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PRELIMINARY REPORT  
ANNAPOLIS RIVER FISH PASSAGE STUDIES

1962

BY

K.E.H. SMITH AND H.W. COATES

FISHERIES SERVICE

*K. Smith.*

PRELIMINARY REPORT

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and

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## ABSTRACT

Continued studies in 1962 of the Annapolis aboideau, gave indication of safe passage of salmon, shad and stiped bass, with little or no serious delay. These indications, in general, support the findings of previous work in the area. The possibility of delay or hold-up does exist, but this is thought to be only to a minor degree. In fact, the indicated delay and fall-back suffered by a few fish may be attributed to unsuitable water conditions, and to unnatural behaviour of the fish after being handled and tagged.

In general, the primary fish pass appears to be serving its intended purpose quite satisfactorily. The secondary fish pass appears to serve only a very minor role in the safe passage of migrant salmon, shad and striped bass.

## INTRODUCTION

Fishpassage studies at the Annapolis aboideau were again carried out during the spring and early summer of 1962. This work was a continuation of the studies carried out in 1960 and 1961, to assess the efficiency of the aboideau fish passage facilities. The main fishway consists of a simple rectangular opening, 10' wide and 24' high, located adjacent to the aboideau control gates. A 4' diameter corrugated steel pipe, located near the true right shore, acts as an auxiliary fishway.

As in previous years, the more important species under observation were the spawning runs of shad and striped bass, and the early run salmon. In 1960 and 1961, studies were continued throughout the late summer and fall. However, <sup>in</sup> 1962, work was discontinued during the latter part of July when it was felt the early runs were finished.

## METHODS

In order to check on fish movements through the aboideau, a tagging and recovery program was continued, as in 1961. The lower basin float trap (tagging station) was again fished in the same general area as last year. Fish were released in the trap area immediately after being tagged.

A second float trap was operated as a recovery station in the upper basin, about 1 mile above the aboideau. This was the same general area in which the picket trap was operated during 1961. The main reason for substituting a float trap for the old picket trap was the short length of time required to set it in fishing position. Because of windy weather and rough water, serious delays were encountered in setting the picket trap in 1961, and it was feared that many of the early run salmon had passed the area before the trap was installed. Experience in 1961 with the floating type trap showed it to be much better for this job. No delays were encountered with the new float trap, and it was completely installed and fishing within only a few hours. Installation was completed on April 12 this year, almost 2 months ahead of the 1961 date for the picket trap.

Even with the recovery trap fishing at this early date, very few early run salmon were taken. Other evidence strongly indicates the early run of salmon was very small this year. This idea is supported by a corresponding<sup>ly</sup> small catch of early salmon in the lower trap. The bulk of the salmon catches for both traps, was taken in late May and June. Also, a small early run is indicated by very small angling catches from the Round Hill River which is normally noted for early fish.

The wooden counting trap was again installed on the auxiliary fishway, and was in operation by April 19. No salmon were taken in this trap and only a very few bass and shad.

As in 1961, the catch consisted mainly of flounder and sculpin.

In addition to the two recovery traps, attempts were made to recover tags from other sources. The anglers, commercial fishermen, and shad dip-netters were all encouraged to return any tags they might find. Most of the recovered tags came from these sources, with only a few taken in the recovery traps.

#### TAGGING OF FISH BELOW ABOIDEAU

The lower basin float trap (tagging station) was set in approximately the same site as in 1961, just below the causeway and near the true left shore of the original river channel. This trap was set and operating on April 5. Except for a one-week period, June 7 - 14, when the trap was removed for cleaning and repair, it remained in operation until July 24.

After being tagged, the fish were released immediately in the trap area. A total of 30 tagged shad from this year's operations were re-caught in this trap, and 2 of these 30 were re-caught a second time. The 30 recoveries amounted to less than 2% of the 1735 shad tagged in 1962. There were also 4 recoveries in this trap of shad tagged in May and June of 1961. There were no other recoveries of tagged fish in this trap. Thus, it appears that most fish did not remain long in the area, but probably quickly found the fishway and continued on upriver. Any serious holdup or delay at the causeway would likely have resulted in a much larger recapture of tagged fish at this trap.

A very small catch in the pipe trap shows that practically all of the migrating fish which passed the aboideau, did so through the main fish pass or the adjacent control gates. This is what was expected, because of the stronger attractive flows from this area.

