

MAINE STATE LEGISLATURE

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**MAINE PUBLIC DOCUMENTS
1948-1950**

(in three volumes)

VOLUME II

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Report

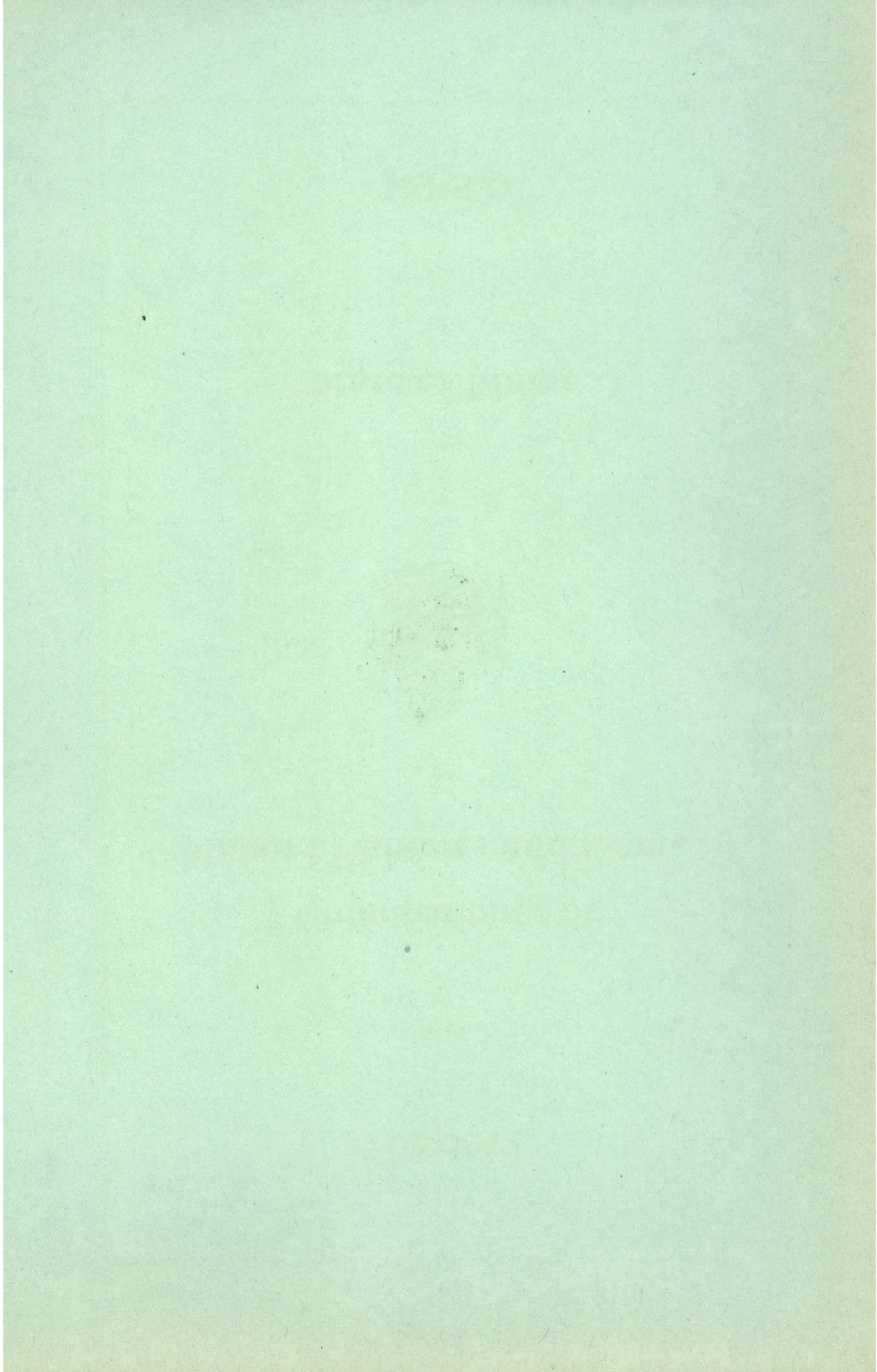
of the

Commissioner of
Inland Fisheries and Game



State of Maine

1950

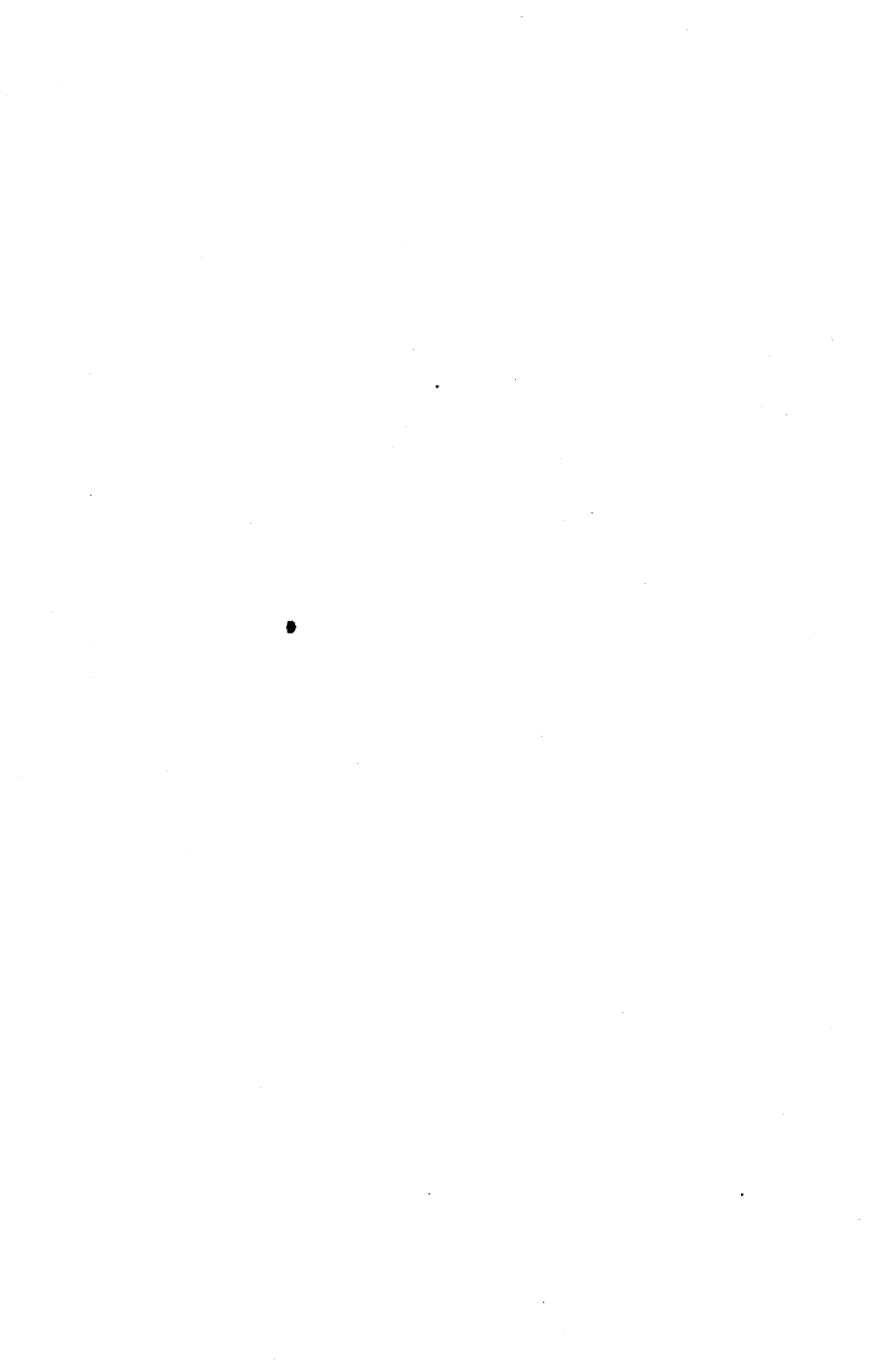


Report
of the
Commissioner of
Inland Fisheries and Game



State of Maine

1950



OFFICE OF THE COMMISSIONER
INLAND FISHERIES AND GAME DEPARTMENT
STATE HOUSE
AUGUSTA, MAINE

To His Excellency, Governor Frederick G. Payne:

Owing to the fact that I expect to retire shortly I hesitate to make any recommendations that might in any way embarrass any man taking my place. Therefore, I am holding my own recommendations to only two matters, which in my opinion are so important that they should not be neglected by anyone holding the job of Commissioner.

First, I believe that the State should in some way secure the water rights that have been handed over in the form of water power privileges so that the end of the abuse by pollution, abandoned logging dams, etc., will come to an end. It is our opinion after a summer study that at least 75% of natural spawn was lost by such conditions. If this could be corrected it will mean that the present hatchery system will take care of the situation and possibly some hatcheries could be closed.

The game conditions in the State are much better than they were when I first took office. The proof of this is the fact that the deer kill in twenty-three (23) years has gone from 8000 to over the 39,000 mark and I believe this could be increased to 50,000 if the wooded areas in the State were open only during the month of November as they are in the organized sections. Too many small deer are now taken during the first ten days of the open season. These are the only two recommendations that I wish to put emphasis on. Other matters are being studied by the Research Department and recommendations can be made by them as soon as their work is finished.

Respectfully yours,

GEORGE J. STOBIE
Commissioner

Report of Acting Deputy Commissioner

*To Hon. George J. Stobie, Commissioner of
Inland Fisheries and Game:*

Game Farm

During the regular session of the legislature in 1931, authority was granted the Commissioner of Inland Fisheries and Game to establish a game farm for experimental work in the propagation of game birds and game animals for restocking the woods and forests of the state.

Land and buildings were purchased originally at the town of Gray in the year 1932 with succeeding purchases of land in 1934 and 1938. Construction of rearing facilities was started in 1932 and an original purchase of 185 pheasants was made that year. From these birds, enough pheasants were raised so that a liberation of 1560 young birds was made in suitable covers in the southern part of the state.

An increase in the hatching and brooding facilities at the farm resulted in increased releases each year until by 1940 there were 8542 birds released. More efficient use of the equipment and enlargement of facilities resulted in 17,000 pheasants being released in the year 1949.

The unit cost of birds has gone down in spite of greatly increased food and equipment costs through the efficient and sound management of the present Superintendent of the Game Farm.

Following is a table showing the average cost per bird since 1940:

1940-1941.....	\$3.31
1941-1942.....	4.31
1942-1943.....	2.40
1943-1944.....	2.75
1944-1945.....	3.24
1945-1946.....	2.98
1946-1947.....	1.74
1947-1948.....	1.75
1948-1949.....	1.60

These figures include all construction costs for these years and because of a fire, these costs were large. Two new brooder houses were built, all new brooder stoves and an auxiliary power plant were purchased during this time.

From 1932 until 1945, there was a limitation by law of an expenditure of no more than \$10,000 per year for the operation of the game farm but in 1945 this limitation was removed and no stipulation of any certain amount is included in the present law.

Any future construction of rearing pens should be only of the covered type. This eliminates wing clipping and produces a much better bird for release. It also reduces greatly a large mortality of birds on the open, uncovered range.

Sportsmen of the state are demanding more and more birds and it would be well if a farm for rearing birds could be purchased in the central part of the state and thus save a great deal on transportation costs. This would also lessen the chance of a serious outbreak of some contagious disease that all poultry growers are subject to.

Bounties

Payment of Bob-cat bounties has been on a fairly even basis for the past ten years with a few more some years than others. For instance in 1940, there were 414 cats presented for bounty payment and in 1949, there were 486 presented. Between these years, payments have been made in one year on about 600 and in other years on less than 400 bob-cats but generally about 450 will be the average. Bounty payments certainly are not succeeding in eliminating the bob-cat problem.

Bears are increasing very rapidly and bounty payments are at an all time high. Although the law in 1940 was that bounty could be paid only in certain organized towns that were specifically opened to bounty payments. Most of the towns where bear were in any abundance were opened but only 280 bounties were paid in that year. During the year 1949, when all organized towns and adjoining townships were open, there were 1090 bounty payments made.

These bear killed for bounty are in addition to a great many killed in wild lands and other bears killed by sportsmen and upon which no bounty was claimed.

From year to year, the popularity of hunting bears by non-resident hunters has increased and now there are many hunters that come to Maine for that purpose alone.

There will probably come a time when these animals will be protected and classified as a game animal as they are in other states.

Deer Damage

During the year 1940, claims paid for damages to crops and orchards amounted to \$2,156.00 and by the year 1949, these damage payments had increased to \$50,169.22.

Legislation passed in 1947 authorized the Commissioner to participate in a fence building program for commercial orchards. Since that law was passed, nearly 50 miles of fence have been erected and have been very successful. The very large damage claims in orchards are being permanently eliminated.

Large acreages of beans have been planted during the past few years and these have been seriously damaged by deer. To meet this problem, a new repellent, developed in part by the wildlife research division of the department, has been used. This is a spray material and a taste repellent. The problem of applying it is a real one but will in time be overcome.

At present, we are using a large sprayer with farmers' tractors being used for power. We also have purchased two jeeps with fifty gallon sprayers mounted on them. Use of the spray with hand sprayers is very costly and inefficient, so if this particular spray is used in the future, it will be necessary to purchase more jeeps to transport the sprayers. It does appear that the peak has been reached on the deer damage but a search for new repellents should continue, as all repellents tried up to this time are far from perfect.

All of this increased deer damage has been during a period of greatly increased hunting pressure and large deer kills. In 1940 there were 99,701 licensed hunters who killed 22,201 deer and by 1949 there were 154,813 licensed hunters and the deer kill was 35,051.

Hunting Accidents

Accidental shootings of human beings while hunting have been the object of much investigation by members of the department and also have been greatly used by the newspapers as much for the sensational value as well as the news value.

The record in Maine has compared very favorably with any state and has I believe, improved over the years. The educational work of the department has probably saved many accidental shootings and should be stepped up. Use of radio, newspapers, posters and other means cannot be over done on this very important work.

There does seem to be a general improvement but the figures rise or fall each year when the reports come in. For instance in 1940, 99,701 licensed hunters were involved in 13 fatal and 12 non-fatal accidents; while in 1949, there were 154,813 hunters who had a total of 15 fatal and 15 non-fatal accidents which certainly shows a great reduction in the ratio of hunter to accidents.

Motor Vehicles Damaged by Protected Animals or Birds

Motor vehicle collision damage claims have increased to such an extent during the past ten years that the legislature of 1949 made a law allowing this department to pay damage claims of no more than \$100 for such collisions. This provision applies to residents of Maine and to car owners of other states that have similar laws to protect our residents when traveling in those other states. We have yet to find such a law in other states and as a result, are paying no damage claims other than to our residents.

The reason that the law was passed allowing us to pay such claims, was that previously all such claims had to go to the legislative claims committee. There were several hundred such accidents and this resulted in such a burden and was so expensive that the thought was that it would be much more economical if we paid the small claims. It was estimated that each claim before the legislature cost about \$20.00 in processing alone.

Whether this new law will cost the department more is problematical, as a great many people involved in accidents where the damage was small, would not present a claim to the legislature. Under the new law, they all present claims.

Respectfully submitted,

W. EARLE BRADBURY
Acting Deputy Commissioner

Warden Service

*To Hon. George J. Stobie,
Commissioner of Inland Fisheries and Game:*

In considering the progress of the Warden Service between July 1, 1940, and July 1, 1950, it is of course necessary to begin with the year 1940 which found the Warden Service to consist of 98 men, divided as follows: 1 Chief Warden, 12 Supervisors, and 85 District Wardens.

The duties of this service were primarily that of enforcing the laws regulating fishing and hunting. On rare occasions in response to requests of the authorities or relatives, a search for someone lost in the woods was participated in, as were occasional requests for the participation of the Warden Service in other activities. Crop damage required the attention of the wardens more than ever.

Uniforms, which had been furnished for several years, were improved and in better supply. Steps toward the procurement of more equipment were undertaken.

1941 saw the beginning of many changes in the Warden Service which were unforeseen at that time, but were due to continue for several years. On February 23, 1941, the writer was granted a Leave of Absence from his duties as Chief Warden for the purpose of entering the Armed Forces of the United States and Mr. Earle Bradbury was made Acting Chief Warden.

It must be noted that the war really began to overtake the Warden Service during this fiscal year. Five men were lost to the Army and Marines, two through retirement, and six had been transferred or resigned. The difference between the rate of pay in the Warden Service and that paid by the ship yards which were really booming at this time was so great that some men were unable to resist the temptation. The Warden Service also found itself competing with draft boards in that the age limits for the Military Service and the Warden Service were the same. The result of this competition was all in favor of the draft boards.

Because of the curtailment of Civilian traveling ability with the resulting loss of revenue to the Department, it was necessary to curtail the activities of the Warden Service to some degree. Therefore, some districts were left without wardens. The situation in regard to automobiles, tires and gasoline at this time was most difficult, and at the same time drastic budget cuts were faced with a steady increase in demands for the services of the Warden Force.

Members of the Warden Service were made State Constables and engaged in such activities as junk salvage, fire protection, assisting the Federal Bureau of Investigation and the Army Intelligence Service on special investigation work. Crop damage was at this time larger than normal with the accompanying demand for the Warden Service for the distribution and application of repellents.

During 1942, additional men were lost to the Warden Service; some were called to the Armed Services and several resigned to enter other employment. These vacancies were filled from a list of applicants for temporary employment, allowed by order of the Governor and Council on January 19, 1943.

During the year it was decided to eliminate one division and Division B at that time was broken up and men assigned to Divisions A and C. Equipment was improved by the addition of boots, shirts and parkas to the list of items furnished by the Department. Crop and orchard damages increased over any previous year. This presented a most difficult situation due to the fact that it was almost impossible to obtain suitable repellents and even those attainable were at an exorbitant price. The Warden Service was almost constantly engaged in operating with other law enforcement bodies. Much work along these lines was in cooperation with the State Police wherein several assignments of a most difficult and dangerous nature were exceptionally well handled by members of the Service.

The year 1943 was marked by the largest turnover in personnel yet experienced. In late August, Mr. Bradbury was relieved of duties as Acting Chief Warden and appointed as Acting Deputy Commissioner.

Supervisor Daniel T. Malloy was appointed Acting Chief Warden, effective September 1, 1943. Division C was reorganized in December; there now being 12 divisions with 88 districts. 27 of these districts were filled with temporary wardens whose appointments expired when the emergency was over. Many of these temporary men were too old to be eligible for permanent appointment while others were under the maximum age limit planned to take the Civil Service examination when it was given. 4 men who had returned from the Armed Forces were employed on a temporary basis. 7 wardens entered the Military Service during that period which made a total of 19 who had entered the Armed Forces. Due to the large number of new district wardens and several inexperienced supervisors, 2 of the supervisors were made Assistant Chief Wardens and assigned to duty assisting in field work, carrying on instruction at Division schools, etc. It had become more and more difficult to obtain equipment so that transportation on both land and water had become a major problem. Automobiles were

difficult to secure and outboard motors were just not available. It was during this fiscal year that the Legislature passed the law which placed the responsibility of searching for lost persons on the Warden Service through the Commissioner. It was also during this year that the Warden Service engaged in the greatest man hunt of its history. A Canadian draft dodger who had spent the winter in hiding in North Piscataquis County started traveling in search of food, shot a man and thereby became the object of an intensified search which resulted in his death.

The year beginning July 1, 1944, in the Warden Service was beset by a continuation of the difficulties experienced during the two previous years. During this fiscal year the number of temporary Wardens in the Service was greater than at any other time. The Warden Service was called upon to capture two groups of German prisoners who had escaped from the detention camps. One of these recaptures took place in northern Washington County after the prisoners had been on their way several days. The other recapture took place in northern Somerset County in midwinter when two German prisoners on improvised snowshoes had started for South America.

On June 2, 1946, temporary appointments to the Warden Service were vacated and the Service returned to a prewar Civil Service basis. All but two vacancies were filled by applicants on the Civil Service waiting list. Later that month, the employment of 10 wardens for "on the job training," under the G.I. Bill of Rights was authorized. During this period, tremendous increase in fishermen was experienced with a corresponding increase in law violations. Prosecutions for fishing without a license had reached an all time high. Illegal deer hunting had also reached a new high.

The fiscal year ending June 30, 1947, showed a marked increase over any previous year. Night hunting of deer reached a new all time high during July, August, September and October of 1946. Prosecutions for this offense totaled 335 for the year, which is almost a 100 per cent increase over any previous year. Crop damage complaints also reached an all time high during July and August, the entire time of some wardens being devoted to the distribution and application of repellents.

Under the provisions of the law passed by the previous Legislature, one Supervisor and nine District wardens were retired and the District wardens being replaced by men who had been prepared under the G.I. Training Program. Many heretofore unobtainable items of equipment were now available. The morale was excellent throughout the service; some divisions being outstanding due to a high degree of leadership displayed in certain Supervisors.

During the fiscal year which ended June 30, 1948, demands on the Warden Service showed an increase comparable to that of the previous fiscal year. Prosecutions for the year did not total as many as for the previous year which is attributable to that part of the hunting season covered by the hunting ban during the period of forest fires experienced the previous fall. During this fire period, violations were at a standstill in most areas. Crop damage complaints increased substantially during July and August and the growing season of this year, the entire time of a large portion of our Warden Service being devoted to the distribution and application of repellents.

It is interesting to note that during this fiscal year while the number of prosecutions dropped 100, several thousands of dollars more were received in fines, indicating that the prosecutions made were of a more substantial nature. During the year, several were compelled to cancel our G.I. Program of "on the job training," due to the fact that it became impossible for us to comply with the rules as laid down by the Veterans' Bureau. All equipment required in the Warden Service now became available at prices of 40 to 60 per cent over pre-war prices for an inferior quality of material.

Several warden camps were extensively repaired and the equipment renewed and improved. Three new camps were built in northern Aroostook. These camps are a most necessary item of warden equipment.

During the fiscal year ending June 30, 1949, the demands on the Warden Service showed an increase in nearly every branch of the wardens' activity. A comparison of this report with that of previous years will show an increase in the number of fishermen checked, both resident and non-resident; an increase in the number of fish taken of nearly every specie. Like increases will be found in the number of hunters and in the amount of game killed.

Prosecutions for the year reached an all time high of 1,983 as compared to 1,332 made during the previous year. The sum of \$58,109.04 was recovered as a result of prosecutions. This constitutes an increase over the previous year of \$20,502.02. This increase is attributable to improvement in the Warden Service and an increase in violations.

Crop damage complaints increased more than 4,000, but many of these complaints had to do with small gardens, so that the man hours expended were less than the previous years. Crop damage payments have been kept at a minimum, due to the distribution of repellents and exercise of a high degree of diplomacy by the wardens.

The hunting season filled the woods with an unusual number of hunters who produced the biggest deer kill of all time. The fishing

season in the spring of 1949 started slow but improved as time went on. Brook and stream fishing is still poor in some sections of the state, not having recovered from the 1947 drought; it is improving however. This poor fishing was very happily offset by excellent lake and pond fishing.

In March of 1949, a Wardens' School was conducted in Augusta, using facilities loaned by the Adjutant General's Department. The school lasted three weeks and we believe it to have been an improvement over previous efforts along this line. With the use of the facilities made available to us, we were able to conduct a school early enough in the spring so that the men returned to their stations before the rush of spring fishing started. Prior to the commencement of the Wardens' School, a three-day Supervisors' Conference was held, using the same facilities. This conference proved highly beneficial and should be continued as an annual affair.

A large amount of new equipment has been issued to the Warden Service, the most outstanding of which was the purchase and issuance of official police revolvers, caliber 38, together with belts, holsters and cartridge boxes to each man. Replacement of unserviceable clothing and equipment is a continuing process which never ends.

