

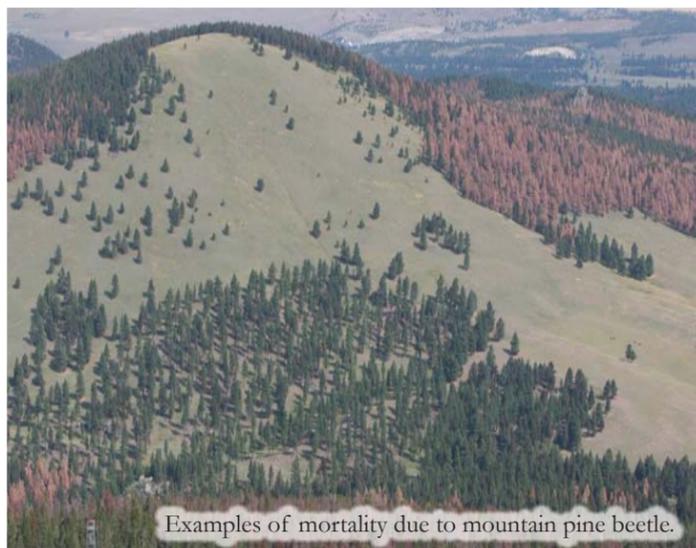


Executive Summary - 2015 Sustainable Yield Calculation

The SYC provides a predictable supply of timber to Montana's wood products industry. DNRC manages <5% of the state's timberland, but annually contributes 15-20% of the statewide harvest volume.

is reflected in the results of the calculation. DNRC collected and relied heavily on data from its own lands for a large part of this calculation, rather than data from other sources as was done in past calculations. This new data reflects influences of past management (or lack thereof) on DNRC lands thus providing a more accurate estimation of existing inventory and potential growth on forested state trust lands.

DNRC used the FVS growth and yield model for this calculation, which is a nationwide model widely-used by several federal, state, and private forest managers. This model includes variants that were developed specifically for Montana forests. DNRC's data was also used to further calibrate the model to the conditions and expected growth rates observed on forested state trust lands. This resulted in more accurate predictions of forest growth compared to previous calculations.



Examples of mortality due to mountain pine beetle.

Over 105,000 acres of state trust lands were substantially affected by damaging events including wildfires and insect outbreaks since 2004 that were not accounted for in the 2011 calculation. These influences were particularly prevalent on lands administered by

the Southwestern Land Office, Central Land Office, and on land offices in eastern Montana. This caused significant mortality that reduced the amount of standing volume in some forest types (ponderosa pine, lodgepole pine, Douglas-fir) that represent large acreages in those areas. The reduction in inventory due to those factors largely offset the additional 4.6 MMBF of volume contributed by the acquired lands to the annual sustainable yield.

Qualifications and Recommendations

The primary objective of this project was to determine at a strategic level the amount of timber that the DNRC can sustainably harvest from forested trust lands; however, it was not intended to determine management direction for individual stands. A range of harvest treatment types used by DNRC were simulated and available for use by the model, and although the model is not deterministic with regards to management of individual stands, the types of management used by the model should be reflected in on-the-ground management.

For further information on the 2015 Sustainable Yield Calculation and FAQs, please visit:

<http://dnrc.mt.gov/divisions/trust/forest-management/sustainable-yield-calculation/public-participation>

or

<http://1.usa.gov/1PBfPJO>

This document highlights the purpose and need, design, methods, results and discussion of the Montana Department of Natural Resources & Conservation (DNRC) 2015 Sustainable Yield Calculation (SYC). It also reflects key factors affecting the results of the SYC.

Purpose and need for the Sustainable Yield Calculation

The Trust Land Management Division of the Montana DNRC manages ~730,000 commercial forest acres (FIGURE 1) for the benefit of the Common Schools and other endowed institutions. Management activities on those lands focus on providing a consistent and long-term revenue source for the trust beneficiaries, which is generated by selling a consistent annual timber volume. The amount of timber sold annually is determined through a sustainable yield calculation.

