

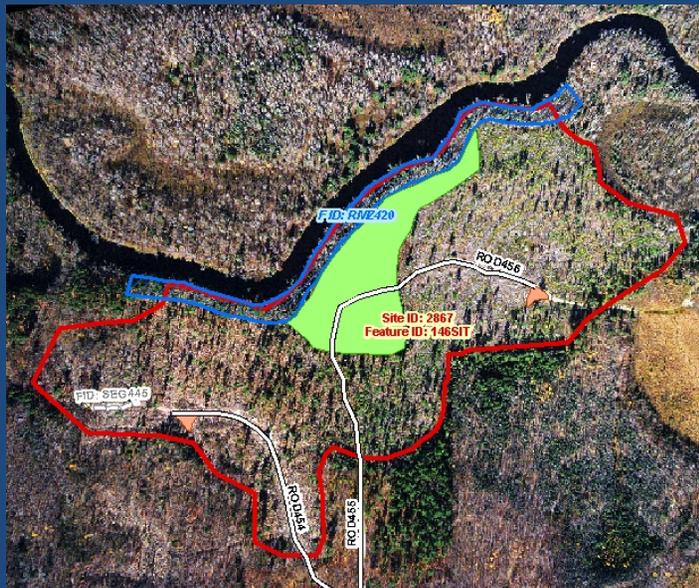
Site-Level Guideline Monitoring



Timber Harvesting and Forest Management Guidelines on Public and Private Forest Land in Minnesota:

Monitoring for Implementation

2014



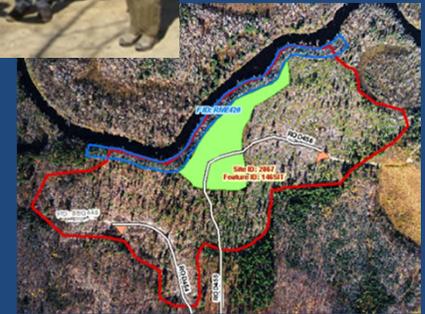
Monitoring Program Components



Forest Disturbance Analysis



Guideline Implementation Field Monitoring



Watershed Assessment



Outreach and Education

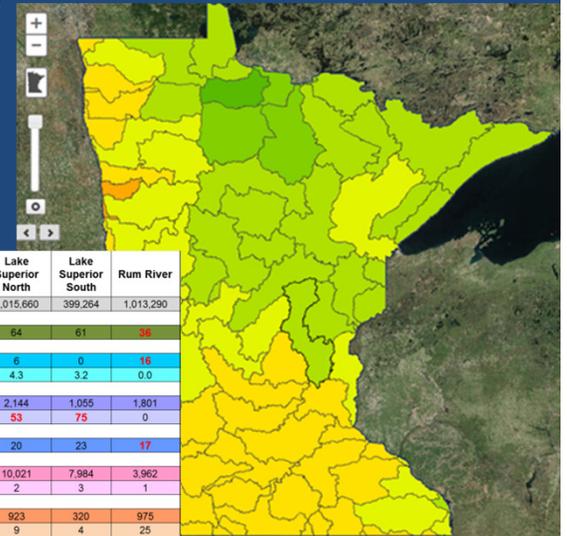
Timber Harvesting and Forest Management Guidelines on Public and Private Forest Land in Minnesota



2011 Monitoring Implementation Results
A report by the Minnesota Department of Natural Resources
Respectfully submitted to the Minnesota Forest Resources Council

