Toxics Management Strategy
Within our Ancestral Territory

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Coos, Lower Umpqua, and Siuslaw Indians

Department of Natural Resources

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1.0 Introduction

Purpose

The purpose of this Toxics Assessment and Reduction Strategy is to provide information to Tribal leadership, members, management, and the general public about toxics and the adverse impacts that toxics can have on human, fish, and wildlife health. The overall goal is to identify a strategy for assessing and reducing toxins within the Tribes' Ancestral Territory.

Background

As a federally recognized Tribal Government, the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians (Tribes) have both the rights and responsibilities with respect to the management and protection of natural resources under tribal jurisdiction and within the Tribes' Ancestral Territory. To exercise these rights and responsibilities, the Tribal Council established the Department of Natural Resources (DNR). The DNR is overseen by a Director and includes the Environmental Division and the Cultural Division. The Environmental Division's mission is to research, monitor, assess, manage, use, conserve, protect, and restore the natural resources of the Ancestral Territory consistent with Tribal values. The DNR receives grant funding from the United States Environmental Protection Agency (EPA) to make progress on this mission.

The Tribes' Ancestral Territory is located on the Central/Southwest Oregon Coast (see Figure 1) and is defined by CTCLUSI Resolution #91-010 (enacted February 25, 1991) as the following:

> *Starting at a point twelve (12) nautical miles West of the Continental Shelf and running due East to the mouth of the creek known as Ten Mile Creek, in Section 27, Township 15, Range 12 West, Lane County, Oregon; thence East to the watershed between the waters of the junction of the Calapooia Range, near the head water of the Siuslaw River, in Township 21, Range 4 West; thence in a Westerly direction following the summit of the ridge between the waters of the Smith and Umpqua Rivers, to a point due North of the head of tidewater on the Umpqua River; thence South across the Umpqua River to the summit of the mountains dividing the waters of Camp Creek from the waters of the Umpqua River; thence Southeasterly direction along the summit of the Coast Range Mountains, to the summit of the divide separating the waters of Looking Glass Creek from the waters of the South Fork of Coos River in Township 27 South, Range 8 West, Douglas County, Oregon; thence West to a point of rocks known as the Five Mile Point, in Section 19, Township 27 South, Range 14 West, Willamette Meridian, Coos County, Oregon; extending due West to a point twelve (12) nautical miles beyond the Continental Shelf.*

