



# **Market-Based Conservation Incentives Workshop: Strategies for Family Forest Owner Participation in Biodiversity and Water Markets**

**Legal and Financial Aspects of Markets and Managing Risk**

**September 10-11, 2008**

**Turf Valley Resort, Ellicott City, MD**



Public Goods



Private Capital





# Introduction

The purpose of this session is to stimulate discussion about Family Forest Owner participation in ecosystem credit markets

1. Assumptions – from the landowner / manager perspective
2. Markets – a little clarity
3. Profile the emerging markets – Carbon / Water / Biodiversity
4. Look at an example project – investment decision process
5. A few considerations for the forest support community
6. A few considerations for landowners moving forward



# Ecosystem Service Enterprises

## Assumptions

1. Markets for nature's services can function to incorporate total production cost into price.
2. The landowner/producer can be compensated for the production or protection of nature's services.
3. Including production of nature's services can help forests compete effectively with other land uses.



# Markets

## Traditional Markets

Sustainable Timber and Agriculture Production

Limited Development consistent with Conservation Outcomes

Recreational Leases

## Emerging Ecosystem Credit Markets

Stream and Wetlands Mitigation

Water Quantity Trading

Carbon Sequestration

Water Quality Trading

Biodiversity – Threatened and Endangered Species Banking



# Markets – Traditional

## Established Products and Delivery – Route to Market

weights and measures – bushel of corn / barrel of oil

Information - volume of transactions - transparency

exchanges that secure purchase and delivery - contracts

## Established Commodity Market Characteristics

exchanges – brokers are key actors

products are contracted– delivery risk is on suppliers

purchases are at arms length – exchange is intermediary

futures contracts/arbitrage exist in clear contract environment

Producers have a measure of demand and an outlet for supply



# Emerging Ecosystem Credit Markets

## Voluntary Markets

variable demand – feelings based, not compulsory  
weights and measures are voluntary – unregulated  
delivery risk can remain with buyer – not the supplier

## Compliance Markets

demand is dictated – penalties for non-compliance  
weights and measures are required to assure compliance  
contracts may transfer liability for compliance – delivery risk  
standards and registries can assure buyers  
exchanges can be established based on delivery contracts  
with exchanges and demand – volume and transparency





# Emerging Ecosystem Credit Markets

## Multiple unique markets

Stream and Wetlands Mitigation

Biodiversity - threatened and endangered species banking

Carbon Sequestration - land use - Agriculture and Forestry

Water Quality Trading - point to nonpoint source trading

## ... in various stages of development

Stream and Wetlands Mitigation - Compliance - CWA

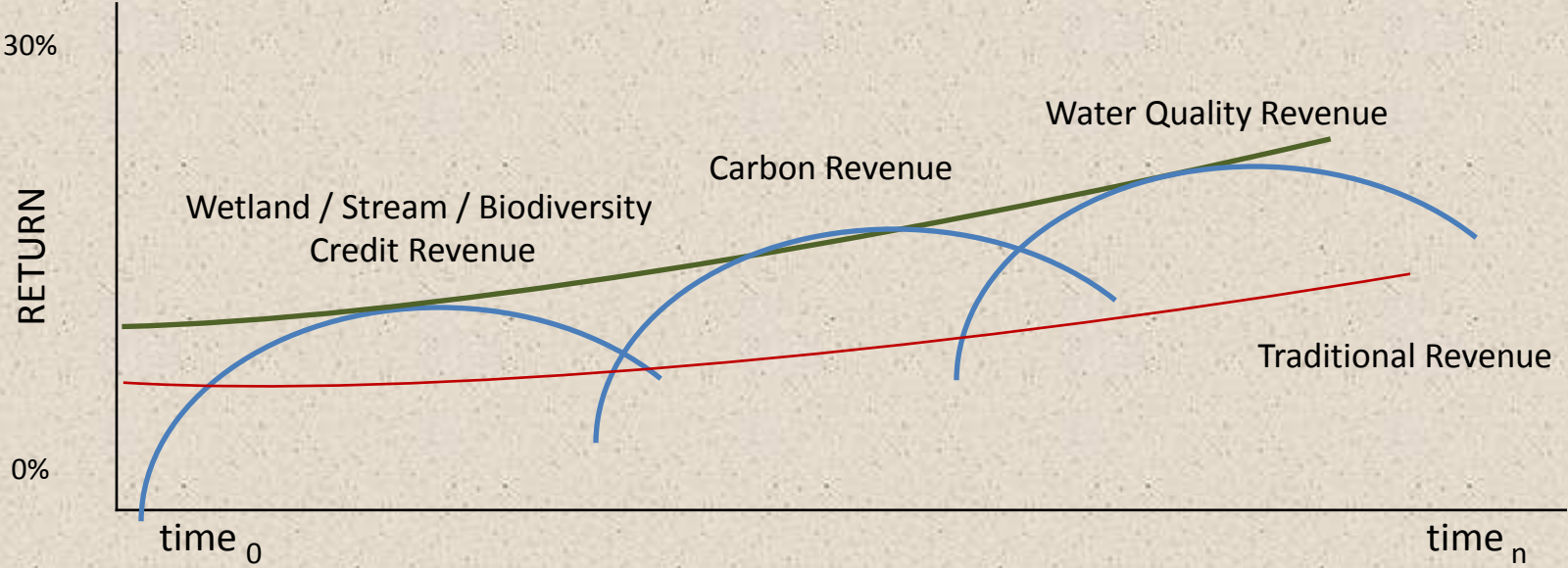
Biodiversity - Compliance - Endangered Species Act