Extensive repairs and alterations have been made on three wardens' camps and the standard of equipment and facilities has been raised.

The morale of the Warden Service has never been as high as at the present time. The only general detriment is the inadequacy in the wardens' salary. The Commissioner has now before the Governor and Council a request for an increase which averages slightly more than 10% and we await the result with a great deal of expectancy.

REPORT OF WARDENS' ACTIVITIES—JULY 1, 1948 TO JUNE 30, 1949

Supervisor Division	Black A	Head B	Rogers C	Hanscom D	Morse E	Clark F	Foster G	Harriman H	Austin I	Brown J	Ingraham K	Gray L	Lindsay M	Turgeon Aviation	Total
Hours in Field	34,378	32,684	23,704	31,005	39,041	33,599	23,835	22,115	26,525	24,037	26,729	23,574	24,949	8,747	374,923
Mileage															
Car	270,787	219,850	180,422	204,769	236,715	179,577	147,773	129,323	77,867	119,983	127,113	148,871	160,951	18,971	2,222,972
Foot	10,417	16,898	7,689	14,124	22,596	13,877	8,710	9,263	13,820	9,581	11,319	9,103	10,532	1,385	159,314
Water	3,148	5,280	2,014	3,781	3,653	6,248	1,548	3,547	8,899	3,235	3,220	1,634	2,956	—	49,163
Other Trans.	—	18	720	8,100	—	—	7,161	3,409	31,276	33,787	7,432	700	1,100	—	93,703
Plane	—	—	—	—	—	—	—	—	—	—	—	—	—	141,223	141,223
Crop Damage:															
Number	504	2,505	830	1,350	3,506	646	99	24	1	4,333	55	380	1,861	—	12,194
Hours	680	3,908	1,619	1,627	3,469	977	266	55	4	644	70	600	1,110	—	15,029
Miles	6,758	39,142	16,076	14,685	23,263	7,243	2,699	218	10	4,512	576	5,228	10,632	—	131,042
Fishermen Checked:															
Resident	14,378	15,353	6,276	8,295	10,738	8,174	10,512	6,244	9,926	10,111	5,257	23,124	6,678	1,320	136,386
Non-resident	3,361	1,250	1,280	724	1,784	2,961	1,367	259	572	1,910	1,189	2,355	1,259	426	20,697
Hunters Checked:															
Resident	4,925	5,897	687	5,890	6,991	5,134	3,888	3,033	1,770	3,117	2,862	2,893	3,027	—	50,114
Non-resident	5,641	1,742	176	1,846	1,883	1,772	1,970	207	264	511	1,009	—	540	—	17,561
Fish Checked:															
Salmon	851	162	80	406	819	2,364	244	534	919	975	297	242	47	340	8,280
Trout	4,142	4,303	708	5,778	9,173	5,292	9,890	10,417	14,863	7,098	5,757	5,686	3,734	1,043	87,884
Togue	11	2	85	233	603	1,271	45	44	132	1,965	657	36	32	190	5,306
Bass	346	155	519	267	868	1,005	42	—	—	76	—	—	122	3	3,403
White Perch	2,449	8,195	6,759	6,152	3,226	2,911	4,959	—	—	514	346	—	855	—	36,366
Small Smelts (qts.)	3,101	755	294	1,192	1,922	685	8,923	209	15,332	10,199	468	31,207	491	3	72,859
Large Smelts (qts.)	4,349	—	64	—	97	—	—	—	—	170	1	—	8	26	4,715
Pickerel	2,531	4,682	1,047	3,172	2,337	1,959	2,295	—	—	1,060	89	520	1,286	17	20,995
Common Fish	3,637	8,737	2,826	1,424	2,130	645	1,984	392	1,566	764	72	997	2,389	15	27,578
Game Checked:															
Fox	—	41	2	11	4	8	3	—	23	1	6	3	4	4	110
Muskrat	73	291	—	484	741	683	161	47	104	200	50	40	103	—	2,977
Beaver	9	142	661	734	312	383	736	564	529	329	386	518	483	165	5,951
Mink	—	—	—	97	26	17	64	15	30	63	61	128	5	6	512
Bear	38	6	10	14	4	75	49	1	7	12	6	70	45	1	338
Rabbit	522	52	253	246	317	145	14	25	18	277	119	86	140	—	2,214
Miscellaneous	44	779	79	837	186	637	1,320	66	281	363	25	314	233	72	5,236
Geese	—	60	—	—	—	—	—	—	—	—	—	—	—	—	60
Partridge	424	149	45	389	264	525	572	568	935	392	649	153	43	42	5,150
Ducks	201	1,169	43	19	1,567	304	16	—	2	8	2	241	27	119	3,718
Woodcock	41	59	—	68	87	—	5	6	—	—	3	58	—	—	327
Pheasants	15	81	21	25	37	—	1	—	—	—	—	6	2	—	188
Miscellaneous	143	—	589	13	618	105	3	130	—	—	422	24	21	—	2,068

REPORT OF WARDENS' ACTIVITIES—JULY 1, 1948 to JUNE 30, 1949—(Continued)

Supervisor Division	Black A	Head B	Rogers C	Hanscom D	Morse E	Clark F	Foster G	Harri-man H	Austin I	Brown J	Ingra-ham K	Gray L	Lindsay M	Turgeon Aviation	Total
Certified for Bounty:															
Bear	—	—	—	86	63	47	75	36	6	32	28	65	42	—	480
Bobcat	—	2	—	36	24	19	51	13	15	20	28	50	28	—	286
Lost Persons:															
Number	—	3	—	21	40	5	4	—	—	15	8	30	12	—	138
Hours	—	4	—	202	547	54	45	—	—	87	124	18	82	—	1,164
Miles	—	75	—	986	3,450	584	201	—	—	419	516	400	623	—	7,254
Fires:															
Number	—	1	—	5	17	—	—	—	—	—	1	3	6	3	36
Hours	—	2	—	48	67	—	—	—	—	—	36	16	14	—	183
Miles	—	10	—	276	215	—	—	—	—	—	134	60	150	—	845
Camps:															
Checked	1,857	2,378	212	4,384	4,012	4,349	520	1,168	952	3,680	374	913	1,297	695	26,791
Open	12	24	—	27	53	29	—	8	17	1	10	2	14	18	215
Arrests	272	193	96	164	131	117	197	130	145	162	110	77	173	16	1,983

REPORT OF WARDENS' ACTIVITIES—JULY 1, 1949 to JUNE 30, 1950

Supervisor Division	Black A	Head B	Rogers C	Hanscom D	Morse E	Clark F	Foster G	Harri-man H	Austin I	Brown J	Ingra-ham K	Gray L	Lindsay M	Turgeon Aviation	Total
Hours in Field	73,367	33,901	25,714	32,963	36,925	29,920	25,414	24,810	28,482	22,692	25,769	26,480	25,945	9,555	421,937
Mileage:															
Car	275,055	224,211	192,924	221,176	239,391	168,712	153,271	160,833	126,639	111,994	120,379	151,419	165,374	18,735	2,330,113
Foot	9,875	17,126	9,108	14,609	22,885	15,748	8,359	10,806	14,967	9,533	11,414	10,451	10,934	810	166,625
Water	4,298	4,587	2,348	3,856	4,860	4,826	1,446	2,866	5,523	2,942	2,974	1,228	3,230	10	44,994
Other Trans.	797	450	2,075	5,272	4	—	—	3,666	46,302	45,557	7,177	—	1,500	—	125,469
Plane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	352,252
Crop Damage:															
Number	273	1,853	563	1,445	3,028	246	93	10	—	351	35	335	829	—	9,061
Hours	405	3,147	1,072	1,727	2,613	950	187	18	—	532	37	554	1,192	—	12,434
Miles	4,440	26,911	11,244	16,087	18,510	6,319	2,115	67	—	5,147	407	4,316	10,473	—	106,036
Fishermen Checked:															
Resident	15,626	16,672	6,353	8,511	13,888	5,877	10,375	7,285	10,169	8,628	5,937	8,347	7,805	877	126,350
Non-resident	3,452	1,256	811	619	2,400	2,163	639	177	764	1,984	1,382	1,786	1,303	388	19,124
Hunters Checked:															
Resident	6,054	9,085	2,912	7,163	7,974	4,676	4,129	3,957	2,285	2,651	3,352	3,263	4,299	150	61,950
Non-resident	2,982	2,291	200	1,985	1,842	1,474	1,026	217	425	618	915	1,020	775	36	15,806
Fish Checked:															
Salmon	933	206	123	308	1,407	730	155	210	869	517	313	103	102	20	5,996
Trout	3,950	3,421	904	3,578	7,951	4,102	7,192	10,708	9,948	5,120	4,284	4,420	2,691	511	68,778
Togoe	1	6	55	320	322	740	70	45	74	636	548	11	106	135	3,069
Bass	573	514	454	387	1,427	1,290	49	—	78	71	34	34	168	—	5,045
White Perch	4,754	7,928	6,041	4,860	6,496	2,286	4,634	—	59	629	247	1	1,680	8	39,623
Small Smelts (qts.)	2,906	407	449	85	1,360	42	13,702	—	7,376	3,007	66	8,125	743	—	38,269
Large Smelts (qts.)	8,357	20	213	—	52	—	21	—	38	68	25	—	—	24	8,818
Pickeral	3,447	5,630	1,551	3,186	2,671	1,363	1,903	—	787	70	605	1,416	—	2	22,631
Common Fish	7,191	9,148	2,376	1,917	2,433	162	718	374	1,011	783	58	80	3,018	2	29,291
Game Checked:															
Fox	—	102	6	4	3	7	3	4	6	10	—	1	—	30	176
Muskrat	—	3	—	—	11	—	34	6	1	7	3	—	1	2	68
Beaver	13	18	181	1,264	653	273	918	187	759	268	261	932	253	72	6,052
Mink	—	3	5	25	83	19	41	41	18	61	15	6	8	—	326
Bear	32	82	3	4	41	10	25	6	25	7	—	84	—	10	329
Rabbit	338	397	145	221	423	270	18	11	15	135	55	73	72	7	2,180
Miscellaneous	1,992	100	24	10	260	—	764	204	208	335	444	424	259	884	5,908
Geese	—	17	—	—	—	—	1	—	—	—	—	—	—	157	175
Partridge	283	121	44	540	302	370	419	955	966	319	727	244	79	184	5,553
Ducks	466	1,419	64	52	2,106	359	12	33	—	26	6	123	48	5,266	9,980
Woodcock	49	65	5	56	211	134	2	7	—	3	—	34	11	1	578
Pheasants	144	131	1	13	63	29	2	—	—	—	—	—	2	—	385
Miscellaneous	64	21	104	754	637	807	4	—	—	55	—	3	3	233	2,685

REPORT OF WARDENS' ACTIVITIES—JULY 1, 1949 TO JUNE 30, 1950—(Continued)

Supervisor Division	Black A	Head B	Rogers C	Hanscom D	Morse E	Clark F	Foster G	Harri-man H	Austin I	Brown J	Ingra-ham K	Gray L	Lindsay M	Turgeon Aviation	Total
Certified for Bounty: . .															
Bear	—	—	3	155	62	48	207	56	44	86	120	78	90	1	950
Bobcat	11	—	—	44	54	26	74	4	21	35	53	57	30	8	417
Lost Persons:															
Number	4	8	1	22	33	10	12	4	—	9	1	9	9	—	122
Hours	122	203	2	542	1,294	149	371	134	—	165	227	147	113	—	3,469
Miles	555	1,113	30	2,932	6,401	833	971	480	—	663	999	390	681	—	16,048
Fires:															
Number	1	2	—	6	22	—	—	—	—	1	1	1	—	—	34
Hours	4	—	—	—	91	—	—	—	—	—	—	—	—	—	95
Miles	16	—	—	—	481	—	—	—	—	—	—	—	—	—	497
Camps Checked:															
Number	1,794	3,009	408	3,498	4,401	3,748	480	1,690	1,072	4,293	319	537	1,688	367	27,304
Found Open	9	15	1	20	34	46	7	28	11	3	30	—	14	12	230
Arrests	340	219	110	76	95	51	127	170	117	143	84	68	128	4	1,732

Year Ending July 1, 1950

The fiscal year ending July 1, 1950, brought the usual increase in demand for Warden Service in relation to crop damage, car damage, lost persons, drowning cases and various other activities not included in law enforcement.

The increase in these incidental activities during the past ten years has been practically 100 per cent and the end is not in sight. There seems to be a tendency on the part of the public to look to the Warden Service for the solution of any problem that has to do with woods or water.

More damage complaints were received than during any previous year, but payments were kept at a minimum due to prompt action of the wardens in distributing and applying deer repellent.

Many instances of automobile collisions with deer were investigated and reported.

122 instances of lost persons were reported, and searches organized consuming 3,469 entailing 16,048 miles travel. The longest search consumed eight days, the services of twelve wardens and cost \$1,113.34; on the eighth day the lost individual was spotted from the air, brought out on a stretcher and returned to his home as soon as he was able to travel.

The change in the number of prosecutions being made for night hunting seems worthy of note. This year the total number of prosecutions was 117 against 362 of the previous year. A substantial part of this decrease may be attributed to the increase in the punishment of this offense, but it should be noted in passing that convictions are far more difficult to obtain and we feel quite confident in making a prediction that this year the number of incidents of night hunting will increase.

The Warden Service was increased to a strength of 125 (115 regulars and 10 trainees). The annual school was held at Camp Keyes during three weeks in March, using facilities of the Adjutant General's department.

This school was the most successful ever held, in that new methods of instruction were adopted and much new subject matter added. The school was in charge of Supervisor Raymond Morse as Director, assisted by Supervisors Elmer Ingraham, Charles Head, and Winfield Foster.

Equipment has been either repaired or replaced so that it is now in the best supply and condition ever.

The Service now owns and has in operation 18 automobiles, three inboard boats and 58 outboard boats. 5 airplanes, 185 canoes and 68

warden camps are owned and equipped; all of which are used and are necessary for efficient service. The value of equipment in use by the Service is in excess of one hundred seventy-five thousand dollars.

The use of airplanes as a means of conveyance to fishing grounds is increasing every year and enables hundreds of persons to enjoy fishing in our back ponds, access to which would otherwise be impossible. Airplanes available for Warden Service patrol must soon receive reinforcements if we are to exercise the present degree of control over fishing and hunting in these back areas. Ponds in the most remote areas of our wilderness are now accessible from several points in one hour's flying time. An overland trip to such ponds would necessitate a journey of three days or more. The net result of which mode of travel has not only increased the number of fishermen going to our back areas, but has made it possible for them to devote many more hours to fishing than was formerly possible; all of which places a heavy production burden in an area that was practically untouched ten years ago.

The storehouse now operated by Warden Wendell Symes continues to justify itself. The building is leased and not wholly suited to our use but is the best that can be procured conveniently near headquarters. It is the thought of the writer that a suitable building might well be constructed for this purpose, with more adequate storage space for all items of warden equipment.

During the year, the Warden Division was audited by State Auditors, whose only criticism was a suggestion for an addition to the inventory system, which suggestion has been put into effect.

A warden has been added to the Chief Warden's office force, which already consisted of one clerk financial, one clerk property record and purchasing and a secretary.

In July 1949, Warden Henry Gross was relieved of duty in Division A and assigned to headquarters as Public Relation Officer. During July and August this assignment took him into eighteen boys' and girls' summer camps where attendance was more than 1,400. At several camps repeat performances were requested.

With the beginning of the school year, a program in conservation was completed, aimed at the 8th and 9th grades. Warden Gross presented this program in more than 35 schools where attendance was more than 6,000. In nearly every instance this program was accepted by the school authorities with a great deal of enthusiasm and in many instances a desire for continuation of such a program was indicated by them.

A program aimed at adults was presented 19 times before various groups. To the writer it seems very conclusive that the most benefit to be gained through an educational program is to be derived through the public schools among children in attendance at the 8th and 9th grades, and we believe that it would be well worth-while for this program to be continued and further expanded so that the teachers, where this program has been presented, would have an outline left so that they could further pursue some studies in conservation with their classes.

In conclusion, the writer wishes to express himself as feeling that the Warden Service of this State compares most favorably with any such service in the United States, and that the citizens of Maine who have assisted in making this possible have every right to be proud of their achievement.

Respectfully submitted,

LESTER E. BROWN
Chief Warden

Hatchery Report

*To Hon. George J. Stobie,
Commissioner of Inland Fisheries and Game:*

In making this report of the activities of the Hatchery Division during the past decade, I cannot but feel that while there is still a great amount of work to be done, knowledge to be gained, problems to be solved, we in fish cultural effort in the State of Maine have made great advances—we have progressed. I base this fact not only on record of accomplishment but by comparison with what has been done in other parts of the country.

In earlier years emphasis was laid on production. Both the sporting public and the administrator were seemingly interested in how many fish could be produced annually. The hatcheryman's thinking, too, was how many eggs can I harvest, how many fish can I produce? Stress was laid on production of fry and fingerling. These ideas were consistent with the thinking of that era but the wise administrator could see the picture of the future, the environmental changes that were already taking place, the added interest of a sports-minded public making greater inroads on our natural resources. It presented a challenge to both administrator and hatchery officials alike. We must keep pace. We must have new thinking. We must develop new ideas.

The idea of raising more fish to a larger size sounds simple, but to the officials and employees it entails considerable planning and many changes, not only in technique but physical equipment as well. For instance, new type troughs were installed in several hatcheries, a new design of rearing pool introduced, nursery ponds were created, each while using the same source of water supply, independent as a unit, a radical change from the raceway type. In this way fish may be treated for any of the infections to which they are susceptible. Concrete was used to replace the old style plank pool, smaller in design, yet with greater capacity because the entire volume of water could be used by the fish and the desired depths regulated as need be. "Cleanouts" were devised and installed, making it possible for the first time to clean a series of pools from top to bottom without sending the debris from one end of the site to the other, a practice which made the fish, all along the line, have to fight continually for survival during every cleaning operation. These changes, along with an almost perfect water control system, gave us a long felt want.

In keeping with this policy of production and considering the economic value of certain units, a decision was made to overhaul the entire system and to modernize our program. This resulted in our closing or disbanding the following units: Presque Isle, Houlton, Shin Pond, Kokadjo, Machias, Cherryfield, Turner, Rumford, Rangeley, Norridgewock, Camden, Monmouth, Lovell, Belgrade, Hollis and Jackman.

In most instances these hatcheries had such inadequate water supplies that they were not economically sound and the number of fishes raised was not commensurate with the cost or overhead. Others had become obsolete. In time these units were replaced with more modern type hatcheries and stations such as Dead River, Deblois and Palermo. The wisdom of this move, I believe, is found in the fact that the annual production was and is being maintained on a fairly equal basis with greater efficiency. To substantiate this statement I submit the annual planting figures of the past ten years, the only exceptions being the latter years of the war period, during which time we were hard pressed, not only to maintain production but to operate at all, due principally to the difficulty in obtaining materials and supplies and our inability to obtain necessary labor, the latter due to the much higher wage scale paid by private industry.

1939-1940

Brook Trout	3,613,167
Brown Trout	299,625
Rainbow Trout	258,460
Togue	530,334
Landlock Salmon	2,072,222
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	6,773,808

1940-1941

Brook Trout	3,060,957
Brown Trout	714,094
Rainbow Trout	149,440
Bass	77,500
Togue	489,002
Landlock Salmon	1,719,166
Chinook Salmon	20,000
Sea Salmon	36,500
	<hr/>
	6,266,659

1941-1942

Brook Trout	3,572,494
Brown Trout	358,350
Rainbow Trout	89,340
Togue	456,800
Landlock Salmon	2,294,174
Sea Salmon	56,598
	<hr/>
	6,827,756

1942-1943

Brook Trout	2,564,310
Brown Trout	161,110
Rainbow Trout	130,750
Togue	997,600
Landlock Salmon	3,014,229
Bass	10,000
	<hr/>
	6,877,999

1943-1944

Brook Trout.....	1,215,110
Brown Trout.....	246,400
Togue.....	363,695
Landlock Salmon.....	2,271,324
Sea Salmon.....	24,000
Bass.....	26,100
	<hr/>
	4,146,629

1944-1945

Brook Trout.....	1,786,612
Brown Trout.....	145,000
Rainbow Trout.....	35,550
Togue.....	262,631
Bass.....	15,500
Sockeye Salmon.....	139,000
Landlock Salmon.....	2,447,990
Sea Salmon.....	23,000
	<hr/>
	4,855,283

1945-1946

Brook Trout.....	2,611,861
Brown Trout.....	941,000
Rainbow Trout.....	26,650
Togue.....	438,200
Bass.....	29,000
Sockeye Salmon.....	68,000
Landlock Salmon.....	2,807,700
	<hr/>
	6,923,011

1946-1947

Brook Trout.....	4,236,470
Brown Trout.....	641,000
Rainbow Trout.....	950
Togue.....	190,000
White Perch.....	8,208
Bass.....	80,000
Sockeye Salmon.....	225,000
Landlock Salmon.....	1,482,250
	<hr/>
	6,863,878

1947-1948

Brook Trout.....	4,908,001
Brown Trout.....	421,500
Rainbow Trout.....	1,300
Small Mouth Bass.....	15,000
Large Mouth Bass.....	15,000
White Perch.....	1,200
Sockeye Salmon.....	593,500
Landlock Salmon.....	3,347,700
Togue.....	30,731
	<hr/>
	9,333,932

1948-1949

Brook Trout.....	2,188,764
Brown Trout.....	1,125,000
Small Mouth Bass.....	15,139
Large Mouth Bass.....	15,000
White Perch.....	7,790
Sockeye Salmon.....	30,000
Landlock Salmon.....	2,699,505
Silver Salmon.....	55,000
Togue.....	96,000
	<hr/>
	6,232,198

While production costs have risen somewhat I do not believe that our costs show or reflect the increases so noticeable in other types of production. Despite an approximately 40 per cent increase in labor, the average salary now being paid the hatchery employee is \$38.20 as compared to \$20.65 of the pre-war era, and with the 100 per cent increase in meat costs together with the higher prices reflected in all other materials and supplies, I believe we have reason to feel that we have operated in a sound businesslike manner.

Total Operating Costs per Year

1939-1940	\$168,182.77
1940-1941	139,439.29
1941-1942	172,713.25
1942-1943	89,900.93
1943-1944	107,001.16
1944-1945	152,439.23
1945-1946	169,068.21
1946-1947	250,657.93
1947-1948	249,035.99
1948-1949	240,102.06

As we became aware of the advancing market and the shortage of materials in fish foods we immediately started out to devise a diet not only lower priced but one that would give us the necessary protein and vitamin content.

Beef liver, which is recognized by medical science for its potency as a building food, was and is being routed to the pharmaceutical houses for medicinal purposes leaving only that which is unsuitable for human consumption available for fish foods. Sheep products, such as heart and liver, are now being used by the meat packer for human consumption. To indicate how great the demand has become for liver, compare the less than 10c per pound price of ten years ago with the now over 40c per pound price. The meats that fail to pass Government inspection must be "treated" before they can be sold or trafficked in interstate commerce. The popular method of "treating" is the use of a vegetable dye. Unfortunately for us this dye must be applied at a temperature of not less than 180°. This is in a sense the cooking of this material and we believe the vitamins are thereby lost.

One other item reflects itself very broadly in the picture. In addition to several of the large packing houses, many others have gone into the manufacture of animal foods thereby competing with the fish hatchery for the same type of product. If I am correctly informed, canned dog food is the largest selling product marketed in cans.

Our diet experiments which were conducted through a complete growing season comprised several types of prepared foods. We were particularly interested in finding a diet of such balance as to produce a healthy fish rather than a quick growing one. We in Maine believe a strong vigorous fish to be far superior to one that has been raised quickly. Our efforts resulted in our getting a diet made up of meat, cereal and fish viscera, and incidentally made in the State of Maine. Satisfied now that we have what we need, we are taking steps to make this diet ourselves, the formula being that of our biologists.

