Cheney Lake Restoration Project

Removal of an Invasive Northern Pike Population through the Application of Rotenone

Draft Environmental Assessment

Alaska Department of Fish and Game
Division of Sport Fish
Anchorage, Alaska

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June 2, 2008

TO: United State Fish and Wildlife Service (USF&WS)

The Alaska Department of Fish and Game has developed an Environmental Assessment (EA) that proposes to remove an illegally introduced northern pike population in Cheney Lake in Anchorage using rotenone. This pike population has destroyed the stocked rainbow trout fishery in Cheney Lake. In addition, Cheney Lake is located near Chester Creek which harbors natural salmon runs and populations of other resident fish. The proximity of Cheney Lake to Chester Creek increases the likelihood that northern pike could be introduced to the Chester Creek drainage and adversely affect the wild fish populations. The objectives of this project are to completely remove the northern pike population and restock Cheney Lake with rainbow trout. This will restore a popular urban fishery while helping to protect local wild stocks. Cheney Lake is a 24.2 surface-acre manmade lake located in east Anchorage.

The EA is available for viewing online at:
http://www.sf.adfg.state.ak.us/Statewide/InvasiveSpecies/PDFs/CheneyLakeEA.pdf.
If you would like a copy or have questions, please contact Kristine Dunker at (907) 267-2889.

Please submit any comments on this project to the address or email below by August 23, 2008.

Cheney Lake Restoration Project: Environmental Assessment
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518
or email at: kristine.dunker@alaska.gov

Sincerely,

Kristine Dunker - Fisheries Biologist

ALASKA DEPARTMENT OF FISH AND GAME
SPORT FISH DIVISION

Environmental assessment of the proposed rotenone treatment in Cheney Lake to eradicate the invasive northern pike population and restore the rainbow trout fishery.

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Remove invasive northern pike that have decimated the stocked rainbow trout fishery in Cheney Lake, Anchorage, Alaska. This effort will require the use of rotenone. Once all invasive northern pike have been eradicated, the rainbow trout fishery will be restored. Removing the invasive pike will also reduce the threat that pike will be introduced into nearby Chester Creek and other Anchorage water bodies.

B**. Agency Authority for the Proposed Action**: By consent of the Board of Fisheries, the Alaska Department of Fish and Game is authorized to perform such acts per Alaska Statue (AS 16.35.200).

C. Estimated Commencement Date: October 20, 2008

D. Name and Location of the Project: Cheney Lake Restoration Project - Removal of an Invasive Northern Pike Population through the Application of Rotenone.

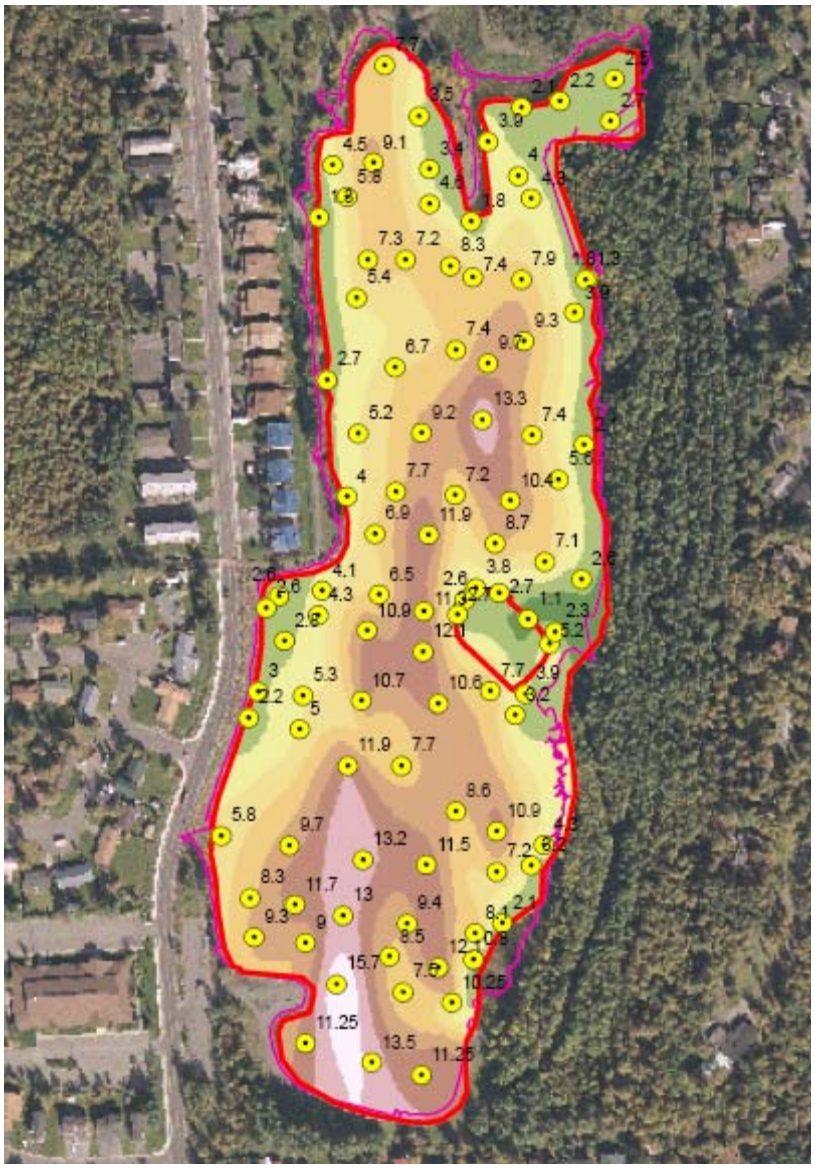
Cheney Lake is located in T13N R3W Sec. 23 in Cheney Lake Park just off Beaver Place in east Anchorage. It is a man-made lake that was formerly a gravel pit (Figures 1-3). The land ownership surrounding Cheney Lake is primarily public (Municipality of Anchorage). However, a condominium complex is located on the northwest shore along Beaver Place, and an adjacent housing development is located to the south of the lake. Cheney Lake is located within an urban setting, and several neighborhoods are located within the vicinity of Cheney Lake Park.

E. Project Size (acres affected)

1. Developed/residential- 0 acres
2. Industrial - 0 acres
3. Open space/Woodlands/Recreation – There are 10 acres of natural park land that surround the lake (Municipality of Anchorage 2006)
4. Wetlands/Riparian – Within the 10 acres of natural park land, there are 1.7 acres of wetlands along the north shore of the lake. Cheney Lake is 23.9 surface acres in size, has a maximum depth of 14 feet and a volume of 137 acre-feet. There is no surface outlet from this lake, but there is a storm drain connection in the lake that drains into Chester Creek approximately two miles to the west (Figure 4).
5. Floodplain - 0 acres
6. Irrigated Cropland - 0 acres
7. Dry Cropland - 0 acres
8. Forestry- 0 acres
9. Rangeland - 0 acres

Figure 1. Location of Cheney Lake in east Anchorage, Alaska

Figure 2. Aerial photograph of Cheney Lake



Elevation: 200'
Shoreline Length: 1.0 mi
Volume: 174.4 Acre Ft.
Mean Depth: 6.5'
Surface Acres: 24.2 Acres
Maximum Depth: 15.7'
ADF&G Management Area: Anchorage

Figure 3. Bathymetric map of Cheney Lake

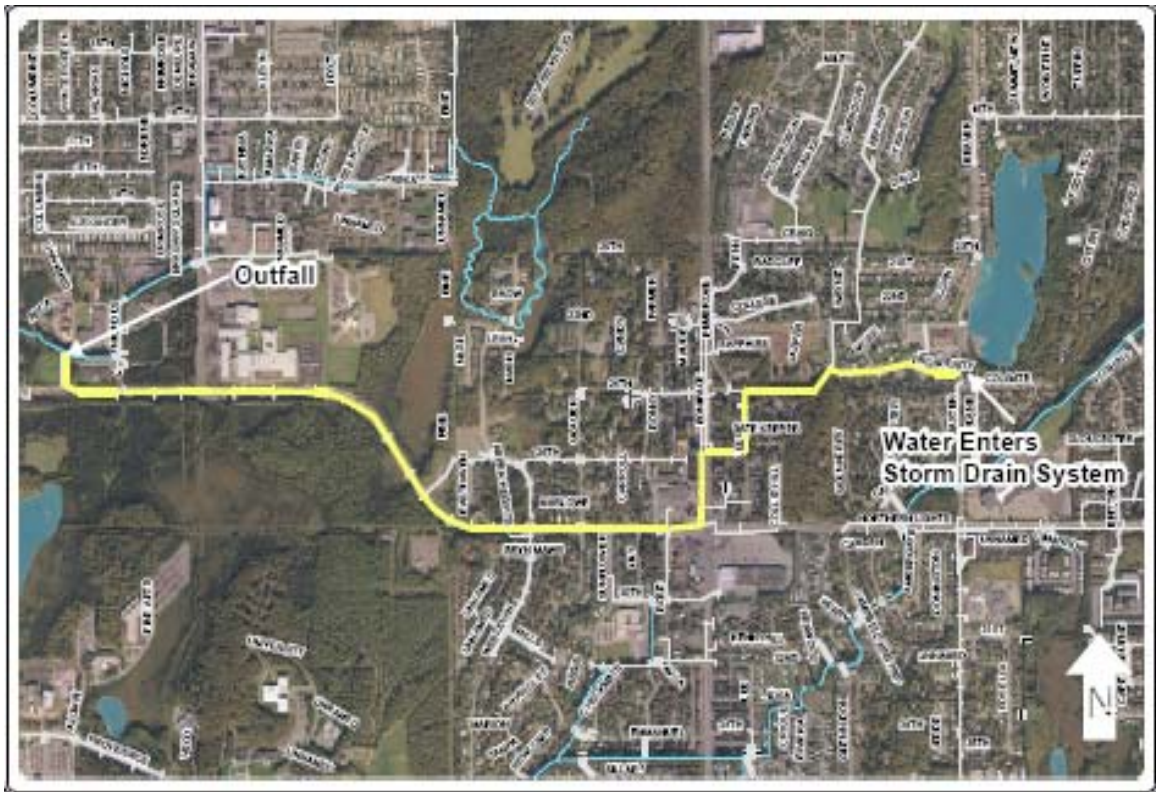


Figure 4a. Storm drain connecting Cheney Lake to Chester Creek.

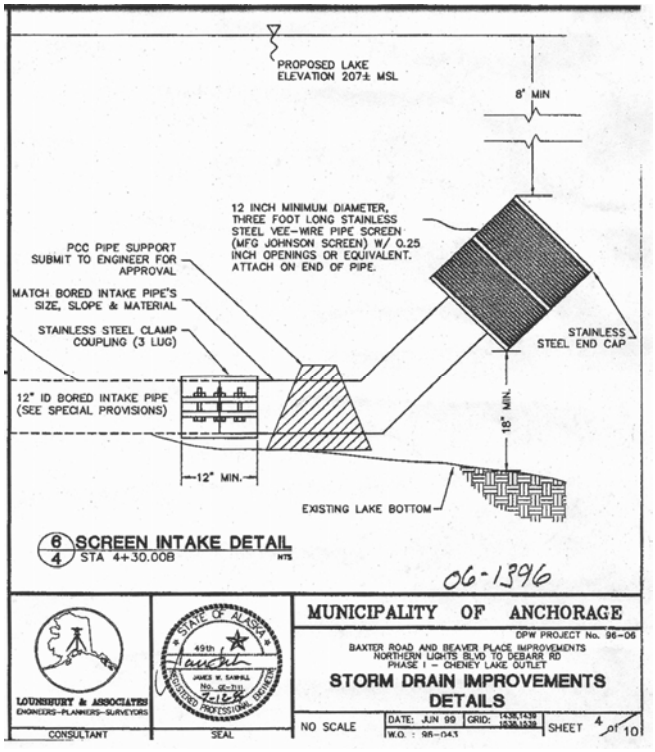


Figure 4b. As-built survey of the intake pike in the lake connecting to the storm drain system.

F. Summary and Purpose of the Proposed Action

Background

Cheney Lake is a 24.2-acre, man-made lake created in the 1970s and is located in east Anchorage (Figure 1). The Alaska Department of Fish and Game (ADF&G) began stocking Cheney Lake with rainbow trout in 1982, and it became one of the most popular rainbow trout fisheries in Anchorage. ADF&G stocked up to 14,470 rainbow trout into Cheney Lake annually providing a fishery favored by local youth (Miller and Bosch 2004). In 2000, northern pike (*Esox lucius*) were illegally introduced to the lake. Northern pike are native to most of Alaska but do not naturally occur south of the Alaska Range (Morrow 1980). In Southcentral Alaska, northern pike are an invasive species capable of causing substantial ecological and economic damage (ADF&G 2007). Pike are highly predatory on juvenile salmon and trout (Rutz 1996, 1999) and can quickly deplete their populations. The rainbow trout in Cheney Lake were no exception. The fishery was reduced from over 5000 angler days spent fishing for rainbow trout (Walker et al 2003) to less than 1000 angler days (Jennings 2004). The presence of pike forced ADF&G to discontinue stocking the lake in 2001. Pike in Cheney Lake prey on other species such as sticklebacks, aquatic invertebrates, and juvenile waterfowl, but they are primarily cannibalistic. The largest pike in the lake have been harvested by anglers, and there is no longer a sufficient prey base to support pike growth. With the population under stress, the pike began maturing and spawning at smaller sizes. As a result, the population has stunted, and these small pike are not sought after by anglers. The ADF&G Division of Sport Fish recognizes the lost recreational opportunities and would like to restore the rainbow trout fishery, but invasive northern pike need to be eradicated first.

