

FOREST RESEARCH REPORT



Nova Scotia Department of Natural Resources
Forest Management Planning

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POCKWOCK - BOWATER WATERSHED STUDY

Watershed Descriptions & Harvesting Information

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LOCATION OF STUDY AND TREATMENTS

The Pockwock-Bowater Watershed Study was established in 1999 as a multi partnership research project to study and model hydrological responses to forest harvesting and stream side buffer zone management. This report provides a technical summary of the locations, treatments, composition, and harvesting activity in each of the eight study watersheds.

The Pockwock and Bowater watersheds are located in Hants County in Nova Scotia. At each location a replication of four study sites was established, consisting of three treatment watersheds and a control (Figure 1; Table 1). The study sites were monitored for two years before and after harvesting. Further information is available in a series of reports and technical notes and on the Internet: <http://map.ns.ec.gc.ca/forest/www/index.html>



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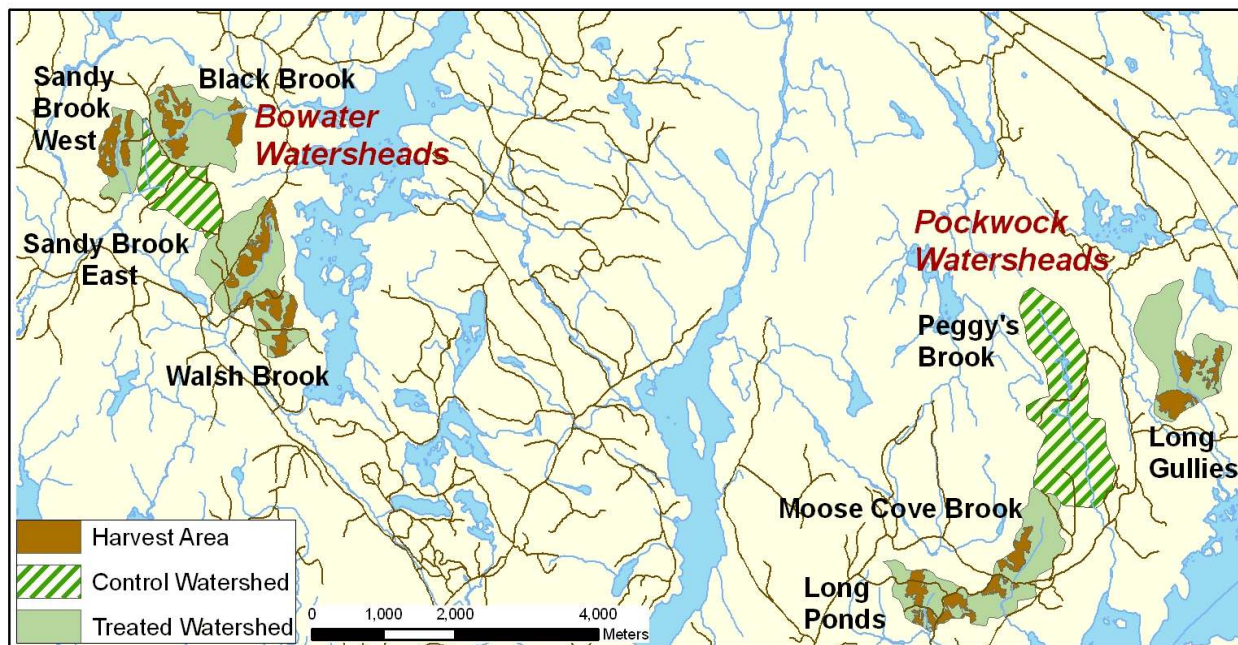


Figure 1. Location of Pockwock and Bowater research watersheds and harvest blocks.

Table 1. Buffer sizes and treatments in the Pockwock and Bowater watersheds.					
Bowater Watersheds	Buffer Size (m)	Buffer Treatment	Pockwock Watersheds	Buffer Size (m)	Buffer Treatment
Walsh Brook	20	No Thin	Long Gullies	20	No Thin
Black Brook	20	Commercial Thin	Long Ponds	20	Commercial Thin
Sandy Brook West	30	Commercial Thin	Moose Cove Brook	30	Commercial Thin
Sandy Brook East	Control	Control	Peggy's Brook	Control	Control

SITE CHARACTERISTICS

The Bowater and Pockwock watersheds are in the St. Margaret Bay Ecodistrict in the Western Ecoregion (Neily, *et al.*, 2003). All areas are located on hummocky or hilly terrain and underlain with coarse-textured, well to imperfectly drained, granite derived till soils of the Gibraltar series (Cann *et al.*, 1954). Two ecosections make up the Bowater watersheds: Well drained; Coarse Textured; Hills (77%) and Imperfectly drained; Coarse textured; Hummocks (23%). The Pockwock watersheds are made up of these ecosections (5% and 33%, respectfully) as well as Imperfectly drained; Coarse textured; Hills (62%) (NSDLF, 1986).

