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Control of Mergansers to Increase Miramichi Salmon - (1950)

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INTRODUCTION AND BACKGROUND

Within the last fifteen years studies and experiments by the Fisheries Research Board of Canada have shown that control of fish-eating birds is associated with notably increased stocks of young salmon. In two separate experiments (Forest Glen Brook, Margaree River system (11) and the Pollett River, Petitcodiac system (5)) increases in smolt production associated with bird control have ranged from doubling to quintupling smolt yields. The earlier Margaree experiment also indicated that increased production of smolts had a favourable impact on resulting adult populations and ultimate salmon harvest (8). The two streams are sufficiently divergent in type (the Margaree with rather cold water and few fish other than salmonids; the Pollett with rather warm water and several species of coarse fish combining to outnumber and outweigh salmon production) that there is some basis for concluding that bird control would be beneficial to most salmon streams where mergansers or kingfishers are at all abundant. Moreover, recent studies have indicated that there is much more need for controlling mergansers than kingfishers (12).

NEED FOR A PRACTICAL PROCEDURE

In both the cases mentioned above, the effort was directed towards carrying on scientific studies with a view to getting sound biological information, and not particularly towards developing the details of a sound economic procedure. That such procedure needs developing was demonstrated when an administrative organization attempted to carry out bird control on the Margaree system after the initial demonstration there of the possibilities of bird control. Through lack of appreciation of the principles involved, considerable effort was spent on removing birds, over a period of years, and no worth-while benefit was obtained. The result was both a waste of effort and a set-back to a promising procedure for salmon management.

There are still phases of control which need clarification, but this can come only through experience. The use of bird control as a management procedure now needs to be developed on a river associated with reasonably good fisheries (both commercial and sport) if its value for management is to be demonstrated and developed.

With this in mind, various streams were surveyed in 1949 (5). Among others, the Northwest Miramichi fitted the requirements of being a salmon stream associated with active fisheries, of having a heavy merganser population, and of being of a reasonable size and accessibility for studying results. The co-operation of the

public, very desirable for success in evaluating the procedure, appeared obtainable. The work here could be made to combine with other projected scientific studies of Atlantic salmon.

HOW TO DEVELOP THE PROCEDURE

In order that the effectiveness of merganser control be properly evaluated, the results should be followed closely throughout the attempt to develop and apply a management procedure. With available knowledge and techniques such checks can include assessment of (1) young salmon populations in the river by seining studies, (2) actual smolt production, by trapping and counting or estimating the numbers of descending smolts, (3) smolt contribution to fisheries, by marking the descending smolts and carefully sampling fisheries catches for marked and unmarked fish, and (4) mature fish, marked or unmarked, which enter the river of marked smolt-origin (this to be done with weirs at or near the same places where the descending smolts were checked).

To give confidence that any increases in fish associated with merganser control are attributable to the control, it is important that the studies on fish and birds be continued for several years. For the Miramichi, with its typically 3-year river and 2-year sea life cycle for salmon (2 and 7), it would not be until the second year after control was commenced that a greatly augmented smolt run could be expected. Even this is predicated on bird predations during the underyearling stages of salmon being of minor importance. Increases in grilse would follow in the year after the improved smolt run, and in large salmon 2 years after. Thus control started in 1950 would give smolt increases in 1952, grilse increases in 1953 and large salmon principally in 1954.

As pointed out by Huntsman (7), Miramichi salmon abundance tends to show cyclical variations of 3 and 6 years length; he associated these fluctuations with the life history of the Miramichi salmon. To have confidence in the ultimate effects of bird control it would be necessary to maintain the control over at least a 3-year cycle (more pronounced of the two) and preferably over a 6-year period. Assessment of the value of increases from bird control could then be made by comparison with previous comparable periods as well as by comparison with other rivers and their associated fisheries. The minimum test to get 3 protected smolt crops would thus require control being exerted from 1950 to 1954, with assessment of grilse from 1953 to 1955 and large salmon from 1954 to 1956. The better test would involve control being extended to 1957, grilse assessment to 1958 and large salmon to 1959.

As demonstrated on the Margaree, bird control is only effective for increasing salmon when applied thoroughly. With this in mind, the initial attempts should stress effectiveness and not risk ineffectiveness by introducing over-economy of effort.

It is to be expected that, with experience, economies can be made without serious detriment to the final result, but these should be approached cautiously. There is basis for believing that the requisite protection can be furnished even now at somewhat less cost than the potential gain in salmon harvest. Whether a procedure can be developed which will have the required low ratio of cost to potential increase in value of the fisheries, is still to be determined. However, it seems likely that the techniques already established, even though relatively costly, furnish a better starting point for new development than would immediate attempts to introduce drastic economies at the risk of obtaining inefficient control and again discrediting what is at present the most promising procedure for increasing the value of Atlantic salmon fisheries in Canada.

PLANS NOW UNDER WAY

In 1950 a start was made in the attempt to develop a satisfactory management procedure of bird control on the Northwest Miramichi River. Since an estimate of smolt production was being attempted for the stream in 1950, it did not seem necessary to delay the attempt at developing control in order to get a measure of pre-control production. Moreover, plans called for measurement of smolt production from a similar stream where birds were to be left undisturbed in 1950 and several following years. A compaign of removal of merganser broods was carried out on the Northwest during the summer of 1950 and this constituted the main control for that year. Plans for a survey and possible removal of autumn migrants did not materialize but should be given consideration for subsequent years. Removal of spring migrants and nesting birds was begun in 1951. With the facilities provided by other salmon investigations on the Miramichi, merganser control can be subjected to the assessments outlined above. Experience gained in 1950 and later has indicated that some changes in procedure can be made to advantage. In order to provide the background for developing a practical procedure a detailed record of initial campaign against merganser broods, in 1950, is given below.

REMOVAL OF MERGANSERS FROM THE NORTHWEST MIRAMICHI RIVER IN 1950

In essence, the campaign for removal of mergansers in 1950 consisted of a continuous patrol from near the headwaters of the stream down to the mouth of the Sevogle River. It covered a distance of about 55 miles along the main stream and about 25 miles along the lower ends of the larger tributaries. A map provided by the New Brunswick Department of Lands and Mines (scale: 100 chains, or 1¼ miles, to the inch) was used for planning routes and plotting locations. (A map reduced from the above accompanies this report and has the important streams and other points of reference marked on it.) Ducks were removed by shooting and by driving them into nets stretched across the stream.

ORGANIZATION OF THE PATROL. The patrol trip was organized under the Fisheries Research Board, with the Department of Fisheries (Conservation and Development Services), the Canadian Wildlife Service (administering the Migratory Birds Convention Act under which mergansers are protected) and the New Brunswick Forestry Service cooperating by supplying personnel, guides and equipment. Preliminary reconnaisance included study of Ganong's detailed description of a canoe trip down the stream from source to tide-water (6) as well as study of aerial photographs of the river and a low-altitude inspection flight (for which aeroplane, pilot and photographer were supplied by the New Brunswick Forestry Service). Operating expenses were shared by the Research Board supplying the services of two hired guides and a teamster, the Department of Fisheries supplying guns, ammunition and food, and the New Brunswick Forestry Service loaning camping equipment.

PERSONNEL. In the original planning it had been proposed to have a party of 4 men. But with some uncertainty as to whether representatives of other Departments could give assistance throughout the campaign, the essential crew of 4 men was made up within the 2 Federal organizations directly concerned with fisheries. The addition of a teamster was a necessity not appreciated in the early stages of planning and meant that the basic crew should consist of 5 men. As finally constituted, the party contained 7 men.

Dr. P. F. Elson, Atlantic Biological Station, who has been largely concerned with the Board's recent studies of bird control and salmon production was chiefly responsible for organization and leadership of the party.

Dr. V. E. F. Solman, Chief Biologist of the Canadian Wildlife Service, was present as the representative of his Department and shared the responsibility for leadership during part of the trip with

Mr. Neil MacEachern of the Conservation and Development Services of the Department of Fisheries. Mr. MacEachern was present not only in order that his Department might become familiar with the problems of merganser control, but also in the expectation that the Conservation and Development Services would eventually be responsible for the application of bird control if it is developed as a worth while management procedure for Atlantic salmon.

Mr. Cornelius Kingston, Forest Warden of the New Brunswick Forestry Service represented his Department and acted as a guide on the upper reaches.

Messrs. Wm. S. Curtis and Floyd Matchett were employed as guides and hunters.

Mr. Bernard Kingston served as teamster and assisted with cooking.

Inspector W. G. MacIvor, Department of Fisheries, gave valuable assistance in arranging for men, procuring supplies and serving as contact-man while the party was in the field.

Twenty-one days were taken for the entire trip.

A summary report of the patrol, including a comprehensive series of photographs, has been submitted by Dr. Solman, through the Wildlife Service (10). The following report, in the form of a rather comprehensive diary, is presented in order to place on record the nature of such an effort and in the hope that it may be of assistance in the development of merganser control as a practical procedure.

DIARY OF NORTHWEST MIRAMICHI MERGANSER PATROL - 1950.

A. TRIP TO HEADWATERS

July 13.

Equipment and supplies were taken to the home of Bernard Kingston, teamster, for loading on wagon.

July 14.

Teamster travelled from Trout Brook to Esty's Camp on wood road above Wayerton.

July 15.

Trip - Settlement to Forty-two. Balance of the party travelled to Esty's Camp by car, met the team and re-arranged the load; left Esty's at 11:00 a.m. Cars were parked at the Exchange road, 12 miles from the Forest Service registration station at Wayerton and the party proceeded on foot. The abandoned Scott's Camp (mile 33 on the river, calculated above the mouth of the Sevogle River) was reached at 5:20 p.m. After a short stop for supper the party proceeded to the camp site at Forty-two (mile 40½), arriving at 7:20 p.m.

River. The stream in this region is 70 to 120 feet wide, either forested or with alders to the banks; little or no emergent gravel; bottom varying from gravelly to small boulders; depth, 1½ to 2½ feet; rate of flow about 3 to 4 miles per hour. The water had a slight brown stain; temperature of water at 7:20 p.m. was 16° C.

Fish. Parr were seen jumping but did not appear overly abundant. Grilse and salmon were seen in the American (1 mile down) and Crawford (½ mile up) pools near Forty-two.

Ducks. The character of the river here, with not many emergent beaches or boulders for roosting ducks, is only moderately good for determining the presence of mergansers by their characteristic manure splashes. No such signs of broods were seen but 2 adult females flew up river at dusk.

July 16.