Aside from the detrimental effect the presence of pike have on the recreational fishing opportunities in Cheney Lake, their presence raises other issues. Although Cheney Lake is essentially an isolated lake, Chester Creek is located less than 600 feet from Cheney Lake. It is also connected to Chester Creek via an underground storm drain system that discharges lake water approximately two miles to the west of the lake (Figure 4). There is a remote possibility that larval pike in Cheney Lake could move into Chester Creek via this stormy drain. Chester Creek supports runs of wild salmon and resident species such as rainbow trout and Dolly Varden. The presence of pike in Cheney Lake increases the possibility that a high water event or an angler with a bucket will transport pike from Cheney Lake to Chester Creek. Preventing the spread of pike is a much more effective method of controlling their presence than trying to eradicate them once they have been established in a watershed.

ADF&G has a legal responsibility to protect and improve Alaska's recreational fisheries resources. The Sport Fish Division Strategic Plan directs the Division to protect Alaska's aquatic habitats from aquatic nuisance species (ANS) (ADF&G 2003). The state has an aquatic nuisance species management plan (ADF&G 2002) which also directs the Division to eradiate ANS quickly with as few environmental impacts as possible. Finally, the Management Plan for Invasive Northern Pike in Alaska (ADF&G 2007) outlines the process for planning and implementing northern pike eradication efforts. Specifically, this process includes detecting populations of invasive pike, assessing habitat characteristics, proposing management alternatives, communicating

with the public about control plans, implementing the chosen management action, and evaluating the success of the action.

Several actions have been implemented in an attempt to control the pike in Cheney Lake. Outreach efforts including public service announcements, public presentations, publications, classroom education, educational DVDs, and an ADF&G pike webpage were all pursued as ways to educate the public to the threat of pike in Anchorage lakes. Management actions were taken to liberalize the bag limit and legal means and methods to encourage anglers to harvest more pike. There is currently no limit on the number of pike that can be harvested from Anchorage lakes, and multiple harvest methods are allowed. Liberalizing the regulations failed to eradicate pike because anglers have harvested only a small portion of their catch (Jennings 2004). The reduced angling effort in the lake further decreased the number of pike removed making this management action insufficient to eradicate pike.

Sport Fish Division biologists have attempted to eliminate pike from the lake with gill nets and fyke nets. Many pike have been captured and removed, but netting, alone, has not eradicated them. Pike are ambush predators and are relatively inactive when not foraging (Mecklenburg 2002). Pike must be moving to encounter nets, and sedentary individuals are not captured. In addition, gillnetting for pike is labor intensive and bycatch of waterfowl and other species is inevitable. While in some systems netting may be a tool for reducing the number of pike in a lake, netting is not an efficient method of pike eradication.

In 2007, the Division pursued a more aggressive means of eradicating the pike in Cheney Lake and drafted plans to lower the water level of Cheney Lake via the storm drain pipe that connects the lake to Chester Creek (Figure 4). The concept was to drain the lake to the level of the intake (18 inches from the bottom) during late fall so that the remaining water in the lake would freeze solid during the winter and winter-kill the pike. Unfortunately, further inquiries revealed that the mechanism controlling water flow through the storm drain could not be manually operated to lower the lake below its current level. Further, in public scoping for the project, it became clear that residents of the lake objected to lowering the lake level and preferred the idea of using chemical means to solve the pike problem. Therefore, ADF&G is proposing a treatment of rotenone to eradicate the pike from Cheney Lake.

Purpose

The purpose of this project is to eradicate an invasive non-indigenous fish species (Northern pike) from Cheney Lake. This will alleviate the risk that these fish will be introduced into nearby Chester Creek and will allow ADF&G to restore the once popular rainbow trout fishery in Cheney Lake.

Objectives

- Remove all the invasive northern pike in Cheney Lake using the piscicide CFT Legumine™ (5% liquid rotenone).

- Re-stock Cheney Lake with hatchery-produced rainbow trout to provide recreational fishing opportunity.

Description of Rotenone

Rotenone is a naturally occurring chemical substance derived from the roots of tropical legumes such as jewel vine *(Derris* spp.) and lacepod *(Lonchocarpus* spp.) (Ling 2003; Appendix 1). Native people throughout Australia, Oceania, Southern Asia and South America have utilized rotenone for centuries to capture fish for food in areas where these plants naturally occur (Quigley 1956, Bearez 1998, Robertson and Smith-Vaniz 2008). Rotenone has been used as a piscicide, a fish-killing agent, in the United States and elsewhere since the 1930s (Finlayson et al. 2000) and is currently registered by the EPA as a restricted-use pesticide for fish research and management activities (USEPA 2007).

Rotenone acts by inhibiting oxygen transfer at the cellular level. The biochemical process affected by rotenone takes place within the cell mitochondria and involves blocking electron transport by inhibiting NADH-ubiquinone reductase, resulting in the uncoupling of the metabolic pathway oxidative phosphorylation (Singer and Ramsay 1994, USEPA 2007). Fish mortality results from tissue anoxia caused by cardiac and neurological failure (Ling 2003). Rotenone is effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals and other non-gill breathing animals do not have this rapid absorption route into the bloodstream and can tolerate exposure to concentrations much higher than those used to kill fish. Therefore, non-target organisms that do not have gills are not negatively affected at piscicidal concentrations (Finlayson 2000, Ling 2003, NPS 2006, USEPA 2007, MFW&P 2008).

Proposed Activities

The entire rotenone treatment for this project will occur within the boundaries of Cheney Lake. The waters will be treated with CFT Legumine™ 5% liquid rotenone. CFT Legumine™ is a relatively new rotenone formulation designed as an improvement over the more hazardous powder form that had been widely used by fisheries managers for decades. Although it has been used in Europe for over a decade, CFT Legumine™ has recently been used successfully in the United States in large-scale rotenone treatments such as Lake Davis in California (CDF&G 2007). For the Cheney Lake treatment, it is anticipated that the label recommendations for "normal pond use" will be adequate to eradicate the northern pike. The estimated concentration of CFT Legumine™ formulation to be used in the Cheney Lake treatment is 1 ppm (0.05 ppm of active rotenone) or about 1 mg of CFT per liter of water. On-site assays using caged rainbow trout as sentinel fish will confirm that this concentration is sufficient to cause fish mortality in the lake. For invasive fish eradication projects, the target species is never used as the sentinel fish. This is a standard precaution to ensure that the invasive fish species is not accidentally re-introduced into the project area.

The preferred timing of the treatment will be the week of October 20, 2008, just prior to freeze-up. Rotenone naturally degrades with light and temperature (USEPA 2007). Therefore, cold water application of rotenone will enhance the active life of the chemical and ensure a longer exposure time during a period when dissolved oxygen levels naturally decrease and freezing of the lake surface limits the accessibility of lake water

to non-target species. The persistence of CFT Legumine™ in the lake will likely last several weeks depending on water temperatures, sunlight intensity, alkalinity and organic load. Standard protocol will be followed for rotenone treated waters, and signs will be posted to warn people not to drink or swim until the rotenone naturally degrades and sentinel fish survive. In the event the preferred timing for this project cannot be achieved, CFT Legumine™ can be applied below the ice by drilling holes in a grid pattern and pumping it into the lake.

All materials and equipment necessary for this project will be transported by truck to the parking lot at Cheney Lake Park. ADF&G staff trained in rotenone application and certified as Alaska Department of Environmental Conservation (ADEC) pesticide applicators will supervise all aspects of the project and treatment. Project personnel will ensure that the rotenone and application equipment are secured. If the preferred project schedule is achieved, the rotenone will be dispersed in the lake with a small motorboat via submerged venturi pumps. The prop wash from the outboard motor will assist in mixing the rotenone through the water, and caged sentinel fish will be used to ensure the rotenone is thoroughly mixing through the water column. After the treatment, caged sentinel fish will be used to evaluate when the waters detoxify. Sentinel fish will be checked and replaced weekly until they are found alive. The rotenone label specifies that once caged fish survive 24 hours in treated water, it is considered detoxified and is safe for restocking.

Dead pike that surface will be collected daily by ADF&G staff and disposed of at the Anchorage Landfill or used for Sport Fish Division education programs. Up to 70% of the pike killed during the rotenone treatment can be expected to immediately sink to the bottom of Cheney Lake (Bradbury 1986). Dead fish stimulate plankton growth and aid in the recovery of zooplankton and aquatic insect populations (UDWR 2007). Gill net and hook and line sampling will begin shortly after treatment to determine the effectiveness of the rotenone treatment, and if no pike are found, the lake will be sampled again with gill nets in the spring of 2009 to confirm eradication. In order to ensure compliance with the Migratory Bird Treaty Act, gill nets will be monitored frequently to minimize the potential for the unauthorized "take" of loons and other birds that might become entangled in the nets. If any live northern pike are sampled, a second rotenone treatment will be required to achieve the desired project objectives. If necessary, this second rotenone treatment would be planned for the fall of 2009.

Monitoring will be a major component of this management activity. Baseline data on the water chemistry (temperature, dissolved oxygen, pH, specific conductance and nutrients) and dominant macro-invertebrate taxa will be collected during the summer prior to the rotenone treatment. Water chemistry parameters and dominant macro-invertebrate presence will also be monitored during the summer of 2009 to confirm that the lake has re-established to pre-treatment conditions. Water samples from Cheney Lake will be collected prior to treatment and monthly immediately following treatment until all rotenone has dissipated. These samples will be analyzed by a water quality lab for chemical and nutrient composition. Though rotenone is known to naturally break down in aquatic systems (Finlayson 2000), no data currently exist on the persistence of CFT Legumine™ components in Alaskan waters. As one of the first CFT Legumine™ applications in Alaska, this project lends itself to such documentation. Pending results

from the chemical analysis of the lake water and confirmation that all northern pike have been eradicated, Cheney Lake could be restocked with rainbow trout as early as the summer of 2009.

Funding

This proposed action would be partially federally funded through allocations to ADF&G from the U.S. Fish and Wildlife Service Aquatic Nuisance Species Program. ADF&G Region II personnel will provide all manpower required to complete the project.

PART II. ENVIRONMENTAL REVIEW

A. NATURAL ENVIRONMENT

Table 1. Impacts to land resources.

1. Land Resources Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Soil instability or changes in geologic substructure?		**X**			
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?		**X**			
c. Destruction, covering or modification of any and unique geologic or physical features?		**X**			
d Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?		**X**			
e. Exposure of people of property to earthquakes, landslides, ground failure, or other natural hazard?		**X**			

Table 2. Impacts to water.

2.Water Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			**X**		**2a**
b. Changes in drainage patterns or rate and amount of surface runoff?		**X**			
c. Alteration of the course or magnitude of flood water or other flows?		**X**			
d. Changes in the amount of surface water in any water body or creation of a new water body?		**X**			
e. Exposure of people or property to water related hazards such as flooding?		**X**			
f. Changes in the quality of groundwater?		**X**			**2f**
g. Changes in the quantity of groundwater?		**X**			
h. Increase in risk of contamination of surface or groundwater?			**X**		**see 2a,f**
i. Effects on any existing water right or reservation?		**X**			
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		**X**			
k. Effects on other users as a result of any alteration in surface or groundwater quality?		**X**			
1. Will the project affect a designated floodplain?		**X**			
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			**X**	**yes**	**2m**

Comment 2a. This project would introduce a pisicide to surface water to kill invasive, non-indigenous fish. It is anticipated the impacts will be short-term. CFT Legumine™ (5% liquid) is an EPA registered restricted-use pesticide and is safe to use to eradicate invasive fish when applied according to label instructions. The proposed concentration of CFT Legumine™ is 1 ppm, but this may be adjusted within the product label's guidelines based upon the results of on-site assays. Under open-water conditions, CFT Legumine™ will be pumped into the lake from a boat, and backpack sprayers will be used to treat wetlands directly adjacent to the lake to eliminate any chance that pike could escape rotenone-treated waters.

CFT Legumine™ is a mixture of rotenone and other organic compounds that facilitate the emulsification and dispersion of rotenone in water. CFT Legumine™ was analyzed by the California Fish and Game Department in 2007 (Fisher 2007). This analysis showed that the primary ingredients are diethylene glycol ethyl ether (DGEE) (61.1%), Fennedefo 99™ (17.1%), N-methyl pyrrolidone (9.8%), rotenone (5.12%) and rotenolone (0.72%).

Fennedefo 99™ is primarily a fatty acid mixture and used with rotenone as an emulsifying agent. DGEE and N-methyl pyrrolidone are solvents. Both solvents have low toxicity and are not known to persist in the aquatic environment because they degrade naturally via biodegradation within less than a month (TOXNET website http://toxnet.nlm.nih.gov/). Other compounds detected in CFT Legumine™ included benzene-based compounds, various ethylene glycol-based compounds, hexanol and naphthalene, but these trace compounds are measured in parts per trillions and are less than those allowed in drinking water standards. In piscidal concentrations, none of the constituents in CFT Legumine™ pose health risks for humans, other mammals, or birds. Gleason et al. 1969 estimated that a single lethal dose of liquid rotenone to humans is between 300-500 mg of rotenone per 2.2 pounds of body weight. Therefore, a 160-pound person would have to drink over 23,000 gallons of water treated at the highest concentration of rotenone allowed under the product label instructions to receive a lethal dose (Finlayson et al. 2000).

The degradation of rotenone results in at least twenty different degradation products of which only one is toxic (rotenolone) (Cheng et al. 1972). Rotenolone is approximately an order of magnitude less toxic than rotenone (Finlayson 2000). The ultimate breakdown products of rotenone are carbon dioxide and water (http://www.prentiss.com/Products/fishman.htm.)

There are three ways in which rotenone can be detoxified once applied: by dilution, oxidation, or natural degradation. The first detoxification method involves basic dilution by freshwater. This may be accomplished by fresh groundwater or surface water flowing into the lake. The second method of detoxification involves the application of an oxidizing agent such as potassium permanganate. This dry crystalline substance is mixed with lake water to produce a concentration of liquid sufficient to detoxify the concentration of rotenone applied. Detoxification is typically accomplished after about 15-30 minutes of mixing between the two compounds (CWE Properties Ltd, 2004).

