[redacted]

March 19, 2014

Sent Via Email: joelle.gore@noaa.gov

Joelle Gore, Acting Chief
Coastal Programs Division (N/ORM3)
Office of Ocean and Coastal Resource Management
National Ocean Service
National Oceanic and Atmospheric Administration
1305 East-West Highway
Silver Spring, MD 20910

Re: Oregon's Coastal Nonpoint Pollution Control Plan

Dear Ms. Gore:

I am writing as an individual, not as representative of any organization or agency with which I may be affiliated. I am writing to ask you to **disapprove** Oregon's current Coastal Nonpoint Pollution Control Plan (CNPCP), for the reasons set out below.

I have been involved in water quality issues on a very personal level since the late 1970s, when the term 'non-point source pollution' was first coined. I was a staff member of the Oregon Department of Environmental Quality and worked closely with the original committee and EPA staff tasked with studying the issue(and explaining the new terminology and concepts) of non-point source pollution around the state. At the time, I had high hopes for the program.

I was a founding member of a local community group that worked doggedly to protect our drinking water source, the North Florence Dunal Aquifer, Oregon, from both point and nonpoint source pollution caused by development and logging in the late 1990s.

My husband was a founding member of the Florence Area Salmon Trout Enhancement Program (STEP) years ago, which gave me an inside view of the on-the-ground effect of nonpoint pollution on local fisheries. Local salmon runs have been devastated from nonpoint pollution from logging and development in the area. The fragility of even our artificially produced salmon runs was painfully illustrated this February when something entered a local stream, presumably from a nearby stormwater drain which empties into the stream, and wiped out 10,000 coho salmon eggs in the local STEP group's hatchery. Several fish and frogs were also found dead in the creek. The eggs represented a year's production, meaning there will be no coho returning to Munsel Creek three years from now. The newspaper article said that the state was not investigating the pollution.

I have been a member of the Board of the Heceta Water District (HWD) since 2003. The district obtains drinking water for over 4,500 people from Clear Lake, which is located within the North Florence Dunal Aquifer, As a board member, I was deeply involved with the formation of the

Clear Lake Watershed Protection Zone - from conception, through seemingly endless litigation, to final adoption by Lane County in 1998. I am also a Commissioner on the newly formed Heceta Water Peoples' Utility District, which will be assuming the water district's responsibilities in June 2014.

I have spent countless hours, as employee, elected official, and community volunteer, trying to ensure that the issue of nonpoint source pollution would receive the political and public attention it deserved. All I can say now is that Oregon's efforts to address nonpoint pollution of our waters has been a MONUMENTAL FAILURE.

I offer, as example, my experiences in a small watershed on the Oregon coast, in the Siuslaw Basin.

Clear Lake is one of many lakes on the central Oregon coast that lie on the 50-mile long North Florence Dunal Aquifer, which was designated a 'sole source aquifer' by the EPA in 1981. A sole source aquifer is an aquifer which has been determined to be the sole or principal drinking water source for the area. The Clear Lake Watershed is situated north of Florence, is part of the North Florence Dunal Aquifer, and empties into Munsel Lake, Munsel Creek, and eventually into the Siuslaw River estuary.

The coastal forestlands included in the North Florence Dunal Aquifer contain a dense network of streams, many of which are salmon-bearing, and others which comprise feeder streams for the Siuslaw River.

Industrial forestry operations in the Clear Lake watershed have been ongoing since the formation of the Water District in 1966. Residential development (on septic systems, not sewer) inside the watershed was curtailed somewhat in 1998, but residential activities continue essentially unmonitored. Two small lakes feed into Clear Lake, both of which have already experienced seasonal algae growth due to nonpoint pollution from residential habitation. Clear Lake is directly threatened by pesticide and herbicide applications inside the watershed, as well as land disturbance on steep slopes near the lake from logging operations.

In addition, Clear Lake is particularly sensitive to fertilizers (whether natural or chemical) which would adversely effect the oligotrophic nature of the lake which provides clean drinking water for over 4,500 people. Many of our coastal lakes are being harmed by non-agricultural fertilizer application - such as those seeping into the ground from septic tanks, applied to nearby lawns and residential gardens, and sprayed on forestlands. The fertilizer which enters the surface waters through runoff and/or groundwater flow increases algal growth, and can have a devastating effect on water quality. Lakes, as described in Dr. Larson's letter, are particularly susceptible to detrimental effects of fertilizers from both domestic uses and logging operations.