State law requires the DNRC to calculate the annual sustainable yield at least once every 10 years in order to incorporate changes in forest conditions, the manageable land base, management intensity, management objectives, or new laws and regulations.

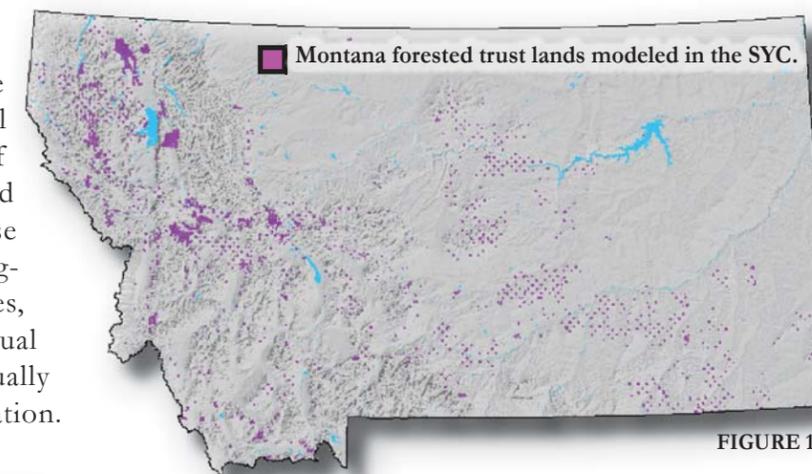


FIGURE 1

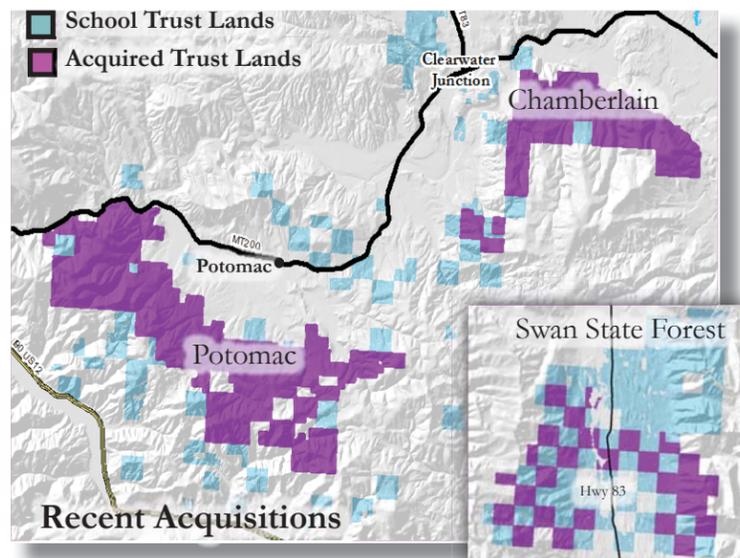
MCA 77-5-221 defines **sustainable yield** as “the quantity of timber that can be harvested from forested state lands each year in accordance with all applicable state and federal laws, including but not limited to the laws pertaining to wildlife, recreation, and maintenance of watersheds, and in compliance with water quality standards that protect fisheries and aquatic life and that are adopted under the provisions of Title 75, chapter 5, taking into account the ability of state forests to generate replacement tree growth.”

DNRC has performed four sustainable yield calculations prior to 2015. The last calculation was done in 2011 in conjunction with the DNRC's development of a Habitat Conservation Plan (HCP), and set a sustainable harvest level of 57.6 million board feet (MMBF) annually.

Since the last calculation in 2011, DNRC has acquired ±67,000 acres of former industry-owned timber land (FIGURE 2). That acquisition was the catalyst for a bill (SB 154) in the 2013 Montana legislative session requiring the DNRC to conduct a new calculation beginning on July 1, 2013. State law requires an

DNRC SUSTAINABLE YIELD CALCULATIONS		
YEARS	CALCULATION (MMBF)	MANAGED ACRES
1983	50.0	399,700
1996	42.2	363,769
2004	53.2	430,784
2011	57.6	469,159
2015	57.8	582,945





independent third party conduct the calculation, and the DNRC contracted with Mason, Bruce & Girard in 2014 to perform the calculation.