FOREST COMPOSITION

A large proportion of each watershed was composed of mature softwood stands dominated by red and black spruce (*Picea rubens* and *Picea mariana*) (Figure 2). A small proportion of young forest, at least 6 years old, existed in all watersheds. Sandy Brook East contained the largest proportion of young forest (54%), estimated to be 11 years old at the beginning of the study.

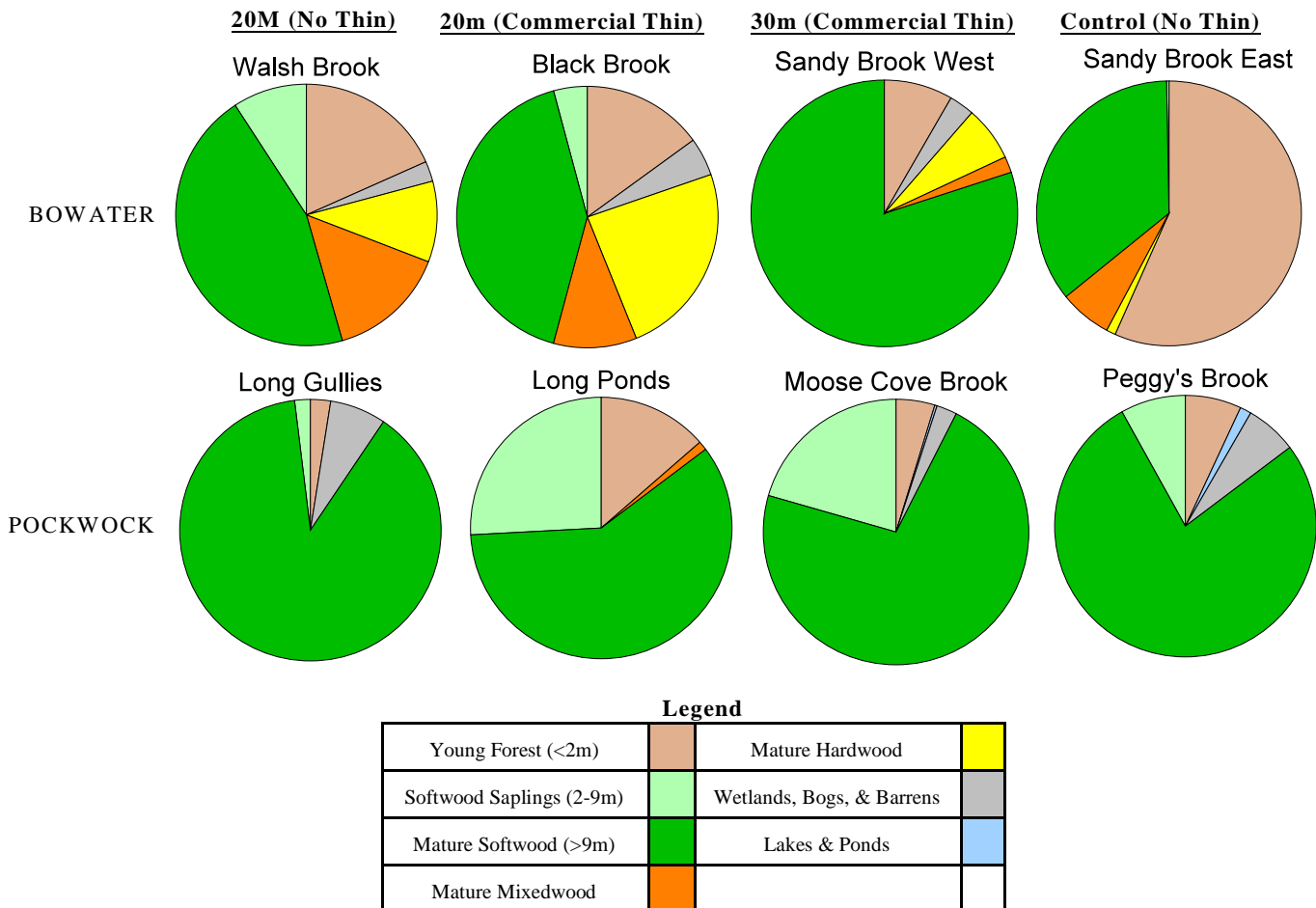


Figure 2. Composition of development stages and cover types of the forests in each watershed by area (from GIS photo inventory collected in 1992)

