



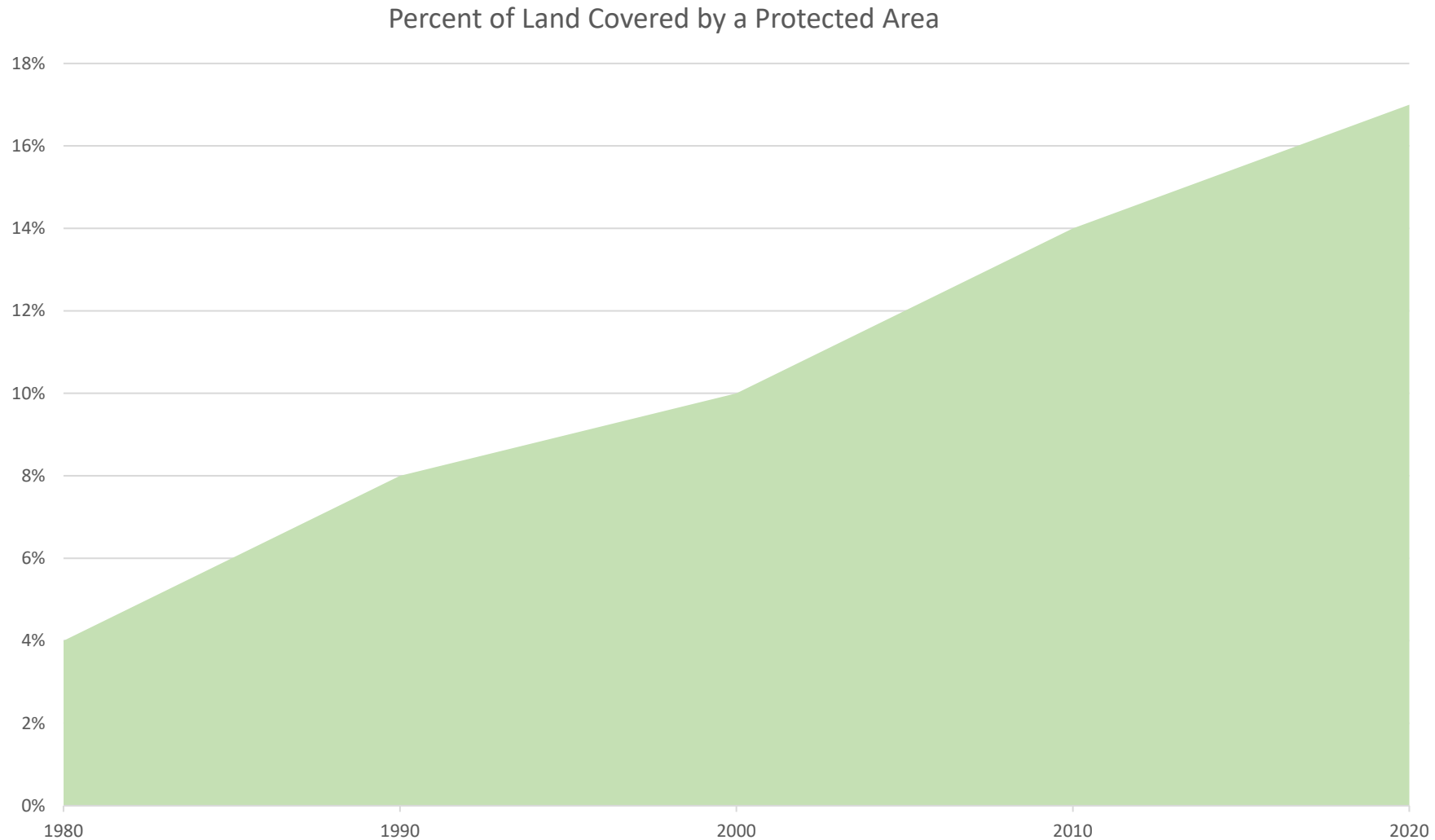
Conservation and Development

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Outline

- Motivation for conservation
- Why is conservation primarily allocated publicly?
- What we need to understand in order to value conservation
 - Benefits
 - Impacts
- Conservation as a tool for development
- Sonoma County