Carbon Sequestration - In between Voluntary and Compliance



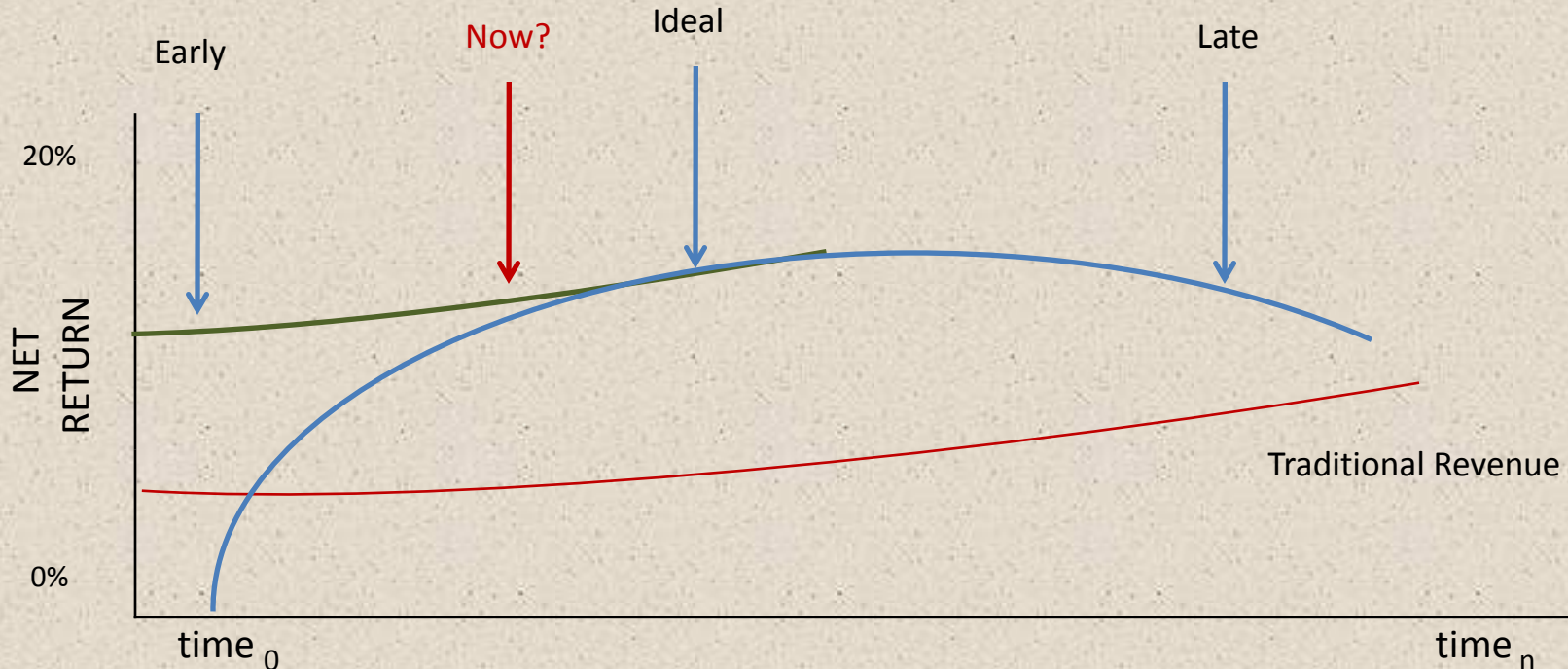


# Ecosystem Market Development



# Ecosystem Market Development

Wetland / Stream / Biodiversity  
Credit Revenue

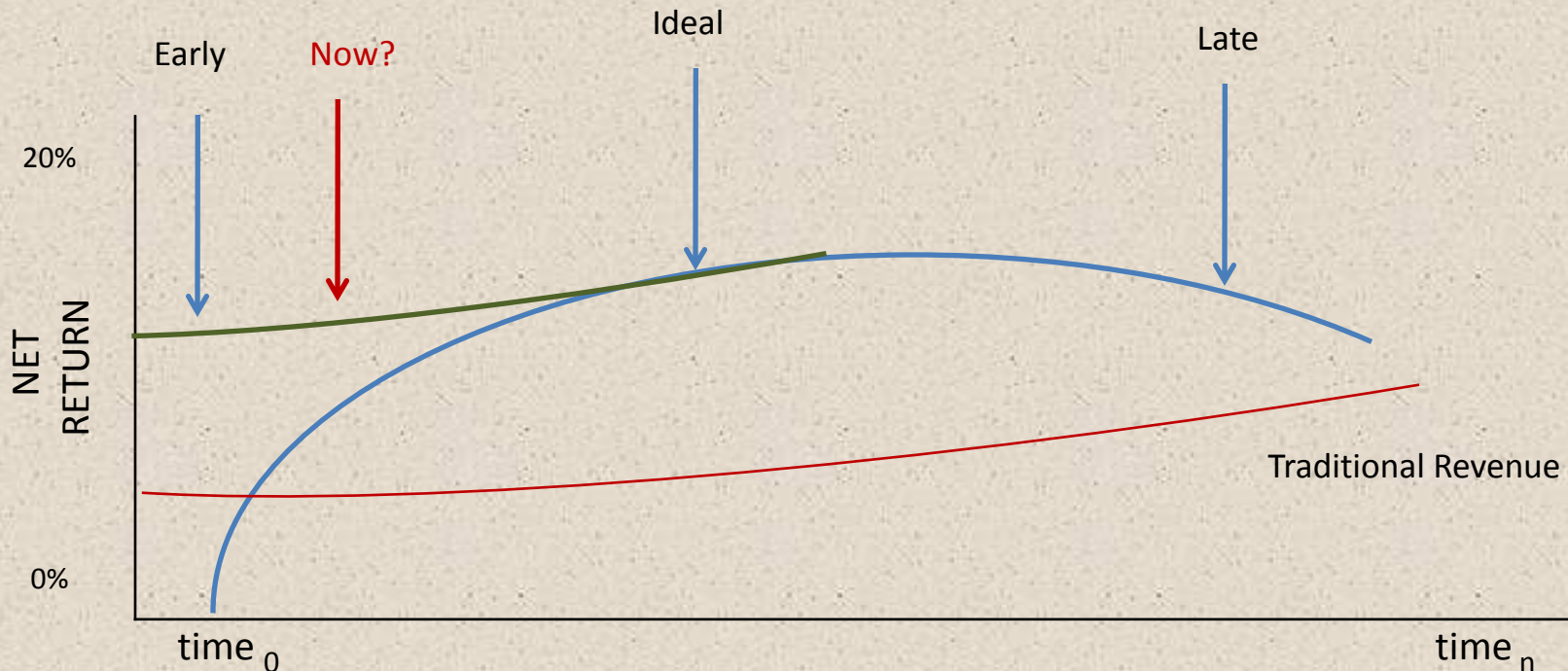


- (+) Mitigation Banking – Regulated on both supply and demand side of transactions
- (+) Transfer of liability occurs with the purchase / sale of credits – delivery risk is on supplier
- (-) Market is still opaque (not transparent in terms of volume and pricing)
- (-) Transactions are bilateral – between specific buyer and seller – no secondary market