Trip - Forty-two to Little Bald Mountain (also called Little Baldy and Mt. Cartier); about 11 miles. In the morning the wagon load was re-arranged, leaving about one-third of the personal equipment, food, ammunition and horse feed cached at Forty-two. Left Forty-two at 10:50 a.m. Followed old portage road for Little Bald via valley of Forty-two Brook and "Home Camp". Very rough travelling for the team, with rocks, swamp and burned-over tableland barrens. Arrived at the North Branch Crossing (Northwest Miramichi River) at 5:45 p.m. Travelled up the true right bank about ½ mile and then re-crossed to Little Bald camp site. (Fig. 1)

River. At North Branch Crossing, jack pine, black spruce and alders to the river's edge; no emergent gravel; stream about 50 to 70 feet wide; 1½ to 2½ feet deep; flow about 4 miles per hour; bottom of stones and gravel; should be excellent parr ground. At Little Bald camp site, the river was 20 to 70 feet wide; somewhat finer stones and gravel and less gradient, but still a good, brisk stream; several pools to about 4 feet deep. Temperatures - at Forty-two (7:45 a.m.), air 10.0°C. and water 11.0°C.; at North Branch Crossing (5:45 p.m.), air 22.4, water 15.5.

Fish. At Little Bald camp pool, grilse, 1 small salmon and sea trout up to 2 or 3 lbs. weight were present and provided good angling in the evening. Parr and small trout were moderately abundant near the camp.

Ducks. Manure splashes were seen on a rock about ½-mile above camp, indicating the recent presence of a brood of young mergansers.

The above describes the trip in to the headwaters. The actual campaign of removal of mergansers commenced on July 17. All mileage points refer to distance by river above the mouth of the Sevogle River, as calculated from the map.

B. MERGANSER PATROL

1. ABOVE THE FORKS (about mile 54½ to mile 45½).

July 17.

Trip - Little Bald camp (mile 50) to mile 54½ and return via river. Heavy rains last night and until 10:00 a.m. this morning. A 3-inch mesh net was stretched across the river at camp.

At 11:30 a.m. Elson, MacEachern, Curtis and Matchett left camp to walk up river. Solman, C. Kingston and B. Kingston stayed at camp to watch the net. The patrol party followed a route about ½-mile inland on the south bank, using old game trails and trapper's trails known to Curtis. Hills were covered with heath, interspersed with jackpine and spruce, making fairly open walking. On one game trail the guides pointed out what they believed to be a caribou track, both having had experience with these animals, now supposed extinct in New Brunswick, about 30 years ago. The river was reached again at the first tributary from the south above Little Bald - about 1½ miles above the camp. From here the party followed the river upstream about 3½ miles to an old beaver dam with a small spruce tree on an island just above the middle of the dam (Fig. 2); this point was estimated to be about ½-mile below the place where the river makes a downstream turn from ESE to N. The party turned downstream at 3:30 p.m. and followed the river back to camp. Another beaver dam was passed about 2 miles downstream, where a tributary enters from the west and the river bends from NW to NE; two more dams were passed about ½- and 1-mile below this. Camp was reached at 7:50 p.m. The only stops were for lunch where the river was first touched going up and at the same place on the return trip for supper.

River. Throughout the 5 miles above Little Bald camp, the river is 30 to 60 feet wide and averages between 8 inches and 1 foot deep, with occasional pools up to 3 or 4 feet deep and one quite large and deep pool about 2 miles above camp. In some places the channel narrows between alder-covered banks and the river flows swiftly through small pools. The bottom is mostly gravel or stony with occasional small boulders. There were very few gravel beaches; throughout most of the length alders grow over the water's edge. The entire stretch appears to be well-suited to rearing salmon. Temperatures at Little Bald camp, (8:00 a.m.) air 16.0°C., water 12.0. Note about travelling - walking is difficult, there being no trails along the banks and the river bottom being rough and slippery; a shallow-draught canoe could negotiate this stretch without portages other than occasional dragging over shallow places (see account by Ganong).

Fish. Parr and small brook trout were moderately abundant at the Camp Pool but appeared to be relatively scarce in the stream above, although in some places conditions for seeing fish were excellent. Grilse and sea-trout were seen in nearly every pool as far up as 3 miles and above all but the 2 uppermost beaver dams. In this upper stretch there were no good holding pools for adult salmon, which may explain their absence. There seems no reason to believe that the beaver dams would act as barriers to migration of adult salmon, especially with normal rain freshets; most of the dams had small, open channels near one end or the other. Even with normal water height, none of the dams seen extended more than 3 feet above the surface of the water on the downstream side.

Ducks. Manure splashes of what was taken to be a brood of about 10 young mergansers were seen 1½ miles above the camp (Fig. 3). Similar signs were seen about 3 miles above the camp.

No ducks were actually seen or heard, but the relatively fresh dung splashes suggested recent presence of mergansers, since the heavy rains last night and this morning would have washed away old signs. Later experience has shown that in such alder-covered streams young mergansers may be present but are liable to hide soon after being startled, rather than running ahead of the drive. It is not known whether the brood indicated present was passed while it was in hiding or whether it was working above or below the limits of the day's patrol.

Daily summary of ducks: sight records - 0; sign - 10 young; estimated number - 10 young.

July 18.

Trip - none. Stayed in camp at Little Bald. Heavy rain most of the day. Curtis ill; Solman has been confined to camp with a lame knee since the trip up from Forty-two.

Fish. About 4 man-hours were spent angling on the Camp Pool, with 6 grilse and 2 sea-trout landed; 2 grilse were also landed in a pool ½-mile downstream (most of these fish were liberated). It appears that practically every pool of any size in this part of the river has one or more grilse. Some of the grilse were quite small - under 3 lbs.; one large sea-trout was taken in the duck net and liberated.

Ducks. At 7:30 a.m., what was taken to be a single call from a female merganser to her brood was heard at the camp. Immediate search of the stream above and below did not reveal any sign of ducks, although the river was searched for about 1 mile above and below. No further sign of ducks was seen during the day. It was believed that the call heard was further evidence of the brood indicated by the manure splashes seen upriver on July 17.

Daily summary of ducks: sight records - 0; sign - 1 female plus brood; estimated number - same as July 17.

July 19.

Trip - Little Bald (mile 50) to Forks (mile 45½). Heavy rain this morning. Broke camp and sent some bedding, food, tent and personal equipment back to Forty-two by team. Main party loaded bedding, small packs and food for 3 days, as well as two cases of ammunition, into 2 inflatable rubber boats (7-man and 5-man size) and travelled down river, 2 men to each boat and 2 others walking. Left camp at 10:45 a.m. Stopped for lunch at 12:50 - 1:30 p.m., having covered 2 miles. Travelling was slow because of the difficult walking for those on foot, and the boats frequently had to wait to avoid getting ahead. Occasionally one or both men on the boats had to dismount but more frequently 4 men were able to ride the larger boat, especially in the lower 2 miles of the day's trip.

Approximately 2 hours were spent hunting a brood of ducklings before supper was eaten along the river. The Forks were reached at 7:45 p.m.

River. For about 2 miles below Little Bald camp the stream is 30 to 60 ft. wide, flows over a generally stony bottom with some gravel and occasional small boulders. Pools are infrequent in this stretch but one large and deep pool, the "Blueberry Pool", about 1½ miles down, held a good supply of grilse and very large sea-trout. The banks are generally forested with conifers to the water's edge and alders are less conspicuous than above. Rate of flow is about 4 to 7 miles per hour. In its lower two miles the North Branch flows through extensive alder flats, which make bank travel quite impractical; the dense alders overhang the water and the channel becomes narrow, deep and the rate of flow is quite swift (Fig. 4). The bottom is of rather fine gravel and pools from 3 to 7 feet deep are in a continuous series.

Fish. Only a few parr were noted but although dull weather and dark water were not particularly favourable for observation, the impression was gained that the stock of small fish was not at all abundant for such excellent water. Grilse were seen in the 2 largest pools in the upper 2 miles; a ¼-hour stop at the Blueberry Pool by 2 anglers gave 4 grilse and 2 large sea-trout (2½ - 3 lbs.) none of which were killed. This section of the river is apparently not visited by anglers more than half-a-dozen times in a season. Excellent grilse angling was also obtained at the Forks in the evening, 2 man-hours resulting in about a dozen fish being landed and liberated.

Ducks. No sign of ducks was seen on the upper 2 miles leading to the suspicion that the brood indicated above Little Bald (estimated at 10 birds) had been missed entirely, probably having escaped upstream. It is unlikely that such a brood would cover 2 or more miles of stream without leaving some trace of manure splashes on the mid-stream emergent boulders. Also, on the basis of experience elsewhere, it appears unlikely that a young brood would cover the distance from a mile or 2 above Little Bald to 2 miles or more below in a single day, or even in 2 days, unless they were being driven.

At about 1 mile above the Forks (3:45 p.m.) a female and 6 to 10 young were sighted in the narrow, winding, alder-grown channel. A premature shot by inexperienced hunters resulted in the birds running a short distance and then hiding before a plan for encirclement and ambush could be effected. Earlier experience had indicated that such a brood would run for ½ to 1 mile when first frightened but this brood hid in the alders without 300 yards. The female was killed while flying back upstream. Elson and Curtis circled through the woods to ½ mile below while MacEachern and Matchett worked slowly down river towards them; Solman remained at the point of first sighting in case any birds should evade the other men

and escape upstream. Four birds were seen by Solman as they swam upstream under water or surfaced for breathing, but no shots were fired. Neither drivers nor ambushers saw any birds. MacEachern and Elson then hunted upstream for 1 mile on the chance of cutting off the ducks but saw none. Supper was then eaten while keeping watch on the river and the trip continued to the Forks later. At 9:00 p.m. a group of about 10 small ducks was sighted swimming up past the camp; they were keeping close to the cover of overhanging alders. Three hurried shots were fired at close range but no kills recorded until one dead duckling was picked up the next morning. More may have been wounded or killed since the birds were closely bunched when shot at. It appeared likely that this was the same brood encountered earlier in the afternoon above the Forks. The whole incident served as a good example of how a brood of young mergansers can escape from an inexperienced crew, even in a small stream.

Daily summary of ducks: sight records - 20 to 24; estimated number - 6 to 10; killed - 1 female plus 1 young; wounded - 1 or 2 more (?).

July 20.