The third and most common method is to allow the rotenone to naturally breakdown. Rotenone is a compound that is susceptible to natural detoxification through a variety of mechanisms such as water chemistry, water temperature, organic load, and exposure to oxygen and sunlight (Ware 2002; ODFW 2008; Loeb and Engstrom-Heg 1970; Engstrom-Heg 1972; Gilderhus et a1. 1986). Rotenone persistence studies have found that in cold water (32°- to 46° Fahrenheit), the half-life of rotenone ranges from 3.5- to 5.2 days (Gilderhus et al. 1986 and Dawson et al. 1991), although the EPA reports that rotenone has a half-life of 20 days in cold water (USEPA 2007). In 46°-water, it has been demonstrated that decreases in mortality rate corresponded with degrading concentrations of rotenone such that rotenone concentrations are no longer lethal to test fish within 18 days after treatment (Gilderhus et al. 1986). However, an under-the-ice application of rotenone conducted in Minnesota showed that target level concentrations of rotenone were sustained over a month until snowmelt allowed sunlight penetration to cause it to breakdown by ice-out (Bandow 1989). It is conceivable under optimal conditions (low light, low temperature and low organic content) that rotenone could persist for months under the ice at levels lethal to fish. This would increase the likelihood that all northern pike would be killed during this treatment. However, Cheney Lake does have natural springs which could increase the rate at which the rotenone dilutes. At present, the groundwater recharge rates for Cheney Lake are unknown. However, Cheney Lake is eutrophic, and the amount of organic matter in the lake is likely to bind with the rotenone and further reduce the amount of time the chemical is active in the water.

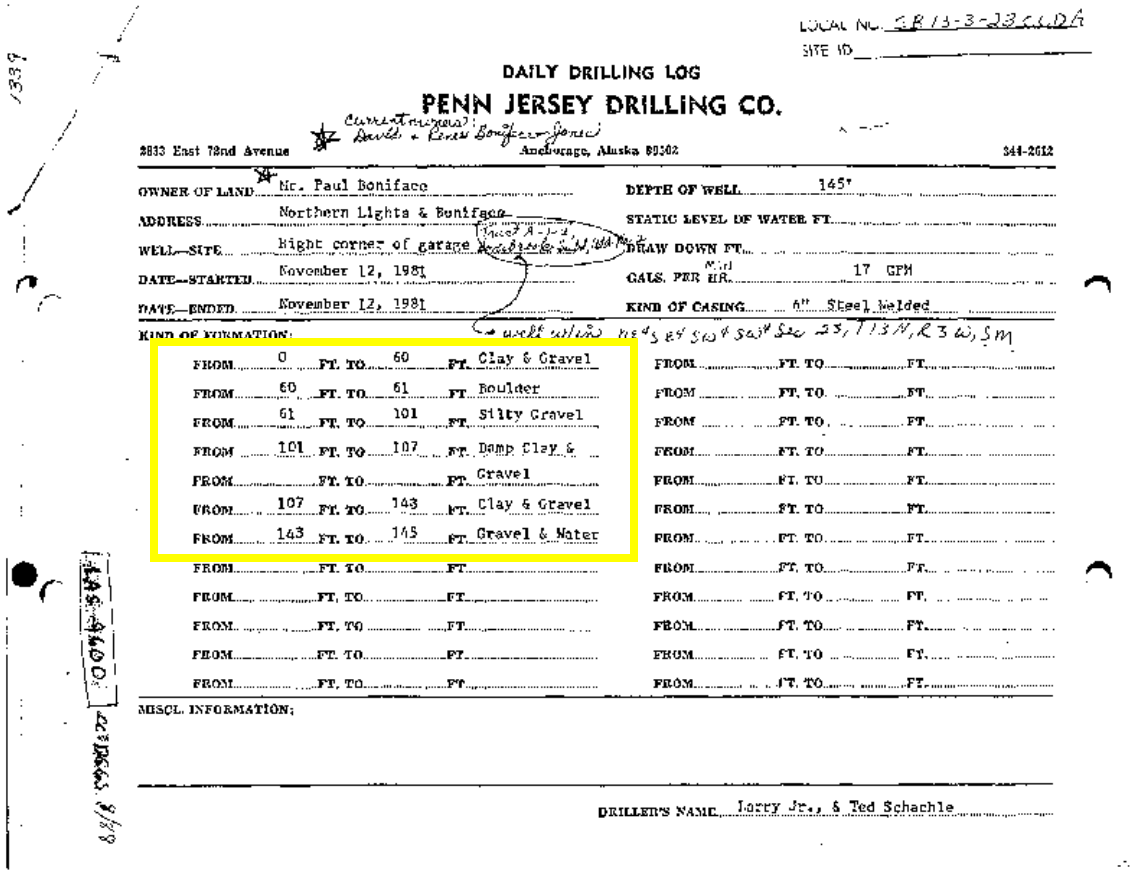
The preferred detoxification method for any rotenone treatment, including Cheney Lake, is to allow the rotenone to degrade naturally over time. Degradation times vary under different conditions, but rotenone is typically neutralized from three days to eight weeks after application. A late October treatment should insure that even if the rotenone persists during winter beneath the ice as the Minnesota treatment suggests it could, all rotenone in Cheney Lake should detoxify by the time the lake-ice melts in the spring of 2009.

Another issue being considered is the storm drain that connects Cheney Lake to Chester Creek (Figure 4). Discharge rates from Cheney Lake through the pipe that empties in the storm drain and eventually into Chester Creek are weather-dependent. During dry periods, there is negligible discharge. However, following a rainstorm, the discharge rates will increase depending on the level of the lake. Rain events are common in Anchorage during the fall. Average October precipitation is 2.09 inches. The risk of rotenone-treated water entering Chester Creek at a concentration detrimental to fish is minimal. Rotenone is already diluted when applied to the lake. If a rain event occurred and rotenone-treated water entered the storm drain, the rotenone would further dilute from both the rain and the other storm water flushing through that system. Once this water reaches Chester Creek, it would be further diluted by the high flows in the creek water and would no longer persist at a concentration dangerous to fish or aquatic invertebrates. As an added precaution during treatment, caged sentinel fish will be placed at the outflow of the storm drain pipe in Chester Creek. This cage will be monitored by ADF&G personnel during treatment to ensure there is no rotenone- treated water entering the creek and affecting the sentinel fish. If sentinel fish do respond, project personnel at the lake will be immediately notified. A drip station containing potassium permanganate ($KMnO_4$) will be utilized to neutralize the rotenone before it

enters Chester Creek.

Following the rotenone treatment, there could be a substantial quantity of dead pike carcasses. Bradbury (1986) reported that approximately 70% of rotenone-killed fish in Washington lakes immediately sink. Parker (1970) reported that at water temperatures of 40° Fahrenheit and cooler, dead fish required 20-41 days to surface. The most important factors inhibiting fish from ever surfacing are cooler water (< 50 °Fahrenheit) and deep water (> 15 feet). Cheney Lake has a maximum depth of 14 feet and the desired treatment period (Oct-May) would likely result in water in the 32-45 °Fahrenheit range (Dan Bosch, personal communication) and potentially result in few recoverable fish. Bradbury (1986) also reported that 9 of 11 water bodies in Washington treated with rotenone experienced an algae bloom shortly after treatment. This occurred from the input of phosphorus to the water as fish decayed. Bradbury further noted that approximately 70% of the phosphorus content in the dead fish would be released into the lake through bacterial decay. This stimulates phytoplankton production which in turn increases zooplankton production, providing prey for macro-invertebrates and fish. This change in water chemistry is viewed as a benefit to stimulate plankton growth (UDWR 2007). Nonetheless, ADF&G personnel will recover and dispose of all surfacing dead fish on regular intervals until ice-up, then again following ice-out until no dead fish are observed.

Comment 2f: No contamination of groundwater is anticipated to result from this rotenone treatment. Rotenone binds readily to sediments and is broken down in soil and in water through the processes of hydrolysis, photolysis, and biodegradation (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). The primary soil type in the Cheney Lake area consists of 'cryorthents' and 'urban land' composed of gravel-filled sandy loams and clays (USDA Anchorage Soil Survey). An additional layer of organic muck and detritus overlies these soils within the lake. Figure 5 details the DNR records of the ground water profile in the vicinity of Cheney Lake. However, personal communication with DNR hydrologists indicates there is a shallow aquifer 20 ft to 60 ft below the ground surface that provides water for the springs in that area. Movement of water in the shallow aquifer is primarily upward into the lake. According to Municipality of Anchorage hydrologists, general lateral groundwater movement in the area near Cheney Lake is from the northeast to the southwest. There are several private wells in the Cheney Lake area (NECC personal communication), and Municipal records indicate that there are wells within a mile both southeast and west of the lake. Depth data for all of these wells are not available, but according to DNR records most known well depths are greater than 145 feet and below the clay confining layer. There is at least one record of a well on the west side of the lake that is 60 feet deep. However, research has documented that rotenone can only penetrate a maximum of three inches in sandy soils (Hisata 2002) and does not affect groundwater. Studies indicate that the other compounds in liquid rotenone formulations have not been detected at harmful levels in groundwater associated with rotenone application (Finlayson et al. 2000, Ridley et al. 2006, Fisher 2007), and case studies in Montana have concluded that rotenone movement through groundwater does not occur (MFWP, 2008). Because water leaving Cheney Lake must travel through lake sediments, soil, and gravel, and rotenone is known to bind readily with these substances, no exposure to ground or well water is anticipated.



LOCAL NO. SB 13-3-23 cc.DA
SITE ID

DAILY DRILLING LOG

PENN JERSEY DRILLING CO.

Current owners? David + Rena Bonifacio Jones

2833 East 72nd Avenue — Anchorage, Alaska 99502 — 344-2612

OWNER OF LAND: Mr. Paul Boniface
ADDRESS: Northern Lights & Boniface
WELL—SITE: Right corner of garage
DATE—STARTED: November 12, 1981
DATE—ENDED: November 12, 1981
DEPTH OF WELL: 145'
STATIC LEVEL OF WATER FT.
DRAW DOWN FT.
GALS. PER HR.: Mid 17 GPM
KIND OF CASING: 6" Steel Welded

KIND OF FORMATION:

well within NE¼ SE¼ SW¼ and SE¼ Sec 25, T13N, R3W, SM

FROM	0	FT. TO	60	FT.	Clay & Gravel		
FROM	60	FT. TO	61	FT.	Boulder		
FROM	61	FT. TO	101	FT.	Silty Gravel		
FROM	101	FT. TO	107	FT.	Damp Clay & Gravel		
FROM	107	FT. TO	143	FT.	Clay & Gravel		
FROM	143	FT. TO	145	FT.	Gravel & Water		

MISCL. INFORMATION:

DRILLER'S NAME: Larry Jr., & Ted Schachle

Figure 5. Drilling log from a local well that shows the underlying hydrologic and geologic features of the Cheney Lake region.

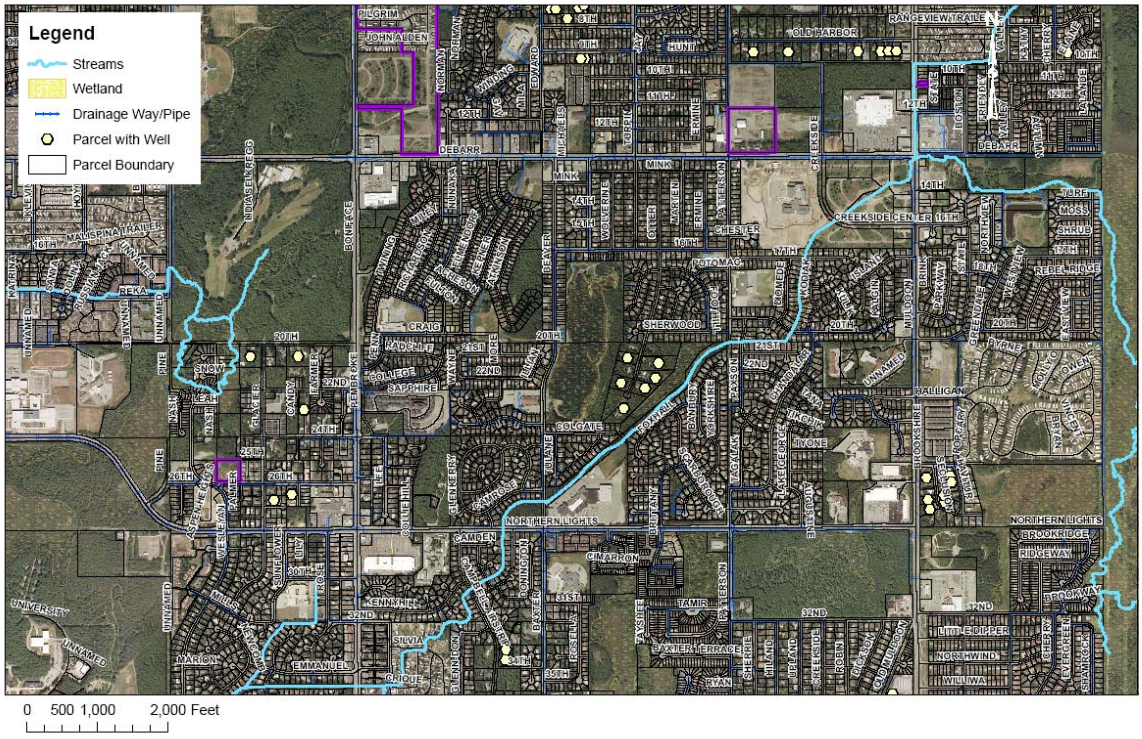


Figure 6. Municipality of Anchorage records for private well locations near Cheney Lake.