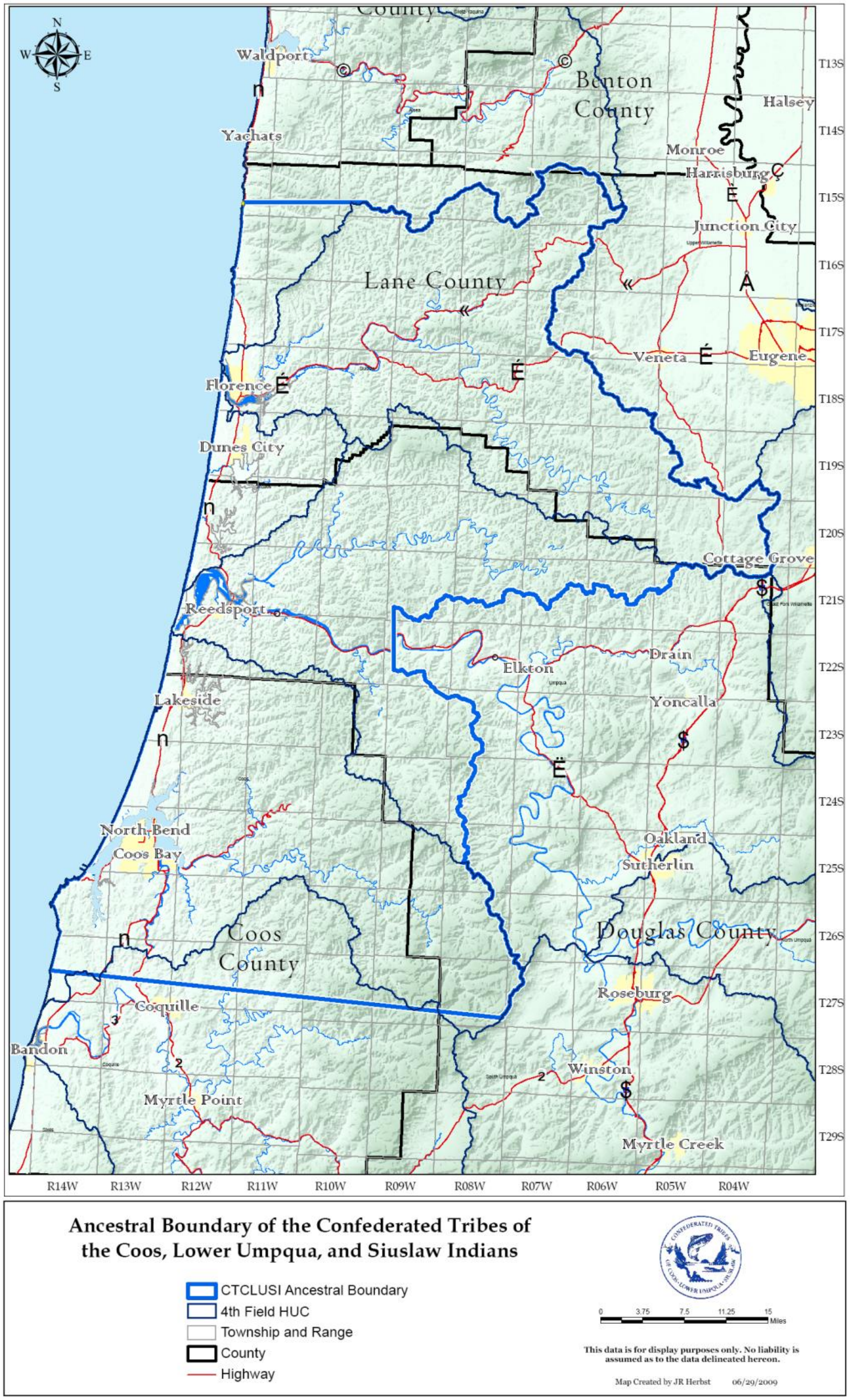

Figure 1: CTCLUSI Ancestral Territory

In 2007, the DNR received grant funding from EPA under the Indian General Assistance Program (IGAP). The goal of the grant was to increase tribal environmental management capacity. More specifically, the grant provided the opportunity to increase tribal capacity to understand and manage invasive species, contaminated soils, and toxics. Since 2007, DNR staff has completed extensive background research, completed a tribal lands site inspection and inventory during the summer of 2008, and drafted management strategies for each of the above mentioned environmental issue. The following is the management strategy for toxics.

It became evident very quickly that toxics are a broad environmental issue with many different levels. The Tribes alone will not be able to fully identify and reduce toxics of concern. It will be important to utilize existing partnerships and build new ones in an effort to better understand the extent and impacts of toxins and stretch limited funding resources to respond to these issues. An example of an active stakeholder leading toxic assessment and reduction efforts within Oregon is the Oregon Department of Environmental Quality (DEQ, www.deq.state.or.us). With a mission "to protect and improve Oregon's water quality," the DEQ has initiated multiple statewide efforts to identify, assess, and reduce toxics. In 2007, the Oregon Legislature directed DEQ through Senate Bill 737 (SB 737) to develop a prioritized list of persistent pollutants (known as the P^3 List, http://www.deq.state.or.us/wq/SB737). Persistent pollutants are those that come from a wide variety of sources but linger in the environment and have a documented effect on human health, wildlife, and aquatic habitat. SB 737 requires DEQ to present a list of priority persistent pollutants to the Legislature by June 1, 2009. By June 1, 2010, DEQ is required to submit a report to the Legislature that identifies sources of pollutants on the list and opportunities to reduce their discharge to Oregon waters. Oregon's 52 large municipal wastewater treatment plants must also develop toxic reduction plans by June 2011 that reduce persistent pollutants within their discharged effluent at levels above DEQ trigger levels.

2.0 Toxics of Concern

<u>What are Toxic Contaminants?</u>

Toxic contaminants (or toxics) are chemicals introduced to the environment in amounts that can be harmful to fish, wildlife, or people. Some are naturally occurring, but many of these contaminants were manufactured for use in industry, agriculture, or for personal uses such as hygiene and medical care. These synthetic and naturally occurring chemicals can be concentrated to toxic levels and transported to streams through a combination of human activities such as mining or wastewater treatment or through natural processes such as erosion (see Figure 2).