Trip - one party from Forks about 4 miles up the South Branch and return, another party 2 miles back up the North Branch. At the camp site, alders were cleared away from the banks of the North Branch and a net set across this stream. At 10:30 MacEachern and Matchett started up the North Branch, walking through the woods and carrying a small boat for the return trip. Elson and Curtis, accompanied by Solman and C. Kingston, travelled up the South Branch by routes known to Kingston for about 4 miles. Solman and Kingston then returned directly to camp to watch the net while Elson and Curtis patrolled the South Branch. No ducks were encountered on the North Branch. All parties were back in camp by 6:30 p.m.

(a) South Branch

Stream. In the upper 2 miles examined the stream is sometimes only about 15 ft. wide (Fig. 5) with alders almost entirely overhanging, but in other places it opens out to about 60 ft. In some places the channel is strewn with large, emergent boulders, while in others the bottom is fine sand or gravel. Frequent beaver ponds flood long sections of alder flats, but none of the dams seen were over 4 feet high above stream bottom and it seems likely that adult salmon could surmount most of them for spawning. Except in the alder flats at the Forks, where the stream is slow and broken into many channels, the lower 1½ miles are swift and rocky with 3 large pools, quite in keeping with the general character of small salmon streams. All the stream examined would appear to be good salmon-rearing water, an idea confirmed by the presence of yearling salmon in merganser stomachs collected at the upper end of the area. In contrast to the North Branch, this stream in summer condition is

scarcely navigable to any type of craft, except on the beaver ponds and travelling is difficult. Temperatures - (8:00 a.m.) North Branch, 10.5°C.; South Branch, about the same; air 9.5°C.

Fish. Fish were scarce, only half a dozen 6- to 8-inch trout being seen at the upper end of the area and 2 or 3 parr near the Forks. The presence of salmon and trout throughout was indicated by parr and trout removed from merganser stomachs collected near the upper end. No large salmon or trout were seen in the pools but the water was very dark and conditions for observing very poor. It may also be true that adult salmon only enter this branch in the autumn; at least there is no angling such as is provided by the North Branch. However, mergansers should be controlled on this branch, not only because of its value as a nursery, but also because birds reared on it would later attack stocks in the main river.

Ducks. About 3½ miles above the Forks a duck and 7 or 8 ducklings were seen but not alarmed. Curtis circled below and Elson waited in ambush above. When Curtis quietly exposed himself in mid-stream about 100 yds. below the ducks they swam up to the ambush where 3 were killed before the remainder turned downstream. Two more were shot by the lower gun and the rest hid in the alders between the guns (about 200 yds. apart). During a 1½ hour wait 2 more emerged from hiding and were killed. In the initial shooting 1 additional duckling was wounded and possibly 2. The action resulted in 7 out of 8 or 9 ducks being certainly killed, including the female and probably the entire brood was eliminated. The female had an empty stomach; the young contained 11 small parr (2½ to 4 inches), 4 trout (2 to 3 inches) and 2 trout or salmon fry. Freshly-used roosting rocks were seen ½ and 1 mile below the place where this brood was encountered (Fig. 6) but no more ducks were seen and it was assumed that the sign had been left by the brood eliminated. This action was a good example of how two men, working co-operatively, can control mergansers on a medium-sized stream.

(b) Main river

Fish. Grilse and salmon were plentiful in the Forks pool and the pools below; 2 rods landed 18 fish between 8:00 and 10:00 p.m., of which 3 were kept for food; 2 large salmon were seen but not hooked. Some parr were seen but they did not appear to be abundant.

Ducks. A group of 6 or 8 young ducks was seen at sunset roosting on a boulder about ¼ mile below the Forks. They moved down stream and were not seen again. They were believed to be the survivors of the brood encountered on the North Branch on July 19.

Daily summary of ducks: South Branch; sight records - 10 to 11; estimated number - 8 or 9; killed - 1 female plus 6 young; wounded - 1; probably wounded - 1. Main river; sight records - 6 to 8 young; estimated number 6 to 8 (probably same group as July 19).

2. UPPER MAIN RIVER (Forks (mile 45½) to Camp Adam (mile 33) at head of Gorge Section).

July 21.

Trip - Forks (mile 45½) to Forty-two (mile 40½). The net kept across the North Branch all night was taken up and camp broken at 9:30 a.m. Most of the time 2 men rode each boat and 2 walked but occasionally 4 rode the larger boat. Lunched at Split Rock Pool (mile 42½) at 11:30 to 12:30 p.m. Reached Crawford at 3:40 p.m. and Forty-two at 4:00 p.m. Arrangement had been made to rendezvous here with the team which had gone out to Esty's Camp for supplies brought there by Inspector MacIvor, so camp was pitched for the night. Other possible camp sites near here would be at Scott's Crossing (mile 39) and Scott's Depot Camp (mile 38).

Stream. For about 1½ miles below the Forks the stream flows in a series of pools and short rapids, first on one side of the stream bed, then on the other. There is considerable gravel interspersed with some rock and boulders. Approaching Split Rock Pool (Fig. 7) the stream widens and becomes shallower, so that only 2 men could ride each boat and at times one or both of them had to dismount to work the boats over short shallows. With the broken rock and boulders and no bank trails, walking was difficult and slow. As in both branches above the Forks, the water carried a brown stain and was consistently low in temperature. Temperatures - Forks at 9:00 a.m., air 12.0°C.; North Branch 11.0; South Branch 12.0; Northwest Miramichi at Split Rock Pool at 12:00 noon, (air 22.0), 14.0°C.

Fish. Grilse were abundant in all pools, especially just below the Forks where schools of 20 to 30 fish, including some larger salmon were frequently seen. It was estimated that about 200 grilse and 30 large salmon were seen between the Forks and Forty-two; the guides suggested that this was a larger number of fish than had been seen in this part of the river for 3 or 4 years. Very few parr were observed, although some of the ground covered was favourable for seeing parr if many were present.

Ducks. Except for the manure splashes where the young ducks had been observed on July 20, just below the Forks, there was no indication of mergansers on the upper two miles. Below Split Rock Pool 2 roosting rocks were observed where about 8 young ducks had recently rested. In addition, half a dozen rocks were seen where adult birds (singles to group of 3) had rested. At 2:30 p.m. 6 adults were seen flying downstream. Curtis and Kingston pushed down through the woods in an attempt to drive these birds back. At 2:45, two adults flew upstream, 1 being killed and the other possibly wounded. At Crawford Pool, ½ mile downstream, a lumbering crew reported that 4 adults had flown down about 10 minutes earlier.

No further evidence of young ducks was seen until nearing the lower end of the Gorge section (about mile 28) so it is assumed that the young birds which left the sign near Split Rock Pool were passed; they may have been the same birds observed near the Forks on July 20 and on the lower North Branch on July 19. The distance between the upper and lower places involved is under 4 miles, which seems to be about the limits of ordinary travel for such a brood during a 2- or 3-day interval.

Daily summary of ducks: sign - 8 young (probably brood recorded July 19); sight records - 12 adults, estimated at 6 birds; killed - 1; possibly wounded - 1. (Note: adults encountered were females, whether accompanied by young or not.)

July 22.

Trip - Forty-two (mile 40½) to Camp Adam (mile 33). Gear was repacked on the wagon and only light equipment, for possible overnight stops, taken in the two boats. Left Forty-two at 10:00 a.m. hoping to meet wagon at Camp Adam tonight. Reached Scott's Crossing (mile 39) at 11:45 a. m.; Scott's Depot Camp (mile 38) at 12:15 noon and lunched there. Reached Sullivan's Pool at 3:00 p.m. and Camp Adam at 5:45. Party was accommodated by Dr. Bell and Mr. Mumford of the Miramichi Fish and Game Club, which controls angling rights on the Gorge section of the river.

River. From a little above Forty-two to Camp Adam the river is 75 to 150 feet wide, with much good gravel for salmon spawning and rearing grounds, and with pools for adult salmon every mile or two (Fig. 8). Depth of water is not great but sufficient to float the boats with 4 men in many places and never any need for removing gear from the boats. Just above Camp Adam the bed narrows and the bottom changes to bed rock and large, broken boulders; the current becomes swifter. The entire crew was able to ride the boats for about ¾ of the distance; water height is possibly a little above average for this time of year. Temperatures - at Forty-two (9:00 a.m.), air 12.0°C.; water, 12.0; at Camp Adam (7:30 p.m.) water 15.0°C.

Fish. Grilse were seen in all pools, but only 2 large salmon were seen above the Gorge section; large fish were present at Camp Adam, two having been landed that day and one taken on the following morning. Parr and small trout were not much in evidence. No cyprinids or suckers have been seen on this upper part of the river.

Ducks. Signs of 3 adult birds were seen on roosting rocks between Scott's Crossing and Scott's Depot Camp. No sign of broods has been seen since that near Split Rock Pool (July 21). At 4:00 p.m. (about mile 34 or 35) 4 adult female mergansers were flushed and flew downstream. At 4:10 p.m. 6 ducks flew upstream; no shots were fired.

Daily summary of ducks: sight records - 10; sign - 6; estimated number - 6 adults.

3. GORGE SECTION (Camp Adam (mile 33) to Stony Brook Camp (mile 25½)).

July 23.

Trip - Camp Adam (mile 33) to Dam Camp (mile 29). Sunday. Most of the gear was put into the wagon and only lunch equipment and ammunition taken in the boats. Left Camp Adam at 10:30 a.m. Lunch at Lower Glory Hole at 11:45; arrived at Dam Camp at 4:00 p.m. The party had been invited to use the facilities of the Fish and Game Club both here and at Stony Brook; these courtesies extended by the Club made possible a chance to dry gear and rest after 10 days of woods camping and river travel, much of it during rain and cold weather, and were much appreciated. The telephone installations at Camp Adam and Dam Camp made possible contact with the outside for replenishing supplies, etc.

River. This part of the river flows through a steep-walled gorge with the cliffs on either bank often only 25 yards apart. The bottom is rocky with some low falls (Fig. 9), deep pools and only a limited amount of gravel-covered bottom. A falls about 8 ft. high at Dam Camp would constitute an effective barrier to suckers and cyprinids. An angler's trail provides good walking for most of the length of the gorge, but is often out of sight of the river and hence not suitable for efficient merganser patrol. Walking in the river bed is difficult and slow. For most of the way 2 men were able to ride in each boat, but much attention had to be given to navigation and it was concluded that although boats are a worthwhile aid both above and below the Gorge section, they should, if possible, be dispensed with through the Gorge. In such broken terrain a close watch must be kept for mergansers if they are not to escape unnoticed. Temperatures - at Camp Adam (10:30 a.m.) air, 17.0°C.; water, 13.0; at Dam Camp (4:30 p.m.) air, 28.0; water, 18.0.