As previously noted, salmon, shad and striped bass are the 3 more important species under study. Table #I below, lists the totals of these species caught and tagged as well as totals for sturgeon.

TABLE I

FISH CAUGHT AND TAGGED AT LOWER BASIN FLOAT TRAP - 1962

(1961 figures shown in brackets for comparison)

SPECIES	No. Caught	No. Tagged	Percentage Tagged
Striped bass, ( <i>Morone saxatilis</i> )	31 ( 306)	20 (279)	64.5 (91.2)
Shad, ( <i>Alosa sapidissima</i> )	2568 (7745)	173 <sup>4</sup> (438)	67.6 ( 5.7)
Atlantic salmon, ( <i>Salmo salar</i> )	33 ( 77)	28 ( 72)	84.8 (93.5)
Sturgeon, ( <i>Acipenser sturio</i> )	9 ( 46)	1 ( 42)	11.1 (91.3)

Several other species of fish were also taken in this trap. These were all counted and released untagged. Table #II, below, lists these fish and their totals.

TABLE II

## FISH CAUGHT AND RELEASED UNTAGGED AT

## LOWER BASIN FLOAT TRAP - 1962

(1961 totals are shown in brackets for comparison)

SPECIES	NUMBER	
Flounder	1046	(2387)*
Gaspereau ( <i>Pomolobus pseudoharengus</i> )	50	(10)
Lumpfish ( <i>Cyclopterus lumpus</i> )	6	(10)
Sea sculpin ( <i>Menitripterus americanus</i> )	58	(153)
Spiny dogfish ( <i>Squalus acanthias</i> )	6	(7)
Mackerel ( <i>Scomber scombrus</i> )	7	(0)
Herring ( <i>Clupea harengus</i> )	2	(2)
Butterfish ( <i>Peronotus triacanthus</i> )	1	(1)
Cunner ( <i>Tautoglabrus adspersus</i> )	3	(4)
Big skate ( <i>Raja ocellata</i> )	2	(15)
Lobster ( <i>Homarus americanus</i> )	1	(5)

\* Flounder totals are made up of 3 separate species, winter flounder (*Pseudopleuronectes americanus*), smooth flounder (*Llopsetta putnami*), and sand flounder (*Lophopsetta maculata*). By far, the greater percentage of these was the winter flounder.

## TAGGED FISH RECOVERY

As in 1961, attempts were made to recover as many tagged fish as possible above the causeway. By checking elapsed times, from release to recovery, it was hoped to obtain some indication of any possible delay to these migratory species at the causeway. Tagged fish recoveries were expected from the trap on the auxiliary (pipe) fishway, the upper basin float trap, the anglers and the shad dipnetters.



Tag recoveries were not too numerous from any of these sources. However, some of the tagged fish were recovered far above the causeway within relatively short periods, indicating that at least a portion of the runs suffered little or no delay.

Auxiliary (Pine) Fishway Trap: Installation of this trap was completed on April 19, and the trap was operated continuously until July 8. No tag recoveries were made at this trap. Only a few striped bass and shad were taken, with the bulk of the catch consisting of flounder and sea sculpin. Thus, this trap was of no value in determining possible delay to migrant fish.

The relatively small numbers of each species ascending by this route seem to indicate that this fishway is of little use. It appears that most of the migrant species pass through the main fishway or adjacent control gates, where the attractive water flow is usually much greater. The small 1961 catch in this trap also supports this idea.

In future structures, similar to the Annapolis aboiteau, it may not be necessary to provide for an auxiliary fishway, provided that a suitable fish pass is located near the control gate section.

Totals of the season's catch in the pipe trap are listed below in Table #III.

TABLE III

## AUXILIARY (PIPE) FISHWAY CATCH - 1962

(1961 figures shown in brackets for comparison)

SPECIES	NUMBER	
Flounder	2097	(295)*
Striped bass	10	(4)
Shad	7	(2)
Tomcod ( <i>Microgadus tomcod</i> )	62	(12)
Sturgeon	13**	(18)
Sea sculpin	163	(116)
Lamprey ( <i>Petromyzon marinus</i> )	6	(1)
Smelt ( <i>Osmerus mordax</i> )	1	(1)
Squid	0	(6)
Lumpfish	4	(1)
Skate	2	(1)
Harbour (American) pollock ( <i>Pollachius virens</i> )	1	(1)
Resperean	2	(6)
Cunner	2	(2)

\* Mostly winter flounder - smaller percentages of sand and smooth flounder.

