Appendix CR-1 – White Paper – Justification for Developing Policies to Phase Out Phosphorus-Containing Fertilizers in the Lake Tahoe Region

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A. Introduction and Background

Lake Tahoe is naturally ultraoligotrophic due to Basin geology; this naturally occurring nutrient-poor condition is the reason for its remarkable water clarity. Increasing inputs of both phosphorous and nitrogen into the Lake over time has created a nutrient imbalance, where excess nutrients result in increases in nearshore and deep water algae production, reducing water clarity. This water quality impairment has triggered a Lake Tahoe Total Maximum Daily Load (TMDL) calling for more stringent controls and restrictions on nutrients in order to reduce phosphorus and nitrogen loads to surface and ground waters.

According to the Lake Tahoe TMDL, urban upland as a land use category is the largest phosphorus contributor to the lake (47 percent). Nitrogen is also a problem in the lake, but its main source is atmospheric deposition (63 percent), which must be addressed by strategic transportation planning and source emission controls. Lake Tahoe has shifted from being nitrogen-limited to being predominantly phosphorus-limited, meaning that phosphorus is the nutrient most responsible for controlling algal growth in the Lake's nearshore and deep water zones.

The Lake Tahoe TMDL Pollutant Reduction Opportunity Report cites anthropogenic sources of pollutants such as fertilizers and road abrasives as key sources affecting pollutant loading in urban uplands (2008), while excessive fertilizer applications on recreational and residential lands and leaking sewage systems are estimated to be the primary anthropogenic sources of phosphorus in the Tahoe Basin (2011). Meanwhile, fertilizer use in the Lake Tahoe Basin has been increasing over time (Table 1). In addition, fertilizers are largely used to support non-native vegetation, which increases erosion in SEZs, shorezones and other sensitive areas, supports invasive aquatic and terrestrial plants, and increases water consumption.

Managing chemical fertilizers, particularly phosphorus fertilizer, should be considered to be an essential component of TRPA's water quality program. This was recognized forty years ago in the first Fertilizer Use Study in the Lake Tahoe Basin (1972), which recommended encouraging the distribution and sale of appropriate fertilizers for the Basin, and promoting slow-release fertilizers. Other recommendations from the fertilizer study included: 1) increasing the availability and dissemination of landscape, recreational, and erosion control planting information; 2) encouraging proper irrigation; 3) minimizing soil disturbance through best management practices and regulations; and 4) improving understanding of fertility and chemical characteristics of Tahoe soils, to aid in landscape establishment and maintenance (including more effective use of soil and plant analyses as diagnostic tools).

It is unclear if these fertilizer study recommendations from forty years ago were the impetus, but there is now a plethora of information and guidance on landscape establishment and maintenance, erosion control, and irrigation that is specific to the Lake Tahoe Region and readily available to the public from local conservation districts, university extensions, and other sources. TRPA has addressed soil disturbance through best management practices and regulations that aim to reduce erosion, and hence sediment and phosphorus loading, to surface waters. Recommended actions that have *not* been implemented include encouraging the distribution and sale of appropriate fertilizers for the

Basin, promoting slow release fertilizers, and using soil and plant analyses as diagnostic tools to increase landscape success.

These efforts to achieve reductions in fertilizer use through the "soft" approach of education and outreach may slowly be increasing public understanding of the Lake Tahoe nutrient problem, but these efforts and current regulations are inadequate to instill behavioral changes that would achieve widespread fertilizer application reductions in the Basin. A new regulatory approach for phosphorus fertilizer may be necessary to supplement education and outreach to aid in achieving water quality standard for Lake Tahoe nearshore and deep water zones. Indeed, regulatory control approaches for sensitive and significant water bodies is at least ten years old and appears to be gaining momentum throughout the country (see Regulatory Precedents for Phosphorus Fertilizer, Attachment 2). More than five states and numerous local jurisdictions (including Puget Sound, Chesapeake Bay, Great Lakes, and coastal areas) are regulating the sale and use of phosphorus lawn fertilizer to help control nutrient enrichment of water bodies.

Minnesota, the first state in the Nation to regulate phosphorus fertilizers, reported on the effectiveness of the law three years after its inception; the law has reduced phosphorus fertilizer use, did *not* increased consumer cost, and created extensive public and professional education through "teachable moments" about yard care and water quality protection. In addition, the report found that phosphorus-free lawn fertilizer is readily available in stores, there has been no enforcement of the law, consumers are supportive of the law, and fertilizer manufacturers and retailers have adapted to the law. On the other hand, the report indicated that short-term water quality data following implementation of the law were too variable to document phosphorus reductions.

