

# Development of a Target Abundance for Northern Pike in Box Canyon Reservoir



**Objective:** Develop a target abundance for northern pike in Box Canyon Reservoir that is consistent with conservation objectives.

**Rationale:** The present northern pike population in Box Canyon Reservoir is not sustainable and is inconsistent with conservation goals. The pike population must be controlled to reduce impacts to native fish and sport fish species, as well as to reduce the risk of establishment of pike populations downstream in the Columbia River system.

**How:** By using pike population data collected from Box Canyon Reservoir since 2004 and comparing that to the relative abundance indices (SPIN and Standard Warmwater Survey gill net CPUE's), we back-calculated the SPIN CPUE commensurate with conservation objectives for the southern half of the reservoir ( $\leq 1.73$  pike/net). Because habitat is less conducive for pike and risk of downstream movement into the Columbia River system is greater, the target CPUE for the northern half of the reservoir is  $< 0.5$  pike/net.



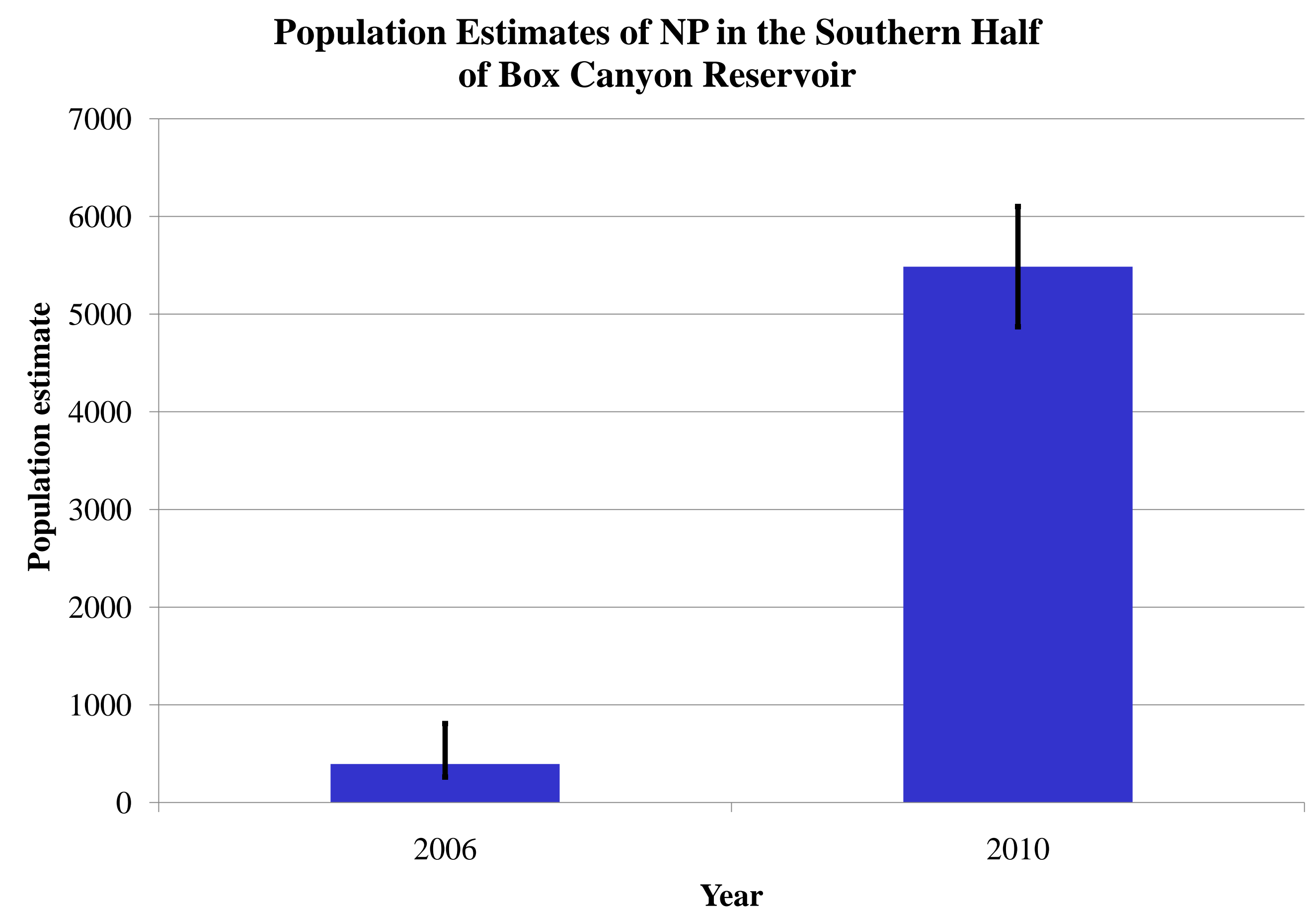
Northern pike collected electrofishing, tagged with a numbered Floy tag (circle), and being released at the location of capture. The proportion of tagged fish to untagged fish in a second random sample can be used to estimate the population size.

## Estimating the size of fish populations

Censuses (complete counts) of fish populations are usually infeasible and impractical. Many methods have been developed to estimate the population size based on a sample of the population including mark-recapture techniques.