Fish. Salmon and grilse were present in all pools. No angling was attempted between Camp Adam and Dam Camp, despite the invitation of the owners, since their guests were fishing the area. Good grilse angling was had below Dam Camp with 2 men landing 15 grilse in 1 hour (all but 3 were liberated). Parr seemed more abundant here than above the Gorge and were frequently hooked on salmon flies. This apparent increase in abundance may have been a result of the almost daily traffic by anglers keeping mergansers frightened off the area, or it may have been merely the result of better conditions for observation. (Throughout the trip very few parr were seen by casual observation as compared with similar territory on the Pollett River; seining studies are planned for obtaining a better picture of the parr production in this river.)

Ducks. One female merganser flew downstream at Camp Adam at 10:00 a.m.; no shots were fired. Dr. Bell stated that only a couple of broods had been seen in the vicinity this year, whereas usually up to half a dozen broods worked past their camps during the summer. The 6 females seen on July 21 and 22 may indicate a relatively poor breeding year for the birds; the Dominion Wildlife Service represenative stated that 1950 had been generally a rather poor year for breeding ducks of other species, in many localities and that a higher than usual proportion of females had failed to nest successfully.

Daily summary of ducks: sight record - 1 female.

July 24.

Remained at Dam Camp all day, cleaning and drying gear and resting. Elson sick. Weather warm and humid.

Fish. Little angling attempted; no fish landed. One salmon with a white tag and 1 grilse with a red tag (both of types attached at the trap at the Sevogle River) were seen in the pool below the Dam Camp Falls.

Ducks. No sign.

July 25.

Trip - Dam Camp (mile 29) to Stony Brook Camp (mile 25½) also Little River (see under "Tributaries"). MacEachern and Matchett left the main party at Mountain Brook (mile 28¾) to travel across country 2 miles, then down the lower 7 or 8 miles of Little River. Solman, Elson, Curtis and Kingston continued down the main river, leaving Dam Camp at 10:00 a.m., planning to meet the wagon at Stony Brook Camp. Travelling was slow because of the broken nature of the river bottom. At the Ledges, the small boat and its load were portaged about ¼ mile, but the larger boat was lined and worked down over the cascades with only one complete unloading of its gear. This is the most difficult section for boating and the boats are a handicap to efficient patrol, at least for a crew not familiar with the stream. Stopped for lunch for 1 hour at 12:45 p.m. Reached Stony Brook Camp at 3:30. After supper Elson was taken out to the car road (about 3 miles) and remained away until July 31.

River. The upper part continues the Gorge section, over the Ledges, a series of high cascades and through the Narrows (Fig. 10). Towards the lower end of the Narrows the gradient becomes less steep, there is more gravel in the bed and the banks open away from cliffs to steep hills. In the Narrows, and particularly in the lower part, there are frequent salmon pools down to within 3/4 mile of Stony Brook Camp; the next pool is at the Camp. Especially in the lower part, the medium gradient and bottom of mixed small boulder, cobble and gravel looks to be good spawning and rearing ground; usual depth is 1 to 3 feet. At the Camp and below, cliffs,

when they occur, are on one side only, usually at the outside of bends so that good pools are associated with them. This can be regarded as the lower end of the Gorge section. Temperatures - at Dam Camp (9:30 a.m.) air, 18:0°C.; water, 15.0.

Fish. Salmon and grilse were seen in nearly all pools. Some large suckers (Catostomus commersonii) were seen in pools below the Gorge section and a few cyprinids were noted in shallower parts; these were not positively identified but appeared to be Semotilus sp. or Couesius plumbeus. But small fish were generally scarce.

Ducks. Two roosting rocks were seen below the Narrows, but it was only possible to tell that more than one bird had used them. Between 11:45 and 12:00 noon a group of 3 or more young ducks was sighted, twice, but could not be approached closely and the cliffs prevented any attempt at circling below them. A bald eagle, seen several times, appeared to be following the ducks but was not actually seen to attack them. By 2:30 p.m. the ducks had not been sighted again and it was thought that they might be travelling ahead of the drive, which moved slowly because of the rough bottom. As soon as the cliffs ended Elson went ahead by trail and set ambush at Stony Brook Camp Pool. At 3:45 a female and 3 ducklings came down and were shot. The drivers had not seen these ducks again but they were apparently running only 5 or 10 minutes ahead of the drive. Judging by the various sizes represented, the group was composed of surviving ducklings of 2 different broods. The stomachs contained: 1 parr, 1 Couesius; 1 parr; 1 parr and unidentified fish remains; the female's stomach contained 1 parr. Thus, even though other species of fish were present, salmon parr formed the principle food item of these few ducks.

Daily summary of ducks: sight records - 6 or more; estimated number - 4; killed - 1 female plus 3 young.

4. LOWER MAIN RIVER (Stony Brook Camp (mile 25½) to Sevogle River (mile 0)).

(July 26 - 31: from records of Dr. V. E. F. Solman and Mr. Neil MacEachern, who jointly took charge during this period.)

July 26.

Trip - Stony Brook Camp (mile 25½) to Little River (mile 20½).

Stream. Moderately swift; mostly under 3 feet deep; bottom of cobbles and gravel with occasional boulders and bedrock and with pools every mile or two; excellent spawning and rearing ground for salmon. Temperatures - at Little River (5:25 p.m.) air, 65.5°F.; main river above Little River, 67.0; Little River, 63.5.

Fish. No report.

Ducks. One brood of 9 to 11 young seen above Little River, but not shot at.

Daily summary of ducks: sight records and estimated number - 9 to 11 young.

July 27.

Trip - Little River (mile 20½) to Hawthorne Pool (mile 14), about 1 mile below mouth of Tomogomops River. (Note: in covering tributaries and adjacent river it is preferable, where overnight stops are necessary, to camp at the mouth of the tributary rather than some distance away; this is to forestall escape of ducks up an unwatched stream. An unguarded net set across any stream is probably not a very effective barrier to birds moving along the stream unless the birds are so pressed and frightened as to rush into the net. P.F.E.)

River. Moderately swift but with a little less gradient than above and with considerable long, shallow, relatively slow-flowing stretches; bottom of mixed stones and gravel; pools every couple of miles. Temperatures - at Little River (9:50 a.m.) air, 63°F.; main river, 59.5; Little River, 57.0; (2:25 p.m.), air, 71.0; main river, 67.0; (5:30 p.m.) air, 74.0; main river, 70.5; Tomogomops River, 69.5°F.

Ducks. "Below Little River one female and four ducklings were sighted. The female and two young were killed. About ½ mile below the Tomogomops a female and 9 ducklings were seen. This female and 5 young were killed. Two nets were stretched end to end across the main river just above the Tomogomops to prevent ducklings from returning upstream" (- from record by Neil MacEachern). Solman stated that 2 additional young from the first brood were wounded and later recovered dead against the net set across the river at the Tomogomops (on July 29). He also listed 4 additional young from the second brood as possibly wounded.

Daily summary of ducks: sight records - 2 adults plus 13 young (in 2 broods); killed - 2 females and 9 young; possibly wounded - 4 young.

July 28.

Patrol of Tomogomops River (see "Tributaries").

July 29.

Patrol of Tomogomops and return to Hawthorne pool.

Ducks. On main river - sighted 10 ducklings below Tomogomops and killed 1 (V.E.F.S.); sighted 3 ducklings below Tomogomops and killed 1 (N. MacE.).

Daily summary of ducks (for main river only): sight records - 13 ducklings; estimated number - 10; killed - 1.

July 30.

In camp at Hawthorne Pool; heavy rains all day. (The facilities of Camp Kingston at Hawthorne Pool were extended by Dr. L. Kingston through his brother C. Kingston.)

July 31.

Trip - Hawthorne Pool (mile 14) to Portage River (mile 13) and up Portage River about 4 miles to above its first fork; then return to mouth of Portage (see "Tributaries"). (Elson rejoined party at Portage River Camp.)

River. Similar to part immediately above but becoming a little wider (100 to 200 feet).

Ducks. No ducks, or sign, seen on main river.

August 1.

Trip - Stickney (mile 16½) to Portage River (mile 13) and Portage River to Wayerton Bridge (mile 6¼). Elson and Matchett left camp at 8:20 a.m., drove down to H. Urquhart's farm and walked across to Stickney (about 2 miles via woods road to shortcut about 5 miles of river); from Stickney patrolled upriver about ½ mile, then floated downriver in Urquhart's flat-boat. Reached Tomogomops at 11:50 a.m.; Hawthorne Pool at 12:15 p.m.; Portage River at 12:45 p.m. Left Portage River camp at 2:00 p.m., 2 men each travelling in the flat-boat and a plywood canoe and 2 others travelling down by car along the right-bank road. Stops were made at the John Allison field (mile 11½), Paul Kingston's (mile 8½) and at the narrows above Wayerton Bridge (mile 6¼). The men travelling overland either set nets or waited in ambush while the boat parties came down to them at each stop. On leaving the various stops, the boat parties allowed sufficient time for the overland party to reach the next destination before pushing off; this was to assure that ducks between stops would be properly intercepted. Camp was made at Wayerton at 6:35 p.m. From 8:00 to 9:30 p.m. a patrol was made by canoe and car from Wayerton Bridge down about 1½ miles to D. A. Stuart's farm (near the head of Copp's island at mile 4½).

River. From Stickney to Portage River the Northwest is a wide, (100 to 175 ft.), fast-flowing stream with a bed of mixed cobbles and gravel and only occasional boulders (Fig. 11). There are large pools about 1 mile apart and some smaller pools in between.

Below Portage the gradient is a little less rapid but otherwise the stream continues to be similar except that its width is greater in some places (Fig. 12). Near Wayerton, the region of continuous settlement begins. In this region the entire stream looks like excellent rearing ground for salmon; it is said locally, however, that only the late-running fish use the lower part of the river for spawning, and both natives and non-resident anglers question the value of this part of the river for producing stocks which will contribute to either sport or commercial fisheries. Mid-summer water temperatures apparently rise too high for good angling, but not so high as to interfere with good growth of the young, judging by parr collected later. Temperatures - main river above Tomogomops (11:50 a.m.), 18.0°C; Tomogomops River, 17.0; main river at Wayerton (7:45 p.m.), 19.5°C.

Fish. Salmon and grilse were seen in the Hawthorne Pool, including 1 salmon with a white tag presumably attached at the trap nearly 14 miles below. In the Flat Pool (mile 12½), 1 tagged salmon, 2 tagged grilse and about 20 untagged grilse and salmon were seen. A few parr were noted between Tomogomops and Portage but this part of the river should support much more abundant numbers than were indicated.