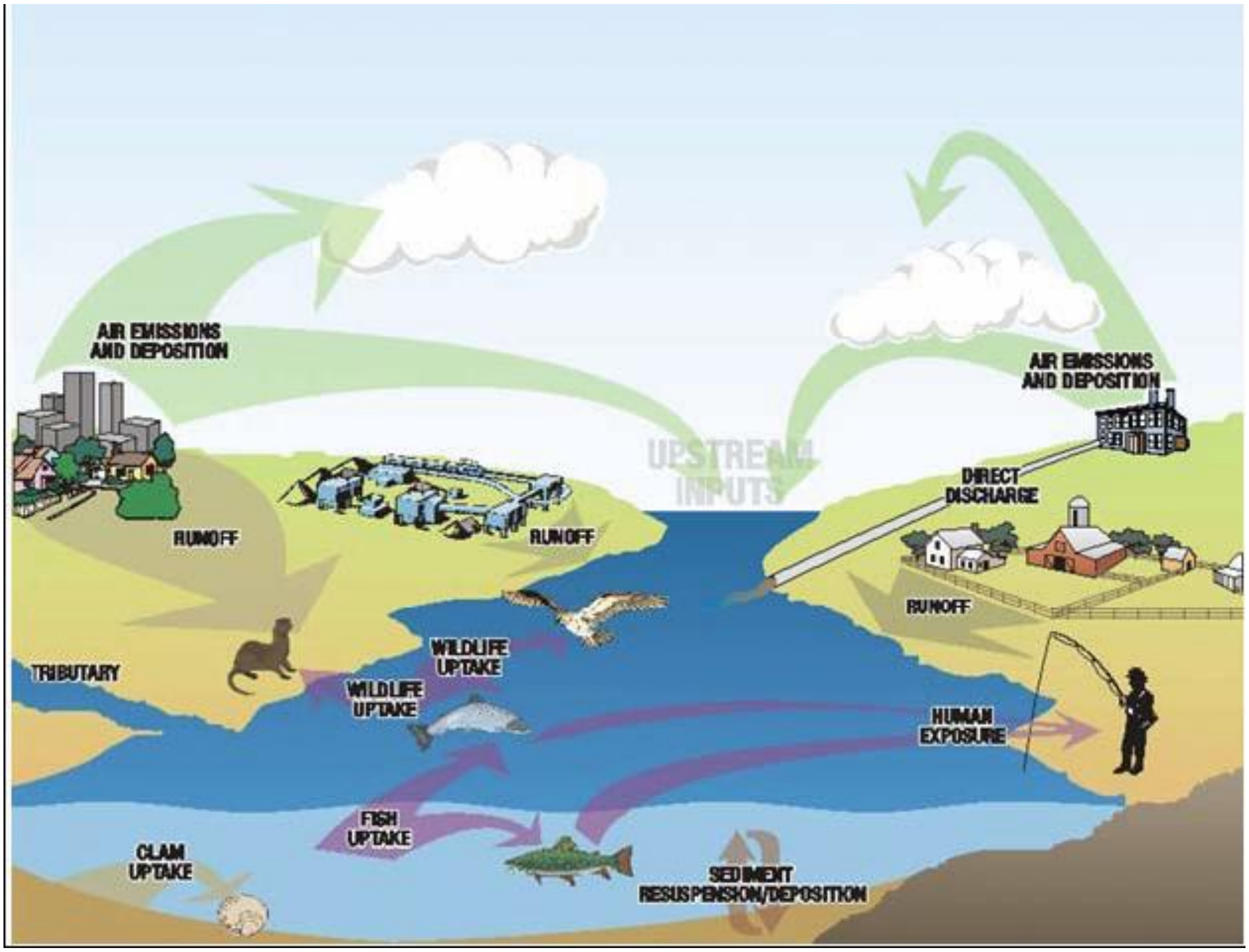

Figure 2: Toxic Contaminant Pathways in the Environment (Source: Columbia River Basin: State of the River Report for Toxics, January 2009)

The fate of a contaminant is determined by its properties-for example, whether the contaminate mixes readily with water or sediment particles, or whether it changes form when exposed to sunlight, bacteria, or heat. A contaminant's location and level of concentration in a river help determine whether fish, wildlife, and people are exposed to it and, if so, whether they experience harmful effects ***(Source: Columbia River Basin: State of the River Report for Toxics, January 2009)*.**

Why should we be concerned with toxics?

Since the mid 1900s, the global production and use of chemicals have increased substantially. It is estimated that in the United States alone 42 billion pounds of chemicals are produced or imported each day.[1]

Scientific studies have found two things:

1. Many of these chemicals pose a grave danger to human health and
2. These chemicals can be found in every corner of every country—in the land, the air, the water, wildlife, people's blood, and women's breast milk. Despite these findings, current laws regulating chemicals are insufficient and endanger the health of all Americans, with particular threats to the health to children.

The primary federal law regulating chemicals is the 1976 Toxic Substances Control Act, or TSCA. Of the 81,600 chemicals registered in the United States, 62,000 were already in production in 1979 when TSCA was implemented. These "existing" chemical substances, as they are classified under TSCA, are assumed to be safe unless the Environmental Protection Agency (EPA) can demonstrate that they present an unreasonable risk to human health or the environment. Additionally, the EPA must weigh risk against the economic costs of banning, limiting, or phasing out a chemical. Unfortunately, because of the limited capacity to study the toxicity, health effects, and hazards of these existing chemicals, it is difficult for the EPA to demonstrate a risk to human health or the environment. As of 2005, the EPA has performed internal reviews of only an estimated 2% of the 62,000 TSCA pre-1979 chemicals.[2]

Today, most people assume that the chemicals, materials and products in their homes, workplaces and schools are safe. This is not necessarily the case.

Chemicals are all around us—in the air we breathe, the water we drink, the food we eat, and the products that are in our homes, schools, and workplaces. While some of these substances are likely to be safe, evidence is building that an alarming number of widely used chemicals pose a threat to our health and environment. Scientific research is revealing that everyday exposures to these common chemicals can contribute to the development of cancers, learning disabilities, Parkinson's disease, endometriosis, birth defects, infertility, and other health problems.

Of particular concern to humans and the environment are chemicals that bioaccumulate, chemicals that are persistent, and highly toxic chemicals including carcinogens, mutagens, reproductive toxicants, and hormone-mimicking chemicals.

Bioaccumulation is the process through which a chemical concentrates in an organism. Chemicals that bioaccumulate can also biomagnify, which means that the concentration of the chemical increases as it moves up the food chain. Because humans are at the top of the food chain, these chemicals can have significant negative impacts on our health. Chemicals that bioaccumulate are usually concentrated and stored in an organism's adipose (fat) tissue and organs.

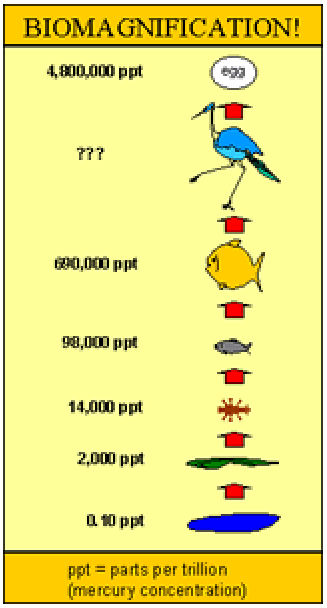

Figure 3: Biomagnification Example (Source: Is Mercury the Achilles Heel of the Restoration Effort? South Florida Restoration Science Forum)

Persistent chemicals are substances that do not break down quickly, staying in and negatively impacting the environment for decades, if not longer. Data from countless studies show persistent toxic chemicals in places they should never be, including human breast milk, the umbilical cords of newborn babies, whales, eagles, and peregrine falcons, to name a few.[3] Even for chemicals that do breakdown within the environment, their sometimes ubiquitous presence in everyday products and foods means we are continually exposed to them.

Carcinogens are chemicals that cause cancer. A mutagen is a chemical that changes genetic information. As many mutations are known to cause cancer, mutagens are also a type of carcinogen.