In passing may I say that, in my opinion, future supplies of meats will bear watching. Science is developing more uses for so many of the so called by-products that a serious shortage may result. By the same token, of course, it is possible that science may discover and develop a complete fish food, something that as yet has not been found.

To meet the demand for more of the larger size fish it was necessary for us to increase our transportation facilities. Additional equipment was required. Where we formerly could stock our waters with three transporting units, we now employ 11 units plus the services of the department's air fleet. The planes have been found to be most valuable in transporting fish to the more inaccessible waters. Considerable experimentation was necessary before this mode of planting was adopted and results checked over a 24-hour period. Our planes are now all equipped with demountable tanks and aerating devices and employ two methods of stocking—landing on the water where practicable—and dropping the fish to the water where landing cannot be made.

A systematical biological survey of the waters of the State was instituted in 1938 and carried on until we were forced to suspend operations due to lack of trained personnel in 1942. During the four-year period many waters, both lakes and streams, were surveyed, including York, Oxford, Cumberland, Franklin, Androscoggin, Kennebec, lower Somerset, Waldo, Knox, Lincoln and Hancock. Parts of Penobscot and Piscataquis Counties were also surveyed including the Moosehead Lake waters. Much valuable information was gathered which was later compiled in book form and made available to the public. The economic value of a biological survey comes in its application to problems of fisheries management. While several individual bodies of water have been surveyed, no direct attempt has been made to reorganize a regular survey crew, due principally to the fact that most of the trained men who were formerly located in Maine have gone elsewhere because of a more attractive wage scale, several of them locating with the Federal Government. Others have taken advantage of the G. I. Bill and are furthering their education. It is to be hoped that this work can be again taken up in the near future.

The process of pond reclamation was undertaken and several ponds have been reclaimed. The general procedure is to first survey an area to determine which specie of fish is adaptable to that particular type of water. The "rough" fish are then removed by the use of a chemical and after a period of time, forage fish are introduced to be followed by a specie of game fish. The outstanding effort in this respect was

the reclaiming of Sabbathday Lake, a body of water over 380 acres in area with a maximum depth of 73 feet. Several tons of stunted perch were removed. Rotonone of 5 per cent content was used in this instance and the job was quite successful. The lake was stocked with trout the following spring and is now considered to be a good trout lake.

Warm water species such as bass and white perch which sometimes become over-abundant in some waters are being salvaged and transferred to waters of small population. In several instances the stocking of some ponds has created entirely new fishing waters.

Several of our salmon waters have been showing a food deficiency, particularly in the smelt population. To relieve this condition we have been transferring both live smelt and smelt spawn to these areas. The results in many instances have been most gratifying.

The past three years have been most trying ones for the Hatchery Division due to the drought in 1947, 1948 and 1949. Many of our streams went completely dry while others dropped to such low levels as to render them unfit to support fish life. Lakes and ponds, too, had some of the lowest elevation ever recorded, resulting in a most difficult situation as to the formulation of a stocking program.

In addition I am definitely of the opinion that the loss of fishes in their natural habitat was very heavy. The inability of spawning fish to reach the spawning grounds also resulted in severe losses, many of the fish retaining their spawn or dropping it where it would have no chance of fertility. The recovery of these waters will be slow, even if the water volume returns to normal. I believe it will take several seasons for the aquatic insect life, which is so essential, to re-establish itself. These conditions are being watched very closely, their importance not being underestimated.

Records, while of course being necessary and valuable, do not always present a complete picture of any program and one must try to recall to memory many events that the records do not contain. I have tried to make this report complete yet brief and no doubt there are omissions but an honest attempt has been made to include all of importance that has transpired.

In concluding this report I cannot help but do it with a feeling of regret, realizing as I do that it is a final report to our Commissioner who not only has been a splendid man to work with but for whose administration I have nothing but the highest respect. Mr. Stobie, may your retirement give you much happiness.

Recommendations:

We are passing through a period of rapid change in fish conservation, thinking and practice. Opinions that seem valid today may have to be discarded as fact finding gains momentum. The fisheries picture is not a static one and there is no assurance that these recommendations will be valid five or ten years hence.

There are two general considerations—management and regulation. Let's take them in that order, as each has its proper place in creating and maintaining better fishing.

Under the term management, I believe that all work pertaining to this subject should stem from a central control, and the responsibility of all fisheries activities be given that office. This would include all types of hatchery work such as egg take, capacities, personnel, construction, improvement, equipment, etc. Major repairs or changes and new construction should be, I believe, taken up for discussion with the engineers, rough plans made and then presented in detail to the Commissioner. Authorization for improvement, (minor) repair or replacement of equipment, supplies, etc., should be given to the Business Manager whose duty it would be to follow through to completion of the transaction, a complete inventory to be maintained of all purchases.

A closer working relationship should be made possible between the Warden force and the hatcheries, particularly in regard to the stocking program and a method worked out whereby the hatchery could receive information from the district Warden at a local level. I feel that no other individual is as familiar with conditions as is the Warden. We depend a lot on him and his opinions regarding conditions in his district.

Building fishways, dams or screens which comes under the jurisdiction of the Engineer should, I believe, be recorded with the Hatchery Division so that they may be informed of what is being contemplated so as to correlate this information with future stocking plans.

In the past the State of Maine has stressed the raising of fishes of a type that would survive after planting with the thought of reproduction foremost in mind. We wanted a healthy fish first and a larger fish next. I believe now that the time has come when, in order to meet public demand, we must attempt to raise some fish for size only and stock some of our waters for the creel. I appreciate that this is a radical departure from our previous practice but I feel that because of fishing pressure in some areas and of the uncertainty of the water supply in these areas that periodic stocking of a legal size fish could well be the answer. This, of course, would mean a change in hatchery procedure.

I believe we should re-establish a permanent survey crew, not only to complete a survey of waters throughout the State but also to review and recheck some of the work of the past as I feel many physical changes are taking place. This branch of the Division should be large enough to make population studies, follow-up stocking, check spawning runs, etc. I feel that our knowledge of what happens to planted fish is altogether too meagre. I would like also to include in this branch the services of a trained Parasitologist as the control of fish diseases is of utmost importance in fish culture.

The clearing of non-game fishes from small ponds by the use of chemicals would, I believe, create more local fishing grounds. I feel that there are many such waters that could be restored. Control of some species should also be undertaken in a larger sense than we do now.

My next recommendation may seem revolutionary but I believe that Maine citizens, who are noted for being practical, will recognize its advantages. As the Inland Fisheries and Game Department is to be charged with protecting and maintaining our natural fish and wild-life resources, it should also be the agency to make the necessary regulations regarding the taking of fish and game by the sportsman.

It is my belief that the delegation of this authority to the department would result in better hunting and fishing. Let us take two examples of the need of this authority. We'll assume that drought, disease or some other factor threatens the fish population of a given body of water. In the best interests of all concerned it may be necessary to temporarily close this body of water to fishing so that it will not be completely ruined for a long time to come. On the other hand let us assume that there is another body of water, perhaps an adjacent one, that is closed to fishing but which in the opinion of the department should be opened so that fishermen could enjoy the fishing it would provide. To change the regulations on either body of water under present procedure is a long, drawn out affair and often the need for the change has passed before the change can be made. In one case a body of water would be ruined for a long time. In the other, a season would have passed in which fishermen would have been deprived of sport. Thus if the department had the authority to regulate waters it would give our work of conservation and propagation much greater flexibility and would result in a greater fish population and healthier fish.

The question that immediately comes to mind is that of whether this procedure would invest the department with too much authority. I don't believe that it would. I believe there are too many checks

and controls that could be exerted by both the executive and legislative branches of government to forestall or make void any misuse of this authority at any time.

While we must think in terms of conservation we cannot neglect the economic value of fishing and hunting to the State of Maine. Fishing pressure is constantly increasing and with this increase the question of regulation assumes greater significance. The following figures very definitely indicate the trend of the public in taking advantage of this sport:

Number of Fishing Licenses Sold

1939-1940	119,099
1940-1941	129,342
1941-1942	125,620
1942-1943	95,899
1943-1944	114,947
1944-1945	124,286
1945-1946	148,661
1946-1947	162,694
1947-1948	161,081
1948-1949	174,707

Ideally each lake and stream should be regulated individually. However, in areas with many fishing waters and with a large number of transient fishermen, regulations must remain reasonably simple and moderately uniform. To have it otherwise confuses the fisherman and complicates the work of fisheries administrators.

Emphasis has been on regulating the fisherman rather than regulating the fish population. We are realizing more and more that the latter may be more significant, though admittedly, the most difficult to regulate.

Stream improvement and habitat improvement, based on the theory that better living conditions will result in greater survival of young and more and larger fish for the fisherman should be emphasized. Foremost should be pollution control, where as too often is the case, fish production is destroyed or impaired by filth and poison dumped into streams or lakes. This subject needs no further comment by me.

Restoration and preservation of forest cover on watersheds is also of vital importance.

I believe that one of the most important policies this department could establish with respect to our natural resources would be one of acquainting the citizenry with the true significance of our natural resources, then to make long range, definite plans to assure their preser-

vation. Outdoor education through the schools is one method. The need for a full time public relations man who could keep Maine people informed at all times of what we are trying to do to improve hunting and fishing is urgent. Hunters and fishermen support the Inland Fisheries and Game Department and it seems highly desirable to me that the department be given a means of giving an account of its stewardship. An informed public can wield an increasingly greater influence on the preservation of our natural resources, not only for our generation, but for those to come. Therefore, I believe a public relations man who could effect a closer liaison between this department and the man who pays the bills is a necessity. I know that you, Commissioner Stobie, are in agreement with this recommendation and have been working to make it an actuality.

Respectfully submitted,

GERRY WADE
Gen. Supt. of Hatcheries

Engineering Activities

To *Hon. George J. Stobie,*
Commissioner of Inland Fisheries and Game:

Herewith is a general report covering the engineering, construction and surveys over the past eighteen years in which I have been employed by your Department. This report will cover only in a general way the work accomplished in my department, and my recommendations which may guide the execution and planning of construction and engineering in the future.

Hatcheries and Feeding Stations

At the beginning of my employment with the Fish and Game Department, the State had many old, and some practically new, hatcheries and rearing stations. Most of these have been remodelled and enlarged to a greater capacity, where possible, and many repairs have been made.

Several new hatcheries and rearing stations have been constructed under my supervision; these are: the new hatchery at Gray, Rearing Station at New Gloucester; Hatchery at Grand Lake Stream, Birch River Station, addition to the Gorham and Squaw Brook, Lily Bay and Pleasant Pond.

The more recent stations completed were at Dead River, Deblois and Palermo. Of course, many other repairs have been made to other stations.

My recommendations on these hatcheries and rearing stations would be to hire a competent superintendent and the Department construct these projects with their own equipment and labor, instead of by contract. I believe a great saving in money can be made. I would also recommend that a maintenance crew be employed to make alterations and repairs on all stations, houses, buildings, and to travel from one section of the State to the other on such work, and this crew could be employed the year round.

Fishways

The fishways constructed over the State in the past ten years have become more popular in demand than fish screens. Many fishways have been constructed in the State, particularly for Atlantic Salmon

and trout. The entire Penobscot River was opened up for the passage of Atlantic Salmon. There were five large fishways constructed throughout this river, and financed by the dam owners and also by the Federal Government in WPA projects. The salmon have definitely found their way to the last dam up at Mattaceunk, as reported on good authority.

Many other fishways have been constructed on many streams and lakes in Maine, and it is my belief that with proper control and supervision fish will negotiate these fishways without much difficulty.

However, I do recommend that closer supervision should be made of the control of water, and the manipulation of the gates to fishway and stop planks in them. This frequent supervision should come from some person under the jurisdiction of the Department, and not by the owner of the dam.

My engineering department does not have the time to make these inspections at the time when most needed, due to other projects requiring our supervision. I realize that the Department does not have sufficient funds possibly to take these added expenses of supervision, but the demands are great and appear to be increasing for these facilities, and if not operated properly they are of little value for the propagation of fish.

I would recommend that a more clear and definite type of fishway construction be written into the fishway laws; such as a concrete type for certain heads of water, and a specified size of pool, and also the drop per pool allowed for certain species of fish. These details of construction give me more trouble with the owner of the dam than to get the owner to agree to construct the fishway in the first place.

It would be more satisfactory if the State were financially able to construct all fishways, and make alterations. When the owner builds the fishway, he feels that he has paid for its construction and therefore owns it, and he will operate the flow of water to suit his needs, rather than for the fish coming up.

Fish Screens

Many fish screens have been constructed in the past eighteen years, and many of them have gone out in high water, or rotted out, due to lack of maintenance. Some have concrete abutments and piers and some timbercribs filled with stones. Many screens were constructed of iron racks and many with wood. I believe that the oak wood screens are just as durable as the iron. Except for high water velocities, and ice or debris coming down on oak screens, they are just as efficient and will last just as long, if inverted after about ten years of wear.

I recommend that fish screen construction be discouraged as much as possible. I believe that, in most instances, fish screens do more harm than good for fish propagation. Many times, on inspection of these screens, I find fish coming upstream and behind the screen trying to get through. Most screens are put in due to some selfish interest to hold them in some pond for a fisherman's paradise, rather than to give the fish the natural run of all brooks and ponds for feed and propagation.

I further recommend that no fish screen be allowed to go before legislature for construction approval without proper investigation by a competent engineer from our Department for an estimate of its construction, location and its merits as to its worth, and this information given to the Legislative Fish and Game Committee, before its construction.

I would recommend that after the Legislature approves such fish screen, each Association, Town, or group of interested persons sponsoring such screen be required to be bonded for the State's cost of construction in this screen. The reason for this is to make the party responsible for its cleaning and maintenance, to keep it clean and keep it in repair.

Properties

The State owns many parcels of land under the Department of Inland Fisheries and Game, and I believe that each parcel should be properly surveyed and concrete markers be located at the respective corners and a description made of same. This has been done on about one-half of the State lands, but time has limited this completion of these surveys.

General Recommendation

It has occurred to me many times that if the engineering department could have an assistant engineer, located in northern Maine, and another assistant in southern Maine, to cover the engineering construction and maintenance in each of its respective areas, then the one engineer in charge of all the activities over the entire State, this would bring about a more efficient and satisfactory operation and control of this work.

Each engineer could then inspect fishways, screens, and make plans for his repairs, new work, etc., under the supervision of the engineer over the entire State, who would be responsible for all work, plans, etc., to the Commissioner. This would reduce the mileage accumulated by any one engineer and would limit the number of trips necessary for the engineer responsible to the Commissioner.

These recommendations set forth in this report are not intended as a criticism of the operation of the Fish and Game Department in any way, but are suggestions which might be of value to the Department.

I would like to take this opportunity to express my appreciation for the patience and help you have shown me during my employment under you. It has been a pleasure as well as a source of gaining valuable experience under you as Commissioner of Inland Fisheries and Game.

Respectfully submitted,

CARL H. CRANE
Engineer

Wildlife Research

*To Hon. George J. Stobie,
Commissioner of Inland Fisheries and Game:*

On May 18, 1938, Governor Lewis O. Barrows assented to the provisions of the Act of Congress entitled "An Act to provide that the United States shall aid the States in wildlife-restoration projects and for other purposes" and in so doing placed Maine among the first states to enter into the wildlife-restoration program.

The need for research and development work, as encouraged by this Act, had long been recognized by Commissioner George J. Stobie as an essential part of any game management program and it was due partially to his efforts that the Act was passed in its present form. Consequently, no time was lost in establishing the Wildlife Research Division with Lester E. Brown in charge, and a short time later the late Joseph S. Stickney became Director.

Provisions of the Pittman-Robertson Act

This Act of Congress, known as the Pittman-Robertson Act, provides that the 10% (now 11%) excise tax already levied on arms and ammunition at the time the Act went into effect, be apportioned among the states according to the area and the number of hunting licenses sold annually. Only those activities which contribute to the restoration and proper management of wildlife (but not fish) are eligible for aid under the Pittman-Robertson program. The State obtains these funds by contributing in the ratio of \$1.00 for every \$3.00 of Federal Aid, and all equipment, materials and supplies purchased with these funds are the property of the State and are to be used on P-R work as long as the need is present and Federal Aid sought. On the other hand, if after the intended wildlife benefits have been derived, there still remain merchantable products on lands purchased and developed with P-R funds, these products can be sold and all income goes to the State.

It is quite proper that the Federal Government should subsidize the states for the purpose of wildlife-restoration since many wildlife species are migratory and are hunted in more than one state, and the findings made by any one state concerning even the non-migratory species are often of value to many other states—especially the adjoining ones.

In addition, since firearms and ammunition purchased in one state often are used in other states, the collection and apportionment of the taxes on these items fall into the category of federal responsibility. Without such a federal subsidy and required reports which keep all states informed of the work of others, little work of this nature could be done except by the wealthier states.

While the apportionments of Federal aid are made annually, two years are allowed in which the money may be spent. Any unexpended funds remaining at that time automatically revert to the Migratory Bird Conservation Fund and may be spent anywhere in the United States and its possessions, thereby often depriving the State of the direct benefit of these funds. Consequently, it is in the best interests of the State—and the duty of the Coordinator—that all P-R funds are expended within the allotted time and in the best manner possible.

Purpose of the Wildlife Research Division

The purpose of the Wildlife Research Division is to determine the facts concerning our wildlife and to make habitat improvements and recommendations regarding the regulation of our game species. While the majority of the work is done with the use of P-R funds, certain functions are carried on without them. In all cases the responsibility for the initiative in this work rests with the State as the federal share of approved expenditures is paid to the State only after the expenditures have been made.

Program Administration

The program is administered by projects, the types of which are as follows:

1. *Surveys and Investigations (research)*—into the problems relating to wildlife populations and welfare. These are designated by the letter R.
2. *Development*—for the improvement of wildlife habitat, designated by the letter D.
3. *Maintenance*—of structures and features established by development projects, designated by the letter M.
4. *Land Acquisition*—for increasing controlled wildlife habitat, designated by the letter L.
5. *Coordination*—to provide supervision and coordination of all projects and activities, designated by the letter C.

Accurate cost records are maintained by projects and the costs by projects since the Division started, including the Federal and State shares, appear in Table 1. The costs itemized by types of projects appear in Table 2. It can be seen from these figures that the largest portion has been spent on research thus far. This picture will change continually as the result of more and more development work being done, based on the findings of the research projects.

TABLE 1
Total Expenditures by Projects Since 1939

No.	Title of Project	Federal Share	State Share	Total
1-R	Waterfowl Restoration Research Project	\$15,476.79	\$5,158.93	\$20,635.72
2-D	Wildlife Restoration	25,936.88	8,645.63	34,582.51
4-R	Prel. Investigation for Wildlife Mgt. in Baxter State Park	6,717.67	2,239.22	8,956.89
5-D	Development for Wildlife Management on Baxter State Park	3,305.60	1,101.87	4,407.47
6-L	Swan Island Game Management Area Acquisition	14,847.97	4,949.32	19,797.29
7-D	Development of Swan Island Game Management Area	55,347.84	18,449.28	73,797.12
8-R	Swan Island Game Management Investigation	21,188.27	7,062.76	28,251.03*
9-R	Beaver Survey	47,503.86	15,834.62	63,338.48*
10-R	Grouse Census	1,556.49	518.83	2,075.32
11-C	Wildlife Management Coordination	29,198.13	9,732.70	38,930.83*
12-R	Ruffed Grouse Investigation	12,134.00	4,044.67	16,178.67*
13-M	Maintenance of Swan Island Refuge and Game Management Area	28,010.71	9,336.90	37,347.61*
14-R	Game Management Investigation (questionnaire)	7,796.07	2,598.69	10,394.76*
15-R	Pheasant Investigation	16,244.56	5,414.85	21,659.41*
16-R	Burned Area Game Investigation	1,279.63	426.54	1,706.17
17-L	Ruffingham Meadow Acquisition	4,414.63	1,471.54	5,886.17
18-R	Waterfowl Investigation	15,331.44	5,110.48	20,441.92*
19-L	Scammon Marsh Acquisition	8,785.38	2,928.46	11,713.84
20-R	Deer Investigation	12,602.01	4,200.67	16,802.68*
21-L	Great Works Marsh Acquisition	1,778.24	592.75	2,370.99
22-L	Madawaska Marsh Acquisition	1,591.34	530.45	2,121.79
23-D	Madawaska Marsh Development	704.06	234.69	938.75*
24-D	Great Works Marsh Development	16,847.25	5,615.75	22,463.00*
25-D	Scammon Marsh Development	1,266.00	422.00	1,688.00*
26-L	Chesterville Marsh Acquisition	6,675.74	2,225.25	8,900.99*
27-L	Jonesboro Upland Game Management Area Acquisition	1,499.90	499.97	1,999.87*
28-R	Fisher Research Study	1,641.00	547.00	2,188.00
29-L	Petit Manan Acquisition	231.18	77.06	308.24
31-D	Jonesboro Upland Game Management Area Development	5,445.75	1,815.25	7,261.00*
	Total	\$365,358.39	\$121,786.13	\$487,144.52

*Projects incomplete, expenditures estimated.

TABLE 2
Total Expenditures by Project Types Since 1939

Project Type	Federal Share	State Share	Total
Research	\$159,471.79	\$53,157.26	\$212,629.05
Development	108,853.38	36,284.47	145,137.85
Maintenance	28,010.71	9,336.90	37,347.61
Acquisition	39,824.39	13,274.79	53,099.18
Coordination	29,198.12	9,732.71	38,930.83
	\$365,358.39	\$121,786.13	\$487,144.52

To date, 13 of the projects have been completed while the remainder are in various stages of completion. Most projects are renewed from year to year until the final results have been achieved, but some are short term projects.

The turn-over in personnel since the Division began work in 1939 has been quite large and has involved all positions. The original Director and Coordinator, Mr. Stickney, passed away in September 1945 and Merwin A. Marston was appointed to the position in 1946. He resigned in February 1949 to accept a position with the Fish and Wildlife Service in Boston, following which the present Director-Coordinator and his assistant were appointed. During World War II all trained biologists left the Division and the work slowed down nearly to a standstill. Since the war as many as 14 trained biologists have been employed by the Division at one time.

Status of Projects

The status of each project undertaken is presented in numerical order of projects.

PROJECT 1-R—WATERFOWL RESTORATION RESEARCH PROJECT

This project was undertaken to determine what areas should be developed for waterfowl and to live-trap and band waterfowl in order to learn more of migration routes, age, sex ratios and local-nesting species. The project was officially completed July 1, 1943, the majority of the State being covered by this survey at that time. The results then determined, along with those of Project 2-D, have been published in *Duck Report No. 1* by the Department of Inland Fisheries and Game. Free copies of this publication are available upon request. Some later results have been incorporated in a report by Howard L. Mendall, leader of the Maine Cooperative Wildlife Research Unit, University of Maine, entitled "Food Habits in Relation to Black Duck Management in Maine" printed in the *Journal of Mammalogy* Vol. 13, No. 1, January 1949, reprints of which are currently available.

PROJECT 2-D—WILDLIFE RESTORATION PROJECT

This followed Project 1-R and was designed to make plantings of aquatics in desired locations for the improvement of waterfowl habitat. The results of this project have been published in part in *Duck Report No. 1* mentioned above. An aquatic plant holding pen was constructed at North Belgrade for the purpose of storing waterfowl food and cover plants over winter for planting the following spring.