Fertilizer manufacturers reported that most consumers are unaware of the composition of fertilizers. As long as a product contains nitrogen, the nutrient that "greens up" lawns, consumers are satisfied. However, manufacturers expressed concerns that use of phosphorus-free lawn fertilizer will cause deficiencies in soil phosphorus over time, and without increased education and soil testing, these deficiencies may lead to decline of lawn health. Looking into the future, this group noted expanding markets for phosphorus-free lawn fertilizer in other areas of the country concerned with water quality.

Table 1. *Amount of Fertilizer Applied in the Lake Tahoe Basin (estimated in metric tons) is increasing over time.*

Year of Study	P	N	Source
1972	7	48	Mitchell and Reisnauer
1986	26-28	79-85	Loeb
2003	>45	143-295	USACE

B. Regulations and Threshold Evaluation Recommendations on fertilizers and lawns/turf

TRPA policies and the *Code of Ordinances* currently require preparing a Fertilizer Management Plan for projects of one acre or more of turf/lawn at staff's discretion, tracking fertilizer use, reviewing plans with TRPA, and producing annual reports. Recommendations include 1) using native or adapted plants for revegetation of disturbed sites, 2) disallowing lawns and non-native ornamentals in SEZs and the shorezone, 3) conducting public outreach for fertilizer sales, and 4) discouraging landscaping that requires long-term irrigation and fertilizer use. Attachment 1 contains a detailed description of TRPA regulations relating to fertilizers and lawns/turf.

Existing fertilizer regulations, guidance, and compliance have been examined by the past two Threshold Evaluations. The 2001 Threshold Evaluation recommended a significant change in our approach to fertilizer management—moving from project-driven reporting of fertilizer use and management—to a region-wide regulatory program requiring reductions in fertilizer use. This recommendation was implemented through an amendment to the *Code of Ordinances* in 2002, and is responsible for the current fertilizer program, where TRPA has the option to request fertilizer management plans, fertilizer use tracking and reporting, and water quality monitoring for large users.

Five years later, the 2006 Threshold Evaluations found that compliance with fertilizer management plans and annual reporting requirements was lacking from large users in the Basin, particularly from commercial and recreational turf managers.

C. Staff Identified Problem/Issue Statement

Fertilizer management in the Lake Tahoe Basin is a critical component of achieving Threshold Standards for primary phytoplankton productivity, reducing nutrient availability for attached algae in the nearshore, and meeting TMDL water quality objectives for nutrients. The Lake Tahoe TMDL Pollutant Reduction Opportunity Report specifically identifies TRPA as a key stakeholder that will, through the *Regional Plan*, contribute to nutrient load reductions through its projects, programs, and regulations (2008).

Existing TRPA regulations for fertilizer may be insufficient to meet these objectives. The "region-wide" regulatory program intended to broadly reduce fertilizer use has been ineffective. Fertilizer management plans were meant to be the core of this widespread regulatory program, but its soft approach hinders meaningful impact on the ground. Its application to large users (greater than one acre of turf) is not broadly applied nor sufficiently enforced by TRPA staff. There is a lack of staff resources to review or track fertilizer management plans. Under the current situation, there is sporadic compliance, little or no tracking, and little or no enforcement. The extent of fertilizer compliance is unknown. There is no existing database to track properties with existing large turf areas that would trigger Fertilizer Management Plans, nor are proposed new turf areas required to be shown on-site plans, which would alert agency staff.

Current code language for fertilizers that recommends or provides guidance—as opposed to a mandate, such as discouraging the use of phosphorus fertilizers unless a soil P availability test demonstrated the need for P—are almost certainly not being followed when required actions are not met. In the ten years since the Code of Ordinances was amended to address fertilizers, management of fertilizers is still very much project-driven, lacks sufficient agency focus, relies heavily on self-compliance and bears little resemblance to a comprehensive program.

D. Staff Recommendations for Regional Plan Update

The following are recommended in whole or in part to address phosphorus fertilizer use in the Basin:

- **Limiting Phosphorus Fertilizer Sale and Application:** The premise of the proposed regulation is that soils already high in phosphorus, as occurs throughout the Tahoe Basin, do not need further phosphorus fertilization. This regulation would reverse the current default, which is that most or all lawn fertilizer contains phosphorus, and a customer must ask for phosphorus-free products. This is a cost-effective approach to addressing phosphorus loading

of the lake. Turf fertilizer is not the only anthropogenic source of phosphorus, but it is a source that can be addressed relatively easily.

Amend the *Code of Ordinances* to adopt regulations limiting phosphorus fertilizer sale and application, with exemptions for new lawns (turf establishment, first growing season), organic soil amendments (compost), agriculture, or soils deficient in phosphorus as identified by a soils test less than 3 years old. Lake Tahoe Basin sellers cannot display fertilizers for sale that contains phosphorus, must post fertilizer ordinance, can have sign indicating fertilizers with phosphorus is available upon request for approved uses. Request Carson City distributors to post regulation. Create opportunities for education, outreach, and partnerships.

