



# Sustainable Harvest Calculation

**A report to the Board of Natural Resources**

*presented by*

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# Choice Assumptions

- Marbled Murrelet
- Arrearage
- Riparian Harvest Level
- Discount Rate
- Uncertainty
- Management Costs



# Marbled Murrelet

A

620,000  
acres

B

593,000  
acres

C

636,000  
acres

D

634,000  
acres

E

640,000  
acres

F

734,000  
acres



# Arrearage

702 mmbf  
from SHUs  
in arrears

5 years

462 mmbf  
from SHUs  
in arrears

10 years

462 mmbf  
from SHUs  
in arrears

1 year

Harvest is  
included in  
decadal  
harvest level



# Riparian Harvest Level

1%

of upland  
harvest

10%

of available,  
non-  
deferred  
riparian land  
base



# Discount Rate

## Board Policy

“the department will analyze the financial characteristics of forest stands in order to optimize the economic value of forest stands and timber production over time, in calculating the sustainable harvest level,…” (PSF 2006, page 29)

- Return to Capital

DNR makes investments in forest management and expects a return on this investment.

- Time Value of Money

Is a dollar tomorrow the same as a dollar today?



# Discount Rate

## Discount Rate – 3 components

**Pure Rate** – expressed as the most “risk-free” cost of using money  
*e.g., long-term real cost of federal borrowing*