PROJECT 4-R—PRELIMINARY INVESTIGATION FOR WILDLIFE
MANAGEMENT IN BAXTER STATE PARK

This project was designed to study the various wildlife species occurring on Baxter State Park to determine their present status, past history and cover and food conditions affecting them. It was on this project that moose and moose yards were studied since that species abounds in that region. While fir reproduction was heavily browsed, the location of the yards—mostly at or near the tops of the lower mountains—made the timber value of such trees negligible even at maturity due to their inaccessibility and small size. The moose browsing as tallied on a cruise of reproduction in the South Turner yard is shown in Table 3. This is from a report by Nathan W. Fellows, Jr., Project Leader.

TABLE 3
South Turner Moose Yard Cruising Results

Species	Fir	White Birch	Mt. Ash	Spruce	Cherry, Poplar and Maple
Degree Browsed	Heavy	Moderate	Heavy	Light	Light
Over 6 feet high	46% 3822	37% 3125	7% 598	8% 637	12
Under 6 feet high	80% 9012	9% 1048	6% 780	4% 498	1% 68

Reproduction considered as everything under 5.5' D.B.H.

Marten and fisher were found to be common to rare and a good chance was afforded to obtain data on them. Deer occur in the Park in moderate numbers but only a few yard there due to the lack of good yarding conditions. A management plan was devised and the project closed July 1, 1942.

PROJECT 5-D—DEVELOPMENT FOR WILDLIFE MANAGEMENT
ON BAXTER STATE PARK

On this project four camps with accommodations for six men each were built on the Park for the housing of development crews. These were spaced about at strategic points and used while the crews were working in the area. Approximately 45 miles of boundary lines were brushed and signs posted. The war interrupted this project and no further work was done after December 15, 1941. Since that time these camps have been utilized by the Warden Division.

PROJECT 6-L—SWAN ISLAND REFUGE AND GAME MANAGEMENT
AREA ACQUISITION

Swan Island in the Kennebec River about 15 miles below Augusta opposite Richmond was almost entirely purchased for a game management area and refuge for the purpose of doing research on deer and other game and to entice geese and waterfowl away from the farms in the vicinity of Merrymeeting Bay where they were considered to be doing harm. This development work was done under Project 7-D and no further purchases have been made since May 1945.

PROJECT 7-D—SWAN ISLAND REFUGE AND GAME MANAGEMENT
AREA DEVELOPMENT

Under this project over 100 acres of land have been made into "goose pasture" for the purpose of reducing reported damage by geese to surrounding farms and to encourage nesting and resting by these species in this area. Consequently it was possible to establish one of the most important goose banding stations in the Atlantic flyway on Swan Island on Project 8-R. Existing buildings were repaired or torn down, road repaired, trails made and boats and ferrying equipment purchased. Openings have been made and shrubs planted for the improvement of habitat for grouse, woodcock and pheasants. Three dug-out and four dammed-up ponds were made when the project was re-opened in 1948. These were constructed under the direction of the Soil Conservation Service and are primarily for the benefit of waterfowl but also benefit the deer, grouse, woodcock and many other species. Corn and other grains raised on the Island have been used as live-trapping bait and surpluses used by the Department's Game Farm. The maintenance of these developments is carried on under Project 13-M. All work on Project 7-D ceased November 30, 1948.

PROJECT 8-R—SWAN ISLAND GAME MANAGEMENT INVESTIGATION

Goose and Waterfowl Banding

As stated previously, the work on Project 7-D made it desirable to establish a waterfowl banding station at Swan Island and results of this banding work have been most encouraging. The purpose of this banding is to determine the migration routes, species present, age, sex ratios and flock composition. Several of the geese banded on this project were shot in North Carolina, northern Quebec and others at points closer to Maine. New methods of live-trapping and marking are being tried. This is in line with similar programs in other states and Canadian Provinces in the Atlantic Flyway but is a long term job which cannot produce voluminous results immediately.

Deer Repellent Studies

Research to find a practical deer repellent was one of the first jobs undertaken on Project 8-R. The need for this research is exemplified by the fact that in the fiscal year 1948-49 the payments made by the Department for damages to crops and orchards (largely done by deer) was \$50,169.22—the biggest payment so far. Swan Island made an excellent place to make these tests. In the beginning, penned deer were used, but as the result of complete protection and constant patrol by a resident warden and research personnel the herd grew from 75 to approximately 200 in the matter of a few years on the 1,400 acres which comprise the Island. Consequently repellents placed anywhere on the Island received severe tests making extensive research possible. In 1948 a non-poisonous substance was formulated and tested which would stick to plants for as long as nine months and repel not only deer, but snowshoe hares, mice and other rodents without injury to the plants or the wildlife. This repellent, known as Goodrite z. i. p., was demonstrated to the farmers in bean and apple-growing sections through the Department's demonstration program. The costs of materials and application is about \$7.50 per acre for row crops and \$0.05 per average size apple tree. The deer have to taste the repellent for it to be effective, consequently new growth, if occurring at the time of damage is apt to happen, must be sprayed periodically as it appears. The details concerning the repellent and its testing were presented in a speech by Stephen E. Powell, Project Leader, entitled "Crop Protection Through a New Deer Repellent Spray" at the Fourteenth North American Wildlife Conference in Washington, D. C., March 8, 1949, reprints of which are available free of charge. It is significant that many states and foreign countries are now using this repellent tested at Swan Island.

Shrub Planting Studies

The desire to find shrubs which would primarily provide winter game food prompted the experimental seeding and transplanting of several species and varieties of shrubs. Grafting also has been undertaken with a hardy variety of apple. Success may be attained with certain shrubs using these methods but the results cannot be realized immediately. This phase of the project is being continued.

Other Studies

The utilization made of the farm ponds and woodcock and grouse habitat improvements created on Project 7-D is being observed, the results of which are to be used later on development areas throughout the State.

PROJECT 9-R—MAINE BEAVER SURVEY

In an attempt to determine the best possible management program for beavers in this State, Project 9-R was started in June 1946. The work was conducted entirely on the ground during the first year and since then an airplane has been used as well as ground work. Beaver habitat is being classified; populations, reproductive rate, effect and occurrence of parasites determined and the harm and good being done and other phases are being observed. Trappers and game wardens have been very helpful in saving carcasses for this study and in reporting unusual occurrences. During this study sufficient data were gathered concerning a new means of determining productivity so that an article entitled "Productivity Data from Placental Scars in Beavers" could be written by Kenneth W. Hodgdon. This was published in the Journal of Wildlife Management in October 1949, reprints of which are available for free distribution. This project is scheduled to close May 31, 1951, at which time it is planned that concrete results and recommendations will be included in the publication covering the work done on the project.

PROJECT 10-R—MAINE GROUSE CENSUS

This was a short term project beginning June 17, 1946 and closing September 7, 1946. Its purpose was to establish grouse census lines in various parts of the State to obtain state-wide trends in the grouse (partridge) population. Game Wardens assisted by giving advice and helping to locate sites for the twenty census lines.

PROJECT 11-C—WILDLIFE MANAGEMENT COORDINATION

As the Pittman-Robertson Program expanded (in 1948-49 the Federal share was \$118,311.87) it became necessary to coordinate and supervise the several current projects as well as plan future ones. Consequently this project was started in 1946 and will continue as long as the need for it is present. It is on this project that the secretaries are hired and all bookkeeping and secretarial work for all projects and work in the Division are done. Only a small part of the Assistant Coordinator's pay comes from this project since much of his time is spent on other projects. In addition to coordinating and supervising projects it is the duty of the Coordinator to establish new projects as they are needed, maintain qualified personnel and close projects when their objectives have been attained.

PROJECT 12-R—MAINE RUFFED GROUSE INVESTIGATION

This project started October 1, 1946 and is still in progress. The purpose as first established was to determine local and state-wide popu-

lation trends, general and seasonal cover preferences and the effect of various factors on nesting and brooding. The population trends were to be determined using the census lines established on Project 10-R and assistance in taking the census was given by game wardens. The results of these censuses, based on King's grouse flushing method of sampling the population were discouraging due to the wide variation. It is possible that the population was not great enough in the census areas to get a sufficient sample for the flushing method to work. Consequently this phase of the project was discontinued.

Sportsmen and game wardens have been very cooperative in obtaining wings and tails from grouse for study on this project. Over 600 in each of the 1948 and 1949 hunting seasons have been received. They are used to determine the age and sex of the flock and reflect the nesting and rearing success in the juvenile—adult ratio which is obtained. A ratio of juveniles to adults of 2 to 1 is good and our birds have been found to obtain this ratio in certain parts of the State. Further data are necessary to bolster these findings and collections will be continued during subsequent hunting seasons for this purpose. Brood determination is necessary as an index to population trends and the shootable surplus. Other methods of determining population trends are being studied.

Fox-trapping was undertaken in the vicinity of Greenville and Rockwood to determine the amount of predation by this species on grouse. Some predation was found when the stomachs were examined but additional data are necessary and these findings will be combined with others as they are obtained.

In cooperation with the Forestry Department when it sprayed with DDT five 40-acre plots of timber land in Jim Pond Township, Somerset County during the summer of 1949 part of the personnel of this project made a concerted effort to determine the effect of these various concentrations of the spray on grouse and other game and non-game species. The concentrations used were 2, 3 and 5 pounds per acre in an oil emulsion diluted to the desired concentration with water. An airplane was used to do the spraying under the direction of the Forestry Department's Entomology Division in an experiment to control the bronzed birch borer.

At the beginning and once weekly thereafter all available P-R personnel were called to assist in the work of determining populations of the wildlife present on the five sprayed and one unsprayed (check plot) areas, and to search for dead animals and birds on those areas. All areas were censused prior to spraying and periodically thereafter for about a month.

As the result of this work it was determined that no dead animals or birds could be found on any of these plots but that grouse decreased in numbers by leaving the area rather than by being killed. Insect life decreased considerably and did not begin to return in noticeable numbers until over 3 weeks after the areas had been sprayed. Those sprayed with the heaviest concentrations were the areas in which the insect life was most affected. Song bird numbers declined sharply and coincided with the decline in insects as did the grouse decline. Two families of song birds raised their young, apparently without harm from the DDT, on these areas during the experiment. It is at the time of year when this experiment was conducted (June and July) that young grouse are dependent upon insects for a large portion of their food and the decline in insects consequently had its effect. It was concluded that under the conditions existing in the experimental areas concentrations of DDT as great as 5 pounds per acre had little or no injurious effect on the wildlife species present but did deprive insect feeders of much food.

PROJECT 13-M—MAINTENANCE OF SWAN ISLAND REFUGE AND GAME MANAGEMENT AREA

This project, designed to maintain the developments established on Project 7-D, was started July 1, 1947 and is being continued. The "goose pastures" have been maintained, improved and enlarged so that approximately 125 acres will be under cultivation for this purpose by the fall of 1950. The utilization of these has been such that as many as 1100 geese have been reported in one field at one time recently and all fields have been completely "cropped off" during each spring. Ladino clover, winter rye, and winter wheat are the crops planted for this purpose and feeding on them begins as soon as the plants turn green in the spring. As many as 15,000 Canadian Geese have been tallied in Merrymeeting Bay at one time so the demand for food is great at this time of year. Despite this heavy utilization parts of these crops reach maturity and are harvested, the income from the sale of which goes to the Department.

The farm ponds have been maintained and are beginning to be utilized heavily by both geese and ducks. Corn is raised by this project to be used as bait in waterfowl live-trapping operations on other projects.

Recently the substantial increase in the deer herd on the Island has worked to the detriment of the deer and other species inasmuch as the area is being over-browsed. This condition makes the removal of surplus deer an essential to the success of the projects located on the

Island. Since no game can be hunted here, live-trapping and transplanting methods have been used, the deer being released on various State parks and refuges. All deer are ear-tagged and several returns have been received from hunters who shot these deer after they had wandered from the protection of the parks. The mild winters of the past two years have hampered these operations by making unsafe the crossing of a loaded truck on the ice in the Kennebec River. As a result it is necessary to attempt to start live-trapping the first of December and transport the animals across the river on a barge, then carry them to release points.

PROJECT 14-R—GAME MANAGEMENT INVESTIGATION
(QUESTIONNAIRE)

This project, started April 15, 1947, had for its objectives a study of the status of eelgrass recovery along the coast, deer growth as an index to range conditions and to determine the game kill of 1947.

It had been reported that eelgrass, an important waterfowl food plant, had disappeared from the coast of Maine and pressure was being brought to bear to start a planting program to re-establish the plant. As the result of this study it was determined that the eelgrass had become re-established sufficiently well in several areas along the coast so that the cause for concern was readily dispelled and no planting was found to be practical.

The study of deer growth was made, and based on its findings a new project (20-R) was later written which increased the scope of this work several times in order to get the desired results in sufficient quantity.

The determination of the 1947 game kill was accomplished by means of a questionnaire sent to 10,000 resident and non-resident hunters whose names were selected at random. The 87 per cent return by sportsmen was very encouraging and the information gathered very gratifying. Consequently this phase of the project has been renewed and is being done annually. This information is essential to the proper management of our game. Table 4 shows a comparison of some of the results obtained on this project as written in a report by Donald E. Dorr, Project Leader.

TABLE 4

Computed Maine Hunting Kill for 1947, 1948 and 1949

Species	1947	1948	1949
Deer	31,000	35,300	34,783
Partridge (Ruffed Grouse)	100,000	105,000	100,500
Rabbit (Snowshoe Hare)	120,000	138,500	123,000
Woodcock	10,000	10,000	13,500
Black Duck	35,000	23,500	26,000
Sea Duck	19,000	31,000	6,000
Other Duck	500	300	600
Gray Squirrel	16,000	34,500	24,500
Fox	—	14,500	11,000
Raccoon	—	18,000	11,000
Bear	—	1,450	1,100
Pheasant	12,000	7,300	7,300

PROJECT 15-R—MAINE PHEASANT INVESTIGATION

Having been initiated July 1, 1947 this project is still being carried on and has as its objectives the gathering of published information on pheasants which applies to Maine, classifying and determining year to year survival, sex ratio and productivity of wild pheasants, studying factors influencing winter survival and survival of farm-reared birds immediately following release, and the determination of feeds which will produce best hatchability, fertility, feathering and growth.

Banding is one technique used in determining the proportion of wild-reared birds shot, best age for releasing, age, distance travelled from release point, etc. The success of this phase of the Project depends largely on sportsmen cooperation which has been only mediocre at best. A few sportsmen have been very cooperative and with these results some conclusions may be drawn, but when 13,700, 13,170, and 17,000 birds have been banded and liberated in 1947, 1948, and 1949, respectively, the annual band returns of 5 to 7 per cent look quite unimpressive.

The trapping of foxes has been undertaken in areas where pheasants have been liberated to determine the amount of predation carried out on pheasants. Over 70 stomachs have been obtained so far, a study of which will be made soon.

A bird dog trainer has been employed since May 1, 1950 to use his dogs in locating pheasants to determine the over-wintering population and the survival rate of released and wild birds.

The classification of habitat has been left to the last so that a clearer picture of the needs of pheasants could be had. Consequently this

phase has yet to be done. It is intended that areas where pheasants should and should not be released will be so classified so that future releases can be made accordingly.

Work will probably be completed on this project and a final report written within two years.

PROJECT 16-R—BURNED AREA GAME INVESTIGATION

Following the disastrous fires of 1947 it became evident that information was needed regarding the effect of the loss of food and cover on game. This project was begun November 22, 1947 and continued for five months during which time a survey was made in the York County burn to determine how much of the woody plants had been completely killed, whether or not deer and grouse would attempt to stay in the burned-over areas, survival in such cases, effect any greater concentrations of deer in surrounding "green growth" and a study of habitat recovery.

Edgar W. Dangler, leader of the project, reported that only 1% of the hardwoods were completely dead and only 13% more had partially burned roots while 53% were dead above the ground. This indicated good sprout growth could be expected and therefore food for rabbits and deer would be plentiful. However, 86% of all the softwoods were dead, but pitch pine which sprouts was 20% alive indicating some growth could be expected in the area. The fire in general burned two inches or less in depth into the ground and in no case was mineral soil deeply burned. The main damage was done to wildlife cover, and that is quite lasting. It is planned that a part of this area will be purchased for the purpose of re-establishing wildlife cover. Deer and grouse were found in the burntland having returned a short while after the fire had gone through it. They were less concentrated than normal in the burn and more concentrated than normal in the surrounding green growth as the result of scarcity of food in the burn. The survival of game in the burn during the following winter was relatively good and can be attributed mainly to the mild and open weather which prevailed.

Several plots were established so that observations of the growth and seeding in of trees and shrubs could be studied in the following years. This study is being done and a report will be written when the work is completed.

PROJECT 17-L—RUFFINGHAM MEADOW ACQUISITION

This area of approximately 610 acres, located at North Searsmont in Waldo County, was the first attempt at the acquisition of land for

the purpose of improving habitat for wildlife. It was begun in 1946 and includes marsh and upland areas. The development of this area will be done on Project 30-D.

PROJECT 18-R—WATERFOWL INVESTIGATION

This project, started June 4, 1948 and still current, was designed to give as complete a picture as possible on the waterfowl in this State through the establishment of the following objectives:

- (a) To determine the survival of plantings formerly made under Project 2-D.
- (b) To obtain migration data for western Maine where no banding has been done.
- (c) To determine the composition of the waterfowl population and kill.
- (d) To determine the location, use and ecology of coastal wintering areas.
- (e) To determine locations of concentration areas and flight lanes in the state and record migrations through these.
- (f) To determine the effects of management on acquired and developed areas.

The survey of past plantings has been completed and report written. An article being prepared on this survey, written by Nathan W. Fellows, Jr., Supervising Leader, is in its final stages and will be available for free distribution soon. In general many plantings failed to produce sufficient results, due to one reason or another, and additional research will be required before any further planting recommendations can be made.

The banding in western Maine proved to be rather fruitless because waterfowl concentrations were not large enough to make live-trapping feasible. This phase was discontinued.

The determination of the waterfowl population and kill has been carried on as one of the most important phases of the project. This has been done by means of detailed studies of representative areas and census flights with the airplane, and through the excellent cooperation of waterfowl hunters in having their kill aged and sexed by any of the several Division personnel making the hunter's bag check. By means of this work it has been determined that as many as 22 species of waterfowl are shot in this State, that the black duck comprises about half the kill and that green-winged teal, American golden-eye and wood duck are of next, but considerably lesser, importance, when

compared by numbers killed. Nesting success is another important bit of information gleaned from this study and all of this, including the results of a spring nesting study are included in reports to the Fish and Wildlife Service which utilizes them in determining the following migratory hunting season regulations. As a result of these studies, waterfowl development work is aimed primarily at the black duck, but other species are also benefited.

Cooperators have been utilized to determine the locations of wintering concentrations and banding stations have been operated in various parts of the State to study both wintering populations and spring and fall migrations consistent with a similar program in other states and Canadian provinces in the Atlantic flyway.

Development areas are constantly observed but it is too early to obtain any significant results yet.

PROJECT 19-L—SCAMMON MARSH ACQUISITION

This area of approximately 1,860 acres has been purchased primarily for the benefit of waterfowl. The construction of a dam at the site of an old dam was commenced June 7, 1950 and is to be finished by August 10, 1950. The bid was awarded to A. P. Wyman, Inc., Waterville, Maine, for \$9,184.40. Such a structure will create a desirable marsh and allow maintenance of stable water levels so necessary to good waterfowl management. The growth of waterfowl food plants will be stimulated by minor fluctuations in the water levels at certain times in the year. Special hunting regulations will be posted annually on this area as on other game management areas. The development on this area is being done under Project 25-D:

PROJECT 20-R—MAINE DEER INVESTIGATION

On October 13, 1948 this project commenced and is currently in progress running in all seasons except the summer.

The purpose of the project is to determine trends in age and sex composition of the herd in Maine, the reproductive rate, locate and evaluate winter "yards," the reasons for over and under populations where such exist and to form recommendations for future management of our deer herd.

The cooperation of sportsmen and wardens has been very good in our attempt to age, sex, weigh and gather other data on as many deer as possible during the hunting season. This gives an index to the condition of the herd in various parts of the State. While data are still being gathered and the present data inconclusive the evidence indi-

cates that the majority of deer examined are in comparatively good shape.

Table 5 shows the woods-dressed weights of 222 Maine deer taken in the 1949 hunting season classified according to age. This is from a report by Walter L. Palmer, Leader of the project in 1950.

TABLE 5
Woods Dressed Weights of 222 Maine Deer, 1949

BUCKS			DOES		
AGE	Average Weight in lbs.	No. Deer in Sample	AGE	Average Weight in lbs.	No. Deer in Sample
4-5 Months	53.6	3	4-5 Months	62.8	6
6 Months	57.0	7	6 Months	51.2	16
7-8 Months	66.8	4	7-8 Months	62.0	1
1 1/2 Years	94.5	28	1 1/2 Years	92.3	18
2 1/2 Years	140.1	23	2 1/2 Years	102.7	21
3 1/2 Years	115.6	35	3 1/2 Years	105.2	6
4 1/2 Years	192.7	18	4 1/2 Years	100.0	4
5 1/2 Years	183.4	14	5 1/2 Years	130.0	1
6 1/2 Years	176.3	4	6 1/2 Years	116.7	3
7 1/2 Years	181.0	2	7 1/2 Years	110.0	4
7 1/2 Years +	190.0	2	7 1/2 Years +	134.5	2
		140			82

The deer "yard" surveys, to determine the utilization of food and amount of food left, have covered parts of the Aroostook, Penobscot, Piscataquis and Hancock County area and others will be surveyed in the future. Those surveyed so far have been mostly in a moderately good condition with a few in extreme conditions. This indicates that for the most part hunters are not killing too many deer. As studies continue, this picture will be more complete.

The difficulty in obtaining doe deer reproductive systems has curtailed activities on productivity studies, but additional attempts will be made to obtain them in future hunting seasons by informing more people as to exactly what we want. It is too early to predict when the final report on this project can be written.

PROJECT 21-L—GREAT WORKS MARSH ACQUISITION

This area of 640 acres in Edmunds, Washington County, has been purchased primarily for the benefit of waterfowl but will also benefit

muskrat, beaver, grouse and woodcock. Acquisition commenced November 17, 1948 and closed March 10, 1949 when the area was completely acquired. The development work is being done on Project 24-D and is reported under that heading.

PROJECT 22-L—MADAWASKA MARSH ACQUISITION

This area of 295 acres in Palmyra, Somerset County, has been purchased primarily for the benefit of waterfowl and will also benefit muskrats and beavers. The acquisition work began January 6, 1949 officially and is an example of the difficult problems to be encountered in land purchasing. Oftentimes the ownership in an area such as this marsh is in several hands, boundaries not defined or known due to the general lack of value of such land, and owners difficult to locate. Inasmuch as the acquisition of lands must be accurate and definite to comply with the requirements of both the State and federal laws and regulations, this area presented a great many problems. In addition to the ownership being untraceable through the years, some persons thought they owned it but had no clear title to it, while others had title but did not know it. The untangling of this problem is one of the examples of the time-consuming operations in acquisition work. It was purchased in 1949 from the Town of Pittsfield, and a family of beavers went to work immediately backing up the water to the desired level for waterfowl at the exact spot where a new dam would have been constructed. They are being repaid through complete protection.

PROJECT 23-D—MADAWASKA MARSH DEVELOPMENT

Since no dam has to be built on this area at present, later development will consist of the blasting of potholes with channels to the open water, encouraging the growth of desirable aquatic plants and creating a suitable nesting and resting area for waterfowl by maintaining stable and desirable water levels. Wood duck nesting boxes have been erected. The boundaries have been fenced with a single strand of plain wire as a permanent marker rather than as a barrier to persons or animals, and posted with metal signs. Regulations governing the hunting on this area will be posted annually and based on the size of game surpluses. The presence of the beaver dam flooding this area since 1949 has hastened the changes in plant growth and already desirable aquatics are beginning to appear. Constant studies will be made to determine the utilization being made of this area.

