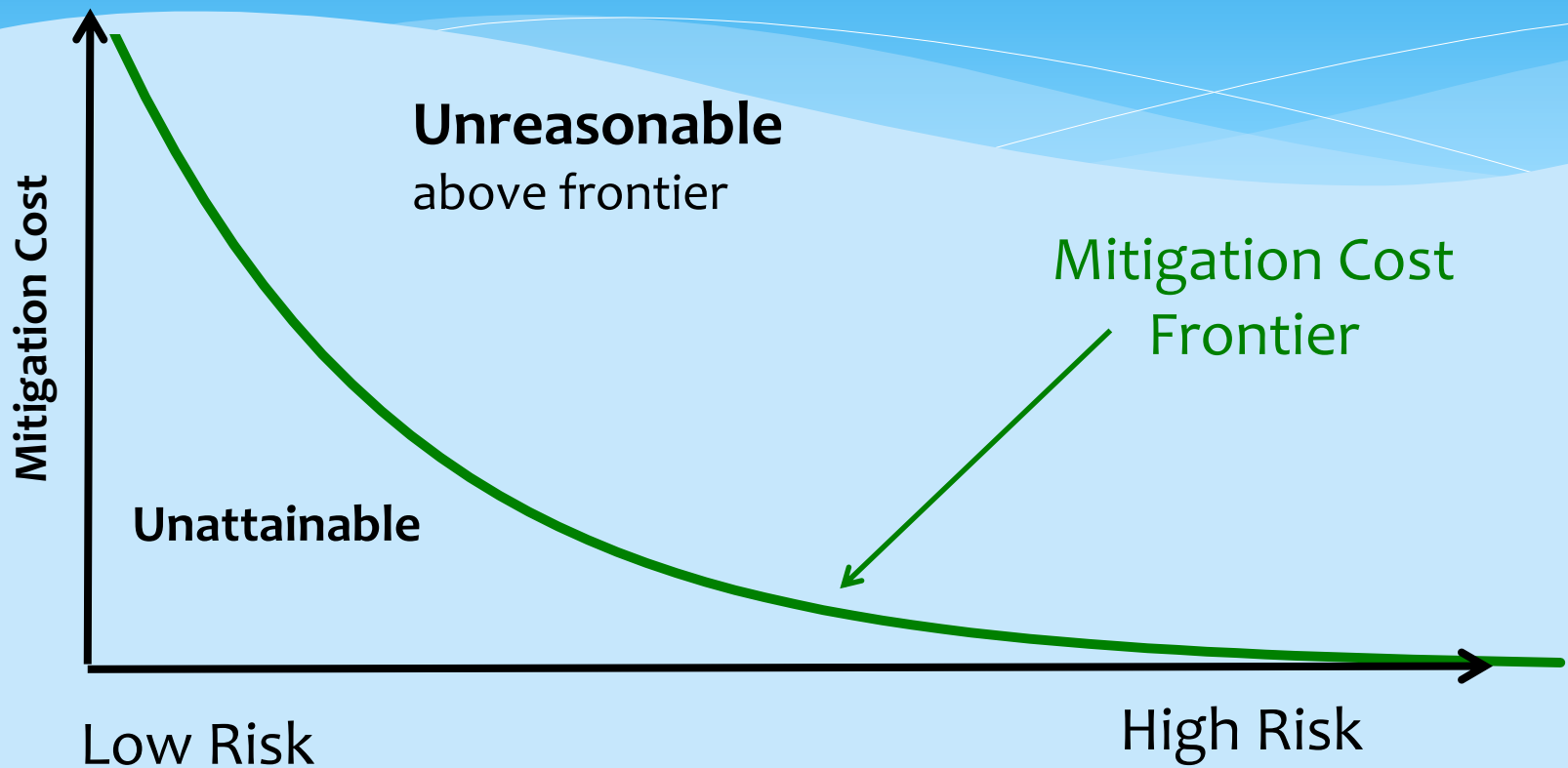


# ESA Mitigation Costs

- \* **Include**

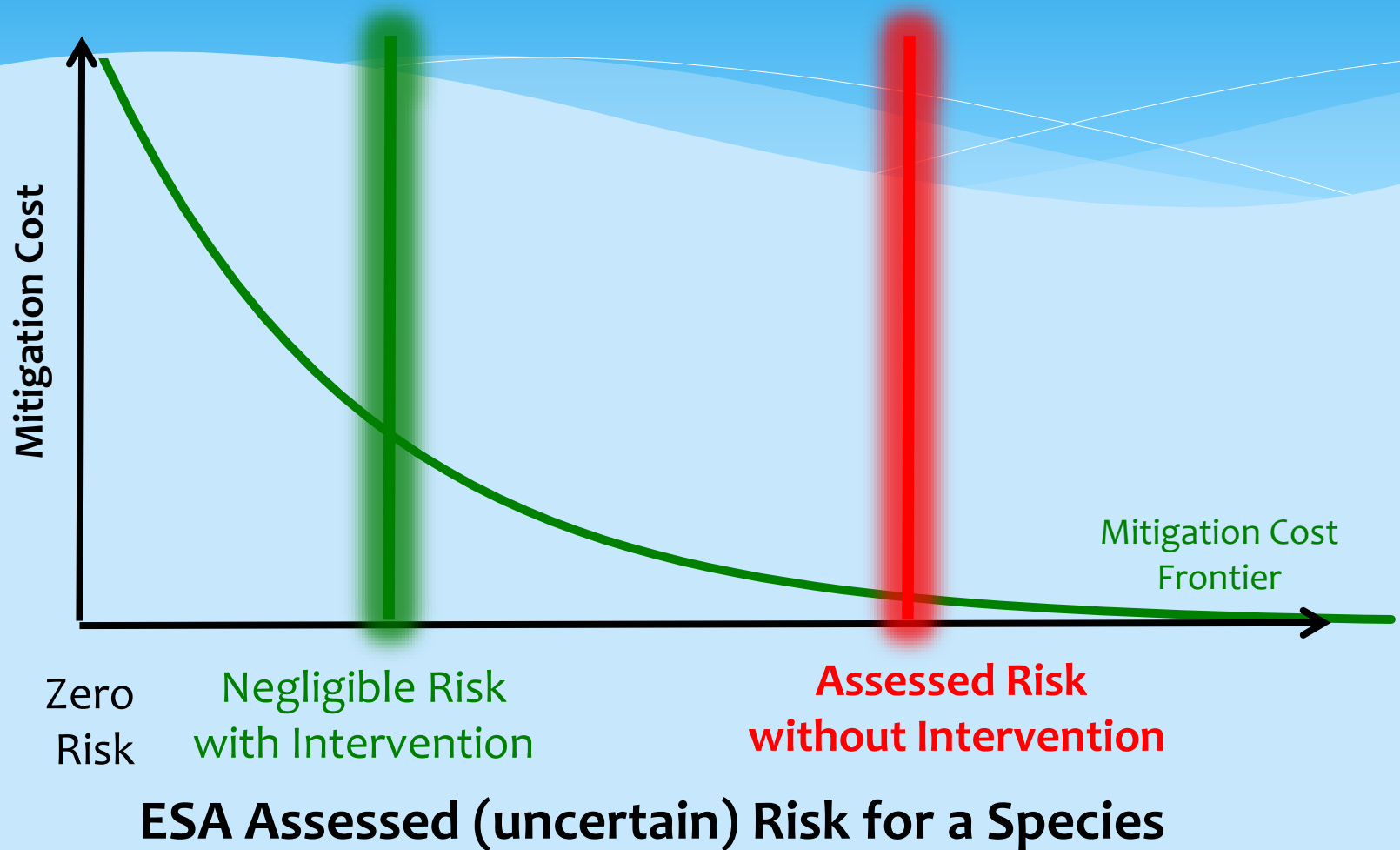
- \* Direct expenditures
- \* Indirect and/or unintended economic costs
  - \* Higher food prices
  - \* Lower farm income
  - \* General (non-ESA) Risk premium/discounts

