9/03/10

REPORT OF EARIP LID/WATER QUALITY SUBGROUP

A. INTRODUCTION

The EARIP LID/Water Quality subgroup recognizes that the EARIP has a primary focus on water quantity impacts on the covered species, particularly as it relates to identifying specific minimization and mitigation measures for inclusion in the habitat conservation plan component of the Program Documents. However, as the Science Subcommittee, Ed Oborny, and Dr. Hardy have acknowledged, water quality is a relevant consideration. Various assumptions underlying the respective flow recommendations provided to the EARIP acknowledge the importance of maintaining good water quality.

The Expert Science Subcommittee, on page 22 of their December 28, 2009, report entitled Analysis of Species Requirements in Relation to Spring Discharge Rates and Associated Withdrawal Reductions and Stages for Critical Period Management of the Edwards Aquifer, states "[w]ater quality encompasses a range of variables that can potentially impact fountain darters and other aquatic life if altered too far from the historic range to which the stream inhabitants have become accustomed. Most potential water quality problems are linked to nonpoint source pollution such as fertilizer runoff and chemicals washed in from adjacent streets; however, spills and leaks from industrial and municipal infrastructure along the heavily developed shorelines of the Comal River also present hazards. The potential for accidents and nonpoint source pollution to affect the organisms in the Comal River may be exacerbated during below average flows since chemicals and nutrients would be less diluted when a lower volume of water is present." Although this specific discussion is directed at Comal Springs and the Comal River, similar concerns are noted elsewhere in that document related to San Marcos and the San Marcos River (see pp. 40-41, also noting additional concerns about sediment inputs) and aquifer-dwelling species (see, e.g., pp. 56-57).

Water quality impacts can be expressed in a variety of ways. For example, impacts, such as sedimentation, resulting from stormwater runoff directly into the spring or stream habitats used by covered species could actually reduce the extent of suitable habitat areas. Some of those direct impacts, particularly to the extent that they originate within the riparian areas adjacent to the habitat areas, are addressed in the report entitled "Restoration and Mitigation Actions for the Comal Springs Ecosystem"[1] produced by the Ecosystem Restoration Subcommittee and the document entitled "Report on Restoration Options for the San Marcos River."[2] Accordingly, in

[1] Available at http://earip.tamu.edu/EcoRest/12-11-09%20Ecosystem%20Restoration%20Subcommittee%20Report%20Final.pdf.

[2] Available at http://earip.tamu.edu/EcoRest/12-11-09%20San%20Marcos%20River%20Restoration%20Options%20Report.pdf.

order to build on those recommendations, while minimizing duplication, this document focuses on water quality impacts in a broader context.

As illustrated by the water quality data previously presented to the EARIP by George Rice,[3] runoff and spills originating even at long distances from the spring openings also can affect water quality at the springs. Fortunately, water quality in the Edwards Aquifer and at the spring openings remains very good. However, as levels of development continue to increase over the recharge zone, transition zone, and even the contributing zone, the threats to water quality will increase.

As a recovery implementation program, the EARIP Program Documents will address both specific actions to be included as provisions in any habitat conservation plan and other actions that are to be taken to benefit the covered species. Accordingly, the recommendations included in this document address both types of actions, as well as adaptive management. Except to the extent that the impacts would be captured in the recommended water quality monitoring at the spring openings, this document does not address water quality issues related to the various types of source water that might be used for recharge purposes. We have assumed that any such water quality issues will be addressed as part of the evaluation and design of those specific proposals.

B. RECOMMENDATIONS FOR ACTIONS TO BE INCLUDED IN THE HCP

1. Pursue implementation, if adequate support is indicated by individual local governments, the EAA, Texas State University, and/or TCEQ, of a ban on use of coal tar sealants within (a) areas draining to Landa Lake or to the Comal River above the confluence of the old and new channels; (b) areas draining to Spring Lake or to the San Marcos River above the wastewater treatment plant outfall for the City of San Marcos; and (c) the recharge, contributing, and transition zones of the Edwards Aquifer that are subject to the pollution control authority of the EAA.