Birds (other than ducks). Kingfishers. Four kingfishers were seen during the first hour of the trip from Stickney. No attempt was made to keep accurate count of these birds during the patrol of the river, since their habit of flying back and forth over the banks means that very careful observation is necessary in order to arrive at a good estimate of numbers. In general, however, some kingfishers were seen all along the river but the numbers were not large - perhaps 1 pair to 5 or 10 miles of river; (on the Pollett River, before control of kingfishers was instituted, the nesting birds were from 2 to 5 times as common). The potential depredation on young salmon by such a stock of kingfishers is relatively small compared to that possible by the merganser populations found. Bald eagles were seen on several occasions during the patrol, including one seen between the Tomogomops and Portage Rivers on both July 29 and Aug. 1. Usually, when these birds were seen, merganser ducklings were located nearby. White (11) lists these birds as an enemy of the merganser, but Wright (13), in a limited study, found that they preferred fish to ducks, as prey. In any case, the eagles on the Northwest Miramichi in 1950 did not exert sufficient control on the mergansers to give a heavy parr production.

Ducks. No ducks were seen in the Stickney to Portage area, although 4 wounded ducklings and 2 to 9 unwounded were reported left near the Tomogomops on July 27 and 29. At the Flat Pool (mile 12½) a flock of about 20 young was frightened and ran downstream. After a 10-minute wait the drive followed to the net at mile 11½. The birds hit the net in a group and the combined momentum of their run lifted the foot of the net so that some were able to dive under and escaped below. A female and 9 young were netted or shot; 2 young, possibly wounded, escaped up river; 6 to

9 young escaped below. (Six young, presumably the survivors of this flock, were found about a mile below on August 3 and removed.) Six or more young were seen below Urquhart's Pool and ran downstream but were lost before they reached the net at Paul Kingston's (mile 8½). The net was then set above Wayerton Bridge (at mile 6¼) and the drive reached there at 6:35 p.m., but no more ducks were encountered.

After supper a canoe trip was made from Wayerton to Stewart's farm, with ambush set at the lower end. The drivers encountered 2 broods of female plus 7 young and female plus 16 young. Of these, 7 young were killed and 3 possibly wounded.

Daily summary of ducks: Sight records - 3 females plus about 70 young; estimated number - about 45 ducks; killed - 1 female plus 16 young; possibly wounded - 5 young.

August 2.

Trip - Wayerton Bridge (mile 6¼) to Salmon trap (mile 0) to Jim Hare's Landing (mile -2½). Two drivers travelled in the canoe and 3 men, to set nets or ambush, by car. Stops were made at Howard Copp's (mile 4½), Trout Brook (mile 3), Herb. Esty's (mile 2), Sutherland's (mile 1), Salmon trap (mile 0) and Little Sevogle (mile -1¾); the canoe was removed from the water at Jim Hare's Landing (mile -2½).

River. The stream is increasingly wide until below the Big Sevogle it averages 50 to 100 yards wide. Except for a ½-mile stretch of bed rock just above the Sevogle, the bottom is of stones and gravel with occasional rock and boulders; it should be good parr-rearing water throughout. There are some quite large pools, of which the Big Hole (about mile -½) is outstanding, being up to 20 feet deep and about ¼-mile long, with cliffs on both banks.

Fish. Not many small fish of any species were observed in this stretch during the merganser patrol. Detailed information on the fish observed near the trap is available through other reports.

Ducks. Above Howard Copp's the drivers shot 1 female and later saw 15 to 18 ducklings below; still later they saw 1 female with 6 young and shot 1 young. They eventually drove 1 female and 12 young into the ambush at Copp's Islands; of these, 6 young were killed but the female, repeatedly shot at, was not seen to fall; 2 young were possibly wounded. The remaining ducklings hid in bushes along the bank and when, after a 1-hour wait, none were seen, the drive moved on.

Between Trout Brook and Esty's the drivers saw and lost a female and about a dozen young. No additional ducks were seen down to the salmon trap, but S. Sedgewick reported that he had killed a female and captured 5 young in the trap from a descending brood of 18; the balance of this brood was presumed to have remained above the trap.

Daily summary of ducks: sight records - 3 females plus about 50 young; estimated number - about 25 ducks; killed - 1 female and 7 young; possibly wounded - 2 young.

No ducks were seen between the Salmon trap and the Little Sevogle River.

During both the 1949 survey and the 1950 patrol, mergansers were found to be abundant in the Wayerton-Sevogle area. In several places the stream is broken into multiple channels by islands, which makes coverage of the water difficult. In both years the hunting of broods here proved uncertain and unsatisfactory, although on practically every visit ducks were found in these places. Further experience should show ways for more thoroughly removing the birds in such places.

At this time it was estimated that the drive had left about 29 ducklings and 1 adult merganser between the Portage and the Salmon trap, of which some had probably been wounded.

August 3.

Dr. Solman left the drive to return to Ottawa. C. Kingston had left at Wayerton and the teamster was discharged at the head of settlement (Portage River). This left a working crew of 4 men, as originally specified.

Trip - repeat patrol from Portage River to Trout Brook. The crew worked in two parties, one travelling by canoe, the other by car. Nets were set or ambushes laid at the John Allison Place (mile 11½); foot of MacLaughlin's Island (mile 10); Paul Kingston's (mile 8¼); Wayerton narrows (mile 6¼); Howard Copp's (mile 4½) and Trout Brook narrows (mile 3¼). The patrol lasted from 10:00 a.m. to 9:30 p.m.

Fish. Three tagged grilse were seen above Urquhart's Pool and one very large (untagged) salmon in Stuart's Pool.

Ducks. No ducks were seen until MacLaughlin's Island was reached, although an eagle coursing the river just above the island may have indicated the presence of ducklings. At the foot of MacLaughlin's Island 6 ducklings were seen by the ambushers as they were preparing to set the net. One man moved about 100 yds. downstream, keeping hidden in bushes, while the other remained hidden on the bank just above the roosting ducks. When the lower man showed himself the ducks swam slowly upstream; all 6 were hit by shot as they moved past the upper gun but only 3 were killed and recovered immediately; 1 wounded bird escaped upstream; 2 more were hunted out and killed in the bank vegetation between the shooters after a 1-hour wait. This action probably completed elimination of the entire group seen just below the Portage River on August 1.

At Trout Brook, 1 young was seen swimming downstream but no shots were fired; a female duck was seen and shot at but apparently missed.

Daily summary of ducks: sight records - 1 female plus 7 young; estimated number - 8 ducks; killed - 5 young; wounded - 1 young.

August 4.

Trip - Copp's Island (mile 4½) to Jim Hare's Landing (mile -2½). The whole crew hunted around Copp's Island for 1½ hours. Then the canoe was taken ½ mile further upstream and launched with 2 drivers. Ambushes were set at Copp's Island, Trout Brook, the Salmon trap, Little Sevogle and Hare's Landing.

Ducks. Although a female and 3 ducklings were reported to have been seen at Copp's Island yesterday, no sign of these birds was picked up today. No other birds were seen above the trap. A flock of about 15 young was reported seen at the Big Hole by swimmers, but the drivers saw no sign of these birds; presumably the ducks had moved into the Sevogle or into one of the frequent back-channels (bogans). After supper the trip below the trap was repeated. One female and 6 young were driven to Hare's Landing where 3 young were killed. The others were believed wounded but 2 were not seen again. The female and 1 wounded young were seen but lost again at Sandy Landing (mile-2).

Daily summary of ducks: No ducks were seen above the trap. Below the trap - sight records - 1 female and 6 young; estimated number - 7; killed 3 young; possibly wounded - 3 young. Since these ducks were below the regular patrol stretch and could possibly have come from the Sevogle, they are not counted as birds removed from the study section of the Northwest Miramichi, which has its lower end at the Salmon trap.

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This, with the addition of the patrol of the tributaries, completed the 1950 merganser patrol on the Northwest Miramichi River. In addition to the ducks listed above, 29 mergansers were killed above the trap by S. Sedgwick and Fisheries Inspector MacIvor, between August 4 and September 2.

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5. PRINCIPAL TRIBUTARIES below THE FORKS.

(From notes by N. MacEachern and Dr. V.E.F.Solman)

LITTLE RIVER

Little River is the uppermost of the 3 large tributaries entering the Northwest Miramichi below the Forks. Its confluence

with the Northwest is about 5 miles below the Gorge section (at mile 20½). It was reached by striking across country from Mountain Brook (mile 28¾), just below Dam Camp. Judging from the map, the distance should be about 2 miles, but the rough, forested terrain made travel slow and precise location uncertain. After striking Little River the party travelled downstream to meet the main drive at the confluence with the Northwest on the second day. This concurrent drive of the 2 streams was designed to prevent ducks from escaping up either branch if they should be driven down the other.

Although no ducks were seen in 1950, it is desirable that patrol of the lower 7 or 8 miles of this stream be continued until it can be established whether the stream is normally used by mergansers as a breeding area. Fall-running salmon are reported to spawn in the stream (salmon-rearing was confirmed by 1951 seining studies) so that protection both for these stocks and for those in the main river below would be afforded, if ducks are found.

Mr. MacEachern's record of the trip follows:

"July 25/50: Floyd Matchett and myself left the Dam Camp at 10 o'clock. We cut inland and proceeded in a northeasterly direction, following an old wood road for approximately a mile and a half. Then it was necessary to leave the road to keep our northeasterly course. Travelling was very rough through second growth soft wood for about one mile. We cut around a swampy area and crossed over a ridge and arrived at Little River.

It took two and a half hours to come about 2½ miles. The woods were very thick after we left the road but I think this is the shortest route to Little River.

At this spot the river was about 15-18 feet wide and the river bed was composed mostly of rock and boulders mixed with some gravel. The average depth of water was about 8 to 10 inches. Small growths of alders were seen along the bank. About 500 yards downstream a small stream enters on the right.

We started downstream about 1:30 p.m. Walking was very difficult due to the slippery rocks. About two miles downstream the river widens out to about 20-25 feet. The river bed is now made up of only rock and boulders. About 3 miles downstream a beaver dam had the water backed up to a height of 3 feet. A trout, 5 inches long, was noticed below the dam but no fish were observed before this. A small brook enters on the right about ½ mile below the dam. Another beaver dam was found about 4½ miles downstream. Most of the river is very crooked but about 6 miles downstream we came upon a straight stretch of river ¼ mile long and running about due east. After walking 8 or 9 miles it was necessary to make camp due to darkness.