# Basic Economics: Mitigation Cost & Risk Tradeoffs

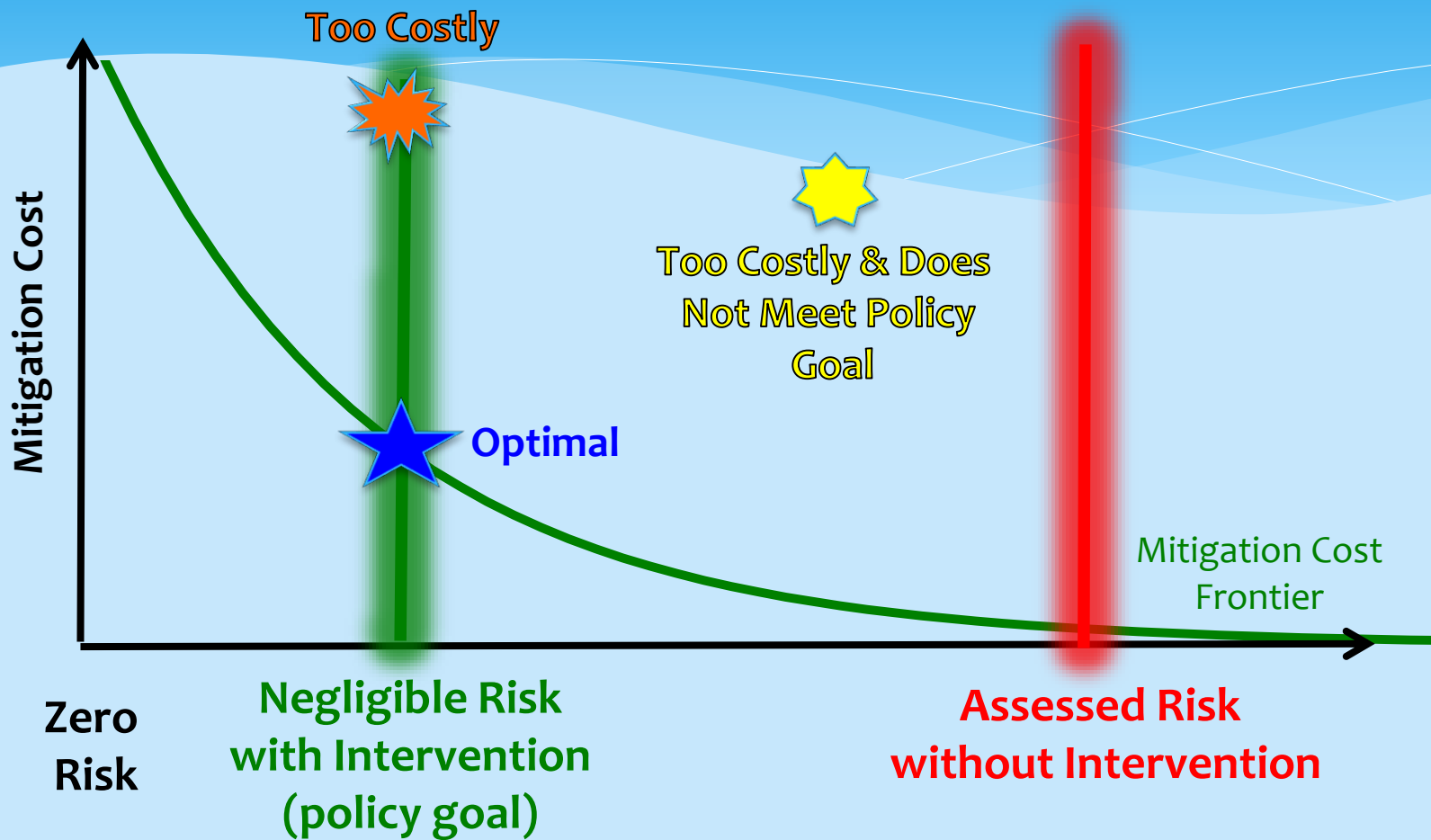


**ESA Assessed (uncertain) Risk for a Species**

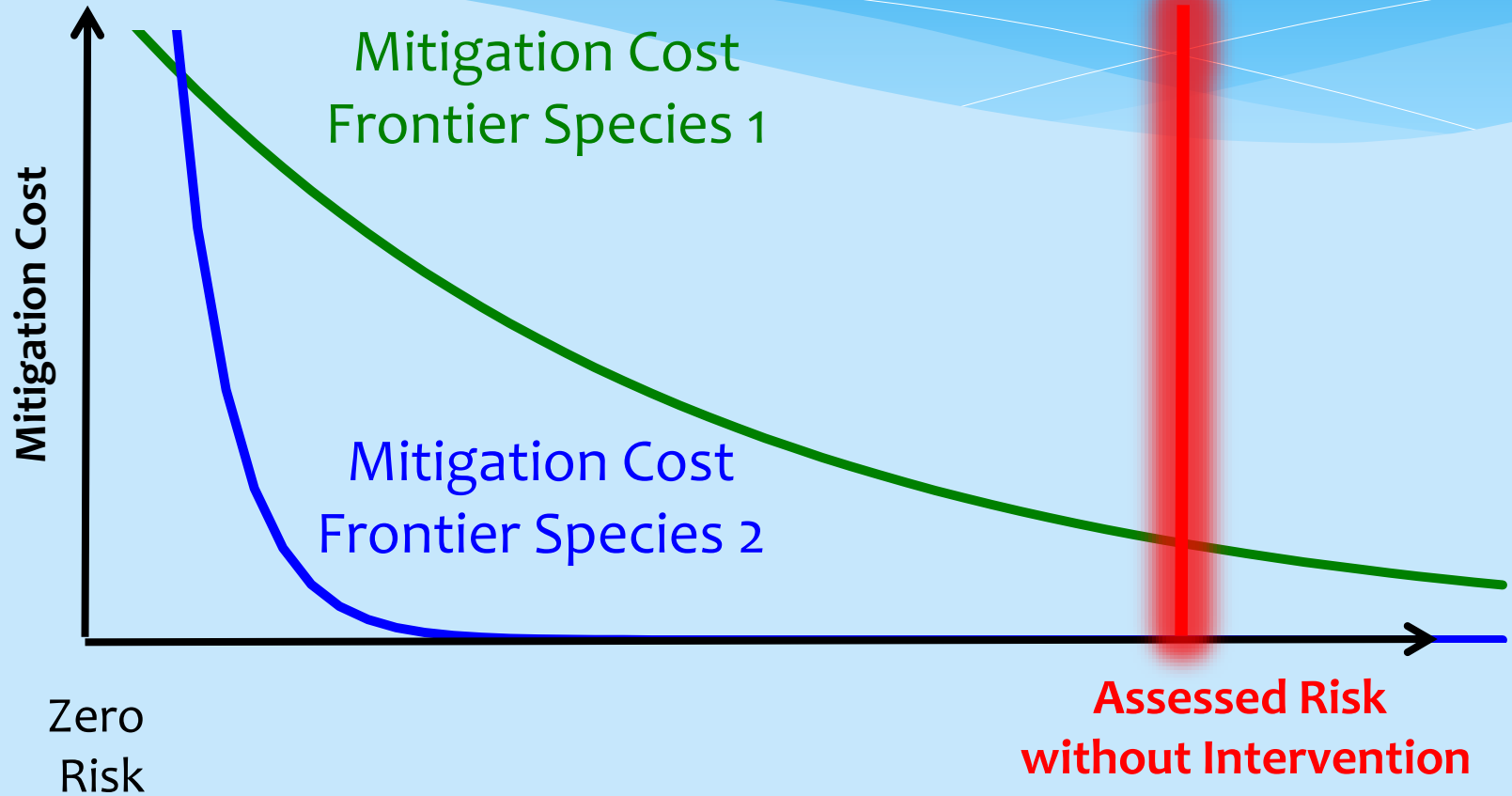
# Consequences of Reducing ESA Species Risks