- **Soil Testing:** Amend the *Code of Ordinances* to require soil testing for all large users (>1acre turf) on a regular (e.g. biennial) basis. Fertilizer formula and application rates appropriate for soils, as indicated by soil test, must be followed. Fertilizer Management Plan must be in accordance with soils test. There are soils in the Lake Tahoe Basin that are not naturally high in phosphorus and could develop phosphorus deficiencies over time due to phosphorus-free fertilizer use. Lawns deficient in phosphorus can lead to poor turf grass health, which can result in increased soil erosion and nutrient runoff into surface water. To avoid unintended consequences of phosphorus-free fertilizer use, soils supporting lawn and turf should be assessed periodically to detect early signs of low phosphorus levels.

- **Landscape Professionals Training and Certification:** Develop a Fertilizer Applicator Program. Commercial landscapers attend training on local fertilizer and turf regulations, and would learn appropriate fertilizer selection, and application and irrigation techniques. Technical assistance and training to be developed through partnerships with NRCS, university extension, and conservation districts. Fertilizer training could be integrated into BMP contractor's workshop. Provide TRPA endorsement similar to list of BMP contractors, or require that "large users" use trained fertilizer applicators on this list.

- **Tracking and Review:** Establish a database (i.e. in Accela) to track large users and fertilizer management plans. Designate a staff person for reviewing fertilizer management plans and fertilizer annual reports.

- **Project Review**: Require areas of existing or proposed turf to be shown site plans as part of the project application to provide an opportunity for education and development of alternative landscapes.

Attachment 1. TRPA regulations pertaining to fertilizers and turf

Threshold	Goal, Policy, and Code Language
Water Quality	*Goal 1, Policy 6:* The use of fertilizer within the Tahoe Region shall be restricted to uses, areas, and practices identified in the BMP Handbook. Fertilizers shall not be used in or near stream and drainage channels, or in stream environment zones, including setbacks, and in shorezone areas. Fertilizer use for maintenance of preexisting landscaping shall be minimized in SEZs and adjusted or prohibited if found to be in violation of water quality discharge and receiving water standards. *Code 81.7: Fertilizer Management* *A.* Fertilizer management shall be consistent with the Soil and Vegetation Chapter of the Handbook of Best Management Practices. See Chapter 77 for re-vegetation requirements. Fertilizers shall not be used except as described below in or near stream and drainage channels, or in stream environment zones, including setbacks determined under Section 37.3, and in shorezone areas except as otherwise provided in this subsection (see Chapter 2, and Section 55.2). Fertilizer use for maintenance of preexisting landscaping according to Subparagraph 74.2.A.(2) shall be minimized in stream environment zones and adjusted or prohibited if found, through evaluation of continuing monitoring results, to be in violation of applicable strictest water quality discharge and receiving water standards. These ordinances are applicable to both inorganic and organic fertilizer applications. 81.7.A (1): …fertilizer management programs proposing phosphorus use shall demonstrate the need for the particular site conditions and vegetation to be maintained or established; consider the use of slow release and phosphorus-free fertilizer. *B.* Fertilizer Management Programs: Projects that include landscaping shall include, as a condition of approval, a fertilizer management program. Revegetation must be guided by a Revegetation Plan. *C.* Existing Uses: At the request of TRPA and for large users in particular as defined below, existing uses that require regular fertilizer maintenance, including but not limited to, golf courses, parks, cemeteries, plant nurseries, recreational ball fields, and large residential yards with an acre or more of turf, shall be required to submit fertilizer management programs for review and approval by TRPA. Following the first growing season after the approval of fertilizer management programs large users of fertilizers such as plant nurseries and those managing more than one acre of turf…shall initiate a tracking program to monitor fertilizer use on lands under their control. Such users shall review fertilizer management programs with TRPA or Lahontan RWQCB staff and present annual reports for the prior season's use and monitoring if required to TRPA by June 1 (or as required by Lahontan) of each year. The report shall include information on the rate, amount, and location of use…TRPA shall include this information in its annual monitoring report under Chapter 32 including such measures of progress as numbers of approved programs,

