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WORK PU.N . I

PROJECT NO. 1 R 1

TITLES An .erial survey of Chinook Salmon Spawning Utilization of
the Major Streams of the Salmon River Drainage, Idaho

OBJECTIVES, The objectives of the project **were** to determine: (1) the escapement of adult chinook salmon to their spawning beds in the Salmon river drainage; (2) the extent of utilization of stream sections available to and suitable for spawning; (3) the efficiency of aerial counts of spawning beds as determined by spot ground checks both before and after aerial counts.

TECHNI;UES USED:

Aerial Surveys All aerial observations were made from a Cessna 170. The observer sat in the **back seat** of the plane so that he could make counts from either side since it was often necessary for the pilot **to** fly from one side of the stream to the other because of the meandering of the stream, 2nd/or the mountainous nature of the **terrain**. Elevations of from 100 to 500 feet above the stream **were** used. It was found that an elevation **of** from 200 to 250 feet above the stream was most effective in following the meander of the stream, particularly so when an observation angle of 40-50 degrees was used. Whenever possible the plane flew on the side of the stream towards the sun in order to escape reflection of light from the surface of the water. A hand tally was operated to enumerate the spawning beds and their numbers were entered on prepared maps of the stream and on tally sheets. Besides making actual counts of completed beds, an estimate of spawning progress was also attempted. This estimate was based on the number of spawning fish in evidence at the time beds were counted and is shown in the summary, table 1.

Ground Checks: Six separate ground check areas were set up in determining the accuracy of the aerial count. In addition one section of the middle Fork was covered on feet after the aerial count was made. Two small check areas were marked off near the head of Beam Valley Creek in the meadows, and ground counts made in advance of aerial reconnaissance. A half-mile ground check area in Poker Creek on Beam Valley Creek was marked off and a ground check was made. A 12 acre section of * was marked off and a ground

el-leek me in both ... after aerial counts. A mile-
 of ... River at Robinson Bar was marked
 off and ... two ground check stations.
 Snawnir ... was still in progress at this point and day to
 day vat ... One section
 1' ... also used as a ground check station,
 c f upper R. ... after the aerial
 the grouse_ ...
 made by wading the streams, when
 eecessrv, cr ... observation from the bark. Each 'round
 check area ... mapped in detail and the location o the
 beds noted. ... markers, plainly visible from the it were
 Placed at the upper and lower boundaries of the stream
 section along the stream bank. White paper, or cloth
 m,rkrs were used.

Ground checks

count.

of beds was noted

:NDI N! S: 'With few exceptions the Salmon River and its major
 tri_ uatary s`resms were modera.tel.. utilized spas? yin
 chi:ncok salmon in I bl. S oce there are variations in
 this stream utilization, each stream shall be treated
 sep-.ratel;r. Tabulation of counts is given in Tale I.

1. Salmon River: y total of 1187 beds were counted
 on the almon River ^roper with ,hut 62 per cent of these
 located on the Derder Flct area near the head of the river.
 Iron the mouth of iiedfish Lske Creek downstream the stream,
 bed is compos`d r,ostly of **medium** and coarse rubble which is
 unsuits'ble Per ss -ruing. However, there we`e usually suitable
 spawr.i-ei, bars s.t the mouths of many of the tributaries. The
 meadow of hl:t crea immediately below Challis was heovil.
 utilized s was the Robinson Bar area eat the mouth of Wcrm
 Sprints Creek. The bars at the mouth of the P: hsineroi River
 and below the mouth of the Lemhi River were model- t.el;' used
 r lthou ,}, spawning at the mouth of the Pchsi• er-si s
 Still in progress during observations. On 3eotemeer 14, there
 ' t h r e e beds on this bar while on Seotemor r 18 there -:
 re'e 18 eeds.

It is essimdte;- th there are only some 16 miles of
 strc:r::r, Led of the: So iron. River suitable for spawning.
 This is only small rcrt of its 409 mile length. P.iost
 of this . which is 1°c 1 for spavming is in thct section
 of the river from the steel ighway bride e just above the
 mouth of edfi h Lake Creek upstream to the next highway
 bridhe.

2. South Fork c'± the Sc i.mon River: The South Fork was
 obsorv? t'ron the rceuth of tTC Secesh River to its head.
 .Tinir:g wastes, entered the South Fork through its East Fork

niaonservd t _cos helot' this ;int were difficult. It is eery
likely t...t some oph-hing occurred in the lower 010 te °roe
. section .,f the stream beccuse of the heca,u utilization--
is. _et, .almost over-utilization--of _voila .;le spuvrni.n_
aree above the mouth o- the Secesh *River*. *r*
in .he Fo-:erty Flat area was extremely *hoc*;r with acts
contigucus ith each other and' often

TZ.BLE / SU1S?RY OP AERI'.L COUNTS OF CHINOOK Si:LF.;ON SP 2:EI vG NESTS

Stream or stream section	Stream mi. observed	Date	Beds counted	Estimated % spawning incomplete	Total beds 1951	Total no. fish using this stream sex ratio 1:1.5)	Stream section suitable for spawnin. less than, per cents
S := RIVER, section observed,	218		1187		127	3533	
M. Chamberlain to M. M. F.	20	9-17	0				2
M. M. F. to M. North Fork	35		34	50	6P	170	5
M. North F. to M. Lemhi	22		13	50	26	. 65	5
M. Lemhi to M. Pahsimeroi	40	9-14	34				
" u " "		9-18	49	25	61	152	5
M. Pa hsimeroi to Challis Br.	21	9-14	100	20	120	300	10
Challis Br. to Clayton	27		0				1
Clayton to Sunbeam	15		103				
" a		9-18	111	10	122	305	5
Sunbeam to M. Valley Cr.	13	9-14	147		147	367	10
W. Valley Cr. to Head	25	t	733		713	1832	35
hEDDLL F°RK, entire	106		425		425	1062	3
Mouth to L. Big Cr.	21	9-17	22		22	55	1
l. Big Cr. to M. Bernard Cr.	10		19		19	47	1
M. Bernard tb M. Camas Cr.	9	9-16	73		73	182	
M. Camas to M. Loon Cr.	9	9-15	39		39	98	1
l. Loon to M. Marble Cr.	15		162		162	406	3
M. Marble to Head of M. F.	42	t'	110		110	275	3
Chamberlain Cr.	26	9-17	25		25	62	
Big Creek	36		160		160	400	3
Camas Creek	20	9-16	187	10	206	515	5
Loon Creek	28	n	104		104	260	2
l&arb le Creek	5	9-15	6		6	15	1
Indian Creek	8	++	17		17	42	1
Pistol Creek	5	"	0				1
Rapid River, up to Lucinda Cr.	4		19		19	47	1
Sulphur Creek	12	-	51		51	126	10
Bear Valley Cr., M. to M. Elk Cr.	9		254		254	635	50
, M. Elk to he d	10	"	246		246	615	45

TABLE I (continued)

