

## 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  $C^\circ$  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  $C_f = 115 \mu\text{S/cm}$  (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

Defects/Repairs Needed

Voltage      Current      Resistance

Description Waveform A

Description Waveform B

Calibration Waveform A

Calibration Waveform B

setting (V)      actual peak (V)

setting (V)      actual peak (V)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Voltage Gradient A (at \_\_\_\_\_ V)

Voltage Gradient B (at \_\_\_\_\_ V)

Next to anode \_\_\_\_\_ V/cm

Next to anode \_\_\_\_\_ V/cm

0.1 m distance \_\_\_\_\_ V/cm

0.1 m distance \_\_\_\_\_ V/cm

1.0 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  $C_i = 115 \mu\text{S/cm}$

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:

$C_w$	$R_{eq} = R_1(C_1/C_2)$ 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  $\times$  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  $R_{eq}$  ( $R_1$ )  $\times$  ( $C_{w1}/C_{w2}$ )**
- **this gives required output of your unit (P, V, I) over a range of water conductivities**