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A PRELIMINARY SALMONID RECONNAISSANCE OF THE TOBA RIVER SYSTEM, 1976

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By
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Data Record Series PAC/D-77-8

Field Operations Directorate
Pacfic Region

ERRATA

Page 30 - Caption for Photo 7 is incorrect. Should read:

"Photo 7. Filer River - Major falls in the headwater area"

Page 31 - Caption for Photo 9 is incorrect. Should read:

"Little Toba - Typical view of the lower 1.25 - 1.5 miles.

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ABSTRACT

The 1976 field studies on the Toba River system had two primary objectives. The first was to determine if sufficient chinook juveniles were present in the estuary to implement a coded-wire-tag marking program. The second was to carry out a general biological reconnaissance with particular emphasis on adult chinook abundance, spawning distribution, run timing and age/size composition.

Beach seining in the Toba estuary for juvenile chinook was totally unsuccessful as less than 20 chinook were captured in 17 sets at 9 set locations.

The reconnaissance program indicated that the chinook escapement was very low, considering the overall size and apparent potential of the system, and the magnitude of historic escapements. In total, reconnaissance procedures accounted for only 68 (approx.) spawners. Sports fishing catch accounted for a further 30-50 adult chinooks. It was not possible to establish a factor, based on visual observation, to apply to the actual number of adults accounted for in order to determine an estimate of abundance, due to the high level of turbidity in most of this system. Determination of spawning distribution and run timing was limited by low chinook abundance and timing of the field study (Aug. 11 - Sept. 30). From information acquired from local anglers, it seems apparent that chinooks were present in the system before the field study was started (i.e. July). During the study spawners were sighted in the Klite (Sept. 11, 16, 25), Filer (Sept. 25-27), Little Toba (Aug. 26 and Sept, 11-25) and Big Toba (Sept. 25) Rivers.

Due to operational problems and the indicated low escapement for the system, insufficient samples were collected to establish reliable age/size composition for the spawning chinooks. Eight out of thirteen scale samples were readable; one was age 2_1, two were age 3_1, two were age 4_1, one was age 5_1, and two were age 3_2.

Adult chum enumeration indicated that approximately 3,000 spawners were present in the lower Little Toba from mid-August to the end of September. This is almost two months earlier than local Fisheries field personnel have traditionally gone into the area to estimate annual chum escapements. Scale sample readings for this run indicated that the majority (18 of 19 samples) were four years old.

Adult coho were caught in the Klite on August 29, and set netting indicated that they were abundant in the Little and Big Toba rivers by the second week in September. Again, this is earlier (about 1 month) than traditionally expected by local Fisheries field personnel. Coho were judged to be present in numbers considerably in excess of the estimated number of chums. Six of the fourteen collected scale samples were regenerated. The readings for the remaining eight were 3_2(no jacks were captured).

Fry sampling indicated that most of the side channels, small tributary streams, etc. are utilized by coho for rearing. No chinook juveniles were captured in these habitats.

Pathological examinations on seven frozen adult (coho and chinook) specimens indicate presence of no abnormal fish diseases. Numerous species of internal parasites were found in the juvenile coho, char and trout specimens, but these appear to be within the normal range for a system of this nature.

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INTRODUCTION

This report summarizes the results of juvenile chinook salmon (Oncorhynchus tshawytscha) marking reconnaissance in the Toba River estuary and preliminary reconnaissance of adult chinook spawning distribution, abundance, and run timing. In addition, results are included from adult chum (O. keta) and adult coho (O. kisutch) observations and sampling; coho, char, and trout fry rearing distribution sampling; and disease pathology sampling. Information of this nature is essential to the process of identifying river systems, salmon stocks, and sites for future enhancement in the Johnstone Strait - Georgia Strait area.

Beach seining for juvenile marking was carried out on June 2 and July 22. The adult reconnaissance and associated activities were carried out from August 11 to September 30. Helicopter reconnaissance flights were made on August 30 and September 26, under ideal visibility conditions.

The base of operations for reconnaissance work was the logging camp at Mile 16 on Branch 100, operated by Onion Lake Logging (Campbell River) under contract to Weldwood Canada Ltd.

Maps of the study areas, photographs, and raw data from the various activities (i.e. beach seining, set netting, fry sampling, etc.) in tabular form are attached. Disease pathology analysis reports are provided in Appendix 1.

DESCRIPTION OF STUDY AREA

The study area encompassed the entire drainage area of the Toba River system (Conservation District 3, Statistical Area 15) including the Tahumming River, which drains into the Toba estuary. Total drainage area is approximately 568 square miles.

The drainage areas of the Tahumming and Toba (excluding the Klite) River systems fall into Tree Farm Licence No. 10 held by Weldwood Canada Ltd.

Timber harvesting under a Timber Licence was completed in the Klite drainage in 1968. There is a possibility of a shake cutter going into this valley during 1977, under a Dead and Down Sale Licence, but there are no plans for further timber harvesting in the foreseeable future.

The present logging operation in the Tahumming drainage will be completed in the next year or two. There are no further plans for logging here in the near future. There is a possibility that timber harvesting may resume in the Little Toba valley in 1977, but this is more likely to begin in 1978 or 1979. There are no plans for future timber harvesting in the Filer drainage.

The following descriptions of rivers are taken from field notes written immediately after the helicopter flight on August 30. Where applicable, these descriptions have been modified by the results of ground reconnaissance work carried out in some areas and by observations from the September 26 helicopter flight. The drainage areas given are scaled approximations. These were worked out using a 1" = 6 mile scale map and a polar planimeter.

A. Toba Estuary (Map 1)

The estuary is a mud flat area of approximately 1.2 square miles. It is about one mile wide and less than 1' to 4' deep on an average high tide. It drops off abruptly to a depth of 41 fathoms (plus). The water is extremely turbid from the glacial silt carried by the Toba and Tahumming Rivers, both of which drain into this estuary.

B. Tahumming River (Map 2)

This river flows from the north into the estuary approximately one mile east of the mouth of the Big Toba (see Photo 1). The Tahumming is partially glacial-fed and somehwat less turbid than the Big Toba, but visibility is poor at best. The drainage area is estimated to be about 51 square miles.

From its mouth to approximately 0.33 miles upstream, the river has a shallow gradient and mostly gravelled bottom.

Over the next 1.5 + miles, the river passes through a narrow rock canyon area. This section has two major water falls (20'+, see Photos 2 and 3) and otherwise consists of a series of smaller falls and cascades.

The next approximately 4-6 miles appear, from aerial observation, to offer good spawning gravel and gradient. A ground reconnaissance program is necessary to determine the full extent of this potential spawning gravel.

Due to the substantial elevation change (400'-500' to sea level) in the narrow canyon area, it is felt that it is unlikely that any modifications are feasible to facilitate fish passage, even if the upper section is deemed to have excellent spawning potential.

C. Big Toba River (Maps 3a-c)

From the estuary to approximately 0.25 miles upstream of Dalgleish Creek (about 1 mile upstream of Branch 100 - Mile 26), the river has a shallow gradient. About 70%+ of this distance has a gravel bottom. Some of the gravel is heavily silt-laden, but generally most of the river appears to have good potential for spawning. Unfortunately, it is nearly impossible to sight spawning activity due to the high level of glacial turbidity (see Photo 4).

Beyond Dalgleish Creek, the river rapidly diminishes in volume and increases in gradient as it flows through a canyon. Much of this area is obscured by a heavy forest canopy, but considering the areas visible from the air, it seems reasonable to assume that there are no potential spawning sites in this upper section.

The overall drainage area of the Toba is estimated to be approximately 517 square miles. This area includes all the drainage areas listed in the following descriptions of the tributaries to this river.

D. Klite River (Map 4)

The Klite River drains an estimated 26 square miles. From the Big Toba confluence, the first 1-1.5 miles is a meandering flat stretch with gravel and gradient apparently suited for spawning. The upstream end of this portion has a series of small side channels. The next approximately 3+ miles have increased gradient and large boulders. Throughout this area, there are a number of small gravel beds along the sides, each of which may provide spawning sites for a few fish. This stretch should be passable to chinook and coho as there appears to be sufficient holding areas below all obstructions severe enough to require high water levels to be readily passable. The next 2.5 miles (approximately) are flat and gravelled throughout. Although aerial observation indicated that this entire area is well suited to spawning, ground reconnaissance showed that only 0.5-1

mile of the lower end is potentially usable for salmon spawning (see Photo 5). The rest of the river increases in gradient, numbers of boulders, and diminishes in volume. There is negligible spawning potential here.

E. Little Toba River (Map 5)

The Little Toba drains approximately 108 square miles. From the Big Toba confluence, the lower 1.25-1.5 miles is a relatively flat area with approximately 75% gravelled bottom (see Photo 6). At the upstream end of this section, the river spreads across a flood plain in a number of small channels; most of these have gravelled bottoms and appear suitable for spawning. The 3-3.5 miles beyond the flood plain area are of increased gradient and contain more boulders than gravel. Although narrow and more turbulent, there are no obstructions to fish passage here.

The next 3.5-4 miles consist of long, flat, gravelled runs. Approximately 90% of this area appears to offer excellent spawning potential (see Photo 7). Numerous tributary creeks also appear to provide excellent spawning potential and their less turbid water offers an opportunity to better observe adults if and/or when spawning takes place. These tributaries, as well as a number of back waters and bogs, also provide potential fry rearing habitat.

Over the next 0.5 miles (approximately), the gradient increases through a progressively deeper and narrower rock canyon. Any movement of fish over this progressively more difficult area would be terminated at a 15'+ falls at the end of this stretch.

F. Brigham Creek (see Map 5)

This glacial-fed tributary enters the Little Toba just below the 7.5 mile bridge (which is actually over Brigham Creek). It is a relatively short stream (approximately 1-1.4 miles from mouth to source). From a few hundred feet above the 7.5 bridge, the next 0.5-0.75 miles of creek meanders across the valley floor occupying one main channel and a few side channels. Due to a heavy forest canopy and substantial turbidity, it was difficult to assess the bottom types and gradient. In spite of this, there were a few places where gravel and gradient possibly suitable for spawning were visible. The upper reaches are not passable to fish.

