

2023 FWP ANNUAL SUSTAINABLE YIELD CALCULATION UPDATE



PREPARED BY: JASON PARKE, FORESTER
DECEMBER 31, 2023



Table of Contents

Introduction	3
2023 Annual Sustainable Yield Update	4
Purpose and Need.....	5
Commercial Forest Land and Annual Sustainable Yield.....	5
Methodology.....	9
Discussion.....	10

Tables

Table 1 – Annual sustainable yield by Region.....	4
Table 2 - Annual sustainable yield by FWP site type	4
Table 3 – Acres that meet criterion to be included in the calculation by Region.....	6
Table 4 - Changes to commercial forest land by Unit.....	6
Table 5 – 2023 Short-term sustainable yield calculation volume summary on changes to forested land base since 2018.....	7
Table 6 - 2023 Long-term sustainable yield calculation volume summary on changes to forested land base since 2018.....	8

Appendices

- Appendix A – Executive Summary: 2013 Forest Inventory and Sustained Yield Calculation (4 pages)
- Appendix B – 2018 FWP Annual Sustained Yield Calculation Update (9 pages)

Cover Photo: Log truck loading logs on the Elk Basin Restoration 2 Project on the Blackfoot-Clearwater WMA in January 2021. Photo credit: Jason Parke.

INTRODUCTION

Montana Fish, Wildlife and Parks (FWP) is responsible to the public for ensuring sustainable populations of fish and wildlife and associated recreation, and for providing a vibrant state park system.

Contributing towards accomplishing this goal are approximately 437,000 acres of land in fee-title ownership that are managed by FWP. These lands are held in trust for the people of Montana and for the purposes provided by law. The Parks and Outdoor Recreation and Wildlife Divisions are responsible for managing three major FWP site types including approximately 15,200 acres of Fishing Access Sites (FAS), 379,300 acres of Wildlife Management Areas (WMA), and 42,400 acres of State Parks (SP).

FASs are administered by the Fisheries Division for the purpose of providing permanent public access to high-quality rivers, streams, and lakes and, when appropriate, other water-based recreation activities.

WMAs are administered by the Wildlife Division with the purpose of providing effective wildlife habitat and compatible recreational opportunities.

SPs are administered by the Parks Division and are managed for their statewide significance in representing the scenic, historic, cultural, scientific, and recreational legacy of Montana. SPs provide relevant programs and experiences that create lasting memories for Montana families, visitors, support our tourism economy and are accessible for all regardless of wealth, physical ability, or location in the state.

FWP's Forestry Program helps advance management objectives that are unique to each property. The basic philosophy for the program is to "manage for desired habitat conditions and public use opportunities while maintaining the ecological integrity of forests" (FWP Forest Management Plan 2018¹). This is conducted in accordance with [§ 87-1-201\(9\)\(a\)\(iv\), MCA](#)² to "address fire mitigation, pine beetle infestation, and wildlife habitat enhancement giving priority to forested lands in excess of 50 contiguous acres in any state park, fishing access site, or wildlife management area under the department's jurisdiction." Approximately 161,656 acres of commercial forest land³ occur on these sites and contribute immense ecological, recreational, and economic value to the State of Montana. Of the commercial forest land on FWP sites, 59,742 acres are potentially available for timber harvest. This report provides a summary of the potential annual sustainable yield of timber that can be harvested from these lands by FWP.

¹ FWP. 2018. Montana Fish, Wildlife & Parks Forest Management Plan. Montana Fish, Wildlife & Parks, Helena, MT. 107 pp.

² MCA – Montana Code Annotated

³ Commercial Forest Land – Timber land capable of growing commercial crops of trees, as defined by the Montana Department of Revenue: Land that can grow 20 cubic feet of timber volume per acre per year.

2023 ANNUAL SUSTAINABLE YIELD UPDATE

FWP’s annual sustainable yield in the short-term (<50 years) is calculated to be **4.1 million board feet per year** and **3.6 million board feet per year** in the long-term. This is a decrease from the 2018 sustainable yield calculation by 66 MBF⁴ per year in the short-term and 38 MBF per year in the long-term annual sustainable yield.

Table 1 – Annual sustainable yield by Region

Region	Commercial Forested Available Acres	Short-term Sustainable Yield (MBF per year)	Long-term Sustainable Yield (MBF per year)
1	7,575	814.5	773.3
2	39,012	2,174.0	2,119.3
3	10,819	1,098.8	720.8
4	516	31.4	16.5
5	1,820	11.1	14.3
6	0	0.0	0.0
7	0	0.0	0.0
Total	59,742	4,129.8	3,644.2

Table 2 - Annual sustainable yield by FWP site type

Site Type	Commercial Forested Available Acres	Short-term Sustainable Yield (MBF per year)	Long-term Sustainable Yield (MBF per year)
FAS	519	32.2	35.2
WMA	54,197	3,813.6	3,082.3
SP	5,026	284.0	526.7
Total	58,922	4,129.8	3,644.2

Board feet is a measure of wood volume equivalent to 1 inch thick by 12 inches wide by 12 inches tall. Logs are typically measured by how many thousand board feet (abbreviated “MBF”) they contain. On average, there are about 4.2 MBF (4,200 board feet) on a standard log-truck load. One million board feet is abbreviated as “MMBF”.