Stream or stream section	Stream mi. observed	Date	Beds counted	Estimated % spawning incomplete	Total beds 1951	Total using (sex ratio 1:1.5)	no. fish?	Stream section
								suitable for spawning less than, per cent:
Elk Creek*	12	"	153		153 (41)	382		EC
Beardsic Creek	5	"	6		6	15		10
Wish Creek, up to Knapp Cr.	11	"	8		88	220		40
Walker Creek	10	"	of		91	227		40
Whiphorn Creek	5	"	49		49	122		60
Knapp Creek	6	"	36		36	90		10
Panther Creek	42	9-17	83		83	207		10
N. Fork, Salmon River	14	"	19		19	47		5
Lemhi River	56		280	10	308	770		10
Pahsimeroi River	14	9-18	163	25	204	510		60
East. Fork, Salmon River	30	9-16	358	5	376	940		20
Yankee Fork Creek	20	"	68		68	170		10
Fork, Yankee Fork	5		39		39	97		60
Valley Cr.	16	9-15	176		176	440		20
Pettit Forks L. Creeks	6	9-14	96		96	240		70
South Fork, Salmon i. Secesh to head	40	9-24	25	10	687	1717		8
Secush River, Entire	20	"	31		31	77		2
Lake Creek	7		21		21	52		30
Johnson Creek	20		110		110	275		10
E. F. S. F. i. to M. Johnson	10	"	0		0			
	834		5173		5431 (741)	13568		

* Elk Creek was trapped for spring eggs in 1951. To the total of 153 should be added the 26 females seen and the 15 females which spawned or partially spawned in the trap enclosure.

overlapping. A total of 623 beds were counted through the observed section of stream and spawning was still in progress as evidenced by the numbers of salmon still working the beds.

3. Secesh Rivers This tributary of the South Fork was covered 7; from its head to mouth. However, except for an occasional bed found near the bank in scattered spots the principal spawning area was above Long Gulch. The stream bed of the Secesh is composed largely of rubble or bed-rock with occasional areas of medium gravel interspersed. Thirty-one fine beds were counted in the Secesh River. Mine wastes precluded good observation below the mouth of Grouse Creek.

4. Lake Creek: This tributary of the Secush River also raised by a chinook salmon. Its bottom is composed largely of suitable gravel. However, salmon were used only on the lower four miles of the stream, through which 21 nests were counted.

5. East Fork of the South Forks This stream was checked from its mouth to the mouth of Johnson Creek. The stream bed is composed of rubble and bed rock. No nests were seen.

6. Johnson Creeks A tributary of the East Fork of the South Fork, Johnson Creek is the best and most heavily used stream in the South Fork drainage except for the South Fork itself. Over half of its 35-40 miles of bed is suitable for spawning. However, Deadhorse Rapids apparently forms a partial migratory block during periods of low stream flow in late summer. No salmon were noted in the stream above the rapids during several round checks made in July. Nor were any fresh beds observed above this point from the air. It is apparent that the lower 6-7 miles of stream is the only part utilized by spawning salmon. There were 110 beds counted through this section.

7. Chamberlain Creek: Because of deadfall blocks in the lower end of Chamberlain Creek salmon have been unable to ascend to the meadow areas near the headwaters of this stream for a number of years. The spring run-off of 19E' however, removed these intermediary blocks and salmon reached the meadows adjacent to the Chamberlain Ranger Station.

A total of 26 beds were counted, 20 of which were in the upper reaches of the stream up to the head of Rod Top Meadow.

8. Middle Fork of Salmon River* Although the Middle Fork

is probably the largest tributary of the Salmon River it **is** not heavily utilized for spawning by chinook salmon. The reason for this is at once apparent, even from the air. It has a moderate to steep gradient (dropping almost 3,000 feet in 100 miles) and its stream bed **is** composed of approximately 98 medium and coarse rubble and bed rock. It is only on the bars formed at or below the mouths of some of its tributaries that suitable spawning gravel is found, and, with two exceptions all beds were located on these bars. The two exceptions to this attempt to make beds, only, and were found in an area of medium rubble. A total of 425 beds were counted **in** the Middle **Fork** and **272**. of these (**64** per cent) were found above the mouth **of Loon Creek**.

9. Big Creek: **Big Creek** was observed from its mouth **to** the mouth of Jacobs Ladder Creek above the Big Creek Ranger Station. The principal spawning area in this stream is through the meadows which begin several miles below the Big Creek Ranger Station and extend upstream to the mouth of Jacobs Ladder Creek. There was, however, scattered spawning throughout the **remainder of Big Creek downstream**

to its mouth. 1 total of 160 beds were counted in Big Creek - with 121 (75 per cent) of these located in the meadow areas near the head and at an elevation in excess of 5500 feet.

10. Camas Creek: A total of 167 beds were counted in Cares Creek from its mouth to the mouth of Pumice Creek. Mire wastes entering Camas Creek from the flour spar mill at the mouth of Deer Creek discolored the stream below this point and made observation difficult. However, 26 beds were counted immediately below the point of entrance of the tributary.

11. Loon Creek: The entire length of Loon Creek was observed for spawning beds. There is no stretch of the stream which affords a large area suitable to spawning. Beds were found from near the mouth to the small meadow some two miles above the mouth of Mc-yield Creek with the usual distribution on bars at or below the mouths of tributaries. A total of 104 beds were counted.

12. Marble Creeks Six beds were located in the lower six miles of Marble Creek. This stream, as well as the next three listed, has fairly steep gradients and very little stream bed suitable for spawning. The beds which were found were located adjacent to and just above the Billie Mitchell Ranch.

13. Indian Creek: Seventeen beds were found in the lower five miles of this stream.

14. Pistol Creek No beds were seen in the lower 8 miles of Pistol Creek, although it has been reported to be used by spawning chinook salmon.

15. Rapid River: Nineteen beds were found on Rapid River, all of which were located in the short meadow near the mouth of Lucinda Creek.

16. Bear Valley Creek: This stream, with Marsh Creek, forms the Middle Fork of the Salmon River and is the most important single stream in the Middle Fork drainage for salmon spawning. The lower 3 miles of Bear Valley Creek flows through a deep, narrow canyon and is little used for spawning. Above the canyon, however, the stream meanders through wide meadow areas, and its bottom is composed largely of decomposed granitic sand and fine gravel. From its mouth to the mouth of Elk Creek, its largest tributary, a total of 254 beds were counted. From the mouth of Elk Creek to the lower end of Big Meadows (the upper limits of spawning), a stream distance of 12 miles, a total of 246 beds were located, or, the total beds in Bear Valley Creek were 500.

17. Elk Creek: This tributary of Bear Valley Creek was trapped for spring chinook salmon and this trapping

trapping operation is covered in another report. Counts of beds were made, however, to conform to the trapping operation. A total of 22 beds were counted below the trap-site (one mile above the mouth of Elk Creek) and 131 beds were counted above the trapping site. To this total should be added the 26 fish used for spawn-taking as well as the 1; females which spawned or partially spawned within the trap enclosure. A total of 172 'beds should be entered' for Elk Creek. Bear-skin Creek, a tributary of Elk Creek, **was** not on the original agenda for Spawning bed counts. since its entire length was covered, however, flying from the head of Bear Valley Creek to the head of Elk Creek, it might well be representative of the many minor tributaries of the streams counted. Six beds were found on Bear-skin Creek.