\*\* One of these sturgeon was tagged before release into the upper basin.

Upper Basin Float Trap: This trap replaced the picket trap used in the same area in 1961. The trap was set this year on April 12 and remained fishing until July 27. During this period, only one fish, tagged at the lower trap in 1962, was taken. This was a shad, tagged and released on May 7, and recovered on June 6, thirty days later. Although the elapsed time seems quite long, this does not necessarily mean the fish suffered any serious delay. It is possible that the fish may have been in the upper pond area for several days.

At least, the fish did reach the area above the aboideau before the end of the normal shad spawning season.

In 1962, this trap also recovered 4 fish tagged at the lower trap in 1961, 2 shad and 1 salmon and 1 striped bass. However, these recoveries give no indication of any possible delay to the spawning run fish. Details on these recoveries are shown below in Table #IV.

TABLE IV

## UPPER BASIN FLOAT TRAP RECOVERIES - 1962 - OF

## FISH TAGGED IN 1961

SPECIES	TAG NO.	DATE TAGGED	DATE RECOVERED	ELAPSED TIME (days)
Shad	1921	July 22/61	May 21/62	303
Shad	2475	June 1/61	May 24/62	357
Salmon*	1649	July 12/61	May 13/62	309
Striped bass**	2764	Oct. 6/61	June 7/62	245

\* This was a black salmon or slink, apparently returning to the sea.

\*\* Since this was a small fish, about 14" in length, it was probably not a spawning migrant in either 1961 or 1962, but only moving about in search of food.

Twenty-one other untagged slink salmon were also taken at this trap during the season. To determine whether the same fish were being recaptured here again and again, ten of these slinks were tagged and released near the trap. One of these was tagged on May 11 (dart tag #6976F) and another on May 13 (dart tag #6980F). These two fish were recovered 5 and 8 days later respectively in a commercial weir near Joggins Bridge, nearly 25 miles downriver.

This shows that these fish are able to descend through the causeway safely and with very little, if any, delay. This is of interest, as all other information on elapsed times is in reference to fish ascending the river. The other tagged slinks have not yet been recovered, either in our own trap or by commercial fishermen.

A number of other fish were also taken in this trap during the season. Totals of the various species are listed below in Table #V.

TABLE V

## UPPER BASIN FLOAT TRAP CATCH - 1962

(1961 totals for picket trap are shown in brackets for comparison)

SPECIES	NUMBERS	No. TAGGED	
		1962	1961
Atlantic salmon (bright)	15 (15)	4	
Atlantic salmon (grilse)	1 (0)	1	5
Atlantic salmon (slinks)	22 (0)*	10	
Shad	693 (814)	-	
Striped bass	34 (63)**	-	9
Casperean	61 (0)	-	
Flounder	199 (30)***	-	
Skate	38 (3)	-	
Lumpfish	2 (0)	-	
Sturgeon	37 (11)	-	
Bucker ( <i>Catostomus commersonii</i> )	1 (0)	-	
Tomcod	1 (0)	-	
Sea sculpin	6 (1)	-	
Mackerel	10 (0)	-	
Eel ( <i>Anguilla rostrata</i> )	1 (2)	-	
Herring	0 (1)	-	
Dogfish	0 (1)	-	

\* The main reason for the absence of slink salmon in the 1961 catch was that the trap was not fishing until early June, after most of these fish would normally have gone from the river. One of the slink salmon taken here in 1962 was a fish tagged at the lower basin trap in 1961.

\*\* Most of the 1962 striped bass catch consisted of small fish 8" - 16" long. These were probably members of local populations, moving about on limited feeding migrations. Very few large or mature bass (possible spawners) were taken in any of the traps.

\*\*\* Most of these were smooth flounder.

Shad Dip-Net Fishery: Six of the shad tagged in 1962 were recovered by dip-net fishermen in the Lawrence town to Kingston section of the river. Details of these recoveries are shown below in Table #VI.