***Discussion**: Asphalt streets, parking lots, and driveways are common in the urban landscape, with most of the parking lots and driveways periodically sealcoated with products containing refined coal tar. Coal tar sealants contain high levels of polycyclic aromatic hydrocarbons (PAHs), which are toxic to fish and other aquatic life and are a known carcinogen.[4] Pavement sealants containing coal tar are typically applied by commercial applicators on parking lots at apartment complexes, retail centers and office buildings. Generally, about 450 gallons of sealcoat are needed to apply a single coat to one acre of*

[3] Those data are contained in the presentation slides available at http://earip.tamu.edu/EARIPMeetings/Jul2710/07-27-10%20Urbanization%20and%20Degradation%20Presentation%20(Rice).pdf.

[4] U.S. Department of Health and Human Services. *Report On Carcinogens*, 10th ed.; National Toxicology Program, Public Health Service : Washington, DC, December 2002.

parking lot. Typically two coats are applied, and applicators suggest reapplication of sealcoat every two to three years.[5] Recent studies[6] show that coal tar sealcoat products used to protect asphalt pavement are a significant source of PAH contamination in our lakes and streams. The sealant is worn off by abrasive action of traffic and degraded by weathering and the resulting particulates are carried away by rainfall runoff. Particularly in areas without effective water quality control ponds, the particulates travel down-gradient to become entrained in sediments of nearby waterways. Studies in Austin[7] demonstrate that the PAH compounds reach streams and the waters of Barton Springs and that these compounds are toxic to fish. Similarly targeted studies focusing on runoff from asphalt surfaces have not been identified for the Comal and San Marcos spring systems.

Alternative products contain a far lower concentration of PAHs than coal-tar sealants. There are also newer sealants on the market that are represented as containing virtually no PAHs. Lowes, Home Depot, and other home improvement stores have discontinued the sale of coal tar sealants nationwide, greatly reducing use by individual homeowners. In 2005 the City of Austin, Texas passed an ordinance prohibiting the use and sale of Coal Tar Sealants.[8]

In order to implement this measure, it would be necessary to have ordinances adopted by individual municipalities and rules adopted by the Edwards Aquifer Authority and/or the Texas Commission on Environmental Quality. Accordingly, the EARIP should appoint a workgroup to approach these entities, in addition to Texas State University, at the earliest opportunity to provide information about this issue and to explore their willingness to take these actions. If adequate support exists, the measure should be included in the HCP. Costs to implement the program are expected to be limited, although the implementing entities would incur some expense in promulgating and enforcing the prohibition.

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[5] Water Resources Website, McHenry County, Illinois. Polycyclic Aromatic Hydrocarbon (PAHs) Quick Facts, Coal Tar Regulations, Page 2 http://www.co.mchenry.il.us/departments/waterresources/pdfDocs/CoalTarOrdinance.pdf.

[6] Van Metre, P.C.; Mahler, B.J.; Wilson, J.T.; *PAHs Underfoot: Contaminated Dust from Coal-Tar Sealcoated Pavement is Widespread in the United States*. 2008. Accessed November 19, 2008. <http://pubs.acs.org/doi/pdfplus/10.1021/es802119h>.

[7] City of Austin Watershed Protection and Development Review Department. *PAHs in Austin, Texas: Sediments and Coal-Tar Based Pavement Sealants Polycyclic Aromatic Hydrocarbons.* May 2005. Accessed August 3, 2010. <http://www.ci.austin.tx.us/watershed/downloads/coaltar_draft_pah_study.pdf>.