⁴ MBF – thousand board feet

PURPOSE AND NEED

In 2011, Montana’s 62nd Legislature passed House Bill 619 (since codified in § 87-1-201 and § [87-1-622](#), MCA), which revised FWP’s forest management laws by requiring the calculation of an annual sustainable yield on FWP lands.

MCA § 87-1-201 and § 87-1-622 defines “annual sustainable yield” as:

“...the quantity of timber that can be harvested from forested department lands each year, taking into account the ability of forested lands to generate replacement tree growth and in accordance with

- a. the provisions of MCA 87-1-201 (9)(a)(iv);*
- b. state and federal laws, including but not limited to the laws pertaining to wildlife, recreation, and maintenance of watershed; and*
- c. water quality standards that protect fisheries and aquatic life and that are adopted under the provisions of Title 75, Chapter 5.”*

Mason, Bruce & Girard, Inc. (MB&G), under contract by FWP, completed the calculation of the first-ever annual sustainable yield from FWP lands on December 31, 2013. A report titled “[State of Montana Department of Fish, Wildlife & Parks 2013 Forest Inventory and Sustained Yield Calculation](#)” was prepared for FWP.

MCA § 87-1-622(4) states that “The commission and board shall review and redetermine the annual sustainable yield for lands under their jurisdiction at least once every 5 years.”

COMMERCIAL FOREST LAND AND ANNUAL SUSTAINABLE YIELD

Management units (sites) with a minimum of 50 acres of contiguous forest cover were included in this report. There are currently 66 management units that have 50 or more acres of contiguous forest cover. Since the 2018 update, FWP added 3,461 acres of commercial forest land to existing management units or new management units (included if they met the requirement of having 50 contiguous acres of forest cover). FWP calculated the annual biological potential⁵ and sustainable yield of commercial forest land added since 2018. **Table 3** summarizes the total acres that met the criterion in 2013, 2018, and the current total acres meeting the criterion. **Table 4** summarizes acreage changes since 2018 in commercial forested land, which is the basis for updates in FWP’s annual sustainable yield estimate for 2023. Inoperable land, including commercial forested land within 300 feet of a stream or with slopes greater than 60% were removed. Commercial forested land that is inaccessible or where commercial timber harvest is incompatible with the site were also removed. The ‘Commercial Forested Available’ column is the forested land available for timber harvest after these removals. **Table 5** and **Table 6** show the biological potential and annual sustainable yield that was calculated for those specific changes in commercial forest land acres listed in **Table 4**.

⁵ The highest level of timber harvest that could be sustained, assuming all commercial timber land is available for harvest, and optimal management regimes could be implemented. This is a measure used to benchmark the productivity of a forest.

Table 3 – Acres that meet criterion to be included in the calculation by Region

Region	MB&G 2013		2018 Update		2023 Update	
	Total Unit Size (acres)	Commercial Forest (acres)	Total Unit Size (acres)	Commercial Forest (acres)	Total Unit Size (acres)	Commercial Forest (acres)
1	15,279	10,986	15,279	10,986	16,060	11,523
2	137,873	81,832	140,250	83,375	140,982	83,669
3	107,879	46,337	107,970	46,777	108,375	47,052
4	80,092	11,426	92,653	16,161	92,653	16,161
5	5,946	896	5,946	896	11,614	3,251
Total	347,069	151,477	362,098	158,195	369,684	161,656

Table 4 - Changes to commercial forest land by Unit

Region	Unit	Unit Type	Acreage Change	Non Forested (acres)	Commercial Forested (acres)	Commercial Forested Non Operable (acres)		Commercial Forested Operable (acres)	Commercial Forested Available (acres)
						Riparian	Slope		
1	Bad Rock Canyon	WMA	772	244	528	6	0	522	209
1	Lone Pine	State Park	9	0	9	0	0	9	9
1	Wildhorse Island	State Park	0	0	0	0	0	0	-870
2	Garrity Mountain	WMA	754	554	200	49	0	151	151
2	Spotted Dog	WMA	438	266	172	58	0	114	0
2	Spotted Dog	WMA	-460	-382	-78	-9	0	-69	0
2	Lost Creek	State Park	0	0	0	0	0	0	-92
2	Lost Creek	WMA	0	0	0	0	0	0	-15
3	Mt Haggin	WMA	405	130	275	53	0	222	222
4	Smith River (South)	State Park	0	0	0	0	0	0	-78
4	Smith River (Central)	State Park	0	0	0	0	0	0	-64
5	Big Snowy Mtns	WMA	5,668	3,313	2,355	227	0	2,128	1,820
5	Haymaker	WMA	0	0	0	0	0	0	-472
Total			7,586	4,125	3,461	384	0	3,077	820