TABLE VI

## TAG RECOVERIES FROM SHAD DIP-NET FISHERY

TAG NO.	DATE TAGGED	DATE RECOVERED	ELAPSED TIME (days)	WHERE RECOVERED
3072	May 11/62	May 28/62	17	Brierton
6917F	May 8/62	May 28/62	20	Lawrencetown
2970	May 7/62	May 28/62	21	Middleton
3073	May 11/62	May 29/62	18	Middleton
4785	May 25/62	May 28/62	3	Wilmot
2876	May 8/62	May 29/62	21	Wilmot- Kingston

These shad are shown to have elapsed times ranging from 3 days to 3 weeks, each having reached the spawning grounds in plenty of time. Possibly most of these fish were in the area a number of days before being caught. Although the recovery percentage is small, no serious delay is indicated. It may be that many tagged shad were delayed somewhat by handling during the tagging operations. Also, from early recoveries below the tagging station, it seems that some fish actually turned and left the river soon after being tagged.

Therefore, elapsed times for unhandled fish may actually be much less than indicated.

Since the dipping season for shad extends only through the month of May (Mondays and Tuesdays), the possibilities of recovering tags from this source are somewhat limited. Rainy weather and high water conditions during much of the 1962 season caused the total catch to be lower than normal. No doubt these conditions also contributed to the low percentage of tagged recoveries. Although the catch was low, observations and local reports indicated there was a large run of shad on the spawning grounds. In fact, local members of the Fisheries Protection Branch reported the largest run of shad in several years. Thus, it appears that the shad were able to ascend the Annapolis causeway with little or no delay.

Two shad, tagged in 1961, were also taken by dip-net fishermen at Middleton in 1962. These fish, #3278 and #882, were tagged on May 25 and June 16, 1961, respectively. Both were taken on May 29, 1962. Recovery of these tags gives no indication of times of passage of the aboideau. The information is included only as a matter of general interest. These fish may have been spawning for the second consecutive year.

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Angling Tag Recoveries: During 1962 a total of 11 tagged shad were reported angled in the Annapolis River above the aboideau. Most of these fish were taken in the Lawrencetown and Middleton areas. Details on these recoveries are shown below in Table #VII. No tagged shad were reported angled below the aboideau.

TABLE VII

## SHAD ANGLING RECOVERIES - 1962

TAG NO.	DATE TAGGED	DATE RECOVERED	ELAPSED TIME (days)	WHERE RECOVERED
3136	May 13/62	June 4/62	22	Anna. R. at Middleton.
3844	May 14/62	June 2/62	19	Anna. R. at mouth of Nictaux R.
6915F	May 8/62	June 13/62	36	Anna. R. 3 mi. above Middleton.
3392	May 14/62	June 16/62	33	Anna. R. at Lawrencetown.
2908	May 8/62	June 3/62	26	Anna. R. at Middleton.
4103	May 16/62	June 4/62	19	Anna. R. at Middleton.
3390	May 14/62	June 17/62	34	Anna. R. at Middleton.
3990	May 15/62	June 17/62	33	Anna. R. at Middleton.
4120	May 16/62	June 6/62	21	Anna. R. at Middleton.
4507	May 19/62	Early June*	12+	Nictaux R. at Rodgers Bridge.
3982	May 15/62	June 25/62	41	Anna. R. at Lawrencetown.
4767	" 22/62.			Anna. R.
3068	" 11/62.	June 14/62	34	Anna. R. - 3 mi. above Middleton.

\* Exact recovery date unknown.

These shad were all recovered from known shad spawning areas, and were taken before the end of their normal spawning season. This again shows that these fish were able to ascend the aboideau safely and reach the spawning grounds, without any serious delay. Since these fish were able to pass without serious delay, it is quite reasonable to assume that the untagged majority of the run also reached the spawning areas with little or no trouble.

In fact, it is quite likely that the untagged and unhandled fish made the trip in even less time than indicated by the tagged recoveries.

A number of tagged shad apparently dropped back downriver soon after being tagged. Others may have been somewhat delayed, possibly dropping back for a time and, after resting, then ascended past the aboideau. Indicated times of passage for the tagged fish could thus be somewhat greater than for untagged.

Evidence of fall-back is provided by the recovery of a number of tagged shad below the tagging site by commercial fishermen. This will be discussed more fully under the next section of this report.

Other angling recoveries of fish tagged in 1962 include only one salmon and one striped bass. The salmon, #2773, was tagged below the aboideau on April 9 and recovered on May 12, 33 days later, at Brickton. Since the recovery site is about 30 miles above the causeway, the elapsed time may be no more than normal. At least, excessive delay is not indicated. Also, as with other tagged recoveries, the fish may have ascended with no delay, and been in the area several days before being caught.