Current State of Conservation

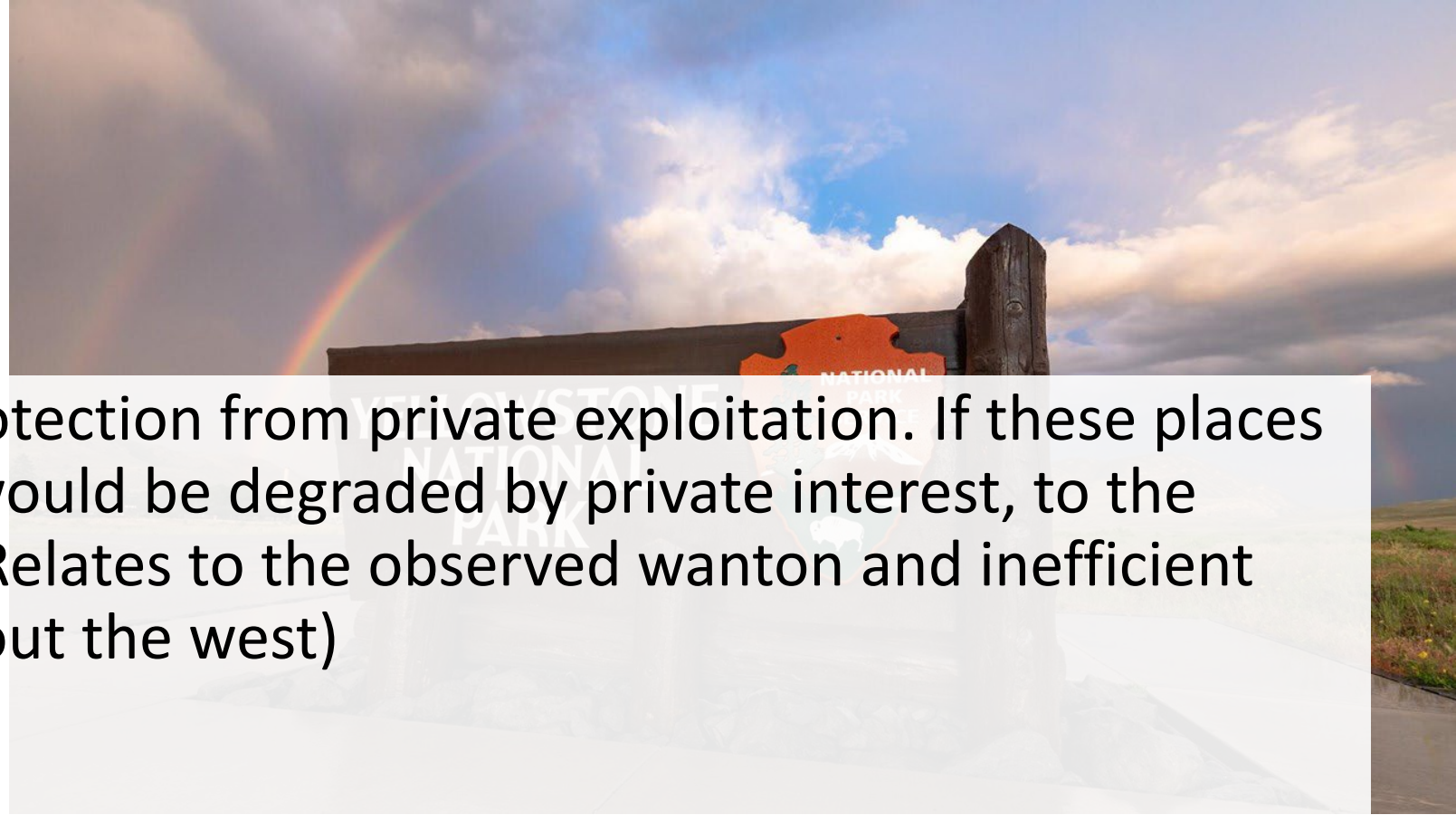


Current State of Conservation

IUCN PA Category	Description	Examples in the USA
Ia - Strict Nature Reserve	Areas strictly protected for biodiversity conservation and research, with minimal human impact.	Scientific research sites, Wilderness Study Areas (WSAs) managed by the BLM, certain National Wildlife Refuges with restricted access (e.g., Izembek NWR).
Ib - Wilderness Area	Large, unmodified areas retaining their natural character, protected for wilderness conservation.	Designated Wilderness Areas (e.g., Arctic National Wildlife Refuge, BLM-managed wilderness areas under the 1964 Wilderness Act).
II - National Park	Large natural areas protected for ecosystem conservation and recreation.	National Parks (e.g., Yellowstone, Grand Canyon), some National Monuments managed for ecosystem and recreation (e.g., Grand Staircase-Escalante NM).
III - Natural Monument	Protected areas focused on conserving specific natural or cultural landmarks.	National Monuments (e.g., Bears Ears NM, Devils Tower NM), unique geological features in National Park Service or BLM management.
IV - Habitat/Species Management Area	Areas managed for the protection of specific species or habitats, possibly with active intervention.	National Wildlife Refuges (e.g., Aransas NWR for whooping cranes), Areas of Critical Environmental Concern (ACECs) under the BLM.
V - Protected Landscape/Seascape	Areas where the interaction of people and nature is integral to conservation and sustainable use.	National Conservation Areas (e.g., Red Rock Canyon NCA), National Heritage Areas, some BLM multiple-use lands with conservation goals.
VI - Protected Area with Sustainable Use of Natural Resources	Areas conserving ecosystems with low-level sustainable resource use.	BLM multiple-use lands allowing grazing, recreation, and energy development, sustainably managed National Forests (e.g., Tongass National Forest).

Motivation for Conservation

- For all intents and purposes, conservation in the USA started in 1872 with the establishment of Yellowstone NP
- Certain places warrant protection from private exploitation. If these places were not set aside, they would be degraded by private interest, to the detriment of the public. (Relates to the observed wanton and inefficient taking of wildlife throughout the west)
- Public Trust Doctrine



Motivation for Conservation

- Conservation in the USA has generally been motivated by two ethical approaches:
 - Teleological:
 - Utilitarian. Natural resources should be used for the benefit of the public (e.g., Theodore Roosevelt, Gifford Pinchot)
 - Deontological:
 - Preservation. Intrinsic goodness of nature (e.g., John Muir, Henry David Thoreau)

