Water Quality Trading Feasibility Assessment for San Jacinto Basin Agricultural Operators

Prepared for
Western Riverside County Agriculture Coalition

Prepared by

TETRA TECH

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The Water Quality Trading Feasibility Assessment for San Jacinto Basin Agricultural Operators was developed through the Western Riverside County Agriculture Coalition (WRCAC).

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Acronyms

AgNMP	Agricultural Nutrient Management Plan
BMP	best management practices
CNRP	comprehensive nutrient reduction plan
CWA	Clean Water Act
CWAD	Conditional Waiver [of WDRs] for Agricultural Discharges
EPA	Environmental Protection Agency
EVMWD	Elsinore Valley Municipal Water District
GWMZ	groundwater management zone
IRWMP	Integrated Regional Watershed Management Plan
LA	load allocations
LCC	life cycle cost
MS4	municipal separate storm sewer system
N	nitrogen
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source
P	phosphorus
SARWQCB	Santa Ana Regional Water Quality Control Board
TDS	total dissolved solids
TMDL	total maximum daily load
TN	total nitrogen
TP	total phosphorus
WDR	Waste Discharge Requirements
WLA	wasteload allocations
WQT	water quality trading
WRCAC	Western Riverside County Agriculture Coalition

1.0 Introduction

In 2011, the California State Water Resources Control Board awarded the Western Riverside County Agriculture Coalition (WRCAC) a Clean Water Act (CWA) Section 319 Nonpoint Source (NPS) grant to conduct a water quality trading (WQT) feasibility assessment for agricultural operators in the San Jacinto River basin. This report describes the approach and summarizes the findings of the WQT feasibility assessment for agricultural operators in the San Jacinto River basin.

1.1 What is a WQT Feasibility Assessment?

Although there might be an interest to conduct WQT in a particular watershed, certain factors need to be present for WQT to be viable and sustainable. A WQT feasibility assessment is a process for collecting and analyzing the data and information needed to determine if the technical and economic factors exist to support trading. The very basic factors needed to support WQT are:

- **Well-defined sources and amounts of pollution.** WQT requires an understanding of pollutant sources. In the case of the San Jacinto River watershed, nitrogen and phosphorus are the pollutants of concern. Sources generating nutrient loads are potential buyers and sellers in a water quality trading approach. Collecting information to characterize the types of sources and the associated nutrient loads from each source help to determine if there will be an adequate supply and demand for tradable credits.
- **Regulatory drivers and incentives.** Without regulatory drivers or some type of incentive, sources would not feel compelled to consider and, ultimately, participate in WQT. The most compelling drivers for WQT are those related to regulatory requirements. In most cases, this is a permit effluent limit that has been revised to meet a more stringent water quality standard or a wasteload allocation from a Total Maximum Daily Load (TMDL) analysis. In other cases, it could be a watershed pollutant reduction goal that might not have a regulatory component, but provides other type of incentives to meet this goal (e.g., avoidance of a TMDL).
- **Difference in control costs among sources.** Sources with high pollutant control costs will have an economic motivation to seek out tradable credits from other sources that are able to control pollutants to meet requirements at a lower cost. It is this difference in control costs among sources that will determine which sources might participate as buyers and which sources might have the ability to participate as sellers. WQT feasibility is largely driven by economics, both actual and perceived costs (e.g., transaction costs and risk factors).

A WQT feasibility assessment has two components: 1) a pollutant suitability analysis and 2) an economic suitability analysis. Each of these is described below in more detail.

- The **pollutant suitability analysis** includes information on pollutant type and form, geographic scope, potential buyers and sellers, potential water quality trading credit supply and demand, potential trade ratios to account for pollutant fate and transport as well as uncertainty in pollutant control efficiency, issues related to avoiding localized areas of excessive pollutant loading (i.e., hotspots), and duration of water quality trading credits.

- The **economic suitability analysis** includes information on potential buyers' willingness to pay for water quality credits, potential sellers' price for generating water quality credits, effect of trade ratios on the cost of water quality trading credits, and the potential costs of involving stakeholders in designing and implementing a water quality trading program.