G. Filer River (Map 6)

The Filer, a glacial-fed (hence very turbid) principal tributary of the Big Toba River drains approximately 52 square miles. It enters the Big Toba at approximately mile 12.5 (on Branch 1). For purposes of description, this river is divided into three sections.

The first section is about ten miles in length, starting from the confluence with the Big Toba. Over the lower seven miles of this section the river generally meanders and occupies numerous channels over a wide gravelled flood plain. This portion is subject to frequent channel relocations. Each high water causes substantial changes in regard to the channels used and in the presence and location of log jams and barriers. In the vicinity of 7 miles from the Big Toba confluence the valley narrows into a canyon approximately 0.25-0.5 miles in length; here, the gradient increases, the gravel bottom is replaced by boulders and the water is turbulent. This canyon presents no apparent obstruction to fish passage. For the balance of this ten mile section the valley widens, but the river stays in a more well defined gravel bottom channel. Approximately 80% + of this 10 mile section has a gravel bottom and gradient suitable for spawning. Although this is a substantial amount of gravel, a ground reconnaissance program is necessary to verify suitability for spawning.

The second section is 1.5 - 2 miles in length. Although portions (approximately 55% - 65%) appear to be potential spawning areas, the river has progressively more areas of increased gradient and turbulence. This section has no obstruction to fish passage.

The third section is 3 - 4 miles long. Here the river bed steadily increases in gradient, number of boulders and turbulence while diminishing in volume. Only 10% of this section may offer some potential for spawning. The last 0.5-0.75 miles of the river rise steadily in a series of small cascades which terminate in a 20' falls (see Photo 8).

H. Headwall Creek

Headwall Creek is a glacial-fed tributary at the upper end of the Filer River (at approximately 14 miles). Although this creek is conceivably passable to fish there appear to be no potential spawning areas available.

I. Raccoon Creek (Map 3b)

From the Big Toba confluence (Branch 1 - Mile 15), the first 0.75 mile of Raccoon Creek is meandering with some side channels. Approximately 35% of this section appears to offer some potential (gravel etc.) spawning sites. Beyond this, fish passage appears possible but potential spawning areas are limited.

FIELD METHODS AND RESULTS

A. Juvenile Chinook

Beach seining was employed as the method of capture for the proposed smolt marking program. The seining was carried out on June 2 and July 22, 1976.

Nets used were 110' x 10' beach seines. Sets were made on June 2 using a 12' fiberglass skiff powered by an "Evinrude" 25 hp propeller-driven outboard. Sets made on July 22 utilized two crews using two 18' "Smokercraft" riverboats powered by jet-drive 65 hp "Mercury" outboards.

Beach seining operations were unsuccessful in capturing sufficient numbers of chinook juveniles for a marking program (Table 1). No chinook juveniles were captured in four sets carried out on June 2, 1976. From thirteen sets made on July 22, only 15 - 18 chinook fry (approximately 35 - 55 mm) were captured.

The relatively few adults found during the stream reconnaissance program suggest that a major contributing factor to the lack of juveniles in the estuary is the small escapement of chinooks to this system.

B. Adult Chinook

i) Spawning Observations

Observations were made while floating rivers, walking side channels and tributary streams and during the helicopter reconnaissance flights. The flights were made using a "Bell Jet Ranger" with bubble side windows. In order to insure optimum visibility, arrangements were made to use the helicopter on clear days. The flights were carried out in the early afternoon (about 1300 - 1530 hours) to minimize the effect of mist and shadows limiting visibility. During the flights an altitude of 300 - 400

feet was maintained as chinooks are large enough to be readily visible from this height, yet the rotors do not cause surface turbulence. At lower altitudes fish are frightened by the helicopter and tend to disperse and seek cover.

All 103 spawning observations are recorded on Maps 3b, 4, 5 & 6 (see Photo 9). Sightings made from the helicopter are so indicated. This number (103) is only a total of sightings and not an actual tally of spawners present. Due to the timing of these observations it is inevitable that some fish were seen and recorded more than once (i.e. on previous foot or boat surveys). It is felt that the actual number of spawners present and observed was approximately sixty-eight.

ii) Sport Gear

Sports fishing gear was used in areas where other methods of observation and/or capture were not possible. Bait used included spoons and spinners, but the most success was recorded with prepared (frozen, salted, etc) or preferably fresh roe and red wool.

This procedure was used successfully for chinooks only in the Klite River, and was limited to two pools frequented by local anglers ("The Lower Pool" and "The Meathole" - see Map 4 and Photos 10, 11 & 12). The four chinooks caught on August 16, 1977 were classified as bright to medium in colour. The three chinooks caught on September 19, 1977 were classified as medium to dark in colour.

Chinooks caught by sport fishing in late July were bright and progressively became darker in colour until spawning was observed in September. Thus it is possible that many of the chinooks holding in these pools are waiting to spawn in the immediate vicinity, and consequently are available to sport fishing effort over a two month period. This and the fact that 90% of the chinook sports catch occurs in these two pools, certainly reduces the reliability of using annual sport catch to measure relative chinook population size for the whole Toba River system. Furthermore, if our observations are correct any increase in sport fishing effort could seriously decrease an already small spawning population.

iii) Set Netting

It was proposed that gillnets would be set in the various rivers on the system to determine the extent of spawning chinook distribution. The procedure consisted of setting nets progressively further up each river and delineating the areas most intensively used for spawning, by comparing the relative number and the degree of ripeness of the captured spawners.

The seven nets used for this program were 30' x 25' gill nets of various mesh sizes (5.5-8"). These were eventually found to be too deep and were cut down to shallower depths (7' - 10').

Numerous difficulties were encountered in trying to execute this program on time (i.e. the anticipated prime chinook spawning period). These difficulties stemmed primarily from the crew having no experience in handling gill nets and choosing set sites. As a result, the following problems caused the program to be unsuccessful (see Table 2 - Set Netting Results).

1. Inability to select proper set sites destroyed three nets in the first four sets, and made it impossible to make sets progressively up each river.
2. The nets were too deep for river work, but no one had either the experience to recognize this or the ability to remedy it.
3. By having to postpone set netting until experienced help was available, the timing was thrown off sufficiently to make it no longer feasible to meet the desired objectives.

iv) Sport Fisherman Interviews

During the course of the study every opportunity was taken to seek out local anglers (loggers) and elicit any information they could provide. The "interviews" took the form of numerous informal discussions regarding access, timing of runs, numbers and species of fish caught, etc.

Much of the information attained came from Bob Spence. Mr. Spence, generally considered the local expert, has worked in the area for the last eight seasons and spends every Sunday angling. His helpful and cooperative attitude was shared by most others interviewed.

The following points of information on the local sport fishery were gleaned from numerous discussions with Mr. Spence and others.

1. This year's sport harvest of chinooks by loggers was 30-50. The range of estimated weights was 3-30 lbs. The average was in the 8-12 lb. range. Almost all (90%+) were taken in the Klite River, and almost exclusively in the two popular angling spots: "The Lower Pool" at 1.33 miles and "The Meathole," 0.25 miles above "The Lower Pool,"
2. Chinooks were seen jumping and some were caught in the estuary as early as mid-June. Chinooks were caught in the Klite in July,
3. Over the years, anglers have apparently reported catching chinooks at all times of the year in various portions of the sytem,
4. No one has heard of chinooks being taken in the upper reaches of the Klite (4-4.5 miles +), although anglers have reported taking trout and steelhead there,
5. Mr. Spence and at least one other seasoned local angler felt that another run of chinooks would come into the system after the end of this study (Sept. 30),
6. It was felt that there had been no reduction in the number of chinooks available to fresh water sports harvesting over the last few years.
7. Salt water anglers residing on both the mainland coast and Vancouver Island reported that Toba Inlet has traditionally had a substantial run of "large white springs" (captured off the mouth of the river),
8. Visiting and local salt water anglers felt that there has been a considerable decrease in the number of chinooks available to them in Toba Inlet.

Some of the previous points warrant comment.

Point 3

Reports of chinooks being caught all year around were all "third hand". It is possible that steelhead, coho and/or other species may have been mistaken for chinooks.

Point 5

In light of Mr. Spence's extensive angling experience (30 years) and consequent knowledge of the local fisheries, this speculation of a late chinook run bears credibility and further investigation.

Point 6

It is important to consider that traditionally chinook fishing is almost exclusively restricted to "The Lower Pool" and "The Meathole" sections of the Klite. Both of these pools are holding areas below obstacles (falls), which require increased flows to facilitate fish passage over them (see Photo 12). The falls at "The Lower Pool" require much less flow to allow fish to ascend than those at the "Meathole". Another consideration here is that logging camp personnel are necessarily restricted to fishing only one day a week, thus they pick the best known spots.

In light of the holding nature and relatively small size of these two pools, as well as the restricted pressure on them (one day per week), it is very likely that angling catch does not vary in direct relationship with escapement numbers for the river, and especially not for the total Toba River system. For example, as long as there are fish in the Klite, there should always be fish in the holding areas noted above, hence anglers should always, under even extreme changes in abundance, be able to capture chinook from these pools; in some years they will simply put more effort into catching fish. Furthermore, chinooks spawn in "The Lower Pool" and likely hold there until mature, thus they are vulnerable to repetitive angling pressure. It is therefore felt that sports catch results are not reliable indicators of relative annual escapements of chinooks for the system.

Point 7

To the end of the study (Sept. 30) the following large chinooks (from a sample of 20 fish for flesh colour) were the only fish found which could fit this description:

1) male, approximately 28 lbs (white) - sports caught in Klite
2) female, approximately 38 lbs (white) - sports caught in Klite
3) male, nose-fork length 101.5 cm (white) - Dead Recovery, Filer
4) male, nose-fork length 99.5 cm (white) - Dead Recovery, Lower Toba

These four fish comprise 20% of the sample. Regardless of how optimistic the calculated estimate of total chinook escapement during the study period is, it is highly unlikely that this percentage would yield a number of heavy white chinooks large enough to be considered a substantial run in 1976.