[8] City of Austin, Texas Municipal Code. *Chapter 6-6, Coal Tar Pavement Products.* Accessed August 3, 2010. <http://www.amlegal.com/nxt/gateway.dll/Texas/austin/thecodeofthecityofaustintexas?f=templates$fn=default.htm$3.0$vid=amlegal:austin_tx$anc=>. *Dane County, Wisconsin passed a similar ordinance in 2007.* Dane County, Wisconsin Code. *Chapter 80: Establishing Regulations for Lawn Fertilizer and Coal Tar Sealcoat Products Application and Sale.* Accessed August 3, 2010. <http://danedocs.countyofdane.com/webdocs/pdf/ordinances/ord080.pdf>.

2. Pursue implementation, if adequate support is indicated by individual local governments, the EAA, Texas State University, and/or TCEQ, of improved stormwater runoff controls, in the form of specific best management practices, applicable (a) in areas that contribute surface runoff to Landa Lake, to the old channel of the Comal River, or to the new channel of the Comal River above the confluence with Dry Comal Creek; (b) in areas that contribute surface runoff to Spring Lake or to the San Marcos River above the wastewater treatment plant outfall for the City of San Marcos; and (c) throughout the areas of the recharge zone, contributing zone, and transition zone that are subject to the pollution control authority of the EAA.

***Discussion**: Stormwater runoff transports pollutants to nearby streams and recharge features where they can impact water quality. Nonpoint source pollutants include sediment, pesticides, herbicides, fertilizers, hydrocarbons, and bacteria from human and animal waste. Sources for these pollutants include streets, parking lots, urban lawns, golf courses, construction sites, hazardous materials, domestic pets and waterfowl, and streambank erosion. Many of these pollutants may be controlled by a stormwater management system that reduces pollutant load and/or concentration. High levels of impervious cover are known to exacerbate nonpoint source pollution impacts by increasing peak flows, channel degradation, and risks of flooding. Malfunctioning septic systems and leaking sewer lines also contribute pollutants. Specific recommended practices for addressing those sources are set out in Attachment A.*

Some best management practices appropriate for addressing stormwater runoff are set out in the two December, 2009 reports released by the Ecosystem Restoration Subcommittee and those practices, as more specifically identified in footnote 9, are hereby incorporated by reference.[9] In addition, other best management practices that will be appropriate in various circumstances are set out on the City of Austin's website.[10]

Storm water management systems may also control pollutants arising from illicit point source discharges and hazardous materials spills. These pollutants may include: dry cleaner

[9] Measures incorporated by reference are those listed in the Stormwater Management and Water Quality section of the December, 2009 "Restoration and Mitigation Actions for the Comal Springs Ecosystem" report, but with certain of those measures (relating to conversion of impervious to pervious cover, construction materials prohibition, prohibition on feeding of species, golf course SOPs, pool SOPs, Schlitterbahn parking lot, railroad trestles, and litter removal) understood to be limited to the areas near Comal Springs or the Comal River. Measures listed in the Stormwater Management section (Section 5) of the December, 2009 "Report on Restoration Options for the San Marcos River" also are incorporated by reference.

[10] http://austintech.amlegal.com/nxt/gateway.dll/Texas/environ/section1-waterqualitymanagement?f=templates$fn=altmain-nf.htm$3.0

solvents, mobile carpet cleaner waste, car wash discharge, boiler coolant discharge, chiller cleaning discharge, waste oil, gasoline (from a ruptured gas tank in the event of an accident), and other illicit or toxic substances. Managing potential impacts from hazardous material spills involves designing hazardous materials transportation routes to minimize travel over environmentally sensitive areas, including, where feasible, a specific prohibition on hazardous material transportation routes crossing the Comal and San Marcos Rivers or key tributaries in areas draining to habitats occupied by listed species, and installation of hazardous materials traps in the storm drain system along transportation routes within selected drainages. For all types of BMPs, monitoring is essential to ensure that the practices are achieving the intended results. In addition, monitoring of actual storm water discharges is needed to help detect illicit discharges so that action will be taken to eliminate those discharges at the earliest opportunity. Implementing entities should undertake reasonable monitoring in addition to monitoring to be undertaken by the EARIP.