"July 26/50: We continued downstream about 2 miles and arrived at the N. W. Miramichi. The last part of the river is about 25-30 feet wide and the river bed contains about 75% boulders and 25% gravel. Alders line the shore.

We covered approximately 10 miles of stream. NO DUCKS OR SIGNS OF DUCKS WERE SEEN. Walking was very slow due to the rocky river bed and the water was too shallow to use a canoe or rubber boat. The majority of the river bed is composed of round boulders." (Note: Judging by the description of the route and by reference to the map, the patrol covered the lower 7, or possibly 8, miles of Little River. P. F. E.).

TOMOGOMOPS RIVER

The Tomogomops is the largest of the three small rivers entering the lower part of the main Northwest Miramichi. Its confluence is at mile 15 above the Sevogle. It is not readily accessible by cross-country travel and the simplest way of patrolling it was to walk up from the mouth and return again by the river. Mr. MacEachern's account is given below.

"July 27/50: Two nets were placed across the main river (Northwest Miramichi) just above the Tomogomops to prevent ducks from returning upstream." (Four ducklings were presumed to have been driven down the main river past the mouth of the Tomogomops. After setting the net the party moved on down the main river about 1 mile to Camp Kingston for the night; see diary for this date concerning the main river. P.F.E.)

"July 28/50: One man was left to watch the net and four of us started up the Tomogomops. The average width of the river for the first mile is about 23-28 feet. The river bed is made up of rocks and a small amount of gravel. Large numbers of minnows were seen along the first mile of the stream. A beaver dam, approximately 30-35 feet long and 2 feet high, was found about 1½ miles upstream. About ½ mile above the dam there is a small rapids. Above this the river bed is composed of rock and boulders. The shore is lined with alders. Average width of the river 3 miles upstream is about 20-23 feet.

Four miles upstream we saw one large duck. We reached the Forks after covering about 6 miles (5 miles according to the map; P.F.E.). We saw the duck again with 3 ducklings. The adult duck was wounded but we could not find the body. The ducklings escaped into the alders. The average width of the river in this area is about 12-20 feet. The river bed is composed of large boulders and rocks. We made camp at the Forks.

"July 29/50: Bill Curtis and I started up the North Fork while Vic Solman and Floyd Matchett walked up the South Fork 1½ miles. We walked 2 or 3 miles upstream and saw no sign of ducks. The river gradually narrows down to about 10-12 feet with very high banks on each side. The river bed is made up of rocks and boulders. The South Fork was found to be similar to the North Fork.

On the return journey to Camp Kingston we saw 3 young ducks. One was shot, the other two escaped. Two ducklings were found in the net across the main river." (See diary on main river for July 27. P.F.E.) (V.E.F.S. recorded 1 female and 4 young seen on the Tomogomops, the female being wounded and 2 young killed.)

The Tomogomops is somewhat similar to Little River. The water is shallow and the large boulders in the river bed would prevent the use of canoe or rubber boats. Walking is very difficult due to the slippery rocks and there is no trail along the bank." (For pictures of this stream see the report by Solman, pp. 21 and 22.)

Summary of ducks on the Tomogomops: sight records - 2 females plus 6 ducklings; estimated number - 1 female and 3 or 4 ducklings; killed 1 or 2 ducklings; wounded - 1 female; left on - 2 ducklings.

The Tomogomops, like Little River, is reputed to have an autumn run of salmon. It is apparently also a breeding ground for mergansers. Patrol should therefore be maintained in order to protect both the stocks in this tributary and in the main river adjacent and below. It would probably suffice to limit this patrol, each year, to whatever can be accomplished in a 2-day trip, such as was made in 1950.

The principle of setting a net to block ducks from moving along a stream, and then abandoning the net in order to camp some distance away should be discouraged! If no camp sight is readily available at the site of the barrier, then one should be made; camp and barrier should be so located that the person staying on guard can see barrier and both streams, preferably having barrier and the confluence within easy gunshot. The unguarded net cannot be regarded as a barrier to movement of ducks, since when not under pressure of a drive the birds are likely to approach the net carefully and find their way around the ends, even taking to the bank to do so.

PORTAGE RIVER

About 4 miles of this stream were covered on July 31. No mergansers were seen, but 4 black ducks and one wood duck were noted. In its lower reaches this stream is deep, slow-flowing and has boggy banks. It does not appear to be the type of habitat with which American mergansers are usually associated, although the crested (or red-breasted) merganser (M. serrator) does occur in such habitats and if reared there would be capable of damaging salmon stocks when the brood moved into adjacent salmon-rearing waters. A single day could well be devoted to patrol of this stream for several years,

until there is better basis for judging its importance for producing mergansers. This stream also is said to have a small run of fall salmon. A road along the lower 4 or 5 miles of the stream makes it reasonably accessible on foot but because of the deep water and boggy banks a portable boat seems to be a necessity for actual patrol of the stream. (For pictures of this stream see Solman's report, pp. 20 and 21.)

Summary of ducks on tributaries:

Little River - no ducks or sign seen.

Tomogomops - 1 female and 3 or 4 young seen; female and 1 or 2 young killed; 2 young escaped.

Portage - no mergansers or sign seen.

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GENERAL CONSIDERATIONS

The experience gained during the 1950 merganser control campaign on the Northwest Miramichi should assist in planning better programs for the future. It should be emphasized that the 1950 patrol was somewhat exploratory in nature in respect to both territory covered and methods employed. Only one man with previous experience in this type of work was included in the party. Because of the desirability of having representatives from several organizations along, the party was cumbersomely large. This and time demands on some members, as well as the lack of familiarity with the ground to be covered, resulted in a lack of flexibility in the program; this in turn meant that some ducks believed present were not hunted sufficiently hard.

The original plan of a 4-man patrol party should serve as a basis for planning future patrols. The additional assistance of a teamster will be required for those places far from car access. Some consideration, however, should be given to the possibility of replacing the team transport with canoe transport; this would permit greater flexibility of programs. On the upper reaches and down to Dam Camp good control could probably be obtained by using a 3-man crew, 1 man only remaining at the Forks while the South Branch is covered. A similar scheme could be used in covering the other tributaries, or for greater speed a 4-man crew could be used to cover tributaries and main river just above simultaneously, using two 2-man parties.

More care should be taken to assure that water already covered is carefully guarded when 2 patrol parties are approaching each other at mouths of tributaries. Where overnight camps are necessary at such locations, they should be located at or just above the mouths of tributaries, not some distance below.

It would be desirable to dispense with boats through the Gorge section, or at least assure that one man can constantly give full attention to watching for birds.

On the river above the Gorge section and particularly above the Forks, it would be desirable to have the program sufficiently flexible in respect to time demands that more than one day can be devoted to particular reaches in case broods are indicated as present but not immediately removed. It might, for example, be advisable to have men lie in ambush 2 or 3 miles apart until such a brood is located and removed, even though this required 2 or 3 days being spent on one 5-mile stretch.

When travel presents no difficult problems it may often be advantageous to leave a shot-up brood undisturbed for a day or two before returning to hunt them down; mergansers are wild and wary birds. Such practice may, however, be impractical for headwaters which are relatively difficult of access, especially if very few birds are involved.

It is recommended that an account of the procedure used on all patrols should be kept, in addition to records of birds encountered and removed. Such accounts would have value for revising procedures towards developing a practical management practice.

APPENDIX 1.

SUMMARY OF MERGANSERS ENCOUNTERED ON THE NORTHWEST MIRAMICHI - 1950.

The table below gives a summary of birds encountered on the patrol to remove broods and indicates the number of birds eliminated from the river above its confluence with the Sevogle, both on the drive and subsequently. A comparison of sight records, i.e. each sighting of a bird, with the estimate of the number of birds involved gives some indication of the difficulties in estimating the number of birds on a stream: on the average, each bird encountered was seen twice before its removal or its escape from the patrol. Since a few of the birds believed killed were not recovered, the list may include some slight errors; the list of wounded birds also involves some uncertainty, but because birds struck by shot sometimes do not show any immediate sign of wounding, and since young birds were often fired upon while in closely-packed groups, these figures are probably an underestimate, as far as they are inaccurate. In general, the figures given are probably a fairly good approximation of the number of birds encountered and removed. No birds removed from below the salmon-counting weir near the Sevogle are included.

The table has been compiled not only to provide a synopsis of the 1950 operations but also to facilitate year-to-year comparisons of duck populations and effectiveness of control operations against them.

MERGANSERS ENCOUNTERED ON THE NORTHWEST MIRAMICHI RIVER - 1950.

A. On drive, July 13 - Aug. 4.

	sight or sign records	estimated no. of ducks	no. killed	wounded (probably killed)	considered removed	believed to remain
ABOVE FORKS						
Females with broods	3	3	2	0	2	1
Females without broods	0	0	0	0	0	0
Young	40	28	7	3	10	18
Totals	43	31	9	3	12	19
UPPER MAIN RIVER						
Females with broods	0	0	0	0	0	0
Females without broods	22	8	1	1	2	6
Young	0	0	0	0	0	0
Totals	22	8	1	1	2	6
GORGE SECTION						
Females with broods	2	1	1	0	1	0
Females without broods	1	1	0	0	0	1
Young	6	3	3	0	3	0
Totals	9	5	4	0	4	1
LOWER MAIN RIVER						
Females with broods	10	7	5	0	5	2
Females without broods	0	0	0	0	0	0
Young	177	76	43	12	55	21
Totals	187	83	48	12	60	23
TRIBUTARIES BELOW FORKS						
Females with broods	2	1	0	1	1	0
Females without broods	0	0	0	0	0	0
Young	6	4	2	0	2	2
Totals	8	5	2	1	3	2
TOTAL FOR RIVER						
Females with broods	17	12	8	1	9	3
Females without broods	23	9	1	1	2	7
Young	223	111	55	15	70	41
Totals	263	132	64	17	81	51

B. Removed above counting weir, Aug. 4 to Sept. 30.

Young		29		29	
OVERALL SUMMARY	132	93	17	110	22

removed during drive - 81 ducks or about 61% of those seen.
total removed - 110 ducks or about 83% of those seen.

APPENDIX 2.

TIME TABLE OF MERGANSER PATROL IN 1950

A synopsis of the patrol to remove mergansers from the Northwest Miramichi in 1950 may be useful for comparing the methods employed and results obtained with the methods and results for subsequent years. Such records will show the basis for later modifications or innovations in procedure and thus facilitate the development of a management practice.