Comment 2m: The treatment will occur within Cheney Lake. ADF&G will submit a pesticide permit application to the Alaska Department of Environmental Conservation (ADEC) which must be approved prior to treating Cheney Lake with rotenone.

Table 3. Impacts to air.

3.Air Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Emission of air pollutants or deterioration of ambient air quality? (Also see 13 c)			**X**		**3a**
b. Creation of objectionable odors?			**X**		**3b**
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		**X**			
d. Adverse effects on vegetation, including crops, due to increase emissions of pollutants?		**X**			
e. Will the project result in any discharge which will conflict with federal or sate air quality regs.		**X**			

Comment 3a: Emissions from an outboard motor could be produced but are expected to dissipate rapidly. A four-stroke motor will be used for the Cheney Lake treatment, so any emissions or odors will be minor.

Comment 3b: Other powder and liquid rotenone formulations are known to cause odors during treatment. However, CFT Legumine™ was formulated to remove the hydrocarbon solvents that are present and responsible for these odors in other rotenone formulations. Prentiss Corporation, which manufactures CFT Legumine™, lists it as "virtually odor-free". Therefore, any odors associated with the rotenone treatment in Cheney Lake should be short term and minor.

The dead northern pike carcasses that will result from this project may cause objectionable odors. Collecting and/or sinking of dead fish in the lake will help mitigate this, making the impacts from these odors short-term and minor as well.

Table 4. Impacts to vegetation.

4. Vegetation Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops and aquatic plants)?			**X**		**4a**
b. Alteration of a plant community?		**X**			
c. Adverse effects on any unique, rare, threatened, or endangered species?		**X**			
d. Reduction in acreage or productivity of any agricultural land?		**X**			
e. Establishment of spread of noxious weeds?		**X**			
f. Will the project affect wetlands, or prime and unique farmland?		**X**			

Comment 4a: Cheney Lake Park has a paved parking lot adjacent to a level dirt area from where the rotenone treatment can be staged, so there should be no vegetation impacts from this. However, treating the surrounding wetlands with back pack sprayers will require project personnel to walk through wetland vegetation and temporarily flatten some plants. However, no direct, immediate, or long-term impacts to vegetation are anticipated from the treatment, itself, because rotenone does not negatively affect plants at concentrations necessary to kill fish.

Table 5. Impacts to fish and wildlife.

5. Fish/Wildlife Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Deterioration of critical fish or wildlife habitat?		**X**			
b. Changes in the diversity or abundance of game animals or bird species?			**X**		**5b**
c. Changes in diversity or abundance of nongame species?			**X**		**5c**
d. Introduction of new species into an area?		**X**			
e. Creation of a barrier to the migration or movement of animals?		**X**			
f. Adverse effects on any unique, rare, threatened, or endangered species?		**X**			
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?			**X**		**See 5b,c**
h. Will the project be performed in any area in which T & E species are present, and will the project affect any T & E species on their habitat? (Also 5f)		**X**			
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		**X**			

Comment 5b:

Fish: This project is designed to kill non-indigenous invasive fish. Other than northern pike, the only other fish species in Cheney Lake are the three-spine stickleback and introduced Alaska blackfish. The stickleback likely colonized from Chester Creek. Sticklebacks tend to be more resilient to rotenone and often survived treatments in Alaska during the 1960s that were aimed at eradicating them from lakes prior to stocking. It is anticipated that enough sticklebacks will survive this treatment to replenish the population. However, as an added precaution, ADF&G is working with faculty and students from the University of Alaska Anchorage to re-stock the stickleback population after the rotenone treatment if necessary. This would assist in providing a food source for waterfowl when they return to the lake in the spring of 2009. Alaska blackfish

are not native to Anchorage lakes. Their eradication in Cheney Lake is not a concern. Previously stocked rainbow trout have already been eliminated by northern pike or have naturally expired since stocking was discontinued. Rainbow trout will be re-stocked into Cheney Lake once the invasive pike are eradicated.

Game Mammals: Cheney Lake is located in an urban setting. Bears occasionally move into greenbelts and stream corridors in Anchorage, but they are a rare occurrence in the vicinity of Cheney Lake. During the fall, when the Cheney Lake treatment is planned, bears will be preparing for hibernation and are not expected to be in the vicinity. Following the rotenone treatment, daily monitoring of the lake to collect dead fish should limit fish carcasses from becoming an attractant to bears. This project should have no impact on bears in Anchorage.

Moose are frequently found throughout Anchorage. During the fall, they could be present near the lake. It is possible that these moose may stand in or ingest water from the lake during the period from application until the lake surfaces freezes over. EPA approved bioassays indicate that, at the proposed concentrations, rotenone will have no effect on mammals that are exposed to or drink the rotenone-treated water (Schnick 1974a, 1974b; Herr et al. 1967).

Migratory waterfowl: During the proposed treatment period, most waterfowl will have already migrated from the area. The remaining waterfowl that could be present during the proposed treatment may be disturbed by the treatment activities and temporarily leave the Cheney Lake area, but the availability of other waters in close proximity to the project area should minimize any impacts. It is possible that birds may feed on rotenone-killed fish carcasses shortly after treatment. However, research has indicated it is not physiologically possible for birds to consume sufficient quantities of rotenone-killed fish to result in a lethal dose (Finlayson 2000 and USEPA 2007).

Other Birds: Birds common to the area that also could potentially consume dead fish include the bald eagle, common loon, red-necked grebe, mallard duck, raven, and magpie. It is possible that some of these bird species could be present during treatment, come in contact with rotenone-treated water, drink rotenone-treated water, and/ or consume rotenone-killed fish. Efforts to remove rotenone-killed fish that surface would minimize any potential risks to these birds. However, at the concentrations necessary to kill fish, birds are not harmed even if they do consume rotenone-killed fish (Finlayson et al. 2000, Ling 2003, NPS 2006, USEPA 2007). During their re-registration process for rotenone, the EPA acknowledged that birds would have to eat tens of thousands of rotenone-killed fish to receive a lethal dose (Jarvin and Ankley 1999 cited in USEPA 2007). According to Finlayson et al (2000), the hazard associated with drinking water containing rotenone is very small for birds and mammals because of the low concentration of rotenone used during treatments and the rapid degradation of rotenone in the environment. Long-term impacts from removing Cheney Lake's northern pike population would not have significant impact on birds. Conversely, because northern pike have been known to opportunistically prey on waterfowl and their young, the eradication of these fish from the lake may actually benefit avian populations in the area.

Comment 5c: Other non-game organisms that might be present during this project include zooplankton, aquatic insects, wood frogs, and small mammals such as muskrats.

Invertebrates: In general, studies report that with the exception of zooplankton, most aquatic invertebrates are less sensitive to rotenone treatment than fish (Schnick 1974b). Anderson

(1970) reported that comparisons between samples of zooplankton taken before and after a rotenone treatment did not substantially change. One study reported that no long-term significant reduction in aquatic invertebrates was observed after a rotenone treatment which was applied at concentrations twice as high as those proposed for Cheney Lake (Houf and Campbell 1977). In most cases, the reduction in aquatic invertebrate density is temporary (Schnick 1974b). In a study on the relative tolerance of aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rate of re-colonization. Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to rotenone.

Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989) and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Jacobi and Deegan 1977; Boulton et al. 1992; Matthaei et al. 1996). Recolonization will include aerial dispersal of adult invertebrates from nearby aquatic habitats (e.g. mayflies, caddisflies).

Amphibians: Wood Frogs are the only amphibians in the Anchorage area. Wood frogs have not been detected in Cheney Lake, and it is suspect that the pike prevent wood frogs from establishing in the lake. Nevertheless, there may be small numbers of wood frogs in the vicinity of Cheney Lake and Chester Creek.

Wood frogs mate in the spring, and their offspring develop rapidly during early summer. This northern adaptation helps ensure complete metamorphosis before fall freeze-up (ADF&G Wildlife Notebook Series: Frogs and Toads). Because adult frogs do not have gills, they are more resistant to the effects of rotenone than fish. Grisak et al. (2007) conducted laboratory studies on long-toed salamanders, Rocky Mountain tailed frogs, and Columbia spotted frogs and concluded that the adults of these species would not respond negatively to rotenone, but the larval and tadpole life stages could be affected by rotenone at fish killing concentrations. These authors recommended implementing rotenone treatments at times when tadpoles were not present, such as in the early spring or later in the fall which aligns well with the timing of the proposed fall Cheney Lake treatment.

Non-game mammals: Various mammals ranging in size from shrews to moose could be in the vicinity of Cheney Lake and could scavenge on rotenone killed fish or drink treated lake water. The effects of rotenone on non-target organisms have been studied extensively. Mammals, in general, are not affected because enzymes in their stomachs neutralize rotenone (Finlayson 2000, AFS 2002, and USEPA 2007). Laboratory tests have been conducted in which rats and dogs have been fed forms of rotenone as part of their diet for periods of six months to two years (Marking 1988). Observed effects included diarrhea, decreased food consumption, and weight loss. Researchers reported that despite the unusually high treatment concentrations of rotenone fed to rats and dogs, the chemical did not cause tumors or reproductive problems in these mammals. CDFG (1994) studies on potential risks to terrestrial animals found that a 22-pound dog would have to drink 7,915 gallons of lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish to receive a lethal dose. A half-pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986) or drink an unlikely 66 gallons of water treated at 1 ppm, the planned concentration for Cheney Lake.

It is important to note that nearly all of these examples involved subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not be exposed to rotenone during normal use in fisheries management. Based on this information we would expect the impacts to non-target, non-gill breathing organisms to be non-existent.

B. HUMAN ENVIRONMENT

Table 6. Noise and electrical effects.

6. Noise/Electrical Effects Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Increase in existing noise levels?			**X**		**6a**
b. Exposure of people to severe or nuisance noise levels?		**X**			
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property		**X**			
d. Interference with radio or television reception and operation?		**X**			

Comment 6a: The only noise generated from this project would result from the use of an outboard motor during application of the rotenone and collection of dead fish afterwards. The noise generated from these activities would be short-term and minor.

Table 7. Land use impacts.

7. Land Use Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Alteration or interference with the productivity or profitability of the existing land use area?		**X**			
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		**X**			
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?		**X**			
d. Adverse effects on the relocation of residences?		**X**			

Table 8. Risk and health hazards.

8. Risk/Health Hazards Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			**X**		**8a**
b. Affect an existing emergency response or emergency evacuation plan or create a need for a new plan?		**X**			**8b**
c. Creation of any human health hazard or potential hazard?		**X**			**see 8a,c**
d. Will any chemical toxicants be used?		**X**			**see 8a**

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the rotenone applicators. All applicators would follow protocol and wear safety equipment listed on the CFT Legumine label such as a fitted respirator (when mixing), goggles, rubber boots and gloves and protective clothing. All applicators have been trained on the safe handling and application of the piscicide at a formal course taught at the U.S. Fish and Wildlife Service Natural Conservation Training Center in Shepherdstown, West Virginia. Four

sport fish division biologists have been certified by the ADEC to apply pesticides in Alaska.

Rotenone will be mixed, transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill, and all operations will be conducted or supervised by state-certified applicators. In the event of an accidental rotenone spill at Cheney Lake, project personnel will contain the spill, immediately contact the ADEC for assistance, and ensure that non-project personnel do not enter the spill area.

Comment 8b: ADF&G has a treatment plan for this rotenone treatment. This plan addresses all aspects of safety for project personnel. Elements of the plan include establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency, first aid, emergency responder information, personal protective equipment, monitoring and quality control, and other details. Emergency response protocols are addressed in detail in the treatment plan. The risk of emergency response for this project would be minimal and any impacts to potential emergency responders would be short-term and minor.

Comment 8c: Although pesticides are widely used to control unwanted species, legitimate public concerns have been raised regarding health and human safety. As with any pesticide, direct exposure to, or consumption of piscicides at full strength, can have harmful or sometimes fatal effects on humans. Rotenone is an EPA-registered restricted use pesticide under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA; USEPA 2007). Further, CFT Legumine™ is registered by the ADEC for use in Alaska.

Several recent documents have addressed a range of questions concerning rotenone and human health and safety issues especially in relationship to the use of rotenone for fisheries management (Finlayson et al. 2000, NPS 2006, CDF&G 2006, Fisher 2007 and USEPA 2007. Additional information on rotenone and human health and safety concerns is available online at:

The Rotenone Stewardship Program (http://www.fisheries.org/units/rotenone/index.htm)

The Extension Toxicology Network (http://extoxnet.orst.edu/pips/rotenone.htm)

The World Health Organization (http://www.who.int/ipcs/publications/pesticides_hazard_rev_3.pdf)

Millions of dollars have been spent in the U.S. on research to evaluate the safety of rotenone, and the majority of this work has focused on human health questions (Finlayson et al. 2000). Results of these studies summarized in Finlayson et al. 2000 confirm that rotenone does not cause birth defects (HRI 1982), reproductive dysfunction (Spencer and Sing 1982), gene mutations (Van Geothem et al. 1981; BRL 1982), or cancer (Marking 1988). No fatalities in humans have been reported in response to proper use of rotenone products (Ling 2003). When used according to label instructions for fish management, hazards to human health are minimal. Non-lethal symptoms such as headaches and skin rashes were reported for humans exposed to powdered rotenone continuously for three weeks (Pintler and Johnson 1958), but this is not typical exposure, and this current project proposes the use of liquid rotenone instead of powder. In their re-registration of rotenone, the USEPA (2007) concluded that using rotenone to control fish "does not present a risk of unreasonable adverse effects to humans or the environment".

Regarding exposure to trace constituents in CFT Legumine™ liquid rotenone, trichloroethylene

(TCE), a known carcinogen, is present, but the concentration of this substance in water immediately following treatment (0.0000073 mg TCE per liter of water) (Fisher 2007) is within the level permissible in drinking water (Finlayson 2000). Finlayson et al. (2000) also stated that other substances including xylenes and naphthalene found in CFT Legumine™ are the same as those found in fuel oil and are present in recreational waters everywhere because of outboard motors.