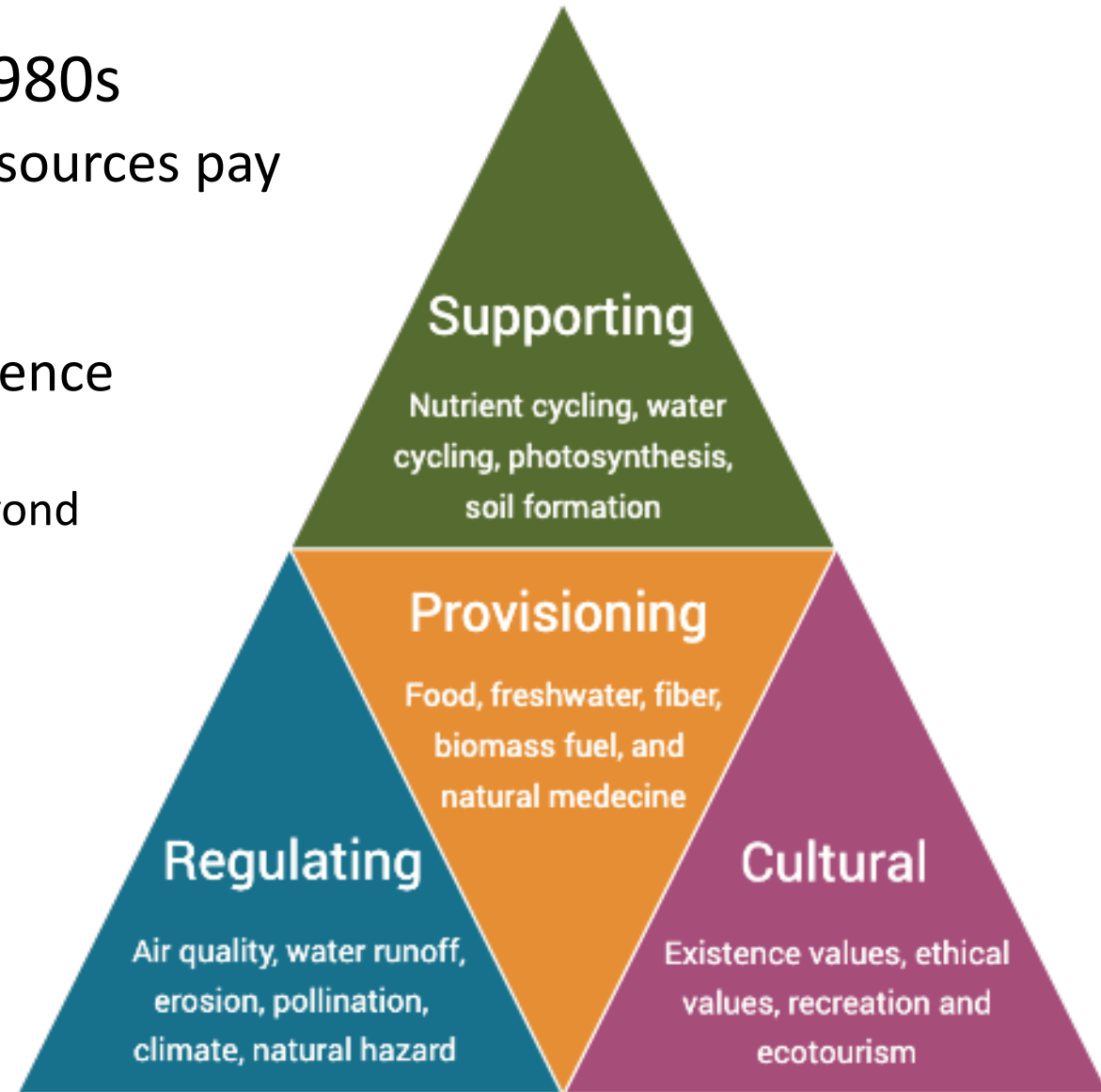
Motivation for Conservation

- Both approaches acknowledge (to some degree) the benefits that natural systems bring to humans
- Both approaches address the classic economic view of natural resources:
 - Natural resources provide benefits through extraction (provisioning service) and use in productive processes



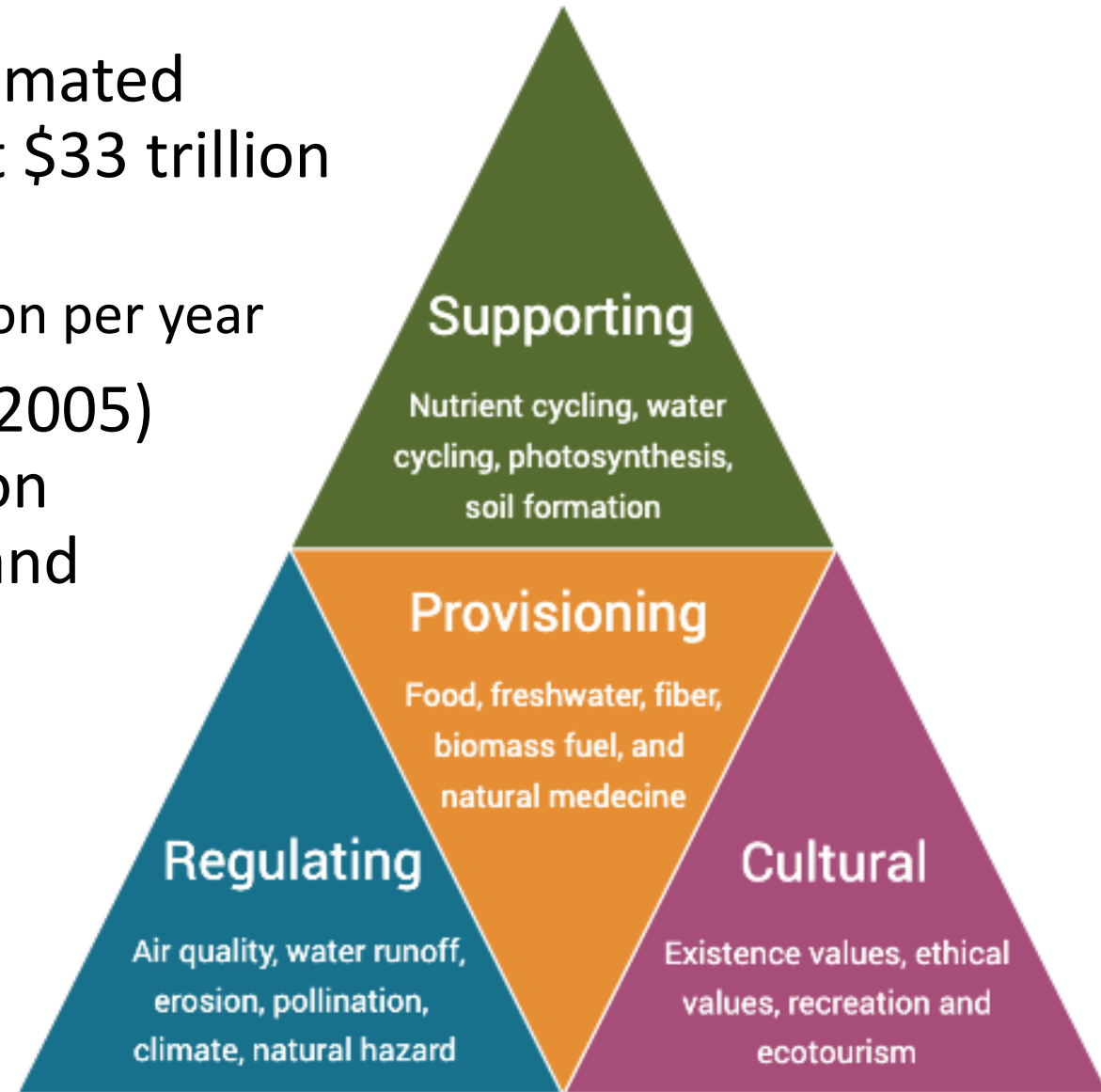
Motivation for Conservation

- Shift in this paradigm began in the 1980s
 - Multiple benefits that *in situ* natural resources pay to humans
 - Natural Capital
 - Helped to shed light on the global influence of conservation (benefits)
 - Some ecosystem services pay benefits beyond their geographic location



Motivation for Conservation

- Costanza Study (1997) placed an estimated value of global ecosystem services at \$33 trillion per year
 - Follow up in 2014 estimated \$145 trillion per year
- Millennium Ecosystem Assessment (2005) reconfirmed the value of conservation and set goals for the proportion of land that should be protected (20%)



Why do we even need conservation?

- Why isn't conservation allocated in markets?
- Fundamentally an issue of property rights
 - The benefits of conserved land are non-excludable and non-rival
 - Misalignment between private and social incentives
- This is problematic for cost-benefit (benefit vs. benefit) analyses:
 - The stream of benefits for development/conversion are largely private and transmitted through markets (think real estate)
 - The stream of benefits for conservation are largely public: think public goods and common pool resources (free-rider/tragedy of the commons)
- Result: type of market failure. Conservation will be under-allocated in the absence of intervention (natural resources will be over-extracted)

Challenges: Benefits and Impacts

- Designation of conservation entails an investment (opportunity cost or foregone development)
- Does conservation work?
 - Conceptually, we need to differentiate between:
 - The **benefits** of ecosystem services (what conservation is supposed protect)
 - The **impacts** of conservation (does conservation create **additionality**?)