A. TRIP TO HEADWATERS

July 14-16 (3 days): the portage wagon travelled to Esty's Camp, Forty-two and Little Bald Mountain on successive days; the patrol party joined the wagon on July 15 and accompanied it to Little Bald. (Each day's trip was about 12 miles long and over unsettled country with very rough portage trails.)

B. PATROL OF THE RIVER

Throughout the trip down river the patrol party consisted of 6 men. Travelling was by walking and by inflatable rubber boat (one 7-man and one 5-man size). Except in the Gorge Section, the boats were a convenience for carrying both supplies and men; not infrequently the whole party was able to ride. Where overnight stops away from portage roads were necessary (as at the Forks) the boats were a necessity for carrying gear in order that some men be unencumbered for hunting. Through the rough Gorge Section the boats required so much attention that they were a handicap to efficient hunting.

1. ABOVE FORKS

July 17-20 (4 days, of which 1 was spent in camp): one day walking 5 miles above Little Bald Mountain and back by river; one day patrolling from Little Bald Mountain to the Forks (carried camping gear in the boats); one day walking 4 miles up the South Branch and patrolling down it to the Forks, with a concurrent repeat patrol on the lower 2 miles of the North Branch.

2. UPPER MAIN RIVER

July 21, 22 (2 days): one day patrolling from Forks to Forty-two, where it had been agreed to meet the portage wagon; one day from Forty-two to Camp Adam.

3. GORGE SECTION

July 23-25 (3 days, of which 1 was spent in camp): one day from Camp Adam to Dam Camp; one day resting at Dam Camp; one day

from Dam Camp to Stony Brook Camp (with concurrent patrol on upper part of Little River - see "Tributaries").

4. LOWER MAIN RIVER

July 26,27,30,31 and Aug. 1-4, (8 days of which 1 was spent in camp, 2½ doing repeat patrols below Stickney and nearly all of another day doing the Portage, i.e., about 4 days making one coverage of this part of the main river): one day from Stony Brook Camp to Little River; one day from Little River to Hawthorne Pool (1 mile below Tomogomops); one day in camp at Hawthorne Pool; one day from Hawthorne to Portage and patrolling Portage (see "Tributaries"); one day repeating from Stickney to Portage and patrolling on down to Wayerton; one day from Wayerton to below the salmon trap; two days on repeat patrols from Portage to Trout Bk. and Copp's Islands (1 mile above Trout Brook) to below the trap.

5. TRIBUTARIES BELOW FORKS

Little River - July 25,26, (2 days, concurrent with main river drive): first day from Mountain Brook (near Dam Camp) across to Little River and down this about 6 miles; second day about 2 miles down to mouth of Little River and waited for arrival of main party from Stony Brook.

Tomogomops - July 28,29, (2 days): one day walking up to 1st forks from the mouth; second day, on up each branch about 2 miles (a 2-man party to each branch) then return by river to the mouth and on down to Hawthorne Pool.

Portage - July 31 (1 day): patrolled 1 mile of main river from Hawthorne Pool down to Portage mouth, then up this stream about 4 miles and back again.

Time taken for the entire patrol was 22 days (July 14 - August 4) with 3 days out for rests (at Little Bald Mountain, Dam Camp and Hawthorne Pool).

APPENDIX 3.

DESCRIPTION OF THE NORTHWEST MIRAMICHI ABOVE THE SEVOGLE

Notes on the general character of this well-known salmon stream are included in the Daily Diary in the main body of this report. This brief summary is offered as being of possible use for ready comparison with other salmon waters. The excellent description given by Ganong in 1904 (6) is still applicable in most respects. With extensive lumbering operations beginning on the upper reaches in 1951, it will be of some value to observe whether the general character of the stream becomes altered in the future.

Width. Down as far as the Forks the stream bed is relatively narrow (20 to 30 feet) and frequently overhung by alders. It presents the appearance of a stream which has not been subjected to log drives and following erosion of the banks (1). As far as could be learned there have never been log drives on the North Branch above the Forks. Below the Forks the stream rapidly widens to about 60 to 120 feet. In the Gorge section it narrows to about 75 feet and below this it again widens to about 100 to 200 feet between banks.

Depth. The river is relatively shallow throughout its course, averaging about 1-2 feet at summer level in the headwaters and 2-3 feet in the lower reaches. The frequent pools (approximately 1 per mile) are 4-6 feet deep in the upper reaches and 6-10 feet in the Gorge section and lower reaches.

Rate of flow. The river flows rather rapidly throughout its course, though only in the Gorge section does it become really precipitous; there it is characterized by frequent cascades and occasional low falls. There are no barriers to movement of salmon and trout, but the combination of low falls and cascades apparently prevents access to the upper reaches for suckers and cyprinids and at least limits access for eels. There are no long dead-water areas, such as characterize many Maritime streams. Some idea of the rate of flow may be gleaned from the fact that Ganong was able to make a canoe trip down the entire stream with only 2 relatively short portages, both in the Gorge section.

Bottom. The bottom in the upper reaches, is composed of small boulders, gravel and occasional bed rock. In the Gorge section there is relatively little gravel and much broken boulder and bed rock. The lower reaches have abundant gravel interspersed with small boulders and only occasional areas of bed rock extending part way across the stream.

Water temperatures. During the time of the merganser campaign relatively cool weather prevailed and the water temperatures recorded may be slightly lower than the usual summer ranges. Temperatures recorded are given in the diary and also tabulated in Solman's report. The general daily ranges, in summer, appear to be -

Above the Forks	50° F.	(10.0° C.)	to	60° F.	(15.6° C.)
Upper Main River	55° F.	(12.8° C.)	to	65° F.	(18.3° C.)
Gorge Section	60° F.	(15.6° C.)	to	70° F.	(21.1° C.)
Lower Main River	65° F.	(18.3° C.)	to	75° F.	(23.9° C.)

Suitability for salmon. The entire stream is well interspersed with suitable spawning ground (gravel) for salmon, except in the Gorge section where gravel beds are relatively limited in extent. All of it, including the Gorge area, provides excellent habitat for parr. Because of the relatively lower temperature in the upper parts, it is possible that smolts reared there will require a year longer to grow than those reared in the lower reaches. Judging from descending smolts counted it would appear that the general level of smolt production has been of the order of 30- to 50,000 smolts per year. It is thought that implementation of thorough merganser control would permit an annual production of the general order of 200- to 400,000 smolts, i.e. up to one quarter of the estimated total production of the Miramichi system in 1951 (3). (Refer to later reports on parr populations found in this stream in 1950 and 1951.)

The suitability of the stream for adult salmon is demonstrated by the fact that it is one of the more popular salmon-angling streams of New Brunswick. The frequent pools and relatively low water temperatures in the middle and upper reaches undoubtedly contribute to this.

Tributaries. The large tributaries of the Northwest Miramichi proper include the South Branch, entering at the Forks; Little River; the Tomogomops River and the Portage River. The latter three enter the main river between 13 and 20 miles above the Sevogle, i.e. all in the lower reaches. All four are similar in size, averaging about 30 feet wide at their mouths. The upper 3 are relatively precipitous and consequently have much coarse boulder and bed rock and relatively little gravel. Water temperatures tend to be a few degrees lower than in nearby parts of the main river. All have some value as salmon-rearing waters, but judged by character of the streams, and by parr observed, this is less than for comparable parts of the main river. They are all relatively difficult of access, even by bush roads. The Portage differs from the other streams in having extensive stretches of deep, quiet water, and has least value as a salmon nursery. All, except possibly the Portage, are used by mergansers for rearing their broods. (Mergansers were found on Little River in 1951.) They should therefore be patrolled, at least on the lower 10 miles of stream, to provide additional bird protection for the adjacent main river.

APPENDIX 4.

EQUIPMENT AND FOOD TAKEN ON THE NORTHWEST MIRAMICHI BIRD DRIVE - 1950.

Equipping and provisioning the 7-man party for the necessary 3-week trip in the woods presented problems outside the previous experience of those in charge. Valuable suggestions were obtained by reference to a book on woods travel (9). A list of equipment, other than personal, and food taken is offered for its possible value in planning future trips.

Bird control equipment.

Shotguns - 6 (one for each man except teamster; 3 repeating guns and 3 single shots - pumps preferred because of greater firepower against broods.)

Ammunition - 4 cases (2,000 rds.) Long Range, shot size No. 7½.

Bird nets - 2 each 100 ft. x 6 ft. of 2½-inch herring net; with 400 ft. extra rope.

Pneumatic boats - 2; one 7-man and one 5-man size.

Binoculars - 1 pr.; used for identifying and counting broods at a distance, to facilitate census and stalking.

Camping equipment.

Tent - 1; canvas (10 ft. x 14 ft.).
Tarpaulins - 2; (10 ft. x 12 ft.); for tent floor and cooking fly.
Blankets - 6 pr. (2 pr. per man).
Sleeping bags - 4; (personal property).
Gasoline lantern - 1; and 2 gals of naptha gasoline.
Electric (battery) lantern - 1.
Large kettles - 2.
Small kettles - 2.
Coffee pot - 1.
Large frying pans - 2.
Enamel plates - 8.
Enamel bowls - 8.
Tin cups - 8 (pint size) seemless steel;open handles).
Cutlery - 8 sets; (knife, fork, tablespoon).
Large cooking fork - 1.
Butcher knife - 1.
10-qt. pail - 1.
Axe - 1.
Web-saw - 1.
Packsacs - 7; for personal equipment (most sacs were personal property).
First aid kits - 2 (1 large; 1 small kit for parties on side trips).

Food, etc.

About three-quarters of the items listed below were taken in at the start of the trip and arrangements were made for replenishing supplies on 2 later occasions, as the party moved down river. The foods listed provided satisfactory meals, on the whole. The high proportion of canned goods resulted in heavy and bulky loads, however. Substitution of more dehydrated items (vegetables, fruits, powdered milk and synthetic fruit drinks, etc.) would somewhat alleviate the problems of weight and bulk - if satisfactory dried substitutes can be obtained. Any ration list, however, should allow for considerable variety and for hearty meals; the days of woods-subsistence on beans, sow-belly and plum duff have been pushed into the past by bulldozers, telephones and 5-day weeks for lumbering crews.

In the list, the numbers in brackets following an item refer to units of food which were unused at the end of the trip. Provision of some extra food allowance for delays resulting from weather or other contingencies should not be neglected. The list follows the classification suggested by Kephart (9) (p. 203); the total weight under each classification is given, as well as the percentage (by weight) which this formed of the entire food supply and, for comparison, the percentage suggested by Kephart.