As discussed earlier, drinking rotenone poses little risk to humans because of the low concentration used and rapid degradation in the aquatic environment. Again, a 160-pound adult would have to drink 23,000 gallons, and a 22-pound child would need to drink over 1400 gallons of rotenone-treated water at one sitting to receive a lethal dose at pisicidal concentrations (Gleason et al 1969, Finlayson et al. 2000).

There have been previous concerns that rotenone exposure could be linked to Parkinson's disease, but this linkage has since been refuted. In a study in which rats were injected with rotenone for a period of several weeks, researchers reported finding symptoms characteristic of Parkinson's disease (Betarbet et al. 2000). However, these results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2), that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration whereas normal routes of exposure actually slow introduction of chemicals into the bloodstream (Rotenone Stewardship program, http://www.fisheries.org/units/rotenone/parkinsonsstudy.shtml). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results.

The major risks to human health from rotenone come from accidental exposure during mixing and application. This is the only time when humans are exposed to concentrations that are greater than those needed to eradicate fish. To prevent accidental exposure to liquid formulated rotenone, the ADEC requires applicators to be:

- Working under the direct supervision of a trained and certified pesticide applicator
- Equipped with the proper safety gear, which, in this case, includes fitted respirator, eye protection, rubberized gloves, and protective clothing.
- In possession of product labels during use
- Storing materials only in approved containers that are properly labeled
- Adhering to the product label requirements for storage, handling, and application

Any threats to human health during application will be greatly reduced with proper use of safety equipment. Public notification through news releases, signage, lake access closure, and administrative personnel in the project area should be adequate to keep unintended park users from being exposed to any treated waters.

There could be an inhalation risk to ground applicators spraying rotenone in the littoral vegetation. To guard against this, ground applicators will be equipped with protective clothing, eye protection, and proper breathing equipment (i.e. organic vapor respirators with pesticide filters).

Table 9. Impacts to the community.

9. Community Impact Will the proposed action result in:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Alteration of the location, distribution, density, or growth rate of the human population of the area?		**X**			
b. Alteration of the social structure of a community?		**X**			
c. Alteration of the level of distribution of employment or community or personal income?		**X**			
d. Changes in the industrial or commercial activity?		**X**			
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		**X**			

Table 10. Impacts to public services, taxes and utilities.

10. Public Services/Taxes/Utilities	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Will the proposed action have an effect upon or result in the need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid water disposal, health, or other governmental services? If any, specify:			**X**		**10a**
b. Will the proposed action have an effect upon the local or state tax base and revenues?		**X**			
c. Will the proposed action result in need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		**X**			
d. Will the proposed action result in increase use of any energy source?		**X**			
e. Define projected revenue sources		**X**			
f. Define projected maintenance costs		**X**			

Comment 10a. This project will occur within Cheney Lake Park owned by the municipality of Anchorage. The Anchorage Department of Parks and Recreation is aware of and supports this proposed management action. Restoring the rainbow trout fishery in Cheney Lake will provide recreational fishing opportunities. Though access to the park will be limited during treatment, there will be no long-term closures or impacts to recreational uses of the park.

Table 11. Impacts to aesthetics and recreation.

11. Aesthetics/Recreation	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?			**X**		**11a**
Alteration of the aesthetic character of a community or neighborhood?			**X**		**11c**
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings?			**X**		**11a,c**
d. Will any designated or proposed wild and scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		**X**			

Comment 11a. As previously mentioned, public access to Cheney Lake is on land owned by the Municipality of Anchorage and administered by the Anchorage Parks and Recreation Department. Public access will be discouraged at Cheney Lake immediately before, during and immediately after treatment using appropriate signage and public notices. It is also possible offending odors could arise from decomposing fish shortly after treatment or from the CFT Legumine™ formulation itself, although the Prentiss Corporation describes CFT Legumine™ as odorless. The odors from CFT Legumine™ would be expected to dissipate rapidly. Also, planned routine removal of fish carcasses post-treatment would be expected to minimize offensive odors.

Comment 11c: The primary goals of this project are to (1) reduce the threat of northern pike being illegally introduced into critical fishery habitat like Chester Creek and (2) to improve fishing quality at Cheney Lake which would result in increased use by recreational anglers. Anglers that enjoy fishing for pike in Cheney Lake may be impacted because these pike will be eradicated. However, restoring the rainbow trout fishery will provide more favorable recreational fishing opportunities in the lake. Again, since the introduction of pike, angling effort in the lake has dropped by about 80%. This has likely also made the lake a quieter area for local residents. Restoration of the rainbow trout fishery will likely result in more residents, families and kids fishing in the lake. This is one of the major objectives of this project, but it is also recognized that there may be minor aesthetic impacts to lake residents as a result. However, any aesthetic impacts directly associated with the rotenone treatment and dead fish in the treatment area would be minor.

5.**Table 12. Impacts to cultural and historical resources.**

12. Cultural/Historical Resources	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Destruction or alteration of any site, structure or object of prehistoric, or paleontological importance?		**X**			
b. Physical change that would affect unique cultural views?		**X**			
c. Effects on existing religious or sacred uses of a site or area?		**X**			
d. Will the project affect historic or cultural resources?		**X**			

Table 13. Summary evaluation of significance.

13. Summary Evaluation of Significance Will the proposed action, considered as a whole:	Impact Unknown	None	Minor	Potentially significant	Can impact be mitigated
a. Have impacts that are individually limited, but cumulatively considerable? (A project or program may result in impacts on two or more separate resources which creates a significant effect when considered together or in total).		**X**			
b. Involve potential risks or adverse effects which are uncertain but extremely hazardous if they were to occur?		**X**			
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		**X**			
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		**X**			
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	**X**			**yes**	**13e**
f. Is the project expected to have organized opposition or generate substantial public controversy?	**X**				**13f**
g. List any federal or state permits required.					**13g**

Comment 13e and 13f: In general**,** the use of any pesticide can generate controversy from some people. Outreach efforts by the Department will help to educate the public on the safe and effective use of rotenone. It is not known if this project will have organized opposition. One reason that ADF&G is considering this course of action is that invasive northern pike have already impacted fisheries in Anchorage and have resulted in lost fishing opportunities in lakes that were previously stocked with rainbow trout or salmon.

Comment 13g: The following permits and approvals are required:

ADEC (Alaska Department of Environmental Conservation): Alaska Pesticide Use Permit (Appendix 2)

Alaska Board of Fisheries: Written consent of approval to use rotenone must be requested of and granted by the Alaska Board of Fisheries (Appendix 3).

Anchorage Department of Parks and Recreation: Permit to operate an outboard motor in Cheney Lake (Appendix 4)

PART III. ALTERNATIVES

Alternative 1 - Rotenone treatment and rainbow trout stocking (Proposed Action)

The proposed action involves removing invasive northern pike from Cheney Lake using CFT Legumine™ 5% liquid rotenone. Following treatment and natural detoxification, the lake would be restocked with rainbow trout.

This alternative offers the highest probability of achieving the goals of improving the recreational fishery in Cheney Lake for public use and reducing the threat of invasive pike in Cheney lake being transported illegally to other areas.

Alternative 2 - Draining

Completely draining a lake or chemical treatment are the only methods proven to completely eradicate invasive, non-indigenous fish. Cheney Lake is small enough to drain, but the storm drain infrastructure will not allow the water from Cheney Lake to be directly pumped into Chester Creek. Water would have to be actively pumped overland into the creek. City engineers in 2007 estimated it would take 30 days to pump the water low enough to allow the lake to completely freeze and winterkill the pike. In addition to the time, the pumps would likely be a nuisance to area residents because they would have to run 24 hours and would be loud enough for neighbors to hear. Draining the lake and allowing it to winterkill could be an option, but this method would be far less efficient and cost prohibitive than chemical treatment. Residents around Cheney Lake have already expressed that draining the lake is not a preferred alternative.

Alternative 3 - Mechanical Removal

This alternative would involve using gill nets and/or trap nets to selectively remove northern pike. Once all northern pike were removed, Cheney Lake would be restocked with rainbow trout.

Under specific conditions, gill nets have been successfully used to remove unwanted fish from lakes. Bighorn Lake, a 5.2-acre lake located in Banff National Park in Alberta, Canada, was gillnetted from 1997 to 2000 to remove an invasive population of brook trout (Parker et al. 2001). Over 10,000 net nights (1 net night = 1 net set overnight for at least 12 hours) were conducted over a four-year period to remove the population that totaled 261 fish. The researchers concluded that the removal of non-native trout using gill nets was impractical for larger lakes (> 5 acres). In clear lakes, fish have the ability to acclimate to the presence of gill nets and avoid them. These researchers reported observing brook trout avoiding gill nets within about two hours of being set.

Knapp and Matthews (1998) reported that Maul Lake, a 3.9-acre lake in the Inyo National Forest in California, was gill netted from 1992 to 1994 to remove another population of brook trout. The population consisting of 97 fish was successfully removed after 108 net days of effort. Following the removal of brook trout, Maul Lake was mistakenly restocked with rainbow trout. Efforts to remove them using gill nets were implemented immediately. From 1994 through 1997, 4,562 net days were required to remove the 477 rainbow trout from the lake. Knapp and Matthews (1998) reported that gill nets could be used as a viable alternative to

chemical treatment, but they acknowledged that the small size and shallow depth of Maul Lake leant itself to a successful fish eradication using gill nets. Their criteria for successful fish removal using gill nets include lakes less than 3.9 surface acres, less than 19 feet deep, little or no inflow or outflow to perpetuate reinvasion, and no natural reproduction of the fish population. Cheney Lake exceeds the surface area criteria described by these researchers, and the pike population is reproducing.

Deploying gill nets and traps requires frequent on-site inspections to check and re-set nets. This method of fish removal at Cheney Lake would require an unreasonable time and manpower commitment. Gill netting, the more efficient of the two mechanical methods listed, could expose birds and aquatic mammals to the risk of net entanglement in water. Although attempts can be made to visually discourage birds from approaching nets by using owl decoys or similar, prolonged and unattended netting will likely result in significant bird bycatch. Netting is not an efficient eradication technique, and though it can successfully reduce pike populations, it can never completely eradicate them.

Alternative 4- No Action

The no action alternative would allow the *status quo* to continue which would maintain or reduce the present angling opportunity. As long as invasive northern pike remain in Cheney Lake, ADF&G will not have the ability to restore the rainbow trout fishery, and angling opportunities for the local public will be limited. Further, there will be continued risk that northern pike could be transported from Cheney Lake to nearby wild salmon and trout habitats where these wild fisheries could be threatened.

PART IV. ENVIRONMENTAL ASSESSMENT CONCLUSION SECTION

A) Is an EIS required? *(Section A-D: for EA reviewer to address)*

Section 102(2)(C) of NEPA establishes the threshold "trigger" that starts the NEPA process. Since this project is being funded in part with federal dollars, the Federal decision-maker has to answer this key question – Might this proposed action be "a major Federal action significantly affecting the quality of the human environment"? If the Federal agency does not find significance, e.g. the alternatives analyzed in the EA would not significantly affect the environment, a Finding of No Significant Impact (FONSI) can be prepared.

After reviewing the information provided by the applicant, the assessment of environmental impact contained in Part II of this document, and the responses to the public comments that were received, the U.S. Fish and Wildlife Service has accepted the EA and has prepared and signed a FONSI for the project as described above.

B) Public involvement:

This EA was posted on the ADF&G internet site http://www.sf.adfg.state.ak.us/Statewide/InvasiveSpecies/PDFs/CheneyLakeEA.pdf and e-mailed directly to interested persons. In addition, a news release was issued on July 30, 2008 that outlined the proposed project, announced the public comment period, provided a link to an ADF&G website about rotenone, and provided a link to the draft EA. All interested citizens were encouraged to contact the preparer of this EA to discuss the proposal.

Public scoping/ notifications:

1) The local ADF&G Anchorage advisory committee, the Northeast Community Council, the Nature Conservancy, ADEC, USFWS, Anchorage Department of Parks and Recreation, and the Municipality of Anchorage Watershed Task Force were sent a project synopsis (Appendix 5) and an e-mail link to this EA.

2) This project has been presented to the Northeast Community Council at their meeting on June 19, 2008.

3) Fact sheets describing the project were distributed to residents immediately around the Lake. These flyers also announced the public meeting date (August 13, 2008) and included the web address to ADF&G's rotenone website.

4) ADF&G created websites to provide information about rotenone to the public. These included a link to the EA. As previously mentioned, these links were available in the news release and meeting flyers.

5) Written public notices of the Cheney Lake restoration proposal were announced in the Anchorage Daily News and ADF&G news releases as required by ADEC during the pesticide use permitting process.

6) An informational public meeting was held at 7:00 pm on August 13, 2008 at Baxter Elementary School

C) Duration of the comment period:

The comment period was 30 days. Public comments were accepted from July 23 - August 23, 2008**.**

D) Consideration of comments:

Written Public Comments and Responses:

During the 30-day public comment period from July 23 – August 23, 2008, four people contacted the ADEC with comments. There were seven questions submitted by three different people (#1-7 below). The fourth commenter submitted five written comments (#8-12 below). The ADEC collected all written questions and comments. ADEC and ADF&G worked together to provide answers and responses to those comments. ADEC sent out letters to the four commenters thanking them for their participation and answering their specific questions. The fourth commenter who submitted the written comments also received a written response to each comment.

All individual questions and comments are listed below:

1) What is the specific date that rotenone will be applied?

The rotenone application will occur during the week of October 20, 2008. The exact date will depend on precipitation. The intention is to apply the pesticide close to the time the lake freezes.

