R T R N

A FISH TAG RETURN PROGRAM

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February, 1980

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INTRODUCTION

This program was designed to facilitate ease of handling large numbers of fish tag returns in a river basin. Return data can be sorted by species, tag types, colors and numbers, location and date intervals. Total distance and distance moved within each segment is calculated for each entry.

The program is designed for typewriter-terminal use with input via cards and output via line printer or terminal. The program is written in FORTRAN IV for the Sigma 7 computer at Montana State University, Bozeman, Montana. It can handle up to 10 interconnected components in a basin, i.e., specific rivers, lakes or tributaries. Although presently programmed for use in the Flathead River Basin it can be adapted to any basin.

INPUT

Data are input to a disc file via punch cards. The following table lists the input parameters and their format. All numbers should be integers, right justified in their respective fields.

Parameter	Card Column	Mandatory yes/no	Comment
Species	1 - 2	yes	rainbow=01;brook=03;Dolly Varden =05;lake trout=06;kokanee=08;west slope cutthroat=12;yellowstone cutthroat=13;lake whitefish=15; sculpin-16;sucker-31;mountain whitefish-85 etc.
Tag type [1]	4	no[2]	jaw tag=1;Floy=2;cinch-3;dangler =4;monel=5;fin clip=6;cold brand= 0,7,8,9.
Tag color[1]	6	no[2]	silver,gray,or white-0 red=1;blue=2;yellow=3;orange=4; brown=5;green=6;lilac=7;black=8 clear=9;finclip or cold brand may be coded by using the appropriate tag type code in combination with a tag color code allowing 10 fin clip codes and 40 cold brand codes.
Tag number	8 - 12	no[2]	any integer through 99999 (alphameric not allowed)
Drainage tagged	14 - 15	yes	Flathead=01; additional drainages may be added later
River tagged	17	yes	a single digit 0-9 specifying a river within a drainage(see attached map of desired drainage).

Continued:

Parameter	card column	Mandatory yes/no	Comment
Tributary code	18	no	an asterisk(*)indicates the fish was actually tagged in a tributary entering at mileage specified in columns 19-21; leave blank otherwise.
Mile tagged	19 - 21	yes	an integer specifying mile point along the river
Month tagged	23 - 24	no[2]	Jan=01;Feb.=02; etc.
Day tagged	26 - 27	no	
Year tagged	29 - 30	no[2]	
Length	32 - 35	no	an integer through 9999 in units of choice
Age	37	no	
Sex	39	no	Male=0;female=1;unknown=3; (if sex left blank, a zero will be input).
Drainage recap	41 - 42	yes	
River recap	44	yes	
Tributary code	45	no	an asterisk(*) indicates the fish was actually recaptured in a tributary entering at mileage specified in columns 46-48.
Mile recap	46 - 48	yes	
Month recap	50 - 51	no[2]	
Day recap	53 - 54	no	
Year recap	56 - 57	no[2]	
Recap method	59	no	Mortality=1; release=2.

1. Codes for tag type and tag color are not binding and may be changed as long as all input data are consistent.

2. These entries are manadatory if sorting is selected which is based on the entry (see output section).

PRE-SORT DATA

An important first step is pre-sorting the fish records. This can be done either via the terminal using the SORT program or in Bozeman. You could use the card sorter at the MSU computing center.

RTRN does no sequencing. Fish records are input in the same order as they appear in the data file. The SORT program, which is not detailed here, is valuable in organizing input data, for editing, finding errors or building sub-files. SORT can arrange data by species, years, or any other combination of variables as well as sequence numbered tags.

The data file can be easily re-sorted when new data is added. Other programs are also available to assist in the efficiency of using RTRN.

OUTPUT

An output sample is attached. All information which was input appears as sorted output plus the distance moved by a fish between tagging and re-capture is calculated and output. Distance moved is given as a total and as the distance moved in a particular river is either upstream (no sign) or downstream (-sign) followed by the river number; thus fish No.5254 moved a total of 79 miles (see sample output); a movement of 10 miles downstream in river 5 (R1), 3 miles upstream in river 9 (R2),46 miles upstream in river 4 (R3), and 20 miles upstream in river 2 (R4). The data are output in a sorted form. Sorting is keyed to the following parameter combinations.