PROJECT 24-D—GREAT WORKS MARSH DEVELOPMENT

This area, on Cathance Stream, Edmunds, Washington County, being best adapted for waterfowl development, now has a concrete

dam which is in its last stages of completion. This will allow the area to be flooded to a constant level or varied according to the dictates of good management for the species concerned. Six potholes with channels to the open water have been blasted with dynamite to increase the nesting and resting territories in the area. Others will be blown as found necessary. Waterfowl food and cover plants have been planted in small numbers to experiment with methods and techniques of establishing them. Other desirable plants will be encouraged by controlling water levels. Wood duck nesting boxes have been established. It is anticipated that muskrats and beavers will be benefited also by such management measures. Snapping turtles, predators of waterfowl of all ages, will be controlled by trapping where necessary. Six irregular openings have already been made for the benefit of grouse (partridge) and woodcock in the wooded section surrounding the marsh and others will be made later as a timber reservation expires. Studies will be made to determine the amount of utilization the area receives.

A fishway is being constructed in the dam to allow the passage of Atlantic salmon which it is hoped may become established in that stream as the result of the efforts of the Atlantic Salmon Commission.

Special regulations regarding hunting on the area will be posted annually.

PROJECT 25-D—SCAMMON MARSH DEVELOPMENT

This area is being developed primarily for waterfowl but also for muskrats, beavers, deer, grouse and woodcock. A concrete dam is under construction and will be completed by August 10, 1950. As in other developments, this structure will allow the control of water levels over a marsh and water area of about 800 acres which will be in the best interests of the waterfowl, muskrats, and beavers in the area. Wood duck nesting boxes have been erected. Potholes and channels will be blown in the marsh to increase nesting and resting habitat for waterfowl. The management of deer, grouse and woodcock habitat must await the expiration of a timber reservation on the wooded area surrounding the marsh. Studies of utilization of the area will be made and special regulations will be posted annually regarding hunting on the area.

PROJECT 26-L—CHESTERVILLE MARSH ACQUISITION

Little Norridgewock (or Bog) Stream is the name of the waterway in Chesterville, Franklin County, on which another area is in the process of being acquired. This area will include about 320 acres most

of which will be marshland. Already the dam, water rights and dam-site property have been purchased and the water is being maintained at a desirable level. A transit survey is being made to determine what other parcels of land would be desirable.

PROJECT 27-L—JONESBORO UPLAND GAME MANAGEMENT AREA ACQUISITION

In an attempt to improve wildlife habitat in the areas burned during the 1947 fires and to experiment with the possibilities of producing crops of wildlife and timber on such areas, 430 acres of burntland in Jonesboro, Washington County, were purchased in March, 1950. This is on Route 1-A between Jonesboro and Whitneyville. Further acquisition of land adjoining present holdings is anticipated, thus giving a larger area to manage and involving a wider variation of soil and timber types which are necessary to produce good habitat during all seasons of the year for our upland game. The development of this area is being done under Project 31-D.

PROJECT 28-R—FISHER RESEARCH STUDY

The open season on the fisher during January, 1950 presented an opportunity for a study of this valuable fur-bearer which was jointly done by this Division and the Maine Cooperative Wildlife Research Unit, University of Maine, Orono. The project started December 27, 1949 and closed May 19, 1950 during which time 50 fisher carcasses of the 124 legally caught were collected. This was accomplished after the pelts had been removed and through the cooperation of trappers and game wardens. Studies were made of the food habits (by inspecting the stomach and intestinal contents), age, sex, size, and weight at the University of Maine. Pelt primeness and sizes were studied wherever pelts could be found—mostly at fur buyers' locations.

Dr. M. C. Meyer, Parasitologist of the University of Maine, kindly made the studies of parasites. The final report of this project is in its last stages of preparation and copies will be available free of charge soon.

PROJECT 29-L—PETIT MANAN ACQUISITION

Through the generosity of Petit Manan in Maine, Inc. and William R. Mague, its Secretary and Manager, the State received a gift of 500 acres of land on Petit Manan Point, Steuben, Washington County, to be used as a game management area. The area is best suited for waterfowl development work. The only costs to acquiring this land were for a survey, salary of the project leader for a few days, and legal fees. The development of this area will be done on Project 32-D.

PROJECT 30-D—RUFFINGHAM MEADOW DEVELOPMENT

An area consisting of upland and marsh game habitat possibilities is this one of 610 acres at North Searsmont, Waldo County. At the site of an old dam a new one will be erected so that constant water levels can be maintained which will flow the approximate area that the old dam did. Prior to flooding the area, several islands will be made by bulldozer, potholes and channels made by the use of a bulldozer and dynamiting and some of the brush on the flowage will be cut and removed. Duck nesting boxes will be erected and the fields next to the flowage area will be tilled and planted to millet, smartweed, corn, rye-grass and ladino clover to improve the area for waterfowl. It is expected that muskrats and beavers will also benefit from the stabilized water level. A part of the area is suitable for woodcock development and openings will be made and sod under the alders controlled for the benefit of this species. Deer, grouse and pheasant habitat will be managed as the opportunities are presented. Shrub plantings as food for game will be made so that utilization can be observed.

An elaborate fishway will be included in the construction of the dam to allow the passage of brook trout. Studies will be made of the effect the flooding has on water conditions and the water can be drawn down if found necessary.

Special regulations will be posted each year regarding hunting on the area, these regulations to be governed by the size of game surpluses.

PROJECT 31-D—JONESBORO UPLAND GAME MANAGEMENT AREA DEVELOPMENT

Work on this project began May 10, 1950 and will continue intermittently for two years. Since this area is primarily for deer, grouse, woodcock and snowshoe hares (rabbits) and was badly burned in the 1947 fires, it is the purpose of this project to re-establish shelter for these game species. Consequently, as many cover plants as could be purchased and used during the spring of 1950 have been planted in the area in a pattern designed to create good wildlife habitat. The plantings included the following:

- 30,000 white pine
- 15,000 red (Norway) pine
- 1,000 mugho pine
- 1,000 multiflora rose

Each species was planted in sites where it was expected to grow best as determined by the amount of shade, drainage, type of soil and gen-

eral location. The mugho pine which grows to about 10 or 12 feet in height was planted along the road to provide a shield of low growth for the game in the area and to beautify the roadsides. Much sprout growth of red and rock maple and seedlings of poplar and white birch are coming in and will provide a quantity of food for deer, grouse and snowshoe hares. The multiflora rose was planted in an experiment to determine the amount of utilization of it by game species.

A forest management plan has been inaugurated so that as the planted stock grows and becomes too thick or fills in openings which have been left, additional thinnings and clearings will be made. As these trees grow to merchantable size, such thinnings and clearings will result in a cash income for the Department. Sound game management requires the harvesting of surplus game so special hunting regulations will be posted on the area annually to allow such a harvest.

The Department has always been interested in the re-establishment of desirable habitat for wildlife in the burned over lands of the State so that the carrying capacity of the land can be brought back to normal or even better and the unsightly scars of these acres of waste can be healed as soon as possible. The annual multi-million dollar income which the State derives from its tourist trade depends mainly on its hunting, fishing and beautiful scenery all of which are adversely affected when forest fires sweep over the land. It is in an attempt to remedy this situation and to show private individuals and concerns what can be done with such areas that development projects of this type are undertaken.

PROJECT 32-D—PETIT MANAN DEVELOPMENT

The development of this area in Washington County will consist of expanding waterfowl breeding and resting habitat by blasting potholes and channels in the marsh area and maintaining grouse and woodcock habitat in the best condition possible. No dam will be constructed as a long "sea wall" of rocks holds back the fresh water and allows it to seep out gradually. This controls the water forming Big Pond and makes the construction of such an expensive dam unnecessary.

York County Fire Investigation

This work took only a few days in October 1947 immediately following the forest fires and was necessitated by the reports of vast massacres of wildlife—especially deer—in that area. By means of a few days of preliminary work and the very cooperative assistance of over 500 sportsmen from several sportsmen's clubs in York and Cumberland Counties the true facts were ascertained.

With the assistance of game wardens, five areas were chosen for deer drives, three in the burntland and two in the green growth close to the fire, to determine the remaining population of deer and other wildlife. Five more areas, all in the burntland were chosen to make a search for dead deer and other wildlife. The results showed that there were several deer, grouse and other wildlife in the burntland but that they were concentrated in the green growth to as high as 1 deer to 23 acres. Approximately 10,000 acres of burntland were covered in the search for dead game and only one dead deer was found. This deer had died as the result of impaling itself on a stake rather than from the fire, although the fire was the secondary cause. Several porcupines and showshoe hares had died as the result of the fire.

These findings showed that while deer food and shelter had been destroyed in a large area, the deer population had not been depleted appreciably. Consequently a recommendation was made that hunting be allowed in order to reduce the deer population to a point where the existing food and cover could sustain the remaining deer throughout the winter. The area was opened to hunting as soon as sufficient rain fell to make the woods safe again.

Non P-R Work

While the majority of work in this Division is done with the assistance of federal Pittman-Robertson funds certain things are done without such aid. One was the purchase of 10,000 multiflora rose plants to experiment with their hardiness and adaptability to the climate in various sections of the State. Game Wardens did all of the planting and have been checking on growth and survival. The fall of 1949 was another dry season and some plants died then. The amount of winter-killing will be determined as well as when and how much they fruit. This plant provides good cover and some food for grouse, pheasants and snowshoe hares and may prove helpful in areas where such is needed.

The moving of deer is best done with the facilities used at Swan Island. Consequently those raised at Klir Beck's at Mt. Vernon and the Game Farm at Gray where young fawns are brought after being picked up by persons thinking the young animals have been orphaned are handled and transported by Division personnel. This affords the opportunity to ear-tag these animals and thereby get more data.

Occasionally certain conditions occur which require immediate attention and research for which federal funds are not available on such short notice. These conditions are investigated and reports made to the Commissioner. At times the Division's airplane is used for fire patrol or in searches for lost persons or drowning victims.

Future Work

The need for additional work appears occasionally as a result of current findings or as an existing need for which personnel, funds and time have not been previously available. Among those projects planned for the future are a book on the game animals and birds and fur animals of Maine which will be accomplished jointly by this Division and the Maine Cooperative Wildlife Research Unit, University of Maine, acquisition and development of land for game management areas in the north and north central parts of the State, and Newfield in York County, a beaver-trout relationship study, development of the Chesterville area (partially acquired), state-wide game census and the development of farm lands for game utilization. It takes time to get such a program started, then it takes time to get sufficient results so that positive recommendations or developments can be made. It is toward this end—to determine the facts about our wildlife and to improve habitat in as scientific a manner as possible—that the work of the Division is aimed. Since the number of hunters, both resident and non-resident, is increasing annually and wildlife habitat is being encroached upon, the need for research and development for better methods to perpetuate our game species in suitable numbers is becoming more and more pressing.

Respectfully submitted,

KENNETH W. HODGDON

Federal Aid Coordinator

TABLE OF CONTENTS

	Page
List of Tables	59
List of Plates	60
Introduction	61
Characteristics of Obstructions	62
Log Driving Dams	62
Power Dams	63
Water Storage Dams	63
Fish Screens	63
Effects of Dams upon Trout and Salmon	63
Effects of Fish Screens upon Trout and Salmon	81
Fishways	82
Log Driving	82
Summary of Obstructions Surveyed	83
Recommendations	83
Acknowledgments	84
References	84

LIST OF TABLES

	Page
Table 1. Obstructions surveyed, Aroostook County.....	85
Table 1A. Obstructions surveyed, Aroostook County.....	88
Table 2. Obstructions surveyed, Franklin County.....	90
Table 2A. Obstructions surveyed, Franklin County.....	91
Table 3. Obstructions surveyed, Piscataquis County.....	92
Table 3A. Obstructions surveyed, Piscataquis County.....	97
Table 4. Obstructions surveyed, Somerset County.....	101
Table 4A. Obstructions surveyed, Somerset County.....	106
Table 5. Summary of data including 167 dams and 6 fish screens	109

LIST OF PLATES

	Page
I. Typical log driving dam in good repair, Trout Brook, T 6 R 9, Piscataquis County	71
II. Leaking sluice bed encountered on log driving dams, Pe- nobscoot Lake Outlet, Prentiss, T 4 R 4, Somerset County	72
III. Leaking of entire stream flow through dam, Red River, T 15 R 9, Aroostook County	73
IV. Sluiceway clogged with debris, Baker Pond Outlet, T 5 R. 6, Somerset County	74
V. A bulldozed stream bed and cut-over stream banks, Blood Brook, T X R 14, Piscataquis County	75
VI. Bark waste and debris deposited on the stream bottom, West Branch Penobscot River, Seboomook R. 4, Som- erset County	76
VII. Uncut flowage, Brassua Lake, Taunton Raynham Grant, T 1 R 1, Somerset County	77
VIII. Fluctuating of water level, Ripogenus Lake, T 3 R 11, Piscataquis County	78
IX. Logging dam with fishway in operation, Machias Lake Outlet, T 12 R 8, Aroostook County	79
X. Abandoned logging dam decaying and falling into stream, Misery Stream, Misery, T 2 R 7, Somerset County	80

Inland Water Survey

*To Hon. George J. Stobie,
Commissioner of Inland Fisheries and Game*

A PRELIMINARY SURVEY OF MAN-MADE OBSTRUCTIONS AND LOGGING PRACTICES IN RELATION TO CERTAIN SALMONID FISHES OF NORTHERN MAINE

Introduction

This preliminary survey was undertaken to determine the extent and location of man-made obstructions in the headwaters of the main river systems of Northern Maine. Observations were also made of logging practices as to their effect upon the habitat of salmon and trout.

No attempt was made to reach all obstructions in any given watershed, but the more important obstructions from the standpoint of trout and salmon populations were surveyed as far as time would permit. The data included in this report were collected from Aroostook, Franklin, Piscataquis and Somerset Counties. These counties were selected as it is in this region of Maine that most of the logging has been carried on in recent years.

The area was surveyed by the writers from June 19 to September 30, 1950. Much of the data collected are compiled in tables of this report. One or more photographs were taken of each obstruction in addition to those that were taken of logging practices which effect the natural suitability of the stream for trout and salmon. These photographs and additional data are on file. The plates included in the appendix of this report are representative of conditions that exist throughout the area surveyed.

Transportation to the obstructions was accomplished where possible by truck and on foot. The more inaccessible areas were reached by canoe and airplane.

It should be pointed out that very little quantitative research has been carried on regarding the effects of logging practices upon fish populations. The qualitative evidence of damage to salmonid populations is convincing; however, further study is necessary to determine the exact amount of reduction in productivity of any lake or stream driven.

In order that the reader may better understand the purpose of this survey a brief outline of some of the more pertinent requirements that salmonid fishes need for good survival and growth follows.

The land-locked salmon (*Salmo salar sebago* Girard) is naturally a stream and river spawner. The favored spawning sites are in fairly coarse gravel from one-half inch up to two inches, located at the head of a riffle or the tail of a pool. Spawning takes place during the months of October through November. In some instances spawning may occur in a lake or pond when suitable tributaries are not available, but there is much doubt among fishery workers as to the success of this type of spawning.

The Eastern brook trout (*Salvelinus fontinalis* Mitchill), is naturally a brook and stream spawner. It differs somewhat from the land-locked salmon in that it prefers the colder spring-fed brooks for spawning. Where it is able to do so it proceeds to the headwaters of the brook which may not be more than two or three feet in width. They also spawn in ponds where a spring provides aeration for the eggs. The brook trout is apparently quite exacting in its temperature requirements and is seldom found thriving in water over seventy degrees Fahrenheit. The spawning period ranges from late September to the middle of December.

Characteristics of Obstructions

Log Driving Dams.

Dams of this category are generally located on the smaller brooks and streams. At present they are used primarily for driving pulpwood and not for long logs as in years past. The number of these dams constructed on a stream varies with the size of the stream, gradient, flow and the amount of logs being driven.

The construction of all of these dams is typical. Generally they are of log-crib construction with earth filled wings and contain one or more sluiceways which may be used for spillways as well as for sluicing logs. The flow is controlled by vertical, sliding, timber gates opening from the bottom. A typical log driving dam is shown in Plate I.

The more common difficulties which are encountered by migrating salmonids at these obstructions include:

1. Leaking sluicebeds where entire flow filters through timbers allowing neither upstream nor downstream migration. (Plate II)
2. Drop from sluicebed to tailwater too great for fish to jump when moving upstream. (Plate I)

3. Leaking of entire stream flow through dam and under sluiceways which acts as a screen to upstream and downstream movement. (Plate III)
4. Sluice gate openings continually clogging with debris which restricts movement in the stream. (Plate IV)
5. Abandoned dams decaying and falling into stream. (Plate X)

Power Dams.

Few dams used directly for hydro-electric power were surveyed. They are located on the larger rivers maintaining a good year round flow. Some of the same problems which occur with log driving dams also are present at power dams. These dams are of a permanent nature and in most cases it is necessary to provide adequate fishways for trout and salmon. Screening of penstock intakes is sometimes necessary to prevent the destruction of downstream migrating fish.

Water Storage Dams.

This type of dam is generally of permanent nature; therefore, in most cases an adequate fishway should be installed. It is necessary that the fishway be constructed so that it will take care of the large fluctuation in head which occurs with the water storage type of dam.

The fluctuations of reservoir lakes may be harmful to fish populations in several ways. (Plate VIII) Such as:

1. Lowering of the water level after spawning has taken place by lake spawning species, such as lake trout, may expose the spawning beds to drying out and/or freezing temperatures causing death to the eggs.
2. Fluctuating water levels may also cause a decline in the productive capacity of the lake by reducing the littoral zone. The littoral zone of a lake is the shallow, shore area which produces the major portion of the bottom food directly or indirectly utilized by trout and salmon.

Fish Screens.

In the course of the survey several fish screens were encountered. Time did not permit thorough investigation of each screen. More time is needed to study conditions as they exist in the particular lake or pond in order to determine any benefits derived from the fish screen.

Effects of Dams upon Trout and Salmon

The effects of dams upon salmonid fish populations may be either beneficial or harmful. Some of the beneficial effects of dams follow:

More Favorable Water Temperature.

In small coldwater brooks the construction of a dam may benefit the fish population by distributing the water surface over a wider area, thus raising the temperature to a more favorable degree for faster growth.

Increase in Feeding Area.

The flowage resulting from the dam increases the bottom area which is available for producing food that is utilized directly or indirectly by fish populations.

Exclusion of Undesirable Species.

In some cases undesirable species are introduced into a watershed. These species may be kept out of the upper portions of the stream by an impassable dam, thus preventing the undesirable fishes from utilizing the entire watershed to the detriment of trout or salmon populations.

Stabilization of Stream Flow.

In some cases a dam on the headwaters of a stream or river can be used to store water for subsequent release in the stream below. This water can be used during the period of low rainfall during the summer months. However, it must be pointed out that to be a benefit to fish life the flow should be gradually and steadily released so that no great fluctuations occur in the stream below.

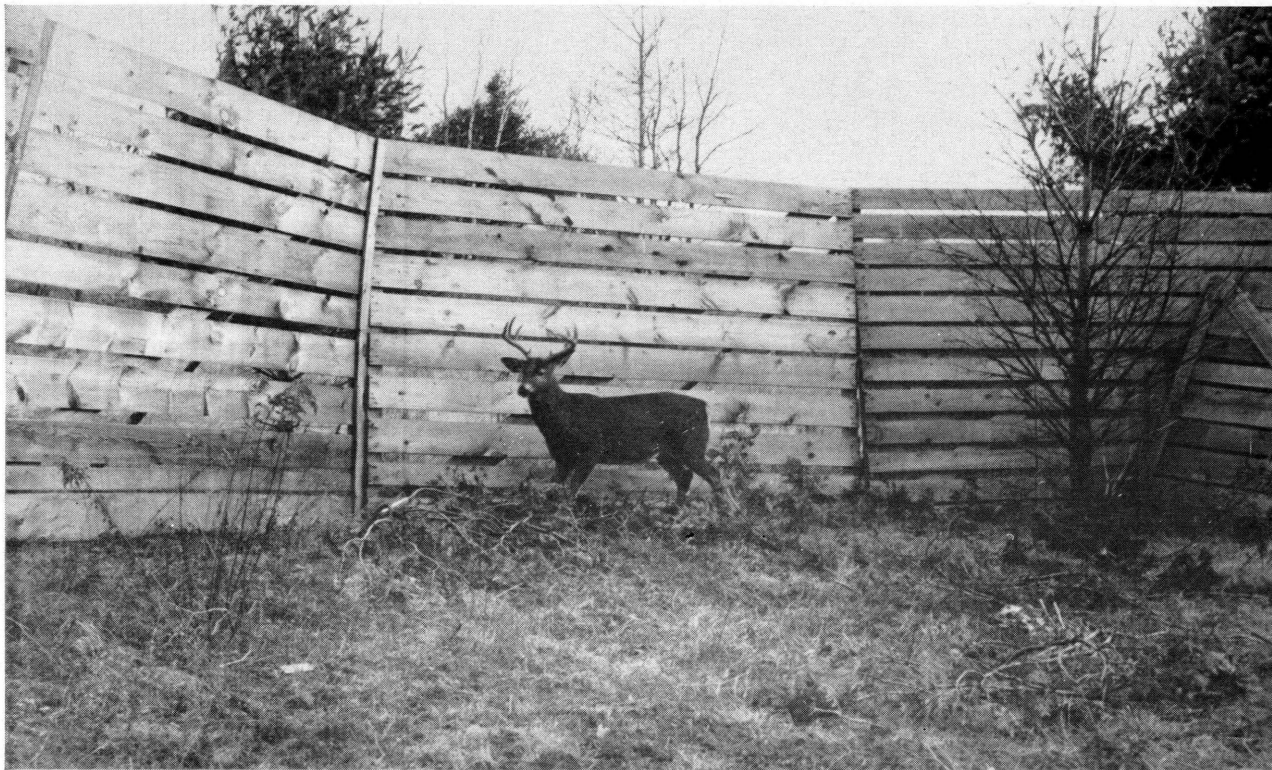
Some of the harmful effects of dams follow:

Unfavorable Water Temperatures for Trout or Salmon.

The raising of the water level in the lake or pond which approaches the borderline temperature for growing cold-water game fishes may bring about temperatures unfavorable to normal growth of trout or salmon. This condition arises particularly in areas where the flowage is not confined, but is spread over wide, flat terrain causing a large portion of shallow water.

Predation.

An impassable barrier in a stream causes a congregation of fishes at certain times of the year. Brook trout as well as land-locked salmon were observed in large numbers directly below impassable dams during this survey. This abnormal concentration of fish is an attraction to bird and mammal predators.