# Possible Outcome of ESA Policy Choices

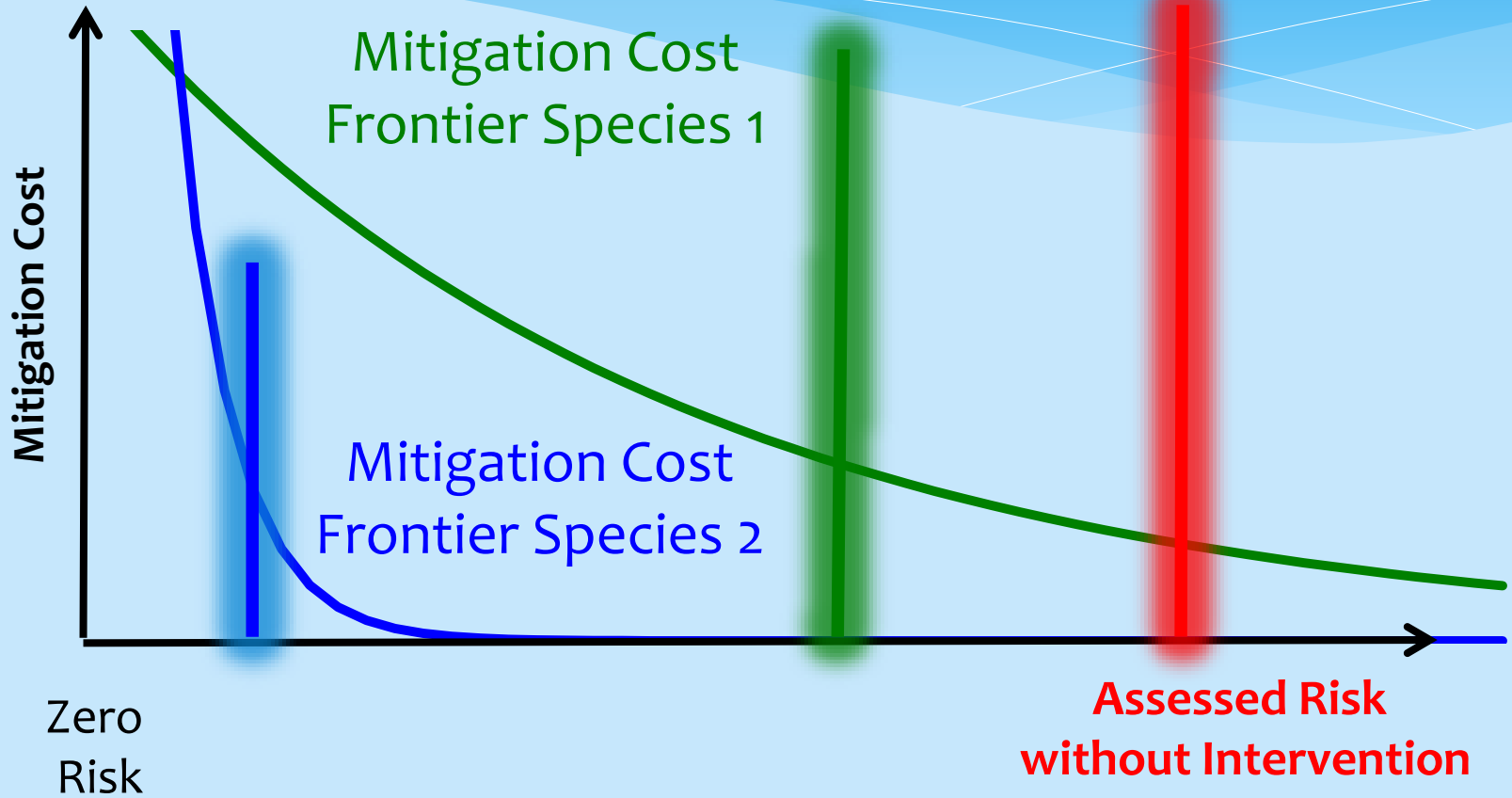


# Different Species, Different Mitigation Costs



ESA Assessed (uncertain) Risk for a Species

# Different Costs Suggest Different Risk Standards



ESA Assessed (uncertain) Risk for a Species



# Conservative (Uncertain) Risk Standards for ESA

- \* May impose significant risks (and costs) on the food economy
- \* Why have a different risk standard for listed species than for the plethora of risks and uncertainty facing the human species?
- \* What would be the economic and ecological consequences of using a highly conservative risk standard for other policy decisions?
  - \* FQPA
  - \* Food policy
  - \* *etc*

# Challenges

- \* Modeling of uncertain risks, and uncertain economic and ecological effects is quite challenging
  - \* Ecologists and economists need to get on the same planet!
- \* Identifying and measuring the “major” unintended consequences and paradoxical effects to reduce “surprises” after a policy has been implemented
  - \* For risks as well as expected consequences
- \* Cannot chase down every aggregate economic and ecological effect
  - \* Even if we could, it would not likely be a sound social investment, as the costs of such an exercise would likely be much greater than expected benefits of fine-tuning policy
- \* But we can do more, which will likely have beneficial social, economic and ecological outcomes