# Ecosystem Market Development

## Carbon Revenue



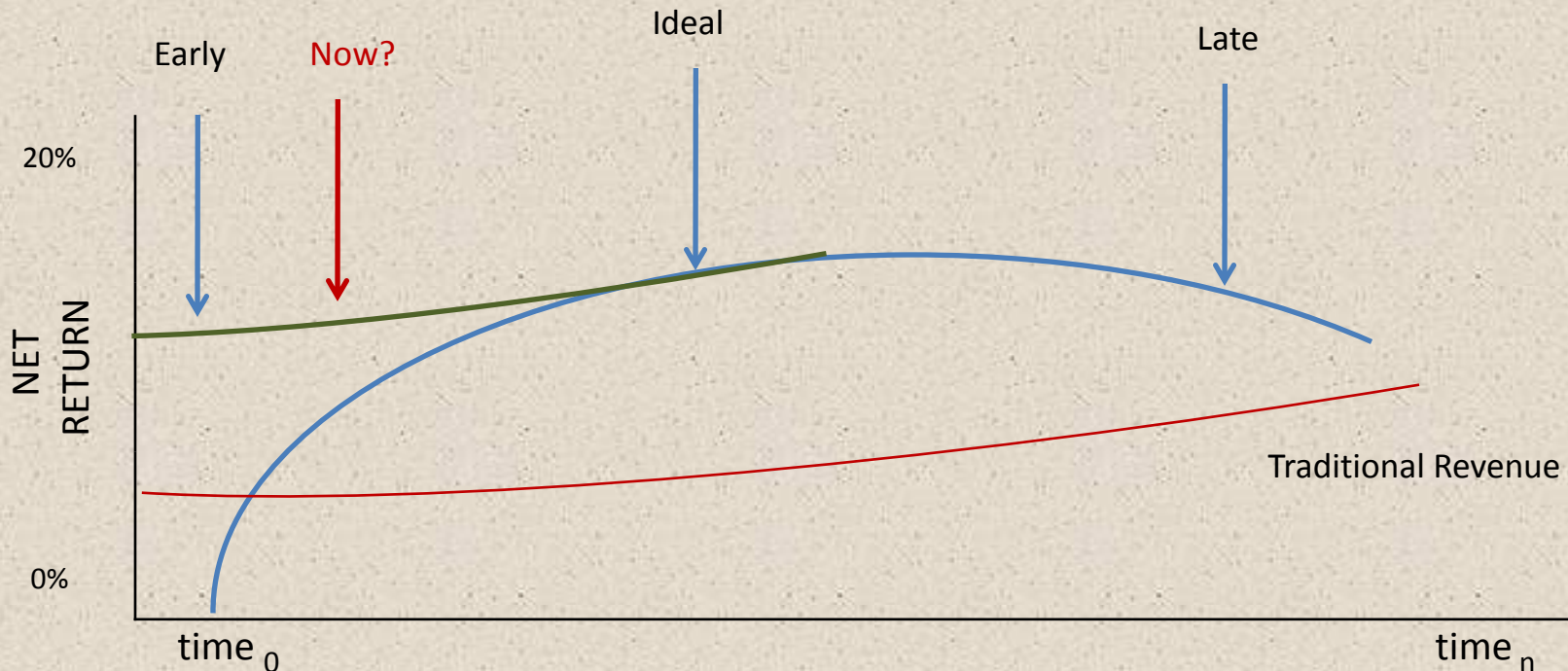
- (-,+) Carbon offsets – Voluntary with an anticipated compliance market in the near future
- (-) Transfer of liability does not occur with sale of credits – delivery risk is on buyer
- (-) Market is still opaque (not transparent in terms of volume and pricing)
- (+) Standards are developing and aggregators are emerging, secondary market emerging





# Ecosystem Market Development

## Water Quality Trading



- (-,+) Nitrogen Phosphorus – Pilot markets with anticipated compliance market in the future
- (-) Transfer of liability does not occur with sale of credits – delivery risk is on buyer
- (+) Pilot markets are transparent, restricted in size and scope
- (+) Standards are developing and aggregators are emerging, secondary market emerging



# New Markets – Transition Strategy

Which credit markets suit your land and objectives

Stream and Wetlands Mitigation

Water Quantity Trading

Carbon Sequestration

Water Quality Trading

Biodiversity – Threatened and Endangered Species Banking

Determine balanced management objectives

Identify and evaluate trade-offs

Credit revenue generation can sub-optimize other revenues

Credit generation can be mutually exclusive of other uses

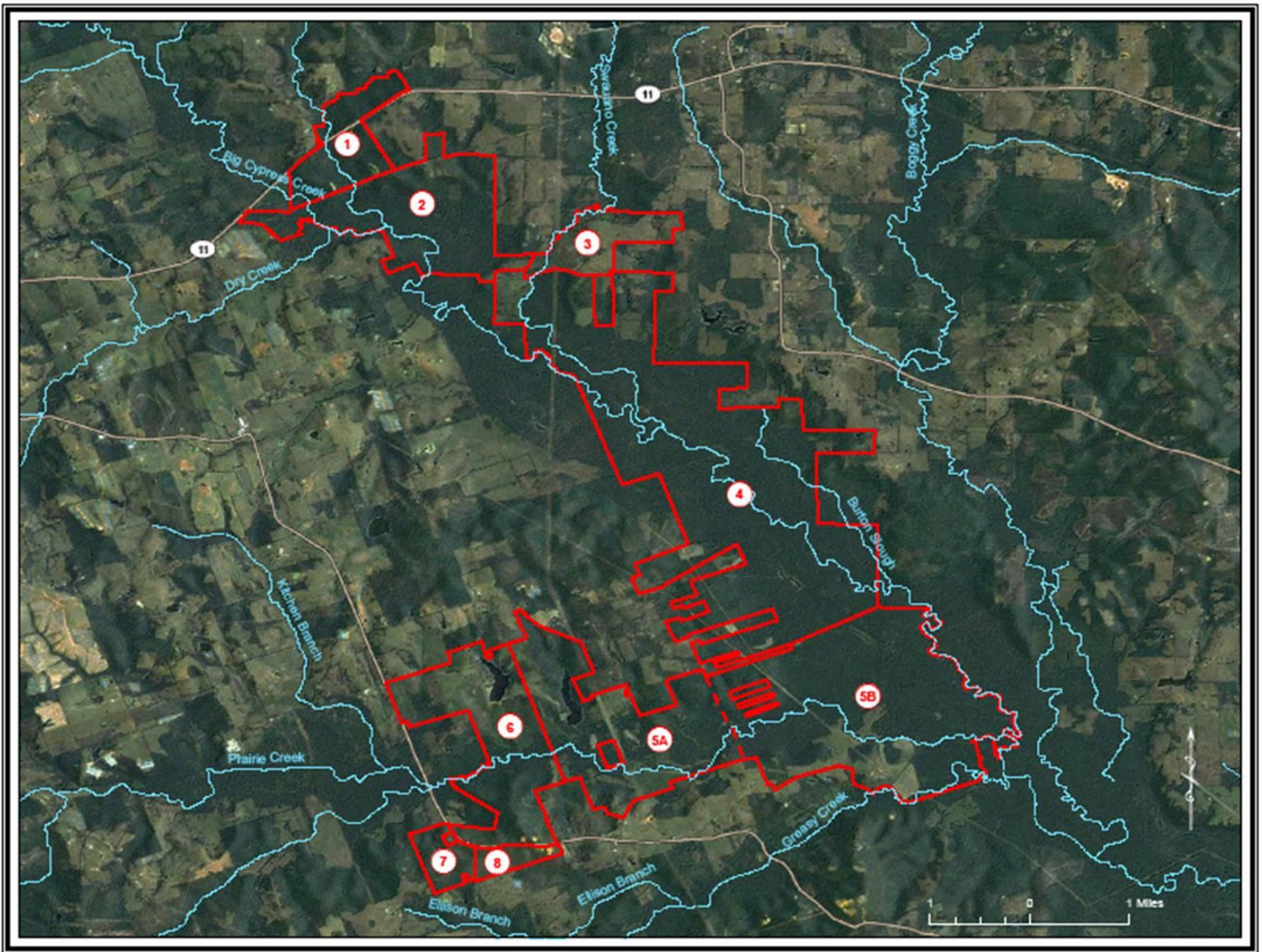
Create a comprehensive picture of the stewardship plan