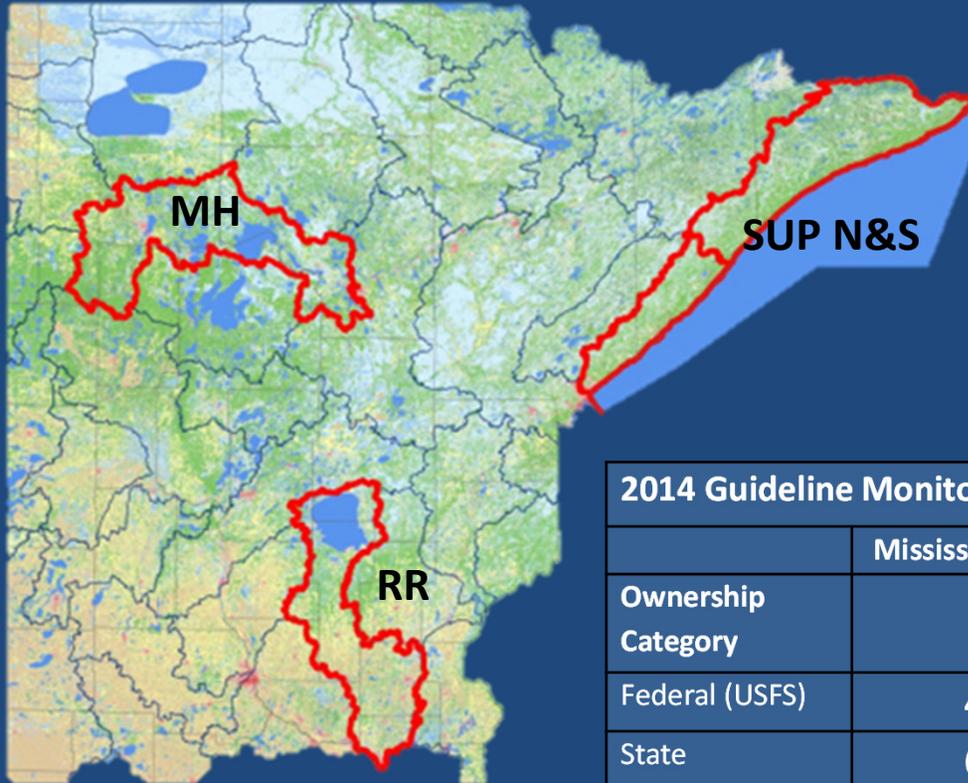


Key Attributes	Mississippi Headwaters	Lake Superior North	Lake Superior South	Rum River
Total Area of Watershed (acres)	1,228,890	1,015,660	399,264	1,013,290
Percent of Watershed in Forestland (%)	53	64	61	38
Percent of Watershed in Lakes and Ponds (%)	15	6	0	16
Percent Trout Lakes and Ponds (%)	0.2	4.3	3.2	0.0
Length of Rivers and Streams (miles)	1,575	2,144	1,055	1,801
Percent Trout Rivers and Streams (%)	3	53	75	0
Percent of Watershed in Wetlands (%)	23	20	23	17
Total Disturbed Area (acres)	23,825	10,021	7,984	3,962
Percent of Forestland Disturbed (%)	4	2	3	1
Area Monitored at the Site Level (acres)	1,173	923	320	975
Percent of Disturbed Area Monitored (%)	5	9	4	25
Number of Sites Monitored	36	17	13	28



2014 Monitoring Site Distribution

3 watershed sample units



- 93 total sites monitored
- Mean size 36 ac. (6.2 – 193)
- 86% clear cut or cc w/ reserves
- Harvested 2011 - 2013

2014 Guideline Monitoring site breakdown by watershed

	Mississippi HW	Rum River	Lake Superior N&S	Total
Ownership Category				
Federal (USFS)	4	-	8	12
State	6	5	8	19
County	12	8	8	28
NIPF & Tribal	11	15	4	30
Forest Industry & Corp. lands	2	-	2	4
Total	35	28	30	93

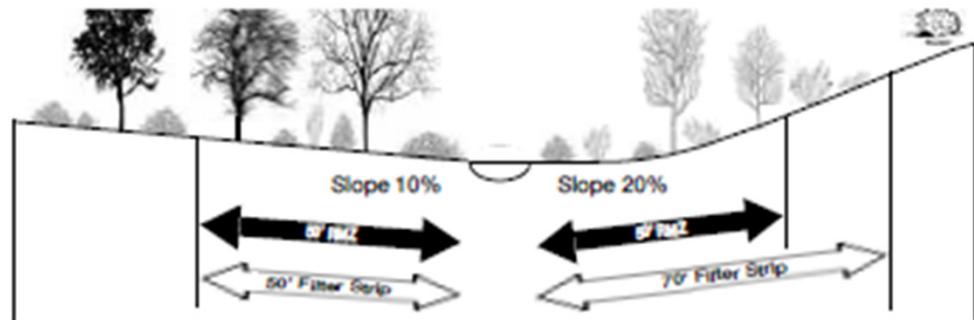
Wetlands & Waterbodies

- 344 Non-open water wetlands monitored on 84 sites
- 20 Open water wetlands & lakes on 11 sites
- 19 streams on 18 sites
- 86 sites (92%) had at least one waterbody
 - 57% on site
 - 43% adjacent