18. Harsh Creek: This stream, with Bear Valley Creek, forms the 'fiddle t'ork of the Salmon River. Its lower five miles is in a narrow canyon with a stream bottom composed largely of rubble and bed-rock. The upper four-mile stretch meanders through a wide meadow and contains excellent spawning areas, at least up to the mouth of Knapp Creek. Above this point the stream is sluggish with sand and mud bottom and very little use is made of this upper section by spawning chinooks. **Twenty-one** beds were counted below the mouth of Capehorn Creek and 67 **above** this point for a total count of 88 beds in the entire stream.

19. Beaver Creek: **A** total of 91 beds were counted in Beaver Creek, a major tributary of Marsh Creek. The majority of these were located between the two road bridges crossing Beaver Creek and encompassing a stream length of some 8 miles. No spawning was found **above** the upper **bridge**.

20, Capehorn Creek: Although a **relatively** short stream, this tributary of Marsh Creek is an important chinook spawning stream up to the mouth of Banner Creek. **A** total of 49 beds were *counted* in this five mile section of stream, *Chinooks* occasionally spawn just above the mouth of Banner Creek in Capehorn, but the majority of spawning above this point is in Banner Creek itself.

21, Knapp Creek: This major, upper **tributary** of Marsh **Creek** has several good spawning areas in its lower six miles. Thirty-six spawning beds were counted through this stream section.

22. Panther Creek: Panther Creek is the only large **tributary** of U^s Salmon River between the middle Fork and the North Fork and drains most of the area on the **south** side of the river *which* does not drain into the Riddle Fork. Although a 42 mile section of this stream was covered by air only **83** spawning beds were **counted**. The spawning was scattered with very little **appearing above** the town

of Cobalt. It is estimated that not over 10 Per cent of Panther Creek has suitable bottom type for spawning.

23. North Fork of Salmon River: The North Fork has been dredged to some extent and it is very likely that formerly reported, large runs have been partially destroyed by migratory blocks as a result of this dredging. Through the dredged areas there is no pool structure in the stream although bottom-type is suitable for spawning. Nineteen beds were counted in the North Fork from its mouth to just above the mouth of Dahlonga Creek, a distance of 14-stream miles.

24. Lemhi River: The Lemhi River in past years was one of the most heavily used spawning streams for salmon on the Salmon River drainage. Factors have reduced the size of the run: (1) Spawning operations by the Bureau of Fisheries, (2) Construction of diversion dams throughout its length and particularly those dams which had inadequate facilities for the upstream and downstream passage of salmon. The powerhouse diversion dam near the mouth of the **Lemhi** has formed a partial block to migration until just recently. Its fish-passage facilities were remodeled in 1950 and this year for the first time in years, a sizable run of chinooks utilized the upper reaches of the Lemhi. A total of 280 beds were counted in the Lemhi River with 219 of these in the upper **five** miles of stream which has the most suitable bottom type for spawning. Spawning was still in progress when this count was made,

25. Pahsimeroi River: . The lower, 20-mile section of the Pahsimeroi River was covered by air and a total of 163 beds counted. Large numbers of fish were working the riffle areas at the time observations were made and from this it was estimated that spawning was less than 75 per cent complete. Beaver dams formed blocks to migrating **fish** a short distance above the mouth of Sulphur Creek, and **no** beds were seen above this point.

26. East Fork of Salmon River: This stream is an **important** spawning stream and also a favorite to the sport salmon fishermen. Salmon generally enter this stream in early July in good physical condition, but seldom spawn before the middle part of August, through September. A localized cloud-burst, which washed out the Fish and Wildlife Service trap near the mouth of Germania Creek, may have obliterated the earlier spawning beds. A total of 358 beds were counted from the Bowery Guard Station to the mouth of the East Fork, a stream-distance of 30 miles. Beds were fairly well distributed over the entire section observed, with spawning fish still appearing in the lower four miles of stream.

27. Yankee Fork Creek: Sixty-eight beds **were counted** in Yankee Fork from **its** mouth to the mouth of McKay **Creek**

with the bulk of satellite in the stream section between the mouth of the North Fork and Nine-mile Creeks. The lower five miles of the West Fork at Yankee Fork, up to the mouth of Cabin Creek were observed by air and a total of 39 beds counted.

28, Valley Creek: Valley Creek was observed from its mouth to a point a mile above the mouth of its East Fork, a stream section of 16 miles. A total of 176 beds were counted (with SF) of this section above the irrigation diversion adjacent to the Silva airport, one of the operating bases.

29 Pettit and Alturaske Creeks:

Ninety-six spawning beds were counted from the Perkins Lake outlet to the mouth of the stream, a distance of about seven miles. This is a shallow, meandering stream with ideal spawning bottom. It is reported by local residents to have had the heaviest spawning use it has had for at least 15 years.

Ground Checks of aerial count sections:

There was little discrepancy between aerial counts and the ground checks made over the same areas. As stated above, ground check stations were set up prior to the aerial count but on some of these the checking of spawning beds from the ground was left until after the aerial count was completed. This gave a double check upon the accuracy of the comparison being attempted. Each ground check section is to be treated separately. Tabulation is shown in Table II, in which numbers conform to check area numbers in text of report.

TABLE II

Comparison of Aerial and Ground Spawning Bed Counts in Caesa Areas

GROUND CHECK AREA	DATE OBSERVED		SPAWNING BEDS	
	Ground	Air	Ground	Air
1	8-26	9-14	5	4
2	8-26	9-15	7	7
3	3-15	9-15	46	44
4	9-18	9-15	4	38
5	9-13	9-14	8	42
6	9-13	9-14	39	

Visibility at all times excellent -8-

1, Bear Valley Creek, Upper Big Meadows: (Plate IIa):

A 100-yard section of Bear Valley Creek near the upper end of Big Meadows was measured and marked off on August 26, 1951, and spawning beds located on A prepared map. At the time this check area was marked off, five beds were located in the area, One fish, a spent female, was observed just above the bridge. The beds appeared to be from 2-3 weeks old as shown by the degree to which the disturbed gravel had begun to resume its normal coloration. This coloration is due to the growth of algae and other aquatic organisms on the surface of the gravel and a freshly-made bed appears as a freshly "washed" area of gravel. On these older beds, each was located by grading the stream and locating the nest--the centrally-located depression in the disturbed bed of gravel. When the female covers the nest only the coarser gravel particles are caught, or retained, in this central depression, the current carries finer gravel downstream, It is the appearance of these coarser gravel particles in the depression which generally indicates a completed nest. During the aerial survey (9-15-51) four nests were counted in this check area, It was necessary to circle the section a second time to discern the fifth. At the time the aerial counts were made the gravel of the spawning beds had almost regained the coloration of adjacent gravel and it was necessary to be able to recognize the "depression-character" of the **nest** in order to make a count. Very often the depression of the nest had collected enough silt to appear darker than the adjacent area.