2) If we go fishing after the pesticide application, how can we be sure that the fish do not contain poison?

Fish exposed to rotenone generally die very quickly. In addition, the substance does not bioaccumulate (build up in tissues), so it is very unlikely that anyone might catch a live fish that contained any of the rotenone. Fish that are already dead should not be consumed because the EPA has not set a permissible residue level for human consumption. Therefore, consuming rotenone-killed fish is not recommended. Also, it may take awhile for rotenone-killed fish to surface, and bacteria on the dead fish may make them unsafe to eat.

3) Is rotenone the same chemical as CFT Legumine?

CFT Legumine is a commercially-produced liquid rotenone formulation. Rotenone is the active ingredient in CFT Legumine.

4) Is the pesticide smelly?

Rotenone products have an odor somewhat similar to mothballs, but the smell should dissipate quickly once the product is diluted into the lake. CFT Legumine is a newer and more improved rotenone formulation, and the manufacturer describes it as "virtually odorless".

5) How will the dead fish be removed and when?

Most of the dead fish will sink to the bottom of the lake, where they will decompose. This will stimulate phytoplankton growth in the lake which will in turn benefit the recovery of zooplankton and other aquatic invertebrates in the lake. Dead fish that surface will be collected daily by Fish and Game, frozen and used by sport fish aquatic education programs. Pike that are not needed for education programs will be taken to the Anchorage landfill.

6) Will the pesticide be harmful to my dog if he swims in the lake?

Swimming in the lake does not pose a hazard to humans or dogs. The EPA approved product label, which is based on extensive research and data, warns that swimming should not be allowed until after the rotenone application is complete and the product has been thoroughly mixed into the water. There is no waiting period specified, meaning that once applied, the water should be safe for swimming.

7) Will residents of the area be notified when the chemicals will be added to the lake so that we keep pets and children away that day?

Regulations require that warning signs be posted prior to application. Once the specific application date has been determined, ADF&G will post signs at locations around the entire lake.

8) The Department of Fish and Game has not measured discharge flow from the lake after storm events.

Discharge flows following storm events were not regularly collected because it was not necessary to collect these data. See the response to #9.

9) A storm event would cause rotenone-treated water to discharge into Chester Creek, which will harm fish in the creek.

It is possible that a rain event following treatment could discharge rotenone-treated water into Chester Creek. However, the rotenone from Cheney Lake would be so diluted from the lake, precipitation, storm water, and flows in Chester Creek that the Department does not believe it would enter Chester Creek at a concentration that is harmful to fish or other aquatic organisms. The following discussion explains this rationale:

Cheney Lake is an approximately 24-acre water body located in east Anchorage. It

was formerly a gravel extraction site that has since been inundated with water from ground fed springs, precipitation, storm drainage and surface run-off (Land Design North 2003). Cheney Lake is connected to Chester Creek by a storm drain (Figures 4a and b). According to a Municipality of Anchorage map (Figure 4a), the storm drain is 12,196 feet (~2.3 miles) long and enters Chester Creek approximately 1.83 miles west of Cheney Lake.

During rain events, excess water in the outlet pipe of Cheney Lake discharges directly into the storm drain. The storm drain has a manhole located across from the lake on Prosperity Drive with a 90-degree control pipe that maintains the lake level at a depth of 13.05 feet (Appendices 6 and 7). Discharge rates from Cheney Lake through this culvert and eventually into Chester Creek are weather-dependent. During dry periods, there is no discharge from the lake. However, following a rainstorm, the discharge rates will increase depending on the level of the lake. Average October precipitation is 2.09 inches (http://weather.uk.msn.com/monthly_averages.aspx?wealocations=wc:USAK0012), although drier periods tend to occur towards the end of the month when the lake begins to freeze. ADF&G will be monitoring the weather and will not apply rotenone when rain is predicted within 24 hours. Despite this precaution, there may be traces of rotenone in Cheney Lake for up to eight weeks following treatment, although the concentration (1 ppm of 5% liquid rotenone or .05 ppm active rotenone) will be highest the day of treatment then will continually decrease as it breaks down and becomes diluted. If a rain event occurs while rotenone is still in Cheney Lake, rotenone-treated water could be discharged into Chester Creek. However, the risk of rotenone-treated water entering Chester Creek at a concentration detrimental to fish is minimal based on results from previous field measurements. Specifically, following a minor rain event of 0.08 inches between August 27th and 28th 2008, flow rates in Chester Creek above and below the confluence of the storm drain outflow were 4 cfs. Contribution of storm water measured at the culvert into Chester Creek was minimal (0.2 cfs). If a major rain event occurred and rotenone-treated water entered the storm drain, the concentration of rotenone would become diluted from both the rain and the other storm water flushing through the system. The storm drain system drains an approximately 2,880 acre (4.5 square-mile) area (Appendix 8). There are nine storm drain connections between Cheney Lake and the Chester Creek outflow that drain this watershed through the culvert. Once this water reaches Chester Creek, it would be further diluted by the high flows in the creek and would no longer persist at a concentration dangerous to fish or aquatic invertebrates. The flow rates observed in Chester Creek on August 28th during a minor rain event (4 cfs), alone, are enough to dilute rotenone entering the creek 20-fold. During October and November, rainbow trout and Dolly Varden are the only fish species that would occupy Chester Creek. All coho salmon will have already spawned, and salmon eggs are not affected. Toxicity to trout varies with water temperature. During October, Chester Creek water temperatures typically range from 4 to 6 °C. At 7 °C, the LC_{50} (Lethal concentration for 50 percent of organisms exposed) of rainbow trout exposed to rotenone for six hours has been documented at 0.237 to 0.322 ppm (0.012 to 0.016 of active rotenone) (Marking and Bills 1976). The water from Chester Creek, alone, should be enough to dilute any rotenone discharge to a level that is non-lethal to resident fish. CFT Legumine^{TM} is the rotenone product that will be used for the Cheney Lake application and will be applied at 1 ppm. One ppm of CFT

Legumine™ would dilute to 0.05 ppm when exposed to flows of 4 cfs in Chester Creek. CFT Legumine™ is a 5% rotenone formulation, so the actual amount of diluted active rotenone would be approximately 0.0025 ppm which is almost five times lower than the amount proven to cause mortality in rainbow trout after six hours of exposure (Marking and Bills 1976). If there is a large rain event that causes rotenone in Cheney Lake to discharge into the storm drain, the addition of all the storm water discharge and higher flows in the creek will dilute the rotenone even more. Therefore, in the event that rotenone would enter Chester Creek, resident fish are not expected to be harmed**.**

As a precaution, during treatment, caged sentinel fish will be placed at the outflow of the culvert in Chester Creek. This cage will be monitored by ADF&G personnel periodically during and after treatment to ensure there is no rotenone-treated water entering the creek and affecting the sentinel fish. If sentinel fish do respond, ADF&G will call the Municipality, and they will immediately install a temporary air bladder to block the storm drain connection until neutralization efforts can begin. If necessary, neutralization will be accomplished by installing a drip station containing potassium permanganate ($KMnO_4$) within the manhole near Cheney Lake to neutralize the rotenone-treated water before it enters Chester Creek. Tests of sentinel fish survival will be conducted prior to the rotenone treatment. The water near the outflow in Chester Creek has a very high sediment load (Appendix 9) and is not ideal fish habitat. This is likely compounded by the storm water runoff. There is some concern that sentinel fish will not survive at the outlet due to the water quality there. Therefore, sentinel fish survival will be tested before rotenone is applied to Cheney Lake. As long as the sentinel fish survive these preliminary tests, monitoring their status during the rotenone treatment will be sufficient to know if neutralization is necessary. Finally, water samples will be collected in Cheney Lake following treatment. These samples will be analyzed by a water testing facility. These results will allow us to document the persistence of rotenone in Alaskan waters during fall treatments and assist us in calculating $KMn0_4$ rates should neutralization become necessary.

10) The well log data provided by the Department of Fish and Game is not adequate in determining if rotenone-treated water could potentially contaminate aquifers.

The well log that is presented (Figure 5) was provided by the DNR as an example of the soil and groundwater composition in the region. No contamination of groundwater is anticipated to result from this rotenone treatment. Rotenone binds readily to sediments and is naturally broken down by light, temperature, oxygen, and alkalinity. Sandy loams are the primary soils in the Cheney Lake area. Additionally, there is a layer of organic muck and detritus that overlies these soils within the lake. Generally, if there is sufficient sediment to support macrophyte growth in a lake, there is sufficient sediment to absorb rotenone. Further, rotenone does not penetrate more than three inches in sandy soils. Because water leaving Cheney Lake must travel through lake sediments, soil, and gravel which rotenone is known to bind readily with, no exposure to ground or well water is anticipated.

11) *The Department of Fish and Game has not accurately measured the area and depth of the lake.*

Existing volume and area estimates of Cheney Lake were determined using ADF&G's GIS data, and these data have been available to the public for many years. Two recent, independent, GIS investigations of the lake area have resulted in the same surface acreage estimates (~24 surface acres) that were reported in the environmental assessment of this project. Further, ADF&G conducted a bathymetric survey of Cheney Lake on September 3, 2008 to verify the volume of the lake (Figure 3).

12) *The Department of Fish and Game did not include plans to reintroduce sticklebacks to the lake, which are an important food source for migratory birds in spring.*

ADF&G is working with UAA to develop plans to study and, if necessary, reintroduce sticklebacks to Cheney Lake. Sticklebacks are capable of surviving rotenone treatments of 5 ppm. Prior to the rotenone treatment in Cheney Lake, UAA plans to collect a large sample of the existing stickleback population so that they can characterize their morphology and have genetic samples and stable isotope samples available for future work. They will also be collecting water chemistry data to accompany these samples. UAA intends to run stable isotope analyses on sticklebacks that are presently in the lake as well as on surviving fish after the rotenone treatment. Following the rotenone treatment, UAA staff would trap, snorkel and seine to see if stickleback survived. In the event that a sufficient population of sticklebacks did not survive the rotenone treatment, sticklebacks from another local population will be introduced. Before this stickleback re-introduction, ADF&G would obtain the appropriate permits and test the source populations for any potential pathogens.

Verbal Public Comments and Responses:

An informational public meeting was held on August 13, 2008 during the 30-day public comment period that ran from July 23 – August 23, 2008. ADF&G posted signs at the lake and at local businesses near Cheney Lake to advertise the meeting. In addition, all residents around Cheney Lake and members of the Northeast Community Council who had requested project announcements were mailed a letter with a flyer for the meeting. The meeting was held at Baxter Elementary School and was attended by 23 members of the public.

The meeting included a 45-minute presentation describing the project and an approximately 45-minute question and answer session. The topics discussed during the question and answer session are detailed below:

The area, volume, and maximum depth measurements of the lake are greater than those reported in the EA.

See the response to #11 in the written comments and responses section. The surface acreage of the lake was determined using aerial photography in GIS. Surface acreage was checked again after the meeting and found to be the same. On September 3, 2008, ADF&G conducted a bathymetric survey to confirm the volume of the lake. Again the volume and maximum depth of the lake were consistent with the earlier data that were reported.

How many pike are in Cheney Lake?

ADF&G does not have a population estimate for pike in Cheney Lake. However, 89 pike were removed with gill nets used to suppress the population in 2005, and 80 were again removed with nets in 2006. With invasive species it is the presence of a species, not the number that raises concerns.

What is the process for submitting public comments?

ADF&G explained that the written public comment period was from July 23 – August 23, 2008. ADEC staff was in attendance and also helped explain the process for submitting written comments for the state permitting process. ADF&G explained that comments submitted to the ADEC during the comment period would also be included in the NEPA review of the project.

There has not been sufficient communication about the project?

ADF&G described the public outreach efforts to date: ADF&G sent out a project synopsis to collaborating agencies and introduced the project to the Northeast Community Council at their meeting on June 19, 2008, collected a list of community council meeting attendees who wanted additional information about the project, sent the EA to everyone on the list, sent the ADF&G rotenone webpage link to everyone on the list, issued a news release about the project and the availability of the draft EA, published an article in the Alaska wildlife news online magazine, was interviewed several times about the project in local newspapers, sent invitations to all residents around the lake regarding the meeting, and held the informational meeting. ADF&G also mentioned that a news release would be issued just before the application takes place, and signs will be posted to let the public know the exact date of the application. An e-mail was recently sent to the president of the Northeast Community Council with an update on the project.

Rotenone will discharge through the storm drain to Chester Creek.

See the response to #9 in the written public comments and responses section. If a rain event causes rotenone-treated water to discharge into the storm drain, ADF&G will monitor the condition of sentinel fish to see in neutralization is necessary. ADF&G will be prepared to neutralize rotenone treated water with potassium permanganate in the man-hole of the storm drain on Prosperity Drive. However, the amount of

precipitation, runoff, and flow from the creek should be enough to dilute rotenone to a sub-lethal concentration for any fish in the area.

Where has rotenone been applied?

ADF&G provided several examples including Perch Lake on the Kenai Peninsula, Lake Davis in California, Strawberry Reservoir in Utah, Diamond Lake in Oregon, and lakes in the Adirondacks. ADF&G reiterated that rotenone is widely used in the United States and has been since the 1930s. ADF&G provided a brochure about rotenone from the American Fisheries Society Rotenone Stewardship Program and provided web addresses for further information about rotenone.

Will rotenone impact wells in the area?

See the response to #10 in the written public comments and responses section. Rotenone does not penetrate more than three inches in sandy soils. Cheney Lake has a maximum depth of 14 feet, and the shallow aquifer is at least 20 feet below the surface. According to available well records, most wells in the area were dug below a clay confining later making it impossible for rotenone to penetrate groundwater supplies and affect local wells.

Will rotenone affect vegetation in the lake?