After countless studies, reports and lawsuits, decades of public hearings, deliberations, and governmental 'paper' actions, our drinking water is still, essentially, unprotected from nonpoint pollution. If Clear Lake becomes polluted, the Heceta Water District will have to install, operate, and maintain additional expensive filtration and cleaning equipment, which will result in higher water rates and lower quality water for the customers.

When a recent logging operation was begun, the community and the Water District discovered first hand just how ineffective the existing laws and regulations are. The community and the Water District were concerned about logging operations and the resulting runoff (and/or wind-drift) into tributaries and directly into Clear Lake from road construction (sedimentation), landslides caused by road construction and other logging activities, herbicide, fertilizer, and pesticide application, and slash burning runoff.

The North Florence Dunal Aquifer's sole source designation should provide some level of extra protection for our drinking water from pollution. The recourse against any government project violating the protections is that they cannot obtain federal funding. One would think that is a strong incentive to implement effective plans to protect the water, but the facts on the ground prove otherwise. DEQ, Lane County, and the City of Florence all regularly adopt rules and regulations which allow development that will obviously pollute the aquifer - commercial stormwater drainage directly into pipes in the aquifer, residential development on septic systems next to lakes and surface water, logging activities that include application of all manner of chemicals, etc. All of this on land which is, essentially, stabilized sand dunes, and extremely pervious to anything that is applied to the surface. To my knowledge, neither entity has ever been denied federal funding for allowing, and in many cases encouraging, development and activities which will cause pollution of the aquifer.

When faced with the recent logging activity inside the Clear Lake Watershed, the Water District tried to prevent the spraying of fertilizers, herbicides and pesticides inside the watershed. The board was informed that there was nothing that could be done until it could be proven that something had actually harmed the water - after the spraying had been allowed. The District had to explain to our many customers that the district itself has no power to prevent nonpoint pollution of Clear Lake, short of expensive (and uncertain) litigation - after the damage had been done.

The next supposed layer of protection: Lane County's Watershed Protection Zone. Politics and profits once again triumphed over science and reason. The protection zone language was purposefully written by Lane County (in response to threatened lawsuits and political pressure by the logging industry) to be completely ineffective as far as application to logging operations inside the watershed, and minimal as to pollution from other human activities. This, too, offered no protection from nonpoint pollution.

Next, inquiry was made to Oregon's DEQ and Water Resources Departments - their regulations are totally ineffective and apparently 'trumped' when in opposition to activities allowed under the Oregon Forest Practices Act. After consultation, it seemed that the EPA also takes a 'hands off' approach to dealing with state logging practices.

In my personal opinion, and based on my experiences with the agency, the Oregon Department of Forestry's primary focus is to make sure that logging occurs as quickly and efficiently as possible for the timber industry - with as little interference or participation by the effected

community. The water district quickly discovered that the riparian regulations purported to be 'protection' by the Department of Forestry are, pun intended, weak as water.

Bottom line - our water - our surface water, groundwater, drinking water - is essentially left unprotected because of the inability of State or local governments to effectively administer a nonpoint pollution program in Oregon.

Oregon politicians and officials, in my opinion, are unable to stand up to the heavy political and financial influence wielded by the timber and development industries in Oregon - influence which prevents any meaningful regulatory actions regarding nonpoint pollution of our waters.

The main point: Oregon does not have a workable program that meets the requirements of EPA and NOAA for a coastal nonpoint pollution program. Piecemeal approaches such as promises to increase TMDL's, tighten Department of Forestry riparian rules and decommission legacy roads, are insufficient as basic management measures to grant Oregon approval for a nonpoint program. Further conditional approval and promises of better enforcement provide no protection to Oregon's rivers, streams and lakes.

I propose that EPA and NOAA step back, and require Oregon to provide not only a solid framework of basic management measures, but also a detailed and concrete list of additional management measures to actually protect riparian areas, and provide substantially increased protections for fertilizer, herbicide and pesticide applications near fish-bearing and non-fish bearing streams.