Challenges: Impact

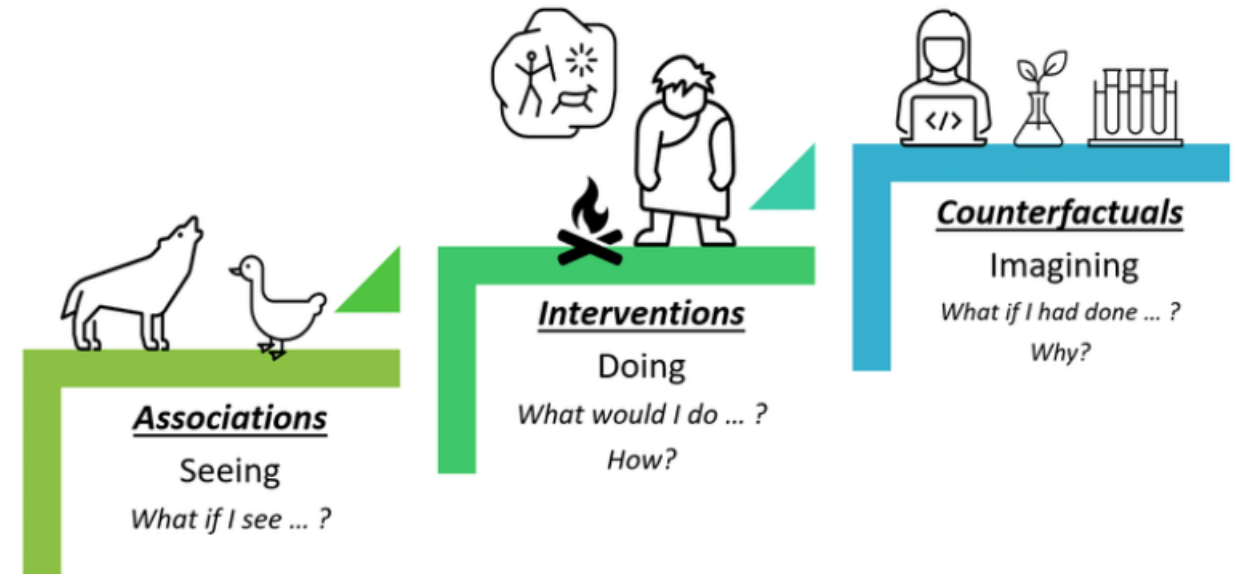
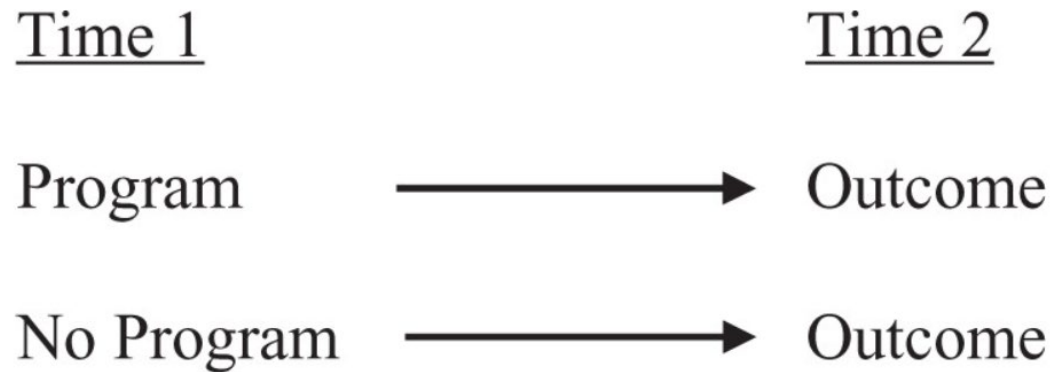
- Classic line of thinking:
 - Conservation is good for the environment
 - Conservation is bad for development (socioeconomic)
 - Fundamental **tradeoffs**
- Impact analyses: retrospective
 - Have protected areas been effective?
- What does it mean for conservation to be effective?
 - Example: did conservation result in greater forest cover (additionality) than would have resulted in the absence of conservation?

Challenges: Impact

- Why might conservation not be effective?
- Lack of funding/management
 - Resultant “paper parks”
- Location selection bias
 - High-far/rocks and ice