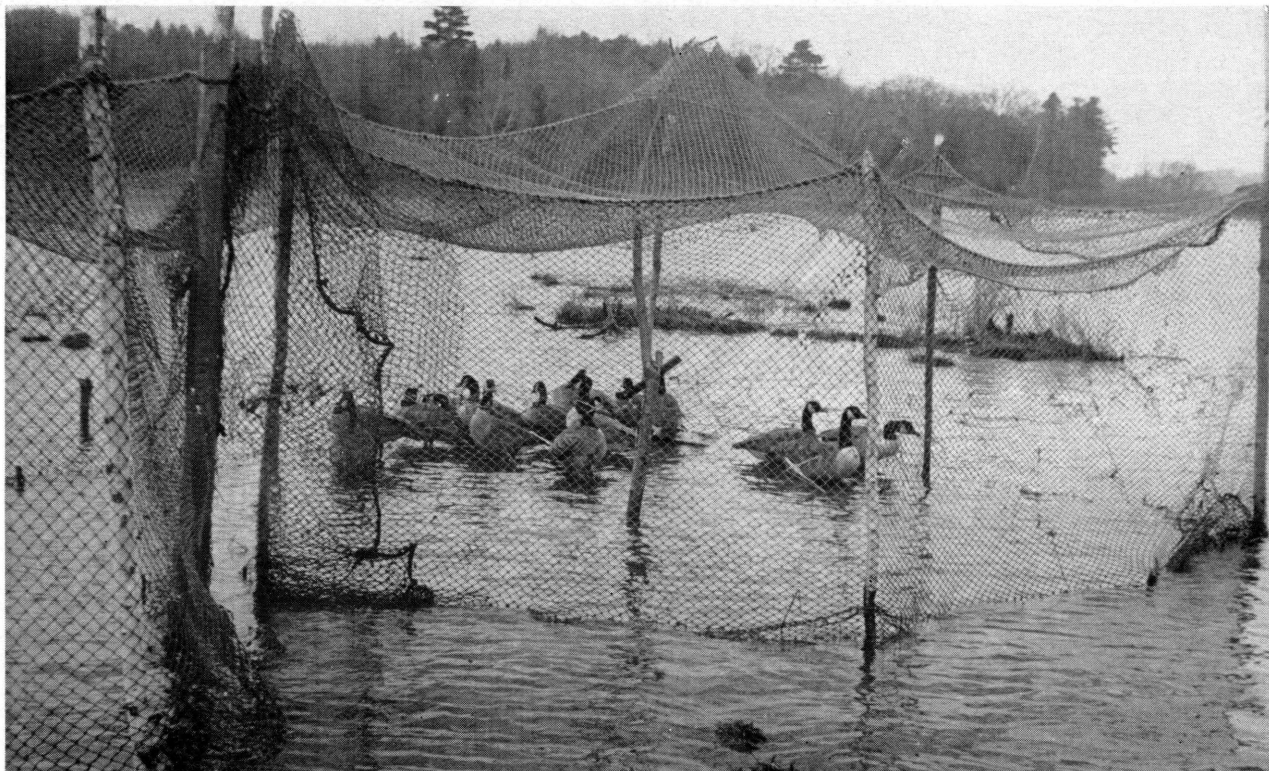
A 10-point buck deer in the corral trap built for the purpose of live-trapping and transplanting of deer from Swan Island Game Management Area and Refuge in 1947. Note the height necessary to prevent deer from jumping out. (Wildlife Research Project 13-M)



A ruffed grouse (partridge) nest kept under observation by J. H. Maasen, Jr., during early studies on this species. 1947. (Wildlife Research Project 12-R) Photo by Bob Elliott



A farmer and a biologist team up in a demonstration of the effectiveness of the new deer repellent (Goodrite z.i.p.) in China in 1949. This application to the beans reduced deer damage to a very minor amount. (Wildlife Research Project 8-R) Photo by Bob Elliott



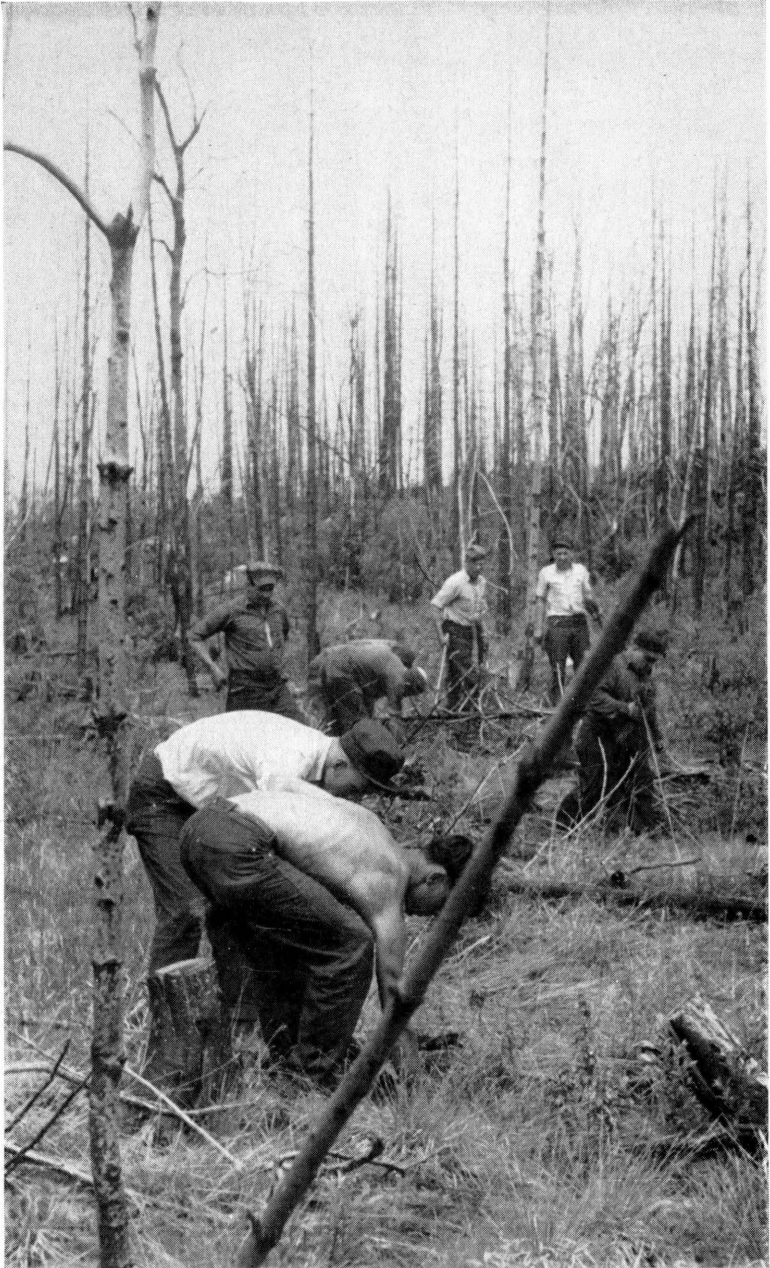
Canada Geese in netting trap in Merrymeeting Bay. These are live-trapped, banded and released.

(Wildlife Research Project 8-R)



Collection of wild rice in Cobbosseecontee Stream in fall for planting in other areas the following spring.

(Wildlife Research Project 2-D)



**Crew at work planting trees in the burntland of Jonesboro, Washington County, in May 1950 to provide cover for game.
(Wildlife Research Project 31-D)**



PLATE I

Typical log driving dam in good repair, Trout Brook T 6 R 9, Piscataquis County



PLATE II

Leaking sluice bed encountered on log driving dams, Penobscot Lake Outlet, Prentiss T 4 R 4, Somerset County



PLATE III

Leaking of entire stream through dam, Red River, T 15 R 9, Aroostook County



PLATE IV

Sluiceway clogged with debris, Baker Pond Outlet, T 5 R 6, Somerset County



PLATE V

A bulldozed stream bed and cut-over stream banks, Blood Brook, T X R 14, Piscataquis County



PLATE VI

Barkwaste and debris deposited on the stream bottom, West Branch Penobscot River,
Seboomook R 4, Somerset County



PLATE VII

Uncut flowage, Brassua Lake, Taunton Raynham Grant, T 1 R 1, Somerset County

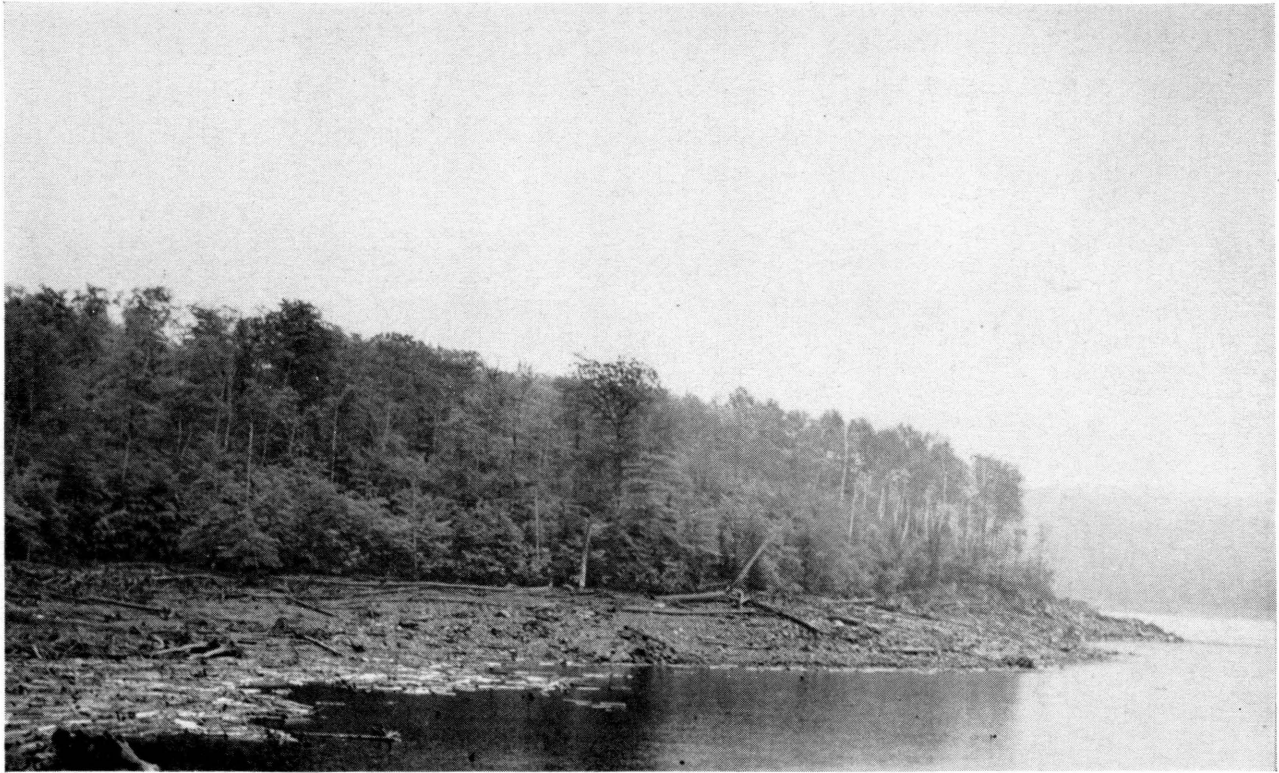


PLATE VIII

Fluctuation of water level, Ripogenus Lake, T 3 R 11, Piscataquis County



PLATE IX

Logging dam with fishway in operation, Machias Lake Outlet, T 12 R 8, Aroostook County



PLATE X

Abandoned logging dam decaying and falling into stream, Misery Stream, Misery, T 2 R 7, Somerset County

Limitation of Spawning and Nursery Areas.

Any obstruction which is not passable to fish tends to limit the amount of spawning area available. This is particularly true with trout which prefer to spawn in the upper tributaries of a stream system. In some of the smaller brook trout ponds which have no tributaries it is possible that natural reproduction is limited if an impassable dam is present at the outlet. The blocking off of the outlet stream also prevents any trout or salmon that were hatched in the stream below from entering the more productive waters of the lake or pond.

Loss of Trout and Salmon through Mechanical Injury.

It has been reported to the writers that trout have been found dead as a result of attempting to pass down over dams with leaking sluicebeds. (Plate II) This condition of leaking sluiceways was found to exist at a great number of the dams surveyed. It is possible that this loss in population is considerable in some ponds.

Unfavorable Spawning Conditions.

Impassable dams in many cases cause a concentration of fish immediately below the barrier. This may force the fish to spawn where temperature, bottom type and stream flow is unsuitable for successful hatching of the eggs. Even though conditions are favorable for successful spawning, large concentrations of fish in a restricted area may lead to superimposition of the spawning beds. For example, a pair of trout or salmon may dislodge and destroy eggs spawned previously by another pair. There are indications that some of these fish will not spawn at all because of the unfavorable spawning conditions.

Effects of Fish Screens upon Trout and Salmon

The management practice of screening lake or pond outlets should not be used indiscriminately, because each lake or pond has different environmental conditions for fish.

Generally the benefits that may be gained by screening the lake or pond outlet are:

1. Exclusion of undesirable species.
2. Prevention of loss of fish out of the lake into polluted waters, over impassable barriers or into water diversions.

Some of the dangers involved in screening a lake or pond include:

1. Limitation of spawning and rearing areas.
2. Gillnetting of fish in the screen.
3. Loss of fish through predation when fish congregate above or below a screen.
4. The risk of overpopulation and consequent stunting of fish.

Fishways

In the construction of any fishway the location of the entrance is one of the most important features in determining whether or not the fish get over the barrier. The entrance must be located so that the fish migrating upstream will find it readily. This is generally adjacent to and not far downstream from the main flow of water coming over or through the barrier. In some of the larger dams it may be necessary to construct two or more fishways.

The proper adjustment of the flow of water through a fishway is another prerequisite to passing fish over a barrier. In many instances encountered this summer the flow was either too great or not enough. The adjustment of flow needs constant attention in most of our Maine fishways because of the fluctuation in forebay water level.

There is a great deal of variation in the time of migration among different species and in different localities; therefore, fishways should be operated as soon as is feasible in the spring until freezing over of the streams in the fall.

A logging dam with fishway in operation is shown in Plate IX.

Log Driving

During the course of this survey observations were made as to the direct effects of driving streams and rivers. Observations revealed that it is a common practice to bulldoze the stream bed in preparing a stream for log driving. The effects of bulldozing were most evident in the smaller brooks and streams. (Plate V) This bulldozing removes stream bank cover, fills natural pools, exposes unproductive ledges, removes natural cover and shelter such as boulders, logs and overhanging vegetation. In addition bulldozing widens the stream which causes a decrease in depth with a consequent increase in summer water temperatures.

One of the most important factors from the standpoint of fish production is the destruction of aquatic insect life when the bottom is disturbed. Aquatic insects are one of the main foods taken by trout and salmon of the younger year classes.

In conjunction with stream driving the cutting of the stream bank cover to facilitate the drive was noted by the writers. (Plate V) This practice can effect the fish population by increasing the summer water temperatures, drying up of the stream in the summer months by exposure to the rays of the sun and may decrease the amount of terrestrial insect life that is available to the fish population.

Numerous instances of bark waste blanketing the stream bottom were noted in streams that had been driven. (Plate VI) It was evident

that the bottom areas covered with bark waste produced little or no food organisms. In some cases this bark waste was covering areas that would ordinarily be good spawning and nursery areas for trout and salmon.

Another logging practice which is considered harmful to trout and salmon habitat is the storage of wood in a lake or pond for long periods prior to being driven. This tends to loosen the bark which is subsequently deposited on the bottom of the lake or stream when the wood is driven.

The act of driving in itself could cause damage to spawning beds as well as killing the young and adult fish by the scouring action of the logs moving down the stream. Further investigation should give an indication of the extent of damage of this type.

In some cases the flowage created by dams has not been cut over prior to flooding. (Plate VII) The effect of this practice upon the fish populations has not been determined in this region. However, in some cases it has been found that oxygen depletion and increased acidity caused by the decomposition of the wood waste has had an injurious effect.

Summary of Obstructions Surveyed

The tables included in this report summarize the data gathered for each obstruction. The column headed "Obstruction Number" applies to the same obstruction in both Table 1 and Table 1A series. The Term "Operable" was judged on the condition of the obstruction at the time of survey as to whether or not they were in a usable state of repair. The passability to upstream and downstream migrating fish was determined by the water level in the stream, the construction and condition of the obstruction, debris present and the jump distance encountered on the date surveyed. The column headed "Fish Jump Distance in Feet" was determined for each obstruction by measuring the distance a fish would have to jump in a vertical and horizontal plane in order to pass upstream.

Table 5 summarizes the conditions encountered at one hundred and sixty-seven dams and six fish screens. One dam and one fish screen are not included as they were under construction at the time of survey.

Recommendations

It is recommended that:

1. The temporary log driving dams be constructed with the highest point of the main sluiceway bed below natural low water level of the stream, or an adequate fishway be installed.

2. After being used, the temporary log driving dams be cleared from the stream sufficiently to allow unobstructed passage of the fish up and down the stream.
3. Adequate fishways be installed in existing permanent dams as specified by the Department of Inland Fisheries and Game.
4. All future permanent dams be constructed with adequate fishways.
5. Bulldozing of the stream bed be confined to the dam site and that indiscriminate bulldozing of the stream bed and banks be controlled.
6. Log driving be confined to the larger streams where it is not necessary to remove protective shade of trees and shrubs along the banks.
7. Flowages be cleared prior to flooding.
8. Pulpwood storage in lakes and ponds for extended periods be controlled.
9. Prior to the construction of any fish screen the fishery biologists of the Department be consulted.

Acknowledgments

The writers wish to express their appreciation to the Maine Inland Warden Force, particularly to Pilot Wardens George Later and Malcolm Maheu, for their excellent cooperation during the course of the survey.

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TABLE 1—OBSTRUCTIONS SURVEYED, AROOSTOOK COUNTY

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
1	North Fork, Dickey Brook	St. Agatha	9/5/50	Corriveau mill site	Saw mill	Log crib	International Paper Company
2	Little Madawaska River	Stockholm	9/5/50	Stockholm Village	Logging	Log crib	
3	Perley Brook	Fort Kent	9/5/50	About 1 mile above junction with Fish River	Unknown	Log crib	
4	Wallagrass Stream	Wallagrass	8/29/50	About 1 mile above junction with Fish River	Saw mill	Log crib and concrete	Ernestine Cyr, Madawaska
5	Wallagrass Stream	Wallagrass	8/29/50	About $\frac{1}{4}$ mile above first dam	Power	Log crib	Robert Z. Michaud, Soldier Pond
6	Wallagrass Stream	St. John Plantation	8/29/50	At outlet to Third Lake	Logging	Log crib	International Paper Company
7	Fall Brook	New Canada Plantation	8/29/50	About 1 mile above confluence with Sly Brook	Saw mill	Log crib	W. Stadig, Soldier Pond
8	Sly Brook	New Canada Plantation	8/29/50	At outlet to First Lake Sly Brook	Unknown	Log crib	
9	Birch River	Winterville Plantation	8/30/50	At Birch River Fish Hatchery	Water storage	Log crib	State of Maine
10	South Branch, Birch River	T 16 R 8	8/22/50	Near junction of Sauls Brook	Logging	Log crib	Great Northern Paper Company
11	Connors Brook	T 15 R 9	8/22/50	At outlet to Mud Pond	Logging	Log crib	Great Northern Paper Company
12	Rocky Brook	Winterville Plantation	8/30/50	About $\frac{1}{2}$ mile above confluence with Red River	Logging	Log crib	Great Northern Paper Company
13	Red River	T 15 R 9	8/30/50	About $\frac{1}{4}$ mile below Pushineer Pond	Logging	Log crib	Great Northern Paper Company

TABLE 1—OBSTRUCTIONS SURVEYED, AROOSTOOK COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
14	Red River	T 15 R 9	8/30/50	At outlet to Pushineer Pond	Logging	Log crib	Great Northern Paper Company
15	Big Brook	T 14 R 10	8/22/50	At outlet to Big Brook Lake	Logging	Log crib	Great Northern Paper Company
16	Allagash River	T 12 R 13	9/6/50	At outlet to Long Lake	Logging	Log crib	International Paper Company
17	Little Musquacook Stream	T 12 R 11	8/22/50	About 2 miles above confluence with Musquacook Stream	Logging	Log crib	International Paper Company
18	Musquacook Stream	T 12 R 11	8/22/50	At outlet to First Musquacook Lake	Logging	Log crib	International Paper Company
19	Musquacook Stream	T 11 R 11	8/22/50	At outlet to Third Musquacook Lake	Logging	Log crib	International Paper Company
20	Musquacook Stream	T 11 R 11	8/22/50	At outlet to Fourth Musquacook Lake	Logging	Log crib	International Paper Company
21	Rocky Brook	T 11 R 10	9/6/50	At outlet to Lower McNally Pond	Logging	Log crib	Allagash Land Company
22	Chase Brook	T 14 R 9	8/22/50	At outlet to Chase Ponds	Logging	Log crib	Great Northern Paper Company
23	Machias River	T 12 R 8	9/1/50	At outlet to Big Machias Lake	Logging	Log crib	Great Northern Paper Company
24	Machias River	T 11 R 7	9/7/50	About 4 miles below junction of North and South Branches	Logging	Log crib	Great Northern Paper Company
25	Pratt Lake Stream	T 11 R 8	9/6/50	At outlet to McGowan Pond	Logging	Log crib	Great Northern Paper Company

TABLE 1—OBSTRUCTIONS SURVEYED, AROOSTOOK COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
26	Billings Brook	T 11 R 9	9/1/50	About 1 mile below Billings Pond	Logging	Log crib	Great Northern Paper Company
27	Billings Brook	T 11 R 9	9/1/50	Headwaters of Billings Brook	Logging	Log crib	Great Northern Paper Company
28	Dead Brook	T 11 R 8	9/1/50	At outlet to Rowe Lake	Logging	Log crib	Great Northern Paper Company
29	Limestone Stream	Limestone	8/31/50	At Limestone Municipal Pool	Water storage	Log crib	Town of Limestone
30	Pattee Brook	Ft. Fairfield	8/31/50	About 200 yards above bridge in Ft. Fairfield	Water storage	Log crib and concrete	George H. Stone and Sons
31	Pattee Brook	Ft. Fairfield	8/31/50	At outlet to Monson Pond	Water storage	Concrete	Ft. Fairfield Fish and Game Club
32	Hockenhull Brook	Ft. Fairfield	8/31/50	About 100 yards south of Caribou Rd	Water storage	Log crib	S. Nightingale and Company
33	Libby Brook	Ft. Fairfield	8/31/50	At outlet to Bryant Pond	Water storage	Concrete	R. Haines
34	Caribou Stream	Caribou	9/5/50	Collins Lumber Mill	Water storage	Log crib	Collins Lumber Company
35	Presque Isle Stream	Presque Isle	9/5/50	In city of Presque Isle	Water storage	Log crib	City of Presque Isle
36	North Branch, Presque Isle Stream	Mapleton	9/5/50	In town of Mapleton	Water storage	Log crib	Higgins and Lenfest

TABLE 1A—OBSTRUCTIONS SURVEYED, AROOSTOOK COUNTY

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
1	No	1	0	No	Yes*	Yes*	Removal
2	No	0.75	27	Yes †	No	Yes	Removal of sluice bed
3	No	8	4	No	No	No	Removal
4	No	12	0	No	No	Yes	Removal or fishway
5	No	6	0	No	No	Yes	Removal
6	No	5	32	No	No	Yes	Removal or fishway
7	No	12	20	No	No	No	Removal
8	No	8	0	No	No	No	Removal
9	Yes	3	15	No	No	Yes	Fishway
10	No	Unknown ‡	?	No	?	?	Further investigation
11	No	Unknown ‡	?	No	?	?	Further investigation
12	No	4	0	No	No	Yes	Removal
13	No	4	50	No	No	No	Removal
14	No	4	5	No	No	Yes	Removal or fishway
15	No	Unknown ‡	?	No	?	?	Further investigation
16	Yes	17	35	No	No	Yes	Fishway
17	No	Unknown ‡	?	No	?	?	Further investigation

*Opening of insufficient size to prevent clogging with debris

†Fishway not operable at low water levels

‡Located from the air only

TABLE 1A—OBSTRUCTIONS SURVEYED, AROOSTOOK COUNTY (Concluded)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
18	No	0	0	No	Yes	Yes	Cleaning out of dri-ki around right wing
19	No	2	20	No	No	Yes	Removal
20	No	0	0	No	Yes	Yes	None
21	No	35	100	No	No	No	Removal
22	No	1	20	No	No	No	Removal
23	Yes	—	—	Yes	Yes	Yes	Alteration of fishway exit
24	Yes	10	25	Yes †	No	Yes	Fishway to be constructed to operate at all water levels
25	Yes	9	19	No	No	No	Removal
26	Yes	11.5	33	No	No	No	Removal or fishway
27	No	0	0	No	Yes	Yes	None
28	Yes	1	30	No	No	Yes	Removal or fishway
29	Yes	14	22	No	No	Yes	Fishway
30	Yes	8	12	No	No	Yes	Fishway
31	Yes	11	45	No	No	No	Fishway
32	Yes	7	15	No	No	No	Removal or fishway
33	Yes	15	0	No	No	Yes	Fishway
34	Yes	16	8	No	No	No	Fishway
35	Yes	4	5	Yes	No	Yes	Fishway improvement
36	Yes	4.5	10	No	No	Yes	Fishway