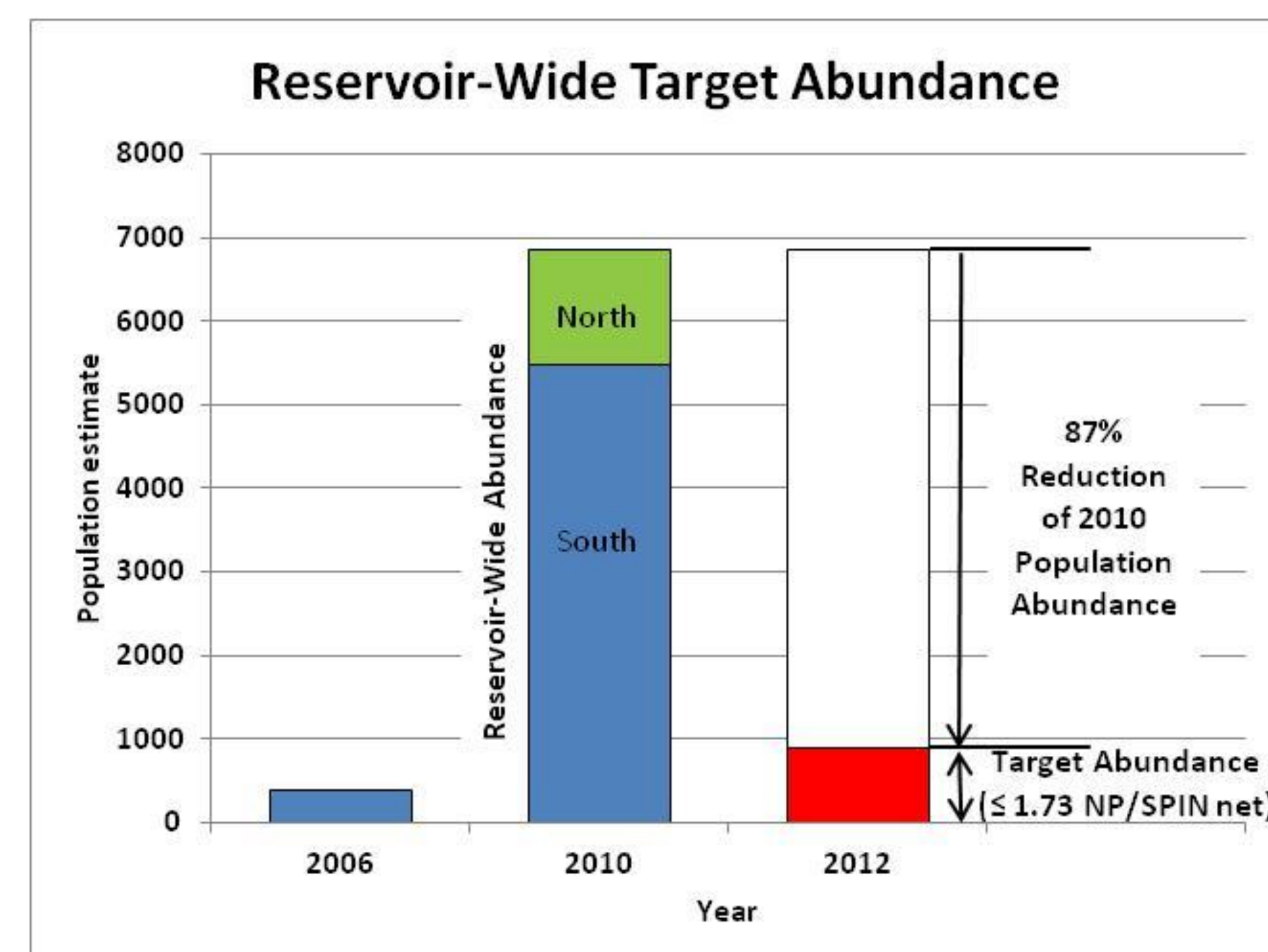
Mark-recapture studies generally consist of at least one marking period in which fish are collected, tagged, and released alive at the location of capture. Fish are allowed to randomly mix, prior to a second random sampling. The proportion of marked to unmarked fish in the second sample is used to estimate of the population size.

We have calculated two population estimates of northern pike in the southern half of Box Canyon Reservoir since 2004. The relationship between these estimates and relative abundance indices (CPUE) is important for defining a target population level. Since mark-recapture estimates are far more expensive and labor intensive than relative abundance estimates, SPIN CPUE will be used to track the status and trend of northern pike abundance over time.



**2006:** Multiple mark-recapture methods (Schumacher-Eschmeyer).  
76 marked NP, 83 captured NP, 7 recaptured NP.  
Estimated 394 NP > age 4 between Tacoma Slough and Delkena (Density ~ 0.4 NP/ha, 0.2 NP/ac)

**2010:** Single mark-recapture methods (Petersen).  
288 marked NP, 742 captured NP, 36 recaptured NP.  
Estimated 5,486 NP > age 2 between Riverbend and Pioneer Park (Density ~ 2.4 NP/ha, 1.0 NP/ac)



The target abundance equates to hundreds of northern pike in the reservoir as opposed to multiple thousands. The target index of abundance (SPIN CPUE  $\leq 1.73$  NP/net), which corresponds to the 2004-2006 population level, was estimated from the relationship between SPIN and Standard Warmwater Survey gill net CPUE data collected in 2004 and 2011.

## Working backward to SPIN equivalent in southern half of Box Canyon Reservoir