ROADS

The extent of new road construction, pre-existing roads, and landings are reported in Table 2 along with the number and dimensions of water crossings (culverts and bridges). Roads were all class C and D gravel surfaced logging roads (Talbot, 1982). Roads and landings occupied from 0 to 1.5 percent of the watershed areas. New road construction occurred at Moose Cove Brook and Long Gullies (which had no pre-existing roads). Long Gullies contained the only bridge inside the watershed boundaries. The variety of culverts used included circular plastic and steel as well as open bottomed wooden boxes. Culvert sizes ranged from a 30 cm diameter culvert to a 160 cm x 100 cm box culvert.

Table 2. Road information for the study watersheds.

Watershed	Total Area (ha)	Pre-Existing Road Surface		New Road Construction		Total Road Surface			Number and Dimensions of Water Crossings (cm)		
		Length (m)	Area ¹ (ha)	Length (m)	Area ¹ (ha)	Length (m)	Area ¹ (ha)	% of Watershed Area	Round Culverts (diam)	Box Culverts (l x h)	Bridges (l x h)
Walsh Brook	174	2 650	2.13	0	0	2 650	2.13	1.2	110 40 40 40 30	60x30 60x30 60x30 50x50	–
Black Brook	120	700	0.54	0	0	700	0.54	0.5	–	60x30	–
Sandy Brook West	60	350	0.24	0	0	350	0.24	0.4	–	160x100 40x40	–
Sandy Brook East	94	1 770	1.19	0	0	1 770	1.19	1.3	–	80x80 70x40	–
Long Gullies	130	0	0	780	1.42	780	1.42	1.1	–	55x35	420x120
Long Ponds	64	1 710	0.94	0	0	1 710	0.94	1.5	–	45x30 45x30 45x30 40x30 40x30	–
Moose Cove Brook	113	540	0.31	210	0.29	750	0.6	0.5	120	95x45 45x30 50x30	–
Peggy's Brook	226	0	0	0	0	0	0	0	–	–	–

¹Includes road surface and landing area.

HARVESTING INFORMATION

Most of the harvesting was carried out using rubber tired and tracked mechanical harvesters including single grip (cut-to-length) harvesters and a feller buncher with on-site processing (Tables 3 & 4). A small amount of manual power saw work was carried out. Most of the forwarding was completed with porters, although a skidder was used on part of Long Gullies. On average, 27% of the area of each watershed was harvested (ranging from 16.7% at Moose Cove Brook to 35.2% at Sandy Brook West).

Buffer zones were established using a *Laser Technology, Inc Impulse 200* © rangefinder to measure horizontal distances from stream edges. Where thinning was prescribed, mechanical harvesters uniformly reduced basal areas to 20 m²/ha. Narrow trails cut perpendicular to the buffer edge allowed machine access for thinning with a 9 meter boom. A machine exclusion zone of 7 m from stream edges was observed.

The volume that was harvested in the Bowater watersheds consisted of 85% spruce (*Picea*

rubens and *Picea mariana*), 10% red maple (*Acer rubrum*) and white birch (*Betula papyrifera*), and 5% white pine (*Pinus strobus*). A total of 16 139 metric tonnes of wood was removed from the 97 ha of area harvested at the Bowater watersheds for an average yield of 166 tonnes/ha. This ranged from 149 tonnes/ha at Sandy Brook West to 175 tonnes/ha at Walsh Brook.

The volume in the harvested area of the Pockwock watersheds consisted of 77% spruce, 19% balsam fir (*Abies balsamea*), and 4% red maple and white birch. During the harvesting, the hardwoods were left standing on site as live residual trees. A total of 7 192 metric tonnes of wood was removed from the 66 ha harvested at the Pockwock sites for an average yield of 109 tonnes/ha. This ranged from 93 tonnes/ha at Long Gullies to 122 tonnes/ha at Long Ponds.

