

Jacobs

Natural Capital Valuation and Decision Support for DoD Land Stewardship

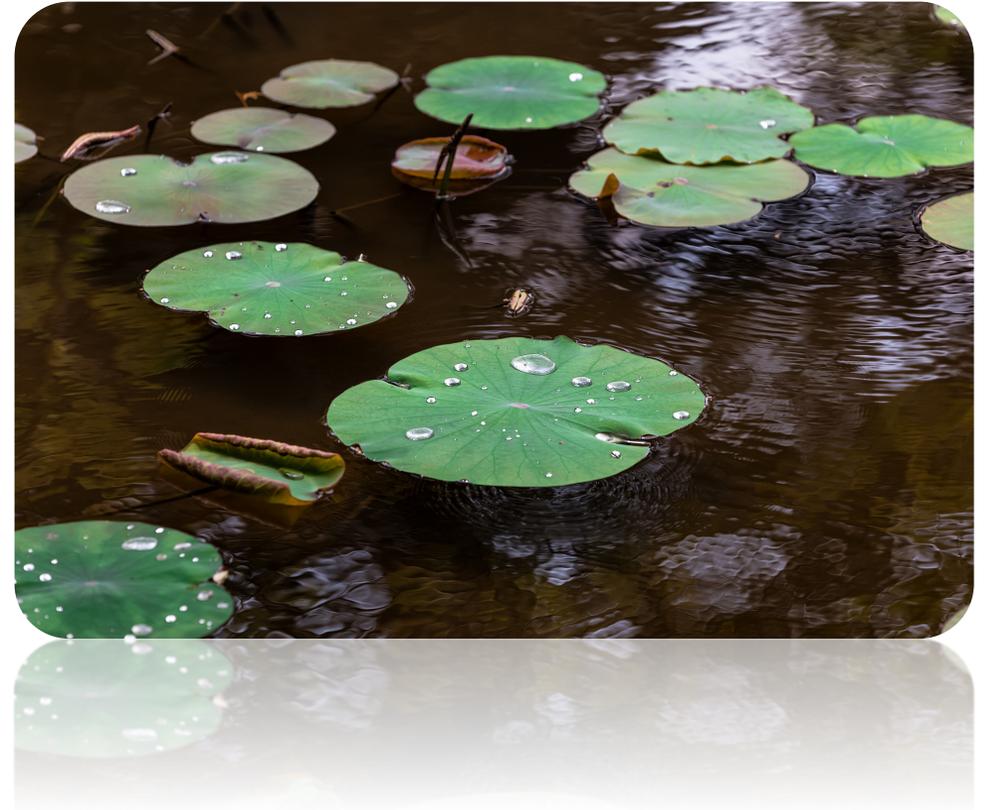
Jonathon Weier, Env. Planning Director
Dr. Stephen Petron, Program Manager

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- Jacobs co-authors:
 - Dr. John Mogge
 - Dr. Mary Jo Kealy
 - Mr. Jameson Morrell



The Issues

- The value of DoD's stewardship of test and training lands is not fully captured
- Natural capital considerations are not fully integrated to optimize decision-making