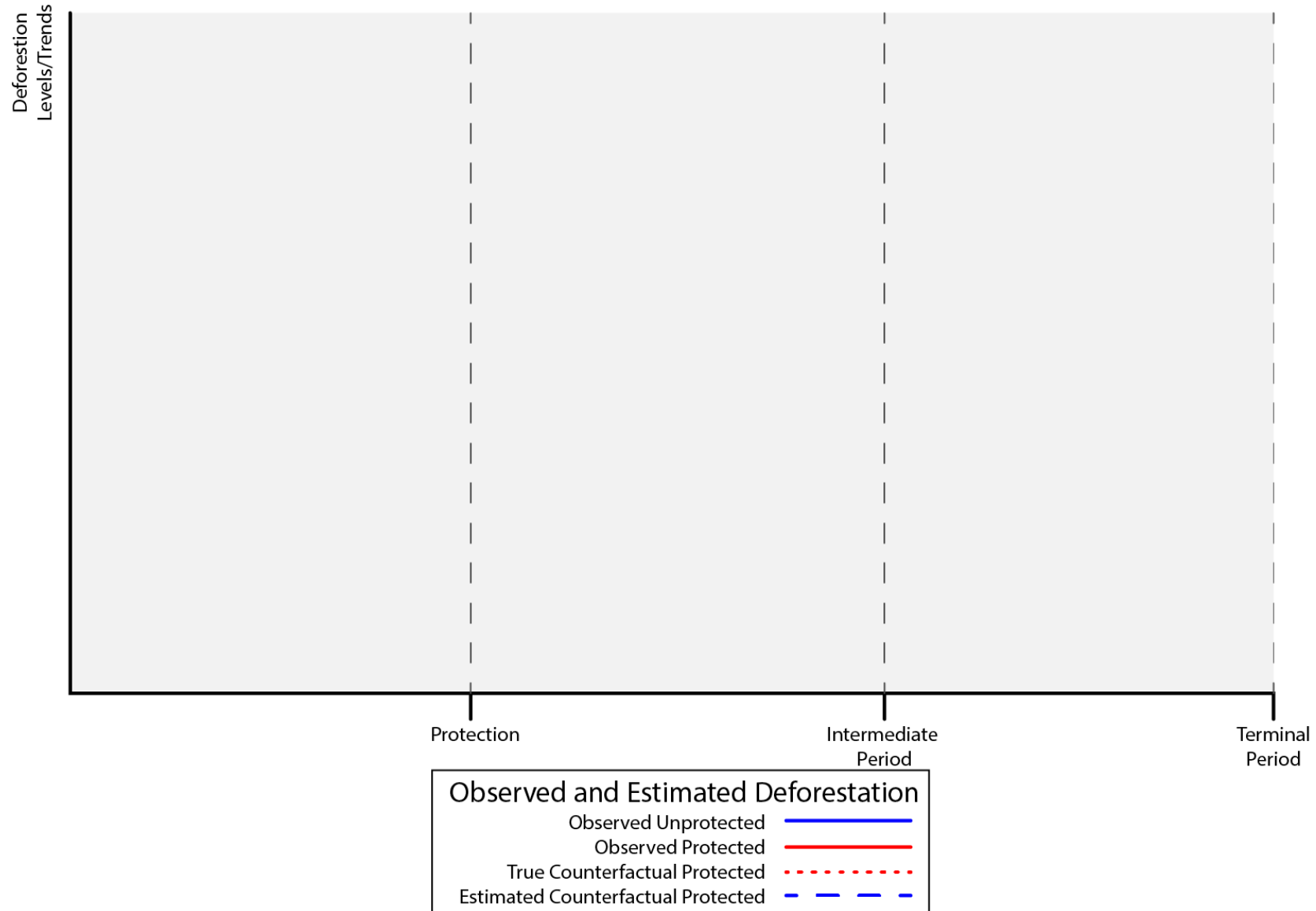
Challenges: Impact

- Understanding impact entails counterfactual approach



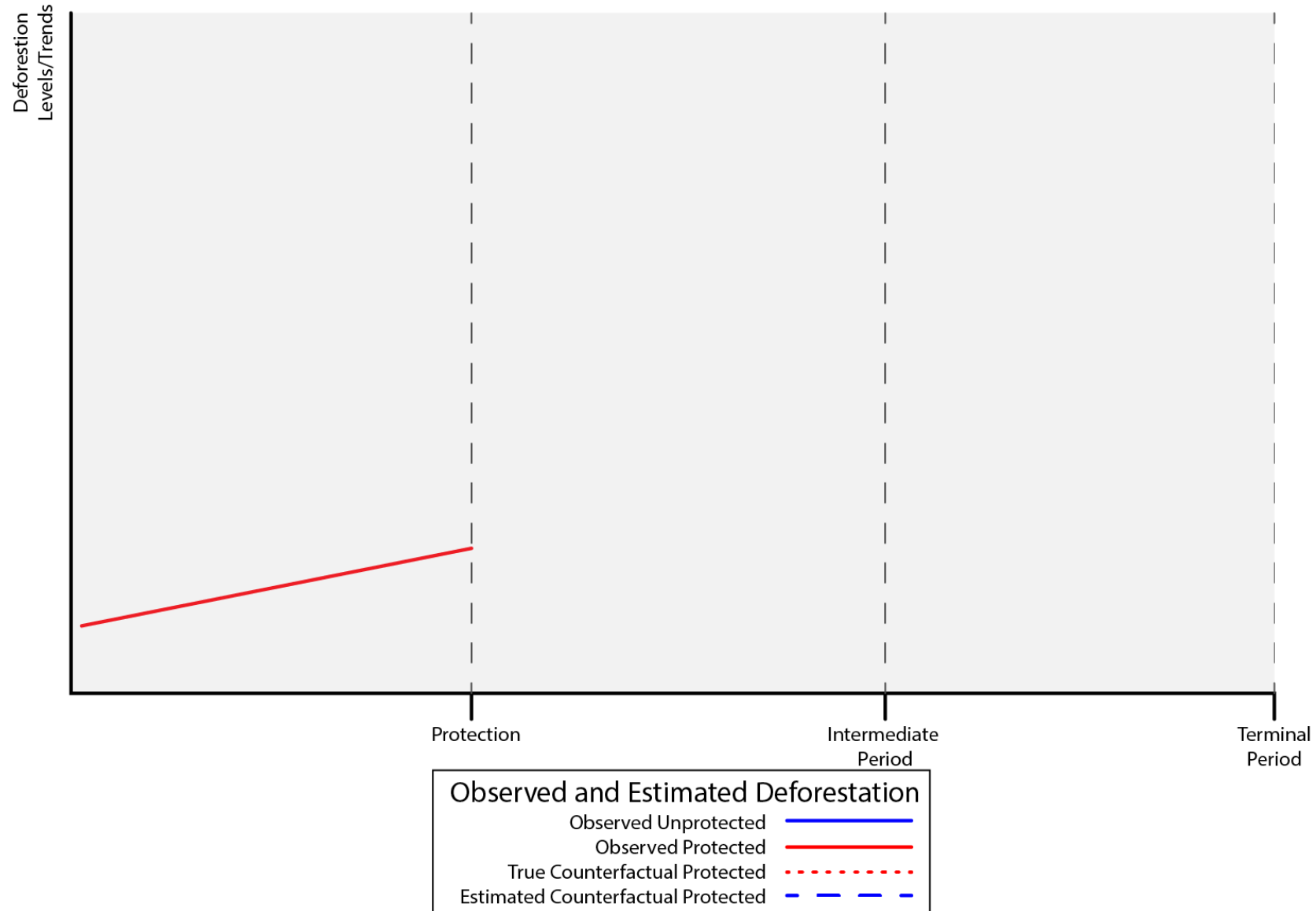
Challenges: Impact

Naive Estimator



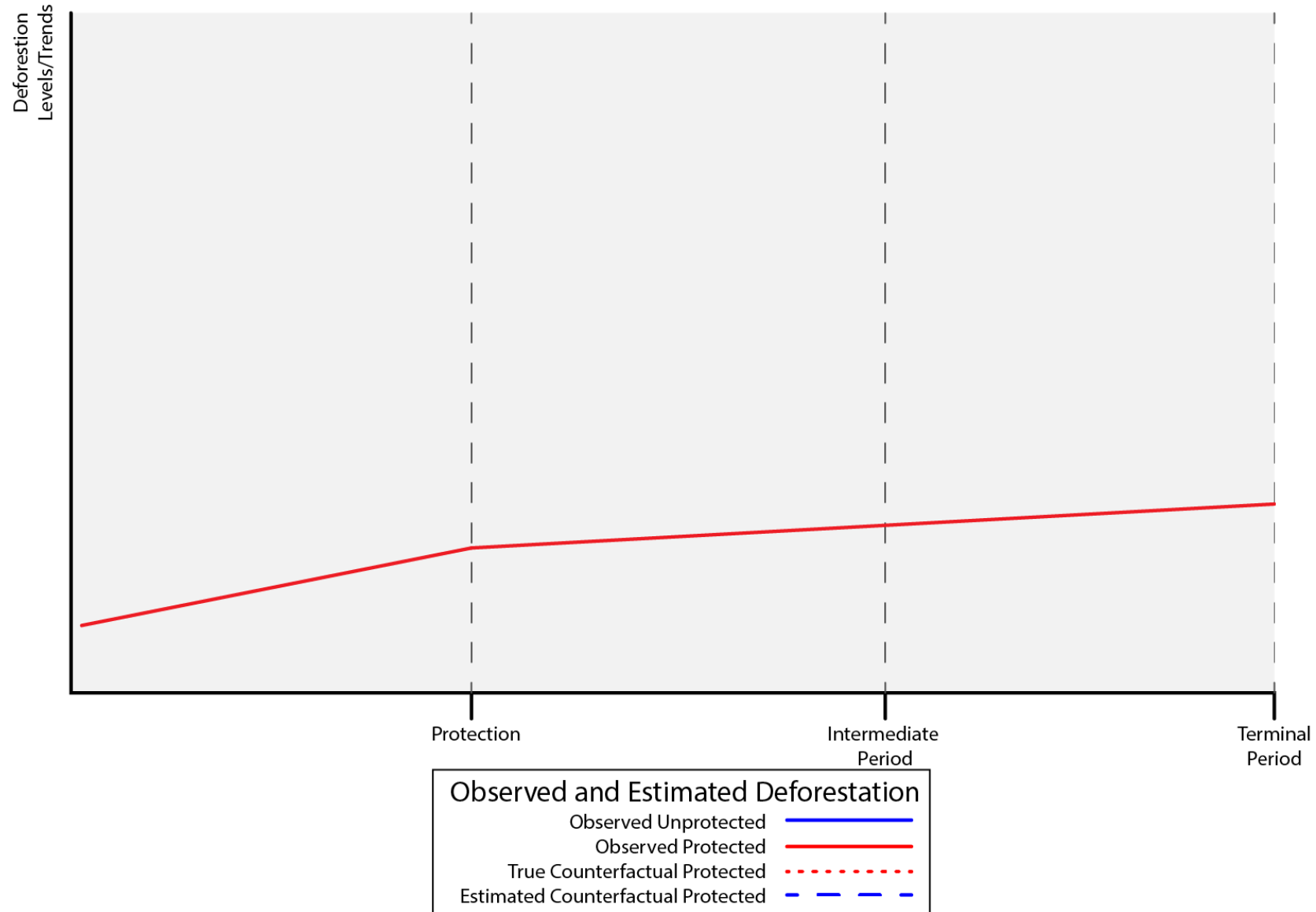
Challenges: Impact

Naive Estimator



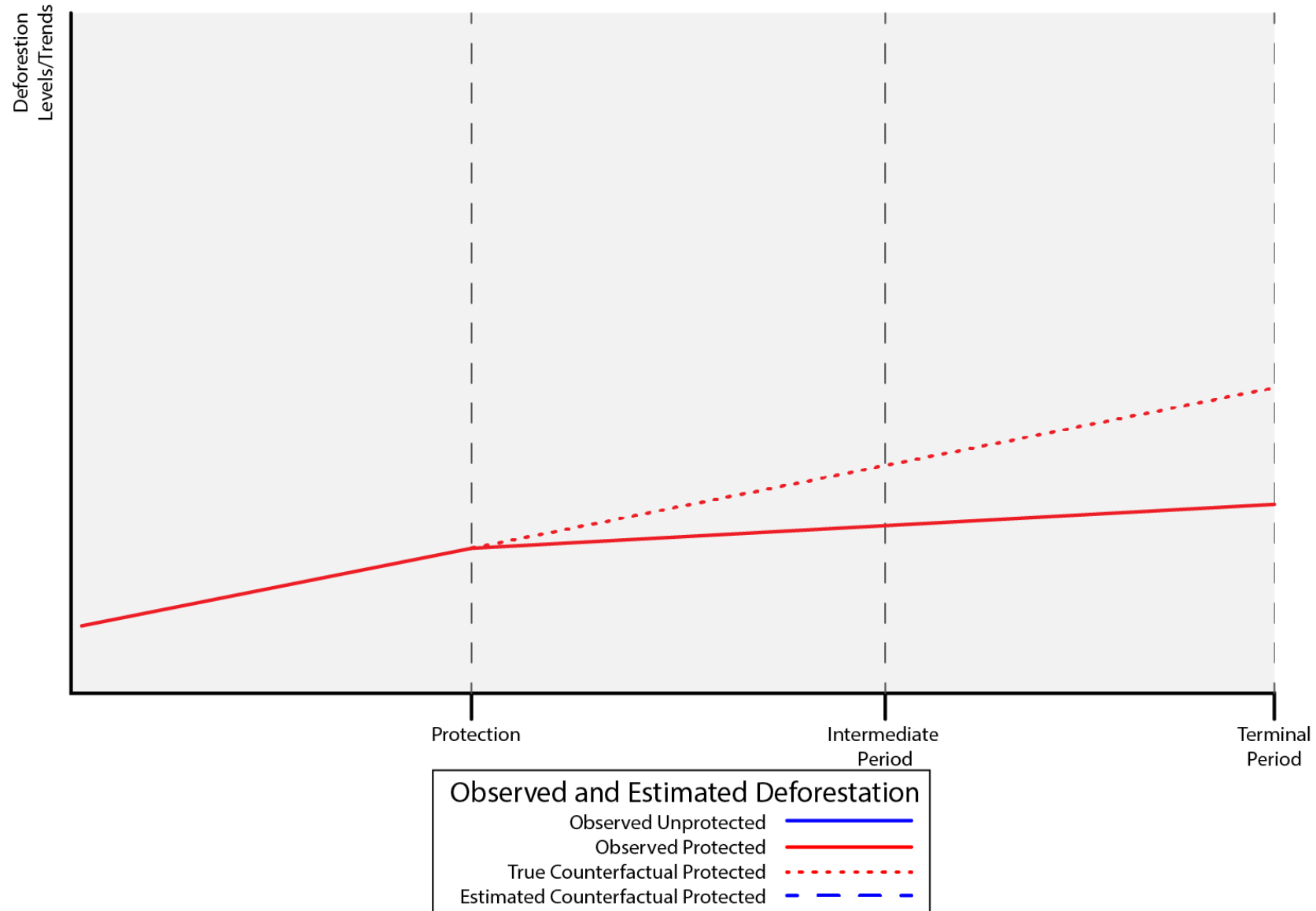
Challenges: Impact

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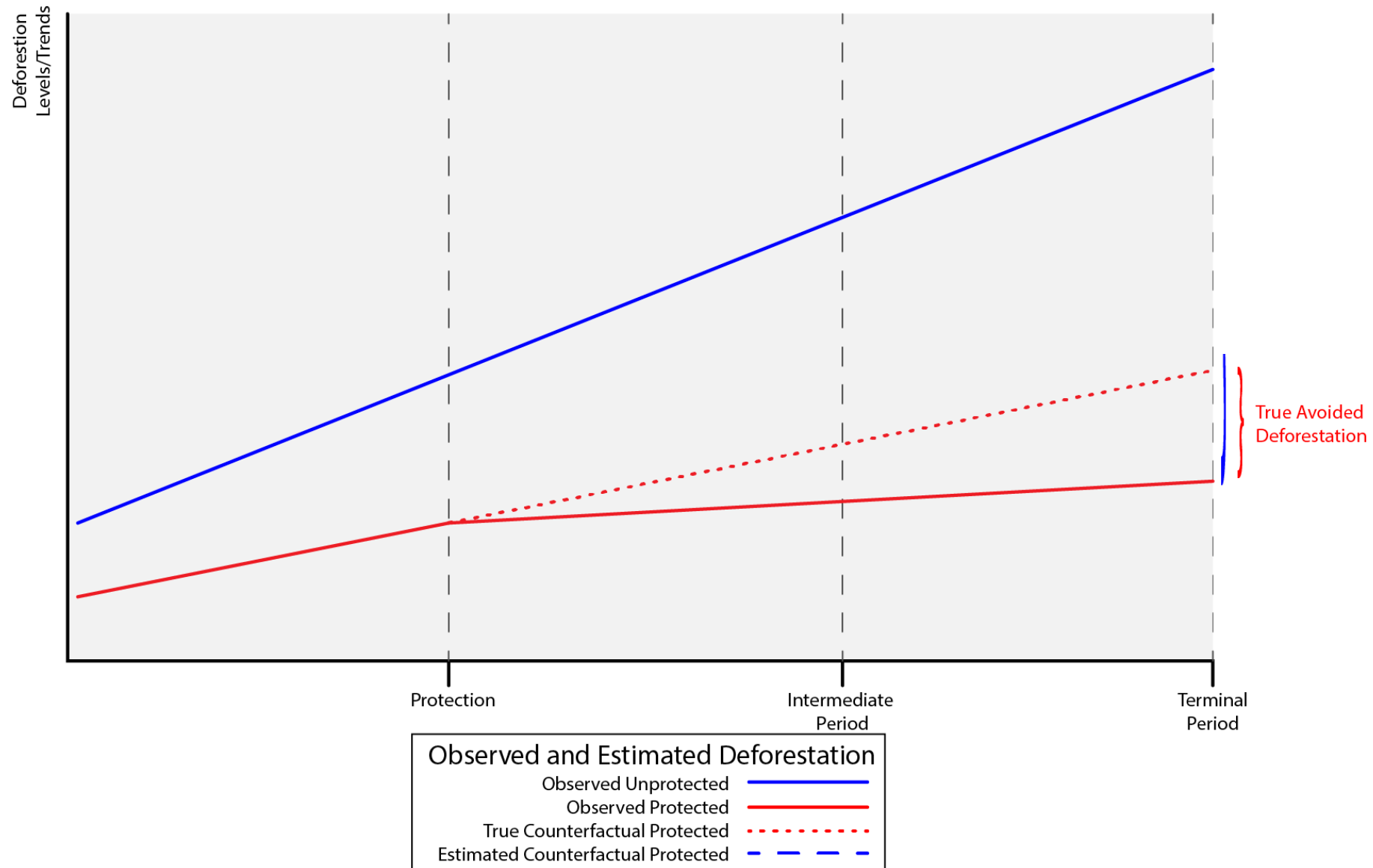
Challenges: Impact

Naive Estimator