Point 8

This point is an indication of a decrease in general escapement numbers.

v) Age Composition

Scale samples and lengths were taken from all sport caught (by Fisheries), dead recovery and set net chinooks (13 in total). Due to low abundance it was not possible to sample enough chinooks to speculate about an age class structure for the 1976 escapement (Table 2). Note that two of eight readable scales were aged as sub twos; one was aged 2_1, two were aged 3_1, two were aged 4_1, and one was aged 5_1.

C. Adult Chums

Chums were found in large numbers in the Little Toba in mid to late August. According to local Fisheries personnel this was about one to two months earlier than would normally be expected. At this time set netting indicated that chums were also present in the Big Toba.

It is estimated that approximately 3000 chums were in the lower Little Toba during this time. No estimate can be given for the Big Toba but all the chums caught were above the Little Toba confluence. At the time chums were observed in the Little Toba the water was low and clear.

The duration of this run appeared to be from mid August to the end of September. Peak spawning likely occurred during the first week in September.

Scales and lengths were taken from all captured chums and some additional recovery work was carried out in order to get a larger sample. The readings for these scales indicated that the majority (18 of 19 samples) were 4 years old (Table 4).

D. Adult Coho

Coho, like chum, were found in the system about a month earlier than anticipated. The first reports of coho in the system came from sports catches on August 29 in the Klite River. Set netting in the Little and Big Toba Rivers showed that coho were relatively abundant by the second week in September.

It is felt that the run is considerable because of the ease and consistent success that was experienced in capturing coho in set nets, as well as the high sport catch success rate of some crew members. This is also supported by the considerable potential fry rearing area (side channels, bogs, tributary streams, etc.) available in the Little Toba, Big Toba and Filer drainages (see Maps 3a-c, 5 and 6) and the fact that large numbers of juvenile coho were minnow trapped over an extensive area. In addition, historic escapement records generally show coho to be more abundant than chum. Considering the much more wide spread adult coho distribution (sports fishermen report catching coho throughout the accessible portions of the systen), and the substantially longer duration of the coho run (late August to February), it seems reasonable to speculate that coho escapements are, in fact, significantly greater than chum escapements, and possibly greater than historic coho escapement records indicate particularly for recent years.

Scales and lengths were taken from all coho captured (Table 5); no jacks were captured. Eight of fourteen scale samples were readable and were aged 3_2. Large average fork length of sampled coho (65.6 cm) suggests that most reared outside of Georgia Strait, or in northern Georgia Strait. Based on troll catch sampling, southern Georgia Strait coho average approximately 56 cm in September, northern Georgia Strait and west coast Vancouver Island coho average between 60 and 67 cm fork length in September (Argue and Marshall, 1976). [1]

E. Fry Sampling

A representative portion of all readily road accessible streams, side channels and back waters were sampled in order to determine the species utilizing the system for rearing. The method of capture was "G.E.E.'s Improved Minnow Traps", baited with roe and left overnight. These are commercially available 1/4" galvanized wire mesh traps, resembling prawn traps in design (Photograph 13).

Trapping results (Tables 6 to 8) indicated that coho use the Big Toba and Little Toba drainages extensively for rearing. Coho fry were trapped at mile 25, Branch 100, on the Big Toba River; hence adult coho presumably spawn at least this far up river. In addition, visual observations indicated that the Filer drainage is also used by coho for rearing. The fry sampling also showed that Dolly Varden char, cutthroat and rainbow/steelhead trout rearing is spread throughout these drainages, however these species appear to be less abundant (based on trap catches).

Generally it was found that the species captured could be related to variations in habitat. The most obvious differences in habitat preference were evident between coho and trout. The largest numbers of coho were captured in slow moving and more brackish waters. Trout were most often captured in faster, clear or glacial-fed streams. Char were found in both habitat types, but seemed to be more plentiful in the less brackish areas. Char juveniles were also sighted in the main-stem on the lower Little Toba when chum salmon were spawning.

No chinook juveniles were captured in any of the above mentioned habitats.

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[1] Argue, A.W. and D.E. Marshall, 1976. Size and age of chinook and coho salmon for subdivisions of the Strait of Georgia troll fishery, 1966. Canada Dept. of Environ., Fish. Serv., Pacific Region, Tech. Rept. PAC/T-76-18, 175 pp.

F. Pathology Sampling

Seven adult (coho and chinook) and approximately 50 fry (coho, char & trout) samples were collected. The adults were preserved by freezing and the fry by immersion in formalin. All samples were shipped to the Disease Diagnostic Service at the Pacific Biological Station (Nanaimo) for pathological examination.

The pathological report on the adult specimens indicated no evidence of furunculosis, bacterial kidney disease, myxobacterial gill disease or viruses (see Appendix 1). As the fry specimens were preserved in formalin, only gross and histopathological examinations were carried out. These examinations showed no evidence of pathology, but numerous internal parasites were found.

SUMMARY

As this was a general and initial survey, the observations and data collected should be considered preliminary. Many of the points noted were the result of intuitive speculation based on hear-say information from anglers familiar with the Toba system.

This is a relatively large system which appears to offer significant potential for fish production. Three Pacific salmon species (chinook, coho, chum) were observed during the course of the study. Observations for each species indicated that past records may be less than accurate in their portrayal of the status of these species in the Toba River system.

A. Chinook

The very few adults (± 100) that could be accounted for from visual observations, helicopter flights, set netting, sport fishing and dead recovery and the lack of juveniles appear to confirm recent observations by Fisheries field personnel (since 1973) that the chinook escapement is extremely low. Past records (Marshall et al., 1976)[2] and sports fishing observations indicate that this is the result of a reduction in the spawning population rather than a reflection of traditional low productivity.

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[2] Marshall, D.E., V.D. Chahley and L.L. Shannon. 1976. Preliminary catalogue of salmon streams and spawning escapements of Statistical Area 15 (Powell River). Canada Dept. Environ., Fish. Serv., Data Record PAC/D-76-2. 54 pp.

However, because of the nature of the Toba River system and its sport fishery, annual spawning escapement records for at least the last ten years are undoubtedly unreliable estimates of absolute abundance. At best, the historical records indicate that past escapements were on the average, perhaps one or two orders of magnitude higher than that observed in 1976.

Fisheries field personnel felt that their estimates could at best represent only relative abundance from year to year, and that due to time and visibility limitations these were heavily influenced by fresh water sports catch reports. It is our opinion (as noted on pages 7 and 10) that fresh water sport fishing results are unreliable indicators of fluctuations in annual chinook escapements. One or two helicopter flights each year would be a definite improvement over traditional methods.

B. Chum

It is possible that chum are more abundant than recent records indicate. The August/September run in the Little Toba was as large as average annual escapement estimates have indicated for the past few years. Field reports indicate that more chum moved into the system after the end of the study period. This suggests that there may well be two spawning runs or two peaks in the annual chum spawning run (called summer and fall runs in other systems). Although this could be the result of an unusually high yield year, it also seems possible that this could be the norm for the system. The fact that there are no previous records of a significant early run is more an indication of time and visibility limitations experienced by the local Fisheries personnel, rather than an indication that this year's early run was an exception.

C. Coho

Coho, like chum, may be utilizing the system to a greater extent than recent records indicate. Although the recent escapement estimates for coho are generally higher than for chum, some of the following points lend credibility to the speculation that coho are utilizing the system in numbers excess of those estimated in the past.

For example, coho have been observed in the Klite, Little Toba and upper reaches of the Big Toba. Also, like chum, coho appeared to be abundant earlier than previously reported. Local residents stated that coho are caught throughout the system and are still in the system until at least the end of February. The potential spawning areas compare favourably to rivers with substantially higher escapement estimates. And finally, the extensive fry rearing areas.(e.g. side channels, bog areas, tributary streams, etc.), a portion of which were sampled during this study, also compare with other systems with high coho escapement estimates.

RECOMMENDATIONS

A. Juvenile Chinook Coded-Wire-Tagging

The recommended method for this procedure is an egg collection and off-site rearing, then release in the following spring to the donor system. There are two suggested sites for egg collection. The first is in the lower Little Toba, approximately 0.5 miles above the Big Toba confluence (see Map 5). The second is in the Klite at "The Lower Pool" (see Map 4).

In the little Toba, the holding pens could be installed in any convenient pool area in the lower section. The donor stock should be captured by means of gill nets, or beach seining with a Smokercraft. In the Klite, the holding pen should be installed in the pool itself. Here the donor stock would be most efficiently captured using sports gear.

In order to insure the greatest possible potential for a successful program, the holding pens should be installed and the beach seine sites should be cleared of snags by early July.

B. Further Adult Chinook Reconnaissance

Due to the large size and turbid water conditions of this system, the most advisable method reconnaissance appears to be a set netting program. The problems encountered during this study lend experience to draw upon to make such a program feasible. In the Little Toba and Klite Rivers, the least turbid of the Toba tributaries, counting towers could be used in conjunction with set netting. The timing should be moved up to enable personnel to start in early July; and the surveys should continue through October.

The use of a helicopter in counting spawners is strongly recommended. It was found that aerial observation was the most effective means of counteracting the limited visibility problems encountered throughout the system. In addition, it was found that a helicopter was the most expedient means of overcoming the problem of counting the relatively few spawners distributed over a large areas with limited ground accessibility to much of it.

