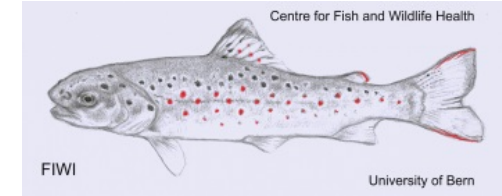


u^b

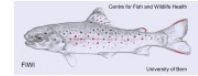
**UNIVERSITÄT
BERN**



Investigation of fish from the field: How to get samples



Electrofishing



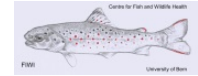
Frequently used method = Electrofishing

Potential problems/questions to be resolved/answered by electrofishing:

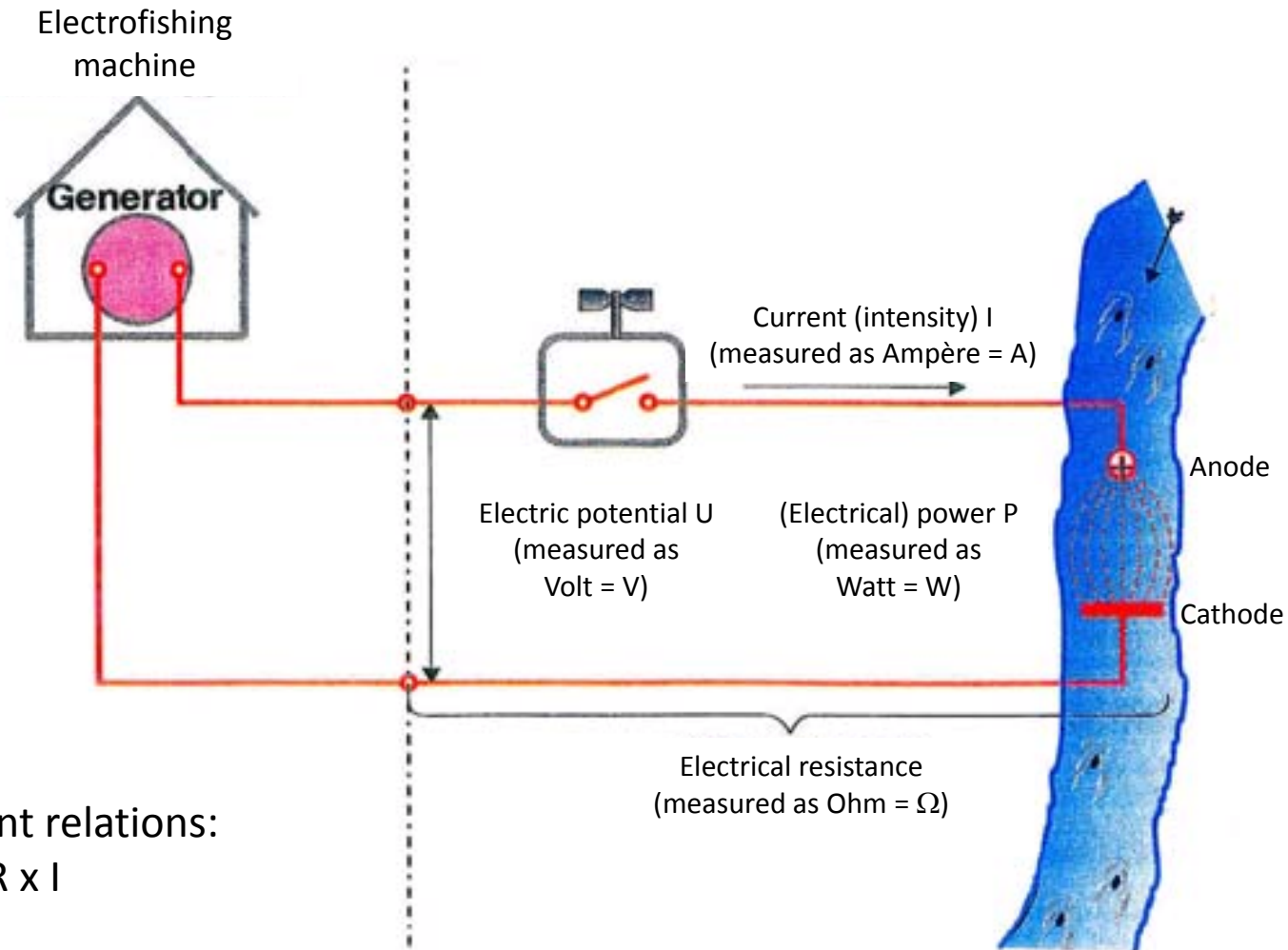
- Biological diversity (Which species? Presence of rare species?)
- Population density and biomass of fish
- Age classes
- Growth
- Survival / mortality rates
- Sex ratio
- Age at first maturity
- Migration
- Overcoming of barriers
- Endangering of species
- Use of habitats (preferences)
- Winter- / Summerhabitats
- Success control of stocking measures
- Success control of improvement of habitats
- Sampling