Table 3. Harvesting data for the Bowater watershed.						
Watershed	Harvest Dates	Total Area (ha)	Harvest Area (ha; % watershed area)	Harvested Weights (MT)	Harvesting Machinery	Extraction Machinery
Walsh Brook	July 1 - Nov. 5, 2001	174	9.2 (5.3%)	1 924	2 - 1270 Timberjack Harvesters (Rubber Tires/Half Tracks)	<ul style="list-style-type: none"> 1 - 1210 8WD Timberjack Forwarder (Rubber Tires/Half Tracks) 1 - 1410 8WD Timberjack Forwarder (Rubber Tires/Half Tracks)
			15.0 (8.6%)	3 032	1 - Keto Harvester (Tracks)	<ul style="list-style-type: none"> 1 - 1010 6WD Timberjack Forwarder (Rubber Tires/Half Tracks)
			22.3 (12.8%)	3 174	1 - 618 Harvester 762 Harvesting Head (Tracks)	<ul style="list-style-type: none"> 1 - 230 Timberjack 4WD Forwarder (Rubber Tires - 44 in. High Flotation/No Chains)
Total			46.5 (26.7%)	8 130		
Black Brook	July 10 - Sept. 30, 2001	120	29.7 (24.8%)	4 885	2 - 1270 Timberjack Harvesters (Rubber Tires/Half Tracks)	<ul style="list-style-type: none"> 1 - 1210 8WD Timberjack Forwarder (Rubber Tires/Half Tracks) 1 - 1410 8WD Timberjack Forwarder (Rubber Tires/Half Tracks)
Sandy Brook West	July 6 - July 20, 2001	60	21.0 (35.2%)	3 124	2 - 1270 Timberjack Harvesters (Rubber Tires/Half Tracks)	<ul style="list-style-type: none"> 1 - 1210 8WD Timberjack Forwarder (Rubber Tires/Half Tracks) 1 - 1410 8WD Timberjack Forwarder (Rubber Tires/Half Tracks)

Table 4. Harvesting data for the Pockwock watershed.

Watershed	Harvest Dates	Total Area (ha)	Harvest Area (ha; % watershed area)	Harvested Weights (MT)	Harvesting Machinery	Extraction Machinery
Long Gullies	July 31 - Oct. 9, 2001	130	7.8 (6.0%)	1 020	<ul style="list-style-type: none"> 620 Prentice Harvester/750 Log Max Head (Tracks) 2 Men/Power Saws (Trail Cutting) 	344 Fabtek 4WD Forwarder (Rubber Tires)
			13.1 (10.0%)	844	<ul style="list-style-type: none"> 590 John Deere Harvester/Fabtek Head (Tracks) 1 Man/Power Saw (Trail Cutting) 	344 Fabtek 4WD Forwarder (Rubber Tires)
			5.4 (4.2%)	594	<ul style="list-style-type: none"> 1 Man/Power Saw (Tree Length) 	240 Timberjack 4WD Skidder (Rubber Tires)
Total			26.3 (20.2%)	2 458		
Long Ponds	June 28 - Sept. 14, 2001	64	13.6 (21.3%)	1 626	<ul style="list-style-type: none"> 620 Prentice Harvester/750 Log Max Head (Tracks) 2 Men/Power Saws (Trail Cutting) 	344 Fabtek 4WD Forwarder (Rubber Tires)
			7.0 (11.0%)	897	<ul style="list-style-type: none"> 653 John Deere Feller Buncher (Tracks) 620 Prentice Harvester/750 Log Max Head (Tracks) 2 Men/Power Saws (Trail Cutting) 	344 Fabtek 4WD Forwarder (Rubber Tires)
Total			20.6 (32.2%)	2 523		
Moose Cove Brook	Aug. 27 - Oct. 17, 2001	113	17.0 (15.1%)	1 984	<ul style="list-style-type: none"> Rottne JD 2001 6WD Harvester (Rubber Tires/Half Tracks) 	Rottne 12 Tonne 8WD Forwarder (Rubber Tires/Half Tracks)
			1.8 (1.6%)	227	<ul style="list-style-type: none"> 653 John Deere Feller Buncher (Tracks) 620 Prentice Harvester/750 Log Max Head (Tracks) 2 Men/Power Saws (Trail Cutting) 	344 Fabtek 4WD Forwarder (Rubber Tires)
Total			18.8 (16.7%)	2 211		

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