Information from each of these components provides insight as to where WQT might encounter barriers in a particular watershed and what type of trading framework might be most appropriate based on the sources with the greatest potential for participation.

A WQT feasibility assessment is not intended to provide definitive answers about how WQT should work in a particular watershed, only if the conditions are ripe to support such an effort. WQT program design and implementation requires coordination and facilitation with watershed stakeholders to ensure the program integrates well with other efforts. The product of a WQT feasibility assessment can, however, give watershed stakeholders a starting place and a foundation for moving into the trading program design phase. The analysis can also identify where watershed stakeholders might have to do additional research to obtain detailed, watershed-specific information that could affect WQT success. This might mean holding focus groups with key sources to better understand attitudes, perceptions, and concerns. It might also mean public meetings with watershed residents and organizations that have perceptions and opinions about how to meet water quality goals.

1.2 What is the Purpose of the WQT Feasibility Assessment for Agricultural Operators in the San Jacinto River Basin?

The purpose of the WQT feasibility assessment for agricultural operators in the San Jacinto River basin is to conduct a preliminary assessment of the potential for a viable, sustainable WQT program to meet the agricultural community's nutrient reduction goals under the Lake Elsinore/Canyon Lake TMDL as reflected in the Water Quality Control Plan for the Santa Ana River basin. This analysis is an initial assessment focused on using mostly existing data developed in support of the TMDL and TMDL implementation examined through the lens of pollutant suitability and economic suitability. The purpose of this analysis was not to collect new data, but to identify where additional data and information might be needed to support further WQT feasibility assessment activities and future WQT program development for agricultural operators. The goal is to create a foundation for the future work agricultural operators and, if necessary, other watershed sources will conduct over time. Ultimately, this WQT feasibility assessment is intended to characterize the watershed for purposes of trading, identify existing data gaps, and make recommendations, where supported by available data, about WQT feasibility. Where data are not available, the WQT feasibility assessment identifies the next steps and additional data needs to move water quality trading for agricultural operators in the San Jacinto River basin forward.

1.3 What was the Process for Developing the WQT Feasibility Assessment for Agricultural Operators in the San Jacinto River Basin?

To develop the WQT feasibility assessment for agricultural operators in the San Jacinto River basin, WRCAC and its consultant, Tetra Tech (Tt), served as the Project Team. The process for the assessment included reviewing existing watershed data and information available through ongoing WRCAC and watershed projects. This included the Lake Elsinore/Canyon Lake nutrient TMDL, the Lake Elsinore and Canyon Lake Nutrient Source Assessment, the Integrated Regional Watershed Management Plan for the San Jacinto River Watershed, and the WRCAC Agricultural Nutrient Management Plan (AgNMP) for the San Jacinto Watershed. Using available existing information, the Project Team developed technical papers on different aspects of the WQT feasibility assessment. These technical papers address the following topics:

- Technical Memo #1: Identify Pollutants and Pollutant Forms
- Technical Memo #2: Recommendations on Geographic Scope and Identify Potential Participants in Sustainable Trading Program
- Technical Memo #3: Estimate Supply and Demand
- Supplemental Analysis to Technical Memo #3: Conditional Waiver of Agricultural Discharges (CWAD) Scenarios Affecting Supply and Demand
- Technical Memo #4: Define Trade Ratio Considerations

Using the information contained in each of the technical memo documents, the Project Team developed this report to summarize the WQT feasibility assessment findings and identify recommendations for developing a WQT program for agricultural operators in the San Jacinto River basin. For the detailed analysis on a technical topic, please refer directly to the associated technical memo.

1.4 What Does This Report Contain?

The WQT feasibility assessment for agricultural operators in the San Jacinto River basin analysis report contains the following:

- **Section 2: Feasibility Assessment Summary.** This section provides a discussion of the information used in the pollutant suitability and economic suitability assessments – the two components of the overall WQT feasibility assessment. It summarizes the information contained in the four technical memos developed to support the overall assessment.
- **Section 3: Water Quality Trading Feasibility Assessment Findings.** This section synthesizes the information provided in Section Two to provide an analysis of the overall potential for water quality trading among agricultural operators in the San Jacinto River basin. This section also addresses other trading considerations that will affect the feasibility of trading.
- **Section 4: Next Steps for WQT Focusing on Agricultural Operators in the San Jacinto River Basin.** This section identifies data needs and additional analyses, as well as preliminary program design recommendations, to move the concept of water quality trading forward in the San Jacinto River basin.
- **Appendix A.** This appendix contains the four technical memos developed by the Project Team to support the WQT feasibility assessment.
- **Appendix B.** This appendix contains additional information developed by WRCAC in support of this grant, including the results of an agricultural operator survey, a description of the weBMP tool being developed to track best management practices (BMPs) in the watershed, and an

analysis of compliance with the U.S. Environmental Protection Agency's (EPA's) nine key elements of a watershed plan.

2.0 Feasibility Assessment Summary

This section summarizes the information generated to support the pollutant suitability analysis and the economic feasibility analysis, the two components of the overall WQT feasibility assessment for agricultural operators in the San Jacinto River basin. The Technical Memos supporting this summary are available in Appendix A and referenced throughout the summary.

2.1 Drivers for Trading

The primary driver for WQT in the San Jacinto River basin is the Lake Elsinore/Canyon Lake nutrient TMDL that is reflected in the Water Quality Control Plan for the Santa Ana River Basin. The anticipated CWAD program, which is intended to support achievement of the TMDL targets for nonpoint agricultural sources, may provide a regulatory driver for trading. A general waste discharge permit for dairies could provide incentive for those operators to participate in trading, as well. In addition, salt offset requirements for groundwater protection could be another potential incentive for trading, although they do not have the same focus as the TMDL, which addresses surface water quality. A brief description of each driver is provided below. More details on drivers for WQT are available in Technical Memos #1 and #2 in Appendix A.

2.1.1 Total Maximum Daily Load requirements

The Lake Elsinore/Canyon Lake nutrient TMDL establishes phosphorus (P) and nitrogen (N) wasteload allocations (WLAs) and load allocations (LAs) for watershed sources that contribute nutrient loads to the lakes. The focus is on wet weather-driven sources, such as livestock and crop agriculture and municipal separate storm sewer systems (MS4s), though the TMDL also includes WLAs for discharge of tertiary treated wastewater and well water from two regional water reclamation systems. The nutrient TMDL for Lake Elsinore and Canyon Lake was incorporated into the Water Quality Control Plan for the Santa Ana River Basin on December 20, 2004 (SARWQCB 2011) and approved by the U.S. Environmental Protection Agency on September 30, 2005.

TMDLs typically do not establish regulatory drivers for nonpoint sources (e.g., agricultural operators) to meet established LAs. However, WRCAC's goal is to coordinate dairy and agricultural operators in the watershed to meet all applicable TMDL targets (WLAs and LAs). All dairies and nearly all private agricultural landowners in the watershed have joined WRCAC to voluntarily comply with the TMDL. Thus, even absent numeric limits for dairies and a regulatory driver for agricultural operators, the TMDL still provides a *de facto* driver for trading.

The nutrient TMDL included a detailed TMDL Implementation Plan that identifies actions intended to achieve the assigned WLAs and LAs. The actions identified under the TMDL Implementation Plan as part of the enforceable Water Quality Control Plan for the Santa Ana River Basin also provide potential drivers for water quality trading. According to the 2013 AgNMP for the San Jacinto River Watershed, the agricultural and dairy operators will achieve compliance with the agricultural LAs or WLAs or lake water quality response targets applicable to Lake Elsinore and Canyon Lake through a combination of watershed-based BMPs and in-lake remediation projects (WRCAC 2013).