Electrofishing



Basics:



Important relations:

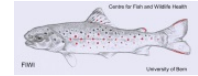
$$U [V] = R \times I$$

Current flowing from + pole (anode) to - pole (= cathode)

River



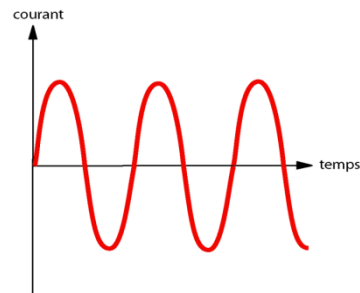
Electrofishing



Basics:

Types of current:

Alternating current (AC)

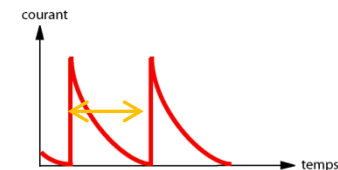
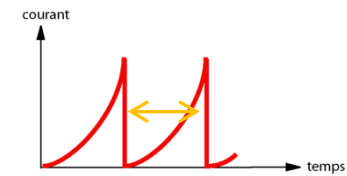
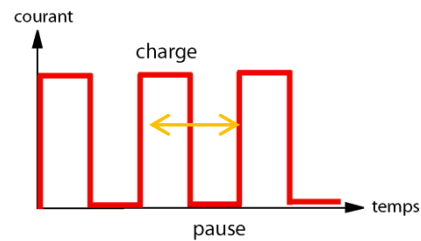


Not allowed!

Direct current (DC)

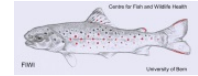


Pulsed direct current
(pulsed DC)