# Value Creation Strategy





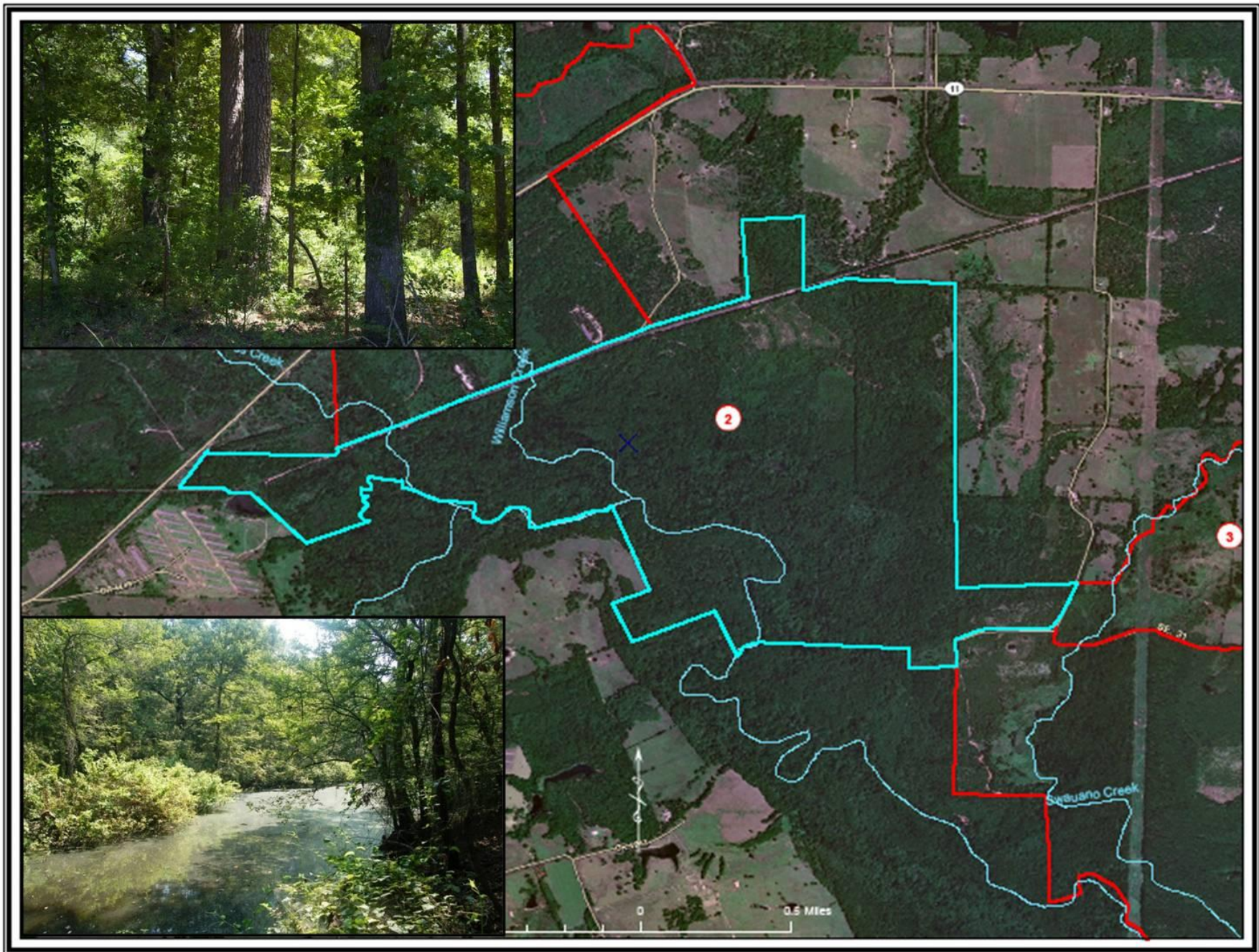


# Pro Forma Assumptions

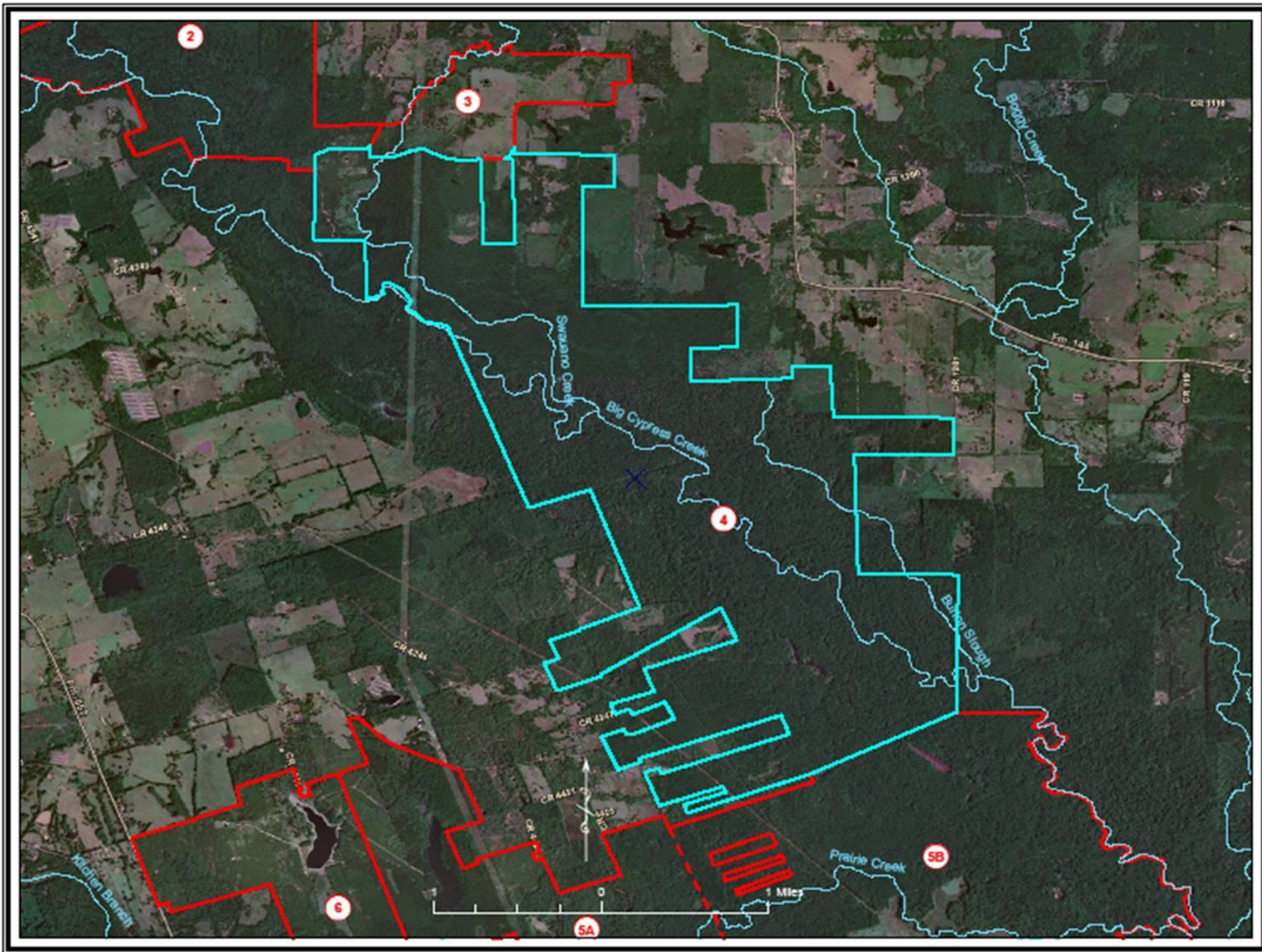
Easement Sales	Mitigation	Recreation	Timber	Limited Development	Carbon
<ul style="list-style-type: none"> <li>•4,000 acres</li> <li>•Appraised value/acre: \$500</li> <li>•Tax Basis Reduction: 20%</li> <li>•Transaction costs: \$35,000 per sale</li> </ul>	<ul style="list-style-type: none"> <li>•Project IRR: 43%</li> <li>•Deal Size: 2,000 acres</li> <li>•<u>Investment</u>: \$1,510,000</li> <li>•<u>Ongoing Costs</u>:               <ul style="list-style-type: none"> <li>•Bank Maintenance: 10%</li> <li>•Monitoring/ac: \$1.50</li> <li>•Endowment: 3%</li> </ul> </li> <li>•<u>Revenue Sources</u>:               <ul style="list-style-type: none"> <li>•Stream Credits: 50,000 @ \$80/credit</li> <li>•Wetland Credits: 1,875 @ \$12,000/credit</li> <li>•Brokerage Fees: 6%</li> <li>•Uniform credit release</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>•Hunting Lease rate/acre: \$10.00</li> <li>•Insurance costs/acre: \$1.50</li> <li>•\$550-600K NPV</li> </ul>	<ul style="list-style-type: none"> <li>•Current Value: \$6,776,025               <ul style="list-style-type: none"> <li>•42% HS</li> <li>•32% PS</li> <li>•14% HW</li> <li>•7% CN</li> <li>•6% PW</li> </ul> </li> <li>•12% harvested per year (value)</li> <li>•8% biological growth</li> <li>•3% price inflation</li> <li>•NPV standing timber at Year 10: \$2.7 million</li> <li>•NPV Harvested Timber \$8-8.5 million</li> </ul>	<ul style="list-style-type: none"> <li>•Residential Sale (Year 2): 50 acres @ \$15,000/acre</li> <li>•Ranchette Sale (Year 2): 500 acres @ \$4,250/acre</li> <li>•Recreational Sale (Year 8): 1,500 acres @ \$2,500/acre</li> <li>•Costs/sale: \$30,000</li> <li>•Brokerage Fees: 3%</li> </ul>	<ul style="list-style-type: none"> <li>•TBD pending further due diligence</li> </ul>