2.1.2 Conditional Waiver [of WDRs] for Agricultural Discharges (CWAD) program

The CWAD Program will apply to agricultural lands in the San Jacinto River watershed and is currently being developed by the Santa Ana Regional Water Quality Control Board (SARWQCB). Although the exact requirements of the CWAD are not yet known, currently available information indicates that it will apply to irrigated agricultural land (includes irrigated row crops as well as orchards/vineyards, citrus, and nurseries) and horse, poultry, and other livestock operations (not including dairies, which are regulated under waste discharge permits) located on private, state, or federally-owned land (i.e., no tribal lands). Within those land uses, the CWAD requirements will apply to parcels owned by persons with a total of 20 or more acres of agricultural land use. The CWAD requirements also could apply to irrigated agriculture parcels owned by persons with, in aggregate, less than 20 acres of agricultural land use, if the SARWQCB determines that those parcels are causing or contributing to water quality impairment. It is anticipated that the CWAD will require agricultural land owners to implement structural and non-structural BMPs that are either specified for certain land uses (e.g., appropriate filter strips along waterways and associated easements to address water quality concerns) or presented as a menu of BMP options (or a combination of the two). Once adopted, the CWAD will provide a regulatory driver for agricultural sources to implement nutrient reduction practices. An individual agricultural operator may wish to purchase or sell credits depending on his or her ability or willingness to implement site-specific BMPs to meet the requirements.

2.1.3 Dairy waste discharge permit

The dairies in the San Jacinto River Basin are regulated under a general waste discharge permit that establishes BMP-based requirements for dairy production areas and land application areas. The production area requirements, in effect, eliminate discharges from the areas where dairy cattle are confined and manure and wastewater are handled and stored. Discharges from those areas are permitted only during very large storm events when, according to the AgNMP loads are likely to pass through both Canyon Lake and Lake Elsinore. Therefore, the permit does not likely establish a driver for trading from dairy production areas. For land application areas, the permit requires implementation of specific BMPs, including nutrient management plans. Applicable regulations clarify that precipitation-related discharges from land application areas where dairy waste is applied in accordance with the permit-required nutrient management plan are considered to be agricultural stormwater. Although exempt from permit requirements, agricultural stormwater is a nonpoint source and still carries a pollutant load. Therefore, the permit could provide a regulatory driver, or baseline, for dairies to participate in trading. If dairy operators can implement BMPs beyond those required by their permits to reduce their nonpoint source nutrient load, they could generate credits for sale in a WQT program.

2.1.4 Salt Offset Requirements

In addition to the nutrient TMDLs, dairies in the San Jacinto River watershed face a different set of requirements related to groundwater protection. The previous dairy discharge permit (SARWQCB Order No. R8-2007-0001) required dairies to develop and implement a salt offset plan in order to apply manure, process wastewater, or stormwater from manured areas on land associated with dairies that overlie groundwater management zones (GWMZs) lacking assimilative capacity for total dissolved solids (TDS) or nitrate-nitrogen. According to the revised dairy discharge permit (Order No. R8-2013-0001), the dairies in the watershed have implemented, and continue to implement, control measures to provide the required offset for salt and nutrient loadings. The new permit includes a time schedule for specific activities required for dairies to ensure continued water resource protection:

- By December 7, 2014: Collect and evaluate all available groundwater monitoring data, including historic data, from wells within a 5 mile radius of all dairies in the watershed to identify statistically significant changes in TDS and nitrate attributable to discharges from dairies.
- By June 7, 2015: If the data analysis indicates hotspots or impacts from dairy discharges, quantify the salt and nutrient loads from dairies and propose additional control measures to be implemented within 6 months of approval.
- Track waste management through a Manure Manifest System using forms provided by SARWQCB or through a system developed by the San Jacinto Basin Resource Conservation District.

The permit also includes less specific requirements for dairies to continue salt and nutrient load reduction programs by reducing manure and process wastewater application to croplands, reducing salt content in the source water, implementing on-site wastewater treatment processes, considering implementation of regional wastewater treatment systems, and participating in local groundwater improvement projects. Although the salt offset requirements are not intended to protect surface water, it is conceivable that BMPs implemented to address salt offset could also result in nutrient load reductions to surface waters. However, it is not clear whether and how the SARWQCB would allow salt offset BMPs to qualify as also generating nutrient reduction credits. Due to this uncertainty combined with lack of current information on the location and type of practices that might be implemented, the salt offset requirements are not currently considered to be a regulatory driver for trading. However, they could provide a driver at some point in the future with identification of specific salt offset control measures.

While the TMDL is the overarching driver for trading, the requirements contained in the CWAD and the waste discharge permit for dairies are the most significant drivers for agricultural operators in the San Jacinto River basin to potentially engage in an agricultural operator-focused WQT program as credit buyers or sellers.