Potential implementation mechanisms include stormwater permits required pursuant to the federal Clean Water Act, ordinances adopted by local governments, voluntary actions taken by Texas State University, and rules adopted by the EAA and TCEQ. However, these actions are outside the control of the EARIP. Accordingly, the EARIP should appoint a workgroup to approach these entities at the earliest opportunity to provide information about these issues and to explore their willingness to take these actions. If adequate support exists, specific measures should be included in the HCP.

C. RECOMMENDATIONS FOR MEASURES TO BE INCLUDED IN THE PROGRAM DOCUMENT BUT NOT IN THE HCP

1. Encourage all entities regulating any aspect of development over the portions of the recharge zone of the Edwards Aquifer that are within areas subject to the pollution control authority of the EAA to implement, consistent with their authority, responsible limits on impervious cover. High levels of impervious cover result in degradation of water quality in surface water and in groundwater. Accordingly, the EARIP should approach these entities at the earliest opportunity to provide information about this issue and to explore ways to facilitate the implementation of appropriate measures. There is general, but not universal, recognition that 20% impervious cover may be the maximum amount that can responsibly be allowed over most areas of the recharge zone, but more data are needed to refine that value. In order to help define responsible limits on impervious cover, the EARIP, in coordination with the EAA and other participating entities, should develop and ensure implementation of targeted, long-term

water quality monitoring of runoff from existing and future development and from control sites, as appropriate.

Discussion: *The most effective way to protect water quality is to limit impervious cover (i.e., urbanization) of the vulnerable portions of the Aquifer: the recharge zone, the near-by contributing zone (e.g., within five miles of the recharge zone) and the transition zone (including the portion of the contributing zone included within the transition zone).*[11] *The available data show that there is a strong relationship between the urbanization of these vulnerable areas and the degradation of surface water and groundwater.*

Water quality in the Edwards Region is currently monitored by a number of agencies including the USGS, TCEQ, EAA, GBRA, SARA, and SAWS. These monitoring programs have produced a large amount of useful data. However, these monitoring programs generally were not specifically designed to measure the effects of urbanization on water quality. A comprehensive program designed to measure these effects would include: 1) monitoring runoff from areas of varying levels of impervious cover; 2) monitoring streams both upstream of urbanized areas, and as they pass through those areas; 3) monitoring flows upstream and downstream of various water quality controls (BMPs); 4) monitoring flows entering recharge features; 5) monitoring recharge zone wells in urban areas; and 6) monitoring springflows, including immediately after storms.

Such a monitoring program could help to quantify the effects of urbanization on water quality, and might identify areas that are causing the most water quality degradation. It also would help to identify control strategies, including improved public education, that might best be employed to address that degradation. If such areas are identified, it may be possible to mitigate the degradation through some kind of corrective action (e.g., improved structural BMPs, education to reduce the use of hazardous materials such as pesticides). In addition, the monitoring program would help to inform future judgments about responsible levels of impervious cover.

A comprehensive water quality monitoring program could be expensive with the cost for of a full suite of analyses for individual samples running about $2000 per sample.[12] *This cost includes sample analysis (common ions, metals, VOCs, SVOCs, pesticides, bacteria), equipment, and personnel costs. Thus, a program that collected 500 samples of that type annually would cost approximately $1,000,000 per year. However, once baseline*

[11] The transition zone is that area where the rocks that form the Edwards Aquifer are not exposed at land surface, but geologic features such as fractures, faults, or sinkholes provide possible pathways for contaminants in surface water to reach the water table of the Aquifer.

[12] Based on a rough estimate of the EAA's sampling costs.

information has been collected, less comprehensive analyses of samples could be interspersed between comprehensive ones, resulting in reduced costs or increased sampling coverage. The EARIP should strive to work with other entities undertaking monitoring in order to accomplish mutual goals and further minimize costs. A monitoring budget of $1,000,000 per year is recommended for this purpose.