	Mississippi River - Headwaters	Rum River	Lake Superior – North & South
Number of sites Monitored	35	28	30
Beaver pond	1	0	3
Man-made pond	0	4	0
Non-open water wetland	72	138	96
Seasonal pond	21	6	2
Seep or Spring	1	0	0
OWW	3	7	0
Lake	9	0	1
Streams	0	1	18

Filter Strips

A **filter strip** is the area of land adjacent to a water body that traps sediment before it reaches surface water. Harvesting is permitted in a filter strip as long as the integrity of the filter strip is maintained.



Schematic showing the distinction between RMZs and filter strips. The width of the filter strip and RMZ if present may be the same or different depending on slope and water feature type.

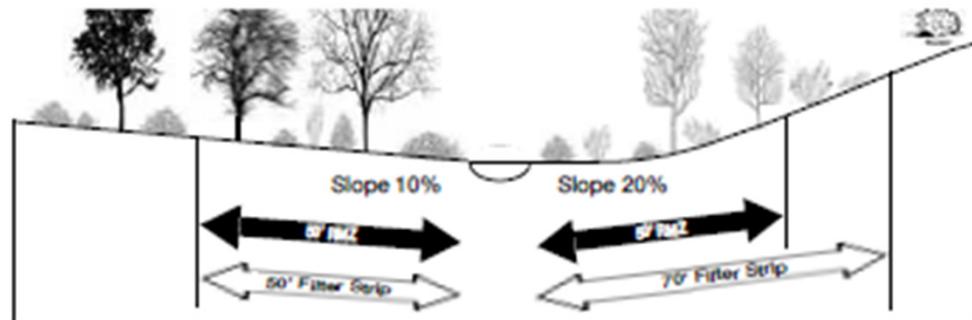


Apply filter strips to all perennial and intermittent streams, lakes, open water wetlands, non-open water wetlands, seasonal ponds, seeps, and springs.

- Minimum filter strip width is 50 feet for slopes less than 10%. Increase the width by 2 feet for each slope percent above 10%.
- Limit soil disturbance in the strip to less than 5% of the area and do not concentrate at any one location.
- Minimize compaction in all filter strips.
- Avoid placing roads, skid trails, and landings in filter strips.

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Filter Strips

- **438 Filter Strips monitored statewide**
- Over all compliance **92%** 👍
- **100%** compliance for streams and OWW/lakes 👍
- **90%** compliance for NOWW types 👍
- **Breakdown by watershed**
 - **MH** had 17 non-compliant F-strips out of 127 = **87%**
 - **SUP** had 19 non-compliant F-strips out of 151 = **88%**
 - **RR** had only 2 non-compliant F-strips out of 160 = **99%** 👍
- **6 filter strips non-compliant based on pre-existing roads**
 - 17% of all non-compliant filter strips
 - 1.4% of all filter strips

Non- Compliant Filter Strips

- Landing within filter strip (where alternative available) 21
 - 11 in MH
 - 7 in SUP N&S
 - 2 within RR
- Roads within filter strip (not crossings) 8
- Rutting within filter strip..... 8
- Skid trail with exposed soil..... 1

- Refers to only 8% of sites



Filter Strip Effectiveness

- **100%** of filter strips showed no evidence of erosion (94% in 2011) 👍
- **100%** no evidence of sediment reaching a wetland or waterbody (98% in 2011) 👍