2.2 Pollutant Forms for Trading

Nutrients and sediment (as a transport mechanism for nutrients) are suitable pollutants for water quality trading per U.S. EPA's 2003 Water Quality Trading Policy. Nutrients and sediment from agricultural sources are the primary focus for the potential WQT program in the San Jacinto River basin at this time. The pollutant forms found in the runoff from these sources are more similar in nature than if comparing nutrients in nonpoint source runoff to nutrients in wastewater treatment plant discharges.

The complications caused by the various forms of nitrogen and phosphorus that exist in the environment often lead to the use of total nitrogen (TN) and total phosphorus (TP) in water quality analyses. The transformations that take place on land and once in aqueous solution make it difficult to trace the forms of nutrients in surface water to the forms contributed by various sources. Therefore, defining loads as TN and TP allows for a simpler comparison of nutrients in surface water and loads coming from watershed sources. As a result, TMDLs typically define allowable loads of nitrogen and phosphorus in terms of TN and TP, as is the case for the Lake Elsinore/Canyon Lake nutrient TMDLs. Therefore, from both a technical standpoint as well as a TMDL implementation standpoint, it is recommended that WQT involving agricultural operators in the San Jacinto River basin focus on TN and TP. More detail on pollutant forms is provided in Technical Memo #1 in Appendix A.

2.3 Geographic Scope

The hydrologic features of the San Jacinto River watershed affect pollutant fate and transport and, as a result, will affect the geographic scope of a WQT program for agricultural operators in the basin. A summary of the geographic scope analysis is provided below. More detail is available in Technical Memo #2 in Appendix A.

2.3.1 Overview of hydrologic features

The unique hydrology that characterizes the San Jacinto River watershed was summarized in the 2007 Integrated Regional Watershed Management Plan (IRWMP) for the San Jacinto River watershed (Tetra Tech and WRIME, Inc. 2007). Figure 1 integrates the information from the IRWMP with input from technical stakeholders to depict these important hydrologic features.