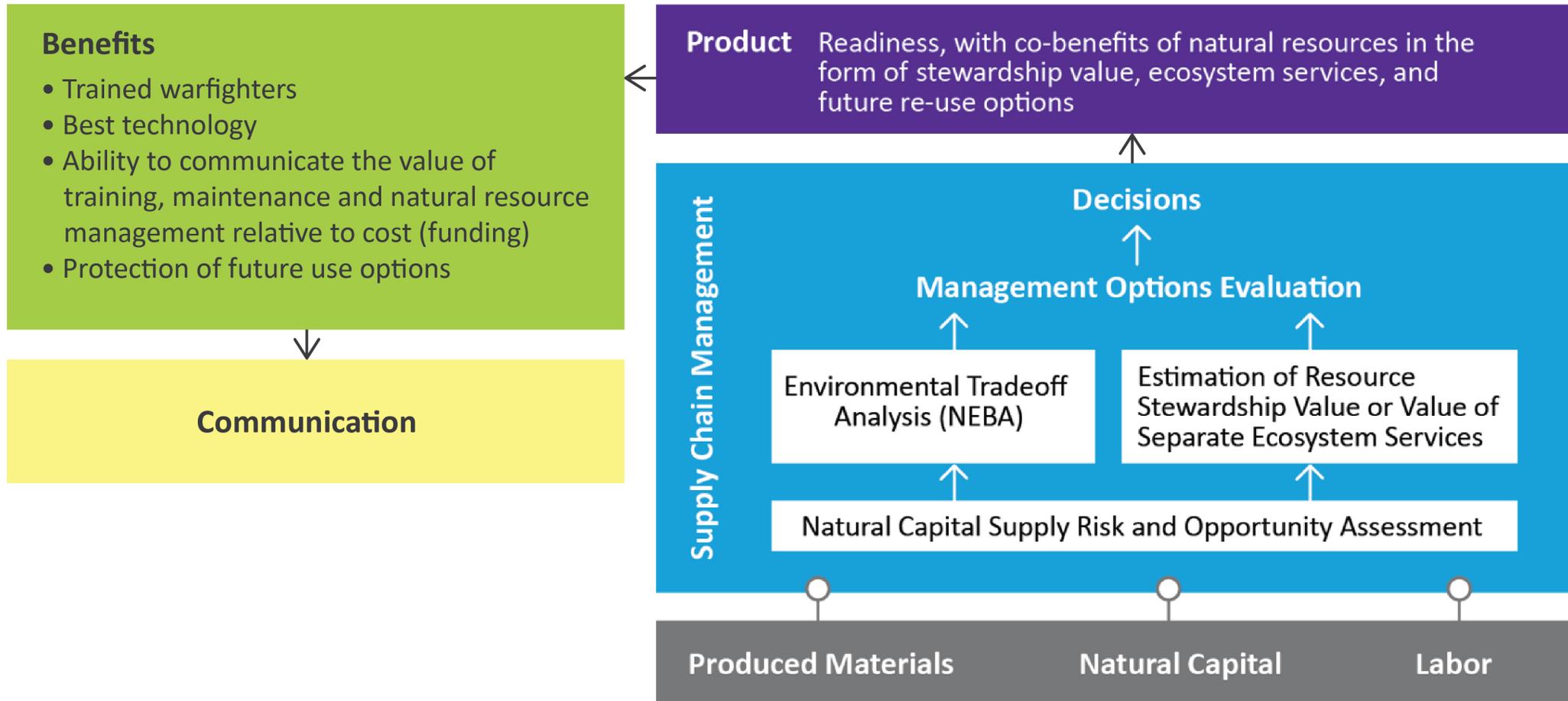


Study Elements

- Business Supply Chain Paradigm
- Net Environmental Benefit Analysis
- Contingent Valuation



Conceptual Framework



The Outcome

-  Supply Chain Paradigm
-  Net Environmental Benefit Analysis
-  Contingent Valuation



