

CHAPTER ONE

PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

Chapter 1 describes the purpose and need for action and summarizes the proposed action for the Diamond Lake Restoration Project. The chapter also identifies the project area, outlines applicable management direction, addresses the scope of the decision, describes interagency cooperation, summarizes the scoping process, and lists the issues identified during scoping.

This analysis is tiered to the Final Environmental Impact Statement for the 1990 Umpqua National Forest Land and Resource Management Plan (LRMP), as amended by the 1994 Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Northwest Forest Plan) and its amendments. This analysis also incorporates by reference the Diamond Lake/Lemolo Lake Watershed Analysis (USDA 1998).

PROJECT AREA OVERVIEW

The project area is located on the Diamond Lake Ranger District, Umpqua National Forest within the Umpqua River Basin (Figures 1 and 2). The area being analyzed in the Diamond Lake Restoration Project Draft Environmental Impact Statement (DEIS) encompasses Diamond Lake, Lake Creek, Lemolo Lake, and the North Umpqua River (Figure 3). The project area boundary includes Diamond Lake proper and Lake Creek (Figure 4). The project area is bounded to the North by the North Umpqua River, to the South by Crater Lake, to the East by Mt. Thielsen, and to the West by Mt. Bailey. It includes all or portions of sections 30 through 32, T27S, R6E; sections 25 and 36, T27S, R5E; sections 4 through 9 and sections 16 through 21, T28S, R51/2E, and sections 1 and 12, T28S, R5E Willamette Meridian, Douglas County, Oregon.

Diamond Lake is a natural lake located at about 5,191 feet elevation. It has a surface area of approximately 3,031 acres and is relatively shallow, with a maximum depth of 48.5 feet and an average depth of 22.5 feet (Eilers and Gubala 2003). Diamond Lake drains into Lake Creek, which empties into Lemolo Lake, an impoundment on the North Umpqua River. Two other impoundments are located downstream from Lemolo Lake --Toketee Lake and Soda Springs Reservoir. The flow of water from Lemolo Lake and the other impoundments is regulated by PacifiCorp, a public utilities corporation.

Diamond Lake is a high use destination recreation area¹ considered important to the economy of southern Oregon. Originally fishless, the lake has been managed as a recreational trout fishery since 1910. Tui chub² were introduced into the lake in the mid-1940's and rapidly overpopulated the lake. In 1954, the Oregon Game Commission constructed a canal near the Lake Creek outlet, lowered the lake level, and treated Diamond Lake with rotenone to

¹ Estimates for recreation use at Diamond Lake are approximately 700,000 Recreation Visitor Days per year (meaning continuous or intermittent recreational use for 12 hours by an individual) (USDA 1998).

² Tui chub are fish in the minnow family that are not native to Diamond Lake.

eradicate tui chub. The lake was restocked with trout following the rotenone treatment and a thriving fishery was maintained for several decades.

In 1992, tui chub were again discovered in Diamond Lake and have since overpopulated the lake for a second time. As the tui chub population grew during the 1990's, the recreational trout fishery declined dramatically and by August of 2002, approximately 95%³ of fish sampled in Diamond Lake were tui chub (Eilers and Gubala 2003).

The tui chub population is negatively impacting water quality at Diamond Lake through its impacts on the aquatic food chain. Diamond Lake has experienced a loss of large zooplankton⁴ species over the last decade (Eilers and Kann 2002). Tui chub eat zooplankton. Large zooplankton eat phytoplankton⁵, such as the blue green "algae" *Anabaena flos-aquae* which "bloomed" at Diamond Lake in 2001, 2002, and 2003. It is believed that the expanding tui chub population has "overgrazed" large zooplankton species in Diamond Lake and effectively eliminated the "biological control" that previously limited these algae populations (Eilers et al. 2001a). Additionally, the tui chub add large quantities of nutrients in the form of excrement that essentially serve as an abundant food supply for the algae. These ecological processes are discussed in detail later in this document.

Negative impacts on the recreational fishery and on water quality in Diamond Lake and down stream prompted multiple local, state, and federal agencies to work cooperatively on solutions for the lake, which led to formulation of this project.



Figure 1. Diamond Lake at the base of Mt. Thielsen.

³ This estimate does not include the large number of young-of-the-year tui chub less than 2 cm in length.

⁴ Zooplankton are very small animals that are suspended in the water column. Freshwater zooplankton are dominated by four major groups: protozoa, rotifers, and two subclasses of Crustacea, the cladocerans and copepods (Mandaville 1997). The larger zooplankton (cladocerans and copepods) are important sources of food for many species of fish.

⁵ Phytoplankton are floating plants usually microscopic, comprised primarily of algae, that live suspended in the water.