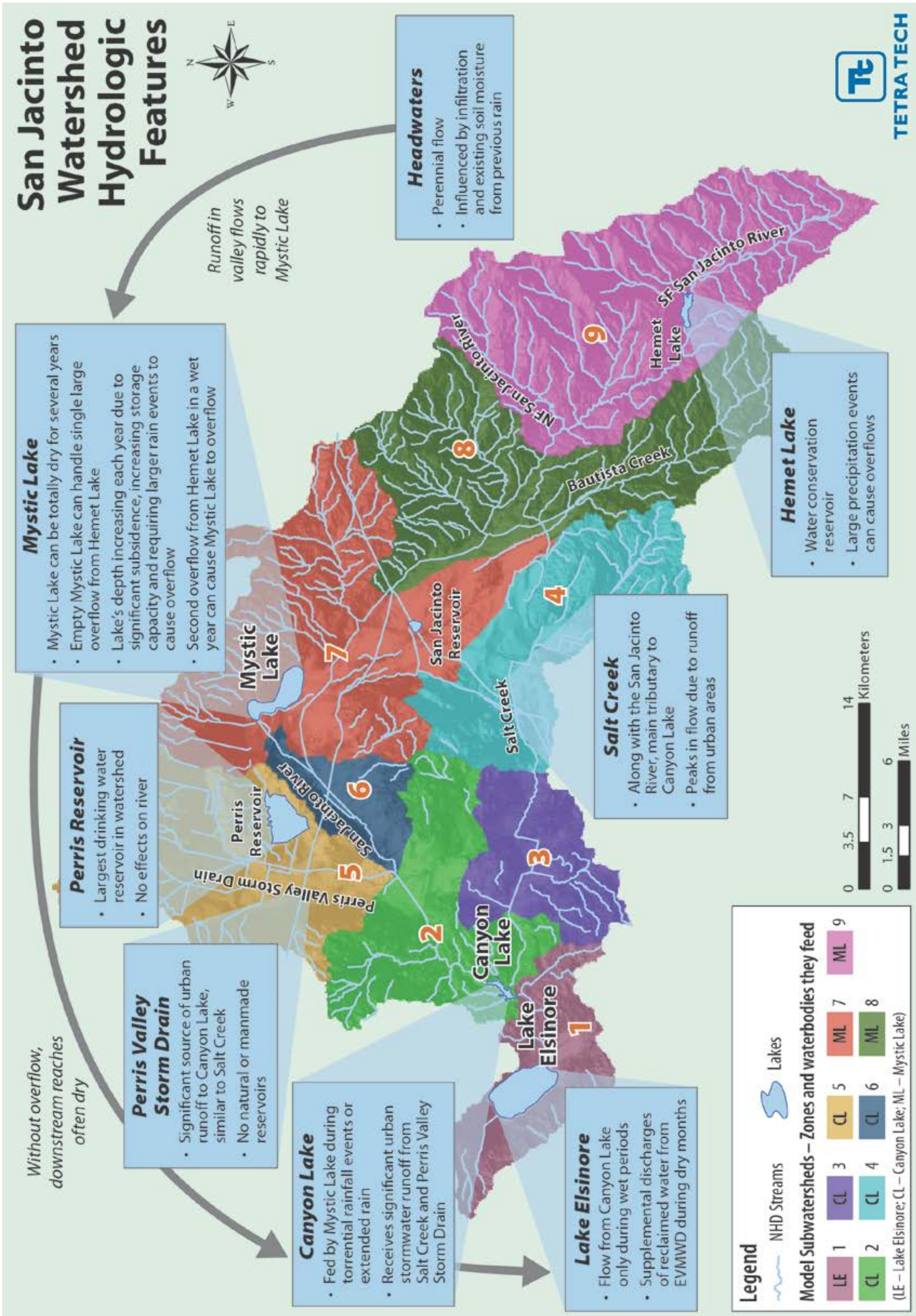

Figure 1. San Jacinto River watershed hydrologic features[1]

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[1] Note: Figure 1 does not reflect September 2013 revisions to the boundaries of subwatersheds 4, 6, and 7 in the area south of Mystic Lake. See Section 2.3.2.

As shown in Figure 1, the headwaters of the San Jacinto River are located in subwatershed zones 7, 8 and 9, which drain to Mystic Lake, located in subwatershed zone 7. Mystic Lake's depth is increasing annually due to significant subsidence, increasing the storage capacity of the lake. During average and low-flow years, Mystic Lake has sufficient capacity to store perennial flow from zones 7, 8 and 9—the entire flow of the San Jacinto River through these zones—without overflowing. Hemet Lake, a water conservation reservoir located in zone 9, can overflow as the result of large precipitation or snow melt events. When empty, Mystic Lake can collect and impound an overflow from Hemet Lake. According to the IRWMP, a full Mystic Lake has been observed to maintain a substantial amount of volume for more than a year with little or no transport back to the San Jacinto River. During very large or prolonged rainfall events, however, the storage capacity of Mystic Lake can be exceeded, particularly with an overflow from Hemet Lake. Data analysis by Riverside County Flood Control District indicates that, historically, Mystic Lake has overflowed on average once every 10 years. More recently, due to subsidence as discussed above, the frequency appears to have decreased. Over the past 25 years Mystic Lake has overflowed about once every 12 years as a result of two consecutive wet years (Pat Boldt, WRCAC, personal communication, April 2, 2012). It is also important to note that the San Jacinto River is often dry above and below Mystic Lake, flowing only during winter months.

Downstream of Mystic Lake, the San Jacinto River forms a wide fluvial plain. When Mystic Lake does not overflow the downstream river reaches are often dry. North of Canyon Lake, there is a 2-mile reach of the San Jacinto River with perennial flow. It is thought that this flow is related to local urban stormwater runoff and rising groundwater (M. Adelson, 2012, personal communication). The San Jacinto River flows through the narrow Railroad Canyon before draining into Canyon Lake. More than 90 percent of the San Jacinto River watershed (subwatershed zones 2–6) drains to Canyon Lake, which fills quickly during the wet season with the water level declining slowly over time during the normal to dry periods when little or no flow enters Canyon Lake. Salt Creek, in subwatershed zone 4, has the majority of its headwaters in the foothills and valleys south of the city of Hemet, including Cactus Valley, St. John's Canyon, and Goodhart Canyon. Much of Salt Creek's headwaters and main stem flow through agricultural lands and it is one of the main tributaries to Canyon Lake. The Perris Valley Storm Drain in subwatershed zone 5 also feeds Canyon Lake. The Perris Reservoir, also located in subwatershed zone 5, does not have any effect on the watershed's hydrology.