Table 5 – 2023 Short-term sustainable yield calculation volume summary on changes to forested land base since 2018

Short-term (<50 years)						
Region	Unit	Unit Type	Biological Potential (MBF/Year)			Sustainable Yield Commercial Forested Available (MBF/Year)
			Commercial Forested	Commercial Forested Operable	Commercial Forested Available	
1	Bad Rock Canyon	WMA	47.2	46.7	18.2	7.1
1	Lone Pine	State Park	0.8	0.8	0.8	0.8
1	Wildhorse Island	State Park	N/A	N/A	N/A	-96.7
2	Garrity Mountain	WMA	13.7	8.2	4.0	4.0
2	Spotted Dog	WMA	21.7	19.2	0.0	0.0
2	Spotted Dog	WMA	-3.9	-3.0	0.0	0.0
2	Lost Creek	State Park	N/A	N/A	N/A	-4.3
2	Lost Creek	WMA	N/A	N/A	N/A	-0.7
3	Mt. Haggin	WMA	36.4	28.7	28.7	26.6
4	Smith River (South)	State Park	N/A	N/A	N/A	-6.2
4	Smith River (Central)	State Park	N/A	N/A	N/A	-4.9
5	Big Snowy Mtns	WMA	43.6	39.7	33.9	11.1
5	Haymaker	WMA	N/A	N/A	N/A	-2.9
Total			159.5	141.5	85.6	-66.1

N/A = No change in biological potential from 2013 Sustained Yield Calculation

Table 6 - 2023 Long-term sustainable yield calculation volume summary on changes to forested land base since 2018

Long-term (>50 years)						
Region	Unit	Unit Type	Biological Potential (MBF/Year)			Sustainable Yield Commercial Forested Available (MBF/Year)
			Commercial Forested	Commercial Forested Operable	Commercial Forested Available	
1	Bad Rock Canyon	WMA	51.9	51.3	20.0	16.0
1	Lone Pine	State Park	0.8	0.8	0.8	0.8
1	Wildhorse Island	State Park	N/A	N/A	N/A	-81.6
2	Garrity Mountain	WMA	16.0	12.9	12.9	12.9
2	Spotted Dog	WMA	10.1	6.8	0.0	0.0
2	Spotted Dog	WMA	-4.6	-4.1	0.0	0.0
2	Lost Creek	State Park	N/A	N/A	N/A	-3.6
2	Lost Creek	WMA	N/A	N/A	N/A	-0.6
3	Mt. Haggin	WMA	27.6	23.0	20.3	17.1
4	Smith River (South)	State Park	N/A	N/A	N/A	-6.7
4	Smith River (Central)	State Park	N/A	N/A	N/A	-2.4
5	Big Snowy Mtns	WMA	66.3	60.4	51.7	14.3
5	Haymaker	WMA	N/A	N/A	N/A	-3.7
Total			168.1	151.1	105.7	-37.5

N/A = No change in biological potential from 2013 Sustained Yield Calculation

METHODOLOGY

FWP used the growth and yield information provided by MB&G's 2013 calculation to extrapolate the potential growth and annual sustainable yield for this 5-year update. MB&G calculated a short-term (<50 years) and long-term (>50 years) annual sustainable yield. The basis for this approach was that the vast majority of FWP's forested land had not been actively harvested prior to the study. Harvest opportunity in the short-term was found to be slightly greater than in the long-term due to a relatively greater abundance of stands available for timber harvest in the short-term.

The primary changes in the 2023 annual sustainable yield update are due to the addition of new commercial forested lands and removal of commercial available forested lands. FWP conducted a GIS⁶ analysis of spatial data maintained by the Department in order to determine changes to the lands eligible to be included in this update and the resulting sustainable yield from those changes to the eligible land base. The following is a list of steps taken to arrive at the sustainable yield for the 2023 update:

- 1) Compile a list of lands acquired since the 2018 update and create a GIS layer of newly acquired lands.
- 2) Overlay the newly acquired lands GIS layer with classified commercial forest lands (Montana Department of Revenue's 2019 Final Land Use Classification GIS layer was used for determining what lands are classified as commercial forest). Photo interpretation of 2021 aerial imagery was used to verify the accuracy of the Department of Revenue's commercial forest land classification.
- 3) FWP calculated the change in commercial forest land since the 2018 update.
- 4) Acres of operable commercial forest land were calculated by subtracting inoperable acres⁷ from the total acres of commercial forest land.
- 5) Acres of commercial available forest land was calculated by subtracting administrative withdrawals⁸ from the acres of commercial operable forest land.
- 6) FWP calculated the biological potential and annual sustainable yield of commercial, commercial operable, and commercial available forest land for the 2023 update by multiplying MB&G's 2013 calculated values by the acres added or subtracted since 2018. For example, the short-term sustainable yield from Garrity Mountain WMA was estimated to be 26.3 board feet/acre/year in MB&G's 2013 calculation. FWP added 151 acres of commercial available forest to the Garrity Mountain WMA since 2018. The updated 2023 short-term sustainable yield from these new acres is calculated to be 4.0 MBF per year.