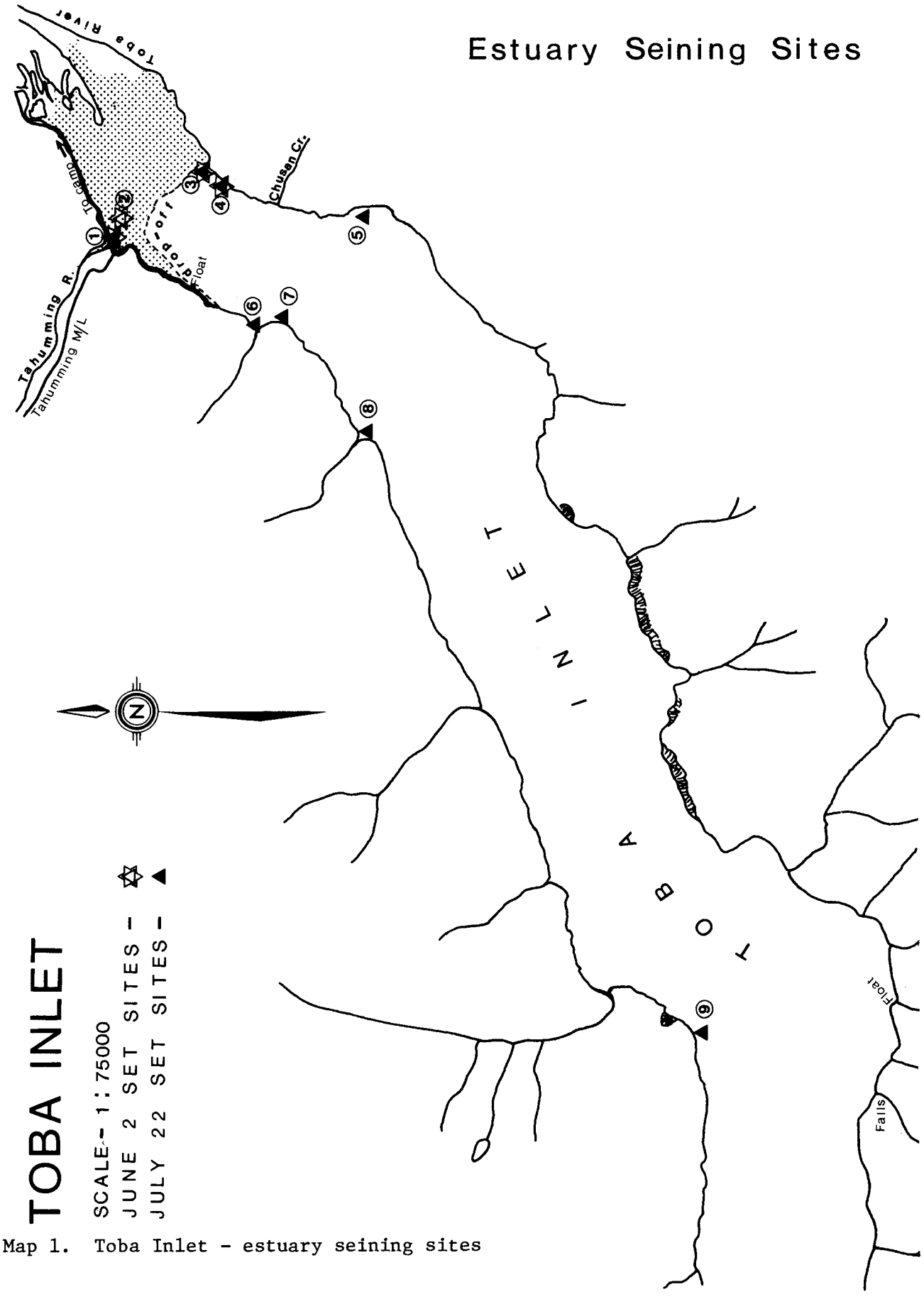
ACKNOWLEDGEMENTS

We extend grateful acknowledgements to Weldwood Canada Ltd. for providing the base maps of the Tree Farm Licence as well as the assistance provided by their personnel in the field; and Onion Lake Logging and all their staff for cooperation and always prompt assistance in providing materials and services during our field work.

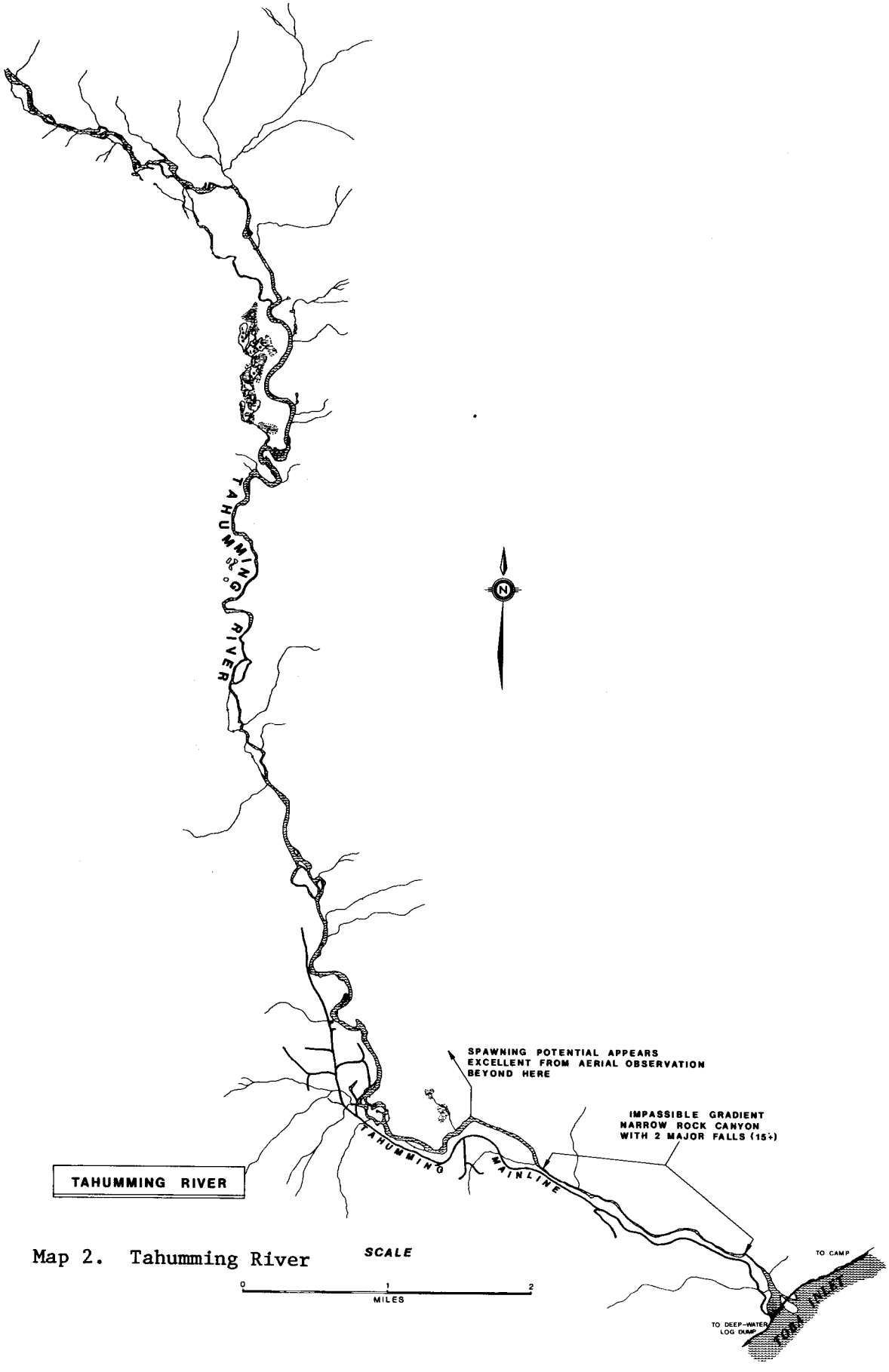
A special thanks to Bob Spence who provided much invaluable information on sport fishing results, access and run timing as well as for looking after our equipment while we were away.

Also, to Norm Lemmen and his field staff for their encouragement, support, assistance and the use of their equipment. Dan Powell of the British Columbia Forest Service provided maps of the Klite River and logging information. Dave Barrett and Al Wood provided helpful editorial comments.