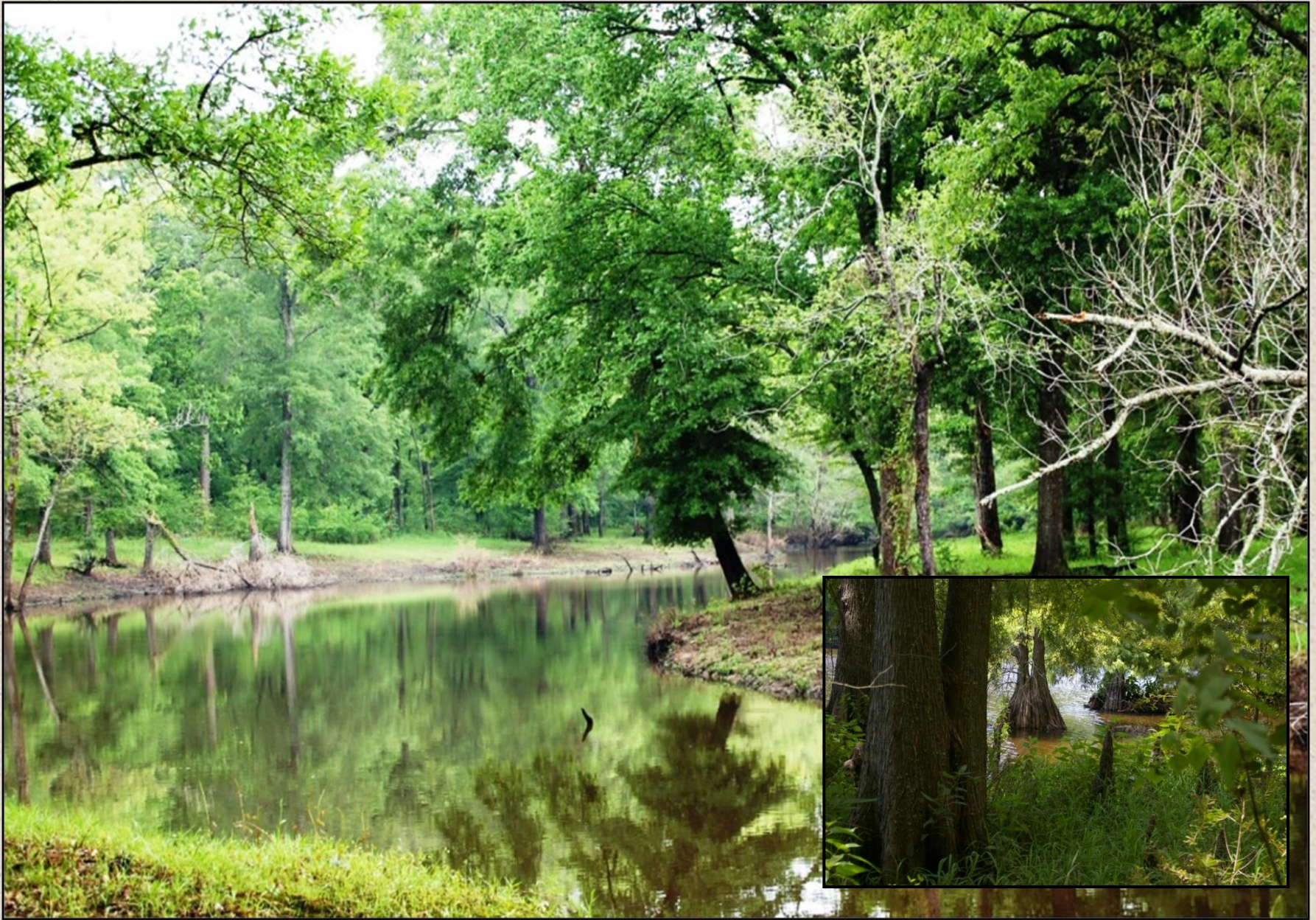




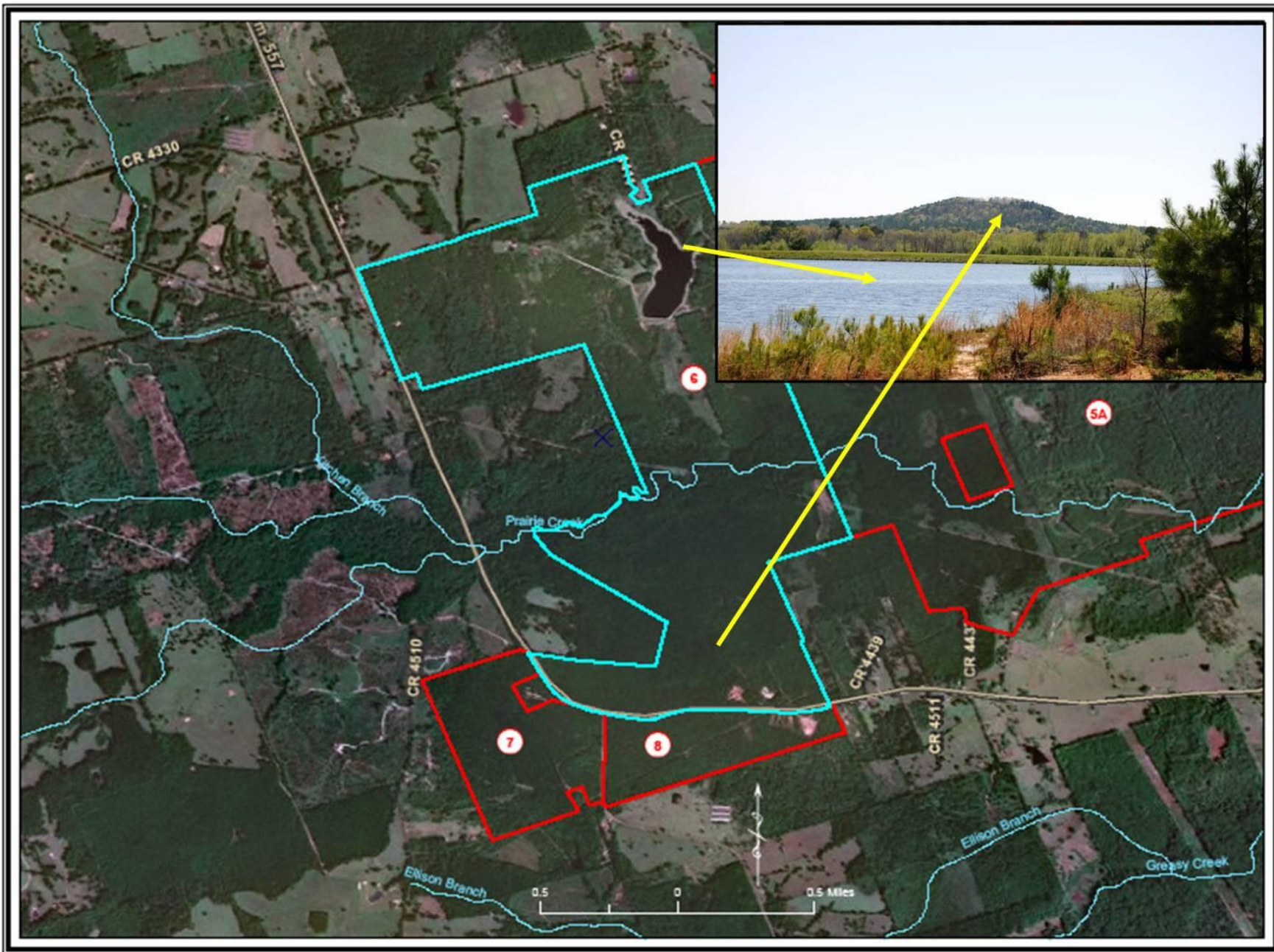














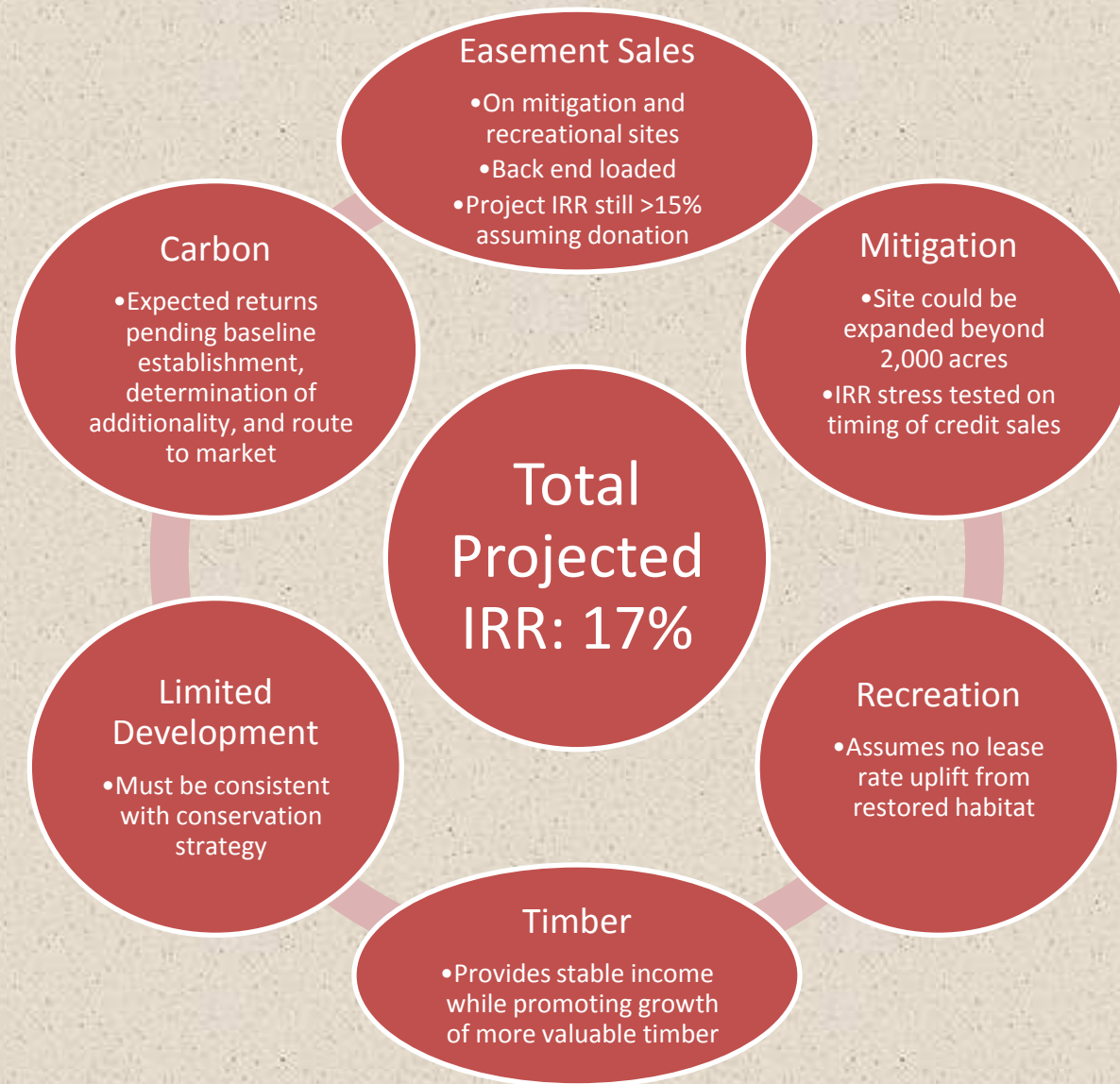








# Example - Return Profile



# Disciplined Land Stewardship

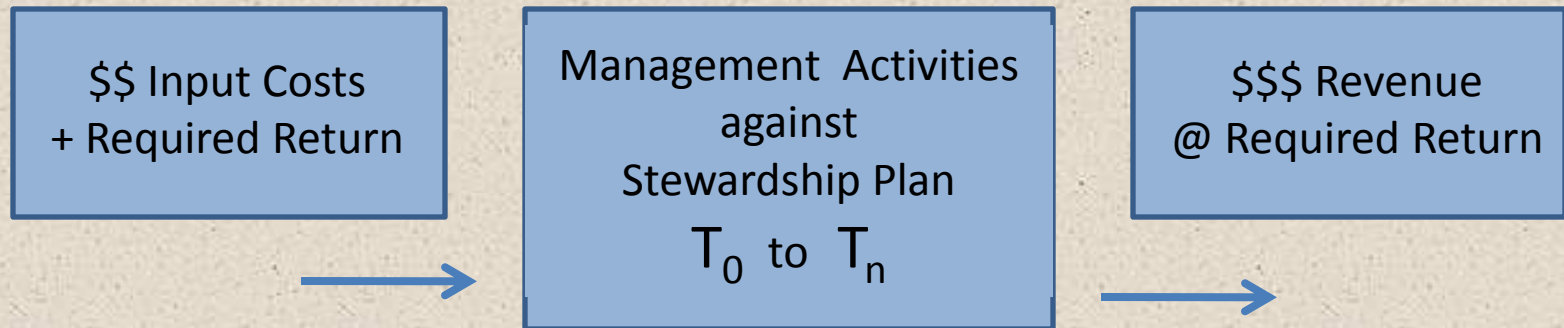
- Biophysical modeling
  - Growth and Yield for fiber / carbon production  
FVS, FORMOP, other variants
  - Hydrogeomorphic modeling  
USCOE HGM models for wetlands functional assessment
  - Land use modeling – landscape level TMDL modeling  
EPRI – WARMF, WRI – Nutrient Net, EPA SWAT
- Financial Modeling