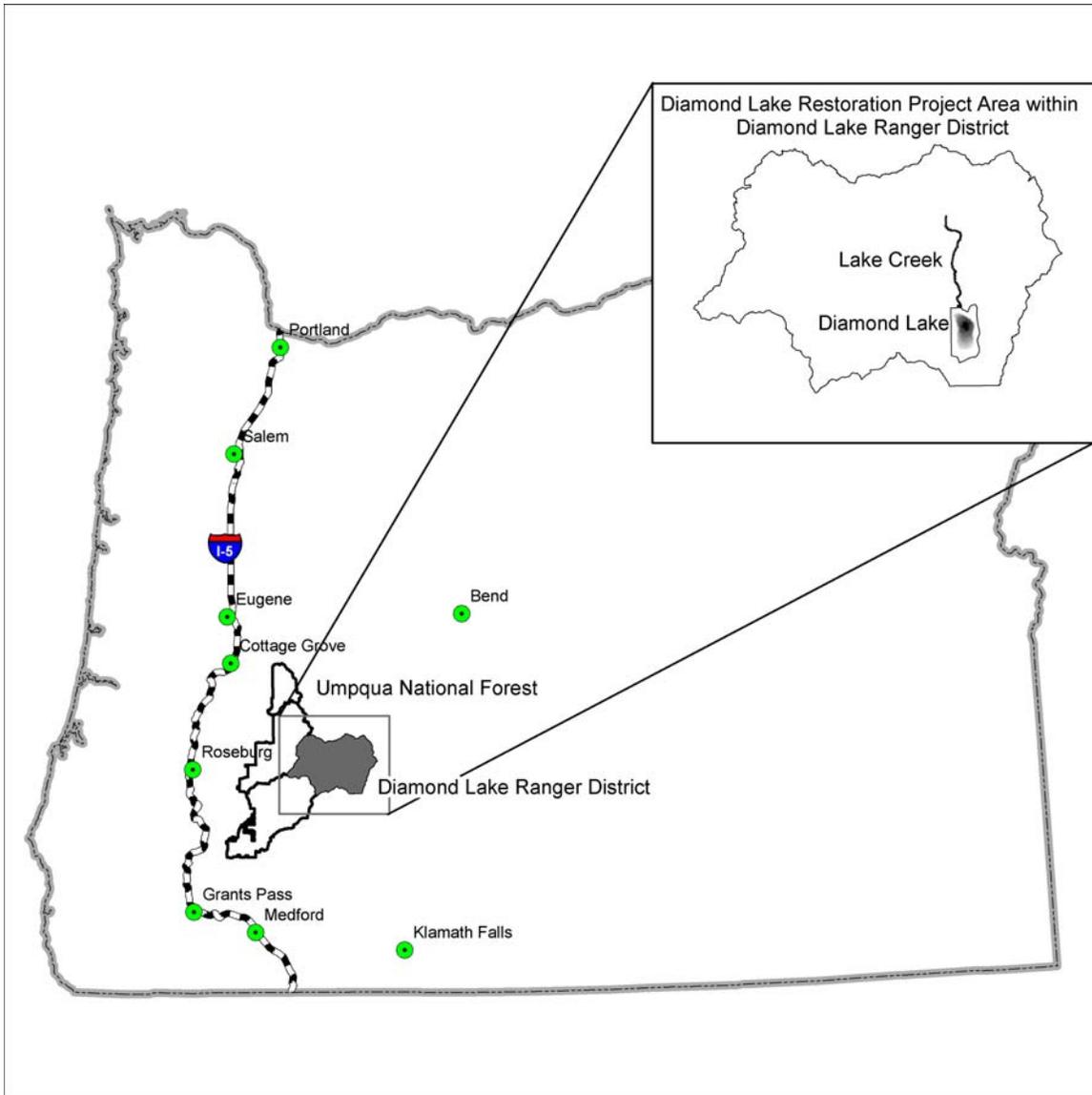


Figure 2. Project Area Location on the Diamond Lake Ranger District, Umpqua National Forest.

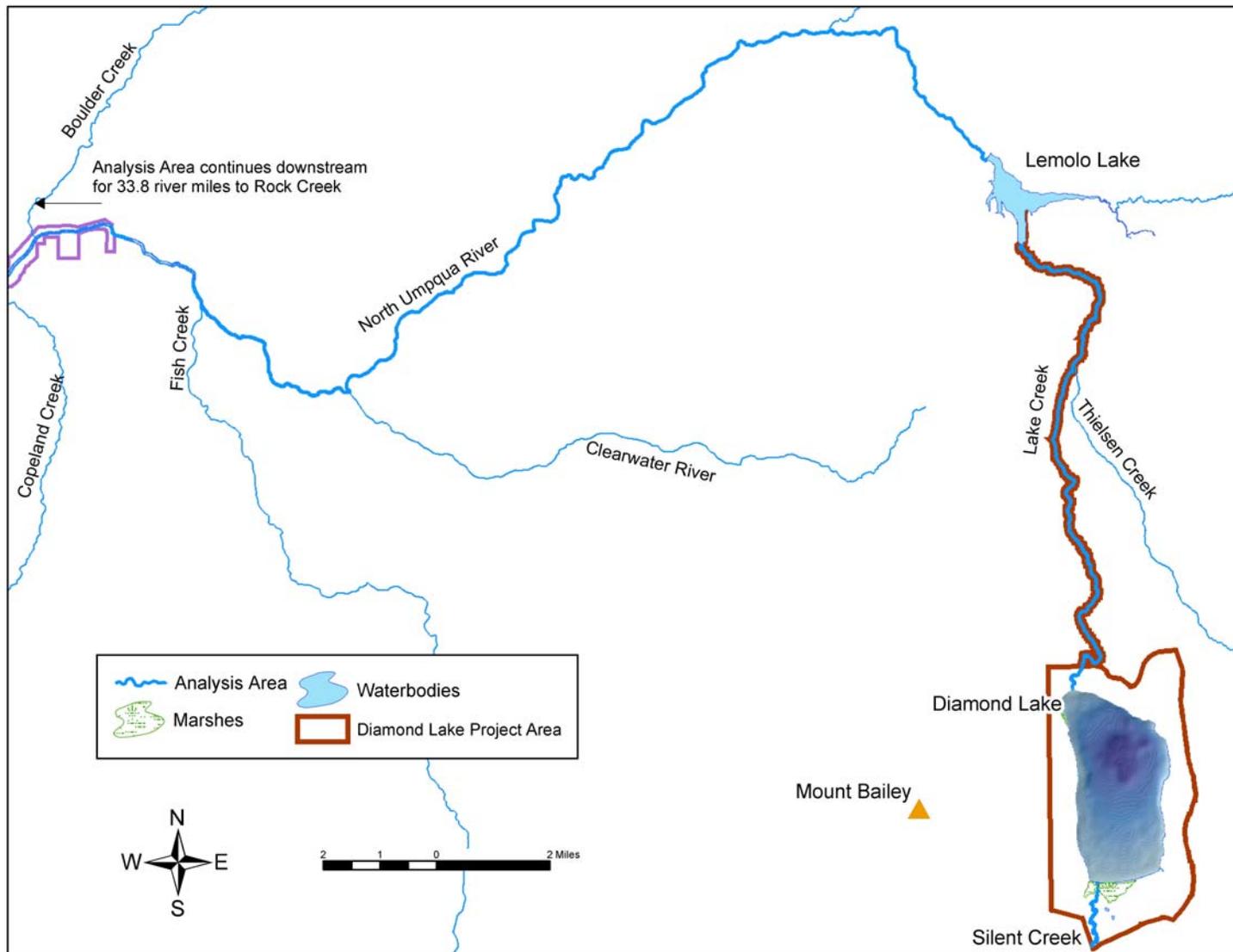


Figure 3. Diamond Lake Restoration Project Area Within the Analysis Area.