†Fishway not operable at low water levels

TABLE 2—OBSTRUCTIONS SURVEYED, FRANKLIN COUNTY

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
37	Stratton Brook	Eustis	9/19/50	In town of Stratton	Saw mill	Concrete	A. B. Sargent
38	Stratton Brook	Wyman T 4 R 3	9/19/50	At outlet of Stratton Brook Pond	Logging	Log crib	The Dorcourt Company
39	North Branch, Dead River	Eustis	9/21/50	In town of Eustis	Power	Concrete	Stratton Light Company
40	Jim Pond Brook	Jim Pond T 1 R 5	9/20/50	At outlet to Little Jim Pond	Fish screen	Log crib hard- ware cloth	Local fish and game club
41	Jim Pond Brook	Jim Pond T 1 R 5	9/20/50	At outlet to Jim Pond	Logging and fish screen	Log crib steel bars	Blaine Viles Estate
42	North Branch, Dead River	Jim Pond T 1 R 5	9/21/50	About 1 mile below Greenbush Pond Outlet	Logging	Log crib	Hollingsworth and Whitney Company
43	North Branch, Dead River	Jim Pond T 1 R 5	9/21/50	At outlet to Chase Pond	Fish screen	Hardware cloth & timber	J. Hill and R. Moore
44	North Branch, Dead River	Chain of Ponds T 2 R 6	9/21/50	At outlet to Chain Lakes	Fish screen	Under construction	Megantic Club
45	Massachusetts Bog Stream	Massachu- setts Gore, T 3 R 6	9/21/50	At outlet to Massachusetts Bog	Logging	Log crib	Brown Company
46	Kennebago River	Seven Ponds T 3 R 5	9/21/50	At outlet to Long Pond	Logging	Log crib	Brown Company
47	Kennebago River	Seven Ponds T 3 R 5	9/21/50	At outlet to Beaver Pond	Logging	Log crib	Brown Company
48	Kennebago River	Seven Ponds T 3 R 5	9/21/50	At outlet to Little Island Pond	Logging	Log crib	Brown Company
49	Kennebago River	Seven Ponds T 3 R 5	9/21/50	At outlet to Big Island Pond	Fish screen	Timber and steel	Megantic Club
50	Kibby Stream	Kibby T 1 R 6	9/20/50	About $\frac{1}{2}$ mile above entrance of Hurricane Brook	Logging	Log crib	Hollingsworth and Whitney Company
51	South Branch, Dead River	Lang T 2 R 3	9/21/50	Lang Town Mill Dam	Unknown	Log crib	Earl W. Spaulding

TABLE 2A—OBSTRUCTIONS SURVEYED, FRANKLIN COUNTY

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
37	Yes	7	9	No	No	Yes	Removal or fishway
38	No	0	0	No	Yes	Yes	Continual check for clogging with debris
39	Yes	14	12	No	No	Yes	Further investigation
40	No	0	0	No	Yes	Yes	Further investigation
41	Yes	9	15	No	No	No	Further investigation
42	No	2	10	No	No	Yes	Removal
43	Yes	6	8	No	No	No	Further investigation
44	Under construction	—	—	—	—	—	Further investigation
45	No	6	48	No	No	No	Removal or fishway
46	Yes	6	32	No	No	No	Fishway
47	No	5	27	No	No	No	Fishway
48	Yes	6.5	21	No	No	No	Fishway
49	Yes	3.5	6	No	No	No	Further investigation
50	Yes	5	30	No	No	Yes	Removal or fishway
51	No	2	1	No	No	Yes	Removal

TABLE 3—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
52	Trout Brook	T 6 R 9	6/24/50	About 3 miles above Grand Lake	Logging	Log crib	Eastern Corporation
53	Trout Brook	T 5 R 10	6/24/50	About 2 miles up North Branch Trout Brook	Logging	Log crib	Eastern Corporation
54	Trout Brook	T 5 R 10	6/23/50	About $\frac{1}{2}$ mile below McCarthy Camp Site	Logging	Log crib	Eastern Corporation
55	Trout Brook	T 5 R 10	6/23/50	About $1\frac{1}{2}$ miles upstream from McCarthy camp site	Logging	Log crib	Eastern Corporation
56	Webster Brook	T 6 R 11	7/13/50	At outlet to Telos Lake	Water storage	Timber crib	Bangor Hydro Electric Company
57	Natural outlet to Chamberlain Lake	T 7 R 13	7/13/50	At outlet to Chamberlain Lake	Water storage	Log crib	East Branch Improvement Company
58	East Branch, Penobscot River	T 7 R 10	7/13/50	At outlet to Third Lake	Logging	Log crib	Eastern Corporation
59	East Branch, Penobscot River	T 7 R 10	7/13/50	About $\frac{1}{2}$ mile above Third Lake	Logging	Log crib	Eastern Corporation
60	Millinocket Stream	T 7 R 9	9/6/50	At outlet to Millinocket Lake	Water storage	Log crib	Maine Public Service Company
61	Mooseleuk Stream	T 10 R 9	9/6/50	At outlet to Mooseleuk Lake	Logging	Log crib	Great Northern Paper Company
62	Mule Brook	T 10 R 10	9/8/50	At outlet to Middle Elbow Pond	Logging	—	Great Northern Paper Company
63	Allagash River	T 10 R 12	9/6/50	At outlet to Churchill Lake	Logging	Log crib	Irving Company
64	Pleasant Brook	T 9 R 11	8/22/50	At outlet to Pleasant Lake	Logging	Log crib	Great Northern Paper Company

TABLE 3—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
65	Soper Brook	T 8 R 12	7/13/50	About 1 mile up Soper Brook from Eagle Lake	Logging	Log crib	Garfield Land Company
66	Soper Brook	T 8 R 12	7/13/50	About 4 miles above first dam	Logging	Log crib	Garfield Land Company
67	Soper Brook	T 8 R 12	7/13/50	At outlet to Soper Pond	Logging	Log crib	Garfield Land Company
68	B Stream	T B R 11	7/11/50	At outlet to B Pond	Water storage	Log crib	Griswell
69	West Branch, Penobscot River	T 1 R 9	6/28/50	Between Millinocket and Ambajejus Lakes	Water diversion	Concrete	Great Northern Paper Company
70	Abol Stream	T 2 R 9	6/28/50	At outlet to Abol Pond	Logging	Log crib	Great Northern Paper Company
71	Sourdnahunk Stream	T 3 R 10	6/29/50	About 1 mile below Daicy Pond outlet entrance	Logging	Log crib	Great Northern Paper Company
72	Sourdnahunk Stream	T 4 R 10	7/14/50	At outlet to Sourdnahunk Lake	Logging	Log crib	Great Northern Paper Company
73	West Branch, Penobscot River	T 3 R 11	6/29/50	At outlet to Ripogenus Lake	Logging	Concrete	Great Northern Paper Company
74	Chesuncook Brook	T 3 R 11	7/12/50	At outlet to Chesuncook Pond	Logging	Log crib	Great Northern Paper Company
75	Black Brook	T 2 R 12	7/10/50	About 200 yards south of road	Logging	Log crib	Great Northern Paper Company
76	Ragged Stream	T 2 R 13	7/10/50	At outlet to Ragged Lake	Logging and water storage	Concrete	Great Northern Paper Company
77	Ripogenus Stream	T 4 R 11	7/14/50	At outlet to Harrington Lake	Logging	Log crib	Great Northern Paper Company

TABLE 3—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
78	Soper Brook	T 4 R 11	7/14/50	About 1 mile upstream from Harrington Lake	Logging	Log crib	Great Northern Paper Company
79	Red Brook	T 4 R 12	7/13/50	About 1 mile upstream from Chesuncook Lake	Logging	Log crib	Great Northern Paper Company
80	Red Brook	T 4 R 12	7/13/50	About 2 miles above first dam	Logging	Log crib	Great Northern Paper Company
81	Pine Stream	T 3 R 13	7/20/50	About 6 miles up Pine Stream from Chesuncook Lake	Logging	Log crib	Great Northern Paper Company
82	Pine Stream	T 3 R 13	7/20/50	About $\frac{1}{2}$ mile above first dam	Logging	Log crib	Great Northern Paper Company
83	Pine Stream	T 3 R 13	7/20/50	About $\frac{1}{2}$ mile above second dam	Logging	Log crib	Great Northern Paper Company
84	Pine Stream	T 3 R 13	7/20/50	About $\frac{1}{2}$ mile above third dam	Logging	Log crib	Great Northern Paper Company
85	Pine Stream	T 3 R 13	7/20/50	At outlet to Pine Pond	Logging	Log crib	Great Northern Paper Company
86	Ragmuff Stream	T 4 R 14	7/20/50	About 2 miles from West Branch Penobscot River	Logging	Log crib	Great Northern Paper Company
87	Ragmuff Stream	T 4 R 14	7/20/50	About 1 mile above first dam	Logging	Log crib	Great Northern Paper Company
88	Ragmuff Stream	T 5 R 14	7/20/50	About 1 mile above second dam	Logging	Log crib	Great Northern Paper Company
89	Little Lobster Lake Outlet	T 3 R 14 & 15	7/20/50	At outlet to Little Lobster Lake	Logging	Log crib	Great Northern Paper Company

TABLE 3—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
90	Duck (Blood) Pond Outlet	T X R 14	7/18/50	About 2 miles below Duck (Blood) Pond	Logging	Log crib	Great Northern Paper Company
91	Umbazooksus Stream	T 6 R 13	7/13/50	At outlet to Umbazooksus Lake	Logging and water storage	Concrete and steel	Great Northern Paper Company
92	Longley Pond Outlet	T 6 R 13	8/4/50	At outlet to Longley Pond	Logging	Log crib	Great Northern Paper Company
93	Little Scott Brook	T 6 R 14	7/20/50	About 1 mile above Caucomagomac Lake	Logging	Log crib	Great Northern Paper Company
94	Little Scott Brook	T 5 R 14	7/20/50	About 4 miles above first dam	Logging	Log crib	Great Northern Paper Company
95	Caucomagomac Stream	T 6 R 14	8/4/50	At outlet to Caucomagomac Lake	Logging	Log crib	Great Northern Paper Company
96	Loon Stream	T 6 R 15	7/20/50	At outlet to Loon Lake	Logging	Log crib	Great Northern Paper Company
97	Loon Stream	T 6 R 15	7/20/50	On inlet to Bear Pond	Logging	Log crib	Great Northern Paper Company
98	Caucomagomac Stream	T 7 R 14	8/4/50	At outlet to Poland Pond	Logging	Log crib	Great Northern Paper Company
99	Shallow Lake Outlet	T 7 R 14	8/4/50	At outlet to Shallow Lake	Logging	Log crib	Great Northern Paper Company
100	Russell Stream	T 4 R 15	8/4/50	At outlet to Cassidy Dead Water	Logging	Log crib	Great Northern Paper Company
101	Cooper Brook	T A R 11	7/11/50	At outlet to Crawford Pond	Logging	Log crib	Great Northern Paper Company
102	Yoke Pond Outlet	T A R 11	7/11/50	At outlet to Yoke Pond	Logging	Log crib	Great Northern Paper Company
103	Pleasant Pond Outlet	T A R 11	7/11/50	At outlet to Pleasant Pond	Logging	Log crib	Great Northern Paper Company

TABLE 3—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Concluded)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
104	Nahmakanta Stream	T 1 R 11	7/12/50	At outlet to Nahmakanta Lake	Logging	Log crib	Penobscot Development Company
105	Pollywog Pond Outlet	T 2 R 11	7/12/50	At outlet to Pollywog Pond	Logging	Log crib	Penobscot Development Company
106	Penobscot Lake Outlet	T 1 R 11	7/12/50	At outlet to Penobscot Lake	Logging	Log crib	Penobscot Development Company
107	Rainbow Stream	T 2 R 11	7/12/50	About 2 miles below Rainbow Lake	Logging	Log crib	Penobscot Development Company
108	Rainbow Stream	T 2 R 11	7/12/50	At outlet to Rainbow Lake	Logging	Log crib	Penobscot Development Company
109	The Gulf Stream	T A R 12	8/7/50	At outlet to Big Lyford Pond	Fish screen	Logs and wood slats	Hollingsworth and Whitney Company
110	Inlet Brook	T A R 12	8/7/50	At outlet to West Branch Pond	Logging	Log crib	Hollingsworth and Whitney Company
111	Wilson River	Greenville	8/14/50	About $\frac{1}{2}$ mile below Wilson Pond	Water storage	Concrete	Central Maine Power Company
112	Wilson River	Greenville	8/14/50	At outlet to Wilson Pond	Water storage	Concrete	Central Maine Power Company
113	Roach River	Frenchtown T A R 13	7/10/50	At outlet to First Roach Pond	Logging	Log crib	Hollingsworth and Whitney Company
114	Roach River	T 1 R 12	7/11/50	At outlet to Second Roach Pond	Logging	Log crib	Hollingsworth and Whitney Company
115	Roach River	T A R 12	7/11/50	At outlet to Third Roach Pond	Logging	Log crib	Hollingsworth and Whitney Company
116	Spencer Stream	T 1 R 14	7/20/50	At outlet to Spencer Pond	Logging	Log crib	Hollingsworth and Whitney Company
117	Spencer Stream	East Middlesex Canal Grant	7/20/50	At outlet to Little Spencer Pond	Logging	Log crib	Great Northern Paper Company

TABLE 3A—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
52	Yes	9	21	No	No	Yes	Removal or fishway
53	Yes	4	55	No	No	No	Removal or fishway
54	Yes	9	0	No	No	Yes	Removal or fishway
55	No	3	5	No	No	Yes	Removal
56	Yes	16	32	No	No	Yes	Fishway
57	Yes	16	20	No	No	No	Further investigation
58	Yes	3	18	No	No	No	Removal or fishway
59	No	Unknown‡	?	No	?	?	Further investigation
60	Yes	—	—	Yes	Yes	Yes	None
61	Yes	12	28	Yes	No	No	That fishway be operated properly
62	Under construction	—	—	—	—	—	Further investigation
63	Yes	10	60	No	No	Yes	Fishway
64	No	0.33	0	No	Yes	Yes	None
65	No	Unknown‡	?	No	?	?	Further investigation
66	No	Unknown‡	?	No	?	?	Further investigation
67	No	Unknown‡	?	No	?	?	Further investigation
68	Yes	3.5	42	No	No	Yes	Removal or fishway
69	Yes	—	—	No	—	—	Further investigation

‡Located from the air only

TABLE 3A—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Continued)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
70	No	3	0	No	No	Yes	Removal
71	No	4	2	No	No	Yes	Removal or fishway
72	No	4	25	No	No	No	Removal or fishway
73	Yes	—	—	No	No	Yes	Fishway
74	No	6	20	No	No	No	Removal
75	No	2.5	3	No	No	Yes	Removal
76	Yes	3.5	45	No	No	Yes	Fishway
77	Yes	7	40	No	No	No	Removal or fishway
78	No	3	0	No	No	Yes	Removal
79	No	3.5	0	No	No	No	Removal
80	No	Unknown‡	?	No	?	?	Further investigation
81	No	Unknown‡	?	No	?	?	Further investigation
82	No	Unknown‡	?	No	?	?	Further investigation
83	No	Unknown‡	?	No	?	?	Further investigation
84	No	Unknown‡	?	No	?	?	Further investigation
85	No	Unknown‡	?	No	?	?	Further investigation
86	No	Unknown‡	?	No	?	?	Further investigation
87	No	Unknown‡	?	No	?	?	Further investigation
88	No	Unknown‡	?	No	?	?	Further investigation

‡Located from the air only.

TABLE 3A—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Continued)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
89	No	2.5	3	No	No	Yes	Removal
90	Yes	1	0	No	Yes	Yes	Passable as long as gates remain open
91	Yes	0	0	No	Yes	Yes	Passable as long as gates remain open
92	No	2	22	No	No	No	Removal
93	No	Unknown‡	?	No	?	?	Further investigation
94	No	Unknown‡	?	No	?	?	Further investigation
95	Yes	1.5	3	No	No	Yes	Removal or fishway
96	Yes	4	25	No	No	Yes	Further investigation
97	No	Unknown‡	?	No	?	?	Further investigation
98	Yes	5	30	No	No	No	Removal or fishway
99	Yes	Unknown‡	?	No	?	?	Further investigation
100	Yes	1	0	No	Yes	Yes	Passable as long as gates remain open
101	No	7	15	No	No	No	Removal
102	No	6	24	No	No	No	Removal
103	No	2	6	No	No	Yes	Removal
104	No	0	0	No	Yes	Yes	None
105	No	Unknown‡	?	No	?	?	Further investigation

‡Located from the air only

TABLE 3A—OBSTRUCTIONS SURVEYED, PISCATAQUIS COUNTY (Concluded)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
106	No	0	0	No	Yes*	Yes*	Removal
107	No	Unknown‡	?	No	?	?	Further investigation
108	No	7	40	No	No	No	Removal
109	Yes	3	0	No	No	No	Removal
110	No	1	6	No	No	No	Removal
111	Yes	24	20	No	No	Yes	Further investigation
112	Yes	14	10	No	No	Yes	Further investigation
113	Yes	—	—	Yes	Yes	Yes	Repair to fishway exit
114	Yes	—	—	Yes	Yes	Yes	None
115	No	3	20	No	No	No	Removal
116	No	5	25	No	No	No	Removal
117	No	Unknown‡	?	No	?	?	Further investigation

*Opening of insufficient size to prevent clogging with debris

‡Located from the air only

TABLE 4—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
118	Russell Stream	T 5 R 16	8/15/50	At outlet to Russell Pond	Logging	Log crib	Great Northern Paper Company
119	Russell Stream	T 5 R 16	8/15/50	About 1 mile up North Branch of Russell Stream	Logging	Log crib	Great Northern Paper Company
120	Lost Pond Brook	T 5 R 16	8/15/50	At natural outlet to Lost Pond	Water diversion	Log crib	Great Northern Paper Company
121	Loon Stream	T 6 R 16	8/15/50	At outlet of unnamed pond in headwaters of Loon Str.	Logging	Log crib	Great Northern Paper Company
122	West Branch, Penobscot River	Seboomook R 4	7/19/50	At outlet to Seboomook Lake	Logging	Concrete	Great Northern Paper Company
123	Nulhedus Stream	T 4 R 17	8/3/50	Headwaters of Nulhedus Stream	Logging	Log crib	Great Northern Paper Company
124	Big Lane Brook	T 4 R 18	8/2/50	About 1 mile below Spencer Pond	Logging	Log crib	Great Northern Paper Company
125	Dole Brook	Dole T 3 R 5	8/9/50	At outlet to Dole Pond	Logging	Log crib	Great Northern Paper Company
126	Dole Brook	Dole T 3 R 5	8/9/50	At outlet to Long Pond	Logging	Log crib	Great Northern Paper Company
127	Northeast Branch, Penobscot River	T 5 R 18	8/3/50	At outlet to Big Bog	Logging	Log crib	Great Northern Paper Company
128	Foley Brook	T 4 R 18	8/16/50	At outlet to Foley Pond	Unknown	Log crib	Great Northern Paper Company
129	Lane Brook	T 4 R 18	8/16/50	At outlet to lower pond on headwaters of Lane Brook	Logging	Log crib	Great Northern Paper Company

TABLE 4—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
130	South Branch, Penobscot River	T 2 R 4	7/19/50	At outlet to Canada Falls Deadwater	Logging and water storage	Concrete	Great Northern Paper Company
131	Penobscot Brook	Hammond T 3 R 4	8/8/50	About 1 mile below Cheney Pond	Logging	Log crib	Great Northern Paper Company
132	Penobscot Brook	Hammond T 3 R 4	8/8/50	At outlet to Cheney Pond	Logging	Log crib	Great Northern Paper Company
133	Penobscot Brook	Prentiss T 4 R 4	8/8/50	At outlet to Penobscot Lake	Logging	Log crib	Great Northern Paper Company
134	Duncan Pond Outlet	Prentiss T 4 R 4	8/8/50	At outlet to Duncan Pond	Logging	Log crib	Great Northern Paper Company
135	South Branch, Penobscot River	Sandy Bay T 5 R 3	8/17/50	About $\frac{1}{2}$ mile below entrance of Campbell Brook	Logging	Log crib	Great Northern Paper Company
136	Hale Brook	Alder Brook T 3 R 3	8/8/50	At outlet to Hale Pond	Logging	Log crib	Great Northern Paper Company
137	Alder Brook	Alder Brook T 3 R 3	8/8/50	About 1 mile above Canada Falls Deadwater	Logging	Log crib	Great Northern Paper Company
138	Alder Brook	Alder Brook T 3 R 3	8/8/50	Headwaters of Alder Brook	Logging	Log crib	Great Northern Paper Company
139	St. John River	T 6 R 17	8/15/50	At outlet to St. John Pond	Logging	Log crib	Great Northern Paper Company
140	St. John River	T 5 R 17	8/3/50	At outlet to Fourth Upper St. John Pond	Logging	Log crib	Great Northern Paper Company
141	St. John River	T 4 R 17	8/3/50	At outlet to Third Upper St. John Pond	Logging	Log crib	Great Northern Paper Company

TABLE 4—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
142	Carry Brook	Seboomook R 4	8/1/50	About 2 miles above entrance into Moosehead Lake	Logging	Log crib	Great Northern Paper Company
143	Socatean Stream	West Middlesex Canal Grant	7/26/50	About 4 miles above entrance into Moosehead Lake	Logging	Log crib	Great Northern Paper Company
144	Socatean Stream	West Middlesex Canal Grant	7/28/50	About 2 miles above first dam	Logging	Log crib	Hollingsworth and Whitney Company
145	Tomhegan Stream	Soldier Town T 2 R 3	7/25/50	At outlet to Tomhegan Pond	Logging	Log crib	Atlas Plywood Company
146	Moose River	Taunton & Raynham T 1 R 1	7/19/50	At outlet to Brassua Lake	Water storage	Concrete	Hollingsworth and Whitney Company
147	Brassua Stream	Brassua T 2 R 2	7/27/50	At mouth of Brassua Stream	Logging	Log crib	Hollingsworth and Whitney Company
148	Brassua Stream	Brassua T 2 R 2	7/27/50	On South Branch about 4 miles above first dam	Logging	Log crib	Hollingsworth and Whitney Company
149	Churchill Stream	Thorndike T 3 R 2	8/8/50	At outlet to Luther Pond	Logging	Log crib	Hollingsworth and Whitney Company
150	Churchill Stream	Thorndike T 3 R 2	8/8/50	At outlet to Mud Pond	Logging	Log crib	Hollingsworth and Whitney Company
151	Parlin Stream	Parlin Pond T 3 R 7	8/17/50	About 3 miles below Parlin Pond	Logging	Log crib	Hollingsworth and Whitney Company
152	Upper Churchill Stream	Moose River Plantation	8/8/50	About 7 miles upstream from mouth	Logging	Log crib	Hollingsworth and Whitney Company
153	Upper Churchill Stream	Moose River Plantation	8/8/50	About 1 mile above first dam	Logging	Log crib	Hollingsworth and Whitney Company