⁶ GIS – Geographic Information System

⁷ Inoperable acres – A 300-foot riparian buffer on either side of a stream or creek and slopes greater than 60%

⁸ Administrative withdrawals – FWP withdrew forest stands and entire units from potential harvest for a variety of reasons. These included: units that are dominated by streamside management zones, particularly common among Fishing Access Sites; forests that are in scattered patches within roadless settings such as mountain foothill big game winter ranges, which include forests along upper slopes of the unit; forests that provide key wildlife habitat values that would be negatively impacted by forest harvest such as drainage stringers, which are important for wildlife movement corridors; forests that are of low productivity or would be difficult to establish road access such as forested boulder fields; sound and view shed buffer zones for recreation areas; recreation sites that lack substantial tree cover; and areas where impacts and economic cost of harvest would substantially outweigh possible benefits.

- 7) The sum of the short- and long-term sustainable yield for 2023 were added (or subtracted) to the values from 2018, resulting in the 2023 updated short- and long-term annual sustainable yield.

DISCUSSION

It is critically important to note that MB&G's 2013 calculation of biological potential and annual sustainable yield were derived from a computer model. More information on the modeling process can be found in MB&G's 2013 report. FWP used the biological potential and annual sustainable yield values calculated by MB&G and extrapolated those values to changes in FWP's forested land base since 2018. The biological potential calculated by MB&G is the maximum volume (MBF) per year that could be harvested on commercial, commercial operable, and commercial available forested lands. The annual sustainable yield calculated by MB&G is an estimate of the volume (MBF) per year that could be harvested on commercial available forested lands after management constraints are applied to the model and on an even-flow (same amount of volume per year). The management constraints applied to the computer model are also described in detail in MB&G's 2013 report.

FWP felt the methodology used for this 2023 update was a reasonable approach since a) the change in acreage of commercial forest land since 2013 is minor relative to FWP's total commercial forest acreage b) FWP has been using timber harvest to manage commercial forest land since the 2013 report so extrapolating the sustainable yield, which is derived from a model that simulated timber harvesting, is appropriate and c) this approach was more efficient and cost-effective compared to collecting additional inventory data on the new lands and re-running the model.

FWP added two new WMAs to its land holdings since 2018, including the Bad Rock Canyon WMA in Region 1 and the Big Snowy Mountains WMA in Region 5. Since FWP did not have growth and yield data for these WMAs, FWP used the growth and yield from similar sites in those regions. FWP used MB&G's 2013 growth and yield from Kokanee Bend FAS for determining the potential growth and yield for Bad Rock Canyon WMA in this 2023 update. FWP used MB&G's 2013 growth and yield from Haymaker WMA for determining the potential growth and yield for Big Snowy Mountains WMA in this 2023 update.

FWP reduced the commercial available forest on several sites in this 2023 update. Wildhorse Island State Park was removed from commercial available forested acres because it would not be feasible to access the island, which is in the middle of Flathead Lake, with logging equipment. Lost Creek State Park and WMA were removed from commercial available forest because it would not be feasible to access the timber due to topography (the lands are within and adjacent to a steep, rocky canyon). All but one of the parcels (Trout Creek) in Smith River State Park were removed due to no legal road access and the Park's primitive land status which precludes road construction. Haymaker WMA was removed because the commercial forested lands occur mostly in isolated stringers in steep coulees and the economic cost of skyline logging would outweigh the possible benefits.

EXECUTIVE SUMMARY

State of Montana Department of Fish, Wildlife, and Parks 2013 Forest Inventory and Sustained Yield Calculation

Prepared by:
Mason, Bruce & Girard, Inc

December 31, 2013



Executive Summary

In 2011, Montana’s 62nd Legislature passed House Bill 619 (since codified in 87-1-201 and 87-1-621, MCA), which revised MT-FWP’s forest management laws by requiring the calculation of an annual sustained yield on MT-FWP lands. Pursuant to this law, MT-FWP contracted with Mason, Bruce and Girard, Inc. to perform a forest inventory and an annual sustained yield calculation on the Department’s forest land.

Approximately 360,000 acres of MT-FWP land was included in this study and from that, about 151,000 acres are considered to have potential commercial value. From that commercial forest land base, about 57,000 acres are available for harvest and it is these acres that contribute to the annual sustained yield calculation.