Oregon's problem is not simply inadequate enforcement: it is a refusal to create, use, enforce and maintain a nonpoint program that protects the designated uses requiring protection. One of the most important "designated uses" is "public and private drinking water," and this is where my principal concern lies, due to my personal long experience with the subject at hand. Unless EPA and NOAA provide adequate management measures to control impacts such as sedimentation, fertilizer, pesticide and herbicide contamination for our drinking water supplies, depending on the States to do so will result in even more damage to our drinking water supplies.

As so clearly stated by Dr. Larson in the attached 1992 letter to Heceta Water District: "The high costs of lake degradation will be borne by the people who depend on Clear Lake for their vital drinking water." Decades have passed, and the problems remain unresolved.

Oregon's DEQ, Lane County and even nearby City of Florence have a decades-long history of creating "paper plans" to protect water quality that have had no effect on actual water quality. To me, that demonstrates that the EPA/NOAA approach has been a failure. As long as Oregon governmental agencies continue to receive Federal monies for this program, it will never create an enforceable (much less enforced) and therefore effective, program.

In conclusion, I urge EPA and NOAA to disapprove Oregon's current Coastal Nonpoint Pollution Control Program (CNPCP), and withdraw funding from Oregon that helps the State implement the existing program. Then work with Oregon and its agencies to craft a workable and enforceable plan that truly improves water quality on the ground in the coastal region. No

more ineffective and wasteful ‘paper plans.’ No more ‘Oregon Forest Practices trumps clean water.’ Thousands of coastal residents currently face the prospect of drinking water laced with fertilizer, pesticides, herbicides and sediment. This is a health risk, as well as being costly for the drinking water suppliers such as Heceta Water District.

If the program is not protecting drinking water for humans, it’s obviously not protecting fish or wildlife, either.

Thank you for the opportunity to comment.

Sincerely,

Attached: 1992 Letter from Dr. Douglas W. Larson

February 19, 1992

Board of Directors
Heceta Water District
87845 Highway 101, North
Florence, Oregon 97439

Gentlemen:

For more than 20 years I have conducted an independent, personally financed lake-monitoring project on the central Oregon coast, mostly in Lane County. This project, dubbed "Aerial photo-surveillance and impact assessment of rare sand-dunal lakes on the central Oregon coast", got started in 1968 as part of an Oregon State University Water Resources Research Institute study to investigate and classify the lakes of Oregon. I participated in this study as a graduate student working under Dr. Jack Donaldson, OSU Professor of Fisheries and Limnology.

Starting in 1969, I proceeded to film the dunal lakes from an aircraft once evry three or four years. My purpose was to track what I believed was the ill-fated evolution of a fragile dunal-lake environment. Hundreds of aerial photos taken between 1969 and 1991 now clearly show the consequences of inadequate land-use planning, chaotic economic development, and environmental insensitivity. Examples include dramatic changes in shoreline configuration and stability, diminished lake depth and volumes, subsurface sandbar formations, and other bathymetric changes attributable to intensified human activity.

The dunal lakes have become depositories for drifting dunal sand and finer soils eroded from areas of watershed disturbance, primarily because of the lakes' location in a region of advancing sand dunes and soils that are extremely vulnerable to weathering. Lake-sedimentation problems are exacerbated by soils and other debris derived from construction and land-clearing activities nearby. Indeed, humans appear to be accelerating the rate of lake sedimentation, although natural phenomena, such as dune encroachment and wind-borne deposits, also contribute to the problem. The development of real-estate plots, access roads, boat-launching and boat-docking facilities, and logged clear-cuts create unstable areas. Disturbed soils, redistributed and

exposed to weathering--including 60 inches or more of rainfall during winter--are readily detached by wind and water action along the shorelines, by channel erosion, and by gullying. Detached soils and debris materials are deposited directly into the lakes, or are transport some distances with streamflow and other surface runoff. Consequently, materials that reach the lakes produce turbid lakewaters, lake-surface debris accumulations, offshore underwater terraces, and lake filling. The permanent loss of soils from surrounding watersheds, in itself, threatens the quality of the lakes.