	annual fertilizer use reports received, and reported reductions in fertilizer use or monitored parameter improvement. *D.* Requirements for Fertilizer Sales: Public outreach, including seller fertilizer recommendations consistent with Subsection 81.7.A, and provision of agency-developed fliers, and brochures of user information and recommended fertilizer rates from the Home Landscaping Guide for Lake Tahoe and Vicinity or its authorized equivalent shall be required in conjunction with fertilizer sales in the Tahoe Basin. Outlying fertilizer retailers with potential purchases from the Tahoe Basin will be requested to provide the same public outreach. *E.* Snow Hardeners: The use of ammonium nitrate, or other substances containing nitrogen or phosphorus, to harden snow is prohibited.
Shorezone	*Policy 3:* Lawns or ornamental vegetation in the shorezone shall be discouraged. Plant species approved by the Agency shall be selected when revegetating disturbed sites.
Stream Environment Zone	*Policy 4:* Golf courses in SEZs shall be encouraged to retrofit design in combination with fertilizer application standards to prevent release of nutrients ground and surface waters.
Vegetation	*Goal 1:* Provide for a wide mix and increased diversity of plant communities in the Tahoe Basin. *Policy 8:* Revegetation of disturbed sites shall require using species on the Approved Plant List. TRPA shall prepare specific policies designed to avoid the unnecessary use of landscaping which requires long-term irrigation and fertilizer use. *Code 74.2:* No project or activity shall be undertaken in an SEZ which converts SEZ vegetation to a non-native or artificial state.

Attachment 2. State Legislations and Local Ordinances limiting phosphorus-free fertilizers for established lawn/turf

Over the past decade, states, counties, and local jurisdictions adjacent to the Great Lakes, Puget Sound, Chesapeake Bay, and other sensitive water bodies and coastal areas around the country have passed phosphorus fertilizer regulations. In addition to the statewide regulations listed below, numerous counties and cities/towns in Michigan, Florida, California, Maryland, and other states have passed similar bans.

- Minnesota [hyperlink to http://www.mda.state.mn.us/protecting/waterprotection/phoslaw.aspx] became the first state in the nation to regulate phosphorus fertilizer use on lawns and turf in 2002.
- Maine [hyperlink to http://www.maine.gov/dep/blwq/doclake/fert/phospage.htm] restricts the sale of fertilizer containing phosphorus in 2008 and continues banning cleaning agents containing phosphates.
- Wisconsin [hyperlink to http://datcp.wi.gov/Environment/Fertilizer/Turf_Fertilizer/Government/index.aspx] passed a state law in 2009 restricting the use and sale of turf fertilizers containing phosphorus unless soil test indicates need for phosphorus.

- Michigan [hyperlink to http://michiganlakeinfo.com/files/2011/04/Michigans-Phosphorus-Fertilizer-Ban.pdf] in 2010 passed a law prohibiting phosphorus-containing turf fertilizer. It also bans turf fertilizer application near surface waters, and on saturated or frozen grounds.
- New York passed a law [hyperlink to http://www.dec.ny.gov/chemical/74885.html] in 2010 banning phosphorus in lawn fertilizer and in detergents. This article [hyperlink to http://www.deseretnews.com/article/700057097/New-York-bans-phosphorus-in-detergent-lawn-fertilizer.html] indicates that up to 50 percent of phosphorus in stormwater is attributed to fertilizers.
- Virginia [hyperlink to http://lis.virginia.gov/cgi-bin/legp604.exe?111+sum+SB1055] passed a state law in 2011 prohibiting the sale, distribution and use of phosphorus-containing lawn maintenance fertilizer and the sale of de-icing agents containing phosphorus, nitrogen, and urea. Training and technical assistance is provided for fertilizer applicators and golf courses.
- Maryland passed the Fertilizer Use Act of 2011 [hyperlink to http://www.chesapeakebay.net/news_mdfertilizer11.aspx?menuitem=58162] to limit nitrogen and phosphorus in most turf fertilizers. Training for fertilizer applicators is required. As stated in this article, the change is expected to achieve 20 percent of the phosphorus reduction Maryland needs to achieve its pollution reduction goals for the Chesapeake Bay TMDL.
- Vermont [hyperlink to http://www.leg.state.vt.us/docs/2012/Acts/ACT037.pdf] passed into law in 2011 prohibitions for phosphorus and nitrogen lawn fertilizers.
- Washington State [hyperlink to http://apps.leg.wa.gov/documents/billdocs/2011-12/Pdf/Bill%20Reports/Senate/1489-S.E%20SBA%20EWE%2011.pdf] passed a law in 2011 prohibiting the sale and application of turf fertilizers containing phosphorus.
- In New Jersey (scroll to p. 12) over 100 towns will be required to adopt ordinances banning the use of fertilizer containing phosphorus. Jefferson Township is an example.
- Florida Works to Ban Phosphorus Florida has several county ordinances that prohibit the use of phosphorus in fertilizers. This is an article discussing the proposal to make this a State wide initiative.
- Wisconsin has several local ordinances. Here are some examples- Dane County, Door County.

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