1. Species, tag type, and tag color
2. a. Species, location or tagging (river and river-mile interval) and time of tagging (month and year interval).
   b. Species and location of tagging only
3. a. Species, location of recapture, and time of recapture.
   b. Species and location of recapture only.
4. Specific fish by tag type, tag color, and tag number.

If the same tag type and color are used for both numbered and non-numbered fish, the user should be aware that the program will not distinguish between the two classes and will output all records (both numbered and non-numbered) of that tag type and color.

OPERATION

Program RTRN may be called into use from the typewriter-terminal as follows (it is assumed that the data has been previously entered onto magnetic disk and given a file identification name or Fid).

1. Log-on using appropriate account number.

2. Make the following set commands

a.	!SET F:90/Fid	If data file resides in log-on account
	!SET F:90/Fid.XXXX	Where XXXX = account where data file resides if different from log-on account.
b.	!SET F:102 LP	Sends output to line printer at MSU
	!SET F:102 ME	Sends output to terminal
c.	Platen 132	To print up to 132 characters on a line.

3. Call program RTRN to run.

a.	!RTRN	If program RTRN resides in the log-on account.
	!RTRN.XXXX	Where XXXX is the account where RTRN resides if different from the log-on account

4. Program will prompt user for operating instructions

   a. Program will output "Run Title?" after which the user may type any alphameric title (up to 80 characters) for the purpose of identifying the run.

   b. In the event that the code for the river in which a fish was either tagged or recaptured is inadvertently given as zero or left blank, an error message will be generated and distance moved by that fish will not be calculated.

5. Log-off

6. Output will be printed either on line printer or terminal as specified in 2.b. above.

Flathead Lake (area 9) is subdivided into the following areas. Fish tagged or recaptured within these areas are given the indicated mileages. Distances are the radial distance from the mouth of the river. Distances moved from one location to another within the lake can not be calculated with this program.

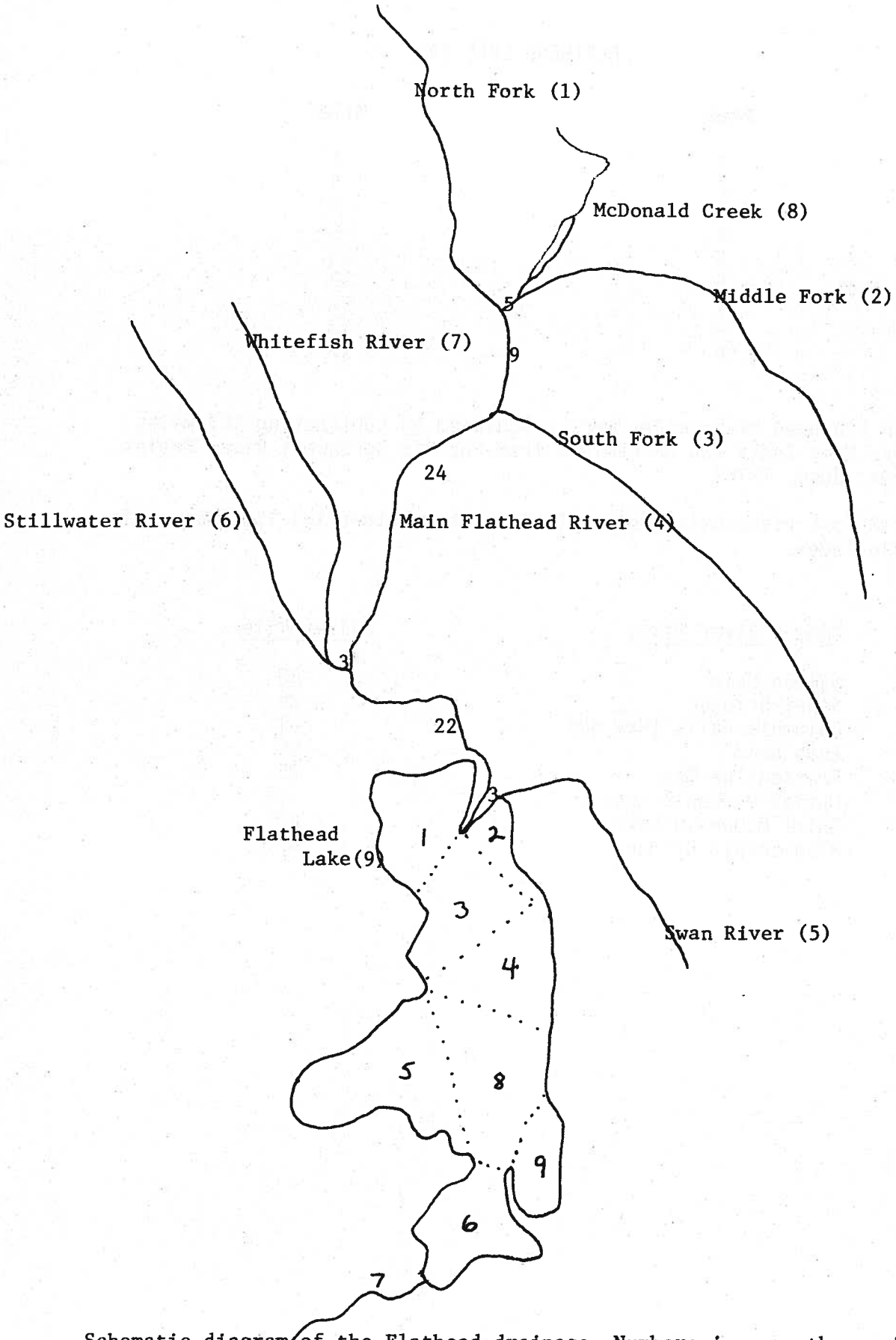
FLATHEAD LAKE (9)