Lake Elsinore, located in subwatershed zone 1, is approximately 3 miles downstream of Canyon Lake at the bottom of the San Jacinto River watershed. Surface flow from the San Jacinto River watershed reaches Lake Elsinore primarily through release, overflow, or seepage from the Canyon Lake dam, though the river is also partially fed by perennial flow from Cottonwood Creek, which joins the river below Canyon Lake. Lake Elsinore acts much like a sink, with almost nonexistent outflow. In rare situations, including torrential rains and extended rain periods, Lake Elsinore overflows into Temescal Creek, which ultimately drains to the Santa Ana River (Tetra Tech and WRIME, Inc. 2007). As discussed in Technical Memo #1, evaporation can cause the lake levels in Lake Elsinore to drop significantly, triggering the need for the Elsinore Valley Municipal Water District (EVMWD) to supplement the lake levels using high quality recycled water that meets National Pollutant Discharge Elimination System (NPDES) permit requirements (a source that is not within the scope of this feasibility assessment).

2.3.2 Changes to subwatershed zone boundaries

It is important to note that a new subwatershed zone boundary analysis was prepared for WRCAC during the finalization of this project. As a result of the shift in subwatershed zone boundaries, some WRCAC agricultural acreage shifted among subwatershed zones 4, 6, and 7, resulting in increased acreage for some land uses in zone 6 and decreased acreage in zones 4 and 7. Where possible, this project integrates the changes in WRCAC agricultural acreage among these subwatershed zones. However, the AgNMP does not reflect the shift in subwatershed zone boundaries; therefore, information from the AgNMP used for this project does not reflect the subwatershed boundary change. Appendix A to Technical Memo #3 provides more details on the subwatershed zone boundary changes, including a map and a table of shifted acreage. (Note that subwatershed zone figures in the body of this report do not reflect subwatershed zone boundary changes.)

2.3.3 Potential WQT areas in the San Jacinto River basin

The geographic scope of the WQT program can influence economic feasibility and, as a result, potential participation. Trading could become cost-prohibitive where a factor, referred to as a trade ratio, will be needed to equalize pollutant fate and transport among different areas of the watershed. For example, a kilogram (kg) of TP reduction in zone 9 above Mystic Lake will not produce the same positive water quality effect for Canyon Lake as a kg of TP reduction in zone 3 due to the intervening hydrologic factors described above. A trade ratio to account for fate and transport is necessary to make these reductions equivalent in the watershed. Trade ratios can increase the cost of credits for trading and can have a negative effect on the economic feasibility of trading between partners that are a significant distance apart or a significant distance from the waterbody of concern (e.g., Canyon Lake).

The analysis of the geographic boundaries of the San Jacinto River basin demonstrate that natural hydrology appears to break the overall watershed into three potential trading areas, as shown in Figure 2.

