

Annual Monitoring Plan for Northern Pike *Esox lucius* in Upper and Lower Lead King Lakes, Washington



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September 2015

Introduction:

Washington Department of Fish and Wildlife (WDFW) stocks and maintains a production trout fishery in Upper and Lower Lead King lakes (Figures 1 and 2) in northern Pend Oreille County. Eastern Brook Trout *Salvelinus fontinalis* were stocked historically (intermittently between 1944 and 1992), while the lakes have more recently received triploid Rainbow Trout *Oncorhynchus mykiss* (1995-2014). Hook and line sampling for trout in spring 2015 yielded no fish, and reports of the presence of Northern Pike in Lower Lead King Lake were received in summer 2015.

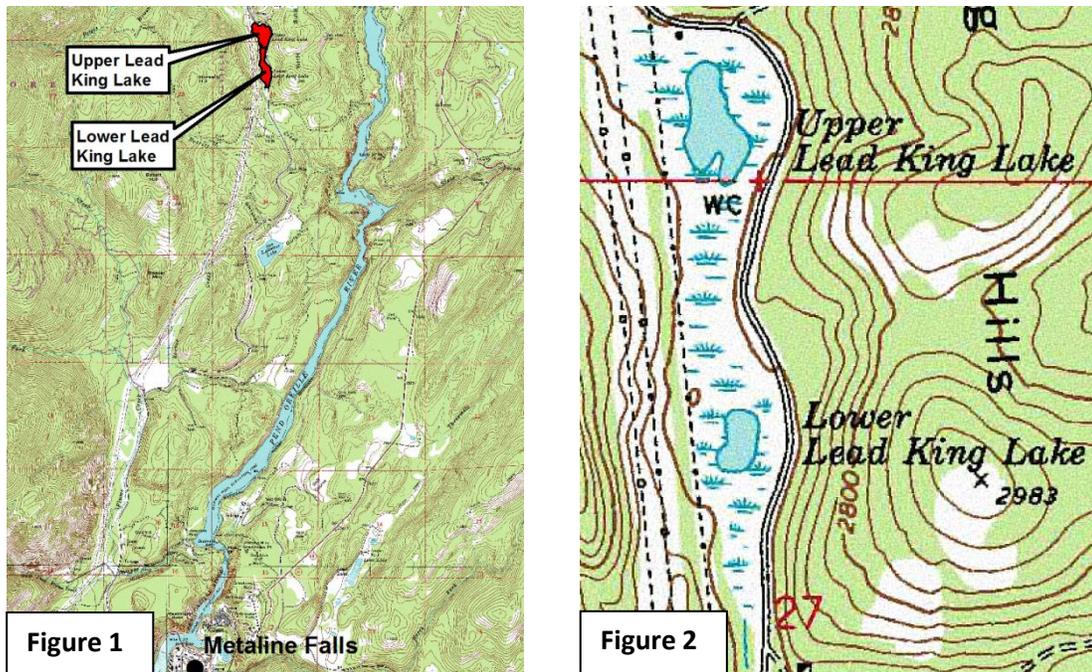


Figure 1. Map depicting the location of Upper and Lower Lead King lakes in northern Pend Oreille County, Washington.

Figure 2. Map of Upper and Lower Lead King lakes and associated wetland complex.

Subsequent electrofishing and gillnet surveys confirmed the presence of Northern Pike in Lower Lead King Lake and Pumpkinseed Sunfish *Lepomis gibbosus* in both lakes. Multiple age classes of both species were present, indicating that natural reproduction had been occurring for at least 3 years. Upper and Lower Lead King lakes are located within a large wetland complex and likely have a surface water connection during high water periods, allowing fish to pass between the two bodies of water.

Northern Pike (Figure 3) are a prohibited species in Washington State under WAC 220-12-090 and RCW 77.12.020. Pike became established in the Pend Oreille River in the mid-2000's through entrainment from illegally introduced upstream populations and have since spread downstream into Lake Roosevelt (Columbia River). Although the Lead King lakes are connected to the Pend Oreille River via the Everett Creek drainage, natural fish passage barriers on Everett Creek preclude upstream movement of fish from the Pend Oreille River mainstem. Therefore, the presence of Northern Pike and

Pumpkinseed Sunfish in the Lead King lakes are deemed to be the result of illegal introductions, with the fish likely originating from the Pend Oreille River.