2. Encourage all entities regulating any aspect of development over the portions of the recharge and contributing zones of the Edwards Aquifer that are subject to the pollution control authority of the EAA to implement low impact development principles and measures for new development. Accordingly, the EARIP should approach these entities at the earliest opportunity to provide information about the benefits of low impact development and to explore ways to facilitate the implementation of those principles and measures. Specific LID principles and measures of particular importance for use in these areas include vegetated swales, bioretention, biofilters, vegetated buffers, curb planters, tree trenches and cisterns. These can be used as stand-alone measures or collectively as part of a stormwater treatment train.

***Discussion**: LID, or low impact development, is an integrated approach to development that seeks to maintain the natural hydrologic character and functioning of a site or region. Put simply, LID techniques address water at its source, capturing rainwater and treating it or reusing it on a site before discharging it into streams and aquifers.[13] LID measures have been shown to be adequate to treat stormwater to regulatory standards, reducing the need for offsite treatment and conveyance. LID projects are typically planted with water-loving vegetation, increasing the beauty of the property while treating water quality.*

In order to help encourage the implementation of LID principles and measures, the EARIP, in coordination with the EAA, should seek state and federal funding to support pilot projects for implementation of LID.[14] In addition, to help document the effectiveness of LID in protecting water quality in karst areas, the water quality monitoring undertaken pursuant to Recommendation 1, immediately above, shall, to the extent possible, include development projects implementing LID principles and measures. Attachment B provides

[13] See for example, Low Impact Development: an integrated design approach, Prince George's County, Maryland June 1999, EPA 841-B-00-003.

[14] The US EPA is a primary funding source for LID implementation in communities through grants, loans and cost-sharing programs. Cities have also relied on impact fees levied on traditional development, stormwater fees for impervious pavement area and special fees for use of potable irrigation water. These and other fees that capture the true costs of stormwater "gray infrastructure" can be used to subsidize low impact development. A 2010 study by the Philadelphia Water Department Office of Watersheds calculates cost-benefits of low-impact stormwater management and recommends ways to offset costs. Philadelphia Combined Sewer Overflow Long Term Control Plan Update, www.phillywatersheds.org/ltcpu.

a general discussion of the value of LID concepts as applied in karst regions. Additional sources of information about LID are listed in Attachment C.

3. In recognition of the special vulnerability of recharge to, and of water quality in, the Edwards Aquifer as a result of development around significant recharge features, encourage all entities regulating any aspect of development over the portions of the recharge and transition zones of the Edwards Aquifer that are subject to the pollution control authority of the EAA to provide special protections, over and above those set out in Recommendations 1 and 2, immediately above, for significant recharge features. Accordingly, the EARIP should approach those entities at the earliest opportunity to provide information about the importance of protecting significant recharge features and to explore mechanisms for facilitating implementation of these protections. Significant recharge features include stream beds, sinkholes, faults, and fracture zones. Given the nature of recharge in the Edwards, pollution introduced at a significant recharge feature association with a rapid flow path to a spring opening can quickly cause adverse effects for listed species. Similarly, damage to such a recharge feature could result in reduced recharge and, ultimately, in reduced spring flows. Protection mechanisms to be considered should include buffer zone designations, conservation easements, transfers of development rights, clustering of development away from recharge features, and fee-simple acquisition for conservation purposes. In order to help identify significant recharge features in need of special protection, the EARIP, working with the EAA[15] in a leadership role if the EAA agrees to play that role and in coordination with affected local governments, will develop and ensure implementation of targeted studies, including, as determined to be appropriate, dye-tracer or equivalent studies designed to detect and characterize especially important recharge features.