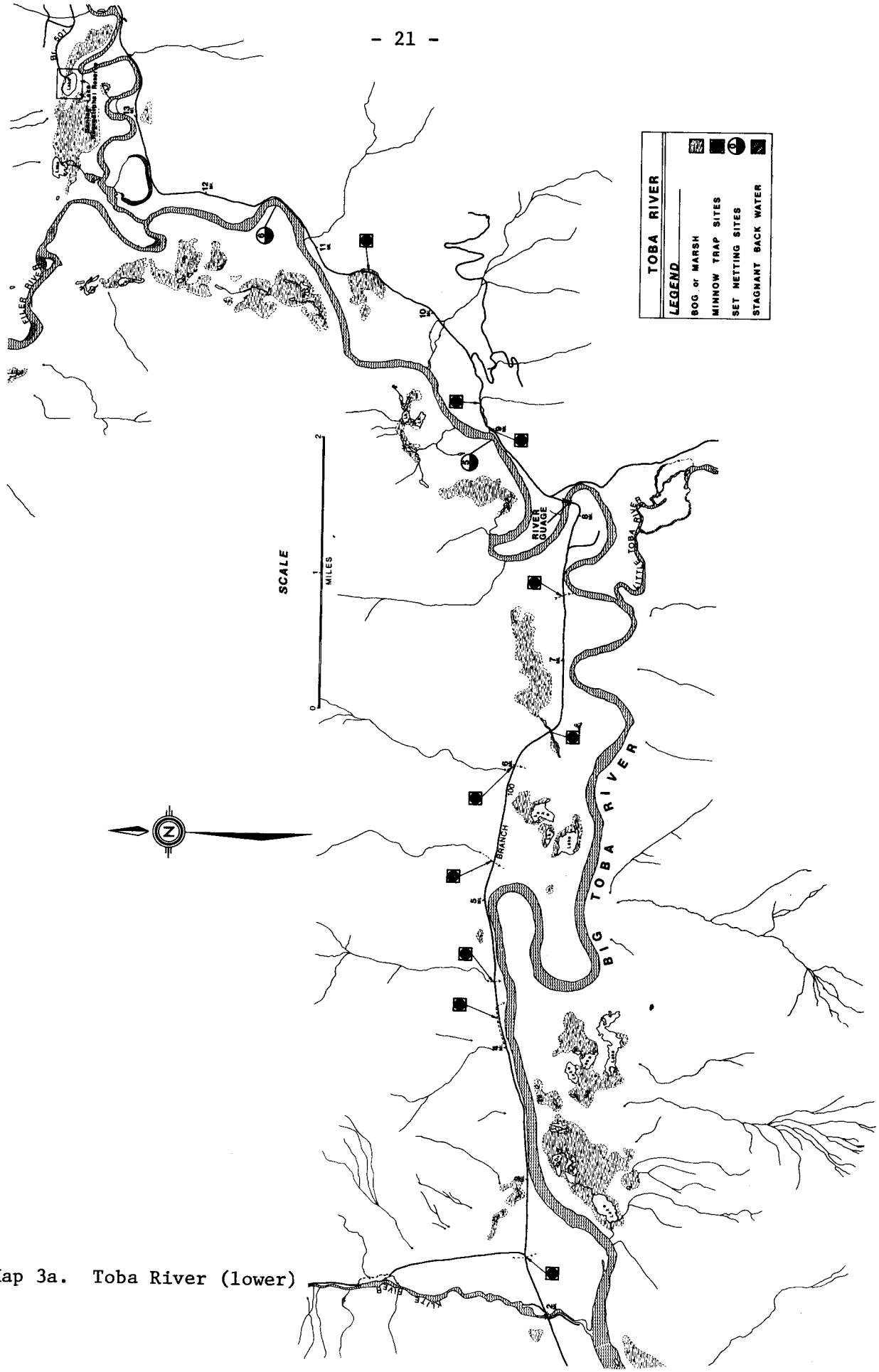
This program was partially funded by 1976-77 Salmonid Enhancement Program funds.



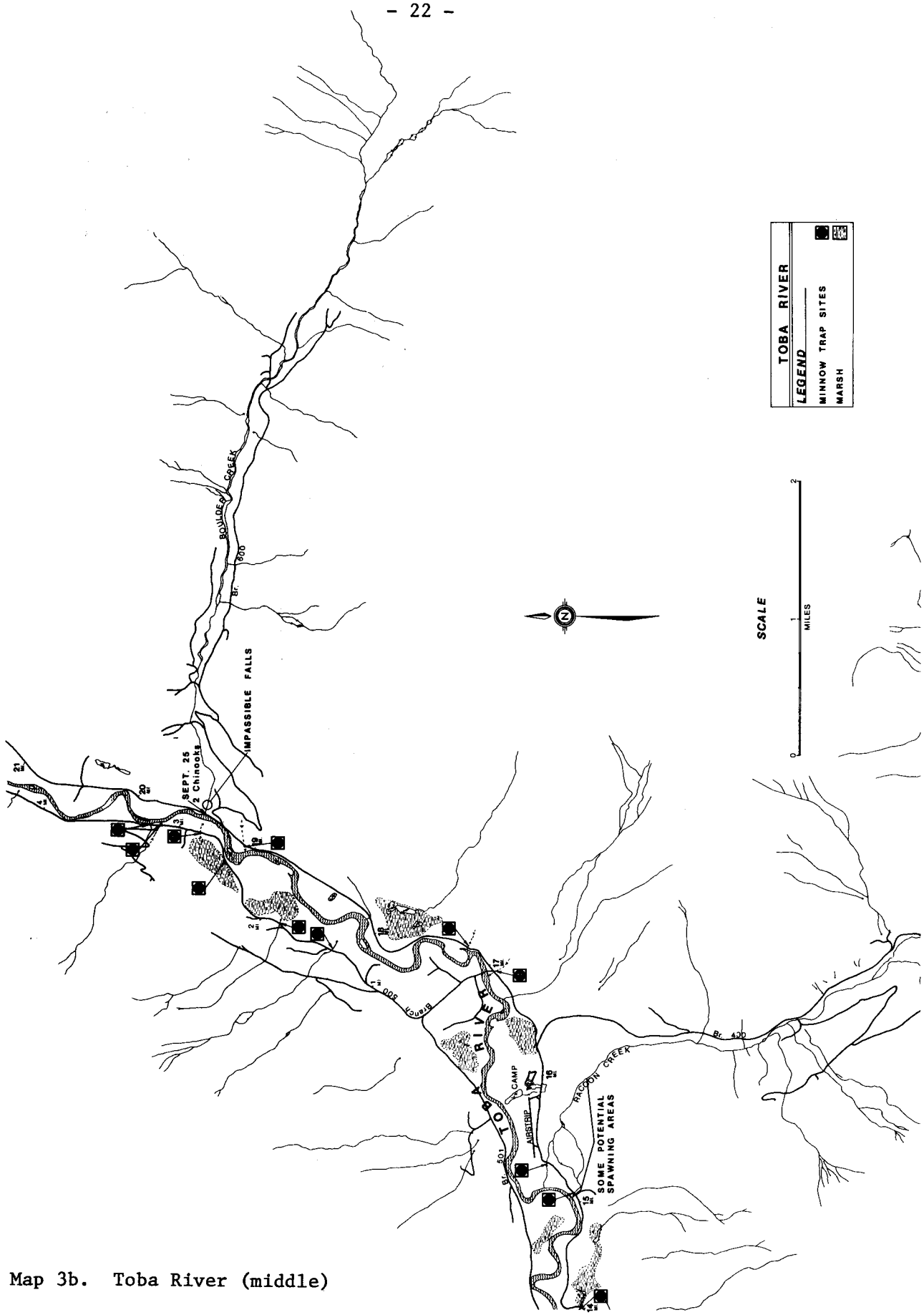
Map 1. Toba Inlet - estuary seining sites