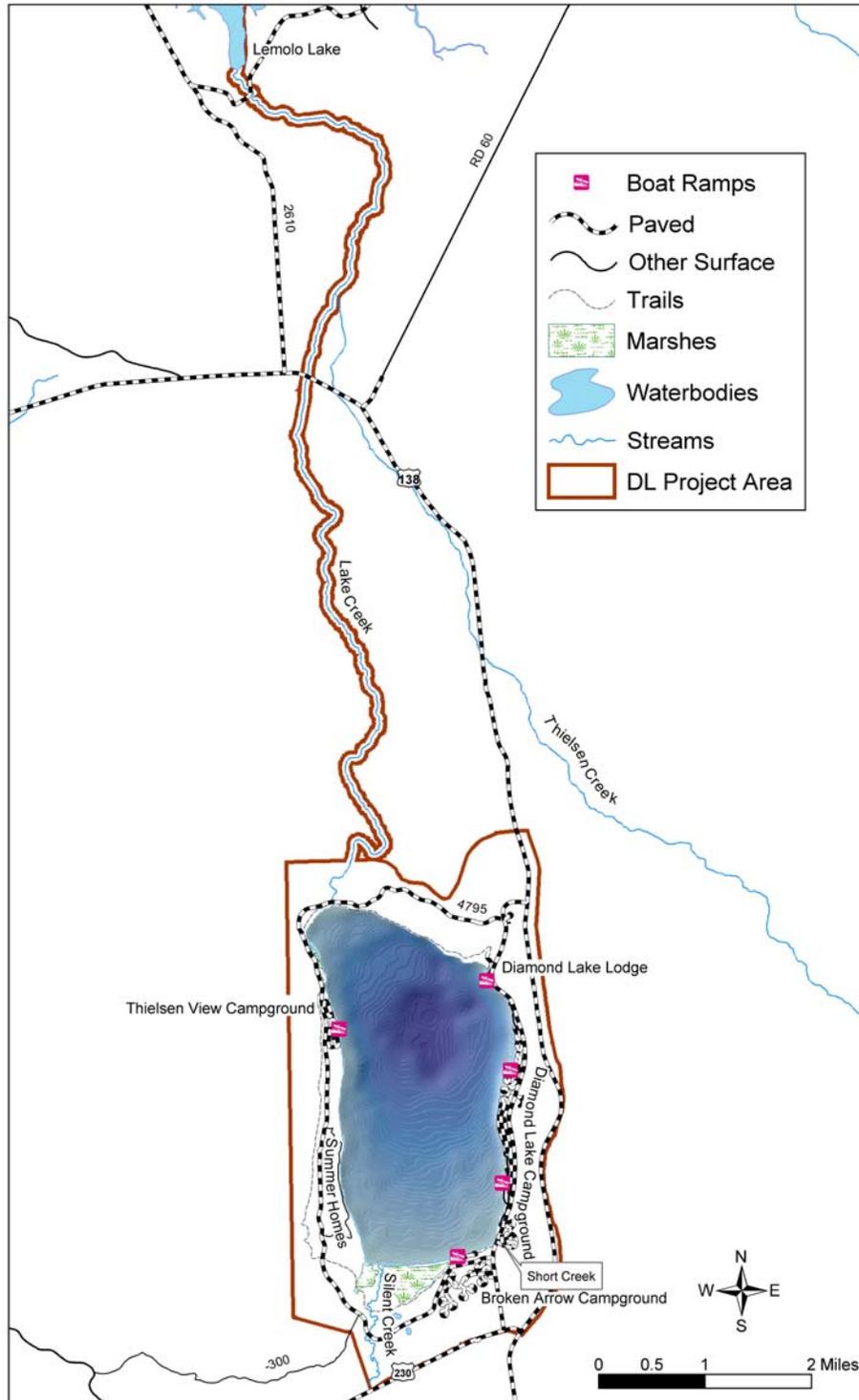


Figure 4. Diamond Lake Restoration Project Area.

PURPOSE OF AND NEED FOR THE ACTION

The Forest Supervisor of the Umpqua National Forest finds there is a need for improvement of Diamond Lake's water quality and recreational fishery. Eradication or control of the existing tui chub population is considered essential for accomplishing these objectives.

Desired conditions for the planning area are described by the various plans, rules, and policies that govern management of the lake.⁶ The difference between the existing conditions and the desired conditions defines the purpose and need for action in terms of elements that can be measured and analyzed. These elements are:

Element 1 - Water Quality

Diamond Lake currently does not meet State water quality standards, LRMP Management Area goals, or support the "beneficial uses" of the lake. Diamond Lake is included in the Oregon Department of Environmental Quality's (ODEQ) 303(d) list of "water quality limited" water bodies for the parameters of pH⁷ and algae (ODEQ 2002). The "beneficial uses" for Diamond Lake that are currently negatively impacted by these water quality exceedances include: resident fish and aquatic life, water contact recreation, aesthetics, and fishing (OAR 340-41-0320).

Annual monitoring data by ODEQ and others demonstrates that pH values exceeded standards⁸ during the summer season every year from 1992-2002. Similarly, annual monitoring data from 1992-2002 indicate that State standards for algae⁹ are not being met at Diamond Lake (JC Headwaters 2003). In the summers of 2001, 2002, and 2003, Diamond Lake experienced severe blooms of the cyanobacteria (blue-green algae) *Anabaena flos-aquae*. This type of algae produces a neurotoxin, that in high concentrations, is harmful to humans and other animals¹⁰. Another species of blue-green algae, *Microcystis aeruginosa*, was also present in the 2003 bloom. This species produces hepatotoxins which are also a health risk. To protect public health and

⁶ Umpqua National Forest Land and Resource Management Plan (LRMP) as amended by the 1994 Record of Decision For Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Northwest Forest Plan)(USDA 1990, USDA/USDI 1994); Oregon Administrative Rules (OAR), Department of Environmental Quality, Water Pollution Division 41 State-Wide Water Quality Management Plan; Beneficial Uses, Policies, Standards, and Treatment Criteria For Oregon; (OAR 340-41-0001); OAR Department of Fish and Wildlife, Chapter 635 Mini-Management Plans, Policies, and Objectives, Diamond Lake (OAR 635-500-0703) and Management Alternatives, Basic Yield (OAR 635-500-0115) and Douglas County Comprehensive Plan (Douglas County 2002).