Reproductive toxicants can interfere with sexual functioning or reproductive ability from puberty through adulthood. Toxicants that target the female reproductive system can cause a wide variety of adverse effects on sexual behavior, onset of puberty, fertility, gestation time, pregnancy outcome, lactation, and menopause onset. Toxicants that target the male reproductive system can affect sperm count or shape, alter sexual behavior, and decrease fertility.

Hormone-mimicking chemicals can interfere with a number of developmental and physiological processes, because our bodies have trouble distinguishing them from natural compounds such as estrogen. Hormone mimickers frequently interfere with sexual development, sperm counts, and reproductive functioning. ***(Source: The Oregon Environmental Council's Pollution in People Report, http://www.oeconline.org/our-work/kidshealth/pollutioninpeople/report)***

Toxins of Concern

The following description of toxic substances is from the Lower Columbia River Estuary Partnership (www.lcrep.org), 2007. Lower Columbia River and Estuary Ecosystem Monitoring: Water Quality and Salmon Sampling Report. The toxic substances do not include all toxins of concern that may pose a threat within the Tribes' Ancestral Territory, but based on similar historical and present day watershed uses the potential of finding toxins within these categories is high.

PCBs

Polychlorinated biphenyls, or PCBs, are stable, nonflammable synthetic compounds that for decades were widely used as insulators and cooling compounds in electrical equipment such as transformers, capacitors, and fluorescent-lighting ballasts. They also were incorporated into lubricants, paints, varnishes, inks, pesticides, carbonless copy paper, and other consumer products because of their ability to preserve, protect, and waterproof. PCBs come in 209 different forms, or cogeners (familiar trade names are Aroclor and Pyranol), and vary in their degree of toxicity and carcinogenicity. Some PCBs are structurally similar to dioxins, and these are considered the most toxic PCBs.

All PCBs are persistent, hydrophobic chemicals, meaning they do not degrade readily or dissolve in water. Instead, they tend to bioaccumulate in body fat and biomagnify up the food chain. Although the United States banned the manufacture of PCBs in 1979 because they are carcinogenic and pose environmental and human risks, their use in closed electrical equipment is still permitted. Over the years, PCBs have unintentionally been released to the environment, sometimes through spills. Today they can be found in the soil, air, water and sediment of lakes, rivers, and estuaries; and the bodies of fish, wildlife, and people.

PAHs

Polycyclic aromatic hydrocarbons, or PAHs, are persistent, widespread organic contaminants that exist in petroleum products or are created through the incomplete combustion of carbon-containing materials, such as wood, coal, fat, and tobacco. They also are created from the gasoline and diesel fuel that power our cars. PAHs are used in the manufacture of dyes, insecticides, and solvents and enter the environment through spills or atmospheric release during burning. Although PAHs most commonly attach to soil and sediment, they can also be found on particles suspended in the air or water. Some PAHs are relatively water soluble and acutely toxic, while others are lipophilic, meaning that they have an affinity for fat; these tend to bioaccumulate in certain organisms, such as invertebrates. However, PAHs do not bioaccumulate in vertebrates such as fish, birds, wildlife, and humans because these organisms can metabolize PAHs. Many PAHs, especially high molecular weight PAHs such as benzo(a)pyrene, are known or suspected carcinogens. Familiar PAHs include anthracene, fluoranthene, and naphthalene.

Trace Elements (Metals)

Trace elements are metals and similar substances that are toxic at fairly low concentrations and for which organisms have little or no biological need. These include *arsenic, copper, chromium, lead, mercury, and nickel*. Trace elements occur naturally, but they have a variety of industrial applications and can be introduced to the environment through the atmosphere, soil, groundwater, or surface water as a result of human activities. Most trace elements can bioaccumulate in fish and wildlife.

Banned Pesticides

DDT, DDE, and DDD

DDT is an organochlorine pesticide. Once its potent insecticidal properties were recognized in the late 1930d, it was widely used to control agricultural pets and reduce the incidence of mosquito-borne diseases such as typhus and malaria. DDT is highly persistent and resists dissolving in water. Thus it can persist for decades in soil and sediment, and it readily bioaccumulates and biomagnifies up the food chain. DDT is known to have acute and long-term effects on microorganisms, invertebrates, amphibians, fish, mammals, and birds, including (notoriously) the reproduction of bald eagles. In addition, USEPA classifies DDT as a probable human carcinogen. The manufacture and use of DDT was banned in the United States in 1972, but it and its breakdown products-DDE and DDD-are still found in the environment.

Aldrin and Dieldrin

Aldrin and dieldrin are chlorinated insecticides that were developed in the 1940s as alternatives to DDT. They were widely used in the United States to control termites and other soil insects until they were banned in 1987 because of their toxicity to a variety of organisms, including humans. In the environment, aldrin breaks down quickly into dieldrin. Like DDT, dieldrin breaks down slowly, has low solubility in water, and persists in soil and sediment, from which it can move to organisms and bioaccumulate. When exposed to sunlight, dieldrin can transform into photodieldrin, a more toxic compound.

Chlordane

Chlordane is a persistent organochlorine pesticide made up of a mixture of related chemicals, such as heptachlor. It adheres strongly to soil, bed sediments, and suspended sediments and can remain intact for decades if it has little exposure to the atmosphere. Chlordane bioaccumulates readily in fish and wildlife and can commonly be found in human body fat. It is highly toxic to freshwater invertebrates and fish; in humans, it can affect the liver and the nervous and digestive systems. USEPA phased out the use of chlordane on food crops in 1978 and for termite control in 1988. Its use in the United States is now completely banned, but chlordane is still manufactured for export.