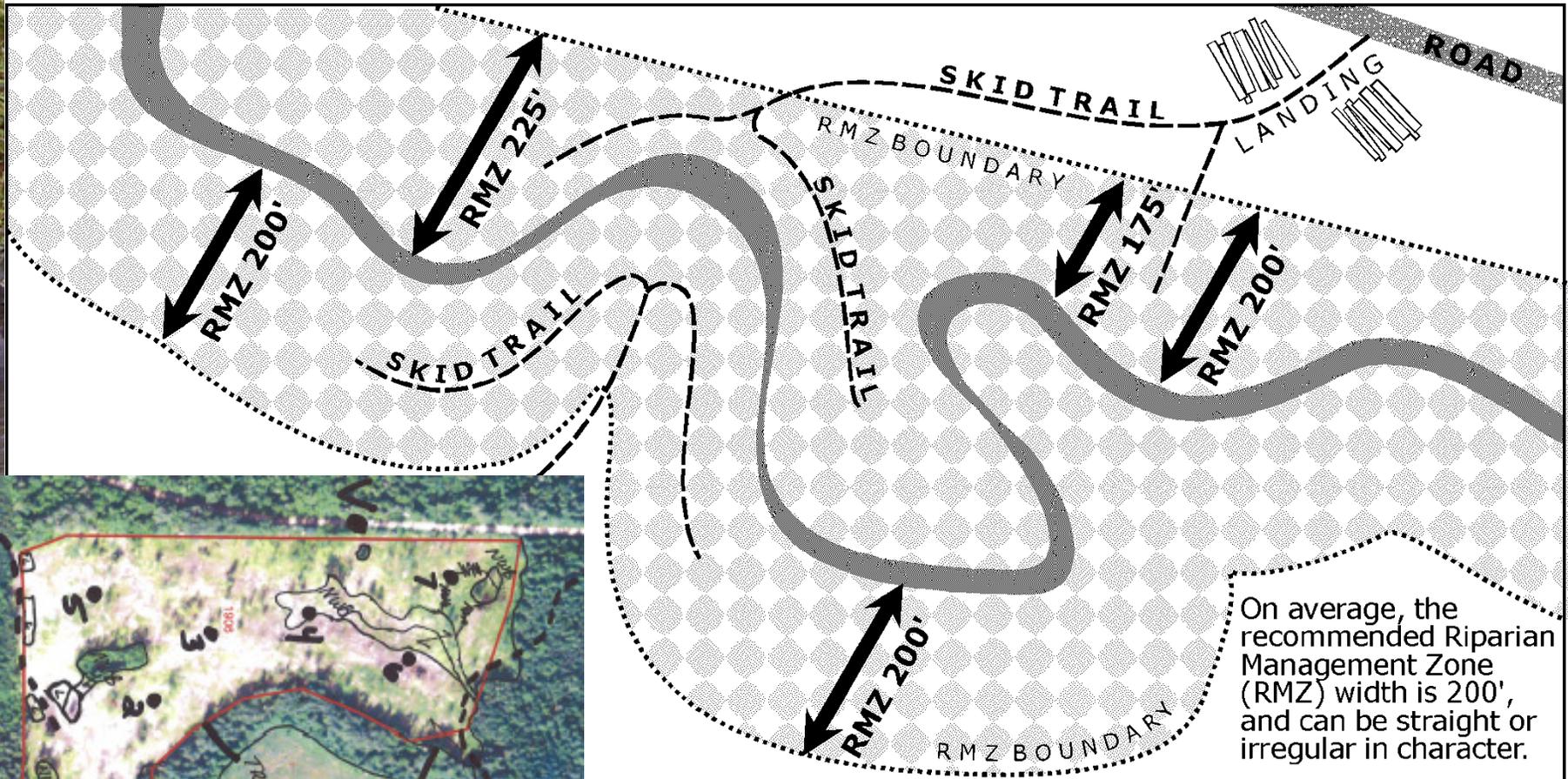
Riparian Management Zones

- Revised in 2012
- Nearly all used 2005 standard



RMZ Width & Composition

Sample Location of Harvest Activity in Relation to RMZ Boundaries
(Uneven-Age Management Adjacent to a Designated Trout Stream)