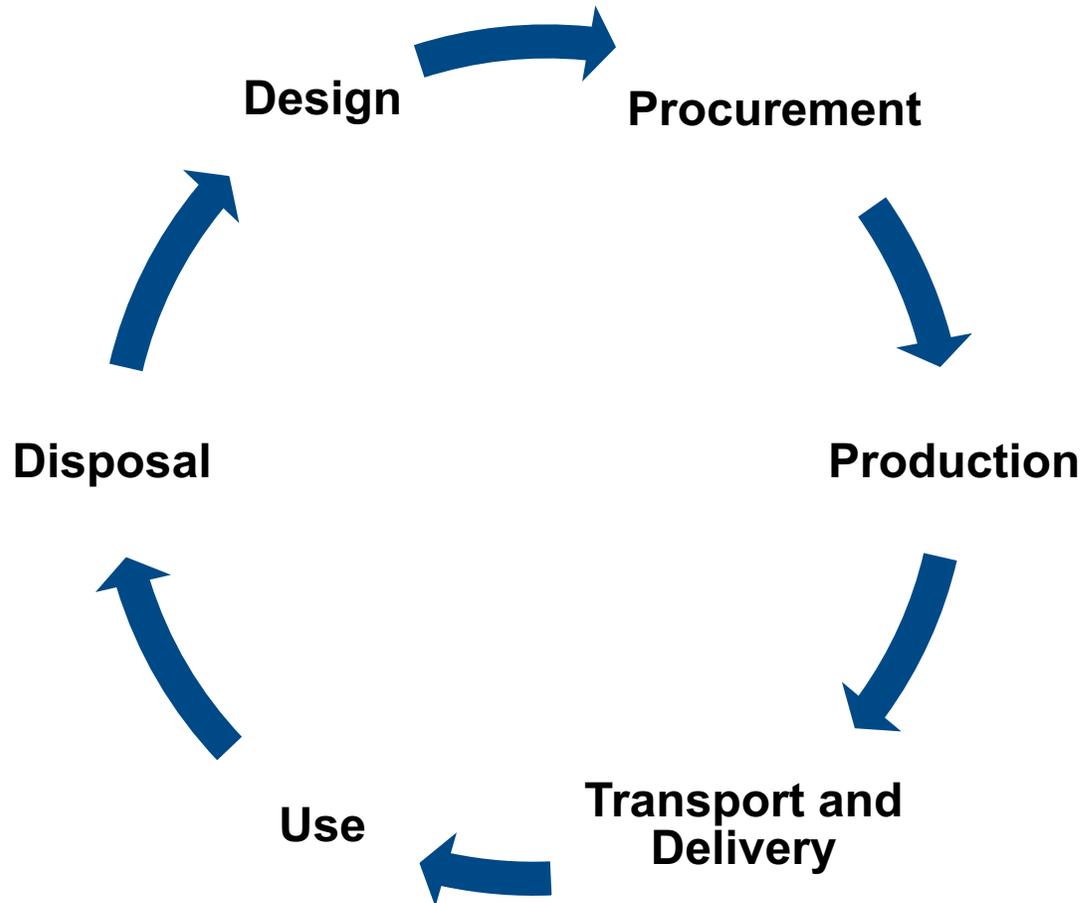
Business Supply Chain Paradigm

- Can the business supply chain paradigm provide a consistent framework to identify and account for NC managed by DoD?



- Reviewed applicability of Life-Cycle Perspective Analysis (LCPA)

Life Cycle Perspective



1. Boundary and values
2. Organizational “maturity” spectrum
3. Context systems map
4. Issues identification
5. Stakeholders review
6. Risk and opportunity
MODA Assessment
7. Document preliminary solutions

Business Supply Chain Paradigm

LCPA did not meet the objective:

- Integration involves adopting ESG standards to maintain “License to Operate”
- L to O less relevant to the military
- ESG is a newer concept to government
- Bundling E&S elements can be confusing and not relatable to readiness
- Lack of uniform metrics for the social and governance aspects
- Valuation is not a strong aspect of LCPA
- Requires significant commitment/participation from management

Natural Capital Protocol

| Stage | FRAME Why? | | SCOPE What? | | MEASURE AND VALUE How? | | | APPLY What next? | |
|----------------------------|--|---|--|---|--|---|--|---|--|
| Step | 01 Get started | 02 Define the objective | 03 Scope the assessment | 04 Determine the impacts and/or dependencies | 05 Measure impact drivers and/or dependencies | 06 Measure changes in the state of natural capital | 07 Value impacts and/or dependencies | 08 Interpret and test the results | 09 Take action |
| Questions this will answer | Why should you conduct a natural capital assessment? | What is the objective of your assessment? | What is an appropriate scope to meet your objective? | Which impacts and/or dependencies are material? | How can your impact drivers and/or dependencies be measured? | What are the changes in the state and trends of natural capital related to your business impacts and/or | What is the value of your natural capital impacts and/or dependencies? | How can you interpret, validate and verify your assessment process and results? | How will you apply your results and integrate natural capital into existing processes? |

PRINCIPLES: Relevance, Rigor, Replicability, Consistency

NCP User Templates

Step 04: Determine the impacts and/or dependencies

Questions each Step will answer

Actions

| | |
|---|---|
| Which Impacts and/or dependencies are material to your assessment? | 4.2.1 List potentially material natural capital impacts and/or dependencies |
| | 4.2.2 Identify the criteria for your materiality assessment |
| | 4.2.3 Gather relevant information |
| | 4.2.4 Complete the materiality assessment |

Outputs that you should achieve from this Step:

- A prioritized list of material impacts, dependencies and changes in natural capital to include in your assessment.

Templates that can help you reach these outputs:

| |
|--|
| Which impact and/or dependency pathways are potentially material to your business? (See Table 4.3 for a detailed example)? |
| |
| Which criteria will you use for your materiality assessment? |
| |
| Which internal and/or external stakeholders will you engage in your materiality assessment? |
| |

| Materiality Criteria | Material issues | | | |
|--|------------------------|---------------|---------------|--------------------|
| | Issue 1 | Issue 2 | Issue 3 | Expand as required |
| <i>e.g. operational</i> | <i>Low/medium/high</i> | | | |
| <i>e.g. legal and regulatory</i> | | | | |
| <i>e.g. financing</i> | | | | |
| <i>e.g. reputational and marketing</i> | | | | |
| <i>e.g. societal</i> | | | | |
| To include in assessment? | <i>Yes/No</i> | <i>Yes/No</i> | <i>Yes/No</i> | <i>Yes/No</i> |

Net Environmental Benefit Analysis

- Analytical framework
Quantify and compare environmental losses and gains associated with different management options
- First applied by USEPA in 1989
- “Net” = Action - Baseline
- Addresses quality over time
- Flexible
- Uses existing data
- Provides quantitative information to support decision-making



NEBA Applications

Capital Projects

- Infrastructure siting
- Gray versus green infrastructure
- Options to mitigate for sea level rise

Mitigation

- Scaling the correct amount of mitigation
- Identifying cost-effective mitigation options

Management

- Techniques to manage natural resources
- Alternatives on the timing of activities