How is the calculation done?

The process of determining the annual SYC involves three steps:

1. Gathering, preparing, and summarizing data to provide a detailed description of the land base
2. Developing estimates of expected forest growth
3. Applying management constraints using an optimization model in order to determine the annual sustainable yield.

Methods

The data used for the calculation includes descriptions of the different types of forests growing on trust lands, wildlife habitat and water resource data, operability data, and spatial data.

The forest data used for the calculation came from two sources. The first source includes plot data collected by the DNRC in 2014 from over 5,300 plots on trust lands in the Northwestern, Southwestern, and Central Land Offices and was used to develop descriptions of forests in those areas. The second source is derived from U.S. Forest Service Forest Inventory and Analysis data and was used to develop descriptions of forests in DNRC's east-side Land Offices. All of the forest data was summarized by timber type, size, and stocking for each Land Office.

Wildlife habitat data used in the calculation included information regarding habitat for the following animals: grizzly bear (visual screening buffers and security core areas), Canada lynx (lynx management areas,

potential suitable habitat), and bald eagle (nest sites). Water resource data included the locations of sensitive watersheds and streamside management zones (SMZ) and riparian management zones (RMZ).

Operability data included stands identified as deferred from management, areas suitable only for harvesting using helicopters, areas managed under conservation agreements or easements, and Federal wild and scenic river corridors.

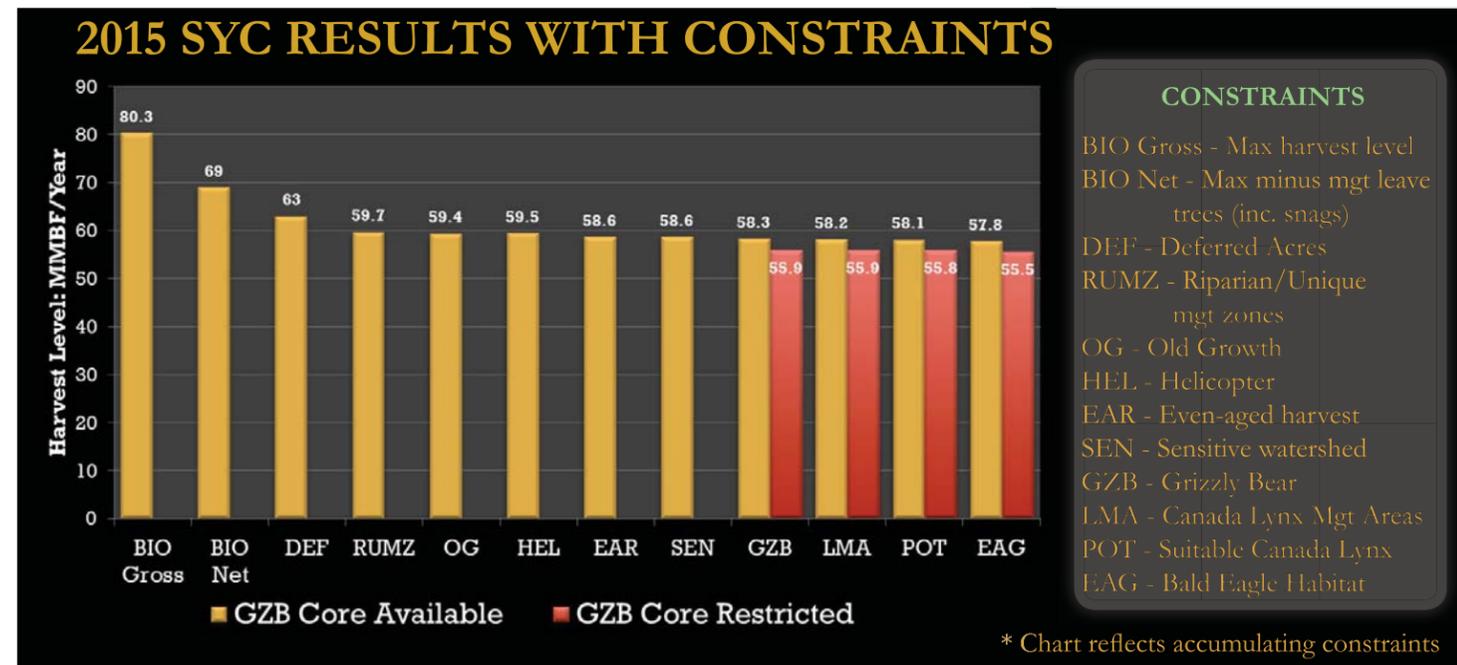
The Forest Vegetation Simulator (FVS) growth and yield model was used to determine estimates of expected forest growth. This model has two variants that apply to forests in Montana; the Inland Empire variant was used for the Northwestern and Southwestern Land Offices, and the Eastern Montana variant was used for the Central and east-side Land Offices. To differentiate among the various ranges of site potential for a given timber type, DNRC supplied information regarding potential growth, habitat types, and site index for use by FVS. To ensure the estimated forest growth and yield projected by FVS was reasonable, simulations that did not include any management activities were modeled. DNRC reviewed those results and adjustments were made to calibrate the model as needed.