Pesticides in Current Use

Organophosphate, Carbamate, Triazine, and Urea

These water-soluble pesticides are commonly used in agriculture, on lawns and gardens, and in horticulture. They typically enter the environment through irrigation and stormwater runoff. The organophosphates (diazinon, chlorpyrifos, malathion, and others) and carbamates (such as cabaryl and carbofuran) have sublethal effects on salmon's olfactory function and reproduction. Effects can be additive or synergistic when several pesticides occur together in the environment, such that the impacts of the mixture are greater than the impacts of any one pesticide would suggest.

Lindane and Related Compounds

This chlorinated hydrocarbon, also known as hyxachlorcyclohxane (HCH), has mainly been used to control wood-inhabiting beetles and to treat people for fleas, lice, and scabies. Agriculture use of lindane was recently banned by the USEPA (it is a suspected carcinogen), but pharmaceutical use is still allowed. Lindane is moderately water soluble and may accumulate in sediment. It can be toxic to salmon at high concentrations (above 2 micrograms per liter in water) and at lower concentrations can affect growth, hormones, and the immune system. Lindane also is toxic to salmon prey.

PBDEs (Flame Retardants)

Polybronminated diphenyl ethers, or PBDEs, are a class of synthetic flame retardants used in plastics, cushions, and clothing. Chemically, PBDEs are similar to PCBs. Like PCBs, they come in 209 different forms, or congeners, depending on how many bromine atoms they have and how those bromine atoms are arranged. Only some of those congeners are commonly used in commercial flame retardants. The three commercial PBDE products-penta-BDE, octa-BDE, and deca-BDE-consist of a mixture of congeners.

Penta-BDE, which is generally more toxic than the octa and deca mixtures, is used in insulation and in foam for furniture, mattresses, and automobile seats. Octa-BDE is used in high-impact plastic products, including computer housings, kitchen appliance casings, and telephone handsets. Deca-BDE is used in carpets and drapes, in non-clothing fabrics, and in plastic found in televisions, computers, stereos, and other electronics. Although deca-BDE is less toxic than penta or octa, it breaks down in the environment into more toxic and bioaccumulative forms.

PBDEs bioaccumulate in both freshwater and marine fish, and their effects on juvenile salmon are believed to be similar to those of PCBs, ranging from neurotoxicity to hormone disruption. PBDEs represent about 25 percent of the flame retardants produced worldwide and are considered an emerging contaminant. Because of their widespread use, their levels in the environment have continued to increase.

Pharmaceuticals and Personal Care Products

Nationally, pharmaceuticals and personal care products such as cosmetics, detergents, and deodorants are being identified more frequently in freshwater systems. Detected compounds include antibiotics, antihistamines, oral contraceptives, analgesics, sunscreen, insect repellant, synthetic musks, disinfectants, surfactants, plasticizers, and even caffeine. Many of these compounds enter the waterways through septic tanks and treated or untreated wastewater and pose developmental or toxic risks to salmon. Some mimic estrogens or other hormones, thus disrupting the endocrine system and possibly interfering with reproduction, growth and development. Some pharmaceuticals and personal care products bioaccumulate in fish and people; the synthetic musk HHCB is on notable example. Like PBDEs, pharmaceuticals and personal care products are considered emerging contaminants about which additional scientific information is needed.

3.0 Toxics Framework Questions

The answers to the following questions will provide the necessary framework to understand and manage toxins of concern.

- Which toxics are the Tribes most concerned about within the Ancestral Territory, and why? Which toxics are the highest priority for cleanup?

- Where are the toxics coming from? How can they be controlled and cleaned up? How can we prevent contamination in the future?

- What can indicator species tell us about the health of the Ancestral Territory? What indicator species should we use to evaluate the health of the ecosystem? Is the health of the ecosystem improving of declining? What additional information do we need to collect so that we can determine changes over time to better understand and deal with the toxics problem?

- What toxics reduction actions are currently under way? Have they been successful? What actions are planned to further reduce toxics?

- What are the next steps to improve the health of the Ancestral Territory? What are the short- and long- term monitoring and research needs?

This toxics management strategy begins to answer some of these important framework questions from a strategic level. Additional resources and partnerships will be needed to fully understand and address any toxic issues within the Tribes' Ancestral Territory.

4.0 Toxics Management Strategy

The variety and quantities of toxins that have been and are being released everyday into the Tribes' Ancestral Territory poses a major environmental management challenge. In addition, some of these toxins, such as mercury, can bio-accumulate as they move up the food chain. Toxins pose a direct threat to traditional subsistence foods (anadromous and resident fish, shellfish, wild game, berries, roots, etc). that Tribal people have relied upon for many generations. Studies have shown, such as the 1990 Columbia River Inter-tribal Fish Consumption Survey (CRITFC), that fish and shellfish are consumed at higher rates by Tribal members than by the general public. A higher fish and shellfish consumption rate can increase the chance of toxin exposure to the consumer. Understanding where these toxins originate and how these traditional food sources that Tribal members continue to depend upon uptake these toxins would be a great start for a toxics management strategy. Four key areas have been identified within this management strategy. Progress on these areas from a management perspective is crucial in an effort to fully understand, assess, and reduce toxins within the Ancestral Territory.