During 1972 and 1973, while employed by the Oregon Department of Environmental Quality, I conducted year-round limnological studies of ten of the most prominent dunal lakes, including Clear Lake north of Florence. I also conducted shoreline surveys from a boat to locate and photograph lake in-fills and other unauthorized shoreline property extensions. Between 1978 and 1980, I worked for the Collard Lake-Mercer Heights Property Owners Association as an unpaid technical advisor. These property owners correctly believed that unrestrained population growth, recreational activities, and real estate development on the central Oregon coast posed a serious threat to the dunal lakes. Subsequently, Lane County and the Oregon Department of Environmental Quality collaborated in a study of selected dunal lakes in 1979 and 1980. Although this effort contributed further to the water-quality database for these particular lakes, apparently little or no attempt was ever made to implement the study's recommendations and enforce strict land-use regulations and special water-quality standards to ensure long-term lake protection.

The dunal lakes continue to be threatened by numerous and varied watershed disturbances. Loggers in the Sutton, Mercer, Woahink, and Siltcoos watersheds, for example, have clear-cut timber down to the shores of all four lakes. In fact, much of the entire watershed along the north shore of Mercer Lake was clear-cut in 1990, creating the potential for future soil erosion and lake degradation. Moreover, seemingly unrestricted use of all-terrain vehicles on the sand dunes adjoining Clear, Cleowox, and Collard lakes has contributed to accelerated sand-dune encroachment and, consequently, increased lake-filling. Possibly, some dunal lakes are being contaminated with sewage, as suggested by the recent appearance of Eurasian milfoil,

(a highly invasive, lake-choking weed) in Collard Lake, as well as a substantial increase in algae in Mercer, Munsel, and Woahink lakes over the past 20 years. Worse, developers would like to subdivide the Clear Lake watershed for luxury homes, despite the lake's use as a major municipal drinking-water supply.

Clear Lake is perhaps the last pristine, relatively undisturbed dunal lake on the Oregon coast. Most of the other dunal lakes have been impacted and thus degraded by land-development activities and use. Limnologists (lake scientists) have described the water-quality of Clear Lake as "excellent" (Johnson and others, 1985, Atlas of Oregon Lakes , Oregon State University Press, 317 pages). These scientists warn, however, that "present and future development within the Clear Lake drainage basin will increase nutrient levels in the lake water which would likely result in higher densities of phytoplankton (algae)". Other scientists (Raymond and others, 1985, Limnology and Nutrient Dynamics of Clear Lake, Lane County, Oregon, Cooper Consultants report to Lane County) also warned that"increased residential development around Clear Lake will increase the phosphorus loading to the lake whether or not a sewer system is built". Dr. Richard Raymond, a Cooper scientist, states in his cover letter to Mr. Harold Youngquist, Lane County Land-Management Division: "The most likely effects of increased phosphorus on use of the lake as a source of drinking water would be an increase in turbidity resulting from increased algal growth, and an increase in taste and odor problems resulting from increases in specific species of algae. An increase in turbidity could bring Clear Lake close to EPA limits for drinking water". Even Lane County, in their 1979 coastal-lakes report, state that: "Development on Clear Lake carries with it more potential impacts than that on other lakes because of its use as the main source of water for the Heceta Water District. The Heceta Water District services a major portion of the population north of Florence and the City of Florence during periods of high use. Sewage seepage from septic tanks and increases in sedimentation due to clearing and grading are two potential problems of development in this area. The majority of Clear Lake is not currently protected from development". The Lane County report goes on to say: "Clear Lake has not yet been

developed, primarily due to the lack of access in the area. The lack of development is the main reason the water quality has remained pure". Finally, Lane County states: "Lane County's coastal lakes are a valuable resource for wildlife, human recreation, and are primary sources of drinking water. The most effective guarantee of preserving the quality of these lakes is to enact specific regulations pertaining to development and land/water use in the coastal lake region coupled with appropriate enforcement".