Currently, the timber inventory on those 57,000 acres is approximately 272 million board feet (MMbf). Available acres and timber volume are distributed across the state as follows:

Acres and Timber Volumes included in annual sustained yield calculation

Region	Commercial Forested Acres	Commercial Forested Acres Available for Harvest	Timber Volume (Mbf) on Available Acres
1	10,986	8,227	55,302
2	81,831	37,875	152,437
3	46,337	10,171	60,011
4	11,426	659	3,609
5	896	472	794
7	-	-	-
Total	151,477	57,403	272,153

Growth and yield modeling utilized the forest inventory data, which was then incorporated into a Forest Management Model used to calculate the annual sustained yield. The model maximizes net present value of timber harvests while meeting constraints designed to reflect the legal and administrative policies, and management objectives of MT-FWP.

Sustained yield is typically thought of as the sustained harvest level that managed forest land can support over the long-term (50+ years). Because most of MT-FWP’s forest land hasn’t been in active management, many stands are currently either over-stocked or under-stocked. Due to the characteristics of these stands, this study provides a short-term and a long-term sustained yield. It is a usual and customary practice to express sustained yield in terms of an annual volume, and that convention is followed in this study. Harvest opportunities on several units, however, are small enough that the annual volume would not support a viable timber sale. Sales on those units are expected to be less frequent in order to have enough volume to make a viable timber sale.

In the short-term (<50 years), under-stocked stands will have less of a harvest as stands grow and reach a point in time where a commercial thin is appropriate. Alternatively, more harvest will be scheduled in over-stocked stands to bring them down to desired stocking levels. Over the long-term (>50 years), stands will eventually reach regulated stocking conditions resulting in a relatively consistent annual sustained yield moving forward through time.

Forest Inventory & Sustained Yield Calculation

With this in mind, the following table shows the short-term and long-term annual sustained yield on each management unit included in this study:

Region	Unit	Unit Type	Available Acres	Short-term SYC (Mbf/Year)	Long-term SYC (Mbf/Year)
1	Bull River	WMA	991	53	129
1	Kootenai/Falls	WMA	-	-	-
1	Kootenai/West	WMA	881	152	103
1	Kootenai/Woods Ranch	WMA	406	46	37
1	Mount Silcox	WMA	632	92	62
1	North Swan Valley	WMA	1,375	172	142
1	Ray Kuhns	WMA	954	120	94
1	Lake Mary Ronan	State Park	104	12	8
1	Lone Pine	State Park	215	30	19
1	Thompson Chain Of Lakes (East)	State Park	287	3	23
1	Thompson Chain Of Lakes (West)	State Park	1,300	107	119
1	Wayfarers	State Park	27	4	2
1	West Shore	State Park	86	10	9
1	Wild Horse Island	State Park	870	97	82
1	Kokanee Bend	FAS	47	2	4
1	Old Steel Bridge	FAS	-	-	-
1	Swan River	FAS	52	3	5
2	Blackfoot-Clearwater 1	WMA	1,438	133	110
2	Blackfoot-Clearwater/Harpers Lake	WMA	6,686	440	364
2	Calf Creek	WMA	712	70	58
2	Fish Creek	WMA	9,763	341	321
2	Fish Creek	State Park	2,217	72	64
2	Garrity Mountain	WMA	3,360	88	368
2	Lost Creek	WMA + State Park	107	5	4
2	Marshall Creek	WMA	8,692	522	431
2	Mount Jumbo	WMA	99	6	5
2	Nevada Lake	WMA	396	36	19
2	Spotted Dog	WMA	-	-	-
2	Threemile	WMA	4,070	353	292
2	Beavertail Hill	State Park	-	-	-
2	Milltown	State Park	90	5	5
2	Erskine	FAS	-	-	-
2	Monture Creek	FAS	-	-	-
2	River Junction	FAS	44	4	2
2	Stuart Mill Bay	FAS	201	24	25
3	Canyon Creek	WMA	1,696	78	65
3	Fleecer Mountain	WMA	460	39	19

Forest Inventory & Sustained Yield Calculation

Region	Unit	Unit Type	Available Acres	Short-term SYC (Mbf/Year)	Long-term SYC (Mbf/Year)
3	Gallatin	WMA	-	-	-
3	Madison-Bear Creek	WMA	-	-	-
3	Madison-Wall Creek	WMA	-	-	-
3	Mt. Haggin	WMA	7,632	913	589
3	Robb-Ledford	WMA	-	-	-
3	Bannack	State Park	-	-	-
3	Lewis And Clark Caverns	State Park	383	27	16
3	Missouri Headwaters	State Park	-	-	-
4	Beartooth	WMA	-	-	-
4	Beckman	WMA	-	-	-
4	Blackleaf	WMA	-	-	-
4	Ear Mountain	WMA	-	-	-
4	Judith River	WMA	-	-	-
4	Marias River	WMA	-	-	-
4	Smith River/Fort Logan	WMA	-	-	-
4	Sun River	WMA	-	-	-
4	Sun River 2	WMA	-	-	-
4	Sluice Boxes	State Park	414	24	16
4	Smith River (Central)	State Park	166	13	6
4	Smith River (North)	State Park	-	-	-
4	Smith River (South)	State Park	78	6	3
4	Tower Rock	State Park	-	-	-
5	Haymaker	WMA	472	3	4
5	Silver Run	WMA	-	-	-
5	Yellowstone	WMA	-	-	-
7	Isaac Homestead	WMA	-	-	-
7	Makoshika	State Park	-	-	-
Total			57,403	4,105	3,624