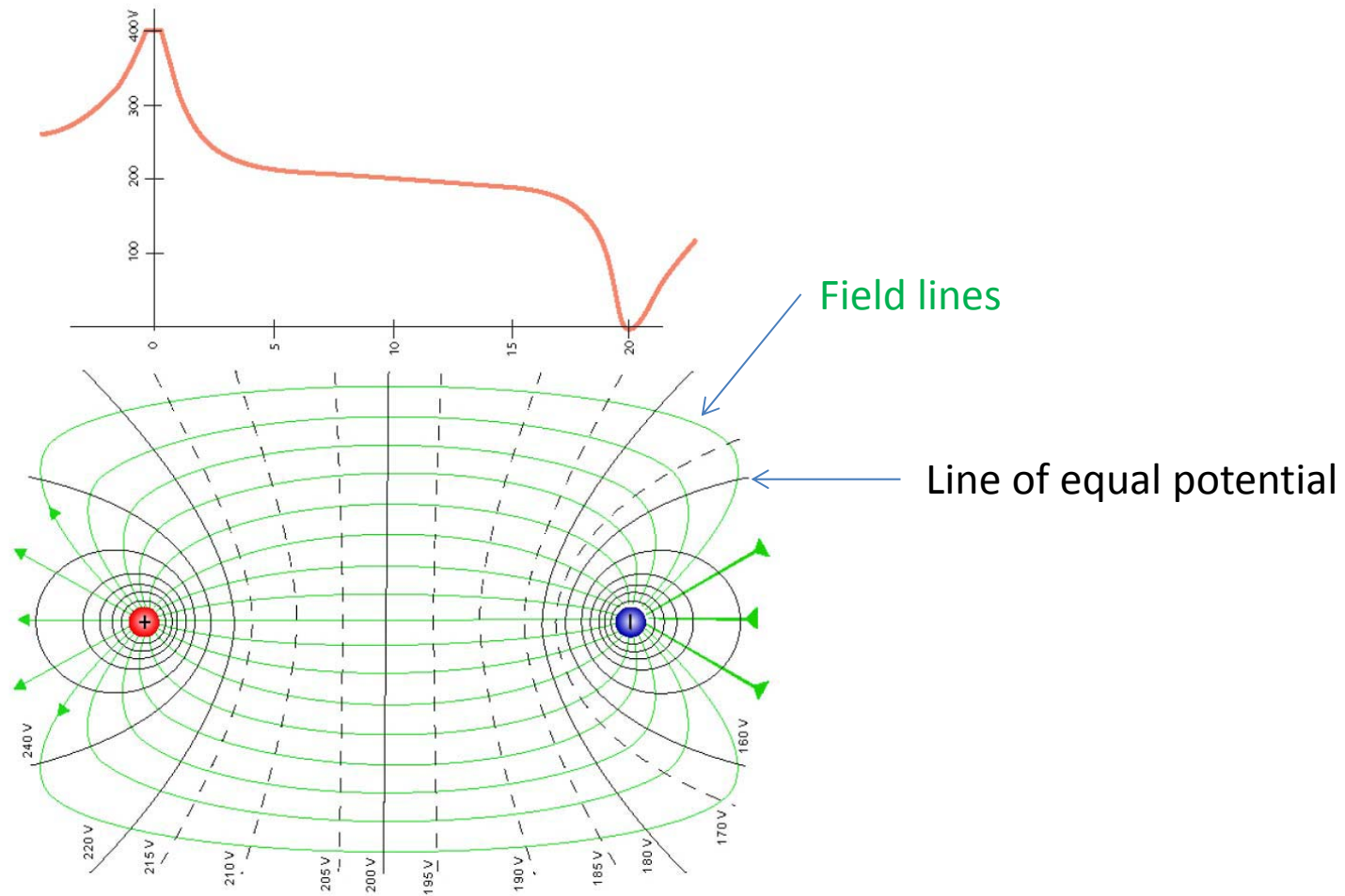


Electrofishing



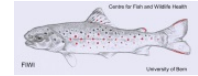
Basics:

Current flowing from + to - pole building up an electrical field





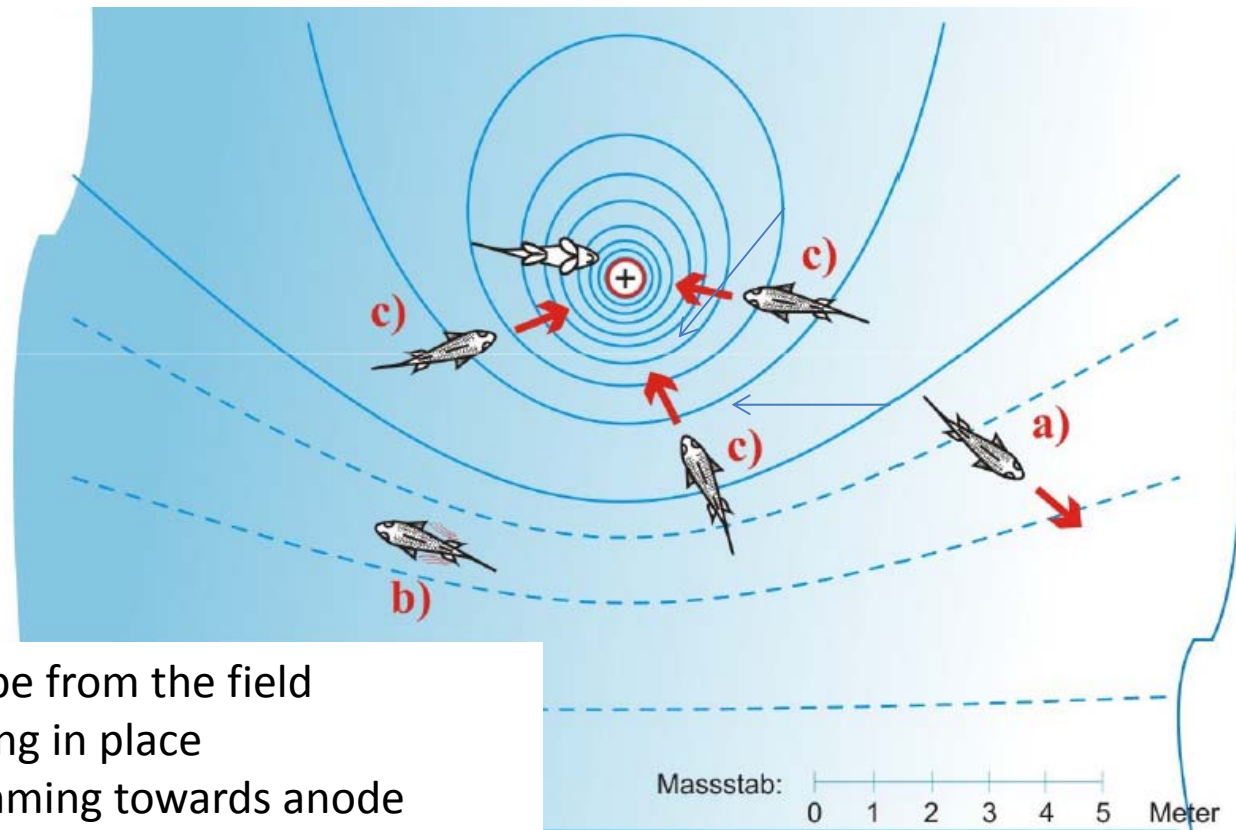
Electrofishing



Basics:

Current flowing from + to – pole building up an electrical field

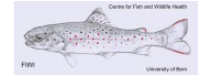
After holding anode in water the following reactions can be seen



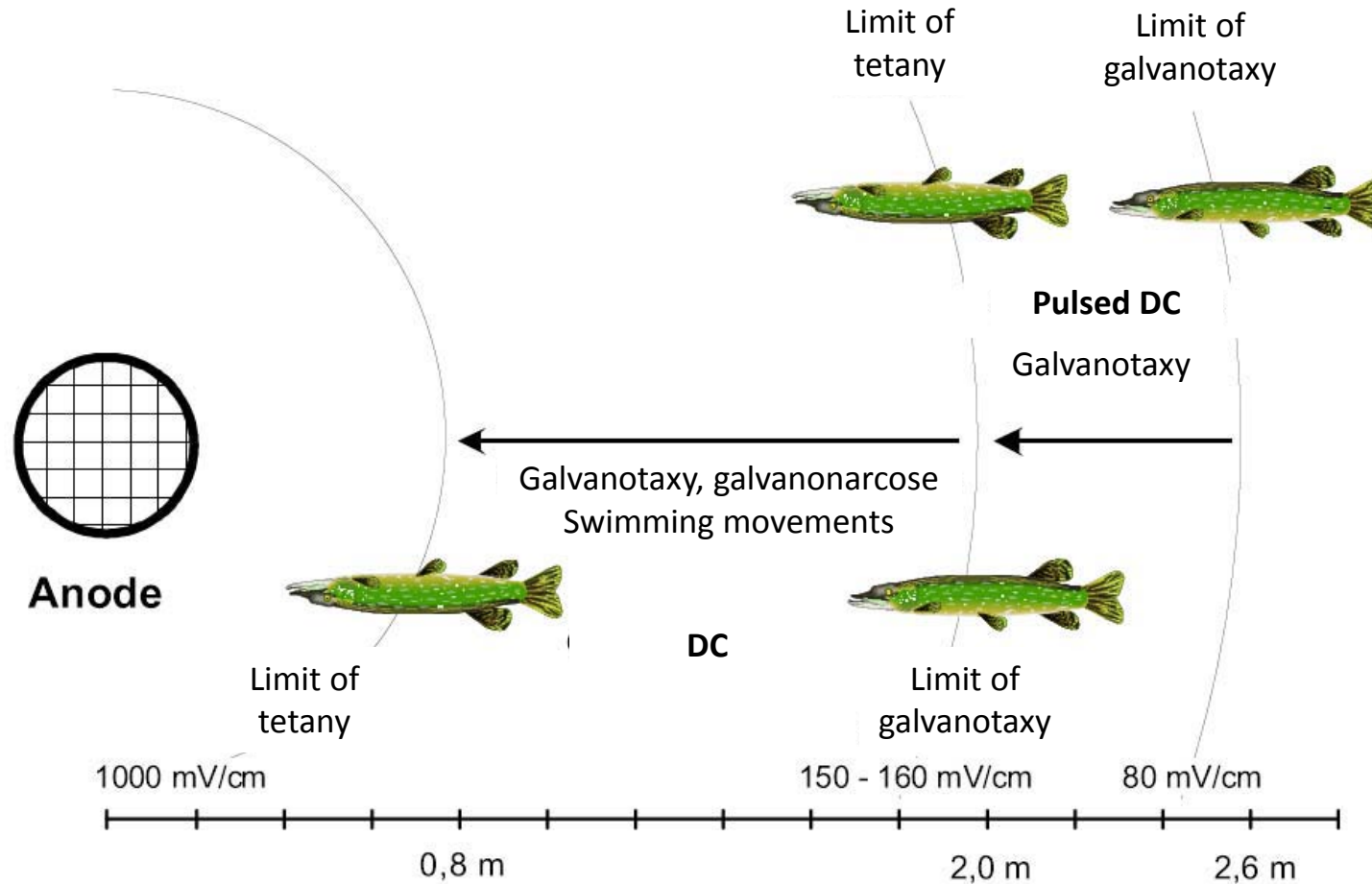
- a) Escape from the field
- b) Staying in place
- c) Swimming towards anode