**Expected Inflation Rate** – using published expectations or historic long-term averages

**Risk Rate** – represent the risk of likely success or failure of the investment





# Discount Rate

## At the DNR

**Pure Rate** – 4%

*10-year Treasury Constant Maturity Rate 20-year average*

**Expected Inflation Rate** – 2%

*20-year Average*

**Risk Rate** – 1%

*Little anticipated chance of failure*

**DNR Discount Rate:**

$$(1.04)(1.02)(1.01) = 7\%$$

**DNR “Real” Discount Rate:**

$$(1.04)(1.01) = 5\%$$

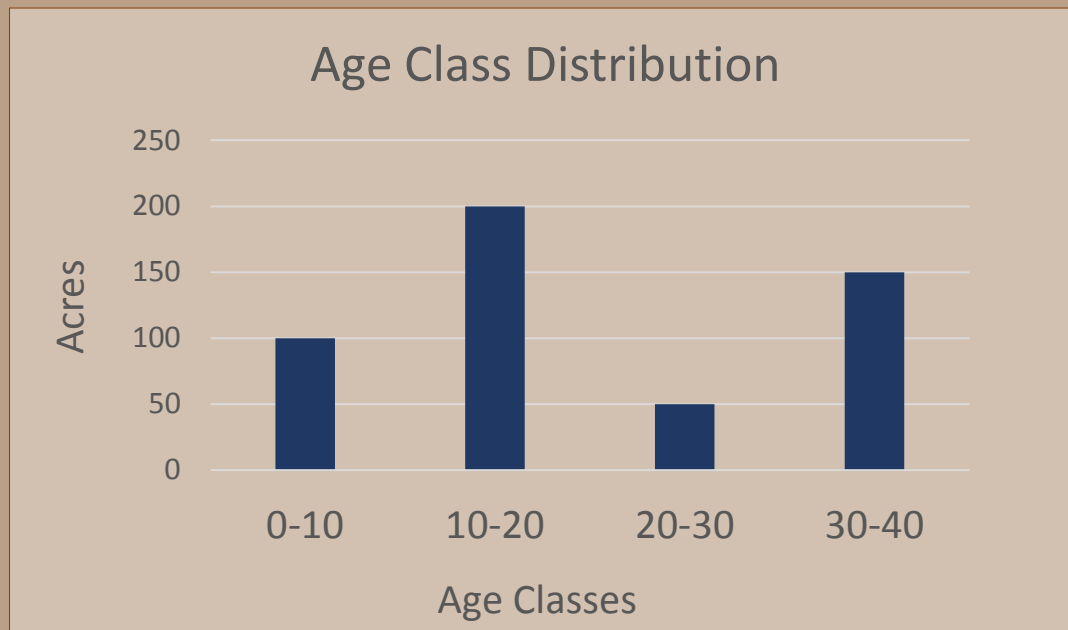


# Discount Rate

## Simplified Example:

Objective: Maximizing Net Present Value

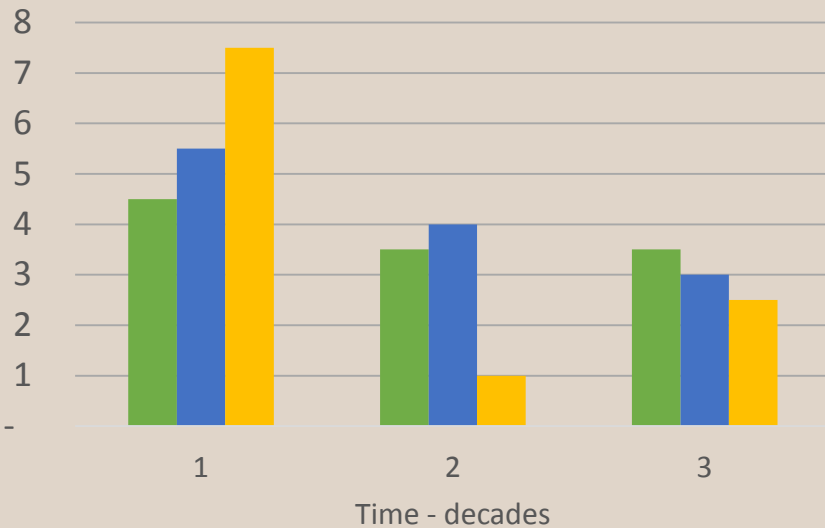
- 400 acre forest
- Discount Rate: 1%, 5%, 10%



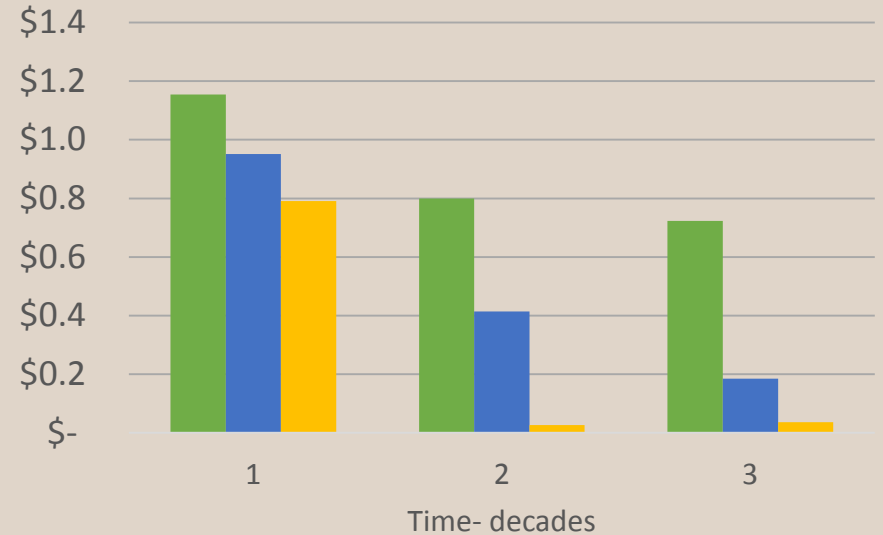
# Discount Rate

Simplified Example:

Harvest Volume



Net Present Value



■ 1%   ■ 5%   ■ 10%

## Trends:

- Higher discount rate = lower future value
- More harvest in the near term



# Uncertainty

The full location and extent of factors that may impact the ability to harvest is not known.

## Examples include:

- *Imperfect Data*
- *Unstable Slopes*
- *Public Reaction*
- *Special Ecological Features*
- *Visual Impacts*
- *Cultural Resources*
- *Catastrophic Loss*
- *Lack of Legal Access*
- *Equipment Limitations*
- *Excessive Road Costs*



# Uncertainty

Timber Sale Examples:

## North Zender

Northwest Region

100 acres

1,949 MBF



# Uncertainty

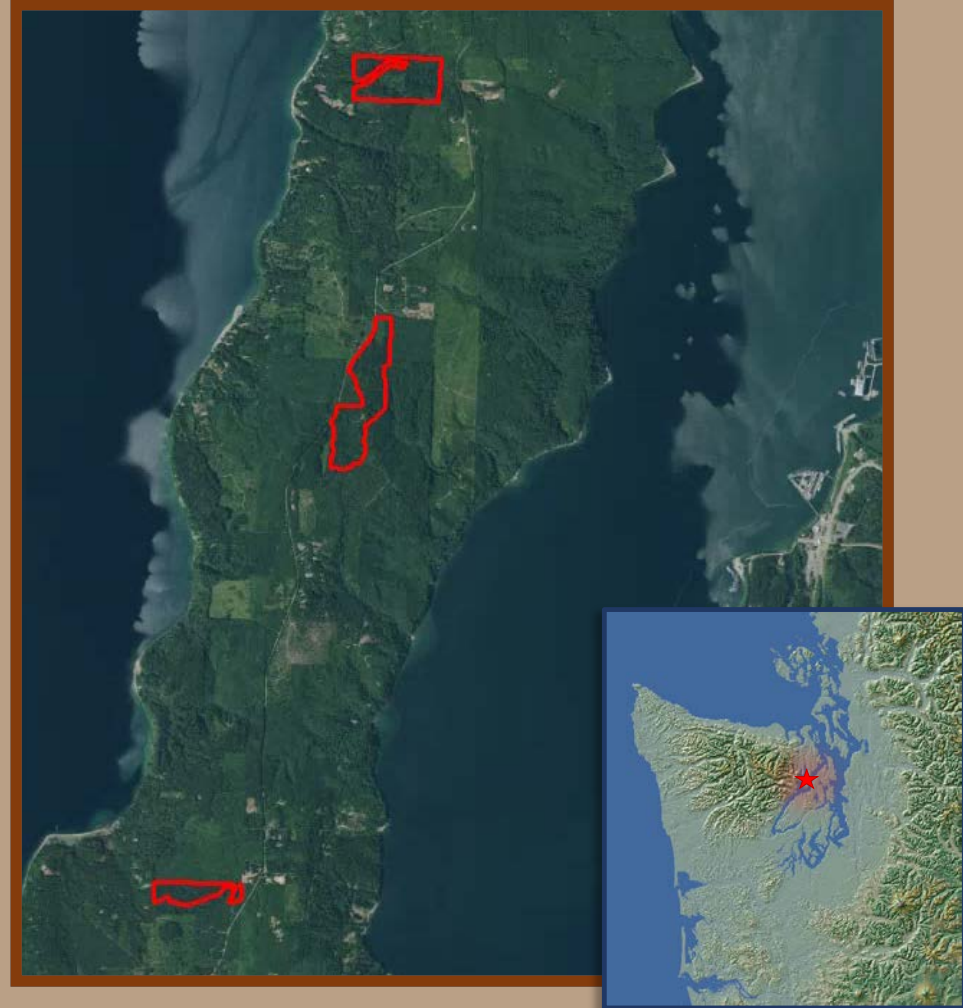
## Timber Sale Examples:

### Bangor

Olympic Region

57 acres deferred/  
113 acres sold

~2,000 MBF deferred/  
3,829 MBF sold



# Uncertainty

## Timber Sale Examples:

### Singletary

Northwest Region

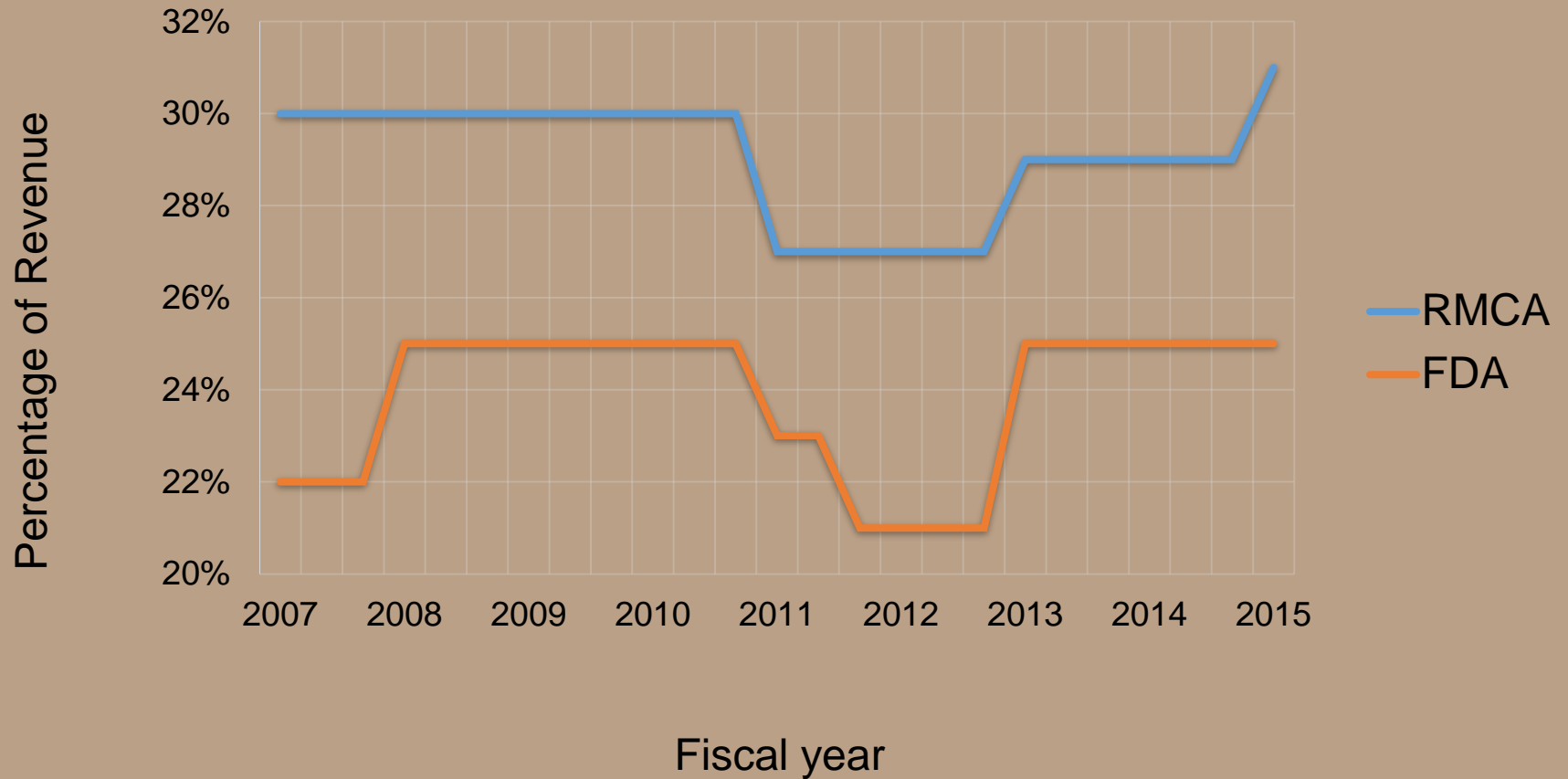
187 acres

6,898 MBF



# Management Costs

## Management Fees By Fund

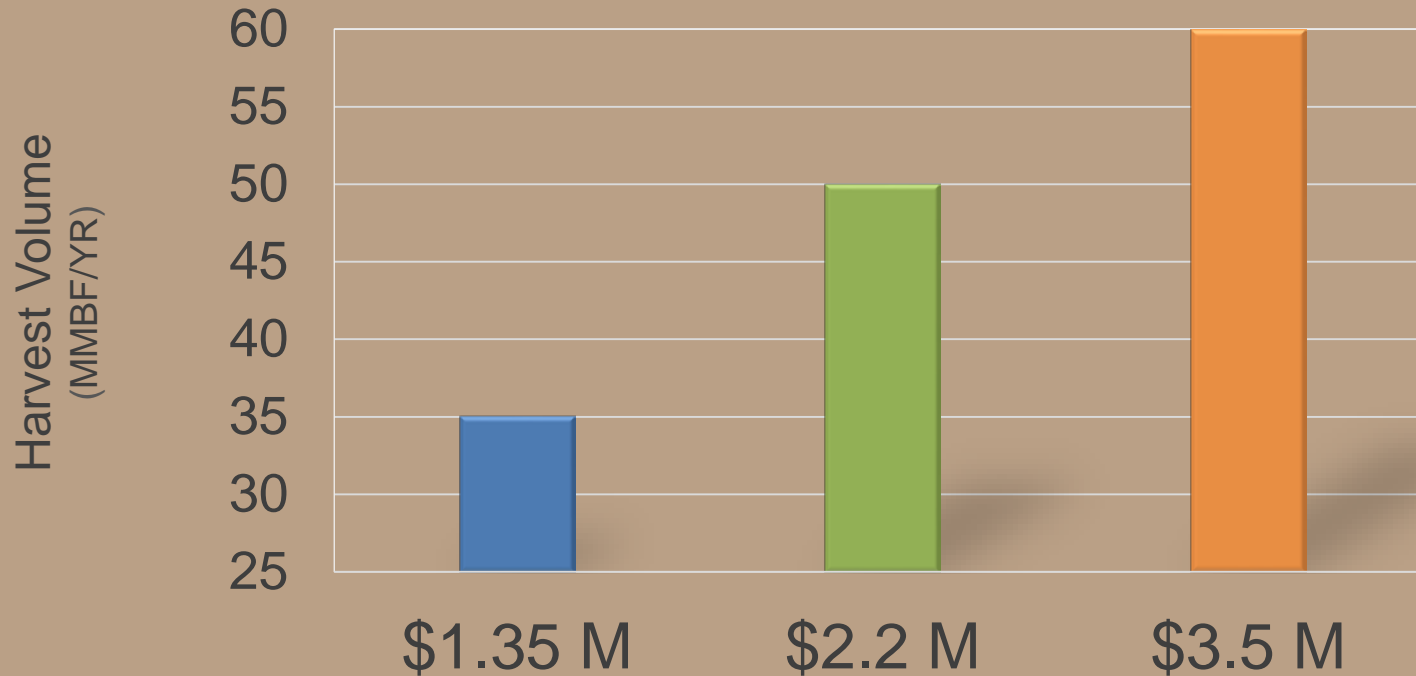




# Management Costs

## OESF Example

Decade 1 harvest under different annual budget scenarios



# Management Costs

- 1<sup>st</sup> decade expenditures must not exceed  
\$48,000,000/year
- FDA/RMCA balances must remain positive at end  
of each decade
- Management fees: FDA: 25%, RMCA: 31%