Across the entire state, on acres available for harvest, this study calculated the total annual sustained yield in the short-term to be **4.1 million board feet per year** and **3.6 million board feet per year** in the long-term. These sustained yield calculations meet the intent of the enacted legislation as well as the policies, goals, and objectives specified by the Montana Department of Fish, Wildlife, and Parks. The results presented above represent the annual sustained yield on commercial forested acres available for harvest as determined by MT-FWP. This study also calculated the maximum biological yield and annual sustained yield on all commercial forested and operable acres. Those results are found within the body of this report.

It is important to realize that this plan represents a strategic level plan and is intended to establish guiding harvest levels. Implementing a plan like this would require another layer of planning, which would consider the operational issues associated with harvesting and could result in a harvest schedule different from the one presented here.

The following sections of this report explain the methods and rationale for this annual sustained yield calculation for MT-FWP.

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Tables

Table 1 – Annual sustainable yield by Region.....	4
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Cover Photo: Log deck on the FWP Dreyer Boyd Timber Sale on the Blackfoot-Clearwater WMA in January 2018. Photo credit: Jason Parke.

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Montana Fish, Wildlife and Parks (FWP) is responsible to the public for ensuring sustainable populations of fish and wildlife and associated recreation, and for providing a vibrant state park system.

Contributing towards accomplishing this goal are approximately 441,000 acres of land in fee-title ownership that are managed by FWP. These lands are held in trust for the people of Montana and for the purposes provided by law. Three FWP Divisions; the Fisheries, Wildlife and Parks Divisions; are responsible for managing three major FWP site types including Fishing Access Sites (FAS), Wildlife Management Areas (WMA), and State Parks (SP).

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³ Commercial Forest Land – Timber land capable of growing commercial crops of trees, as defined by the Montana Department of Revenue: Land that can grow 20 cubic feet of timber volume per acre per year.

2018 ANNUAL SUSTAINABLE YIELD UPDATE

FWP’s annual sustainable yield in the short-term (<50 years) is calculated to be **4.2 million board feet per year** and **3.7 million board feet per year** in the long-term. This is an increase over the 2013 sustainable yield calculation by 91 MBF⁴ per year in the short-term and 58 MBF per year in the long-term annual sustainable yield.

Table 1 – Annual sustainable yield by Region

Region	Commercial Forested Available Acres	Short-term Sustainable Yield (MBF per year)	Long-term Sustainable Yield (MBF per year)
1	8,227	903.3	838.1
2	38,968	2,175.0	2,110.6
3	10,597	1,072.2	703.7
4	658	42.5	25.6
5	472	2.9	3.7
6	0	0.0	0.0
7	0	0.0	0.0
Total	58,922	4,195.9	3,681.7

Table 2 - Annual sustainable yield by FWP site type

Site Type	Commercial Forested Available Acres	Short-term Sustainable Yield (MBF per year)	Long-term Sustainable Yield (MBF per year)
FAS	519	32.2	35.2
WMA	52,282	3,768.4	3,026.3
SP	6,121	395.3	620.2
Total	58,922	4,195.9	3,681.7

⁴ MBF – thousand board feet

PURPOSE AND NEED

In 2011, Montana's 62nd Legislature passed House Bill 619 (since codified in § 87-1-201 and § [87-1-622](#), MCA), which revised FWP's forest management laws by requiring the calculation of an annual sustainable yield on FWP lands.

MCA § 87-1-201 and § 87-1-622 defines "annual sustainable yield" as:

"...the quantity of timber that can be harvested from forested department lands each year, taking into account the ability of forested lands to generate replacement tree growth and in accordance with

- a. the provisions of MCA 87-1-201 (9)(a)(iv);*
- b. state and federal laws, including but not limited to the laws pertaining to wildlife, recreation, and maintenance of watershed; and*
- c. water quality standards that protect fisheries and aquatic life and that are adopted under the provisions of Title 75, Chapter 5."*

Mason, Bruce & Girard, Inc. (MB&G), under contract by FWP, completed the calculation of the first-ever annual sustainable yield from FWP lands on December 31, 2018. A report titled "[State of Montana Department of Fish, Wildlife & Parks 2013 Forest Inventory and Sustained Yield Calculation](#)" was prepared for FWP.

MCA § 87-1-622(4) states that "The commission and board shall review and redetermine the annual sustainable yield for lands under their jurisdiction at least once every 5 years."