TABLE 4—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Continued)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
154	Upper Churchill Stream	Moose River Plantation	8/8/50	About 1 mile above second dam	Logging	Log crib	Hollingsworth and Whitney Company
155	Misery Stream	Sandwich Acad. Grant T 2 R 1	7/21/50	About 3 miles above mouth at Brassua Lake	Logging	Log crib	Hollingsworth and Whitney Company
156	Misery Stream	Misery T 2 R 7	7/21/50	About $\frac{1}{2}$ mile below entrance of North Branch	Logging	Log crib	Hollingsworth and Whitney Company
157	Misery Stream	Misery T 2 R 7	7/21/50	About 2 miles above second dam	Logging	Log crib	Hollingsworth and Whitney Company
158	Misery Stream	Misery T 2 R 7	7/21/50	About $\frac{1}{2}$ mile below Misery Pond	Logging	Log crib	Hollingsworth and Whitney Company
159	Misery Stream	Misery T 2 R 7	7/21/50	At outlet to Misery Pond	Logging	Log crib	Hollingsworth and Whitney Company
160	Kennebec River	Taunton & Raynham T 1 R 1	7/19/50	At West Outlet to Mooshead Lake	Water storage	Concrete	Hollingsworth and Whitney Company
161	Kennebec River	Sapling T 1 R 7	7/19/50	At East Outlet to Mooshead Lake	Water storage	Concrete Log crib	Hollingsworth and Whitney Company
162	Pierce Pond Stream	Bowtown T 1 R 4	8/8/50	At outlet to Pierce Pond	Logging	Log crib	Central Maine Power Company
163	Baker Pond Outlet	Caratunk Plantation	8/9/50	At outlet to Baker Pond	Logging	Timber crib	
164	Bald Mountain Stream	Bald Mountain T 2 R 3	8/10/50	At outlet to Bald Mountain Pond	Logging	Log crib	Hollingsworth and Whitney Company
165	Enchanted Stream	Upper Enchanted T 3 R 6	8/10/50	About 1 mile up East Branch Enchanted Stream	Logging	Log crib	Kennebec Land Company

TABLE 4—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Concluded)

Obstruction Number	Stream	Township	Date Surveyed	Location	Use	Construction	Land Owner or Operator
166	Enchanted Stream	Upper Enchanted T 3 R 6	8/10/50	At outlet to Enchanted Pond	Logging	Log crib	Kennebec Land Company
167	Little Spencer Stream	T 3 R 5	8/8/50	At outlet to Spencer Lake	Logging	Log crib	Central Maine Power Company
168	Spencer Stream	T 4 R 5	9/20/50	About 10 miles above confluence with Little Spencer Stream	Logging	Log crib	Coburn Lands Trust
169	Baker Stream	T 5 R 6	9/19/50	At outlet to Baker Pond	Logging	Log crib	S. D. Warren Company
170	Spectacle Pond Outlet	T 4 R 5	9/20/50	At outlet to Spectacle Pond	Fish screen	Logs Hardware cloth	Forster Manufacturing Company
171	Dead River	T 3 R 4	8/8/50	About 1 mile above entrance to Spencer Stream	Water storage	Log crib	Central Maine Power Company
172	Black Brook	Pierce Pond T 2 R 4	9/22/50	At State Fish Hatchery	Water storage	Concrete	State of Maine
173	Black Brook	Pierce Pond T 2 R 4	9/22/50	At outlet to Black Brook Pond	Logging	Log crib	Hollingsworth and Whitney Company
174	Dead River	T 3 R 4	9/22/50	Long Falls	Water storage	Concrete	Central Maine Power Company
175	Sandy Stream	Carrying Place Town T 2 R 3	9/22/50	At outlet to Lower Otter Pond	Logging	Timber crib	Hollingsworth and Whitney Company

TABLE 4A—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
118	Yes	14	22	No	No	No	Removal or fishway
119	Yes	1.5	20	No	No	No	Removal or fishway
120	Yes	4	10	No	No	No	None
121	No	4	20	No	No	No	Removal
122	Yes	50	75	No	No	Yes	Fishway
123	Yes	4	15	No	No	No	Removal
124	No	6	20	No	No	No	Removal
125	Yes	6	30	No	No	Yes	Removal or fishway
126	No	2.5	3	No	No	Yes	Removal or fishway
127	Yes	5	25	No	No	Yes	Fishway
128	No	0	0	No	Yes	Yes	Cleaning out of dri-ki
129	No	10	30	No	No	No	Removal
130	Yes	—	—	Yes	Yes	Yes	None
131	No	Unknown‡	?	No	?	?	Further investigation
132	Yes	Unknown‡	?	No	?	?	Further investigation
133	Yes	7	33	No	No	No	Removal or fishway
134	Yes	8	25	No	No	No	Removal or fishway
135	Yes	3.5	28	No	No	No	Removal or fishway
136	No	Unknown‡	?	No	?	?	Further investigation

‡Located from the air only

TABLE 4A—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Continued)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
137	Yes	Unknown‡	?	No	?	?	Further investigation
138	Yes	Unknown‡	?	No	?	?	Further investigation
139	Yes	14	24	No	No	No	Removal or fishway
140	Yes	0	0	No	Yes	Yes	That both gates remain open or fishway be constructed
141	Yes	6	30	No	No	No	Removal or fishway
142	No	4	0	No	No	Yes	Removal
143	No	3	3	No	No	Yes	Removal
144	No	1	4	No	No	Yes	Removal
145	No	3	25	No	No	No	Removal
146	Yes	—	—	Yes	Yes	Yes	None
147	No	6	28	No	No	No	Removal
148	No	2.5	25	No	No	No	Removal
149	No	Unknown‡	?	No	?	?	Further investigation
150	No	Unknown‡	?	No	?	?	Further investigation
151	No	5	25	No	No	No	Removal
152	No	Unknown‡	?	No	?	?	Further investigation
153	No	Unknown‡	?	No	?	?	Further investigation
154	No	Unknown‡	?	No	?	?	Further investigation
155	No	3	25	No	No	No	Removal

‡Located from the air only

TABLE 4A—OBSTRUCTIONS SURVEYED, SOMERSET COUNTY (Concluded)

Obstruction Number	Operable	Fish Jump Distance in Feet		Fishway	Passable to Fish		Recommendation
		Vertical	Horizontal		Upstream	Downstream	
156	No	6	25	No	No	No	Removal
157	No	2	15	No	No	No	Removal
158	No	3	3	No	No	No	Removal
159	No	3	42	No	No	No	Removal
160	Yes	8	0	No	No	No	Fishway and minimum flow
161	Yes	9	0	No	No	Yes	Fishway
162	No	Unknown‡	?	No	Yes	Yes	That run-around be kept clear
163	No	5	20	No	No	No	Further investigation
164	No	3	20	No	No	No	Removal
165	Yes	Unknown‡	?	No	?	?	Further investigation
166	No	3	20	No	No	No	Removal
167	Yes	13	25	No	No	Yes	Further investigation
168	Yes	1	2	No	Yes	Yes	Fishway or all gates remain open
169	No	2.5	3	No	No	No	Removal
170	Yes	—	—	No	No	No	Further investigaton
171	Yes	6	20	No	No	Yes	Fishway or opening of all sluice gates
172	Yes	3	3	No	No	Yes	Fishway
173	Yes	6	25	No	No	No	Removal or fishway
174	Yes	—	—	Yes	Yes	Yes	None
175	No	0	0	No	Yes	Yes	Removal because of rotted condition of dam

‡Located from the air only

TABLE 5—SUMMARY OF DATA INCLUDING 167 DAMS AND 6 FISH SCREENS

Obstruction	Operable	Not Operable	Fishway		Upstream and downstream	Passable to Fish		Undetermined
			Present	Absent		Downstream only	Neither upstream or downstream	
Dams	73	94	11	156	23	50	58	36
Fish screens	5	1	—	—	1	0	5	0

Respectfully submitted,

LYNDON H. BOND
 STUART E. DE ROCHE
Biologists

INLAND FISHERIES AND GAME

FINANCIAL STATEMENT—July 1, 1949-June 30, 1950

Departmental Operations:

Balance forward from 1948-1949	\$ 137,140.31
Cash Income—Net	1,222,560.00
	<hr/>
Available for Expenditures	\$1,359,700.31

EXPENDITURES

Office Division:

Regular Salaries	\$49,668.10
Temporary Wages	509.08
Audit Expense—Courts	1,861.22
Travel Expense	1,275.11
Operation Cars	1,318.72
Operation Truck	143.51
Telephone Service	901.93
Telephone Tolls	1,351.48
Telegrams	80.33
Miscellaneous Rents	10.00
Repairs to Buildings	38.44
Repairs to Equipment	178.51
Repairs to Typewriters	57.33
Insurance on Buildings and Contents	406.23
Employees Bonds	144.05
Miscellaneous Insurance	99.00
Stamps, Parcel Post, etc	1,019.07
Meter Postage	3,451.71
Printing	27,979.54
Advertising Notices	1,849.14
Subscriptions, Periodicals, Newspapers	103.00
National Association Dues	114.50
General Operating Expense	186.23
Office Supplies	2,016.29
Miscellaneous Supplies	395.58
Minor Equipment	1.24
Building Improvements	70.80
Office Equipment	1,990.76
Transportation Equipment	1,204.04 Cr.
Tools and Work Equipment	67.46
	<hr/>
	\$96,084.32
Deer Registration	\$5,254.95
Research to University of Maine	\$8,600.00

Warden Division:

Regular Salaries	\$334,266.91
Caterers Services—Warden School	255.00
Dry Clean Services	27.15
Legal Services	200.00
Medical Services	14.00
Travel Expenses	116,151.23
Operation Cars	12,842.37
Operation Planes, Boats, Motors	21,296.97
Telephone Service	396.17
Telephone Tolls	5,046.83
Electricity—Light	70.72
Rent of Land	33.00
Rent of Buildings	76.00
Rent of Boats	6.00
Rent—Storage Space	435.00
Repairs—Warden Camps	1,251.82
Repairs to Equipment	525.20
Miscellaneous Repairs	13.42
Insurance on Buildings and Contents	629.28
General Operating Expense	72.34
Deposits on Returnable Containers	472.00
Investigating Expense	80.00
Fuel Oil	60.28
Coal	68.25
Wood	32.00
Clothing	7,471.72
Household Supplies	737.72
Laboratory and Hospital Supplies	173.17
Miscellaneous Supplies	2,224.01
Minor Equipment	1,786.17
Maintenance of Prisoners	235.80
Grant by Legislative Resolve	921.55
Disability Compensation	1,888.63
Pension by Legislative Resolve	399.48
Buildings and Improvements	55.57
Household Equipment	491.25
Transportation Equipment	7,537.40
Communication Instruments	1,602.00
Miscellaneous Equipment	205.15
Structures and Improvements	479.63
Total Warden Division	<hr/> \$520,531.19

Hatchery Division:

Regular Salaries \$103,744.50

Temporary Wages:

General Hatchery Work \$2,517.98
 Auburn Hatchery Repairs 1,074.70
 Dry Mills Hatchery Repairs 483.00
 Newport Station Repairs 294.25
 Oquossoc Hatchery Repairs 3,525.38
 Watchmen (Spawning Season) 1,687.00
 Netting Spawning Fish 902.00

10,484.31

Professional Fees 12.37
 Travel Expense 1,811.26
 Operation Cars 1,474.74
 Operation Trucks 8,535.15
 Telephone Service 748.97
 Telephone Tolls 490.41
 Telegrams 1.56
 Electricity—Light 1,821.15
 Electricity—Power 384.62
 Utility Gas 100.00
 Ice 702.12
 Rent of Land 42.00
 Rent of Boats 15.00
 Repairs to Roads and Grounds 2,835.24
 Repairs to Buildings 3,499.86
 Repairs to Equipment 3,632.06
 Miscellaneous Repairs 126.07
 Insurance on Buildings and Contents 2,218.48
 Boiler Insurance 130.08
 General Operating Expense 2,070.30
 Deposits on Returnable Containers 37.00
 Feed for Fish 44,473.86
 Fuel Oil 4,335.38
 Coal 3,315.89
 Wood 511.13
 Clothing 225.95
 Household Supplies 109.13
 Laboratory Supplies 1,485.62
 Fish and Eggs for Propagation 19,912.72
 Miscellaneous Supplies 2,235.23
 Minor Equipment 1,253.19

Disability Compensation	36.50	
Purchase of Land	2,502.45	
Buildings and Improvements	165.76	
Household Equipment	430.83	
Transportation Equipment	1,492.63	
Tools and Work Equipment	413.78	
Miscellaneous Equipment	102.55	
Structures and Improvements (other than buildings)	2,144.68	
	<hr/>	
Total Hatchery Division		\$230,064.53
Research Division:		
Regular Salaries	\$9,090.45	
Temporary Wages	908.60	
Travel Expense	1,989.90	
Operation Cars	1,519.69	
Operation Truck	669.80	
Repairs to Equipment	19.72	
General Operating Expense	23.25	
Laboratory Supplies	634.55	
Minor Equipment	41.29	
Transportation Equipment	762.06	
	<hr/>	
Total Research Division		\$15,659.31
Sea Salmon Research:		
Regular Salaries	\$2,815.20	
Travel Expense	696.70	
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Total Sea Salmon Research		\$3,511.90
Inland Water Survey:		
Regular Salaries	\$114.63	
Travel Expense	98.35	
Operation Truck	7.80	
Office Supplies	19.10	
Laboratory Supplies	68.00	
Minor Equipment	33.80	
Office Equipment	68.44	
Transportation Equipment	156.00	
Educational Equipment	19.63	
Miscellaneous Equipment	9.26	
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Total Inland Water Survey		\$595.01

Engineering Division:

Regular Salaries	\$11,046.20
Dry Clean Services	5.75
Travel Expense	2,281.93
Operation Car	1,055.91
Drafting and Photographic Supplies	223.00
Miscellaneous Supplies	1.44
Minor Equipment	2.75
Engineering Equipment	638.10
Work Equipment	34.25

Total Engineering Division \$15,289.33

Construction Division:

Palermo Rearing Pools:

Temporary Wages	\$15,315.68
Operation Machinery	248.58
Fuel Oil	19.22
Miscellaneous Supplies	26.25
Minor Equipment	9.65
Purchase of Land	202.40
Buildings	9,749.07
Household Equipment	70.61
Tools and Work Equipment	168.02
Structures (other than buildings)	4,096.13

Total Palermo Construction \$ 29,905.61

Dead River Pipe Line:

Temporary Wages	\$13,656.10
Travel Expense	3.60
Operation Truck and Machinery	1,993.66
Telephone Tolls	6.85
Rental of Machinery	916.12
General Operating Expense	42.42
Deposits on Returnable Containers	13.00
Fuel Oil	5.03
Clothing (Rubber Boots)	42.00
Household Supplies	42.27
Miscellaneous Supplies	66.26
Minor Equipment	218.07
Disability Compensation	44.00
Tools and Work Equipment	1,330.45
Structures (other than buildings)	20,438.07

Total Dead River Pipe Line Construction \$38,817.90

Birch River Rearing Station:

Temporary Wages	\$7,634.91
Operation Truck	142.29
Repairs to Buildings	8.08
Repairs to Equipment	1.50
Clothing (Rubber Boots)	20.00
Household Supplies	7.14
Miscellaneous Supplies	5.22
Minor Equipment	74.15
Disability Compensation	7.00
Household Equipment	7.50
Structures (other than buildings)	3,806.98

Total Birch River Construction \$11,714.77

Game Farm Division:

Regular Salaries	\$13,947.40
Temporary Wages	1,500.25
Travel Expense	182.30
Operation Trucks and Machinery	872.27
Telephone Service	56.25
Telephone Tolls	31.10
Electricity—Light	238.41
Electricity—Power	38.33
Electricity—Heating Brooders	187.87
Utility Gas	490.50
Rent of Houses	700.00
Repairs to Buildings	286.58
Repairs to Equipment	237.88
Miscellaneous Repairs	61.00
Insurance on Buildings and Contents	271.29
General Operating Expense	7.13
Feed for Animals	10,920.78
Fuel Oil	677.05
Household Supplies	4.43
Farm Supplies	5.50
Pheasants for Propagation	187.50
Miscellaneous Supplies	35.44
Minor Equipment	65.92
Disability Compensation	5.00
Buildings and Improvements	23.72
Farm Equipment	60.00
Structures (other than buildings)	824.12

Total Game Farm Division \$31,918.02

**Wildlife Restoration Projects not Reimbursable
by Federal Aid:**

Salaries and Wages	\$ 128.11
Travel Expense	21.33
Operation Trucks	23.46
Repairs to Equipment	3.20
Printing	28.91
Periodical Subscription	5.00
Deposit on Returnable Containers	16.00
Office Supplies	33.95
Miscellaneous Supplies	7.60
Disability Compensation	11.00
Buildings and Improvements	638.03
Miscellaneous Equipment	75.05

Total \$ 991.64

Wildlife Restoration Projects--Federal Aid:

Regular Salaries	\$51,725.69
Temporary and Seasonal Wages	9,362.89
Laboratory Services	3.00
Travel Expense	10,491.92
Operation Cars	4,717.35
Operation Trucks, Plane, Boats and Machinery	5,712.23
Telephone Service	429.96
Telephone Tolls	777.97
Telegrams	2.59
Rent of Plane	100.00
Rent of Building	40.00
Rent of Truck	1,264.44
Repairs to Roads and Grounds	16.50
Repairs to Buildings	41.60
Repairs to Equipment	262.54
Repairs to Typewriters	10.78
Miscellaneous Repairs	21.14
Insurance on Buildings and Contents	323.20
Stamps, Parcel Post, etc	472.00
Meter Postage	730.05
Printing	940.64
Advertising Notices	101.16
Periodicals, Subscriptions	36.60
General Operating Expense	15.76

Deposit on Returnable Containers	32.00
Feed for Animals	315.10
Fuel Oil	15.82
Coal	44.00
Office Supplies	454.20
Household Supplies	7.92
Laboratory Supplies	33.23
Farm Supplies	1,676.60
Deer Repellents	18.74
Miscellaneous Supplies	665.25
Minor Equipment	481.15
Purchase of Land	20,403.31
Buildings and Improvements	372.44
Household and Office Equipment	1,078.86
Transportation Equipment	3,464.64
Educational Equipment	81.82
Farm Equipment	1,508.73
Tools and Work Equipment	769.90
Miscellaneous Equipment	809.12
Structures (other than buildings)	13,280.88

Total Wildlife Projects—Federal Aid \$133,113.72

Workshop and Storehouse:

Electricity—Light	\$ 83.29
Rent of Building	1,300.00
Repairs to Building	19.79
Repairs to Equipment	8.00
Miscellaneous Repairs	1.84
Fuel Oil	207.52
Miscellaneous Supplies	7.47
Household Equipment	4.45

Total Workshop and Storehouse \$1,632.36

Bounties, Damages and Repellents:

Regular Salaries	\$2,877.28
Temporary Wages	48.20
Travel Expense	1,530.89
Operation Truck	97.06
Repairs to Equipment	4.89
General Operating Expense	410.52
Deer Repellents	11,483.88

Repelling Material	23.66	
Minor Equipment	100.79	
Transportation Equipment	1,317.51	
Miscellaneous Equipment — Discount recovered on invoice previous year	10.63	Cr.
Damage to Crops and Orchards	41,000.59	
Damage to Motor Vehicles	12,798.50	
Bounties on Bobcats	8,235.00	
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Total Bounties, Damages and Repellents		\$79,918.14

Educational Program:

Salaries and Wages	\$103.97	
Special Services (Typing)	25.50	
Travel Expense	39.86	
Repairs to Equipment	85.67	
Printing	2,079.87	
Photographic Supplies	622.03	
Minor Equipment	150.18	
Educational Equipment	62.37	
	<hr/>	
Total Educational Program		\$3,169.45

Food and Care of Protected Wild Animals:

Salaries and Wages	\$ 73.39	
Travel Expense	29.98	
Feed for Animals	312.36	
Minor Equipment	7.20	
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Total Food and Care of Protected Wild Animals		\$422.93

Screening Lakes and Ponds and Fishways:

Molasses Pond	\$400.00	
Tacoma Lake	132.53	
Lake Auburn	501.52	
Hancock and Peabody Ponds	397.23	
Molunkus Lake	385.90	
Great Pond	632.68	
Eagle Lake Screen Repair	78.80	
	<hr/>	
		\$2,528.66

Total Expended—Departmental Operations \$1,229,723.74

Balance at end of year \$129,976.57

INCOME

Resident Combination Lics.	27,878.	\$ 111,512.00
Resident Hunting Lics.	106,797.	213,594.00
Resident Fishing Lics.	79,075.	158,150.00
Transportation Tags.		348.30
Non-Resident Deer Hunting Lics.	15,216.	304,325.00
Non-Resident Bird Hunting Lics.	1,088.	10,880.00
Non-Resident Exch. Hunting Lics.	92.	920.00
Non-Resident Jr. Bird Lics.	47.	235.00
Non-Res. Fish Lics.—Season.	8,663.	64,972.50
Non-Res. Fish Lics.—15-Day.	23,177.	104,296.00
Non-Res. Fish Lics.—Exch.	475.	1,431.50
Non-Res. Fish Lics.—3-Day.	16,696.	50,088.00
Non-Res. Fish Lics.—Junior.	4,212.	8,424.00
Resident Guide Lic.—Class A.	197.	1,477.50
Resident Guide Lic.—Class B.	1,978.	11,868.00
Guides Replacement Lics.	574.	1,820.25
Non-Res. Guides Lics.	21.	1,050.00
Res. Trapping Lic.—Statewide.	1,312.	13,120.00
Res. Trapping Lic.—Organized.	388.	1,940.00
Res. Trapping Lic.—Exchanged.	21.	105.00
Non-Res. Trapping Lics.	2.	400.00
Res. Taxidermist Lics.	23.	115.00
Camp Proprietors Lics.	108.	540.00
Game and Fur Farm Lics.	105.	525.00
State Fur Buyers Lic.	28.	700.00
Non-Res. Fur Buyers Lic.	7.	700.00
State Deer Skin Buyers Lic.	75.	1,875.00
Live Bait Lics.	541.	1,082.00
Eel Permits.		798.47
Duplicate Lic. Fees.		205.75
Beaver Stamping Fees.		10,930.00
Fisher Stamping Fees.		248.00
Fines and Fees.		38,818.34
Roadside Menagerie Fees.		250.00
Federal Grant—Wildlife Projects.		92,033.14
Misc. Fees.		102.50
Sale of Hides and Furs.		2,196.60
Misc. Sales.		247.20
Sale of Equipment.		765.00
Sale of Cars.		508.75
Overpayments.50

Res. Deer Transportation Lics.....	29.....	580.00
Rent of Buildings.....		175.00
Contributions (Screens).....		200.00
Airplane rental.....		100.00
Sale of Land (Leg. Resolve).....		100.00
Sale of Bldgs. (Leg. Resolve).....		1,200.00
Sale of Bldgs. (Leg. Resolve dedicated for new work)...		6,518.50
Adjust Bal. Frd. (Checks outstanding).....		88.20
		<hr/>
Total Income.....		\$1,222,560.00

Search for Lost Persons:

Legislative Appropriation..... \$1,500.00

EXPENDITURES

Services locating lost persons.....	\$ 246.75	
Dry Clean Services.....	2.50	
Travel Expense.....	117.55	
Minor Equipment.....	86.88	
Transportation Equipment.....	955.20	
	<hr/>	<hr/>
	\$1,408.88	\$1,408.88

Balance lapsed at end of year..... \$ 91.12

Fishway at Aroostook Falls:

Balance Forward per Chapter 53 Resolves of 1949..... \$2,241.04

EXPENDITURES

None
 Balance carried to 1950-1951 year as a carrying account
 to June 30, 1951 as per Resolve..... \$2,241.04