2. Bear Valley Creek, Lower Big Meadow (Plate IIb):

This ground check area was marked off and mapped on August 28, 1951, and beds counted and **located** on the map. At this time a total of 8 nests were counted. **Seven** of these nests were counted from the air (9-15-51) and the reason the eighth was missing was apparent: A road-improvement crew had re-channeled the stream just **before** the aerial count was made.

3. Bear Valley Creek, Poker Meadows (Plate IIIa):

This section of Bear **Valley Creek** was marked off on September 13, 1951 and mapped but no **beds were counted** or mapped until after the **aerial** count. During the **aerial** count a total of 44 **beds were observed between the ground** markers. The ground check was made **September 18 at which** time 46 beds were counted.

4. Elk Creek, Twin Bridges Area (Plate IIIb): **This** area was not visited until after the aerial count was made. Familiarity with stream division and the **large** island formed from ground checks in previous years prompted the inclusion of this area as a ground check section after **aerial** counts

had been started. A rough map was drawn to be used for
15' contour; hereafter the aerial count. From the air, three
were counted, Furwick: greenbrook (September 18)
an additional bed was laser scanned on the map,

e, 7-iron River - ,row Doc elFl t JI-t

A. one-half mile section of the Delaware River was set--
off with ground markers, mapped, and the 2eos then of pawn-
ing hods noted on the map on 7, eptomber ih. Lode
were located in this area from the ground. The same area
was observed from the air on the following day and F beds
counted. Although spawning was complete at this time,
it had been completed prior to the aerial survey and
the spawning beds were easily discernible from the air.
(Sc, Plate VI)

6. Selman River-Robinson Bar Area (Elat 7):

This area, some two miles long. The dam, which was
first visited on September 13, at which time spawning was
still in progress although it is clear from the physical
appearance of the fish, spawning was in completion.
It was not intended originally to include this area in
the ground check group. However, the dredge working Yankee
Fork was not operating during the latter part of September
and as a result the river below the mouth of Yankee Fork
was clear and afforded an opportunity not only to make
counts but to make observations which had been previously
impossible,

A one-mile section of the river was marked off and
mapped, and spawning beds counted and located, on the map.
A total of 33 beds were located from the roads which parallel
the river on either side. This section was observed from the
air on the following day at 1130 a.m. when 42 beds were
counted. The three additional beds were located from the
ground that **same** evening. Whether these beds were new or had
been missed during the ground check is not known. It is
thought, however, that they were new beds. **A** second aerial
count was made of this section on September 18 at
800 a.m., while enroute from the Pahsimeroi River to Stanley.
The south bank and part of the river was in shadow at this
time, however, and only 33 beds could be **seen**.

7. The afternoon of September 16 was spent along the banks
of the Middle Fork, in the vicinity of Bennetts Ranch, in an
attempt to observe any differences in appearance of the
stream bed as it appeared from the air and from the ground.
This ground check confirmed the aerial observation that most
of the stream bed was composed of medium and coarse rubble
which would prevent effective spawning. No spawning beds
were seen from the ground and none had been observed from
the air through this stream section.

PLATE II

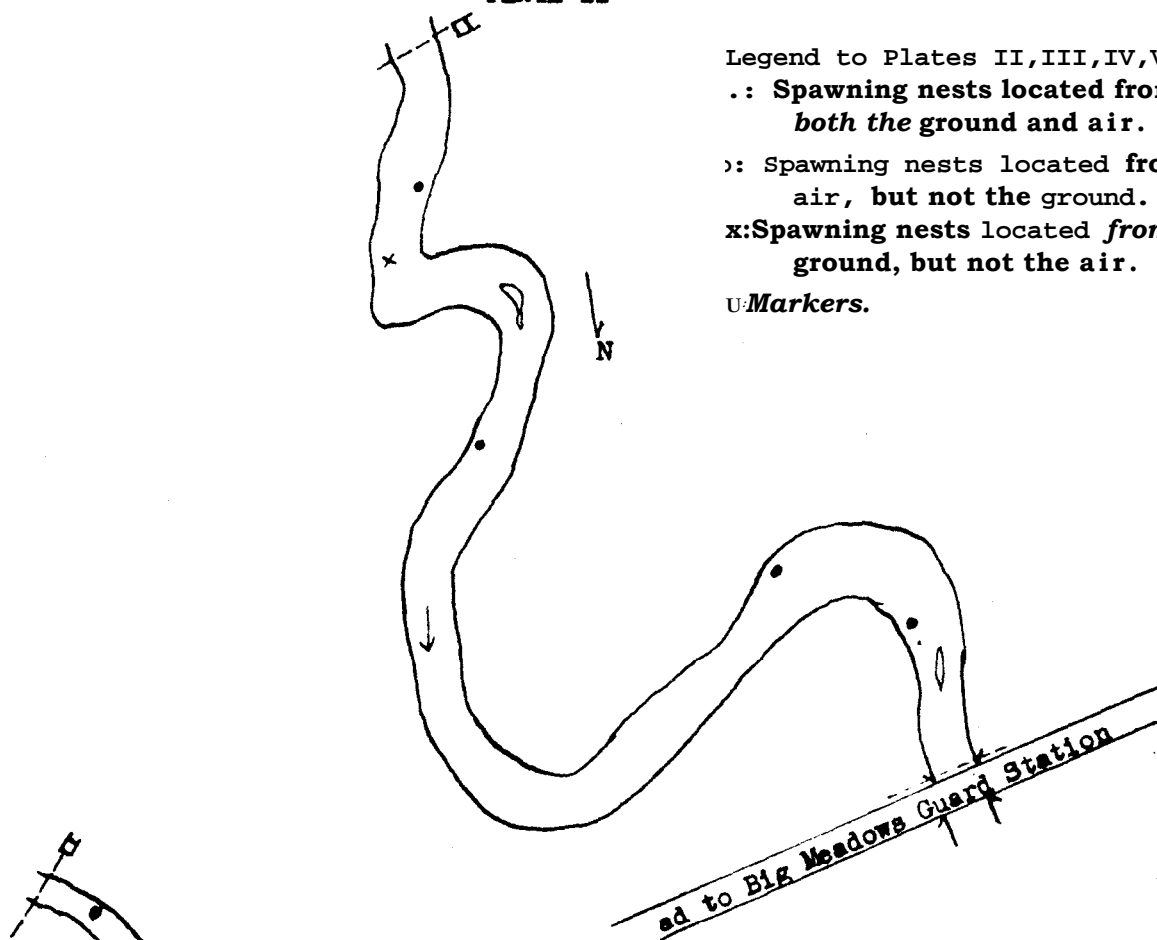
Legend to Plates II, III, IV, V:

∴: Spawning nests located from both the ground and air.