Rotenone has no effect on vegetation. Meeting attendees were concerned that if the lake was drained as part of the rotenone application, the lake would become more vegetated. ADF&G explained that they will not be lowering the water level of lake before applying the rotenone.

How is rotenone applied?

ADF&G explained that rotenone will be pumped below the water surface from a motorboat. The prop wash from the outboard motor will help mix the rotenone through the water column. In the vegetated, wetland areas surrounding the lake, rotenone will be applied with back-pack sprayers.

Fishing line left onshore can harm birds around the lake.

Some meeting attendees were concerned that increased participation in the fishery after ADF&G stocks Cheney Lake with rainbow trout will result in more improperly discarded litter and fishing line left along the shore. They were concerned about the welfare of grebes and loons that could become entangled in improperly discarded fishing line. ADF&G responded that although litter law enforcement is outside of ADF&G's jurisdiction, ADF&G will promote ethical angling by posting signs instructing anglers to properly discard fishing line and litter. These signs would focus on the impacts of improperly-discarded monofilament on waterfowl. ADF&G could also increase the presence of employees near the lake following the re-stocking to

promote ethical angling in the park. Also, it was agreed upon that installing monofilament recycling tubes would be a great community service project for a church or scouting group for example. Both ADF&G and the Anchorage Department of Parks and Recreation will work with a community group or an eagle scout candidate with this project.

Stocking the lake with rainbow trout will increase the number of people in the park and the potential for illegal activity.

It is likely that restocking Cheney Lake will increase the number of people who use Cheney Lake Park. One of the main goals of this project is to restore the recreational fishery in Cheney Lake. Prior to the illegal pike introduction, Cheney Lake was one of the most popular fisheries in Anchorage, and it's location in an eastside neighborhood made it popular with families and kids. ADF&G is trying to rehabilitate the lake so that it is, again, a popular fishing location for families. ADF&G has a legal authority to stock fish to enhance recreational fishing opportunities (AS 16.10.44). ADF&G stocks many water bodies in Alaska for the purpose of providing recreational angling opportunities and is not aware of a link between recreational fishing and criminal activity. Regulating criminal activity in Cheney Lake Park that does not pertain to state fish and game laws, however, is outside of ADF&G's jurisdiction.

Stocking the lake with rainbow trout will increase the number of people in the park and lead to increased noise levels.

Increasing the recreational usage of the fishery in Cheney Lake is a large part of this project. It is possible that noise levels in the area will increase as a result of increased use of the park. However, ADF&G has a very popular stocked lakes program and there have never been complaints from lake residents about noise levels from anglers. Cheney Lake Park has a multi-use bike trail that is shared by a variety of park users. Noise levels in the park can result from a variety of activities in the park other than angling. Under municipal ordinance 15.70, noise levels in the park cannot exceed 60 decibels between 10:00 pm and 7:00 am. This ordinance is enforced by the Anchorage police department. ADF&G does not have authority over regulating noise levels in municipal parks, but ADF&G will inform the municipality when the lake is stocked so they can increase police patrols if necessary.

Who decides on stocking?

ADF&G is the agency responsible for managing fishery resources in the state. Sport Fish managers create stocking plans for their areas, evaluate existing programs and submit an annual stocking plan available for public review every year.

Telephone and E-mail Correspondence:

As of the end of September, 2008, ADF&G has received a total of eleven phone calls and three e-mail correspondences concerning the Cheney Lake restoration project. Most phone calls about this project were received after articles about the project were published in the Anchorage Daily News. Most of these phone calls occurred before the official public comment period began. Several callers wanted to know if they could have the fish after the rotenone treatment to use for food. ADF&G explained to those callers that rotenone-killed fish could not be used for food because there is no EPA-set rotenone tolerance level for human consumption, and fish that do not surface right away can acquire bacteria making them unsafe to eat. Other callers wanted to know if they could fish for pike in Cheney Lake before the rotenone application. They were told there was no bag limit for pike in the lake, and they were encouraged to harvest as many as possible before the rotenone application. One caller wanted to know what the status of the project was and if she could be notified before the application so she wouldn't let her dogs swim in the lake that day. The remaining phone calls and e-mail correspondence were from people expressing their support for the project and wanting to know how they could be of assistance.

E) Name, title, address, and telephone number of the Person Responsible for Preparing the EA Document:

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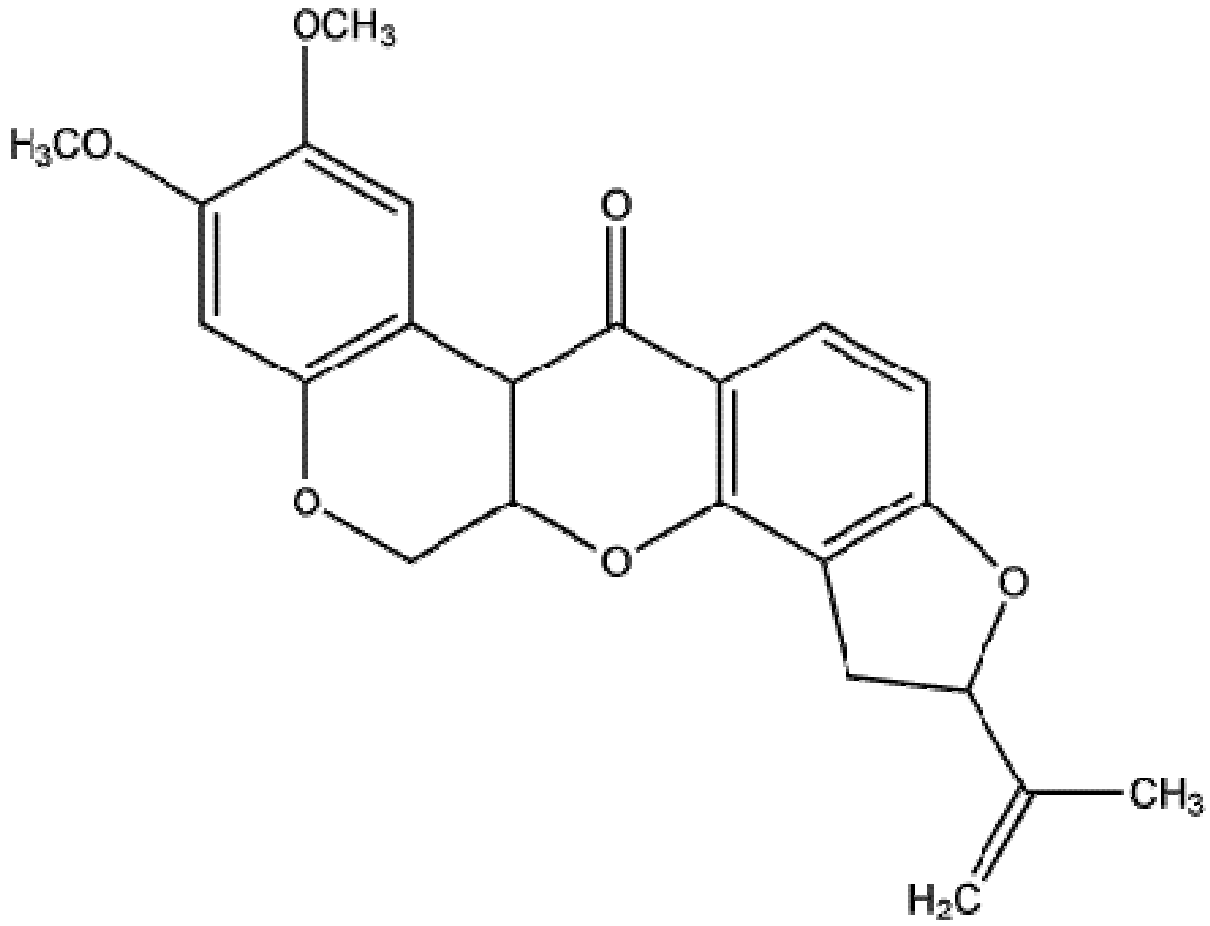
Appendix 1. Molecular structure of rotenone.



Appendix 2. Department of Environmental Conservation Pesticide Use Permit

STATE OF ALASKA / SARAH PALIN, GOVERNOR

DEPT. OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL HEALTH
PESTICIDES PROGRAM

555 Cordova Street
Anchorage, Alaska 99501
PHONE: (907) 269-7644
FAX: (907) 269-7654
http://www.dec.state.ak.us/

Certified Mail # 7003 2260 0004 1152 6632
Return Receipt Requested

September 8, 2008

Kristine Dunker
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518

Subject: Permit to Apply Pesticides, **# 08-0908-09-AQU-01**

Dear Ms. Dunker:

The Department of Environmental Conservation (DEC) has completed its evaluation of your request for a permit for the application of the pesticide **CFT Legumine Fish Toxicant**, EPA Registration Number **75338-2** to waters of the state to eradicate invasive Northern Pike in Cheney Lake, Anchorage, Alaska. DEC is issuing the enclosed permit in accordance with Alaska Statute 46.03.330 and Title 18, Chapter 90.525 of the Alaska Administrative Code (18 AAC 90.525) for a period not to exceed two years.

Any person who disagrees with this decision may request an adjudicatory hearing in accordance with 18 AAC 15.195 - 18 AAC 15.340, or an informal review by the Division Director in accordance with 18 AAC 15.185. Informal review requests must be delivered to the Division Director, Alaska Department of Environmental Conservation, 555 Cordova Street, Anchorage, AK 99501 within 15 days of the permit decision. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation, 410 Willoughby Avenue, Suite 303, Juneau, Alaska 99801, within 30 days of the permit decision. In addition, please send a copy of the request to ADEC Pesticide Program, 1700 E. Bogard Road, Building B Suite 103, Wasilla, AK 99654. If a hearing is not requested within 30 days, the right to appeal is waived.

Sincerely,

Kristin Ryan

Kristin J. Ryan
Environmental Health Director

Enclosure

STATE OF ALASKA
DEPARTMENT OF ENVIRONMENTAL CONSERVATION
555 CORDOVA STREET
ANCHORAGE, ALASKA 99501

PERMIT TO APPLY PESTICIDES

Permit No.: 08-0908-09-AQU-01
Date Issued: September 8, 2008
Date Effective: October 18, 2008
Date Expires: December 31, 2009

The Alaska Department of Environmental Conservation (ADEC), under authority of Alaska Statute 46.03.330 and Title 18, Chapter 90.525 of the Alaska Administrative Code (18 AAC 90.525), hereby grants a Permit to Apply Pesticides to:

Kristine Dunker
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518

for the purpose of applying the pesticide **CFT Legumine Fish Toxicant**, EPA Registration Number **75338-2** to waters of the state to eradicate invasive Northern Pike in Cheney Lake, Anchorage, Alaska.

The permit holder shall manage and apply the pesticide in accordance with 18 AAC 90 and the permit application materials submitted July 16, 2008. In addition, the following permit conditions and stipulations are required:

1. Use pesticides only in the manner specified by the label instructions. Adhere to all the requirements specified by the pesticide product label.

2. Ensure that pesticides are applied only by a person properly certified by DEC to apply such pesticides, or a person under the direct supervision of a person so certified.

3. Apply pesticides using properly calibrated equipment, and in strict compliance with safety precautions.

4. Public notification signs must be posted prior to pesticide application at each point of access to the lake, as specified in 18 AAC 90.630(a). Signs shall remain posted at the treatment site until application is complete.

5. If rotenone-treated water is discharged through the storm drain and sentinel fish at Chester Creek exhibit any signs or symptoms of rotenone poisoning, apply potassium permanganate immediately to neutralize the rotenone.

6. Notify the DEC Pesticide Program immediately if potassium permanganate is applied to neutralize rotenone-treated water.

7. Maintain the following records for each pesticide used. Records must be available to DEC upon request:

- Product name
- EPA registration number
- Target pest
- Date and time of application
- Method of application
- Weather conditions during application
- Amount of pesticide used
- Location and size of treatment area
- Names of applicators
- Purchase, storage, and disposal information

8. Dispose of empty pesticide containers in accordance with label directions and 18 AAC 90.615(a). Any burning of pesticide containers must be done in compliance with 18 AAC 50.

9. Immediately report any spill or accident, alleged accident, or complaint to the DEC Pesticide Program at 1-800-478-2577.

10. Ensure that decontamination, safety, and spill clean up supplies are available at the treatment site at all times during application.

11. Store all pesticide containers securely, as required by 18 AAC 90.615(d). Post a warning notice on the outside of each storage area in compliance with 18 AAC 90.615(e)-(h).

12. No later than **March 31, 2010**, submit a written Summary of Treatment Results in accordance with 18 AAC 90.535. This summary must include the following information for **each** pesticide used:
    - Product name
    - EPA registration number
    - Target pest
    - Dates and times of application
    - Method of application
    - Weather conditions during applications
    - Total amount of pesticide used
    - Location and size of treatment area
    - Names of applicators
    - Purchase, storage, and disposal information
    - Assessment of success or failure of the treatments
    - Any observed effect on human health, safety or welfare, animals, or the environment

In addition to the above stipulations, the ADEC Pesticide Program may monitor treatments to ensure compliance with 18 AAC 90 and the Permit Conditions and Stipulations.

This permit expires on **December 31, 2009**, or upon completion of the above described project, whichever comes first, and may be revoked in accordance with 18 AAC 90.540.

Kristin Ryan

Kristin J. Ryan
Environmental Health Director

Appendix 3. Board of Fish letter approving the use of rotenone.

STATE OF ALASKA

SARAH PALIN, GOVERNOR

DEPARTMENT OF FISH AND GAME
BOARD OF FISHERIES

ADF&G
P.O . BOX 115526
JUNEAU, AK 998011-5526
PHONE: (907) 465-4110
FAX: (907) 465-6094

Charles Swanton
Director, Sport Fish Division
Alaska Department of Fish and Game
P.O. Box 115526
Juneau, AK 99811

August 20, 2008

Dear Mr. Swanton,

The Board of Fisheries received your August 12, 2008 letter asking for Board consent for the use rotenone to eradicate a non-indigenous Northern Pike populations from Cheney Lake in Anchorage and Arc Lake near Soldotna. The Board supports its use in this project. Board members were polled and there was no opposition.