Clear Lake remains one of the most pristine, high-quality lakes in the Pacific Northwest. For this reason, the lake supplies drinking water to Florence-area residents that is unsurpassed in quality, purity, and dependability. Indeed, Clear Lake is one of the few remaining surface bodies of water in the Pacific Northwest, whose waters are still clean enough to be safely drunk without treatment, such as filtration and chlorination. As lake scientists and others have pointed out, however, the quality of Clear Lake water will certainly degrade if the watershed surrounding the lake is developed and used for recreation and other purposes. Like Mercer, Munsel, and Woahink lakes, land-development and recreational activities around Clear Lake will significantly alter the quality of lakewater within 10 years or less. Consequently, if the lake continues to be used as a source of municipal drinking water, water drawn from Clear Lake for drinking purposes may have to be treated by rather expensive and unhealthful processes. Additionally, despite various water-treatment processes, water drawn from a degraded Clear Lake may have troublesome and undesirable tastes and odors. Certainly, all of these problems can easily be avoided if the Clear Lake watershed is left undisturbed and protected from potentially harmful human activities. Clear Lake is a major source of excellent drinking water for present and future generations of coastal residents. It would be extremely unwise and irresponsible to open the lake's delicately balanced watershed to fateful human disturbances. If that should happen and the lake eventually degrades, as it surely will, the community and its inhabitants who drink Clear Lake water will pay the consequences in terms of money, health, and personal well-being. The high costs of lake degradation will be borne by the people who depend on Clear Lake for their vital drinking water.

So, I urge you to make every effort to preserve and protect your

important water supply, namely Clear Lake. Essential to the lake's protection is a long-term, scientifically sound lake-monitoring program, which has already been proposed. Monitoring is probably pointless, however, if the lake is allowed to degrade because of watershed development. Monitoring will merely document the inevitable lake degradation process, not prevent it. Therefore, it is up to you, the trustees and caretakers of Clear Lake, to not allow lake development in the first place.

Thank you, and I look forward to hearing from you.

Respectfully yours,

Douglas W. Larson, Ph.D.
Limnologist and Adjunct
Professor, Biology Dept.
Portland State University
tele:503-292-3168

CURING THE INCURABLE?

Douglas W. Larson

Americans, it seems, have an abiding faith in the power of science and technology to remedy environmental degradation. Take, for example, the nation's war on lake eutrophication. This federally funded effort sprang from the belief that a massive lake-restoration program could erase the damage inflicted on the nation's lakes by decades of abuse and mismanagement. Many millions of dollars and many years later, it appears that this faith was sadly misplaced.

More than 20 years ago, in *American Scientist*'s *Marginalia* department (May–June 1973), Yale University professor G. Evelyn Hutchinson expounded on the subject of lake eutrophication, the process by which lakes deteriorate as they become increasingly productive with age. Referring to eutrophication as a "contemporary practical problem," Hutchinson explained how all lakes evolve naturally in a manner corresponding to ecological succession. Newborn lakes are typically oligotrophic—deep, clean and unproductive. As lakes mature, however, they become more eutrophic. A eutrophic lake is typically shallow—the result of long-term sedimentation—and infested with aquatic vegetation, including rooted plants and phytoplankton.

People accelerate eutrophication by polluting lakes with sewage, fertilizers and other materials enriched with nitrogen and phosphorus, which stimulate excessive vegetative growth. Deforestation, road construction, real-estate development, agriculture and other cultural disturbances in watersheds are major sources of sediment. Thus eutrophication can proceed at a natural rate or be culturally accelerated; either way the process is more or less continuous and irreversible. Bogs, swamps and marshes—the climax stage of eutrophication—are often sites of former lakes that are nearly extinct.

Douglas Larson is an adjunct biology professor at Portland State University in Oregon and a limnological consultant for the U.S. Forest Service. Between 1992 and 1994 he coordinated and managed the Clean Lakes Program for the Oregon Department of Environmental Quality. He holds a Ph.D. in limnology from Oregon State University and has spent many years monitoring the limnological status of lakes in the Northwest, including Crater Lake in Oregon and Spirit Lake at Mount St. Helens, Washington. He described the post-eruption recovery of Spirit Lake in an American Scientist *article published in March–April 1993. Address: 10325 N.W. Flotoma Drive, Portland, OR 97229.*

Ironically, just as Professor Hutchinson, the world's most renowned limnologist, was informing the scientific community and others about the inevitable nature of lake eutrophication, the U.S. Environmental Protection Agency was embarking on an ambitious project to halt eutrophication and restore highly eutrophic lakes to pristine conditions. The Clean Lakes Program, authorized under the Clean Water Act of 1972, proceeded to fund lake-restoration projects in 1976. By 1993, EPA had awarded grants totaling about $150 million and had spent hundreds of millions of additional dollars administering the program. Thousands of first-rate scientists and engineers participated in countless limnological studies and lake-cleanup efforts nationwide.

