ASK Erik about catchments and tributaries to solve spatial replication issue

Öring=Salmo trutta (brown trout)

Bäcrö=Salvelinus fontinalis (Brook trout, an introduced species; bäckröding).

The species name in SERS (öring, bäcrö, gädda, mört) consists of an abbreviation (if needed) of the swedish name for the species.

As for brown trout we have the total sum of brown trout = Öring\_tot.

This can be divided into:

Fry (the first cohort born the same year as the sampling) is called öring 0+.

Parr and older trout (they are older than 0+) are called öring.

Öring 0+ and Öring together = Öring\_tot.

Cheers Erik

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Don’t be sorry that you have questions.

1)Lax=Salmon - Is this *Oncorhynchus*? No, it is **Salmo salar**

2)Laxfix=Unknown salmon - may include the above as well? or the below-mentioned spp.?

**This is unidentified Salmo species; Salmo salar or Salmo Trutta.**

3)Laxör=Hybrid Salmo trutta \* Salmo salar = ok, I got it YES

4)Öring=Brown trout - which according to Wikipedia should be*Salmo trutta*, eller? **sì**

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Keep asking & have a nice weekend

Erik

Hej Serena, "mi scusi" for at late reply.

As for your questins:

1. Look at enclosed ppt.

2. Wetted width is the width of the stream, and site width is the width of the site investigated. It is explained in the sheet in the data file. So if the wetted width is 20 m and they only electrofished 10 m from the shore, wetted width will still be 20 m, but site width 10 m. I should consider only data where site width = wetted width

3. Yes, maxdepth is the maximum depth of the sampled area, not the river. It is not possible to wade into 3,5 m, naturally. But they may have used a long stick to measure the depth. Although inexact, they may be a good estimate. As for the site length, check whether estimates depend on the sampling depth.

4. The temperature included in the data set is the actual (ambient) water temperature at sampling. This will affect sampling.

The average air temperature is more a proxy of the climate, another important driver of the fauna. Temp problem not solved

5. Shade is the proportion (%) of the river (not the site) that is shaded from the sun during midsummer. This is guesstimated and I would not give to much focus on this right now.

6: I tried to explain this, but understand that it is confusing. Salmo trutta (öringtot) may be divided into the number of trout fry (Öring0+) and the number of parr and older (Öring>0+). I suggest using only the total for the species, not to use the number of fry and parr separately. We can discuss this further so that I can explain the data set.

As for the errors in the data:

1- This watershed (catchment) runs into Norway and we can not estimate the area.

2-4% is not in the database. It happened when I made an Excelfile. It should be "4".

3-Apocalypse is certainly here - but this is older data where we only know the year of sampling, not the exact date. I suggest omitting.

4-As for -0,1 this is not within the database. Must be my error when extruding the data. I have checked now and it was another error when extracting the data. Sorry, but when extracting there are some data missing (due to actual circumstances) and I tried to fill them in automatic. Almost successful...

Get back to me or Berit if there are any more questions!!

Buona notte!

(:rik Degerman

Hej Erik!

I know you are in Umeå, so no stress with replying -  I will be back to action on Friday but have plenty of stuff to work on :)

I need to well understand what factors could potentially drive fish abundance/occurrence and what factor can instead affect the accuracy of the estimates (and what factors may have both effects, such as temperature for instance) - basically ecological vs sampling issues.

So here are some questions to help me with the above problem plus some other things:

1) Does the tributary number tell me how many times "the water has split up", e.g. 3 means that the main stream has split up 3 times? If so, what does 17 12 2 mean?

2) What's the difference between "wetted width" and "site width"? what's "site area"? I mean, does it refer to the area directly surrounding the sampled river lentgh, and if so, how was it calculated?

3) Is "Max depth" the max depth of the sampled area? Do you know how it was estimated in the field? I see 3.5m...were they walking  or using boats? If so, is the efficiency the same, can we compare estimates obtained from both methods?

4) We talked about the temperature when we met in Örebro. Temperature can affect catchability of fish, that's why it would be good to have estimate of average temperature over longer time.

I remember you suggest to use air temperature but I guess that this was also taken at the time of sampling, and it fluctuates even more than water temperature.

Is there a way to get average air temperature in the area? I think SMHI should have these data available to the public..It may be a lot of work, given that we need to choose the weather stations that are closest to each individual site, so we can think about it, and maybe do it only for a subset of data.

5) Was "shade" estimated on the sampled area at the time of sampling(which is?)? Why is that relevant? Do we get more fish in the shade?

6) I see that we have 3 different salmon estimates: salmon, unknown salmon, and salmon trutta. Shall we pool any of these, i.e. salmon + unknow salmon?

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Ok, that's enough for now :D

We can also take it on the phone if that's more practical.

Also: I found few mispelling/errors in the dataset, just in case you want to correct the original database:

1) ​Catchment\_area\_class is blank in one of the sampling done in Luckholmen sydon, catchment 053

2) I found "4%"  (2x) as a value in "substrate class" (and replaced with 4)

3) Under "month" you will find a zero. Apocalypse?

4) Brown trout abundance: there is a -0.10, I put 0.8 based on the number of adults

Cheers!!!

Serena

Diversity

There are few fish species in a Swedish stream and river. Normally only 2-3 species are caught at a site. This means that different diversity indices are quite meaningless. Sometimes we use Simpson diversity index, but I recommend not to – as chance has so large effect on sites with few species and individuals. Certainly the number of species caught may be used as a proxy for biodiversity.