Following calibration of the FVS model, simulations were made of DNRC's types of management actions implemented on forested trust lands. These simulations determined the expected growth associated with management activities over time and the harvest volumes associated with those activities for use in the optimization model.

An optimization model was used to apply the management constraints and determine the annual sustainable yield. Constraints are limitations placed on the model that restrict when, where, which, and how often harvesting treatments may be applied. The constraints were determined by laws, administrative rules, and management plans applicable to DNRC's forest management. These included constraints related to operability, harvest and silviculture, wildlife habitat, and water resources.

Results of the 2015 SYC

For this calculation, three scenarios were evaluated at the statewide level. Two scenarios were evaluated to address current uncertainty regarding management of grizzly bear security core in the Stillwater Unit, and the third scenario aimed to identify the impact of the acquired lands on the annual sustainable yield. Each scenario evaluated a planning horizon of 200 years.



- #### CONSTRAINTS
- BIO Gross - Max harvest level
 - BIO Net - Max minus mgt leave trees (inc. snags)
 - DEF - Deferred Acres
 - RUMZ - Riparian/Unique mgt zones
 - OG - Old Growth
 - HEL - Helicopter
 - EAR - Even-aged harvest
 - SEN - Sensitive watershed
 - GZB - Grizzly Bear
 - LMA - Canada Lynx Mgt Areas
 - POT - Suitable Canada Lynx
 - EAG - Bald Eagle Habitat

* Chart reflects accumulating constraints

First Scenario: The Stillwater grizzly bear security core (FIGURE 3) was made available for management, resulting in an annual sustainable harvest level of 57.8 MMBF, with 582,945 acres contributing to the solution. 146,434 acres were not considered in the solution and received no management—these areas are primarily stands deferred from management and riparian areas.

Second scenario: Management in Stillwater grizzly bear security core was restricted, resulting in an annual sustainable harvest level of 55.5 MMBF, with 561,611 acres contributing to the solution. 167,768 acres were not included in the solution due to constraints similar to first scenario.

Third scenario: The acquired lands were withdrawn from the model in order to determine the impact of those acres on the sustainable yield. This resulted in an annual sustainable harvest level of 53.2 MMBF, with 527,456 acres contributing to the solution and inferring that the acquired lands contribute 4.6 MMBF to the annual sustainable yield when compared against the first scenario.

Acquisition lands account for 4.6 MMBF of the SYC.



For all scenarios, acres identified as suitable only for helicopter logging did not contribute to the annual sustainable yield. These acres were considered to provide an opportunistic amount of volume above and beyond the calculated yields when specific markets are available. When market conditions are feasible for helicopter logging, those lands could contribute an additional 1.1 MMBF to the annual sustainable yield.

What factors most affected the results?

Although the results of this calculation are similar to previous calculations, there are important factors that distinguish this effort from past efforts and that provide a significant contribution to these results - namely improved data, improved growth and yield estimates, and a reflection of changes in forest conditions on DNRC lands.

The data used for this calculation represents a significant step forward for DNRC in terms of quality, and that