Funding

The Tribes' DNR receives a majority of its environmental program funding from EPA. The DNR is currently restricted from completing a baseline toxic assessment at known or suspected contaminated sites due to limited levels of funding, grant commitments and requirements, and staff resources. Each EPA funded environmental programs comes with their own program/grant requirements which guide how the grant funds can be used. For example, the Tribes' Water Quality Monitoring Program is grant funded by EPA through Section 106 of the Clean Water Act. In 2006 EPA developed the *Final Guidance of Awards of grants to Indian Tribes under Section 106 of the Clean Water Act (EPA 832-R-06-003, 10/20/2006)* which describes how Tribes are required to develop their water quality monitoring program. Complying with these program requirements and the capped amount of funding that EPA is capable of providing for each program makes it difficult to add an additional toxic monitoring parameter to the Water Quality Monitoring Program. Another example is EPA's IGAP program, which funded the development of this management strategy. The IGAP provides en`vironmental capacity building funds. Baseline assessments for air, water, and land concerns are allowable under the program, but implementing projects to responds to these concerns are not. Increasing the flexibility of the IGAP program would greatly assist the Tribe's in assessing and responding to toxin issues. Also having an EPA program that allows for capacity building and implementation provides funding stability that is necessary to address toxins.

EPA is limited in the amount of funding that it can provide Tribes. A strategy to overcome this funding limitation is to look into other funding opportunities. This includes funding opportunities from other state and federal agencies and foundations. An example of a major stakeholder in assessing and reducing toxin exposure is the United States Geological Service (USGS). USGS's Toxic Substances Hydrology Program provides objective scientific information on environmental contamination to improve characterization and management of contaminated sites, to protect human and environmental health, and to reduce potential future contamination problems. By building partnerships funding opportunities will become more transparent.

Partnerships

A potential partnership strategy is to develop a local toxic assessment and reduction partnership similar to the Lower Columbia River Estuary Partnership (www.lcrep.org). LCREP is one of twenty-eight programs in the National Estuary Program which uses a watershed approach to preserve and enhance the water quality of the Lower Columbia River Estuary in an effort to support its biological and human communities. LCREP has developed the Lower Columbia River and Estuary Ecosystem Monitoring: Water Quality and Salmon Sampling Report (2007) which could be used as a model to assess the Coos, Umpqua, and Siuslaw Estuaries. This type of partnership would take time to develop but from toxics management strategy would be essential to fully grasp the extent of toxics within the Tribes' Ancestral Territory. In addition, contacting and working with LCREP staff to learn from their efforts would assist in developing a toxics assessment in the Coos, Umpqua, and Siuslaw Estuaries.

DEQ is another major stakeholder with a common goal of assessing and reducing toxins. DEQ's focus is on statewide efforts, but local DEQ staff are very knowledgeable of past and upcoming toxic assessment and reduction efforts. DNR staff have contacted the local DEQ staff for insight on how to obtain this information. Working with DEQ would greatly improve tribal understanding of toxic assessments and concerns.

Toxics Data

Toxics data has been collected within the Tribes' Ancestral Territory by DEQ and the Environmental Monitoring and Assessment Program (EMAP, http://www.epa.gov/emap). A management strategy would be to obtain and review the data and any report summaries. The next step would be to work with DEQ and EMAP to identify what data gaps may exist and how the Tribes can assist in additional assessment efforts.

Policy

Federally recognized Tribal Governments are in an excellent position to push local, state, and federal policy that assesses and reduces toxics. A success story on this effort is the recent increase in Oregon's fish consumption rate from 17.5 grams/day to 175 grams/day. Tribal leadership and environmental staff from the Confederated Tribes of the Umatilla Indians successfully pushed this effort with the State of Oregon. CTUIR's leadership on this issue has sent a clear statement nationwide that Tribal Governments can influence State's water quality policy.

5.0 Conclusion

Toxics are a complicated environmental management issue with many different levels. Toxins can have a direct impact on human health, fish and wildlife. It's important to understand that Tribal people may be at more risk from toxic ingestion due to higher consumption of traditional foods (fish, shellfish, small and large game, berries, roots, etc.). The DNR has completed this management strategy in an overall toxic assessment and reduction project. This strategy attempts to take the first step in addressing toxins within the Tribes' Ancestral Territory by trying to establish a framework questions identified in Section 3.0. By working and learning from stakeholders interested in understanding and reducing toxins we can eventually begin to understand toxin issues within the Tribes' Ancestral Territory. Thanks to EPA Region 10 for providing the capacity building funding to develop this management strategy for toxins.

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7.0 Appendix: Maps of Toxic Release Concerns on CTCLUSI Tracts

