

## Multi-pass Electrofishing

Electrofishing is a non-lethal technique commonly used to sample fish in both large and small river systems. In small rivers (first and second order streams), multi-pass surveys can be conducted where crews block off a section of river, perform multiple passes (typically three passes), and remove fish from the reach during each pass. If the assumption that capture probabilities are the same for each pass and the population is closed, a depletion model can be used to achieve a population estimate ([click here for details on this method](#)).

For larger rivers, such as the Henry's Fork, it isn't possible to block off large sections of the river so a mark-recapture technique is used to estimate population abundances. This technique is done by floating through a river reach where fish are captured and marked. Several days later, a second round of sampling occurs through the same river reach where both marked and unmarked fish from the population are captured. After sampling is done, biologists will have three critical pieces of information needed to produce a population estimate; the number of marked fish in the population ( $n_1$ ), the total number of fish captured during the second sampling period ( $n_2$ ), and the number of marked fish captured during the second sampling period ( $m_2$ ). With this information you can use a simple Lincoln-Petersen model to estimate capture efficiency ( $m_2/n_1$ ) and expand the total number of captured fish during the second sampling period ( $n_2$ ) by this capture efficiency to estimate abundance. The complete formula is below:

$$(N_1 * N_2) / M_2 = \text{abundance estimate}$$

An example scenario:

During the first float, 300 fish are captured and marked. During the second float, 600 fish were captured and 100 of them were marked. Since the electrofishing crew captured 100 out of 300 marked fish, their capture efficiency was 1/3. If their capture efficiency was 1/3 and they captured 600 fish during the second round of sampling, then the total abundance of the population is 1800. Using the Lincoln-Petersen model,  $(300 * 600) / 100 = 1800$  fish.

For additional details on mark-recapture techniques, [click here](#).