

Suppression Measures Considered for Northern Pike in Box Canyon Reservoir



Measures	Purpose of Measure	Relative Cost	Pros	Cons	Feasibility
No Action	Maintain high-density NP population	Low	<ul style="list-style-type: none"> Temporary increased angler opportunity Diverse angling opportunities Temporary economic stimulation 	<ul style="list-style-type: none"> Expansion of the NP population This measure is unacceptable to fishery managers in the Columbia basin downstream of Albeni Falls Dam due to conservation risk Increased predation and competition with native species Impacts to game fish Potential expansion into unoccupied waters Contrary to ESA recovery efforts Eventual stunting Environmental toxin bioaccumulation 	Low
Angling Regulations <ul style="list-style-type: none"> Slot limits Maximum/1-over limits 	Higher quality NP in fishery by protecting large individuals and promoting the harvest of small NP	Low Low	<ul style="list-style-type: none"> Maintain or increase angler effort Diverse angling opportunities Economic stimulation Potential for NP cannibalism to control smaller NP abundance Possibly effective at altering size structure of the population Combined with mandatory harvest or incentive may help reduce abundance of small NP 	<ul style="list-style-type: none"> Ineffective at reducing abundance Current exploitation rate too low to shape size structure Noncompliance may result in decreased size structure Environmental toxin bioaccumulation 	Low Low/Medium
Promote General Angler Harvest	Increase angler exploitation of NP to decrease abundance	Low	<ul style="list-style-type: none"> Angler exploitation removes a portion of population Public perception 	<ul style="list-style-type: none"> Current exploitation rate too low to reduce abundance Environmental toxin bioaccumulation 	Low/Medium
Angler Incentive <ul style="list-style-type: none"> Bounty Fishing contests 	Increase angler exploitation by offering financial reward for harvest	Low-high Low	<ul style="list-style-type: none"> Maintain or increase angler effort and harvest Diverse angling opportunities Economic stimulation Outreach and education opportunity 	<ul style="list-style-type: none"> Angling pressure alone is largely ineffective at reducing abundance Current exploitation rate too low to shape population May result in decreased size structure if large NP are removed May provide economic incentive for further illegal introductions Environmental toxin bioaccumulation 	Medium Medium
Trapping	Remove adult NP in spring when congregated at spawning locations	Medium-High	<ul style="list-style-type: none"> Limit impact to non-target species 	<ul style="list-style-type: none"> Trap saturation with non-target species Only effective soon after ice-out Gear and labor intensive Ratio of effort to number of NP removed not favorable 	Medium
Mechanical Removal (Gill netting)	Remove adult NP during spring when congregated at spawning locations	High	<ul style="list-style-type: none"> Has been demonstrated as an effective method to remove large numbers of NP Adult NP highly susceptible to capture by gill nets Well designed net dimensions and timing limit bycatch of non-target species 	<ul style="list-style-type: none"> High capital investment Labor intensive Requires several repeated, if not continual, removal events Public perception Disposal of carcasses Impact to non-target species 	High
Electrofishing	Remove adult and juvenile NP seasonally by boat electrofishing	High	<ul style="list-style-type: none"> Limit impact to non-target species Effective at capturing juvenile NP in autumn/early winter whereas our gillnets are not 	<ul style="list-style-type: none"> Labor intensive Requires continual maintenance One of the least efficient methods of capturing adult NP 	Medium
Water Level Manipulation	Maintain stable water level through the peak spawning period followed by abrupt drawdown to dewater eggs and fry	High	<ul style="list-style-type: none"> Remove large portions of spawning year classes Drastically reduce available spawning habitat for late spawners Has been successfully used in some areas 	<ul style="list-style-type: none"> Increased entrainment possible FERC license amendments Lost revenue for PUD Limited storage/drawdown capabilities (run-of-river) Potential complications due to Lake Pend Oreille and Columbia River water management Impacts to non-target species 	Unknown
Sterilization	Release sterile male NP with intent to have them spawn with wild females resulting in non-viable offspring.	Medium-High	<ul style="list-style-type: none"> If spawning habitat were limited, could reduce successful reproduction 	<ul style="list-style-type: none"> Spawning habitat not limited in Box Canyon Reservoir Must be raised in hatchery Only takes a small percentage of the population reproducing to rebound or maintain the population Increased predation potential (at least temporarily) 	Low
Detonation Cord	Kill NP with pressure waves generated by the use of explosives	Medium-high	<ul style="list-style-type: none"> Has been used in Europe and Lake Davis, CA. However, less efficient than mechanical removal 	<ul style="list-style-type: none"> Vegetation, flow, distance, area, and substrate all drastically affect the range of explosive Impact to non-target species Permitting and training required Ecological impact 	Low
Spawning Habitat Barriers	Prevent access to NP spawning habitat	High	<ul style="list-style-type: none"> May limit reproduction especially during low water years 	<ul style="list-style-type: none"> Boat access prohibited Constant maintenance Must be implemented annually Non-target species movement inhibited Not feasible during high water years 	Medium
Spawning Habitat Alteration	Remove vegetation in spawning and rearing habitats to lower NP production and survival	High	<ul style="list-style-type: none"> Removal of vegetation by shoreline development has contributed to declines in NP abundance in their native range Aquatic vegetation removal programs exist on the POR Physical, chemical, biological options 	<ul style="list-style-type: none"> Large percentage of vegetation removal required (>10%) to be successful Labor intensive (continual annual removal) Pike often spawn in flooded terrestrial vegetation in POR Permits Long-term ecological impacts Non-target species impacts (fish, invertebrates, amphibians, waterfowl, mammals) 	Low
Mainstem Electric Barriers	Block downstream migration with surface to bottom electric weir	Very high	<ul style="list-style-type: none"> May limit entrainment downstream 	<ul style="list-style-type: none"> Risk of electric shock to humans Prevents natural migration of native species Infeasible to construct at this time 	Low
Fish toxicant (piscicide) <ul style="list-style-type: none"> Reservoir-wide Localized 	Lethally remove NP with rotenone reservoir-wide or in localized areas (sloughs) where NP are congregated	Very high High	<ul style="list-style-type: none"> Effective at removing all sizes/life stages of NP 	<ul style="list-style-type: none"> Permitting requirements Severe impact to non-target species Reservoir-wide application logistically and cost-prohibitive Localized applications must be detoxified to prevent impacts to non-target organisms Public perception Short-term ecological impacts (invertebrates, zooplankton, etc.) 	Very Low Medium
Disease/parasite introduction	Introduce viral or bacterial disease or parasite of NP to cause increased mortality	Medium	<ul style="list-style-type: none"> Certain diseases of NP cause very high mortality to different life stages 	<ul style="list-style-type: none"> Potential severe impacts to non-target species Not likely a viable control mechanism Potential for biological control to become invasive or entrained, often worse than the original problem Research and laboratory testing required 	Low
Stocking pike predators	Plant sterile tiger muskellunge to prey on NP	Medium	<ul style="list-style-type: none"> Additional angler opportunities 	<ul style="list-style-type: none"> Another additional apex predator in the system Potential for backcrossing / hybridization with northern pike 	Low
Commercial fishery	Reduce abundance of NP by commercial harvest	Low	<ul style="list-style-type: none"> Potential small business 	<ul style="list-style-type: none"> Impact to non-target species Highly dependent on market development Environmental toxin bioaccumulation May provide economic incentive for further illegal introductions 	Medium/High