A. Coos Head

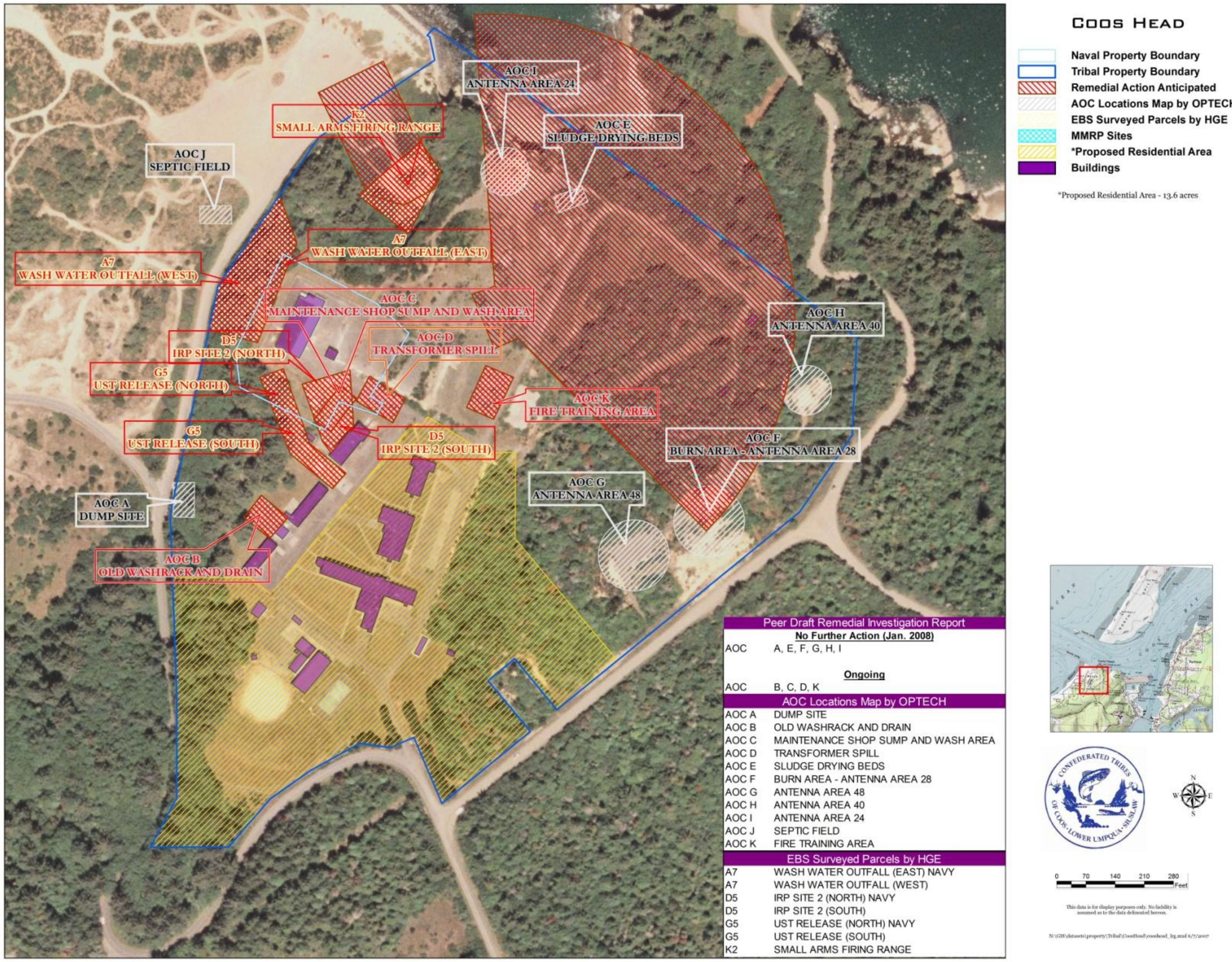
B. Baldich (Gregory Point)