Area	Miles
1	4
2	3
3	8
4	6
5	13
6	22
7	27
8	13
9	17

Main Flathead River miles were calculated by subtracting 103 miles from River Mile Index (as determined from Pacific Northwest River Basins Commission, June, 1976).

North Fork river miles were calculated by subtracting 158.3 miles from River Mile Index.

Common River Miles	River Mile
Salmon Hole	22
Steel Bridge	26
Columbia Falls (Hwy 40)	41
Foys Bend	20
Pressentine Bar	35
Outlet McDonald Lake	2
Inlet McDonald Lake	10
Blankenship Bridge	55



Schematic diagram of the Flathead drainage. Numbers in parentheses indicate river codes (input in cols 17 & 44 of data cards). Distances in miles are shown between stream junctions. Flathead drainage code = 01 (input in cols 14-15 of data cards).

OOIO: BURKHALTER,1169GNRL 09/27/79 13:34
DEMØNSTRATIØN RUN

THE TØTAL # ØF TAGS IS 5

SP	T T	T C	TAG #	TAG DR	TAG R	LØC MI	TAG DATE	LENG	A G	S X	RCAP DR	RCAP R	LØC MI	RECAP DATE	R M	TØT	R1	R2	R3	R4	R5
1	1	1	329	1	4	10	6-23-78	255	3	0	1	3	20	11-24-78	1	56	36.4	20.3	0.0	0.0	0.0
1	1	1	468	1	7	10	6-23-78	356	4	0	1	5	20	11-24-78	1	58	-10.7	-3.6	-22.4	-3.9	20.5
1	1	1	567	1	8	10	6-23-78	142	2	1	1	7	20	11-24-78	1	71	-10.8	-5.2	-33.4	3.6	20.7
1	1	1	5254	1	5	10	6-23-78	282	3	0	1	3	20	11-24-78	1	79	-10.5	3.9	46.4	20.3	0.0
1	1	1	789	1	2	10	6-23-78	432	5	1	1	2	35	11-24-78	1	25	25.2	0.0	0.0	0.0	0.0

Sample output from program RTRN