Stressed Sites

- Remediation alternatives for contamination
- Active/inactive ranges

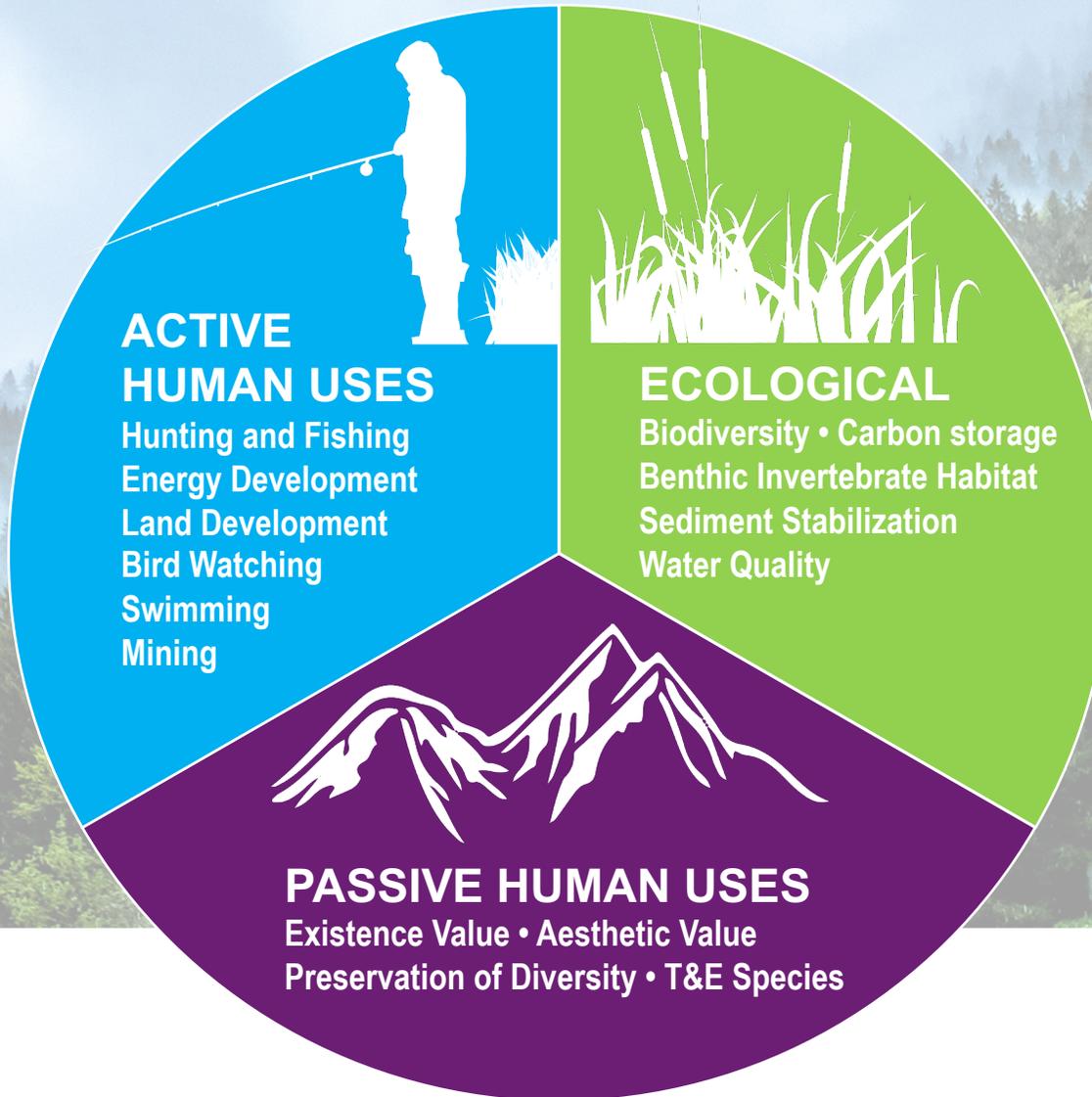
A NEBA Provides Stakeholders with Additional Information

| Option | Alignment with Need | Cost (NPV) | Time to Completion | Net Human Use Value (\$ NPV) | Net Ecological Service Value (dSAYs) |
|--------|---------------------|------------|--------------------|------------------------------|--------------------------------------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | | | |

Ecosystem Services are the Benefits People Gain from the Environment



**NATURAL
CAPITAL**



Net Environmental Benefit Analysis

Identifies options that create the greatest net environmental benefit

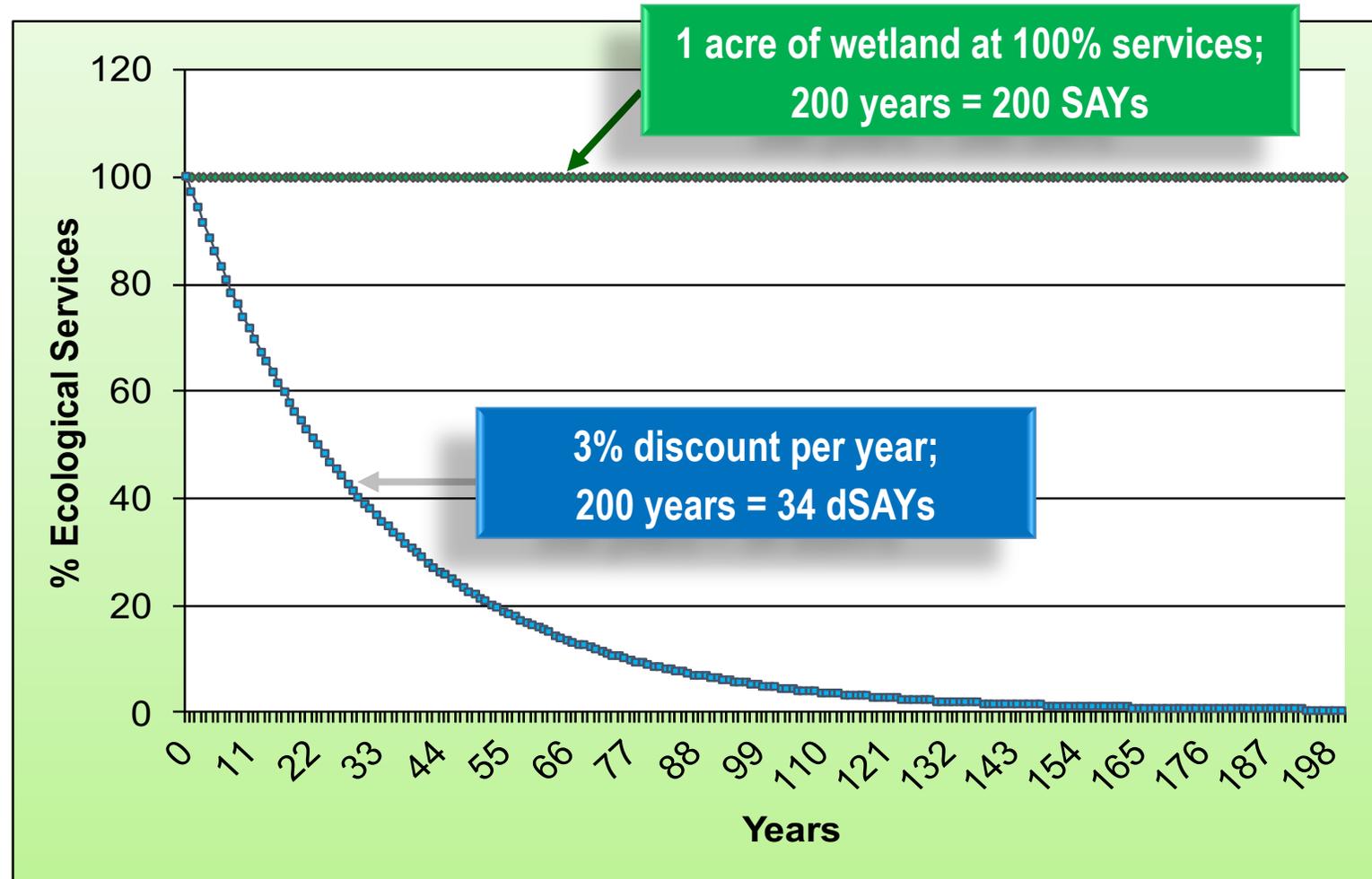


Ecological Service Value
(dSAYs; Habitat Equivalency Analysis)