⁷ pH is a measure of acidity and alkalinity of a solution. A pH of 7.0 is a neutral solution. The pH of natural waters ranges between the extremes of 2 to 12 with 2 being the most acidic and 12 being the most alkaline or basic (Wetzel 1983) .

⁸ The applicable water body specific pH standard for Cascades Lakes is 6.0 to 8.5 (OAR 340-41-326 (1)(c)). Early water quality data indicate pH values exceeded this standard for most of the 1970's as well, probably due to the high densities of aquatic macrophytes (algae and aquatic plants) (JC Headwaters 2003).

⁹ Development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or which are injurious to health, recreation, or industry shall not be allowed (OAR 340-041-007(11)). A three-month (summer) average chlorophyll a value exceeding 0.01 mg/l (for natural lakes) shall be used to identify water bodies where phytoplankton (floating algae) may impair recognized beneficial uses (OAR 340-41-019 (1)(a) (A)).

¹⁰ Human health guidance levels derived from Yoo et al. (1995) and Chorus and Bartram (1999) indicate that when quantities of *Anabaena flos-aquae* contained in water samples reach 15,000 cells/ml it is appropriate to restrict public access for water contact recreation. Quantities of *Anabaena flos-aquae* reached approximately 600,000 cells/ml in 2001; 35,974 cells/ml in 2002; and 255,567 cells/ml in 2003.

safety, the Umpqua National Forest, in cooperation with the Douglas County Health Department, closed Diamond Lake to some public uses (wading, swimming, water skiing, and boating) during portions of all summers. Changes in lake ecology associated with overpopulation of the lake by tui chub are believed to be major contributing factors influencing the development of toxic algae blooms at Diamond Lake¹¹.

Diamond Lake is identified in the LRMP as a special management area (MA-2). As such, the lake is to be managed for concentrated developed recreation, favoring activities such as resort use, camping, picnicking, visitor information services, boating, fishing, interpretation and developed and dispersed winter sports (LRMP 1990, pgs. 110, 153). Summer-time lake closures due to degraded water quality are not compatible with MA-2 goals, are disappointing to some summer recreationists, and have negative economic impacts to some local businesses.

The desired condition for Diamond Lake is water quality that supports the beneficial uses of the lake and meets MA-2 goals. The existing water quality conditions do not meet State standards, do not support beneficial uses of the lake, and do not meet recreation management goals. Therefore, there is a need for improved water quality at Diamond Lake.

Measures

Quantitative and qualitative models are used to characterize physical, chemical, and biological processes in Diamond Lake using past water quality data. Scientific research and professional judgment are used to forecast future water quality conditions in Diamond Lake and downstream water bodies under each alternative. Element 1 is measured by:

- Expected primary production
- Expected phytoplankton density
- Expected blue-green algae toxin production

Post-Project Goals

Water quality improvement would be demonstrated post-project by movement toward the following water quality goals:

pH: Less than 10 percent of summer water samples would have pH values that exceed 8.5 (or the pH value determined attainable in the Total Maximum Daily Load¹² (TMDL) calculations)¹³.

¹¹ Eilers et al. (2001a,b) showed a strong correlation between historical changes in the lake and changes in the fisheries. In particular, the greatest increases in *Anabaena* akinetes (spore-like structures produced by this algae) were associated with increases in the tui chub population in both the 1940s/1950s and the 1990s.

¹² A Total Maximum Daily Load is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards; it is an allocation of that amount to the pollutant's sources. Water quality standards are set by the State. They identify the beneficial uses for each waterbody, for example, drinking water supply, fishing or swimming. A TMDL is the sum of the allowable loads of a single pollutant from all contributing sources. The calculation must include a margin of safety to ensure that the waterbody can be used for the purposes the State has designated.

¹³ It is also a project goal that pH values meet water quality criterion in all seasons. However, summer is the only season that pH values currently exceed standards.

Algae: The average value of primary production¹⁴ (chlorophyll *a*¹⁵) for all samples collected during a three month summer sampling period would be less than or equal to 0.01 mg/l (or the level determined attainable in the TMDL calculations)¹⁶.

Neurotoxin production: *Anabeana flos-aquae* levels would remain below 15,000 cells/ml indicating that the waters of Diamond Lake are safe for water contact recreation.

Element 2 - Recreational Fishery

The Diamond Lake recreational fishery does not currently meet State management objectives or LRMP Management Area goals. For several decades, Diamond Lake has supported a large and popular recreational trout fishery that is important to the local and regional economy. No natural trout reproduction occurs in the lake, so the Oregon Department of Fish and Wildlife (ODFW) traditionally maintained the fishery in a cost-effective manner, primarily by stocking the lake each year with about 400,000 fingerling (about 3” in length) rainbow trout.

In recent years, the recreational fishery at Diamond Lake has declined dramatically from a high annual average harvest rate of about 270,000 trout averaging approximately 12 inches in size during the 1963-1978 time period to a 1999 low annual harvest rate of 5,000 trout averaging less than 10 inches in length (ODFW, Unpublished Creel Data). Failure of the formerly successful recreational fishery is attributed largely to changes in the ecology of the lake caused by overpopulation by tui chub (Eilers et al. 2001a; ODFW 2002).

The desired condition for the recreational fishery at Diamond Lake as described in *current* State regulations¹⁷ is:

Diamond Lake shall be managed for hatchery production under the basic yield alternative of Oregon’s Trout Plan (OAR 635-500-0703), which in summary states that the waters use their natural productivity to grow trout to a harvestable size with or without the addition of fingerling or yearly hatchery trout (OAR 635-500-0115).

Specific fish stocking strategies and harvest goals associated with these regulations are generated through an adaptive management process¹⁸. Appropriate numeric goals for out-year stocking would be determined by ODFW using existing data and knowledge,

¹⁴ Primary production is the quantity of new organic material created by plant growth or photosynthesis, or the stored energy this material represents.

¹⁵ Chlorophyll *a*: Chlorophyll is the green pigment in plants. Chlorophyll *a* is the “master pigment” in blue-green algae and higher plants that is responsible for photosynthesis. It is often used as a surrogate measure for the amount of phytoplankton (microscopic floating plants-algae, diatoms, etc) in a water sample (Mandaville 1997).

¹⁶ It is also a project goal that algae meet water quality criterion in all seasons. However, summer is the only season that these values currently exceed standards.