Challenges: Impact

Naive Estimator



Challenges: Impact

- Practical challenges to estimating the impact of conservation
- Methodological
 - Counterfactuals are challenging to estimate
 - Early studies took naïve approach
- Availability of data
 - Timing
 - What are we measuring?

What we Know: Impacts

- Generally:
- Conservation has been effective (created additionality), but simple “inside-outside” comparisons tend to overstate their effectiveness
- Conservation has not made surrounding communities worse off
 - Classic “trade off” scenario doesn’t hold
- Location matters: protecting the areas most imperiled by conversion imposes the largest economics costs

Challenges: Benefits

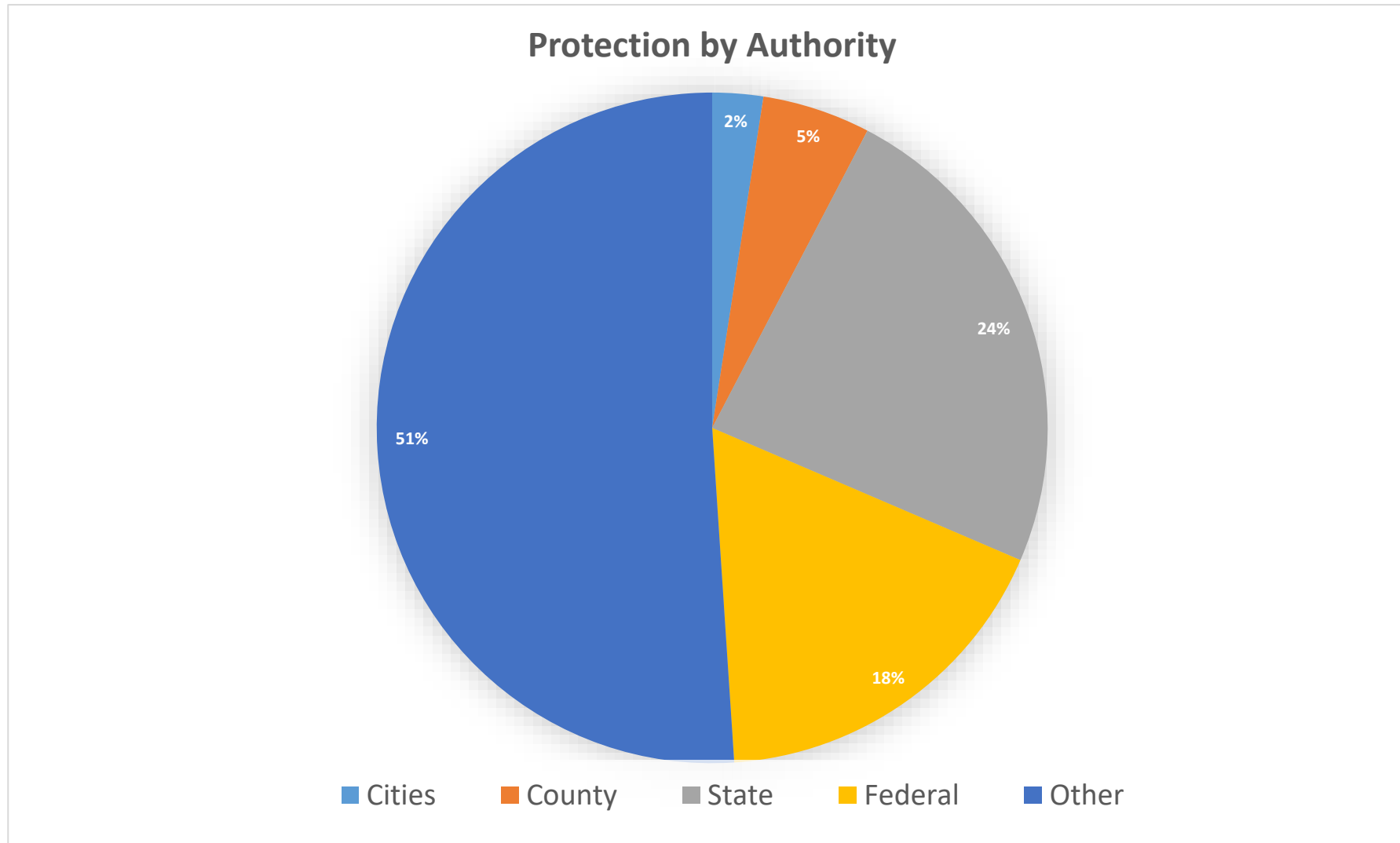
- How do we value the benefits of conservation?
- The ecosystem services provided by *in situ* natural resources are not valued in markets, so how can we place a dollar amount on them to compare that value to the value placed on conversion?