**Active or Passive
Human Use Value (\$)**

Discounted Service Acre Years

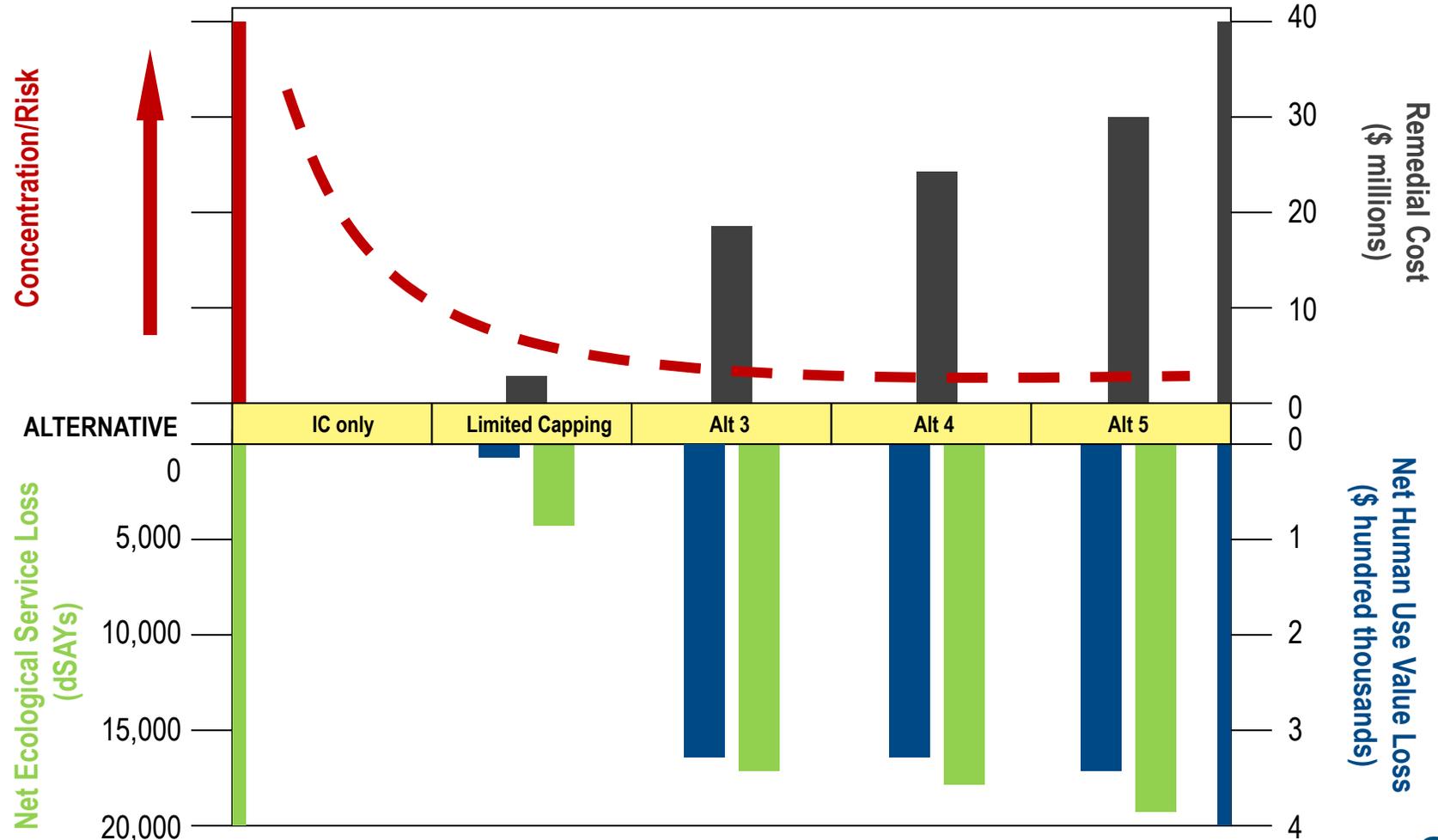


Why?

- ✓ **Facilitate mission**
- ✓ Best decision is unclear
- ✓ Reduce cost
- ✓ Reduce impacts
- ✓ Identify opportunities to create value

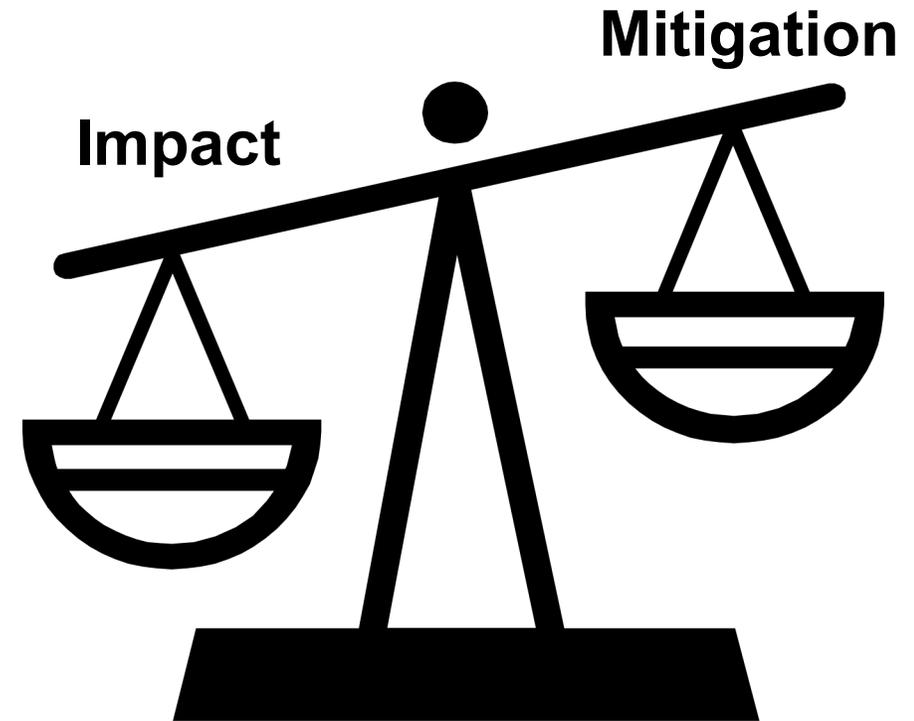
- ✓ Document stewardship
- ✓ Attract investment/support
- ✓ Resolve conflict
- ✓ Provide basis for support
- ✓ Save buildable land