Figure 3. Northern Pike captured during an angling survey of Lower Lead King Lake.

Management Action

Through actions including the de-classification of Northern Pike as a gamefish and suppression of the population in the Box Canyon Reservoir portion of the Pend Oreille River, WDFW and its partners have actively worked to prevent further spread of Northern Pike in Washington State. Upper and Lower Lead King lakes and the associated wetland complex will be treated with rotenone in October 2015 to eliminate Northern Pike. The open water portions of both lakes will be treated with a powdered rotenone slurry delivered from a boat(s) equipped with a venturi-style pumping system. Littoral margins, areas with prolific aquatic macrophytes (Figure 4), and the associated wetland complex will be treated with liquid rotenone delivered by an airboat equipped with a high volume pump. The outlet of Lower Lead King Lake will be sandbagged to impound any outflow until detoxification through environmental degradation of rotenone has occurred.



Figure 4. Aquatic macrophytes in Lower Lead King Lake.

Pre-Treatment Chemical Monitoring

Immediately prior to the rotenone treatment, water temperature and pH will be collected as described in Table 4 of the Aquatic Invasive Species Management General Permit. Temperature and pH will be sampled using a Hydrolab Surveyor 4a on each lake at the location of the greatest water depth. Measurements of temperature and pH will be taken at the surface and at 1 m intervals thereafter until the sonde reaches the bottom, where a final measurement of temperature and pH will be recorded.

Post-Treatment Chemical Monitoring

Temperature and pH will be measured using the methods described in the preceding paragraph one day post-treatment at the location of greatest depth in each lake.

Between 3 and 8 weeks post-treatment, a toxicity bioassay will be conducted. A live box containing five trout will be placed in each lake in open water away from aquatic vegetation. The live box will be suspended beneath a buoy, and attached to an anchor to hold it in place. The fish will remain in the lake for 24 hours, at which time the live box will be retrieved and mortalities counted. The bioassay will be repeated on a weekly basis until at least 60% (3 of 5) of the fish survive the 24 hour bioassay period.

Due to the timing of treatment (October), it is possible that ice will form on the lake prior to detoxification. In that event, the bioassay will resume immediately following ice-out in Spring 2016.

Liquid rotenone will be applied to the shallow portions of each lake and the wetland complex. Use of liquid rotenone requires monitoring for Volatile Organic Compounds (VOC) and semi VOC's. In

addition, WDFW monitors for N-Methylpyrrolidone, a substance found in certain liquid rotenone formulations. Beginning four weeks post-treatment, a water sample will be taken from each lake from the shore in a location where liquid rotenone was applied. The samples will be sent to an accredited laboratory for analysis. The sample will be repeated weekly until no VOC's, semi-VOC's, or N-Methylpyrrolidone is detected.

Prior to treatment, the ephemeral outlet stream will be dammed with sandbags at the culvert passing under Pend Oreille County Road #2975 (Boundary Road). This dam will impound any water leaving the Lead King lakes and hold it until detoxification has occurred. Because no treated water will be released downstream prior to detoxification, no downstream monitoring is warranted.

Treatment Effectiveness Monitoring

Gill net monitoring will occur following ice-out in Spring 2016 to determine the effectiveness of the treatment in eradicating Northern Pike. Nets will be placed in habitats likely to contain Northern Pike if they were still present.

If Pike are absent, Upper and Lower Lead King lakes will be immediately stocked with catchable Westslope Cutthroat Trout *Oncorhynchus clarkii lewisi* to restore the recreational fishery. Westslope Cutthroat Trout fry will be stocked into both lakes on an annual basis in the fall of subsequent years. Occasional monitoring through gill netting and/or hook and line surveys will also be conducted in following years to ensure Northern Pike are not illegally re-introduced.

Detection of Northern Pike in either lake in any monitoring event will trigger repeat rotenone treatments (once annually) for both lakes and the wetland complex until Northern Pike are no longer detected.