¹⁷ Relevant Oregon Administrative Rules are reproduced in the glossary.

¹⁸ An adaptive management process refers to the practice of implementing a management strategy, monitoring the results, and then adapting the strategy as needed before implementing again.

ecological indices of lake health¹⁹ (i.e., zooplankton and benthic invertebrate²⁰ populations), annual fish monitoring data and applicable nutrient loading allocations provided in ODEQ's pending TMDL publication.

LRMP MA-2 goals for the Diamond Lake fishery are general in nature and simply identify that fishing is a recreational activity that should be supported through management activities at the lake (LRMP 1990, pgs. 110, 153). Many members of the public have expressed dissatisfaction with the current recreational fishing opportunities at Diamond Lake (Personal observation, Sherri L. Chambers, 2003 Early Public Involvement Process).

The desired condition for Diamond Lake is an ecologically sustainable²¹ recreational fishery that meets State management objectives and LRMP MA-2 goals. The existing fishery meets neither. Therefore, there is a need for improvement of the recreational fishery at Diamond Lake.

Measures

Because overpopulation of the lake by tui chub is believed to be the primary limiting factor in managing Diamond Lake for an ecologically sustainable recreational fishery, elimination or reduction of the tui chub population is used as a predictive measure of progress toward the desired future condition. Scientific research and professional judgment is used to forecast and evaluate changes in tui chub populations under each alternative. Element 2 is measured by:

- Expected tui chub populations
- Expected trout body condition
- Expected annual angler catch

Post-Project Goals

Improvement of the recreational fishery would be demonstrated post-project by movement toward the following goals:

Ecological Indices of Lake Health: Monitoring data (zooplankton and benthic invertebrate population numbers and community compositions, and appropriate water quality data) indicate recovery of the Diamond Lake food chain is adequate to support a recreational fishery without compromising progress toward achieving water quality standards.

Tui chub: Tui chub are absent from Diamond Lake or if illegally reintroduced are present in numbers believed small enough to control using limited mechanical methods (nets, seines²², disruption of breeding, etc) or stocking with predacious fish.

¹⁹ Eilers (2003a) created an ecologically based index for guiding salmonid-stocking decisions in Diamond Lake.

²⁰ Benthic invertebrates are invertebrate organisms such as worms, leeches, and snails that live in or on the sediments at the bottom of the lake (Mandaville 1997).

²¹ An ecologically sustainable fishery refers to the concept that fish stocking practices would be based on ecological indices such as phytoplankton, zooplankton, benthic invertebrate populations, and applicable nutrient loading factors.

²² Seines are a type of fishing net that usually hang vertically in the water.

Trout: Annual harvest rates for legal-sized trout increase. Trout growth rates and condition factors return to levels approaching those observed prior to the introduction of tui chub.

PROPOSED ACTION

The Umpqua National Forest, in cooperation with multiple state and federal agencies, proposes to implement a series of actions that will meet the need for improvement of water quality and the recreational fishery at Diamond Lake. Proposed activities include: canal reconstruction, a fall/winter lake draw down, mechanical fish removal and utilization, a September rotenone (fish toxicant) treatment to eradicate tui chub, fish carcass removal and utilization, water management during lake refill period, monitoring, fish restocking, educational activities, and contingency measures for controlling tui chub if they are reintroduced to Diamond Lake in the future. The proposed action is described in its entirety in Chapter 2. Proposed activities are summarized below in the order in which they would be implemented:

Canal Reconstruction: A blocked and debris-filled existing earthen canal that connects Diamond Lake to Lake Creek would be reconstructed to facilitate a lake draw down. The portion of the canal within Diamond Lake would be dredged to its original depth using a floating suction dredge or other appropriate equipment. Dredge spoils would be used to expand an existing wetland. From the lakeshore to the canal outlet, the canal would be excavated to its original configuration and fitted with a new head-gate structure to control water flow. The existing concrete box culvert under Forest Service Road 4795 would be extended or replaced depending on its condition. A new box culvert would be constructed under the bike trail. If necessary during construction, temporary bridges or culverts would be used to maintain access to the bike trail and summer homes using Forest Service Road 4795.

Fall/Winter Lake Draw Down: Diamond Lake's water level would be lowered by eight feet from its normal summer level using both the reconstructed canal and Lake Creek for water transport. The lake draw down would begin on or around September 15 in the year prior to a chemical treatment. A gravity-driven draw down would occur at a discharge rate approximating a bankfull flow in Lake Creek.

Mechanical Fish Removal and Utilization: Several methods would be used to remove and utilize fish biomass from Diamond Lake prior to chemical treatment including: liberalizing catch limits on fishing at the lake; harvest of fish by individual crews using traps, nets and seines; and, harvest of fish through commercial fishing operations. Harvested fish carcasses would be converted to an organic fish emulsion product on site (lake shore) or trucked to an off-site plant for utilization as fertilizer.

September Rotenone Treatment: The powdered formulation of the fish toxicant rotenone would be applied to Diamond Lake in September (about a year after the lake draw down begins). This would happen when water temperature and chemistry reached conditions considered optimal for achieving a complete fish kill. Rotenone would be administered according to label instructions at the necessary amounts based on water volume, temperature, and chemistry in Diamond Lake at the time of

application. Sections of Silent Creek and Short Creek would also be treated with liquid rotenone.

Non-Significant Forest Plan Amendment: The proposed action would include a non-significant amendment to the 1990 Umpqua National Forest Land and Resource Management Plan (LRMP). The amendment would allow the use of rotenone within Diamond Lake, Short and Silent Creeks, which would not normally occur under Standard and Guideline Water Quality/Riparian Areas #8 (LRMP IV-60) and Prescription C2-IV (LRMP IV-178). The non-significant Forest Plan Amendment (Amendment #5) would apply to this project only; upon completion of the project, Standard and Guideline Water Quality/Riparian Areas #8 and Prescriptions C2-I and C2-IV would again apply to Diamond Lake, Short and Silent Creeks.

Mechanical Fish Carcass Removal and Utilization: A commercial fishing or professional fish mortality recovery and recycling operation would be employed to collect fish carcasses following a chemical treatment of the lake. Fish carcasses would be converted to an organic fish emulsion product on site or trucked to an off-site plant for utilization as fertilizer.