NEBA Results for Multiple Remediation Alternatives



NEBA for New Infrastructure

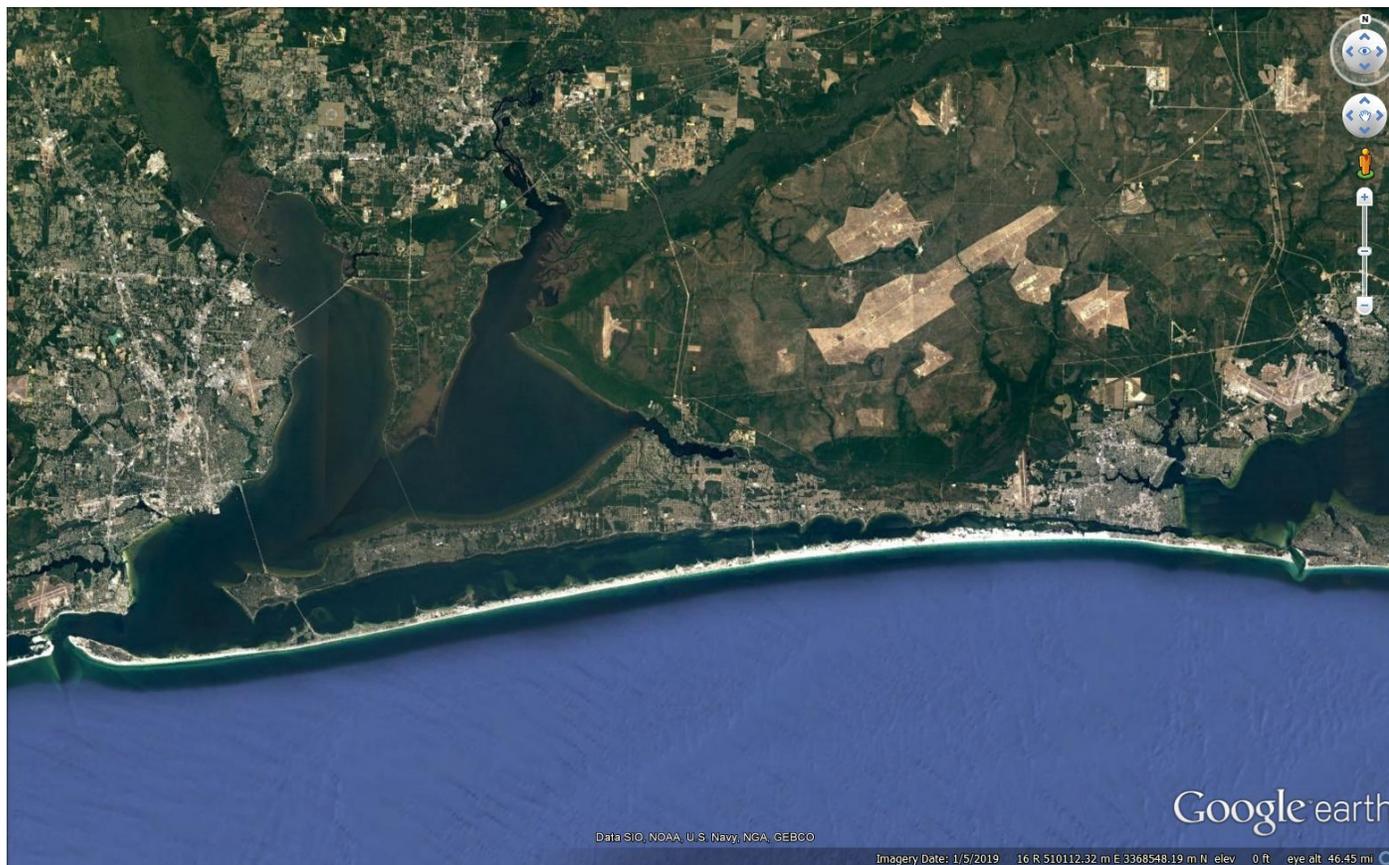
- New pipeline
- Forested wetlands
- 15.5 acres - temporary impact
- 6.1 acres - permanent impact
- Agency request - 26.5 acres
- HEA - 8.25 acres
- Resolution - 10 acres
- 62% reduction in cost