C. Munsel Lake

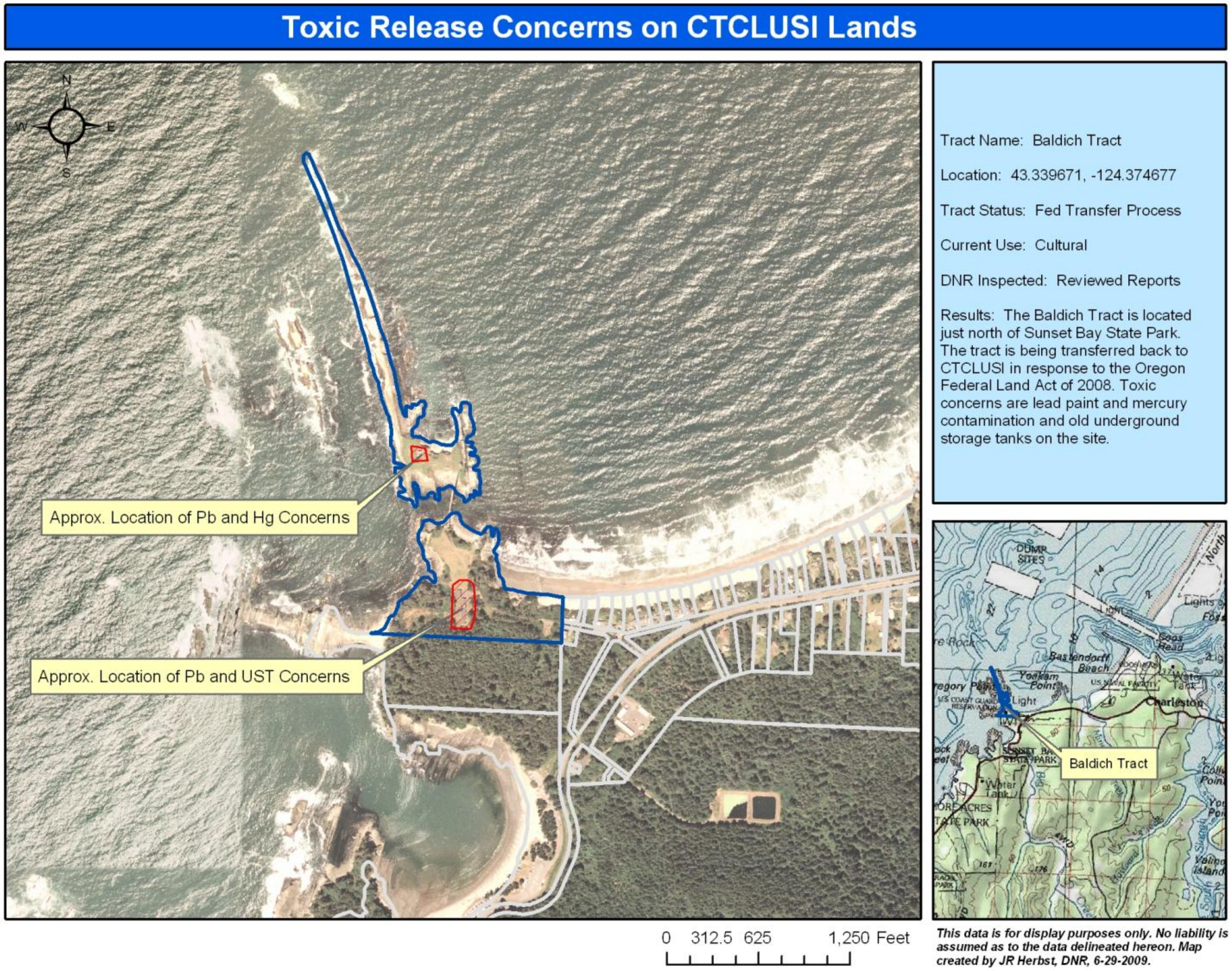
D. Hatch

During the summer of 2008 DNR staff performed a Tribal Tract Inspection. The purpose of this tract inspection was to identify and document any evident environmental issues at each tract. DNR staff focused on documenting invasive species, toxics, and contaminated soil issues. The majority of the Tribes' tracts are small and urban and only minor garbage issues were documented. Maps A-D are tracts that have known or suspected toxin concerns at the time of the tract inspection.

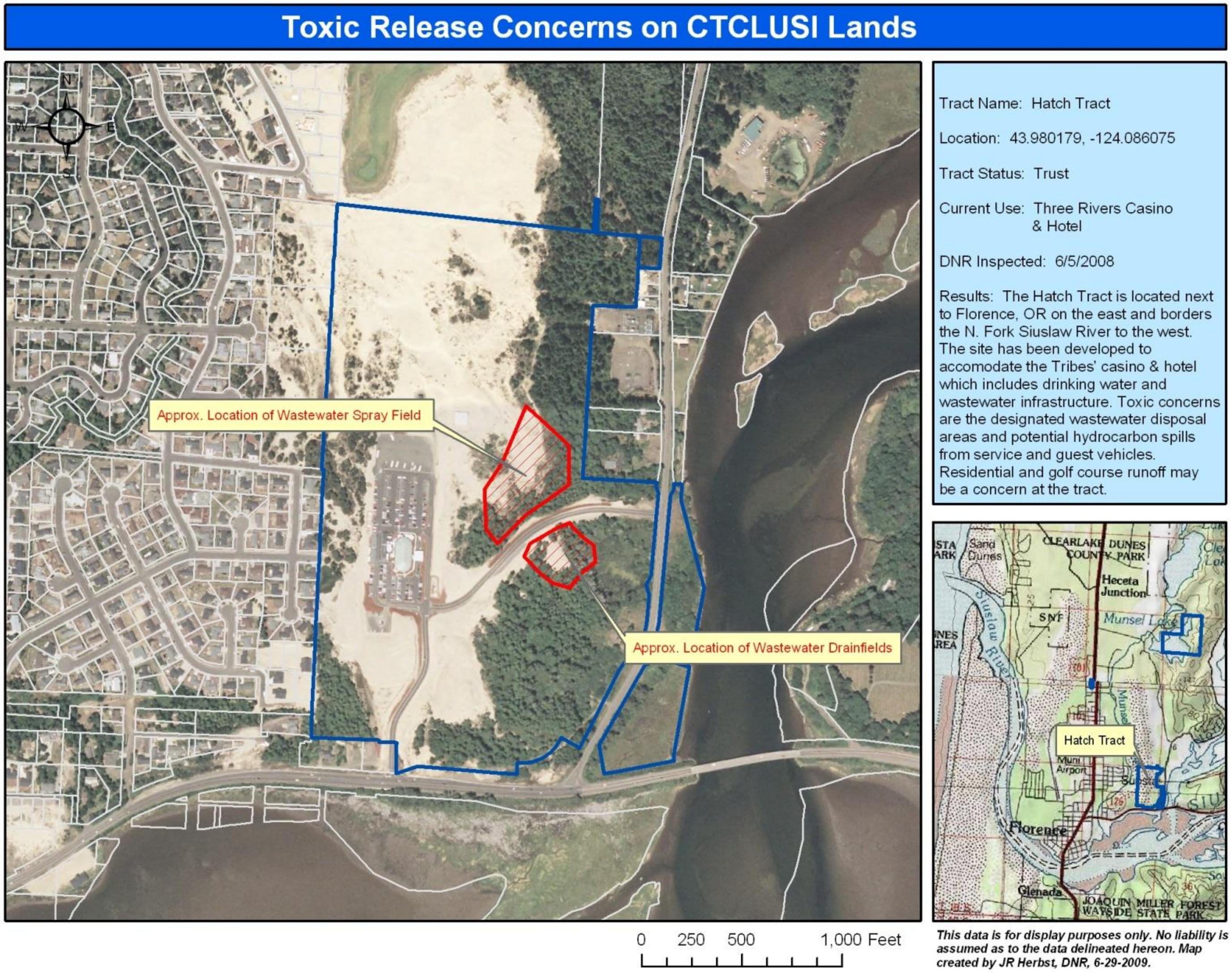
A. COOS HEAD TOXIC RELEASE CONCERNS



B. BALDICH TOXIC RELEASE CONCERNS



C. HATCH TRACT TOXIC RELEASE CONCERNS



D. MUNSEL LAKE TOXIC CONCERNS