

FISH POPULATION ESTIMATION BY THREE PASS DEPLETION

Assignment #2

WFS 443

INTRODUCTION

The object of this assignment is to learn how to estimate the size of a fish population in a small stream by using backpack electrofishing to conduct three pass depletion. The principle behind this method is that if a section of stream is sampled repeatedly and the fish captured are removed, then each sampling pass should remove fewer fish. By extrapolating the decreasing number to 0, the total population can be estimated. Two assumptions have to be made for this estimate to be valid. First, the removal effort must have a high enough catchability. That is, there must be sufficient removal with each pass to actually reduce the population enough so that fewer fish will be caught on the next pass. A minimum of about 50% of the total population has to be removed with each pass. This means that the removal method has to be adequate for the habitat. Using backpack electrofishing on small streams, the established rule is to use one backpack unit for each 3 m (10 ft) of stream width with the further condition that no spot in the section should be deeper than 1 m (3 ft). The second assumption that must be met for the estimate to be valid is that there should be no movement of fish into or out of the sample section during or between passes. This can be assured by the use of block nets, though, in practice, if the upstream end of the section is small a waterfall it is often assumed that movement will be minimal during the short time of sampling.

NOTE

The day you will actually electroshock your stream be sure and call the TWRA dispatcher in Morristown (number on collecting permit) and inform them that you are UT students who will be sampling _____ stream that day for Richard Strange under our collecting permit. This will prevent the Wildlife officer from coming out, if an alert citizen spots you "poaching".

FIELD METHOD

Your measured section of stream should be shocked from the bottom to the top. The individual carrying the shocker should work slowly keeping the probes about two feet apart. Shock all areas of the stream paying particular attention to deeper spots or areas with cover where fish might be hiding. Stunned fish may simply roll over and be swept downstream or may attempt to flee. In either case, they should be quickly netted by the shocker net or an assistant carrying another net. Fish in the shocker net are generally transferred to the back-up net by turning the shocker net over into the back-up net, then flipped from the back up net to a bucket containing water. After one pass through the 100 m section fish should be identified, sorted into species groups, counted and a batch weight obtained. Do not return fish to stream until all passes have been completed. If

identification is a problem bring back a few individuals to key out. Repeat the process two more times keeping data from each pass separate. After the third pass fish may be returned to the stream.

SAFETY CONSIDERATIONS

Working with electricity around water always poses potential danger. While the amperage generated by a backpack electrofisher would not generally be lethal to humans, injury could occur. Precautions: 1) person carrying shocker should always wear rubber gloves, 2) all persons in the water should be wearing waders, 3) no bare hands should touch water or shocker probes, 4) shocker operator should only depress "on" switch when probes are in the water, 5) operator should always release "on" switch when transferring fish from shocker net to back-up net, and 5) do not shock in rain.

DATA ANALYSIS

Data you bring back from the field should include: number of fish of each species collected each pass and the corresponding batch weight of those fish. These data must be entered into a computer for analysis by Microfish 3.0. Data cannot be entered directly into Microfish 3.0, this program only accepts ASCII files. The typical way of generating an ASCII file of your data would be to use a spreadsheet program, though a word processing program could also be used.

SPREADSHEET DATA ENTRY

Your spreadsheet will contain seven corresponding columns (one for each category):

A	B	C	D	E	F	G
Site	Run	Species	Length	Weight	Batch	Batch
No.	No.	Code	Each	Each	Count	Weight

You will have only one site and you will not take individual lengths and weights, so A will always be 1 and E and F will be (.) no data.

This column arrangement corresponds to the format requirements of MicroFish 3.0. You will not have data to enter in columns D and E since you did not take individual lengths and weights of each fish. Microfish 3.0 does not tolerate blanks, missing data is indicated by a period (.). You will only have one site, but you will have 3 runs and several species. Enter weight in grams. Species codes are provided on the last page. A simple example of data entry is provided below.

```
A B C D E F G
1 1 1 20 . . 14 66
2 1 1 17 . . 7 32
3 1 2 20 . . 11 45
4 1 2 17 . . 5 21
5 1 3 20 . . 6 26
6 1 3 17 . . 0 0
```

In this example, 14 stonerollers weighing 66g and 7 river chubs weighing 32g were caught on the first run, fewer fish of both species were collected on subsequent runs. You will, no doubt, have more than two species of fish, otherwise, your spreadsheet will be similar. Once you have your data entered and checked save to disc as a ASCII file.

MicroFish 3.0 ANALYSIS

Go to <http://web.utk.edu/~rstrange/wfs443/mfish/> and save the Microfish files to a floppy (it will fit on one) or to a subdirectory on your harddrive. With your ASCII data on the harddrive insert Microfish in the A: drive (or access the your mfish subdirectory). Type MFISH and return. MicroFish will begin to run and after pressing any key to move through the initial information screens, you will be asked to enter the name of your input data (ASCII) file. Enter the appropriate file name and be sure to precede it with a C:\ to indicate where the file is located

WHAT TO HAND IN

Post the the print out of the Microfish results (either as a .txt file or a screen shot) and answer the following questions:

- 1) What is your estimate of the total fish population in your section? Express this as density (fish/ha) and standing crop or biomass (kg/ha). Do this for each species.
- 2) Was Microfish unable to calculate an estimate for any of you species? If so, why?
- 3) Explain what the confidence limits that Microfish provides mean.
- 4) Why would a fisheries scientist want to know density? Standing crop?

SPECIES CODES

- 1, Trout: RBT <90mm
- 2, Trout: RBT >90mm
- 3, Trout: BKT <90mm
- 4, Trout: BKT >90mm
- 5, Trout: BNT <90mm
- 6, Trout: BNT >90mm
- 7, Dace: Longnose
- 8, Dace: Blacknose
- 9, Sculpins: Mottled
- 10, Sculpins: Banded
- 11, Shiners: Warpaint
- 12, Shiners: Saffron
- 13, Shiners:
- 14, Shiners:
- 15, Shiners:
- 16, Chubs: Creek
- 17, Chubs: River
- 18, Dace: Rosyside
- 20, Stonerollers
- 25, Dace: Tenn.
- 26, Fathead minnow

40, Darters: Fantail
41, Darters: Greenfin
42, Darters: TN Snubnose
43, Darters: Swannanoa
44, Darters:
45, Darters:
60, Suckers: N. Hog
61, Suckers: White
70, Smallmouth bass
71, Rock bass
72, Redbreast
73, Bluegill
74, Blueg. x Redbr.
75, Crappie: White
76, Crappie: Black
80, ADD
90, ADD
99, NO FISH