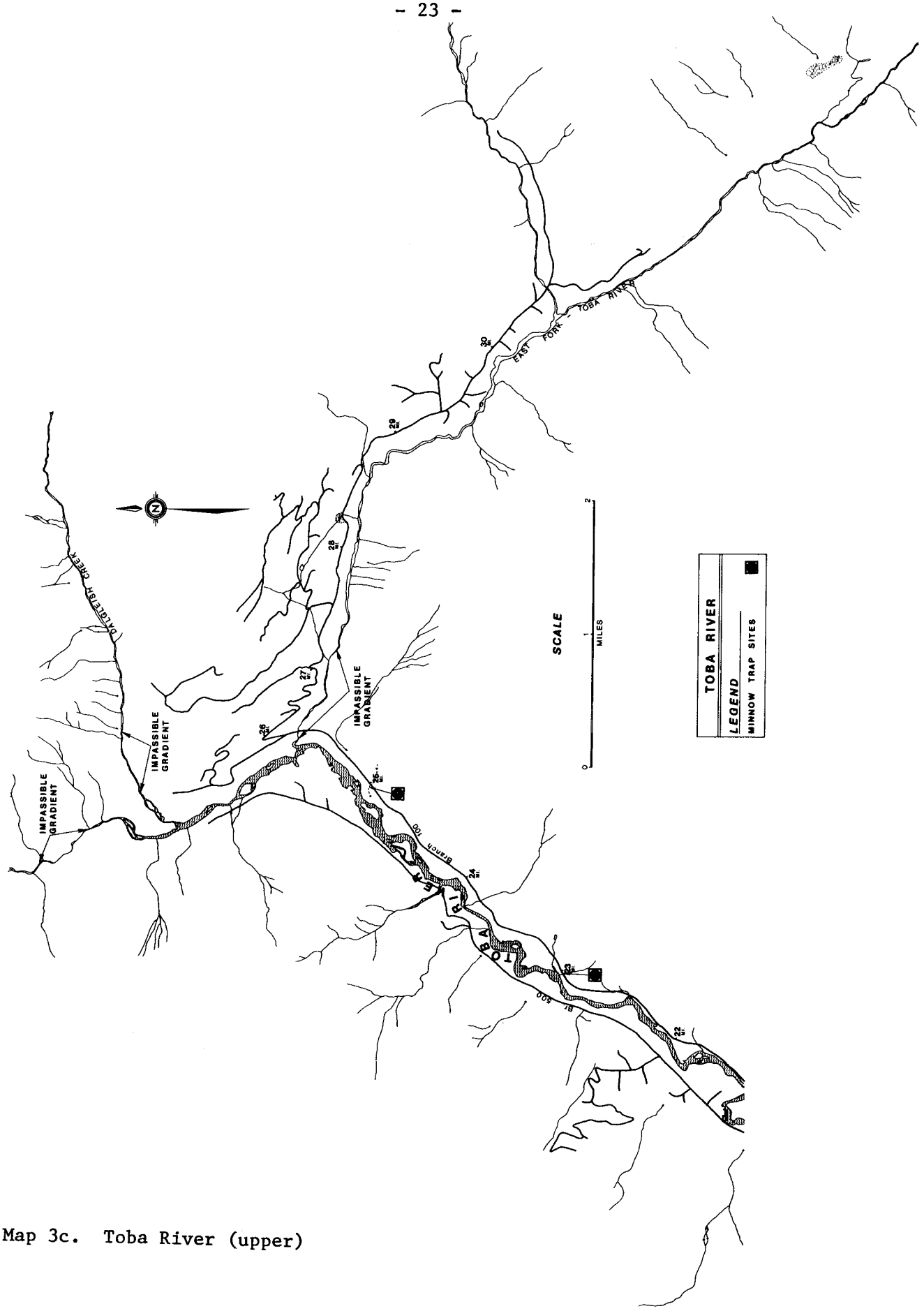
Map 2. Tahumming River



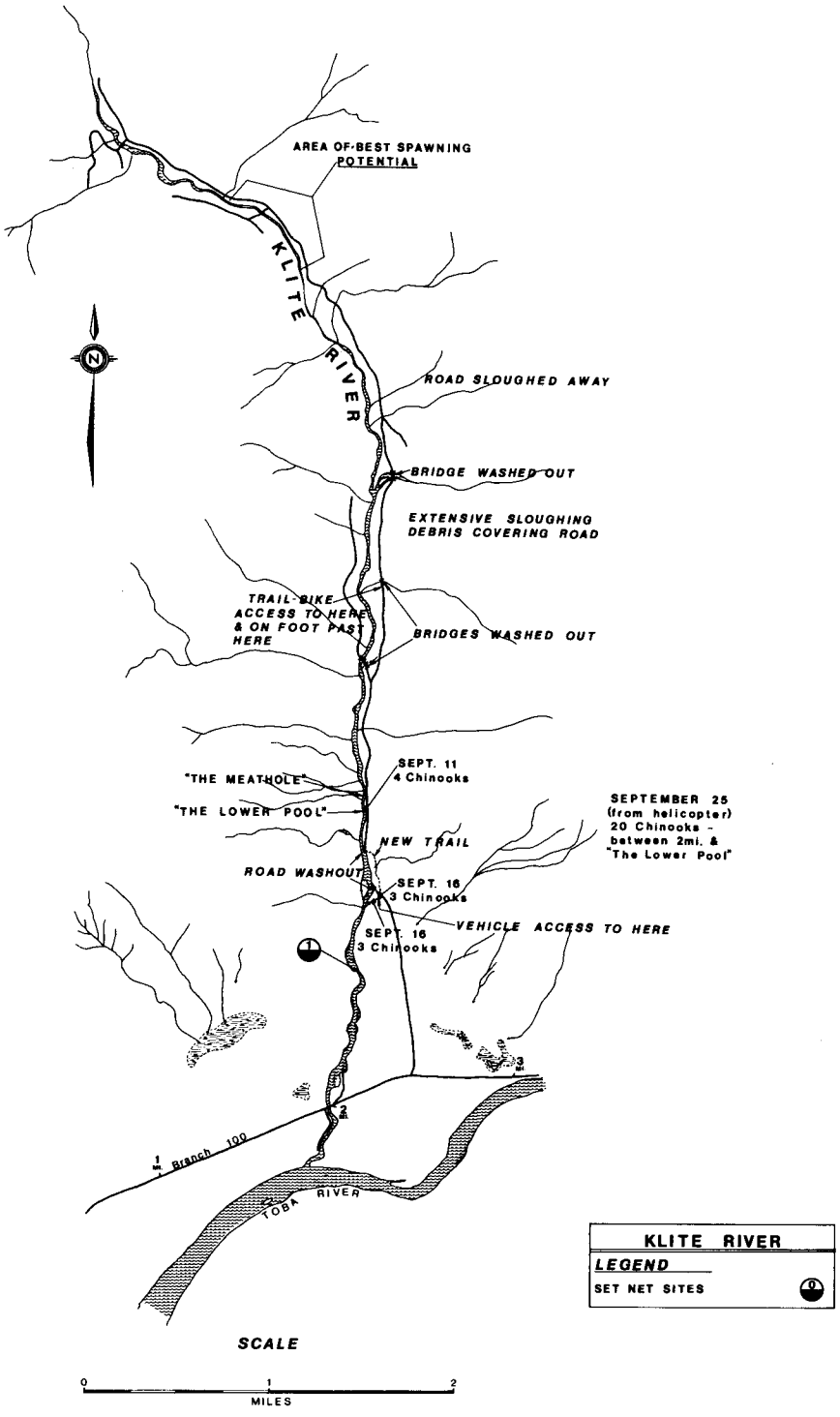
Map 3a. Toba River (lower)



Map 3b. Toba River (middle)

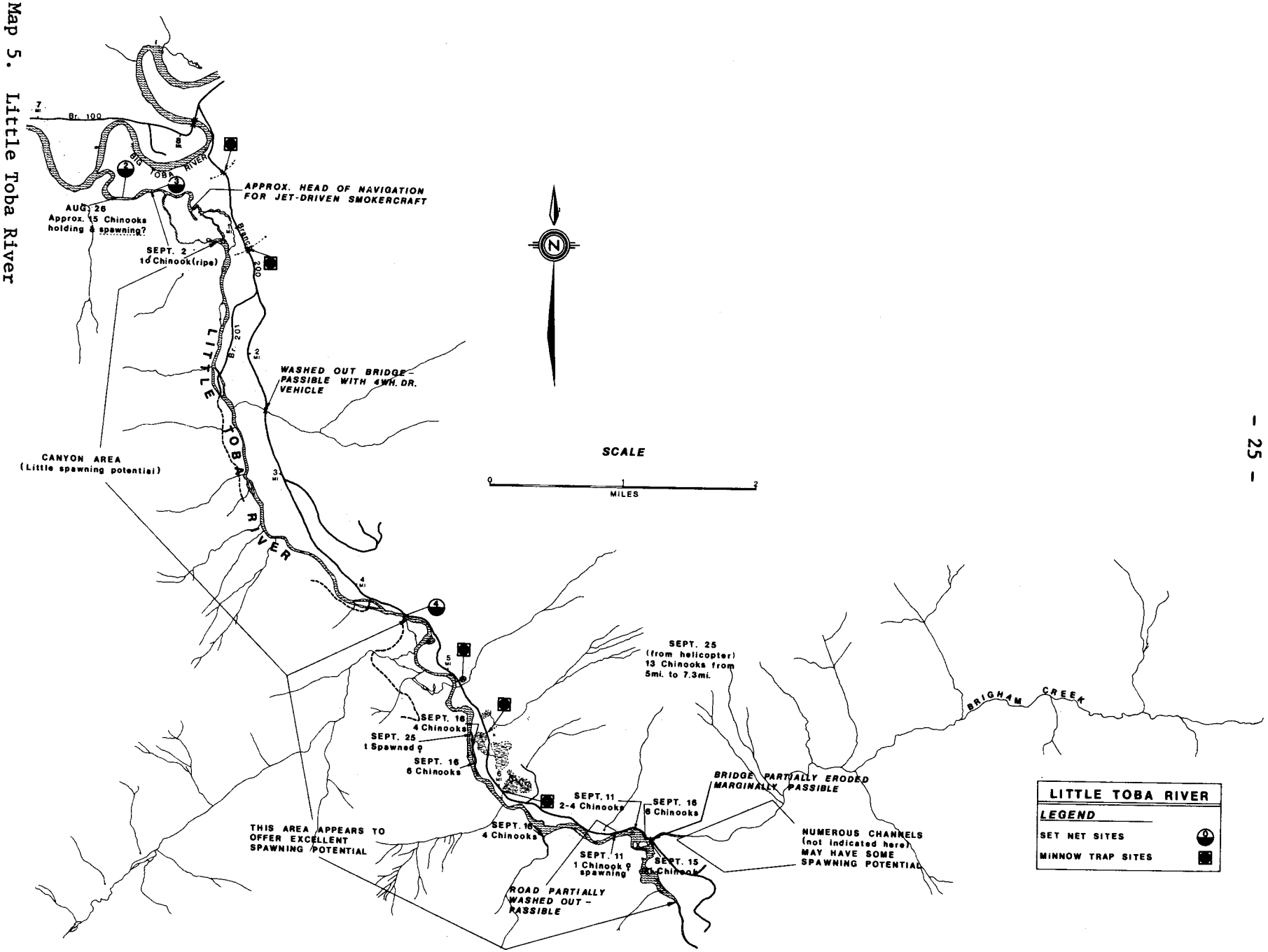


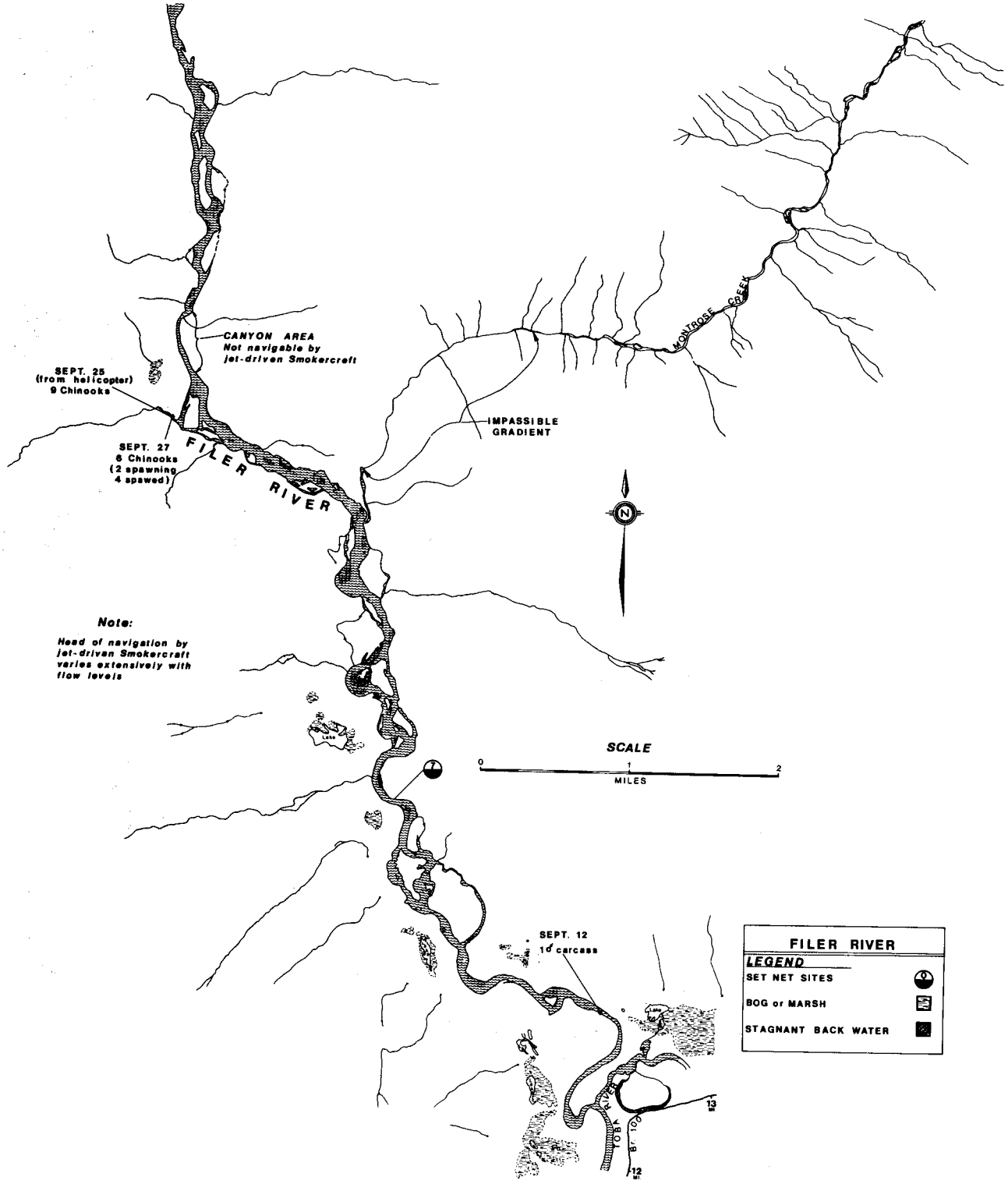
Map 3c. Toba River (upper)