Congressional funding for the program was slashed almost to zero in fiscal year 1995, and the future of Clean Lakes along with other EPA programs is in doubt in the current political climate. Many, many lakes are in urgent need of help. But perhaps not the sort of help that came from the Clean Lakes Program. Unfortunately, this heroic effort may have cost us the opportunity to protect and improve lakes that *can* be saved.

The Clean Lakes Effort

The Clean Lakes Program had one characteristic that made it widely popular but, hindsight suggests, scientifically unsound: It targeted lakes that were highly eutrophic, ones popularly referred to as "dead" or "dying." EPA's promotional material led the public to believe that technical means were readily available to restore eutrophic lakes to pristine bodies of water, promptly and cheaply. This impression took hold in the minds of lakeside residents who desperately wanted their polluted lakes to be clean again. But the can-do notion that science and technology could actually resuscitate aging, weed-clogged lakes, restoring them to near-original conditions, was remarkably naive on the part of some people and simply arrogant on the part of others. What the public needed was an up-front education about the inevitability of lake eutrophication and the improbability of actually reversing the process. They would have benefited, too, from a dose of healthy skepticism about the promise of a technical solution.

Although there are examples of lakes "saved" by the program, there are many more examples of failed Clean Lakes projects. Consider the Pacific Northwest, where I work. In Oregon, despite objections from many scientists, EPA and the Oregon Department of Environmental Quality (DEQ) funded a $1 million project to eradicate weeds in Devils Lake, a popular and heavily developed eutrophic lake on the northern Oregon coast. Some 30,000 weed-eating carp, *Ctenopharyngodon idella*, were introduced into the lake to consume a troublesome weed, Eurasian watermilfoil (*Myriophyllum spicatum*), but their liquefied fecal wastes fueled new crops of weeds and algal blooms that were unprecedented for the lake. Six years into the project, in 1992, investigators reported that the carp "have not significantly reduced the total amount of attached aquatic vegetation" and that only 4,000 carp had survived. Meanwhile, little was done to protect the lake's once-pristine watershed from intensive real-estate development, clear-cut logging and myriad recreational activities, all of which contribute to the lake's polluted, eutrophic condition.

On Sauvie Island, located in the Columbia River near Portland, EPA and DEQ spent another $1 million trying to flush sediments from Sturgeon Lake, an extremely shallow and turbid lake periodically covered by tens of thousands of migratory waterfowl. The lake is so turbid that sunlight hardly penetrates the water column, a condition that inhibits photosynthesis and hence vegetative growth, despite the enormous nutrient loadings from bird droppings and agricultural runoff. Water for sediment flushing was diverted from the Columbia River by reopening a sand-obstructed stream channel that once connected the river to the lake. The project eventually failed, however, because the diversion channel soon refilled with sediment from the Columbia River and from stream-bank erosion. Although there is little or no scientific evidence demonstrating the effectiveness of the flushing process, EPA and DEQ are seeking an additional $400,000 to reopen the channel so that it can resume.

EPA even studied the feasibility of restoring ancient Upper Klamath Lake, a 250-square-kilometer relict of the western Great Basin in southern Oregon. The algae in Upper Klamath Lake are so abundant that huge rafts of this planktonic vegetation are easily visible in infrared photographs taken at 80,000 feet by U-2 aircraft. The study, costing $100,000, considered various restoration techniques, including the use of a dredge to deepen the lake. EPA's proposed technique would have cost up to $2.6 million; a more ambitious proposal from the U.S. Army Corps of Engineers would have cost up to $150 million. In 1983, EPA wisely shelved the Upper Klamath Lake restoration plan, ending what would have been a gigantic pork-barrel project.

EPA and local governments did spend nearly $20 million during the early 1980s dredging and

Figure 1. Aerial view of eutrophic Vancouver Lake, Washington, taken August 3, 1995, illustrates the shallow lake's turbidity and the progress of residential development near its banks. (Photographs by Stephen D. Ward, Image-a-Nation Enterprises.)

flushing Vancouver Lake by diverting water from the Columbia River through a newly excavated channel. This was the most expensive Clean Lakes project ever undertaken. Dredging removed approximately 6.5 million cubic meters of sediment, half of which was deposited near the center of the lake to create an island roughly 1 kilometer in diameter. But lake improvements were merely temporary. Since 1983, when the project was completed, the lake has become shallow again as sediments continue to pour in from many urban and agricultural sources in the watershed. The artificial island and the inshore sediment-disposal sites, constantly battered and thus eroded by wind-driven waves and currents, also yield sediments that are redeposited throughout the lake. Lake water quality is no better now than it was prior to "restoration."