Challenges: Benefits

- Approaches to measuring non-market environmental services (benefits)
- Market based (revealed preference):
 - Link the service to some other market-based decision
 - Travel costs
 - Capitalization in real estate (hedonic pricing)
 - Replacement costs
 - Etc.
- Non-market (contingent valuation):
 - Ask people about their willingness to pay
- Value Transfer:
 - Infer based on results from “similar” studies

Example: Sonoma County

- Between 25%-28% of Sonoma County's land is "protected"

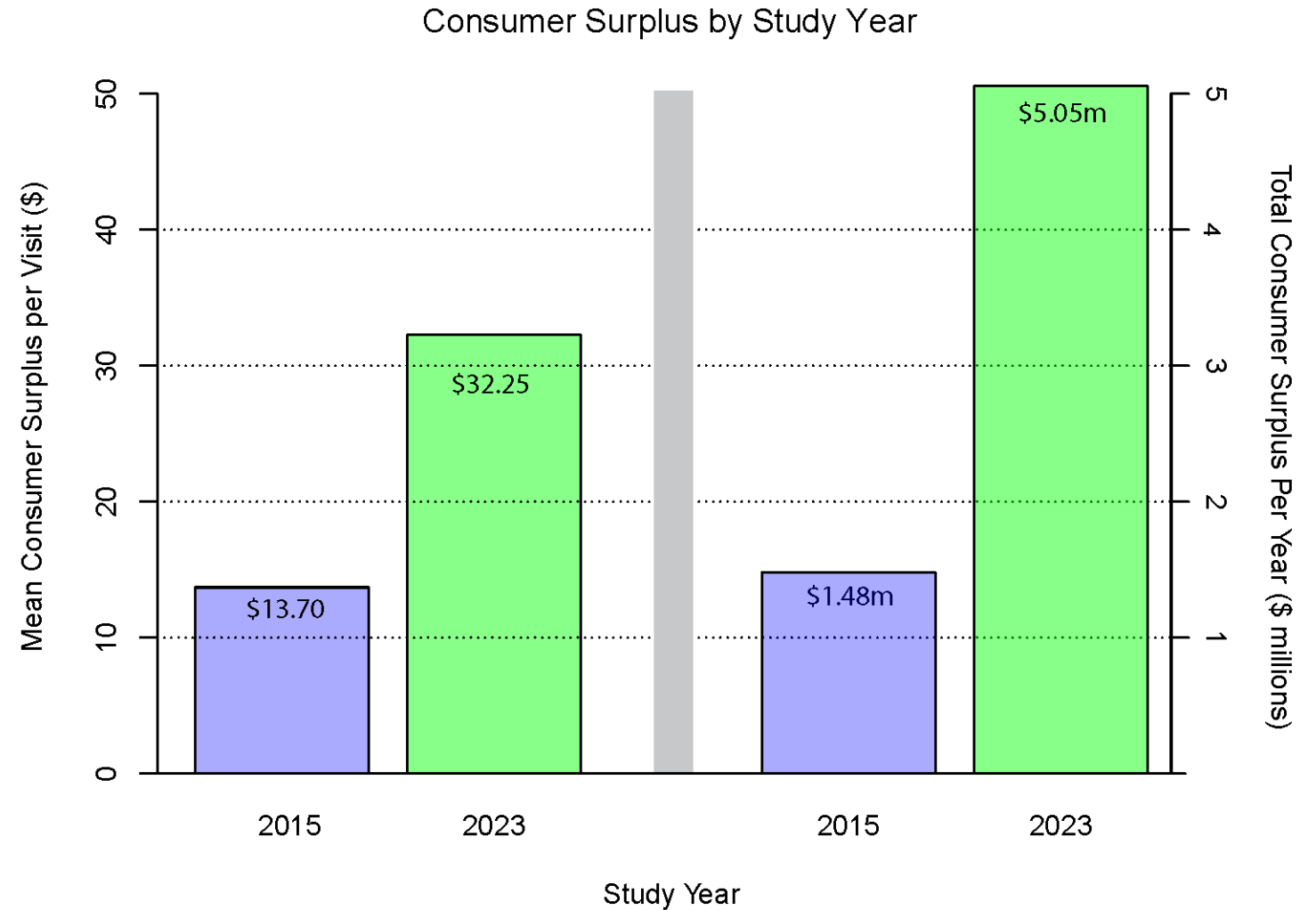


Example: Sonoma County

- Open Space District's "Healthy Lands and Health Economies Initiative"
- Goal: value the benefits of the diverse investments in conservation:
 - Grasslands & Rangelands
 - Riparian Corridors
 - Urban Open Space
 - Carbon Sequestration
 - Watersheds
 - Drinking Water
 - Public Health
 - Nature-Based Education
 - Groundwater
 - Community Resilience
 - Coastal Areas

Example: Sonoma County

- Example: Taylor Mountain Regional Park
- Recreational Value



Example: Sonoma County

- Overarching results: ecosystem services in Sonoma County are diverse and substantial in value
- In 2015, estimated value:
 - \$2.2-\$6.6 billion
 - Perspective: Sonoma County 2015 GDP was approximately \$24 billion

Conclusion: Conservation as a Tool for Development

- Move away from paradigm of strict tradeoffs
- In light of evidence, the Sustainable Development Goals (United Nations) include increasing terrestrial conservation to aid development
- Conservation can be complementary to development
 - 30% of the earth's land (and marine) areas by 2030
- CBA in small-scale decisions needs to acknowledge the economic benefits of intact ecosystems



Conclusion: Conservation as a Tool for Development

- Cautions
- Empirical evidence and modeling suggests that context matters
 - Location, designation, management all play a role in maximizing the efficiency of conservation
 - Maximize benefits, minimize tradeoffs
- Need both large-scale and case studies
 - Large scale to ensure credible inference
 - Case studies provide better understanding of contextual factors