Another tagged salmon, #1604, was angled in 1962 just above Middleton. However, this fish was tagged on July 6, 1961 so that no information is available as to its time of passage of the aboideau. As a matter of interest, this fish was recovered at the lower float trap on September 1, 1961 and again released. Although this fish was not seen by the writer after being angled, it is strongly suspected it was a slink or black salmon.



The angling recovery of one striped bass, tagged this year, is also of no value in checking the fishway efficiency since it was angled below the aboideau. This fish, #6852F, tagged on June 29, was taken 21 days later only a few hundred yards from the site at which it was released.

<sup>6</sup> Four other tagged striped bass were reported taken by anglers in 1962. Again, these recoveries are of no value in checking for possible delay at the aboideau, since <sup>4</sup> ~~three~~ were tagged in 1960 and <sup>2</sup> ~~one~~ in 1961.

Commercial Fishery Tag Recoveries: All tags recovered by commercial fishermen were taken from areas below the causeway, so are of no value in assessing fishway efficiency. However, early recovery of these fish definitely indicates there is some fall-back suffered by them.

Five shad were recovered this year in a commercial weir, about 7-8 miles below the aboideau within periods of 1 to 5 days after being tagged. This clearly indicates some of the tagged fish at least dropped back downriver temporarily and were possibly leaving the river entirely. Another shad was recovered from this weir 23 days after release, and another was recovered after 48 days. It is suspected that this last one was a spawned out fish. It may have dropped its spawn below the aboideau, or possibly could have ascended to the normal spawning areas and returned before being caught.

Two other shad, tagged <sup>in</sup> 1962, were reported taken by commercial fishermen. One was taken by a drift-netter in Cobequid Bay on July 19. This was 59 days after being tagged. It is possible that this fish may have ascended the aboideau and spawned between tagging and recovery dates. The other was taken in tidal water of the Shubenacadie River on July 4, only 18 days after being released at Annapolis. It appears that this individual wasted little time in leaving the river after being tagged.

Commercial fishermen also reported catching 2 tagged shad from 1961 tagging operations. One of these was recovered in the lower Annapolis Basin, the other at Lower Five Islands.

No tagged salmon recoveries were reported by the commercial fishermen. However, two striped bass, tagged in 1961, were reported taken from Kings County weirs at Morden and Harbourville.

The only other reported 1962 tag recovery from the commercial fishery was a sturgeon. This fish was released on May 28 about 5 miles below the Annapolis Causeway. It was recovered 18 days later from a weir off Port George, in the Bay of Fundy. A second tagged sturgeon was taken at this weir on July 18, 1962, but had been tagged on July 24, 1961.

## ANNAPOLIS RIVER ANGLING - 1962

Salmon: Total angling catch of salmon in the Annapolis system in 1962 has been very poor. This river has always been regarded as an early run river-for salmon angling, with few being taken after the end of June. This year, the total to June 30, was only 36 salmon. Table #VIII below gives a breakdown of this catch by areas, along with corresponding figures for 1959 to 1961 for comparison.

TABLE VIII

## SALMON ANGLING - ANNAPOLIS RIVER SYSTEM

YEAR	Lequille River	Round Hill River	Bridgetown to Laurencetown	Lawrencetown to Middleton	Above Middleton	TOTALS
1959	30	110	16	16	8	180
1960	4	21	1	4	0	30
1961	49	36	1	1	0	87
1962	<del>27</del> 25 56	3	1	4	3	36

This total angling catch of only 36 salmon is one of the lowest in recent years. One of the biggest losses seems to have taken place on the Round Hill River. The remainder of the losses seem to be confined to the upper sections of the main Annapolis River. Although this year's catch in the Lequille River was only about one-half of that in 1961, it was nevertheless slightly better than the average for the previous eleven years.

Poor catches in recent years in the upper main river are probably due largely to the loss of spawning areas on the Nictaux River. However, this does not help explain the poor catches in the Round Hill River over the past 3 years. Low water levels during 1960 and 1961 may have been the greatest single factor. However, in 1962, water levels were slightly higher but the catch was much lower. Although there is no definite proof, it is possible that hold-up or delay to salmon at the aboideau may have had some influence on the poor catches during the past 3 years.

This possible hold-up or delay at the aboideau may also partially explain the continued average or above average catch from the Lequille in 1961 and 1962. As in 1961, the Lequille angling catch was again greater than that of the Round Hill River. This situation is the reverse of that during the previous 10 years, when each year more fish were taken from the Round Hill.