Species and taxa

The number of species…it is calculated from the observed number of true species (Excel column = DA). But to avoid effects of misclassification of some taxa I prefer that when we talk about abundance we should lump some species together;

Cottus = Simpor = Cottus gobio & Cottus poecilopus  (Excel column = CW)

Sticklebacks = Spiggar = Pungitius pungitius & Gasterosteus aculeatus (Excel column = CX)

Lampetra = Nejonögon = Lampetra fluviatilis & L. planeri (probably only one species; CY).

Abundance

LWD, the number of pieces of large woody debris, is counted at the electrofishing site after the fishing is completed. It is expressed as LWD per 100 m2. Also fish abundance (density) is given as number per 100 m2. These values are estimated in such a way that if you fish a site you normally fish it three times in a row, three runs. In the first run you may catch 50 fish. You keep them in a large container and fish again. Now there was only 25 fish caught. If you fish a third time you may catch only 12 fish. This is called successive removal or depletion fishing. A simple linear regression will now give you an estimate of the true number of fish at the site (even those that are still left uncaught in the water).

Salmonids

Salmonids are the only species where we divide the number of fish into two age classes; fry=0+ and older fish >0+. If you look at the abundance of trout (Excel columns = CS to CU) you’ll see that there is a possibility to use abundance of 0+ and >0+ separately or the total abundance (CU). I’ve highlighted the salmonids and you may choose whatever approach you prefer. My suggestion is to use the total abundance avoiding complications. As we catch the fish by wading in shallow water, large trout are seldom caught. The majority of the abundance is made up of small fish; fry 0+ and parr (1+,2+).

Size

I haven’t include all fish lengths. But there is an easy way to check for fish sizes – for trout (DE to DG) and eel (DC & DD). Here you have the smallest and largest caught individual of each species. For trout is also given the largest fry (0+) a sort of proxy of growth conditions at the site.

Ecological status

VIX (ecological status using fish) is calibrated so it can be used across all sites in Sweden. VIX is the probability that a site has good status. It is calculated from a comparison of the actual catch with a predicted catch for that site in pristine conditions. We have taken into consideration site habitat, slope, climate, altitude, catchment area, proximity to lakes etc.

Crayfish

The number of species at a site is calculated as the number of fish species, crayfish species (n=2) are not included. Whether to include crayfish in analyses or not can be discussed. However, we have shown that the abundance of crayfish (Excel column = CV) cannot be properly estimated using successive removal. This is due to that catch probability is not equal between runs. Crayfish are burrowed in holes during the day and only a low proportion is caught in the first run and more in the second, making our calculations useless.

Cheers Erik

Dear Serena,

There are two sheets, one with the data, one with an explanation to what the different variables represent.

As you will notice some sites (identified with X- and Y-coordinates in the Swedish grid) are only investigated once, others up to 20-30 times (once every year). This must be handled some way. You might use the data from only the last fishing occasion, or use an average of all available sampling dates. There are pros and cons to both alternatives.

I will write some more about how to handle these data, and we will discuss further on Friday.

Now I’m off in the field to look at a proposed hydropower plant/fishway.

Cheers

Erik Degerman

Hi again Serena,

My drawers a full of unfinished papers that were never finalized due to lack of time (and interest once the results were there). Here is a data set (Excel) and two outputs (Word) that Erik Petersson at our institute and I were working with in 2014, was it?

In the data set two columns are marked with yellow, these are the abundance (density) of trout per 100 m2 and the other column the number of pieces of LWD at the site. LWD is dead wood with a diameter of at least 10 cm and the length should be at least 0,5 m.

I just wanted to show you yet another approach to the problem with the effect of LWD, something in between the former two paper I sent.

I will produce a new data set (we have new data) so don’t worry too much about the enclosed one. I just wanted to give you a glimpse of what will come.

Cheers Erik

Dear Serena, welcome to SLU Aqua!

I hope we can have a fruitful cooperation. Leonard and I have discussed some future articles that could be produced using the data we already have in our databases. Much of the data of interest is in our Electrofishing database, that stores data on fish investigations in running waters using electrofishing. If you look at the recent paper by Cristina Trigal and me you can read a little bit about the data. That paper really started out from a question – what is he effect of large woody debris (LWD) on fish in lotic environments?

The other included paper is an older attempt to address the same question. Between these two papers we have done several more on fish in running waters, but not focussed on LWD as such.

Aim of the intended study is to evaluate if LWD has an effect on ecological status and dominant species occurrence/abundance. And further to see if this eventual effect depends on size of river (wetted width), slope and dominating bottom substrate - the coarser perhaps the less effect of LWD. (A future paper could focus more on traits.)

The background is that a power plant has a debris clearance system (screens) that makes  water downstream devoid of LWD. Often a large stretch downstream the power plant today is lacking water, a dry river bed. These sites were normally with fast flowing water as there is a high gradient (slope). If the power companies would allow that some water would be released downstream the old river bed would again produce a habitat for lotic animals. If so, would it be beneficial for fish and ecological status to artificially add LWD - will that structure have a positive effect even in wide and steep waters? Are there thresholds? We will answer this by looking at undisturbed sites in the database.

I will put together a set of data until Friday.

Cheers Erik

*One of the guys on the other side of the screen in our “enhetsmöte”, Monday*