The same lesson can be learned from positive examples. Perhaps the most celebrated example of lake eutrophication and recovery is Seattle's Lake Washington. After decades of using the lake as a sewage repository, the community finally halted the lake's deterioration by diverting the sewage into Puget Sound. Recovery was possible for two reasons: First, the lake—being steep-sided and volumetrically large (roughly 65 meters deep and 90 square kilometers in area)—had not yet filled with weeds and sediment; and second, corrective action was taken before the lake had become a shallow, highly eutrophic body, sufficiently deteriorated to qualify for a Clean Lakes grant.

Lakes for the Future

Unquestionably, the goal of protecting and restoring America's lakes is well-intentioned and noble. As Henry David Thoreau pointed out, "Nothing so fair, so pure, and at the same time so large, as a lake, perchance, lies on the surface of the earth." Inspired by Thoreau's observation, I have spent over 30 years as a limnologist studying lakes and

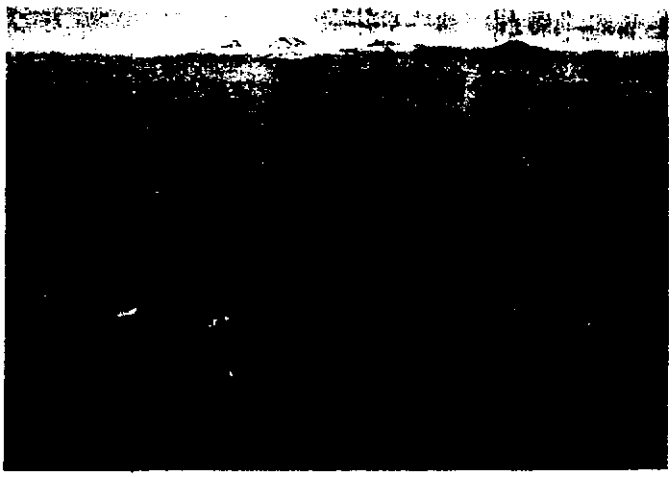

Figure 2. Waldo Lake in Oregon is oligotrophic, with water so clear that a disk submerged 37.5 meters was visible from the surface in 1991, but it shows early signs of eutrophication and may be culturally threatened. This photograph was taken on September 11, 1995.

campaigning doggedly to protect them. But experience, and the scientific evidence that has come partly from the Clean Lakes experience, has taught me to prefer a triage approach: disregarding lakes that are "dead" or "dying" and focusing on the ones that are still pristine and savable.

One example of such a lake lies in the same region as the lakes described above. In 1972, K. W. Malueg and other limnologists described Oregon's incomparable Waldo Lake as possibly the most oligotrophic large lake in the world, stating: "Lakes of the quality and character of Waldo are rare.... It represents a unique and fragile resource requiring specialized management techniques for its preservation." They urged that the lake be monitored so that "symptoms of incipient eutrophication may be detected as early as possible." But because Waldo Lake and other pristine lakes in the Pacific Northwest are not "problem" lakes—they are still clean and oligotrophic—they have been rejected for Clean Lakes funding. Funding priorities thus have ignored the fact that these extraordinary lakes are culturally threatened and prone to change. Recent limnological data suggest that Waldo Lake has shifted to a higher trophic status over the past 25 years, possibly in response to human encroachment. Indeed, according to the U.S. Forest Service, the number of people visiting Waldo Lake increased from 18,700 in 1971 to 173,000 in 1994. This usage increase foreshadows the lake's degradation, which is inevitable over the very long term. But if degradation is detected early and promptly remediated, this lake and other oligotrophic lakes could be preserved for many human generations to come.

Preserving oligotrophic lakes was apparently a low-priority goal in the Clean Lakes Program. Instead, millions of dollars were squandered on weed-choked, shallow-water quagmires. Anyone cruising the muddy waters of Vancouver Lake, wondering whether the $20 million spent restoring the lake was a wise investment, would be well advised to watch out for barely submerged mudflats and rusted strands of barbed wire.

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