Electrofishing



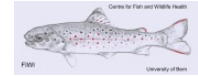
Basics: Effect on fish



Taxy = targeted movement, initiated by environmental stimulus
Tetany = dysfunction of musculoskeletal system, muscular cramps



Electrofishing



Engines:

Portable engine

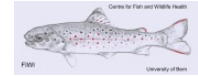


Static engine





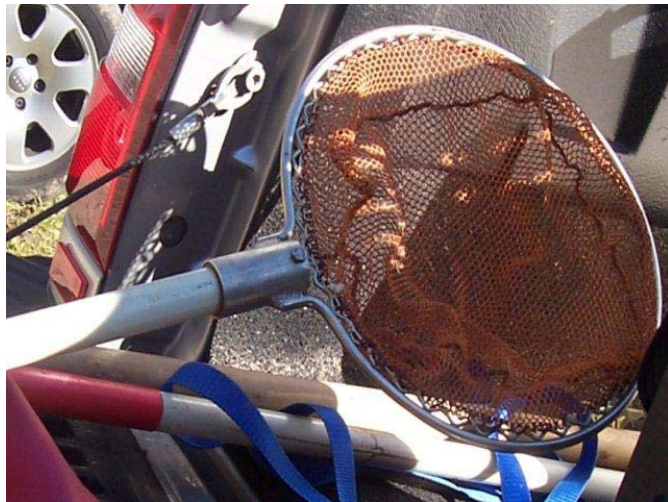
Electrofishing



Material:



Cathode



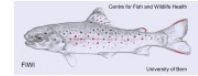
Anode



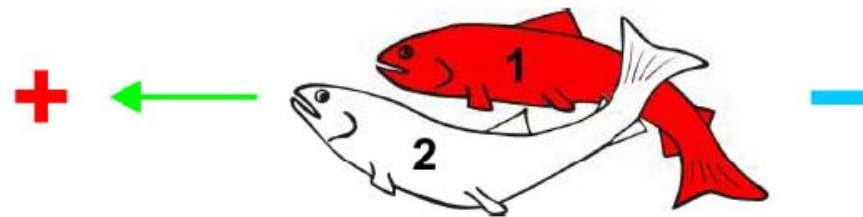
Cable for static engine



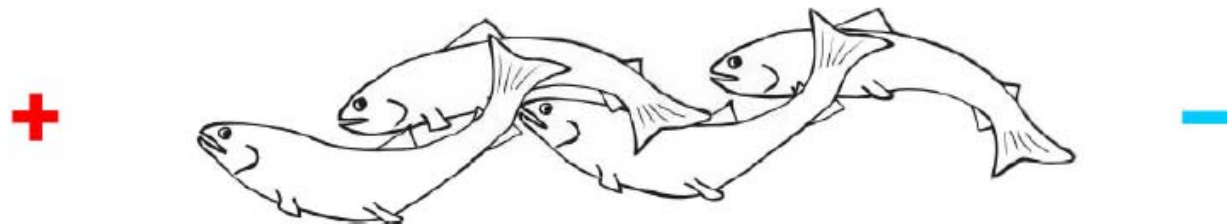
Electrofishing



How works anodic reaction?



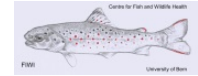
- 1.) Closure of current circle provokes knee-jerk body flexion towards anode
- 2.) Fish reacts with counter reaction



- 3.) Repeated flexion and counter-flexion provokes swimming movement towards anode



Electrofishing



Factors influencing effect

Shape voltage = electric potential (V) to provoke a reaction in a fish (species specific but not depending on size nor length of fish)
e.g. to provoke anodic reaction in trout: 1.2 V

Threshold current density = current (A) needed to provoke a reaction in a fish (depending on fish size → the larger the fish, the lower the current needed to provoke reaction)

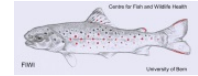
→ Larger fish must be removed faster from the field than smaller fish to prevent adverse effects

Consequences:

- Anodic reaction in trout at 1.2 V independent of length
- Large trout show reaction at larger distance from anode than smaller fish
- At low distance from anode small trout might show reaction aimed for while large fish is already in galvanonarcosis
- Other fish species of same size might show different reaction patterns



Fish health and influencing factors



Limits of electrofishing

Some factors can limit success of electrofishing

- Depth of water (maximum 2-3m)
- Conductivity
- Turbidity
- Structure of habitat
- Structure of sediment / riverbed
- Flow velocity
- Watertemperature
- Selectivity due to size (earlier flight of large animals)
- Selectivity of species due to physiology