RMZs

- **36 RMZs** rated on 27 sites
 - Statewide **78% compliance** 👍
- **By Watershed**
 - 12 in **MH** with **100% compliance** 👍
 - 17 in **SUP N&S** with **88% compliance** 👍
 - 7 in **RR** with **15-30% compliance**
- **Conditions of Non-compliant RMZs**
 - Superior N&S unit:
 - 1 non-trout stream with RMZ 10 ft. short of 50' target
 - 1 trout stream with RMZ 9 ft. short of 150' target
 - Rum River unit
 - 1 non-trout stream with 50 ft. short of 100' target
 - 5 OWW with 4 having less than ½ of 50' or 100' target
 - One had 43 ft. of 50 ft. target



Statewide RMZ Summary Table

RMZs That Met Guidelines for Width and Basal Area (including trout waters)

		Total RMZs That Met Guidelines	Total RMZs	On-site RMZs That Met Guidelines	Total On-site RMZs	Adjacent RMZs That Met Guidelines	Total Adjacent RMZs (#)
Lakes & OWW	2000–02	47.6%	84	31.3%	32	57.7%	52
	2004–06	54.5%	22	25.0%	4	61.1%	18
	2009	57.1%	7	50.0%	2	60.0%	5
	2011	87.5%	8	50%	2	100%	6
	2014	74%	19	33%	3	81%	16
Streams	2000–02	56.5%	69	30.8%	26	72.1%	43
	2004–06	43.1%	65	37.9%	29	47.2%	36
	2009	50.0%	14	25.0%	4	60.0	10
	2011	62.5%	16	100%	2	57.1%	14
	2014	82%	17	0	1	87.5%	16
Total	2000–02	51.6%	153	31.0%	58	64.2%	95
	2004–06	46.0%	87	36.4%	33	51.9%	54
	2009	52.4%	21	33.4%	6	60.0%	15
	2011	70.8%	24	75%	4	70.0%	20
	2014	77.8%	36	25%	4	84%	32

Crossings & Approaches

- **Crossings:** Sections of roads or skid trails where equipment crosses a wetland or waterbody.
- **Approaches:** The portion of a road or skid trail immediately leading into a wetland or onto the crossing of a wetland or waterbody.



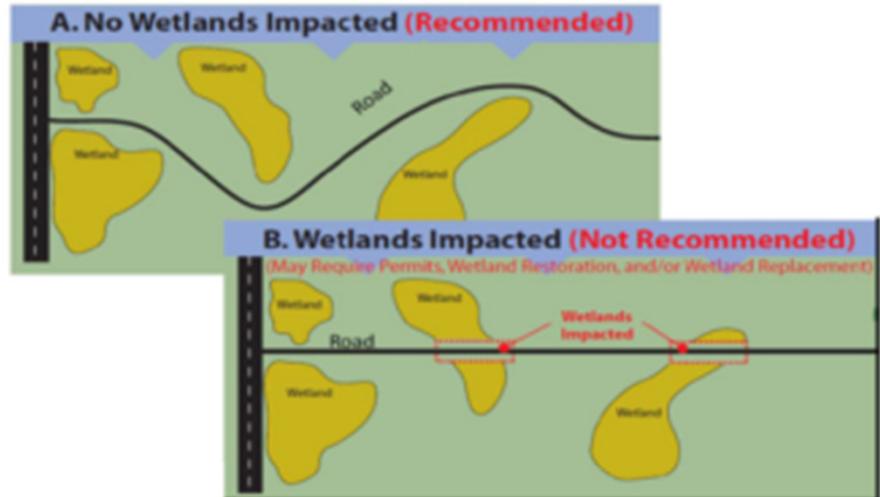
Crossings & Approaches



What do
Guidelines
say...

Stream and Wetland Crossings

✓ **Avoid crossing streams and wetlands whenever possible**



✓ Utilize the following general guidelines when installing crossings.