Example DoD Applications

| Context | Air Force | Army | Marine Corps | Navy |
|---|--|---|-------------------------------|--|
| Remediation | Edwards AFB; JB Andrews; Homestead ARB; JB Langley-Eustis | Camp Edwards | Marine Corps Base Quantico | NAS Patuxent River; NWS Seal Beach; Norfolk Naval Shipyard |
| Mitigation | Grand Forks AFB | | | NAS Patuxent River |
| Infrastructure | MacDill AFB | | | |
| Lease Assessment | Barksdale AFB | | | |
| Remediation and Redevelopment for Public Use | | Camp Bonneville; Fort Ord, Savanna Army Depot; Fort McClellan; Rocky Mountain Arsenal | | |

NEBA Demonstration – Eglin AFB



- Hypothetical change in recreation access
- Recreation benefits assessment conducted to establish baseline
 - > half of Eglin's 464,000 acres open to recreation
 - 500,000 visits/year

Recreational Use – Eglin AFB

| | Number of Visits Per Year |
|-----------------|---------------------------|
| Hunting | 8,5748 |
| Fishing | 30,598 |
| Beach | 117,744 |
| Hiking | 364 |
| Camping | 1,530 |
| Forest Products | 817 |
| General | 258,669 |
| Total | 495,470 |



Dollars per Visitor Day by Activity

| | Hunting | Fishing | Beach | Hiking | Camping | Forest Products | General |
|----------------------------|-------------|-------------|--------------|-------------|-------------|-----------------|-------------|
| Number of Estimates | 42 | 60 | 16 | 7 | 6 | 9 | 76 |
| Mean | \$111 | \$64 | \$112 | \$54 | \$17 | \$70 | \$60 |
| Standard Deviation | \$79 | \$50 | \$104 | \$43 | \$9 | \$56 | \$54 |
| Median | \$85 | \$43 | \$107 | \$45 | \$19 | \$62 | \$44 |
| 25 Percent Quartile | \$58 | \$30 | \$26 | \$22 | \$10 | \$31 | \$25 |
| 75 Percent Quartile | \$156 | \$84 | \$149 | \$73 | \$23 | \$90 | \$74 |

Annual Value and Net Present Value (30 years)

| | Number of Visits Per Year | 2018 Dollars per Visit | 2018 Dollars per Year | Net Present Value at 3 Percent |
|-----------------|---------------------------|------------------------|-----------------------|--------------------------------|
| Hunting | 8,5748 | \$85 | \$7,288,580 | |
| Fishing | 30,598 | \$43 | \$1,315,719 | |
| Beach | 117,744 | \$107 | \$12,598,608 | |
| Hiking | 364 | \$45 | \$16,380 | |
| Camping | 1,530 | \$19 | \$29,070 | |
| Forest Products | 817 | \$62 | \$50,654 | |
| General | 258,669 | \$44 | \$11,381,425 | |
| Total | 495,470 | | \$32,680,435 | \$640,550,956 |

\$ = U.S. dollars

- \$33 M in annual economic value is net benefit to the public
- Hypothetical Scenario: Loss of Santa Rosa Island to development or sea level rise
- Negative net environmental benefit (-\$247 M)
- Does not address the adverse impacts to test and training mission

DoD Stewardship and Co-Benefits

- DoD generates co-benefits from environmental stewardship
- A result of management/protection of:

Unique
ecosystems

Habitat for rare
species

Biodiversity

Large tracts of
open space

- Co-benefits have an economic value to individuals independent of their direct use and enjoyment (passive use value)
- Difficult to quantify value – no market data/preference data

Contingent Valuation

- Method of measuring benefits
- Relies on survey data
- Present respondents with information about natural resources and choice situations
- Trade dollars for preservation
- Population x WTP = \$ Value
- 1.5 to 2 years
- Base, part of base, national

Steps

1. Review
2. Kick-off Meeting
3. Design and Test Survey and Devise Sample Plan
4. Peer Review
5. Office of Management and Budget Approval Process
6. Administer Survey
7. Data Entry
8. Data Analysis
9. Prepare Report
10. Disseminate Results

Uses for CV Outputs

Assess off-installation activities that may impinge upon national parks, wilderness areas, etc.

Support real estate decision-making (acquisition, divestiture, re-use, land swaps, leases, land withdrawals)

Support natural resource management funding requests

Demonstrate DoD stewardship value to the public

Study Findings

| Study Element | The value of DoD's stewardship of test and training lands is not fully captured | Natural capital considerations are not fully integrated to optimize decision-making | Application |
|--------------------------------|---|---|---|
| Business Supply Chain Paradigm |  |  | Not aligned with DoD focus |
| Natural Capital Protocol |  |  | Systematic way of considering impacts and dependencies on NC |
| NEBA |  |  | Quantifies losses and gains in ecological services and human use value to support decision-making |
| Contingent Valuation |  |  | Method of quantifying the value of DoD stewardship beyond direct use |