COMMERCIAL FOREST LAND AND ANNUAL SUSTAINABLE YIELD

Management units (sites) with a minimum of 50 acres of contiguous forest cover were included in this report. In 2013, MB&G calculated that across the entire state, 64 units met this criterion and made up 359,820 acres. Since MB&G's 2013 calculation, FWP added 15,029 acres to existing management units which brings the total acres for management units under consideration for forest management to approximately 374,850 acres. FWP calculated the annual biological potential⁵ and sustainable yield of commercial forest land added (or subtracted) since 2013. **Table 3** summarizes the total acres that met the criterion in 2013 and the current total acres meeting the criterion. **Table 4** summarizes acreage changes since 2013 in the commercial forest land acreage, which is the basis for updates in FWP's annual sustainable yield estimate for 2018. **Table 5** and **Table 6** show the biological potential and annual sustainable yield that was calculated for those specific changes in commercial forest land acres listed in **Table 4**.

⁵ The highest level of timber harvest that could be sustained, assuming all commercial timber land is available for harvest, and optimal management regimes could be implemented. This is a measure used to benchmark the productivity of a forest.

Table 3 – Acres that meet criterion to be included in the calculation by Region

Region	MB&G 2013		2018 Update	
	Total Unit Size (acres)	Commercial Forest (acres)	Total Unit Size (acres)	Commercial Forest (acres)
1	15,279	10,986	15,279	10,986
2	137,873	81,832	140,250	83,375
3	107,879	46,337	107,970	46,777
4	80,092	11,426	92,653	16,161
5	5,946	896	5,946	896
7	12,752	0	12,752	0
Total	359,820	151,477	374,850	158,195

Table 4 - Changes to commercial forest land by Unit

Region	Unit	Unit Type	Acreage Change	Non Forested (acres)	Commercial Forested (acres)	Commercial Forested Non Operable (acres)		Commercial Forested Operable (acres)	Commercial Forested Available (acres)
						Riparian	Slope		
2	Garrity Mountain	WMA	633	562	71	22	0	49	49
2	Fish Creek	WMA	743	142	601	197	55	349	349
2	Nevada Lake	WMA	762	83	679	77	2	600	600
2	Threemile	WMA	217	42	175	78	19	78	78
2	Blackfoot-Clearwater	WMA	22	5	17	0	0	17	17
3	Canyon Creek	WMA	735	30	705	33	8	664	634
3	Lewis & Clark Caverns	State Park	-644	-379	-265	-14	-43	-208	-208
4	Beartooth	WMA	8,189	3,923	4,266	646	16	3,604	0
4	Sun River	WMA	3,411	2,952	459	87	2	370	0
4	Blackleaf	WMA	961	951	10	0	0	10	0
Total			15,029	8,311	6,718	1,126	59	5,533	1,519

Table 5 – 2018 Short-term sustainable yield calculation volume summary on changes to forested land base since 2013

Short-term (<50 years)						
Region	Unit	Unit Type	Biological Potential (MBF/Year)			Sustainable Yield Commercial Forested Available (MBF/Year)
			Commercial Forested	Commercial Forested Operable	Commercial Forested Available	
2	Garrity Mountain	WMA	4.9	2.7	1.3	1.3
2	Fish Creek	WMA	49.1	23.9	23.0	12.2
2	Nevada Lake	WMA	88.0	77.9	78.5	54.5
2	Threemile	WMA	24.7	10.9	10.9	6.8
2	Blackfoot-Clearwater	WMA	2.1	2.1	2.1	1.1
3	Canyon Creek	WMA	54.4	48.2	46.0	29.3
3	Lewis & Clark Caverns	State Park	-24.9	-19.8	-19.2	-14.7
4	Beartooth	WMA	471.2	394.0	0.0	0.0
4	Sun River	WMA	61.1	49.2	0.0	0.0
4	Blackleaf	WMA	1.2	1.3	0.0	0.0
Total			731.8	590.2	142.6	90.4

Table 6 - 2018 Long-term sustainable yield calculation volume summary on changes to forested land base since 2013

Long-term (>50 years)						
Region	Unit	Unit Type	Biological Potential (MBF/Year)			Sustainable Yield Commercial Forested Available (MBF/Year)
			Commercial Forested	Commercial Forested Operable	Commercial Forested Available	
2	Garrity Mountain	WMA	5.7	4.2	5.7	5.4
2	Fish Creek	WMA	44.2	26.3	26.4	2.1
2	Nevada Lake	WMA	72.8	64.3	64.8	29.1
2	Threemile	WMA	20.9	9.2	9.2	5.6
2	Blackfoot-Clearwater	WMA	1.8	1.8	1.8	0.9
3	Canyon Creek	WMA	47.4	42.5	40.6	24.2
3	Lewis & Clark Caverns	State Park	-16.9	-13.5	-13.0	-8.5
4	Beartooth	WMA	393.9	329.2	0.0	0.0
4	Sun River	WMA	51.1	41.1	0.0	0.0
4	Blackleaf	WMA	1.1	1.1	0.0	0.0
Total			621.8	506.2	135.4	58.8

METHODOLOGY

FWP used the yield information provided by MB&G's 2013 calculation to extrapolate the potential annual sustainable yield for this 5-year update. MB&G calculated a short-term (<50 years) and long-term (>50 years) annual sustainable yield. The basis for this approach was that the vast majority of FWP's forested land had not been actively harvested prior to the study. Harvest opportunity in the short-term was found to be slightly greater than in the long-term due to a relatively greater abundance of stands available for timber harvest in the short-term.