Please contact Executive Director Jim Marcotté (465-6095) if you have any questions.

Regards,

Mel Morris

Mel Morris
Chairman, Alaska Board of Fisheries

cc: Board of Fisheries members
Rob Bentz, ADF&G
Jim Hasbrouck, ADF&G
Robert Massengill, ADF&G

Appendix 4. Anchorage Department of Parks and Recreation permit to operate an outboard motor in Cheney Lake.

Municipality of Anchorage

P.O. Box 196650 • Anchorage, Alaska 99519-6650 • http://www.muni.org

Mayor Mark Begich

Parks & Recreation Department

Kristine Dunker, Fishery Biologist
Alaska Department of Fish and Game
333 Raspberry Road
Anchorage, Alaska 99518

September 25, 2008

Re: Authorization for Temporary Access to Cheney Lake Park for Removal of Northern Pike

Dear Ms. Dunker:

The Municipality of Anchorage Parks and Recreation Department authorizes the Alaska Department of Fish and Game (ADF&G) to enter certain park lands known as Cheney Lake Park and operate a motorized watercraft to conduct wildlife management activities under authority of State of Alaska and federal agencies. Authorization includes use of portions of the parking lot and picnic area to stage the operation, scheduled for the week of October 20, 2008. This date is subject to change for reasons including weather.

The principal purpose of the activity is to remove an invasive population of northern pike from Cheney Lake. The process involves the application of rotenone in accordance with plans approved by State and Federal agencies and described in your letter of September 16, 2008 (attached). Project plans are further described and cited in an Environmental Assessment prepared by the Alaska Department of Fish and Game.

This authorization is subject to the following understandings and conditions.

1. Access would be by pickup truck or similar sized vehicle. Watercraft would be an 18-ft. "Willie" boat powered by a 50-HP outboard motor.
2. ADF&G understands that the subject park lands may be in use by others at any time, and will take precautions to prevent conflicts with and assure the safety of the area by park users. Specifically, ADF&G will secure the area of pesticide storage and use, and will post or otherwise provide adequate public notice of pesticide use, for example until the water resumes pre-application quality.
3. ADF&G will minimize disturbance of the subject park area.
4. ADF&G shall provide the Parks and Recreation Department three-days' notice prior to beginning this activity, shall advise the Parks and Recreation Department of any proposed changes in the scope and schedule of the activity, and shall notify this department of any unusual conditions or incidents.

Thank you for contacting us regarding this activity. If you have any questions, please call the Parks and Recreation Department at 343-4503.

Sincerely,

Monique Anderson
Parks Superintendent

Attachment

Cc: Jeff Dillon, Director, MOA Parks and Recreation Department
Teri Peters, MOA Northeast Park District Manager
Ted Johnson, MOA Park Maintenance Superintendent
Kristi Bischofberger, MOA Watershed Manager

Community, Security, Prosperity

Appendix 5. Cheney Lake Project Synopsis

Alaska Department of Fish and Game
Sport Fish Division, Anchorage, Alaska

Contact: Kristine Dunker (267-2889), Dan Bosch (267-2153), Chuck Brazil (267-2186)

Cheney Lake Restoration Project Synopsis

Northern pike (*Esox lucius*) are native to most of Alaska, but they do not naturally occur in Southcentral. Where northern pike are native, they are a valuable sport and subsistence fish. However, outside of their native range, northern pike are an invasive species capable of causing tremendous ecological and economic damage. Pike are highly piscivorous and can deplete populations of rearing salmonids. The presence of northern pike in Anchorage lakes is the result of illegal introductions, and the impacts from these introduced predators on local fisheries have been severe.

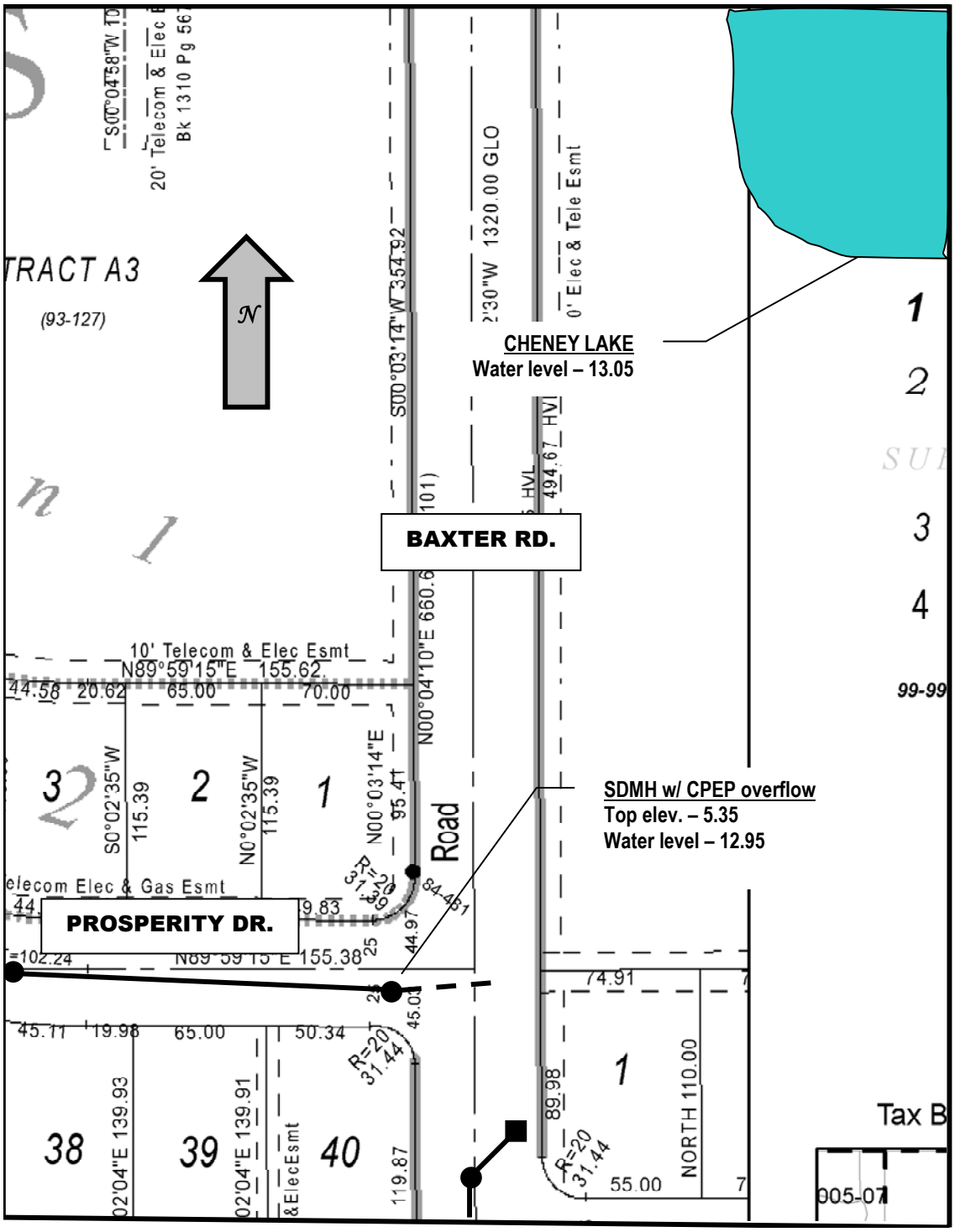
Cheney Lake, an approximately 24-acre man-made lake located in east Anchorage, was historically a very popular location to fish for rainbow trout. In 2000, northern pike were illegally introduced to Cheney Lake, and the pike completely destroyed the rainbow trout fishery. Currently, ADF&G is not able to re-stock Cheney Lake because of the pike. The angling effort in the lake has consequently decreased to less than one quarter of what it formerly was. In addition to the lost recreational fishing opportunities in the lake, the invasive northern pike population poses other concerns. Cheney Lake is located in close proximity to Chester Creek which supports wild salmon runs and populations of other resident fish. As long as invasive northern pike are in Cheney Lake, there is increased potential for them to be introduced to Chester Creek.

During the last few years, ADF&G has tried to reduce the pike population in Cheney Lake by removing spawning fish with gill nets. While reducing the number of pike in the lake, this method has been unsuccessful at removing all of the pike in the lake. ADF&G is currently drafting plans to restore the rainbow trout fishery in Cheney Lake by eradicating all of the pike. The most practical method to accomplish this will involve using an organic chemical called rotenone. Rotenone is a naturally-occurring substance derived from the roots of tropical plants. It has been used around the world by indigenous tribes to help catch fish and by fish managers in the U.S. and elsewhere to remove unwanted or invasive fish. When dissolved in water, rotenone blocks the absorption of oxygen through the gills resulting in fish mortality. In the concentrations necessary to kill fish, rotenone is not dangerous for birds or mammals. Light and temperature naturally degrade rotenone, and it does not enter ground water. No public health effects from the use of rotenone in fish management have been reported.

Cheney Lake, because of its small size, lost recreational opportunities, and proximity to Chester Creek is a strong candidate for initial lake restoration efforts in Anchorage. Successful restoration of Cheney Lake will serve as a step toward restoring other Anchorage lakes where invasive northern pike have damaged fisheries.

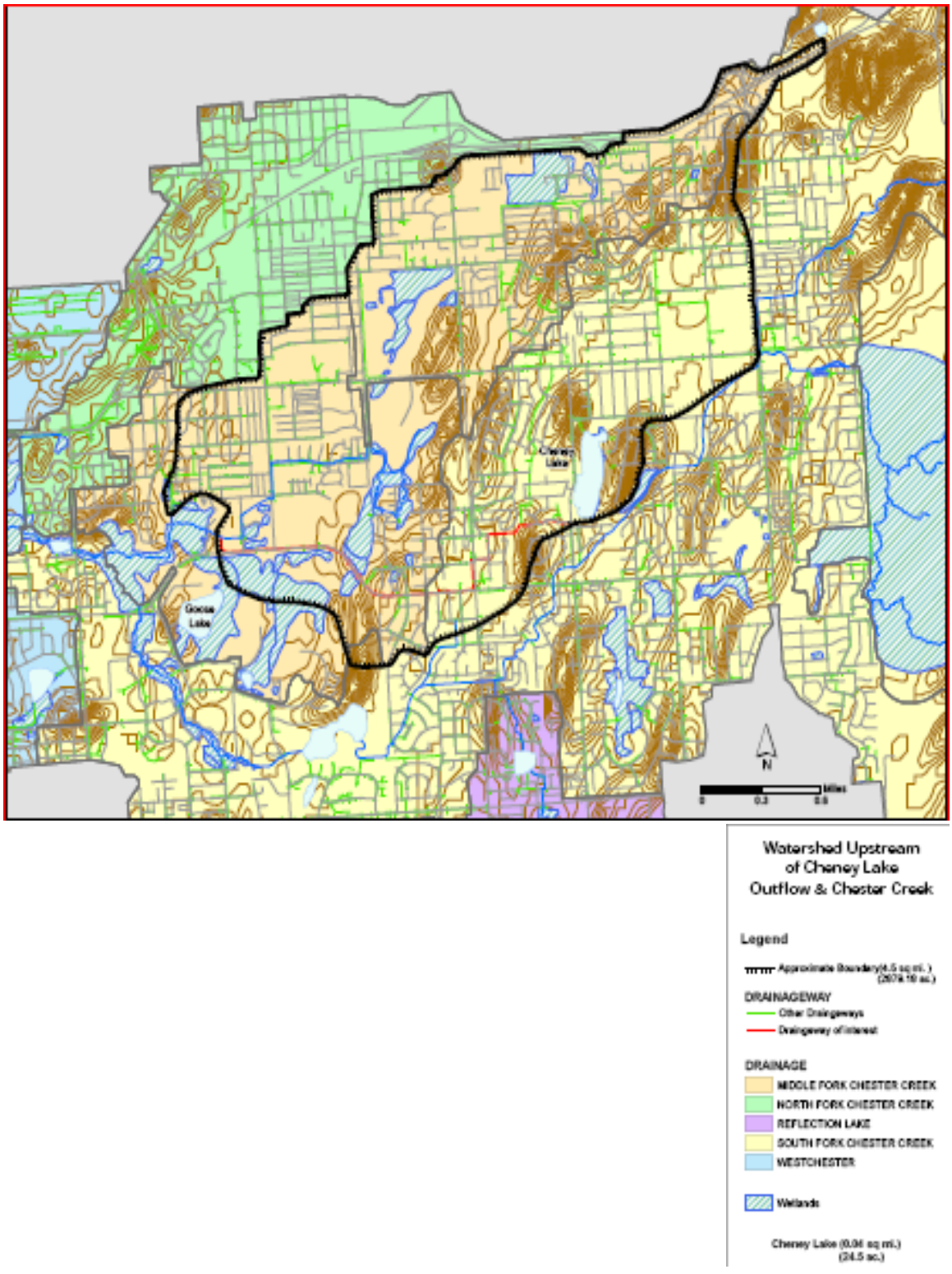
ADF&G is currently preparing an environmental assessment document that will initiate the local public participation process for this project. The rotenone treatment is being planned for late fall 2008. Cheney Lake will then be monitored throughout winter and spring to assure the pike have been eradicated. If all pike have been successfully removed, rainbow trout could be re-stocked in the lake by the spring of 2009.

Appendix 6. As-built survey of the water levels maintained in the lake and storm water overflow.



Appendix 7. Photographs of the inside of the storm drain manhole.

Appendix 8. Watershed that is drained by the storm drain.



Appendix 9. Outflow of the storm drain into Chester Creek.