Although most other evidence seems to show that fish easily ascend the aboideau with little or no delay, the salmon angling picture appears to indicate the opposite. It will be interesting to see if the same conditions continue or if the salmon angling catches on the Round Hill will again increase in relation to those of the Lequille.

At the present time, it is known that at least a portion of the salmon run is able to pass the aboideau successfully. However, after examining the angling statistics, there appears to be a possibility of some of these fish being held up at this point.

Striped bass: In 1962, the striped bass angling was quite poor in the Annapolis River system. Up until the end of July, the catch is estimated to be well below half of the 1961 catch for the same period. Some sections of the system appeared to show a much sharper decline than others. For example, the aboideau area catch is estimated to be only 10 - 20% of that in 1961. The scarcity of bass in this area is also indicated by the poor catch this year in the lever basin float trap which was only about 10% of the catch during the same period in 1961.

The decline in the Lequille River (Allen's Creek) area, on the other hand, appeared much less. The 1962 catch (up to July 31) here is estimated to be about 50% of that taken in 1961.

The 1962 catch in general appeared to consist of a much larger percentage of small fish. Much of the catch consisted of fish in the 8" - 10" and 14" - 18" size range, while large fish were quite scarce.

Bass angling in the Bear River and Joggins Bridge areas was also reported to be quite poor in 1962.

A complete analysis of the striped bass angling picture will be impossible until further reports are submitted by the members of the Protection Branch. The angling picture will be dealt with more fully in the final report at the end of the season.

Shad: Shad angling is carried out only on a small scale on the Annapolis River.

However, a regulated dip-net fishery is carried out during the month of May in which fish can be dipped on Mondays and Tuesdays. Reported shad catches, from members of the Protection Branch, include both the angled and dipped fish.

The reported catch in 1962 was 1543, to the end of June, almost the same as the 1657 reported for 1961. These catches were considerably lower than the reported 3219 for 1960. However, as in 1961, this lower catch may be attributed to high water conditions and poor weather. The high water levels hindered the success of dipping operations. Also, cold and rainy weather cut down on the amount of fishing effort.

Local Protection Officers reported more shad in the river in 1962 than in any year during their memory. However, on dipping nights, the weather usually appeared to be abnormally cold. Thus, even with a good population present, few were taken. It appears the fish do not move around to spawn so much when the water is cold.

Thus even though the catch was not too great, there appear to have been a good number of this species on the spawning grounds.

The bulk of the catch was taken in the latter part of the month of May. This may indicate the run was quite late in 1962. This theory is also supported by the timing of the catch in the lower basin float trap. Very few were taken here before the end of April, and therefore could not be expected to reach the spawning and dipping areas during the early part of May.

From observations of the timing of the run at the trapsite and the timing of the catch in the spawning areas, there appears to be little if any delay to this species.

Another point of interest is that the dipping catch remained at approximately the same level as in 1961 although the catch in the lower basin trapnet dropped to about 1/3 of the 1961 figure. Therefore, it appears that this species suffered little or no delay at the aboideau.

### DISCUSSION AND CONCLUSIONS

In 1962, fish passage studies were carried out at the Annapolis River aboideau for the third consecutive season. Tagging and recovery programs have been carried out each year to try and assess the efficiency of the two aboideau fish passes. The primary pass consists of a simple rectangular opening, 10' wide x 2 1/2' high, located adjacent to the regulating gates. The secondary pass consists of a 4' diameter corrugated steel pipe at 0' m.s.l., located in the old river channel near the true right shore.

The three species of primary concern were the Atlantic salmon, striped bass and shad. A wooden trap was operated in 1961 and 1962 on the pipe fishway. Only very small numbers of bass and shad ascended by this route and no salmon were taken. Thus, it appears that practically all of these fish, when migrating to their spawning areas, pass through the primary fish pass or the adjacent regulating gates when open.

In most cases, the studies carried out during 1960-1962 indicate that the majority of these fish were able to ascend the aboideau successfully with little or no serious delay.

However, observations on salmon movements have shown both evidence of quick passage and the possibility of some delay.

Evidence of successful passage by the salmon is shown by the recovery of a few tags above the aboideau both by anglers and by the Department trap nets. However, the percentage recovery of tagged fish each year was much lower than anticipated. Observations of other salmon jumping in the upper basin area and the recovery of untagged bright fish also gave indication of successful passage.

