Standardizing by Power Data Collection Using Backpack or Boat Shockers

Crews apply their data to create a standardized power table using *Electrofishing with Power* or *EF goal*

Water conductivity and threshold voltage (V_t), current (I_t), or power (P_t) must be known

- **need ambient water conductivity (C_a), not specific (C_s); but if record C_s, also record water temperature in C° and convert to C_a later**
- **threshold power can be calculated using power equations**
- **in the field, get C_a and threshold V_t, I_t, or both for successful catch**
- **if voltage & current known (metering), calculate $P_t = V_t \times I_t$**
- **if voltage known but current unknown, measure R_{eq} and calculate $P = V^2/R_{eq}$**
  - **R_{eq} can be measured using any waveform at any conductivity but requires measurement of both voltage and current using the same metering**

OR

- **if you only have a voltmeter, or calibrated voltage dial, record V_t (you will derive a voltage goal table)**

OR

- **if you only have an ammeter, record I_t (you will derive a current goal table)**

- **Prepare a standardized output table for your unit**
  - **Go to "Power Goals" tab of *Electrofishing with Power***
  - **Enter the C_a of the sample site and your voltage and/or current minimum requirements for successful electrofishing**
  - **Enter C_f = 115 μS/cm (fish conductivity)**
  - **during future sampling, measure C_a and use table to set P, V, or I.**
  - **this procedure will give constant power transfer**
  - **disclaimer: changing electrodes may cause significant error**
    - **thus, each electrode set requires a different standard table**
    - **keep standard electrodes clean to avoid "creeping error"**

FIELD DATA: ELECTROFISHER OUTPUT

Make/Model

Owner

Serial No.

Anode/Cathode Description

Controls (type, range, steps)

Power Source Description

System Resistance Measurement

Voltage	**Current**	**Resistance**

Defects/Repairs Needed

Description Waveform A

Description Waveform B

Calibration Waveform A

setting (V)	**actual peak (V)**
___________	____________
___________	____________
___________	____________
___________	____________

Calibration Waveform B

setting (V)	**actual peak (V)**
___________	____________
___________	____________
___________	____________
___________	____________

Voltage Gradient A (at _____V)
Next to anode ______V/cm
0.1 m distance ______V/cm
1.0 m distance ______V/cm

Voltage Gradient B (at _____V)
Next to anode ______V/cm
0.1 m distance ______V/cm
1.0 m distance ______V/cm

FIELD DATA: CATCH INFORMATION

Site Location **Site Description**

Date **Approximate Time**

Water Temperature **Water Conductivity (Ca or Cs ?)**

Waveform Selected (type: if PDC- frequency, pulse width, duty cycle)

Find Threshold Voltage: start low, fish 5 min, record results, increase voltage and repeat until threshold is determined

Voltage Setting	Catch Results	Fish Reaction*	Threshold?

Describe any evidence of fish stress or injury; at what voltages?

*** describe fish reactions as "escape", "inhibited swimming", or "immobilization"**

POWER STANDARDIZATION WORKSHEET

Or

Use *Electrofishing with Power* or *EF goal*

Perform calculations for initial conditions measured in the field:

Enter system resistance **Enter ambient conductivity**

Enter threshold voltage **Calculate q assuming C_f = 115 μS/cm**

q=	**PCF=**	**$P=V^2/R$=**	**$P=V \cdot I$=**

Now, calculate applied P needed at other ambient conductivities:

C_w	q	PCF	P
50			
115*			
200			
500			

Now, calculate the new system resistance at other conductivities:

C_w	$R_{eq} = R1(C1/C2)$ where 1=initial and 2=new
50	
115	
200	
500	

Now, calculate the V and I needed at each applied P:

C_w	P	$V=\sqrt{(P \cdot R)}$	$I=P/V$
50			
115			
200			
500			

*** start here to obtain power needed at matched conditions**

Calculation methods-

- **Calculate the PCF for a range of C_w expected in other conditions**
  - **calculate q for each C_w; $q = C_w/C_f$**
  - **calculate PCF = $(1+q)^2/(4 \cdot q)$ for PCF at each C_w**
- **Calculate applied power needed to get constant power transfer**
- **use (PCF × threshold P) to get applied P for new value of C_w**
- **use Joule's Law to get V and I needed for each applied P**
- **BUT: R_{eq} changes in inverse proportion to C_w :($R_2/R_1=C_{w1}/C_{w2}$)**
  *** SO: new R_{eq} (R_2) equals old R_{eq} (R_1) × (C_{w1}/C_{w2})**
- **this gives required output of your unit (P, V, I) over a range of water conductivities**