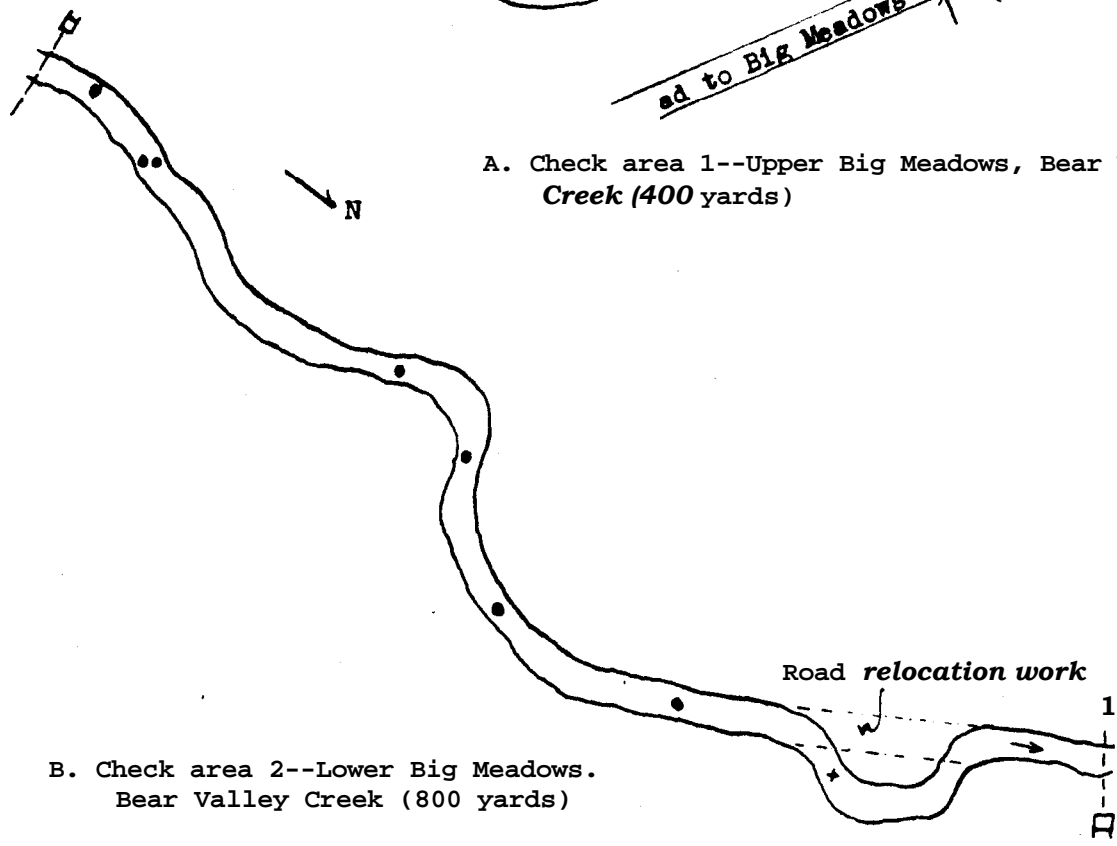
∴: Spawning nests located from the air, but not the ground.

x: Spawning nests located from the ground, but not the air.

U: Markers.



A. Check area 1--Upper Big Meadows, Bear Valley Creek (400 yards)



B. Check area 2--Lower Big Meadows. Bear Valley Creek (800 yards)

Lowman-Stanley road

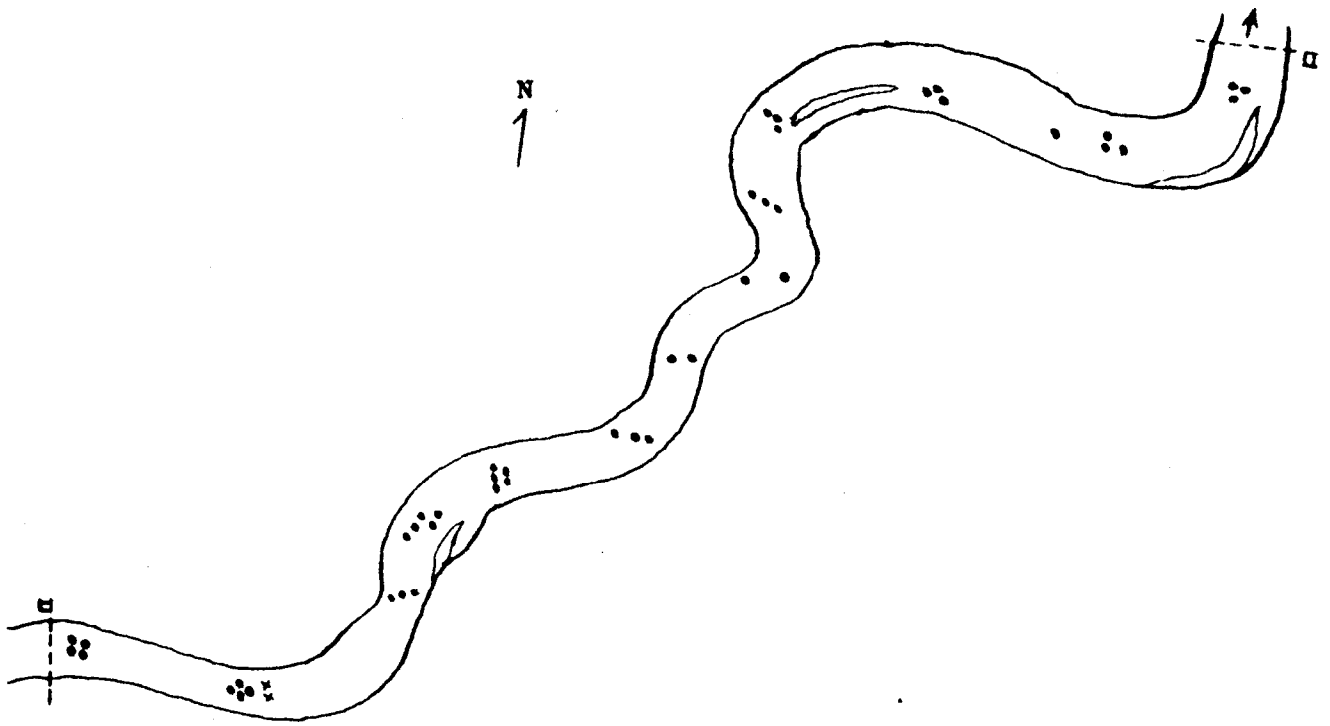
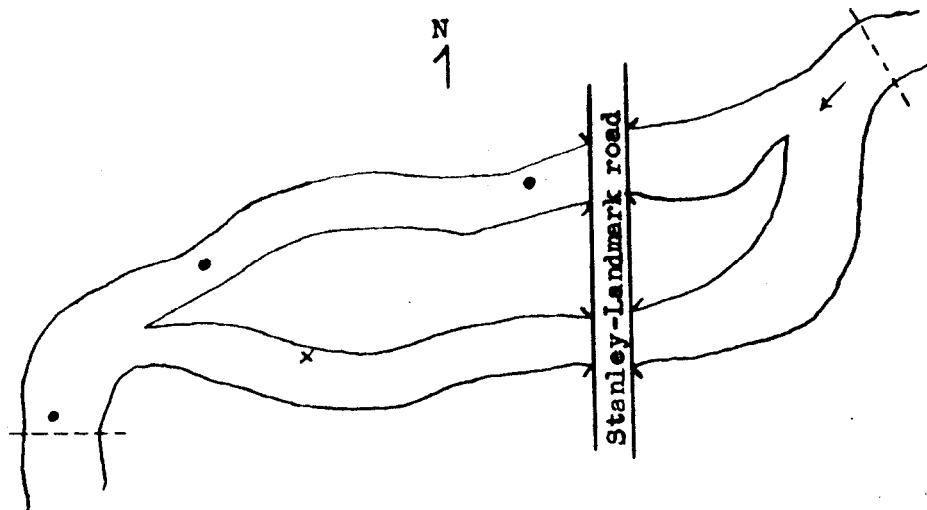
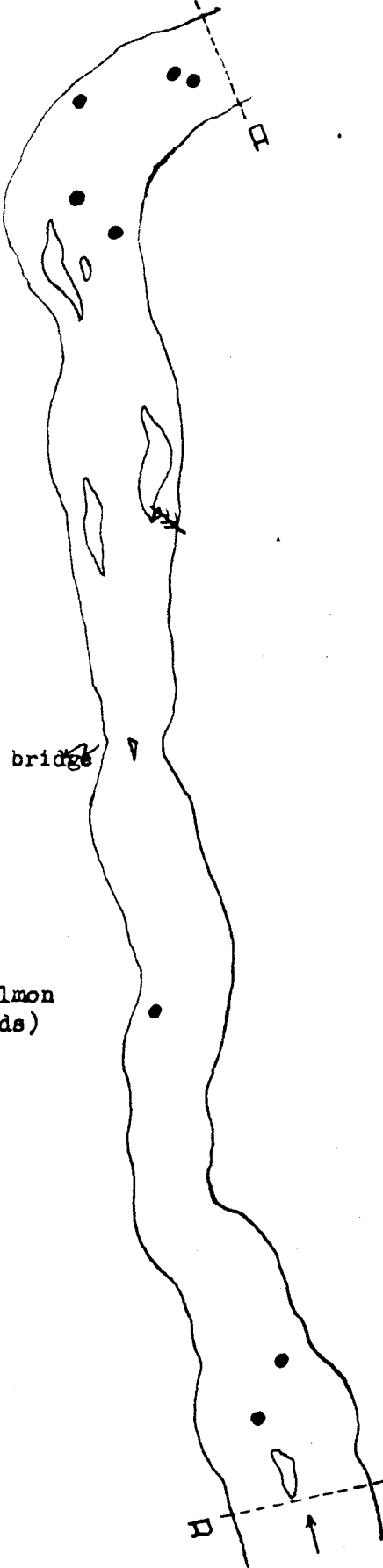