The primary change in the annual sustainable yield is due to the addition (and subtraction) of commercial forested lands. FWP conducted a GIS⁶ analysis of spatial data maintained by the Department in order to determine changes to the lands eligible for this update and the sustainable yield resulting from that change to the eligible land base. The following is a list of steps taken to arrive at the sustainable yield for the 2018 update:

- 1) Compile a list of lands acquired since MB&G's 2013 calculation and create a GIS layer of newly acquired lands. FWP found an error in the 2013 data resulting a reduction in acres for the Lewis and Clark Caverns SP. One section of land (approximately 640 acres) administered by the Montana Department of Natural Resources and Conservation, Trust Lands Division was accidentally included by MB&G in their 2013 calculation. This was corrected and these acres and associated annual sustainable yield were removed for the 2018 update.
- 2) Overlay the newly acquired lands GIS layer with classified commercial forest lands (Montana Department of Revenue's 2015 Final Land Use Classification GIS layer was used for determining the classification). Photo interpretation of 2015 aerial imagery was used to verify the accuracy of the Department of Revenue's commercial forest land classification.
- 3) FWP calculated the change in commercial forest land since MB&G's 2013 calculation. This included both the addition of new lands and the subtraction from the Lewis and Clark Caverns SP.
- 4) Acres of operable commercial forest land were calculated by subtracting inoperable acres⁷ from the total acres of commercial forest land.
- 5) Acres of commercial available forest land was calculated by subtracting administrative withdrawals⁸ from the acres of commercial operable forest land.
- 6) FWP calculated the biological potential and annual sustainable yield of commercial, commercial operable, and commercial available forest land for the 2018 update by multiplying MB&G's 2013 calculated values by the acres added or subtracted since 2013. For example, the short-term

⁶ GIS – Geographic Information System

⁷ Inoperable acres – A 300-foot riparian buffer on either side of a stream or creek and slopes greater than 60%

⁸ Administrative withdrawals – FWP withdrew forest stands and entire units from potential harvest for a variety of reasons. These included: units that are dominated by streamside management zones, particularly common among Fishing Access Sites; forests that are in scattered patches within roadless settings such as mountain foothill big game winter ranges, which include forests along upper slopes of the unit; forests that provide key wildlife habitat values that would be negatively impacted by forest harvest such as drainage stringers, which are important for wildlife movement corridors; forests that are of low productivity or would be difficult to establish road access such as forested boulder fields; sound and view shed buffer zones for recreation areas; recreation sites that lack substantial tree cover; and areas where impacts and economic cost of harvest would substantially outweigh possible benefits.

sustainable yield from Nevada Lake WMA was estimated to be 90.1 board feet/acre/year in MB&G's 2013 calculation. FWP added 600 acres of commercial operable available forest to the Nevada Lake WMA since 2013. The updated 2018 short-term sustainable yield from these new acres is calculated to be 54.5 MBF per year.

- 7) The sum of the short- and long-term sustainable yield for 2018 were added (or subtracted) to the values from 2013, resulting in the 2018 updated short- and long-term annual sustainable yield.

DISCUSSION

It is critically important to note that MB&G's 2013 calculation of biological potential and annual sustainable yield were derived from a computer model. More information on the modeling process can be found in MB&G's 2013 report. FWP used the biological potential and annual sustainable yield values calculated by MB&G and extrapolated those values to changes in FWP's forested land base since 2013. The biological potential calculated by MB&G is the maximum volume (MBF) per year that could be harvested on commercial, commercial operable, and commercial available forested lands. The annual sustainable yield calculated by MB&G is an estimate of the volume (MBF) per year that could be harvested on commercial available forested lands after management constraints are applied to the model and on an even-flow (same amount of volume per year). The management constraints applied to the computer model are also described in detail in MB&G's 2013 report.

FWP felt the methodology used for this 2018 update was a reasonable approach since a) the change in acreage of commercial forest land since 2013 is minor relative to FWP's total commercial forest acreage b) FWP has been using timber harvest to manage commercial forest land since the 2013 report so extrapolating the sustainable yield, which is derived from a model that simulated timber harvesting, is appropriate and c) this approach was more efficient and cost-effective compared to collecting additional inventory data on the new lands and re-running the model.