- Minimize the number of crossings ★
- Design approaches to divert water away from stream or wetland ★
- Install crossings at 90-degree angle
- Install at firm soil/bank areas
- Install at low gradient and short slopes
- Maintain the cross-sectional area of a stream
- Use erosion control on all approaches ★
- Reshape and stabilize crossings after use

Crossings & Approaches

- **220 Crossings** on all sites monitored
 - 30% roads, 67% skid trails , 3% landings
 - Most cross NOWW
- **By watershed:**
 - 99 crossings **SUP N&S**, (30 sites) = 3.3/sites
 - 79 on **MH** watershed (35 sites) = 2.3/site
 - 42 on **RR** watershed (28 sites)= 1.5/site
- **Streams**
 - All stream crossings from roads
 - All judged “not avoidable”
 - 3 of 4 stream Crossing = approaches in good shape
 - 1 crossing (non-trout SUP)
 - both approaches not meeting guidelines;
 - small amount of sediment is reaching the stream.

Crossings & Approaches

Rutting

Rutting occurred on 15% (32) of 216 NOWW crossings

Rutted crossings by Watershed:

- **13% (13) of CRSs are rutted in SUP**
 - Most < 25% (only 1 is over 25%)
 - Over half occurred on just 2 sites
- **23% (18) in MH**
 - Most (16 of 18) > 25% rutted with 12 > 50% rutted
 - Half occurred on just one large site
- **2% (1) in Rum River**
 - Only one rutted crossing – a permanent road >50% rutted

See discussion on rutting later

Crossings & Approaches

Crossing Avoidance

22% (49) of all crossings judged “avoidable”

- Nearly all on skid trails (45 skids, 3 landings and 1 road)
 - 28 avoidable in SUP
 - 3 avoidable in RR
 - 18 avoidable in MH

Reasons contractors called them avoidable:

7 had two crossings close together

- (5 of these are in SUP and 2 in MH)

27 are clipped corners

- (10 in MH 17 in SUP)

3 located within a landing that had upland available

9 small avoidable wetland

- (2 RR, 2 MH, 5 SUP)

Wetland Crossings

Example of “clipping the corner” of a wetland as well as “two crossings close together”



Approaches

- **472 Approaches** monitored on 93 sites
 - 95% met guideline recommendations
- **By Watershed Unit:**
 - MH, 187 with **93%** compliant 👍
 - SUP N&S, 198 with **93%** compliant 👍
 - RR, 87 with **100%** compliant 👍
- **Primary reason:** lack of erosion control or water diversion practices were needed
- 65% (17 of 26) departures occurred on roads
- 92% on NOWW crossings
- Erosion occurring on 77% of non-compliant approaches
 - 13 in MH, 7 in SUP, 0 in RR

Approaches - Effectiveness

- Only 20 of 472 Approaches had erosion occurring



- **By watershed:**
 - **MH:** 8 Approaches sediment reaching wetland
 - **SUP N&S:** 5 had sediment reaching wetland
 - **RR:** No erosion visible on approaches



Opportunities for Improvement

- Redistribute tops and finer slash to approaches as operation progresses
- Monitor presence of bare soil on approaches and segments
- Install water diversion on all approaches especially those with bare soils
- Ensure that erosion control is sufficient to sustain through spring runoff and heavy summer rains

Landing Locations

- 234 landings
- 31 (13%) located all or partially in wetland, filter strip or RMZ where alternative was available.
- 87% compliance for location of landings
 - MH: 88%
 - SUP N&S: 92% 
 - RR: 76%

– Why?

Watershed	# Landings	# In wetland, filter strip or RMZ – upland available	Compliance	Total sites in Watershed
Mississippi Headwaters	117	14	88%	35
Lake Superior	76	7	92%	30
Rum River	41	10	76%	28
Total	234	31	87%	-



Leave Trees



	# of Sites for Which Recommendations Apply	Sites With ≥ 6 Scattered Leave Trees / Acre	Sites With $\geq 5\%$ of Site in Leave Tree Clumps (at least $\frac{1}{4}$ acre size)	Sites with Scattered Leave Trees, Leave tree Clumps, Both or in combination
2000–02	293	50%	31%	61%
2004–06	266	41%	13%	47%
2009	74	50%	22%	61%
2011	71	55%	32%	83%
2014	80	73%	26%	87% 👍
MH	33	82%	42%	91% 👍
Superior	25	48%	36%	84% 👍
Rum River	22	18%	86%	86% 👍