***Discussion**: Recharge occurs broadly across the recharge zone. Although some recharge features are easily identified (e.g., stream beds, exposed sinkholes), many recharge features are difficult to identify because they are hidden beneath the soil. Thus, while it is necessary to protect easily identified features, doing only that is not sufficient to protect water quality or to protect recharge quantity. Accordingly, in order to help ensure better informed decisions about protection of recharge features, the EARIP will work with*

[15] *The EAA has been performing dye tracing studies in the Edwards aquifer for a number of years.* For an example of a recent dye tracing study see the EAA publication: *Tracing Groundwater Flowpaths in the Edwards Aquifer Recharge Zone, Panther Springs Creek Basin, Northern Bexar County, Texas*; http://www.edwardsaquifer.org/files/Panther%20Springs%20Creek%20Traces%202010.pdf.

regulatory entities to facilitate protection of significant recharge features, including by providing funding for a limited amount of studies designed to identify flow paths and recharge features meriting special protection. If the EAA is agreeable, the EARIP should rely on the EAA to take a leadership role in study implementation.

The relationships between recharge features and flow paths may be determined through dye tracing. Dye tracing may also be used to define the distribution of recharge and to identify hidden recharge features. The cost of a typical dye tracing study is around $50,000. The budget should be adequate, when considered in combination with support from cooperating entities, to support at least 2 such studies per year, on average during the first 10 years of program implementation ($100,000 per year).

D. RECOMMENDATIONS FOR SPECIFIC ADAPTIVE MANAGEMENT PROVISIONS

Identifiable trends in degradation of water quality as measured at the springs, in areas of occupied habitat downstream of the springs, or in the aquifer would call into question assumptions underlying the determination of spring flow levels needed to protect the covered species. Accordingly, the EARIP will need to implement and fund the water quality monitoring programs set out above along with focused monitoring of water quality in the Comal and San Marcos rivers. If those monitoring programs reveal a trend toward significant degradation in water quality, as determined by an appropriate scientific body, the EARIP will develop and implement specific measures to address those changes in accordance with the adaptive management plan.

ATTACHMENT A

The LID/Water Quality group also recommends the following BMP's be adhered to regarding construction acceptance testing and maintenance of central wastewater collection systems pursuant to Recommendation B.2:

- All plans for systems must be submitted to TCEQ prior to construction for review and approval and clearly identify areas in the recharge, contributing within transition or contributing zones. TCEQ rules cover certain requirements unique to the Edwards formations.
- Excavation practices for working in the Edwards formation must be adhered to.
- Completed wastewater system piping and manholes must be pressure/vacuum tested, mandrel alignment tested, and video inspected prior to acceptance and placement into service.
- Piping and manholes over the Edwards recharge zone must be video inspected and smoke tested every five years. The films must be reviewed by a certified, registered Professional Engineer and sealed. The repairs specified as needed by the engineer must be completed within 60 days of review.
- In the event more stringent requirements are adopted in the future, the more stringent regulation should be followed.

ATTACHMENT B

"USING GREEN INFRASTRUCTURE IN KARST REGIONS"

ATTACHED SEPARATELY

ATTACHMENT C

Other LID resource material, consisting primarily of information about national programs and design standards, may be found at the links below:

Us Department of Housing and Urban Design (HUD)

The Practice of Low Impact Development

http://www.lowimpactdevelopment.org/lid%20articles/practLowImpctDevel_jul03.pdf

Environmental Protection Agency

http://water.epa.gov/polwaste/green/

Low Impact Development (LID) Center
A non-profit organization balancing growth and environmental integrity.

4600 Powder Mill Rd, Suite 200;
Beltsville, MD 20705 (USA)
301-982-5559;
301-937-3507 (fax)
info AT lowimpactdevelopment.org

http://www.lid-stormwater.net/background.htm

TCEQ Edwards Aquifer Technical Guidance Manual

http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-348/rg-348.html/at_download/file

Natural Resources Defense Council

http://www.nrdc.org/water/pollution/storm/chap12.asp

Additional information from EPA regarding LID and related storm water best management practices is available at:
http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=min_measure&min_measure_id=5

Additional documents are available through the Center for Watershed Protection. Free registration is required to access the documents: http://cwp.org/store/free-downloads.html