Water Management During Lake Refill Period: An active water management strategy would be implemented to limit the length of time that Lake Creek is reduced to no or very low flows. When water in Diamond Lake becomes suitable for release²³ (about November), canal headgates would be opened to allow approximately 10 cubic feet per second (cfs) of water to flow into Lake Creek and through the North Umpqua River system.

Monitoring: A variety of monitoring activities would be used to verify assumptions, evaluate project success, and formulate appropriate lake management strategies including: stream flows and water quality in Lake Creek; water quality in Diamond and Lemolo Lakes and the North Umpqua River; tui chub presence; and phytoplankton, zooplankton and benthic invertebrate and trout populations.

Fish Restocking Strategy: ODFW would pursue approval for a change to the following strategy for restocking Diamond Lake through the Oregon Fish and Wildlife Commission (OFWC) and the appropriate public process.

Diamond Lake would be restocked with fish using an ecologically sustainable stocking strategy. The Oregon Department of Fish and Wildlife would manage the lake for hatchery production under the *Basic Yield Alternative* of Oregon's Trout Plan. However, ecological indices of lake health (i.e., zooplankton and benthic invertebrate populations), existing data and knowledge, annual fish monitoring data and applicable nutrient loading allocations provided in ODEQ's pending Total Maximum Daily Load (TMDL) publication would be used to determine appropriate numeric goals for annual fish stocking and harvest post-project.

Under this stocking strategy, it is expected that conservatively small numbers of fingerling "Fishwich" or Oak Springs rainbow trout and legal and/or trophy sized

²³ Water would be considered suitable for release when rotenone, its' by product, and all associated inert ingredients have dissipated to non-detectable or trace levels in both the water column and the lake bottom sediments (approximately one to two months).

predacious fish species (Eagle Lake rainbow trout, brown trout, or spring Chinook) would be introduced into Diamond Lake as soon as the food chain recovered adequately to support them without compromising progress toward water quality goals. Annual stocking rates would be expected to increase as the food chain and water quality continued to recover.

Education: A number of educational activities would be used to reduce the likelihood of tui chub reintroduction into Diamond Lake potentially including: “angler stamps”, interpretive signs and brochures, and boat inspections.

Tui Chub Contingency Plan: Following rotenone treatment, tui chub are not expected to be reintroduced into Diamond Lake by migrating into the lake from inflowing or outflowing streams. Rotenone would be applied to the two inflowing streams of Diamond Lake that support fish and a 5-6 foot waterfall in the one stream that drains Diamond Lake (Lake Creek) would prevent chub from entering the lake from any downstream locations. However, because it is recognized that tui chub may be accidentally or illegally reintroduced, several actions designed to control tui chub populations would be implemented including: an extensive monitoring program to facilitate early detection of tui chub presence in the lake; stocking with predacious fish species following rotenone treatment and increasing the numbers of predacious fish if tui chub are detected; and using mechanical treatments such as netting and electro-shocking to limit tui chub population growth.

DECISIONS TO BE MADE BASED ON THIS ANALYSIS

Based on the analysis documented in this environmental impact statement, the Responsible Official will make the following decisions:

- To implement this project as proposed, to implement a modified version (alternative) of this project which addresses unresolved issues, or not implement this project at this time;
- To decide which management requirements, mitigation measures, monitoring and water quality best management practices are necessary to achieve resource goals, objectives and the desired future condition;
- To amend the 1990 Umpqua National Forest Land and Resource Management Plan, as proposed;
- Whether the proposed amendment would result in a significant change to the 1990 Umpqua National Forest Land and Resource Management Plan.

RELATIONSHIP TO FOREST PLANS, THE PROJECT RECORD, AND THE DIAMOND LAKE/LEMOLO LAKE WATERSHED ANALYSIS

Forest Plan: The 1990 Umpqua National Forest Land and Resource Management Plan (LRMP) and its amendments to date, including the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Northwest Forest Plan), provide broad management direction for the proposed action. These documents also provide

direction in terms of standards and guidelines to be applied. The proposed action would occur within an Administratively Withdrawn Area (AWA) under the Northwest Forest Plan. AWA's are areas that have already been designated under existing plans (i.e., the LRMP) and the most restrictive applicable standards and guidelines apply whether from the Northwest Forest Plan or the LRMP.

Project Record: This DEIS hereby incorporates by reference the Project Record (40 CFR 1502.21). Chapter 3 provides a summary of the Specialist Reports in adequate detail to support the rationale for the decisions and the appendices provide supporting documentation. The Project Record contains Specialist Reports and other technical documentation used to support the analysis and conclusions in this DEIS. The Specialist Reports incorporated by reference are for Geology, Groundwater, Hydrology, Limnology, Fish, Wildlife, Botany, Recreation, Economics, Human Health and Cultural Resources. Incorporating these Specialist Reports and the Project Record helps implement the CEQ Regulations provision that agencies should reduce NEPA paperwork (40 CFR 1500.4), that EISs shall be "analytic rather than encyclopedic, and that EISs shall be kept concise and no longer than absolutely necessary (40 CFR 1502.2). The objective is to furnish adequate site-specific information to demonstrate a reasoned consideration of the environmental impacts of the alternatives and how these impacts can be mitigated, without repeating detailed analysis and background information available elsewhere. The Project Record is available for review at the North Umpqua Ranger District Office, 18782 North Umpqua Highway, Glide, OR 97443.

Watershed Analysis: The Diamond Lake/Lemolo Lake Watershed Analysis (WA) provides relevant background information and a landscape-scale context for the proposed project. Recommendations from the WA regarding water quality and fisheries at Diamond Lake, consisted of forecasts for future conditions based on the assumption that ODFW would treat the lake with rotenone and restock with rainbow trout (USDA 1998 pgs. 114, 208).

INTERAGENCY COOPERATION

An interagency collaborative group, referred to as the "Diamond Lake Project Working Group" was informally formed in October of 2001, hosted a technical forum in May of 2002, and began meeting on an approximately monthly basis since July of 2002.

In December 2002, all of the following members of the Diamond Lake Project Working Group signed a formal Memorandum of Understanding (MOU) to cooperate on the restoration of Diamond Lake: Oregon State Representative Susan Morgan, US Fish and Wildlife Service, US Forest Service, US Environmental Protection Agency, Douglas County, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Oregon Water Resources Department, Oregon Economic and Community Development Department, and Oregon Division of State Lands. Although not parties to the MOU, representatives of the National Oceanic and Atmospheric Administration and PacifiCorp also work cooperatively with MOU partners.