Leave Trees – Plot Data

Site #		68		Date: 6/24/2014						Blowdown			FWD			
Plot # (218)	spp. (219)	# Leave Trees (219)	Total Leave Trees	# of Snags (221)	# CWD Logs (222)	Decay Evidence (Y/N) (223)	How Many (223)	Dominant/Codominant (Y/N) (224)	How Many (224)	Present	Spp.	Number	Present Y/N	a. 20%	b.	c.
1			0	1	7	No		No		No						
2			0	5	13	No		No		No						
3	White Pine	7	23	2	2	Yes	4	Yes	21	No						
	Jack Pine	9														
	Tamarack	3														
	Red Pine	3														
	Black Spruce	1														
4	Jack Pine	8	14	17	0	Yes	1	Yes	14	No						
White Pine	6															
5	Tamarack	2	18	6	0	Yes	3	Yes	17	No						
	Black Spruce	1														
	Jack Pine	13														
	Red Pine	1														
	White Pine	1														

Totals 55 31 22
 Per Acre 22.00 12.40 44.00

Per Acre	
White Pine	14 5.6
Jack Pine	30 12.0
Tamarack	5 2.0
Red Pine	4 1.6
Black Spruce	2 0.8

55

Infrastructure



Infrastructure Compliance by Watershed Unit

	2005 Standard	2012 Standard	Mean % infrastructure
Mississippi Headwaters	63%	80%	2.8%
Lake Superior N&S	67%	80%	2.1%
Rum River	79%	96%	1.4%
Statewide	69%	85%	2.2 %

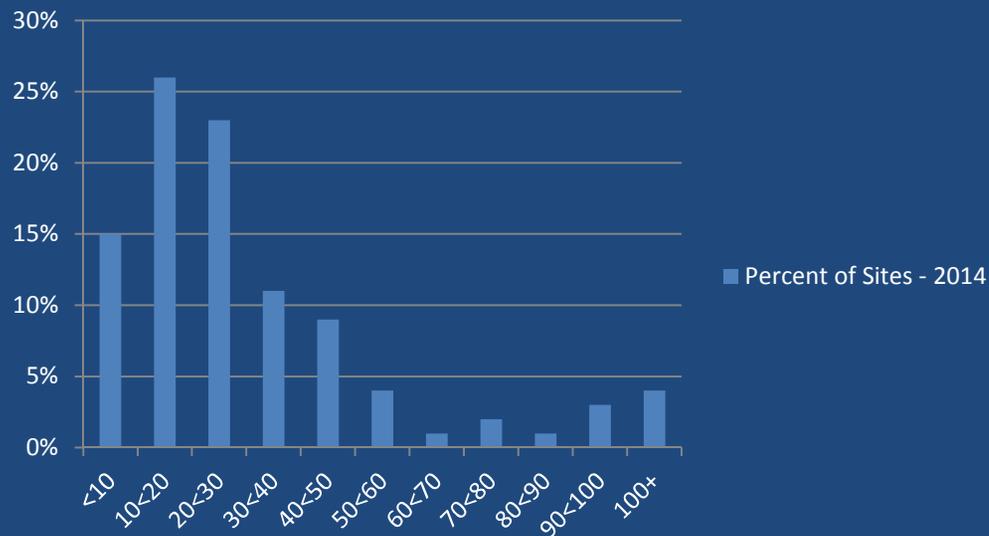
Infrastructure

- 2012 guideline revisions:

< 20 acres	1 acre
20-30 acres	5% of harvest area
>30 acres	3% of harvest area

- Site distribution by size - 2014

Distribution of sites by Size Class - 2014



Rutting Summary by Site

- 93 sites statewide
- 22% had some observed rutting
 - Mean % area of site rutted = **0.3%**
 - Range of 0.02% – 1.72% of site area rutted
- **By watershed:**
 - **MH:** 11 of 35 sites (31%)
 - **SUP N&S:** 7 of 30 sites (23%)
 - **RR:** 2 of 28 sites (7%)
- 61% of rutting occurred at crossings
- 86% of crossings were not rutted 👍



2015 Monitoring

Watershed Sample Units:

- Vermillion & Rainy River
- Mississippi River (Grand Rapids section)
- Red lake, red Lake River & Clearwater River