PLATE III A. Check area 3--Poker Meadows. Bear Valley Creek (} mile)



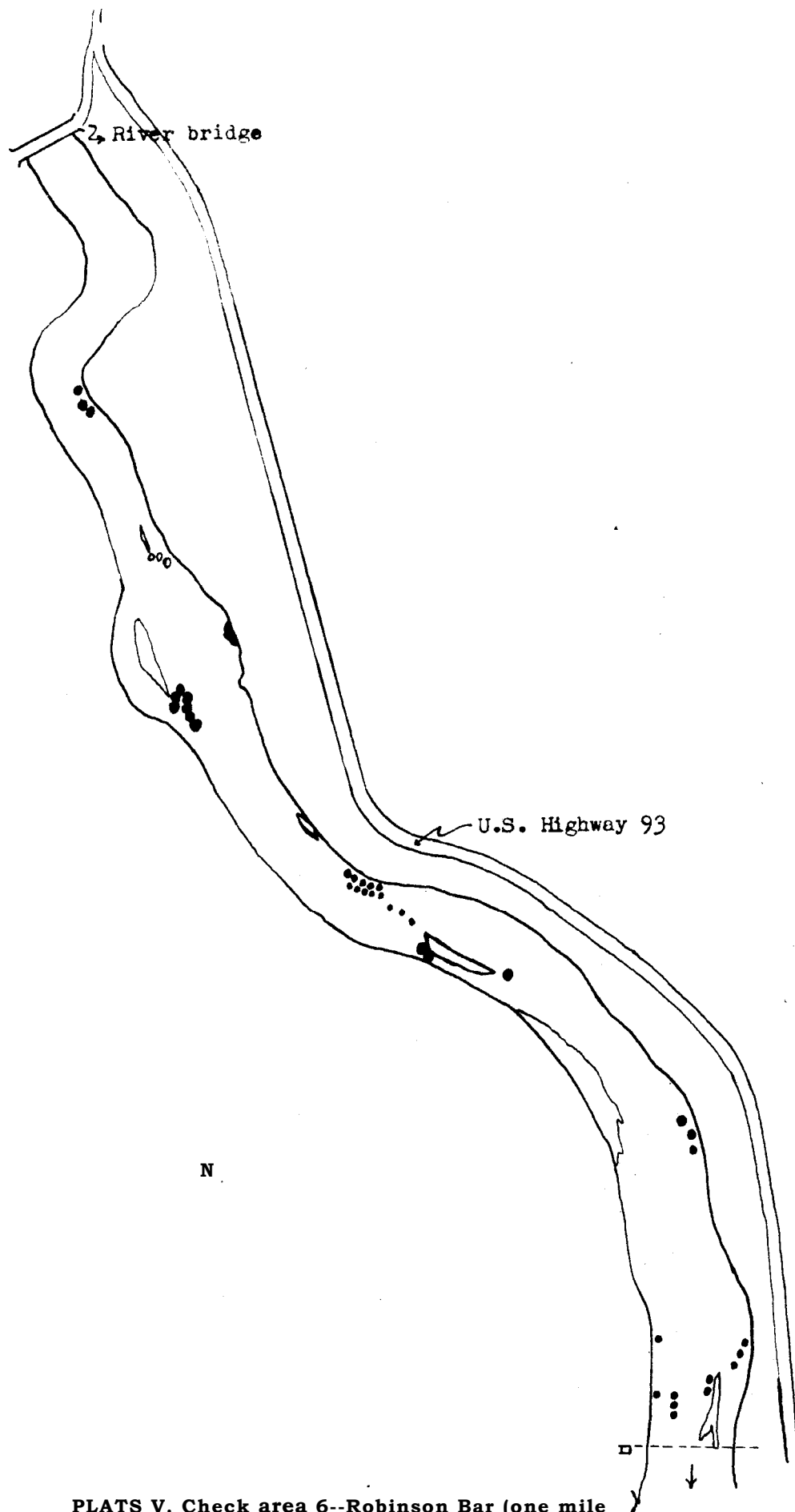
PUTS III B. Check area 4--Twin Bridges. Elk Creek (250 yards)



Old sheep bridge

PLATE IV. Check area 5--
Decker Flat, Salmon
River (1200 yards)

N



PLATS V. Check area 6--Robinson Bar (one mile

Analysis and Recommendations:

The escapement of adult chinook salmon into the Salmon River drainage streams during the 1951 season has been described as good to excellent. The basis for this comparison is the size of runs in previous years. The 1951 migration equalled or exceeded the 1947 escapement in most streams, and it exceeded escapements of 1948, '49 and '50. However, there is a wide gap between the numbers of salmon entering the Salmon River and its tributaries and the number which successfully spawn. This gap is largely the result of sport fishing pressure on this species.

