Live Sessions Week 9: Essential Skills 17 and 18: Fish biological sampling, and water quality









Essential Skill #17: Fish Biological Sampling



DNA sampling



NATURAL RESOURCES TRAINING GROUP

Collecting DNA sample from fish



Collecting DNA sample from fish



But, does not work on all groups: some fish lack scales







Tissue handling





FILTER PAPERS

110 1004 110

hatman

TO LABORATORY

Other tissue sampling





General principles

- •Cleanliness is paramount.
- •We sample precisely what the laboratory needs to do the analysis.
- •Samples must be preserved in some way to stop ongoing degradation and chemical changes after death.
- •Often we take multiple samples.



Estimating age from length

What about if we don't want to take scales, fin rays, or otoliths?



Length Frequency Analysis



 Assume we have completed three weeks of sampling brown trout in a 3rd order stream in New York State. We used electrofishing, minnow traps, Fyke nets, and beach seine (for the pools). Over the three weeks we captured and measured 246 brown trout of various sizes.





Size of brown trout caught in New York stream







A note on age notation

	Age	Notation	Pronunciation
Born that year	Not yet 1 year old	0+ or YOY	zero plus or young of the year
Born the previous year	Between 1 st and 2 nd "birthday"	1+	One plus
Born two years previously	Between 2 nd and 3 rd "birthday"	2+	Two plus
Born more than two years previously	After 3 rd "birthday"	3+	Three plus



Essential Skill #18: Water Quality











What are you trying to protect?

- Drinking water
- Agricultural uses
- Recreational uses
- Industrial uses
- Aquatic life



Water quality criteria – an example

Pollutant	Maximum concentration (micrograms per litre)
Arsenic	340
Cadmium	1.8
Iron	None
Lead	65
Mercury	1.4
Nickel	470
Zinc	120

Note: 1 microgram per litre = 1 part per million (ppm)



Freshwater quality criteria (metals)

Pollutant	Maximum concentration (micrograms per litre)	Continuous concentration (micrograms per litre)
Arsenic	340	150
Cadmium	1.8	0.72
Iron	None	1,000
Lead	65	2.5
Mercury	1.4	0.77
Nickel	470	52
Zinc	120	120



Narrative criterion

Criterion for tainting substances:

Materials should not be present in concentrations that individually or in combination produce undesirable flavors which are detectable by organoleptic tests performed on the edible portions of aquatic organisms. (from US EPA)



Some Indicators in Running Water









(1) Algae on stream bottom



(2) Orange water







(3) Cold water inputs



(4) Hydrocarbon sheen







(5) Death of fish



(6) Sediment







(7) Benthic Invertebrates















Eutrophication





Consequences of eutrophication





Some Indicators in Standing Water







(1) Smell

- Could indicate:
 - Sewage
 - Dead fish
 - Excess decay of plants
 - other





(2) Dead mussels, crayfish, seaweed.









(3) Excessive plant growth







(3) Absence of expected plants or animals







(4) Signs along debris line of shore





Essential Skills 17 and 18: summary This week we focused on:

Fish Biological Sampling

- DNA sampling
- Fish tissue sampling
- Length frequency analysis for ageing

Water Quality

- Water quality criteria
- Water quality indicators in running water
- Water quality indicators in standing water