LIST OF FOOD FOR NORTHWEST MIRAMICHI MERGANSER PATROL - 1950
(7 men for 21 days)

Item	Units	Weight	per cent of total wt. taken on this trip	per cent of total wt. suggested by Kephart
MEATS, etc.		159 lbs.	17%	27%
bacon	20 lbs.			
ham (boneless)	44 lbs.			
Kam	12 tins			
Weiners & Beans	12 tins			
corned beef	12 tins			
Cottage Beef	6 tins			
cheese (processed)	5 lbs.			
eggs - fresh	15 doz.			
butter - tinned	12 lbs. (1)			
Crisco	6 lbs. (2)			
CEREALS, etc.		160 lbs.	17%	21%
rolled oats	5 lbs. (2)			
buckwheat flour	4 lbs.			
cornmeal	4 lbs. (2)			
Biscuit Mix	3 lbs.			
Cornflakes	6 boxes (3)			
Grapenuts Flakes	6 boxes (2)			
bread	56 loaves			

CEREALS, etc. (continued)				
sweet cookies	38 lbs.			
soda crackers	3 pkgs., large (1)			
pilot biscuits	8 pkgs.			
VEGETABLES		329 lbs.	35%	24%
potatoes	150 lbs.			
carrots	25 lbs.			
onions	25 lbs.			
peas	16 tins (2)			
string beans	16 tins (2)			
baked beans	48 tins (5)			
sauerkraut	6 tins (2)			
FRUITS		156 lbs.	17%	17%
raisins	16 pkgs.			
figs	8 pkgs.			
peaches	9 tins			
pears	9 tins			
plums	6 tins			
pineapple	6 tins			
grapefruit juice	6 tins			
blended juice	21 tins			
tomato juice	18 tins			
apple juice	21 tins			
SWEETS		52 lbs.	5%	7%
white sugar	15 lbs.			
corn syrup	16 small cans ($2\frac{1}{2}$)			
jam	3 4-lb. tins (1)			
chocolate, sweetened	28 $\frac{1}{2}$-lb. cakes (2)			
BEVERAGES		63 lbs.	7%	2%
tea	7 lbs.			
coffee	3 lbs.			
milk, condensed	48 tins (2)			
milk, powdered	1 tin			
CONDIMENTS		25 lbs.	2%	2%
salt	4 lbs.			
pepper	2 pkgs. ($1\frac{1}{2}$)			
ketchup	6 bottles (2)			
pickles, mustard	3 bottles			
pickles, mixed	3 bottles			
MISCELLANEOUS ITEMS		20 lbs.		
scouring pads, metal	6			
tea towelling	6 yds.			
soap (Lux and Ivory)	12 cakes (5)			
detergent powder	2 pkgs.			
toilet tissue	6 rolls			
matches	(9 large boxes (1)			
	(4 doz. small boxes (5)			

fly dope	7 bottles
rubber patching	1 kit
shoe oil	1 bottle
saw file	1
saw blade	1; (replacement)
Bromo Seltzer	1 bottle

****

The total weight of food taken on the trip was a little under 950 lbs. and was equivalent to an allowance of about 6½ lbs. per man per day. Kephart (p. 204) lists "light" rations of 3 lbs. per man-day and "heavy" rations of 5 lbs. per man-day, both rations providing the same amount of energy, the difference being attributed to the greater amount of canned stuff, hence variety, in the "heavy" ration. The still heavier 6½ lb. ration provided on the Northwest trip included a large amount of canned food; when a saving of weight and bulk is needed, such items should be among the first to receive critical examination.

APPENDIX 5.

COSTS OF NORTHWEST MIRAMICHI MERGANSER PATROL - 1950

The costs of the 1950 program of merganser removal on the Northwest Miramichi should be used only as a very general guide for estimating costs of control programs in the future. For one thing, the party included more men than is desirable for such an undertaking; this was to permit representation of all interested governmental organizations. Moreover, this first trip was somewhat exploratory in nature, both as to terrain covered and in the nature of the job to be done; as far as is known this was the first such large-scale removal of mergansers to be attempted.

The items listed below do not include capital costs of equipment (guns, camping equipment, etc.) nor do they include salaries of permanent governmental employees. It is believed that, eventually, control could properly be done by experienced local woodsmen working under the direction of, but without constant supervision by, the Department of Fisheries. Moreover it is quite possible that as personnel become experienced in the work the suggested crew of 4 men plus teamster could profitably be reduced to 3 or even 2 men, and some of the service provided by the team might then be dispensed with. It must, however, be emphasized that such economies should be approached gradually to avoid spending money on "control" which is not sufficiently thorough to give the desired protection to young salmon.

Item	Approximate cost
Ammunition - 4 cases @ $54 (only about 2 used)	$ 216.00
Food, etc., as listed in Appendix 3	200.00
Wages - 2 guides for 21 days @ $6.00	252.00
Teamster, 21 days @ $10.00	210.00
Car mileage on lower reaches (approx. 300 miles @ 9¢)	27.00
Miscellaneous small items	12.00
	$ 917.00

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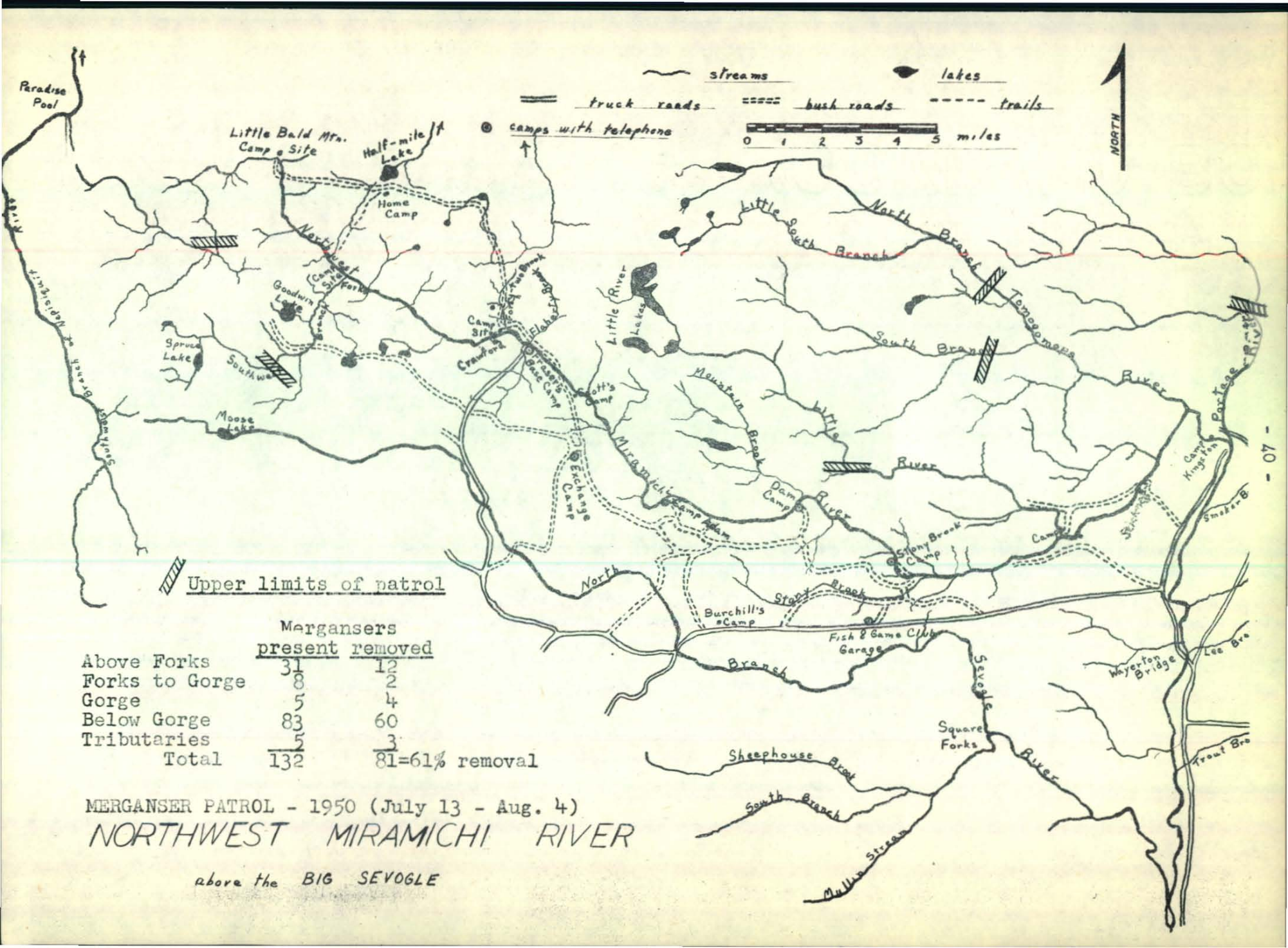

	Mergansers present	removed
Above Forks	31	12
Forks to Gorge	8	2
Gorge	5	4
Below Gorge	83	60
Tributaries	5	3
Total	132	81=61% removal

MERGANSER PATROL - 1950 (July 13 - Aug. 4)

NORTHWEST MIRAMICHI RIVER

above the BIG SEVOGLE

ILLUSTRATIONS

Northwest Miramichi Merganser Patrol - 1950.

Comprehensive series of snapshots showing the river and features of the trip are in the files of the Atlantic Biological Station and of the Canadian Wildlife Service. This selection of pictures is to show the general character of the country and of the river, proceeding down-stream.

1. The portage wagon travelling over an old burn, approaching Little Bald Mountain.

2. North Branch: upper limit of 1950 patrol (about mile 54½ above Sevogle River).

3. North Branch: merganser dung on rock in front of men indicated presence of ducks (mile 51½).

4. North Branch above the Forks; narrow, winding and overhung by alders (mile 47).

5. South Branch: upper limit of 1950 patrol (mile 49½).

6. South Branch: a typical merganser "roosting rock", showing dung splashes (mile 48).

7. Upper main river: Split Rock Pool (mile 42).

8. Upper main river: at Forty-two camp site (mile 40½).

9. Gorge section: Indian Falls near Camp Adam (mile 33).

10. Gorge section: The Narrows near lower end of this section. The "straddle-bug" walk is used by anglers where banks are not suitable for trails (mile 27).

11. Lower main river: looking across at the mouth of the Tomogomops River (mile 15).

12. Lower main river: here running through abandoned farm land at head of settlement. Note bird net set across the river (mile 11½).