Sport fishing for salmon in Idaho has increased to the point where it has been necessary to place fishing restrictions on certain streams, or parts of streams, during the spawning season of this species. Some streams are closed to salmon fishing. In general, all of the regulations in effect the past year helped in the spawning escapement and will result in a return of salmon to these streams some four to five years in the future. There is a need for **additional** regulations of salmon fishing in certain waters, however, and it is recommended that:

1. The South Fork of the Salmon River be closed to salmon fishing from the mouth of the Secesh River upstream to its source from August 15, to September 30, each year.

2. The Middle Fork of the Salmon River through the Sulphur (or Dagger) Falls area be closed to all fishing from July 20 to August 20 each year. This will allow an escapement over the falls to the entire headwater drainage of the Middle Fork where almost one-fifth of all the spawning in the Salmon River drainage occurred in 1951.

3. Salmon River from Sunbeam Dam downstream to the measuring cable below the mouth of **Yankee** Fork Creek **be closed** to all fishing from August 5 to September 15 each **year** to insure an escapement into the headwaters of the Salmon River.

4. Camas Creek from the mouth of Duck Creek upstream to the mouth of Furnace Creek be closed to salmon fishing from August 15 to September 30, each year.

5. The East Fork of Salmon River from the **mouth** of Big Boulder Creek upstream to its source be closed to all fishing from July 16 to September 15. This extends the present closure boundary downstream about **six miles**.

6. Big Creek from the mouth of Smith Creek upstream to the mouth of Jacobs Ladder Creek be closed to fishing from July 16 to September 15. This extends the lower **boundary** downstream about three miles.

7. In years of low escapement over **Bonneville** Dam special or emergency closures to **salmon** fishing be **made** on Panther Creek, the upper end of the Lemhi River, and the Pahsimeroi River (including the Salmon River from the mouth of the Pahsimeroi downstream 300 **yards**.)

Q. # il other ro ;ul..tions on salmon fishing or closures of streams der',n,; salmon spawning in effect in l':i`,l be continued.

In_ outlining aerial counts in future ears it is suggested the the headwater streams of the iddle Fork of the salmon River be observed no later than September 1, with :_ugust 20 as the earliest observation date. Grazing use of meadows adjacent to these streams is very heavy during September and as c. result the riffle; are=s arc disturbed by cattle. fording the streams. This not only obliterates s'pawning beds but is disconcerting to an aerial observer. :.11 other streams can readily be observed after September 20.

It is further suggested that some streams be added to the aerial survey, notably, Little Salmon River to the .vest, and Horse, Bargemin, Indian, and Crooked Creeks to the north. Nothing is presently known of the chinook salmon use of the northern tributaries. It is also suggested that ground observations bs made during 1952 to determine the extent to which spawning chinook salmon utilize small strums tributary to the observed s'oreams.

The stream index which is incorporated in another retort should be tested cemplotely by aerial survey in 1.952.

Observation times should be confined between 9 a.m. and 1 p.m, durin clear dais, but could be extended later in the afternoon on overcast de's.

S U M b L . R Y

1. Tvjent. r-nine major streams of the Salmon River drain-age were observed from the air to determine the use made of these streams by spoa rning chinook salmon, .
2. total of 5173 completed beds wore counted during this aerial survey.
3. To this total should be added some 2E8 beds that were in the process of being mode during the aerial survey as well as the beds in many of the minor tributaries in order to arrive at a drainage total.
4. .11 observations were made from o. Cessna 170 which, flying at speeds of 65-75 miles an hour (flaps down) at elevations of from 200-250 feet above and to the side of the stream so that an observation angle of from '0 to 50⁰ could be maintained, could maneuver enough to make counts of spawning t;ds accurately.
5. Ground checks in six selected stream sections showed aerial counting slightly more accurate in large streams P rovided the strewn bottom was not in shadow and slightly less accurate in small streams. :aerial observation is considerably time-saving over ground and, or, boat counting, and on