  - Cash flow tables for timber production
  - Pro forma development to optimize stewardship plan





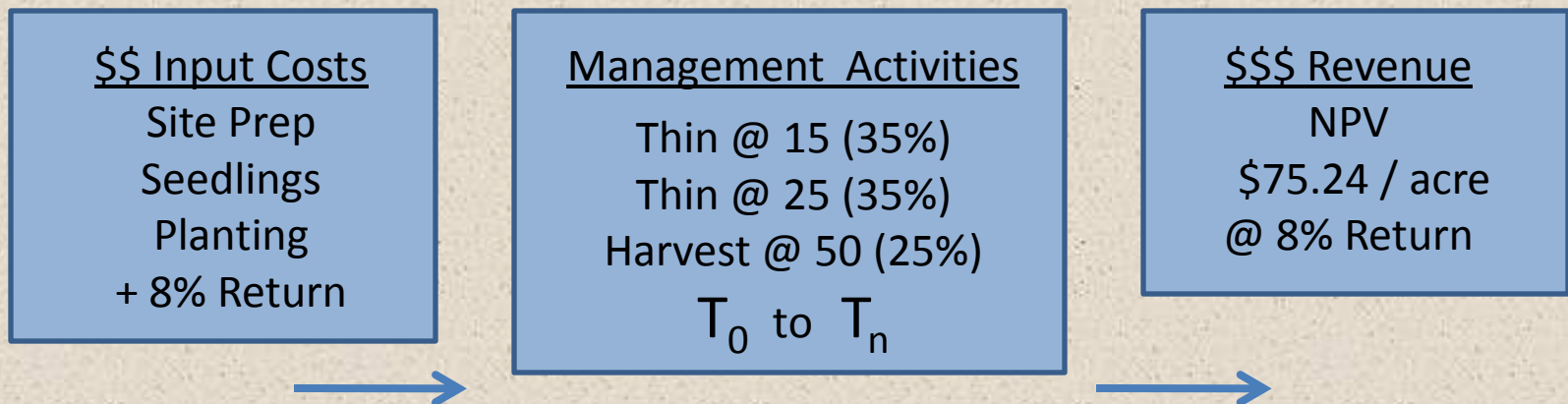
# Approach to Valuation - General

- Inputs
- Management Activities
- Outputs



# Approach to Valuation - Forestry

- Input \$\$: site prep, herbaceous control, seedlings, and planting costs
- Management: two thinning from below, harvest at 50
- Output \$\$\$: Volume \* Stumpage price = Return





# Approach to Valuation - Forestry

Table 21. Cash Flow Analysis – Bare Ground – Expected Final Harvest Value \$1,535 / acre.