In 2003, the Diamond Lake Working Group continued to meet monthly. The Forest Service assumed the role of "lead agency" and ODFW and ODEQ joined as "cooperating agencies" in the preparation of the EIS. The Forest Service, ODFW, and ODEQ signed a

MOU in November 2003, which identified their respective roles and responsibilities in the EIS process. This MOU is incorporated by reference.

ODFW has full authority to decide what fish stocking strategy would be utilized in Diamond Lake. Fish stocking analyzed in this DEIS is a State, not a Federal action. However, per the MOU between the Forest Service, ODFW, and ODEQ, ODFW has agreed to pursue approval of fish stocking strategies described under individual alternatives through the Oregon Fish and Wildlife Commission and the appropriate public process (MOU November 14, 2003).

PacifiCorp has the authority to determine how to adjust their water schedules to accommodate flow changes that would result from a draw down and refill of Diamond Lake. PacifiCorp personnel assisted in the development of the proposed action and are cooperating partners in the Diamond Lake Project Working Group. Appendix A documents the responsibilities and activities that would be required of all partnering agencies in order to implement the action alternatives described in Chapter 2. Key responsibilities of individual agencies are also summarized in the Chapter 2 alternative descriptions.

SCOPING

Public involvement to assist the Forest Service in developing the framework of the proposed action for the Diamond Lake Restoration project began in the fall of 2002. Four public forums, eight presentations to special interest groups, electronic distribution of presentations to nine interest groups, a technical meeting with actively interested publics, and multiple public mailings were all components of the early public involvement process for the project. Notes from these meetings are incorporated by reference into this document and are on file at the North Umpqua Ranger District. The Confederated Tribes of Siletz, Cow Creek Band of Umpqua Indians, and Confederated Tribes of the Grande Ronde were each notified by mail on April 4, 2003 about the upcoming Diamond Lake project. No responses were received from the tribes. The concerns and information raised from this early involvement process helped the Forest Service to formulate the proposed action.

Formal scoping (a process used to surface issues) began with publication of the Notice of Intent (NOI) to prepare an Environmental Impact Statement in the April 25, 2003 Federal Register. The media, 21 actively interested members of the public, and the 303 members of the public who were on the project mailing list received the NOI and/or additional project information. The NOI was posted on the Umpqua National Forest internet website and the project was first listed in the April 2003 Umpqua National Forest Quarterly Schedule of Proposed Actions (SOPA). A revised NOI was published on November 19, 2003 when ODFW and ODEQ joined as Cooperating Agencies on the DEIS. A revised NOI was also published on February 06, 2004 to inform the public that a non-significant amendment to the Umpqua National Forest LRMP may be completed for this project.

Numerous area radio and television stations and newspapers published articles about the project. A public meeting announcement was completed on May 19 by issuing a press release to the media and distributing a public mailing to the project mailing list. A public meeting soliciting scoping comments was held in Roseburg at the Douglas

County Library on May 27. The formal scoping period ended on May 30, 2003, however, all input received was considered regardless of timelines. In total, 63 letters were received during formal project scoping. Public scoping comments are summarized in the project Scoping Summary and are incorporated by reference. Among the scoping comments received were the following:

- Concerns regarding the proposed fish stocking strategy
 - ODFW should stock Diamond Lake with different species of fish.
 - Restoring the water quality should be the primary project goal with the fishery coming second. The fishery should be well balanced and of minimal impact to ensure that water quality is maintained.
 - A lake that did not historically produce fish should not be managed to produce fish.
 - ODFW's 1990 management plan sets unrealistically high goals that have likely contributed to water quality problems.
 - Concerned about the risk of stocking non-basin fish on indigenous fish species in the watershed.
- Concerns regarding the tui chub
 - Diamond Lake will never remain tui chub free. Even if people don't reintroduce tui chub, birds and other wildlife could.
 - Concerned that large numbers of tui chub will be transported into Lemolo Lake when Diamond Lake is drawn down, creating the same problems in Lemolo Lake that Diamond Lake is experiencing.
- Concerns regarding the effects of the proposed action on water quality
 - Concerned about the effects of the proposed action on nearby lakes and streams.
 - Concerned about the effects of the proposed action on water quality in Diamond Lake.
- Concerns regarding economics
 - In the economic analysis, the EIS should not place undue importance on the economic impact of a rainbow trout fishery; there are numerous other reasons tourists visit the area.
 - Concerned about the high cost of the proposed action.

Additionally, members of the public made numerous suggestions for alternative treatment options for Diamond Lake. These suggestions are also documented in the project Scoping Summary and incorporated by reference in this DEIS. Some public recommendations were incorporated into action alternatives and some were considered, but eliminated from detailed study as described in Chapter 2.

SIGNIFICANT ISSUES

Significant issues associated with a proposed action are the focus of an environmental impact statement because they provide the basis for formulating and comparing alternatives to the proposed action (40 CFR 1502.14). Significant issues are based on

unresolved conflicts concerning alternative uses of available resources. Issues are points of debate, dispute or disagreement over the effects of the proposed action.

Scoping identified a number of issues and concerns related to the proposed treatment of Diamond Lake. These issues, together with applicable laws, regulations, and policies, were used to develop alternatives. Issues expressed for the Diamond Lake Restoration Project and the measures (indicators) for those issues are as follows:

- 1. Fish Stocking:** Some members of the public felt that certain fish stocking strategies, different from past or proposed strategies, may now be appropriate for use in the management of the recreational fishery at Diamond Lake because: they believe past/proposed strategies have and would compromise water quality in the lake; or they believe different fish species would make better predators on tui chub than rainbow trout. They suggested strategies that include, but are not limited to: a change from management under a “Basic Yield Alternative” of the Oregon Trout Plan to a higher priority alternative due to the potential classification of Diamond Lake as a problem water²⁴; a change in numeric goals for annual stocking and harvest rates²⁵; a change to a different fish species mix that may include “Fiswich” rainbow trout²⁶, Eagle Lake rainbow trout, Kamloops rainbow trout, Crane Prairie rainbow trout (“Cranebows”), Oak Springs rainbow trout, spring chinook, brown trout, steelhead, Umpqua cutthroat trout, Lahontan cutthroat trout, bass, catfish, whippers, walleye, or northern pike.