Map 4. Klite River

Map 5. Little Toba River





Map 6. Filer River

Photo 1. Mouth of The Big Toba River

Photo 2. Klite River - "The Lower Pool", showing spawning gravel at lower end

Photo 3.
Tahumming River - The Lower Falls

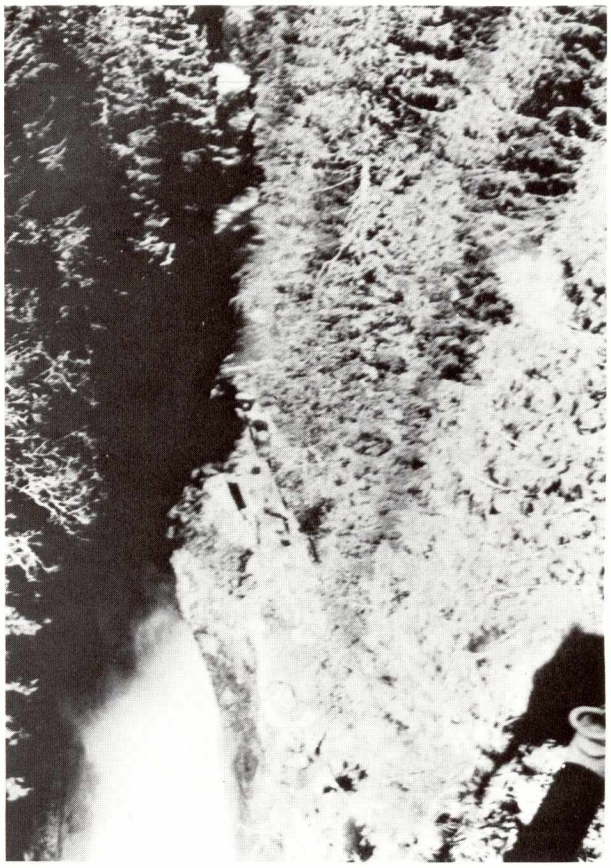


Photo 4.
Tahumming River - The Upper Falls

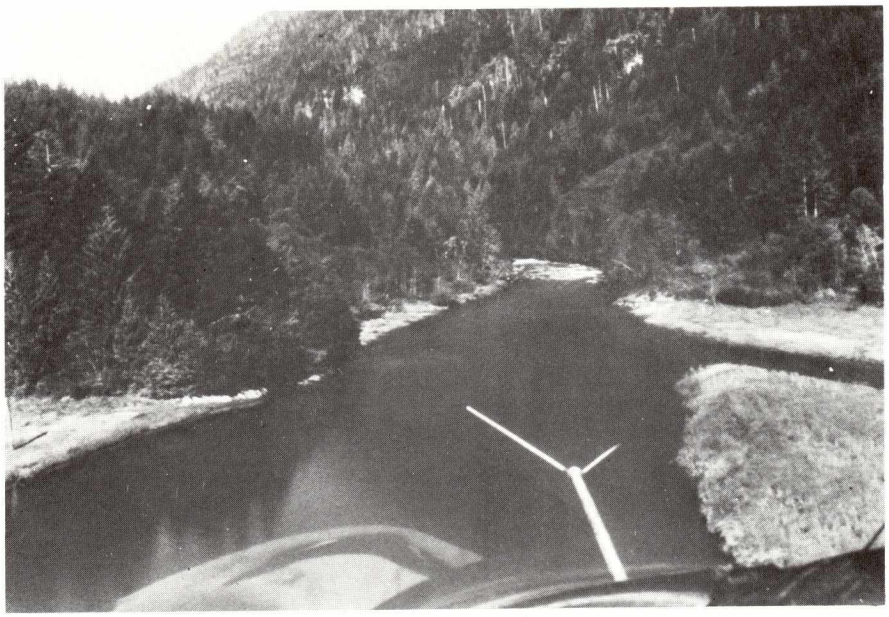


Photo 5. Mouth of the Tahumming River

Photo 6. Klite River - Approximately 4.5 - 5 miles above Toba confluence (area of greatest spawning potential)

Photo 7. Little Toba - Typical view of the lower 1.25 - 1.5 miles

Photo 8. Little Toba (Approximately 5 miles) - Typical view of area of excellent spawning potential (4.5 - 7 miles)

Photo 9. Filer River - Major falls in the headwater area

Photo 10. Klite River - Spawning chinooks in a small side channel at 1 mile above Toba confluence

Photo 11. Klite River - "The Meathole", The most popular/productive chinook and steelhead angling spot in the Toba system

Photo 12. Klite River - The falls at the upper end of "The Meathole" at moderately low flow level

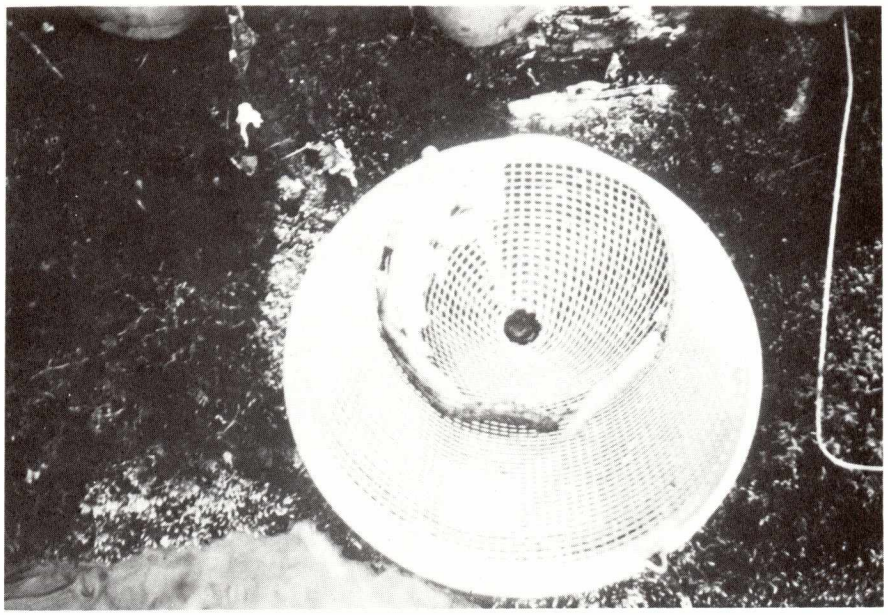


Photo 13 A. Fry trap used for juvenile salmonids and baited with roe

Photo 13 B. Fry trap used for juvenile salmonids and baited with roe

Table 1. Estuary beach seining results - see Map 1.

Date	Time	Set Site	Temperature	Catch
June 2	1145	1	7°C	3 Dolly Varden
	1530	2		50 Sculpins 1 Flounder
	2015	3		No Fish
	2030	4	9°	1 Cutthroat
July 22	0845	1	7°	5 Dolly Varden 12 Flounders 20 Sculpins
	0915	4		No Fish
	0930	3		No Fish
	0945	6		2 Cutthroat
	1000	7		No Fish (Poor set)
	1015	8	10°	12-15 Chinook Fry (35-55 mm) 6 Cutthroat
	1200	9	7°	3 Chinook Fry (up to 55 mm) 30 Sculpins
		3		No Fish
		4		2 Trout
		4		Larval Herring 1 Blenny
		5		6 Trout (10-31 mm)
		5		3 Trout
		5		1 Trout

Table 2. Set netting results - see Maps 3a, 4, 5, 6.

Date	Refer To Map	Set Sites	Duration	Chinooks	Sex	Condition	Other Species
Aug. 26	5	2	150' drift	1	M	bright	2 chum
Aug. 26	5	2	Overnight	2	M F	ripe bright	5 chum 2 dolly
Aug. 26	3a	5	Overnight	1	M	bright	
Aug. 27	3a	5	Overnight				1 chum
Sept. 1	6	7	Overnight				washed out
Sept. 1	5	3	Overnight	2	M F	spawned spawned	 11 chum
Sept.12	3a	6	Overnight				3 coho
Sept.13	3a	6	Overnight				washed out
Sept.16	5	4	All day				4 coho
Sept.25	5	4	Afternoon	1	F	spawned	5 coho
Spet.26	4	1	1 1/2 Hrs.				-
Sept.29	5	4	Afternoon				4 coho

Table 3. Chinook - age/length data.