On the other hand, examination of the salmon angling records on the Lequille and Round Hill rivers seems to indicate there may have been some serious delay or hold-up to this species. During the 10 year period immediately preceding completion of the aboideau, angling catches were always greater in the Round Hill than in the Lequille River. However, in 1961 and 1962, after closure of the river, the picture is reversed, with the Lequille River yielding the larger catches. Examination of the angling effort records for 1961 shows clearly that the larger Lequille catch was taken with relatively less effort (rod-days) than during previous years. Complete data for 1962 are not yet available, but the Round Hill River salmon catch has dropped to only 3 fish, probably the lowest on record. At the same time, the Lequille River catch in 1962 was very good, being slightly above the average for the previous eleven years.



These facts appear to give strong support to the idea of hold up at the causeway. If salmon are being held up at this point, they could quite easily ascend the Lequille River as an alternative, and thus increase the availability and the catch from this area. However, water levels during the early spring may also have had some effect on the run of fish in the Round Hill River. In 1960 and 1961, water levels were low throughout most of the season. In 1962, levels were very low in March and April, but increased to normal or above later in the season. However, the salmon run in this river is usually very early so that the early low water may have been an important factor. Poor catches in the Round Hill River in future high water seasons would lend support to this theory of hold up at the aboideau. If the Round Hill catches again pick up, the recent poor years may be attributed to low water or some other cause rather than hold up at the causeway.

In any event, as previously noted, a number of bright salmon have been recovered above the aboideau, so that it is definitely not a complete barrier to this species.

As far as shad are concerned, there seems to be very little evidence of delay. The only possible evidence is the early recovery of a few tagged shad some distance below the aboideau. These fish may have turned back after failing to find passage but also may have dropped back directly as a result of handling and tagging.

The main shad fishery above the aboideau consists of a dip-net fishery carried on during the month of May.

Catches in 1961 and 1962 have been only fair. Very poor weather during these two seasons is thought to be mainly responsible for the poor catches. High water and rain interfered with dipping success and the number of fishermen participating. Also, cold water temperatures on many of the dipping nights seemed to cause the fish to move around less and thus be harder to catch. Also, the timing of the spawning run may have had an important bearing on the relatively poor catches. The peak of the runs did not seem to arrive on the dipping areas until near the end of the open season.

Personal observations and reports from the members of the local Protection Branch indicated a good run of fish were in the area in both 1961 and 1962. In fact, the Protection Branch in 1962 reported more fish observed along the river than in any previous year within their memory. Thus, it appears that the shad suffered little, if any, delay.

From the apparent success of the shad in ascending the aboideau, it seems hard to believe that the stronger swimming salmon and bass would have any difficulty in finding passage.

In 1961, the striped bass angling catch from areas above the aboideau was the largest reported for several years. This, as well as the early recovery of a number of tagged striped bass above the aboideau, indicates this species suffered little or no delay. However, in 1962 the bass catch in all areas of the river was much lower with very few fish being tagged and very few recovered.

*(none above the aboideau).*

Thus, there is little evidence from this season's studies to indicate either quick passage or delay. It appears that 1962 will be a very poor year for striped bass in this area.

The only possible evidence of delay to this species is, like the shad, the early recovery of a few tags some distance below the aboideau. Again, this fallback may be attributed to the handling and tagging of the fish rather than their failure to find passage at the aboideau. Also, a number of these tag recoveries may not have been members of the spawning run. They may, in fact, have been moving downriver when tagged and merely travelling about on feeding migrations. Thus, in general, the evidence seems quite strong in favour of easy passage for striped bass.

In summary, the studies carried out in the Annapolis aboideau area during the summers of 1960 - 1962 in most cases indicate that migratory fish are able to pass with little or no serious delay or hold up. Other evidence indicates there could be limited delay or hold up to some of the fish especially the salmon. However, the possible delay or hold up appears to be of only a minor nature. Also, as noted before, the small salmon catches may be at least partially attributed to low water conditions and not hold up at the aboideau.

The observations and records of angling, submitted by the Protection Branch, should continue to be studied over the next few years as a check on the efficiency of the fish passage facilities in this structure. However, from the studies carried out to date this type of fish pass appears to work quite satisfactorily.

A more detailed report on these studies will be submitted at the end of this year. Before that time, it is likely that more tags will have been recovered and more detailed information will be available on the angling situation.

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