Indicators:

- Management strategy alternative selected by ODFW
 - Fish species mix selected by ODFW
- 2. Non-target Species:** Some members of the public expressed a concern that rotenone treatment would kill non-target fish and wildlife species (i.e. amphibians, macroinvertebrates, rainbow trout) in Diamond Lake and could have negative impacts on other fauna in the Diamond Lake food chain (i.e. bald eagles, waterfowl, river otters). In addition, there were concerns about the potential negative effects on non-target species in Lake Creek, Lemolo Lake, and the North Umpqua River system if rotenone treated water escaped Diamond Lake through Lake Creek or groundwater.

²⁴ OAR 635-500-0115 describes six alternatives for the management of trout. Under the Oregon Trout Plan; “Basic Yield” is the fourth alternative. Item 4(b) under Basic Yield states: “The productive capacity of waters in this alternative will be maintained or enhanced so that no net loss of natural fish production occurs. Problem waters can be transferred into a higher priority alternative”. Higher priority alternatives include (1) Wild Fish (not applicable to Diamond Lake because it is naturally fishless), (2) Featured Species and Waters, and (3) Trophy Fish. All alternatives are described in OAR 635-500-0115 which is reproduced in the glossary of this document.

²⁵ This refers to a change from numeric goals described in the fisheries management plan for Diamond Lake adopted by the Oregon Department of Fish and Wildlife Commission in 1990. This plan describes the following: providing an average of 100,000 angler trips with a catch rate of 0.5 fish per angler-hour or about 2.7 fish per angler trip; and a total catch goal of 270,000 rainbow trout averaging 12 inches and yielding about 90 pounds of trout per acre annually. Implementation of the 1990 plan is accomplished by stocking 350,000-400,000 fingerling rainbow trout annually (OFWC, 1990).

²⁶ Native rainbow trout strain; the brood stock for these fish was collected from rainbow trout in two upper North Umpqua River tributaries- Mowich and Fish Creeks.

Indicators:

- Expected effects on bald eagle (Federally listed species)
- Expected effects on coho salmon (Federally listed species)

3. Water Quality: Some members of the public were concerned about the following potential effects on water quality associated with the proposed action including:

- Effects of the lake draw down on water quality in Lake Creek, Lemolo Lake, and the North Umpqua River.
- Effects of the rotenone treatment on downstream or adjacent water quality (i.e. summer home wells and North Umpqua River), if treated water escaped Diamond Lake through the Lake Creek outlets or the groundwater.
- Effects of the proposed action (rotenone treatment and fish restocking strategy) on water quality in Diamond Lake proper in both the short and long-term; i.e. the immediate effects of rotenone on the existing condition of water quality in the lake and the long-term effects of the entire proposed action on the future food chain and ecology of Diamond Lake (fish-zooplankton-phytoplankton-water quality relationship).

Indicators:

- Expected pH in all potentially affected water bodies
- Expected primary production in Diamond Lake
- Expected blue-green algae toxin production
- Expected changes in large-bodied zooplankton populations (indicator species)
- Risk of well contamination by toxins

4. Wetland Ecology: Some members of the public expressed concern that the proposed draw down could affect wetlands adjacent to the lake and the flora and fauna species associated with them. In addition, there were public concerns over the potential effects of the draw down on the physical integrity of Lake Creek.

Indicators:

- Expected acres of wetlands temporarily dewatered
- Expected changes in stream channel morphology
- Effects to rare plant communities

OTHER ISSUES

In addition to the significant issues listed above, eight other issues were considered. Although these issues did not drive the development of an alternative, six are tracked and discussed in the DEIS for full disclosure. Of the remaining two issues, one was considered infeasible (fishless condition) and one (tui chub transport into Lemolo Lake) would be mitigated. Other issues raised by the public are:

Fishless Condition

Some members of the public hold the opinion that since Diamond Lake was historically fishless it should not be managed for fish at all, but rather for natural lake conditions.

As described in Chapter 2, an alternative that would create and maintain a fishless condition was considered to be infeasible. Thus, this issue is not tracked in this document.

Impacts on Indigenous Fish Species

Stocking Diamond Lake with fish species not naturally found in the Umpqua River basin may negatively impact indigenous fish species.

The proposed action is not expected to adversely impact indigenous fish species in the Umpqua River basin; rationale for this conclusion is described in Chapter 3. Fish stocking strategies described in other action alternatives are also considered unlikely to have adverse impacts; however, the potential impacts to indigenous fish species are tracked for all alternatives in this DEIS.

Likelihood of Tui Chub Reintroduction

Tui chub are present in numerous lakes in close proximity to Diamond Lake. Therefore, there is a high likelihood that the species will be reintroduced at some point in the future.

It is acknowledged that tui chub may be reintroduced to Diamond Lake in the future. The proposed action identifies numerous educational activities designed to reduce the likelihood of intentional or accidental reintroduction of tui chub and describes several contingency measures for controlling/limiting future tui chub populations, if the species is reintroduced. The likelihood of tui chub reintroduction is tracked for all alternatives in this DEIS.

Human Health Risks

There are potential risks to human health and safety associated with the proposed action through exposure to rotenone.

Potential effects to human health are tracked for all alternatives in this DEIS.

Economics

There are numerous potential economic effects associated with the proposed action including, but not limited to: potential impacts to tourism, private businesses at the lake, and outlying area businesses; potential impacts to campground and fishing license revenues; and project implementation costs.

Potential effects to economics are tracked for all alternatives in this DEIS.

Recreation

There are potential effects to recreational opportunities associated with the proposed action including, but not limited to: impacts to visual quality, and access to swimming, fishing, boating and camping opportunities.

Potential effects to recreational opportunities are tracked for all alternatives in this DEIS.

Water Rights

The proposed draw down may impact people and corporations who hold water rights in/around and downstream of Diamond Lake.

Potential effects on water rights are tracked for all alternatives in this DEIS.

Tui Chub Transport into Lemolo Lake

Large numbers of tui chub may exit Diamond Lake and enter Lemolo Lake during the proposed draw down. As a result, tui chub may become problematic in Lemolo Lake.

Mitigation measures would limit tui chub passage into Lemolo Lake.

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