No.	Date	Method of Capture	Location	Sex	Nose/Fork Length	Orb/Hyp Length	Condition	Scale Reading
1	Aug. 16	Angling	Klite-"Lower Pool"	M	61.5 cm		Bright	R
2	Sept. 11	Angling	Klite-"Lower Pool"	F	61.2		Bright	R
3	Sept. 11	Angling	Klite-"Lower Pool"	M	63.2		Dark	3_1
4	Aug. 26	Net	Little Toba-Site 2	M	69.5		Bright	3_2
5	Aug. 27	Net	Big Toba-Site 5	M	42.9	34.9 cm	Bright	2_1
6	Aug. 27	Net	Little Toba-Site 2	F	60.0	49.0	Bright	3_2
7	Aug. 27	Net	Little Toba-Site 2	M	74.0	57.7	Ripe	3_1
8	Sept. 2	Net	Little Toba-Site 3	F	96.0		Spawned out	4_1
9	Sept. 2	Net	Little Toba-Site 3	M	99.5		Spawned out	R
10	Sept. 12	Dead Recovery	Filer @ Approx. 1 mi.	M	101.5		Spawned out	R
11	Sept. 25	Dead Recovery	Little Toba @ 5.25 mi.	F		77.0	Spawned out	5_1
12	Sept. 25	Net	Little Toba-Site 4	F		72.0	Spawned out	4_1
13	Sept. 27	Dead Recovery	Filer Tributary @ 5 mi.	M		74.4	Spawned out	R

Table 4. Chum - age/length data

No.	Date	Method of Capture	Location	Sex	Nose/Fork Length	Orb/Hyp Length	Condition	Scale Reading
	Sept.							
1	2	Net	Little Toba-Site #3	M	72.5cm		Ripe(Spawning)	4
2	2	Net	Little Toba-Site #3	F	77.0		Ripe(Spawning)	4
3	2	Net	Little Toba-Site #3	M	85.0		Ripe(Spawning)	4
4	2	Net	Little Toba-Site #3	F	77.0		Ripe(Spawning)	4
5	2	Net	Little Toba-Site #3	M	83.0		Ripe(Spawning)	4
6	2	Net	Little Toba-Site #3	M	86.0		Ripe(Spawning)	4
7	2	Net	Little Toba-Site #3	M	81.0		Ripe(Spawning)	4
8	2	Net	Little Toba-Site #3	M	86.5		Ripe(Spawning)	4
9	2	Net	Little Toba-Site #3	F	76.5		Ripe(Spawning)	4
10	2	Net	Little Toba-Site #3	M	83.0		Ripe(Spawning)	4
11	2	Net	Little Toba-Site #3	M	77.5		Ripe(Spawning)	4
12	13	Net	Big Toba-Site #6	M	104.0		Ripe	3
13	13	Net	Big Toba-Site #6	M	101.5		Ripe	4
14	25	Dead Recovery	Little Toba-1/3 mi.	M	85.5	63.6cm	Spawned out	4
15	25	Dead Recovery	Little Toba-1/3 mi.	F	67.0	62.2	Spawned out	4
16	25	Dead Recovery	Little Toba-1/3 mi.	F	68.6	66.5	Spawned out	4
17	25	Dead Recovery	Little Toba-1/3 mi.	F		65.0	Spawned out	4
18	25	Dead Recovery	Little Toba-1/3 mi.	M	80.8	62.6	Spawned out	4
19	25	Dead Recovery	Little Toba-1/3 mi.	F		62.1	Spawned out	4

Table 5. Coho - age/length data.

No.	Date	Method of Capture	Location	Sex	Nose/Fork Length	Orb/Hyp Length	Condition	Scale Reading
	Sept.							
1	13	Net	Big Toba-Site #6	F	64.0cm		Bright	3_2
2	13	Net	Big Toba-Site #6	F	64.5		Bright	3_2
3	13	Net	Big Toba-Site #6	F	58.0		Bright	3_2
4	16	Net	Little Toba-Site #4	M	74.0		Bright	R
5	16	Net	Little Toba-Site #4	M	51.5		Bright	R
6	16	Net	Little Toba-Site #4	F	65.0		Bright	3_2
7	16	Net	Little Toba-Site #4	F	66.5		Bright	R
8	25	Net	Little Toba-Site #4	M	69.1	55.0	Bright	3_2
9	25	Net	Little Toba-Site #4	F	63.1	51.0	Bright	R
10	25	Net	Little Toba-Site #4	F	68.9	55.1	Bright	R
11	25	Net	Little Toba-Site #4	M	70.9	54.1	Bright	R
12	25	Net	Little Toba-Site #4	F	64.6	52.0	Bright	3_2
13	29	Net	Little Toba-Site #4	F	70.2		Bright	3_2
14	29	Net	Little Toba-Site #4	F	66.6		Bright	3_2

Table 6. Fry sampling results - Little Toba - see Map 5.

Date	Site No.	Approx. Mileage	Site Description	Temp.	Coho	Size	Other Species
Aug. 29	1	0.6	Slow tea-colored creek	12°C	27	4-10 cm	1 stickleback
Aug. 29	2	1.2	Slow tea-colored creek	12.5°	18	3.5-9	6 sculpins 2 trout
Aug. 29	3	5.1	Detritus laiden old beaver pond	11°			
Aug. 29	4	5.4	Small clear fast creek	9°	5	Avg. 7 cm	5 trout 1 dolly
Aug. 29	5	6.1	Fast colored creek over road	12°	25	4.5-8	1 dolly

Table 7. Fry sampling results - Big Toba (Branch 100) - see Maps 3a-c.

Date	Site No.	Approx. Mileage	Site Description	Temp.	Coho	Size	Other Species
Sept. 25	1	2.35	Slow shallow colored creek	10.5°C	11	Avg. 6 cm	
Sept. 25	2	4.25	Clear creek forming ditch	10.5°	1	6	3 trout 1 dolly
Sept. 25	3	4.6	Shallow creek/ditch	10.0°			10 sculpins
Sept. 24	4	5.2	Larger fast glacial creek	14.5°	7	Avg. 6	3 dolly 1 trout
Sept. 24	5	6.0	Small clear fast creek	15.0°	9	4-7	2 dolly 1 trout
Sept. 24	6	6.5	Large colored back-water	19.0°	4 (dead)	7-13.5	
Aug. 31	7	7.4		14.0°	7	6-9	7 sticklebacks
Aug. 31	8	9.0		12.0°	25	4-6	1 sculpin
Aug. 31	9	9.2		11.0°	2	5	1 stickleback
Aug. 31	10	10.7		13.0°	1	9	
Sept. 1	10	10.7		13.0°	7	Avg. 4.5	6 sticklebacks
Aug. 31	11	14.0		12.0°	2	4.5	
Aug. 31	12	15.0	Racoon Creek	8.0°			
Aug. 31	13	15.6	Still back water	11.0°			
Sept. 14	14	16.9	Pool by road culvert	8.0°			
Sept. 14	15	17.2	Small shallow fast creek	14.5°	10	4-6.5	
Sept. 14	16	19.1	Larger, fast dark creek	13.0°	2	4 & 7	
Sept. 14	17	23.0	Slow brackish creek	14.5°	3	7.2	
Sept. 14	18	24.95	Fast clear creek	12.0°	3	5-7	

Table 8. Fry sampling results - Big Toba (Branch 500) - see Map 3b.

Date	Site No.	Approx. Mileage	Site Description	Temp.	Coho	Size	Other Species
Sept. 29	1	1.39	Pool by road culverts	12.0°C			1 cutthroat
Sept. 29	2	1.93	Clear, fast creek	11.0°	1	6 cm	3 trout
Sept. 29	3	2.51	Clear, fast creek	12.0°	8	Avg. 5.5	2 trout 1 dolly
Sept. 29	4	2.78		12.0°			1 trout
Sept. 29	5	3.13	Slow brackish creek/ditch	11.0°			3 trout
Sept. 29	6	3.24	Shallow brackish pond	13.0°			5 sticklebacks

APPENDIX 1

Disease Pathology Analysis Reports

Diagnostic Service
Fish Health Program
Pacific Biological Station
Nanaimo, B.C.

Laboratory Report

Report No. 76222

Date Jan 20/76

1. Species: Coho/CHAR/TROUT 2. Wild [✓] or cultured [ ] stock

3. Date sample collected: End of Sept/76 4. No. examined: ____ 5. Pond no.: ____ 6. Age: fry

7. Site: Toba Inlet (Toba Rivers)

8. Diagnosis: no evidence of pathology

9. Recommended treatment:

10. History of stock:

11. % of stock affected: ____ 12. % mortality: ____ 13. Size of stock (nos.) ____

14. Water: fresh [✓] salt [ ] 15. Overt disease [ ] carriers [✓] Health check.

16. Fork length: ____ 17. Weight: ____

18. General observations and remarks:

Received in formalin; so, gross + histopathological examination only. No culturing possible.

S R Bell

Diagnostician

Diagnostic Service
Fish Health Program
Pacific Biological Station
Nanaimo, B.C.

Laboratory Report

Report No. 76223

Date Jan 20/77

1. Species: chinook / coho 2. Wild [✓] or cultured [ ] stock

3. Date sample collected: End of Sept/76 4. No. examined: 7 (5♀, 2♂) 5. Pond no.: ___ 6. Age: adult

7. Site: Toba River

8. Diagnosis: No evidence of furunculosis, bacterial kidney disease or myxobacterial gill disease. No evidence of viruses.

9. Recommended treatment:

10. History of stock:

11. % of stock affected: ___ 12. % mortality: ___ 13. Size of stock (nos.) ___

14. Water: fresh [✓] salt [ ] 15. Overt disease [ ] carriers [✓]

16. Fork length: ___ 17. Weight: ___

18. General observations and remarks:

Kidneys examined for microorganisms, including virus.

Sandy: Sorry about the delay in completing this report but we had unusual troubles with our cell lines necessary for the virus assay. Anyway, in summary, these fish appeared to be free of the common fish disease agents.

L. R. Bell

Diagnostician