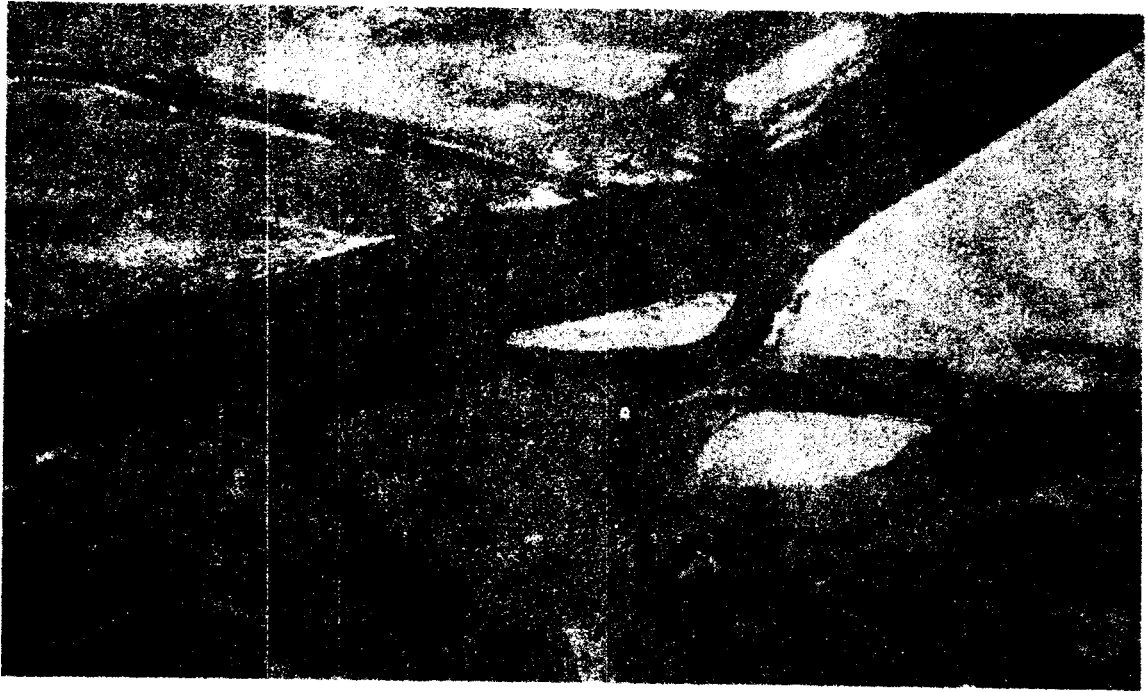


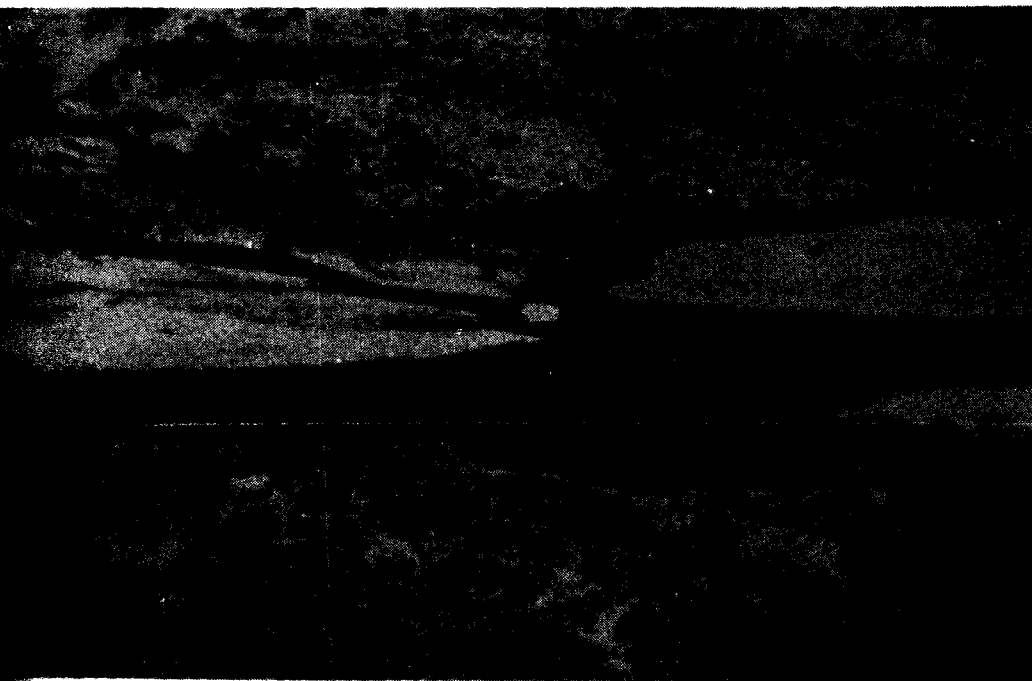
PLATE VI A. Aerial view of Salmon River about two miles above ground check area 5, showing the **appearance** of spawning **beds from the air.**



PLATE 71 Aerial photo of Salmon River about **one mile** below the location shown in **Plate 71 A.** The **completed spawning beds are** shown.



PLATE VI A. Aerial view of Salmon River about two miles above ground check area 5, showing the appearance of



spawning beds from the air.

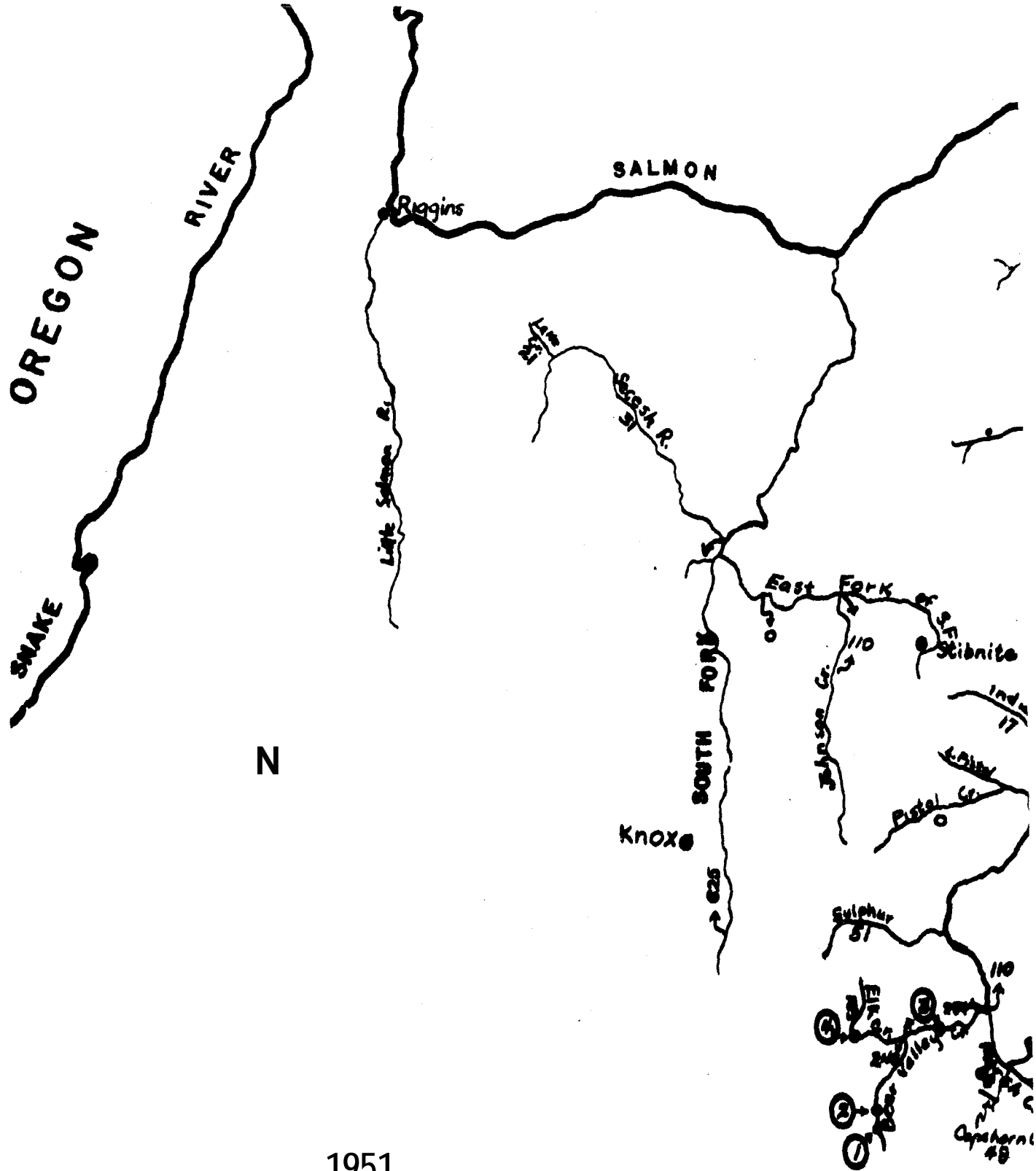
1 P. **Aerial** photo of Salmon River about $\frac{1}{2}$ **mile**
below the section shown in Plate VI A. *Four*
completed spawning beds are shown.

a large number of them were abandoned.
The road from the station and back to the station, the Great
Track and the other lines, the lower part of the road, and
back to the station were heavily utilized by spanning
of road columns, and other structures were lightly or
not used at all.

STATION AND TRACK

1,

Rich, Coordinator
STATION AND TRACK



1951
 CHINOOK SALMON SPAWNING SURVEY
SALMON RIVER DRAINAGE

IDAHO

usual

SCALE: 1" = 12m.

V1 Srewad sheik ores No.

= Ne, et nests observed In strum sullen between strews

“ : N 6.” “

“ t o m t i t s ,