COSTS	YEAR	0	5	10	15	20	25	30	35	40	50	
<b>Site Preparation</b>												
Mowing		34.50	-	-	-							
Subsoil Plowing		34.50	-	-	-							
Herbicide Application		110.00	-	-	-							
<b>Establishment</b>												
Seedlings - Bare Root		127.00	-	-	-							
Planting		50.00	-	-	-							
Survival Survey		-	29.43	-	-							
Timber Stand Improvement		-	-	-	-	-	-	-	-	-	-	
Management Fee		4.63	3.81	3.14	2.58	2.12	1.75	1.44	1.18	0.97	1.20	
Property Taxes		13.90	11.43	9.41	7.74	6.37	5.24	4.31	3.55	2.92	3.61	
		374.53	44.67	12.55	10.32	8.49	6.99	5.75	4.73	3.89	4.81	
<b>REVENUES</b>												
Timber: Hardwood Sawtimber		-	-	-	-	-	229.28	-	-	-	266.78	
Hardwood Pulp		-	-	-	-	-	55.92	-	-	-	-	
		-	-	-	-	-	285.20	-	-	-	266.78	
<b>NPV</b>		<b>75.24</b>	(374.53)	(44.67)	(12.55)	(10.32)	(8.49)	278.21	(5.75)	(4.73)	(3.89)	261.98

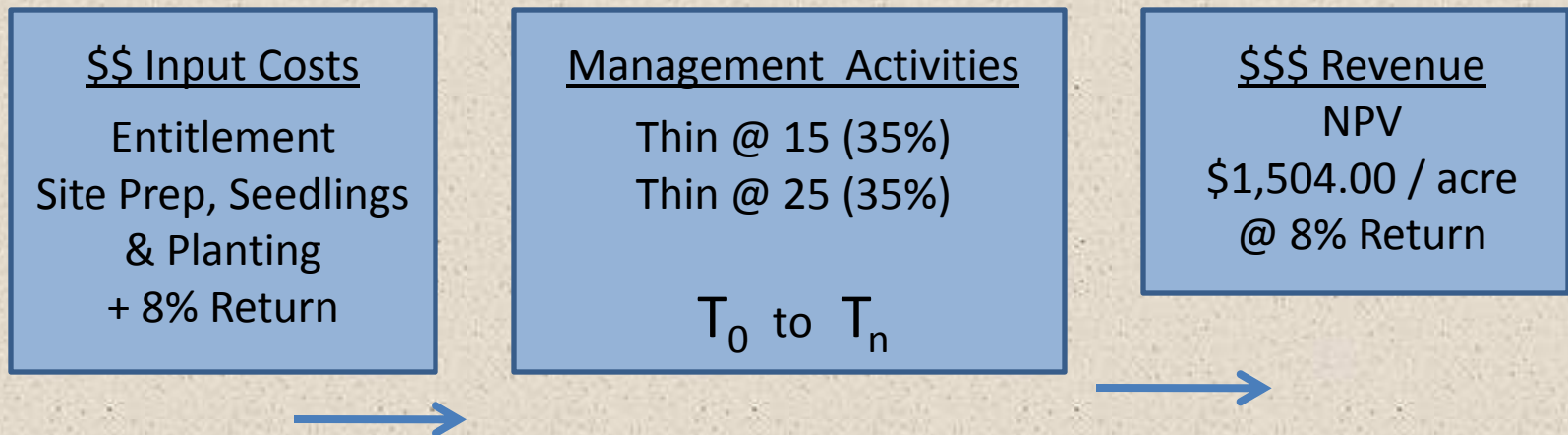
<b>Assumptions:</b>	
8.00%	ARR
3.87%	inflation
0.43%	labor
0.40%	real price HW Saw
1.20%	real price HW Pulp
435	1/0 bare root seedlings / acre

This cash table represents the NPV of BHW management starting with 'bare ground'.



# Approach to Valuation - Wetlands

- Input \$\$: site prep, herbaceous control, seedlings, and planting costs
- Management: two thinning from below
- Output \$\$\$:  $\text{Volume} * \text{Function Price} = \text{Return}$





# Approach to Valuation - Wetlands

Table 7. Restoration Cost Breakeven Analysis at 8% Return.

<b>COSTS</b>	<b>YEAR</b>	0	5	10	15	20	25	30	35	40	50
Restoration Land		450.00									
Legal - Conservation Easement		20.00									
Mitigation Banking Instrument		65.00									
Jurisdictional Determination		15.00									
Survey		12.00									
<u>Site Preparation</u>											
Mowing		34.50	-	-	-						
Subsoil Plowing		34.50	-	-	-						
Herbicide Application		110.00	-	-	-						
<u>Establishment</u>											
Seedlings - Bare Root		127.00	-	-	-						
Planting		50.00	-	-	-						
Survival Survey		-	21.02	-	-						
Timber Stand Improvement		-	-	-	29.71						
Management Fee		23.16	19.06	15.68	12.90	10.62	8.74	7.19	5.92	4.87	3.30
Property Taxes		13.90	11.43	9.41	7.74	6.37	5.24	4.31	3.55	5.32	1.98
		955.06	51.51	25.09	50.36	16.99	13.98	11.50	9.47	10.19	5.27
<b>REVENUES</b>											
Mitigation Credit Sales		376.00	309.40	254.60	209.50	-	-	-	-	-	-
Timber: Hardwood Sawtimber		-	-	-	-	-	-	-	-	-	0.00
Hardwood Pulp		-	-	-	-	-	-	-	-	-	0.00
		376.00	309.40	254.60	209.50	-	-	-	-	-	0.00
<b>Breakeven</b>	<b>\$ 1,504.00 / acre</b>	(579.1)	257.89	229.51	159.14	(16.99)	(13.98)	(11.50)	(9.47)	(10.19)	(5.27)
NPV	\$ 0										
HGM Credit	\$ 3,008										

Assumptions:

- 8.00% ARR
- 3.87% inflation
- 0.43% labor
- 0.40% real price Saw
- 1.20% real price Pulp
- 1,000 acres
- 435 1/0 bare root seedlings / acre
- 0.50 HGM Credit / Acre



# Forestry Service Skills & Expertise

## State and Private Forest - stewardship planning

- Expand the notion of forestry / land use outputs – good and services

- Provide landowners with the tools necessary to optimize their land using forestry skills

- Participate in the entitlement process to include forestry principles

## Land management support community

- Inform policy with guidance leading to results on the ground

- Provide tools that are necessary to support market transactions

- Provide outreach and tools necessary for private landowners to evaluate their options with ecosystem services markets

- Learn – Do – Teach Support active pilots projects that demonstrate effective management regimes and routes to market





# New Markets – landowner perspective

The question may be not whether but when.

Develop a clear definition of management objectives

Recognize that these markets are developing and in flux

Identify opportunities that are consistent with overall plans  
and understand the tradeoffs involved...

for instance - conservation easements that preclude  
other land use,

loss of timber revenue due to longer rotation or  
exclusion of timber production, etc.

Pick your optimal point of entry, with realistic expectations.



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