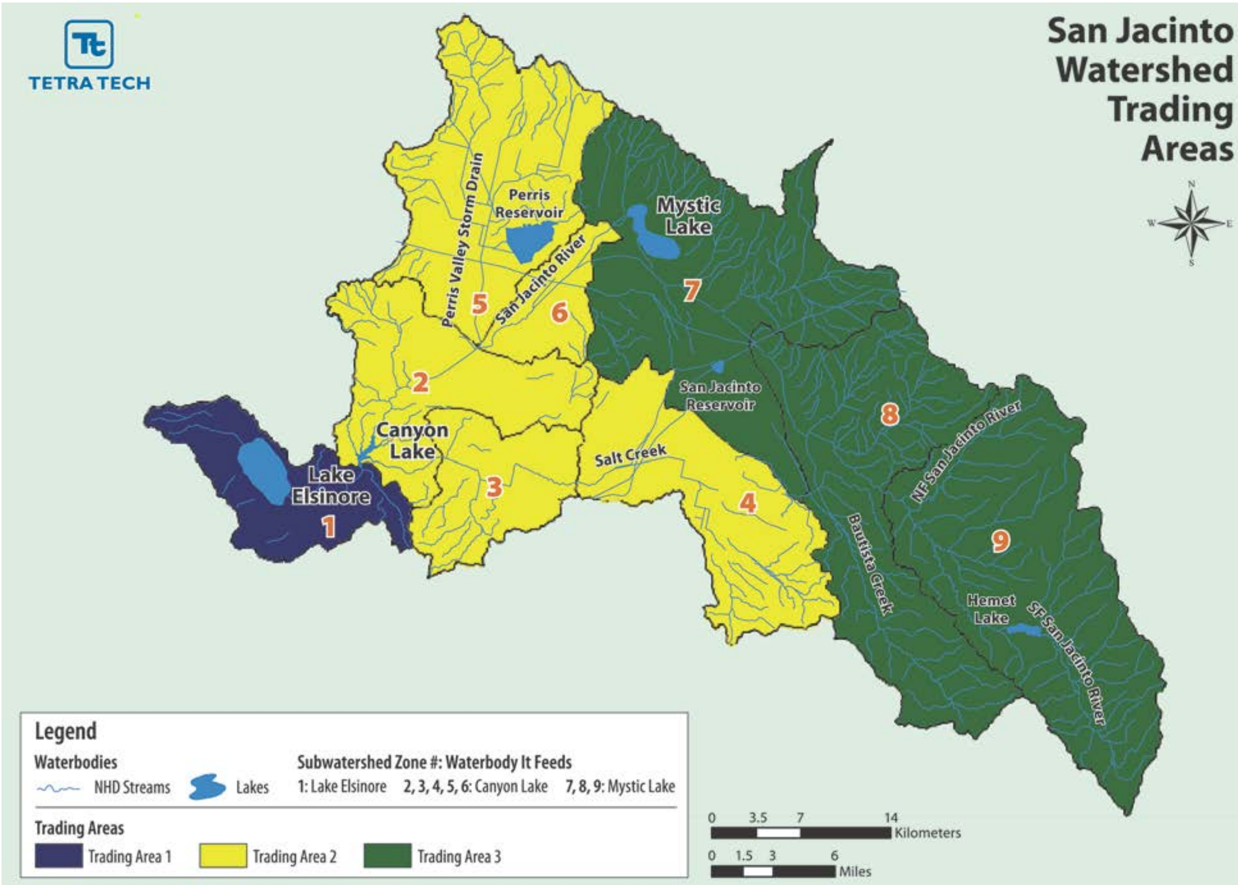

Figure 2. Three potential trading areas in the San Jacinto River basin based on hydrologic features[2]

While trading can potentially take place among agricultural operators located throughout the San Jacinto River basin, it is likely that the natural hydrologic boundaries will promote trading within these three trading areas due to the effect of trade ratios on credit supply and demand, as well as credit pricing. A WQT program for agricultural operators in the San Jacinto River basin can consider limiting trading among operators within specific trading areas, or letting the market determine if trading is feasible among agricultural operators in different trading areas after the application of trade ratios. The key will be ensuring trade ratios accurately reflect the hydrologic characteristics of the watershed in each trading area.

2.4 Potential Credit Buyers and Sellers

The focus of the WQT feasibility assessment is on agricultural operators in the San Jacinto River basin. Therefore, the inventory of potential credit buyers and sellers also focuses on agricultural operators. A summary of the potential credit buyers and sellers in the San Jacinto River basin is provided below. More detailed information is available in Technical Memo #2 in Appendix A.

[2] Note: Figure 2 does not reflect September 2013 revisions to the boundaries of subwatersheds 4, 6, and 7 in the area south of Mystic Lake. See Section 2.3.2.

2.4.1 Overview of agricultural land use in the San Jacinto River basin

Understanding the location and types of agricultural land uses in the San Jacinto River basin provides a starting point for understanding the universe of potential credit buyers and sellers for agricultural WQT in the San Jacinto River basin. Figure 3 shows the various agricultural land uses with the San Jacinto River basin by subwatershed zone.

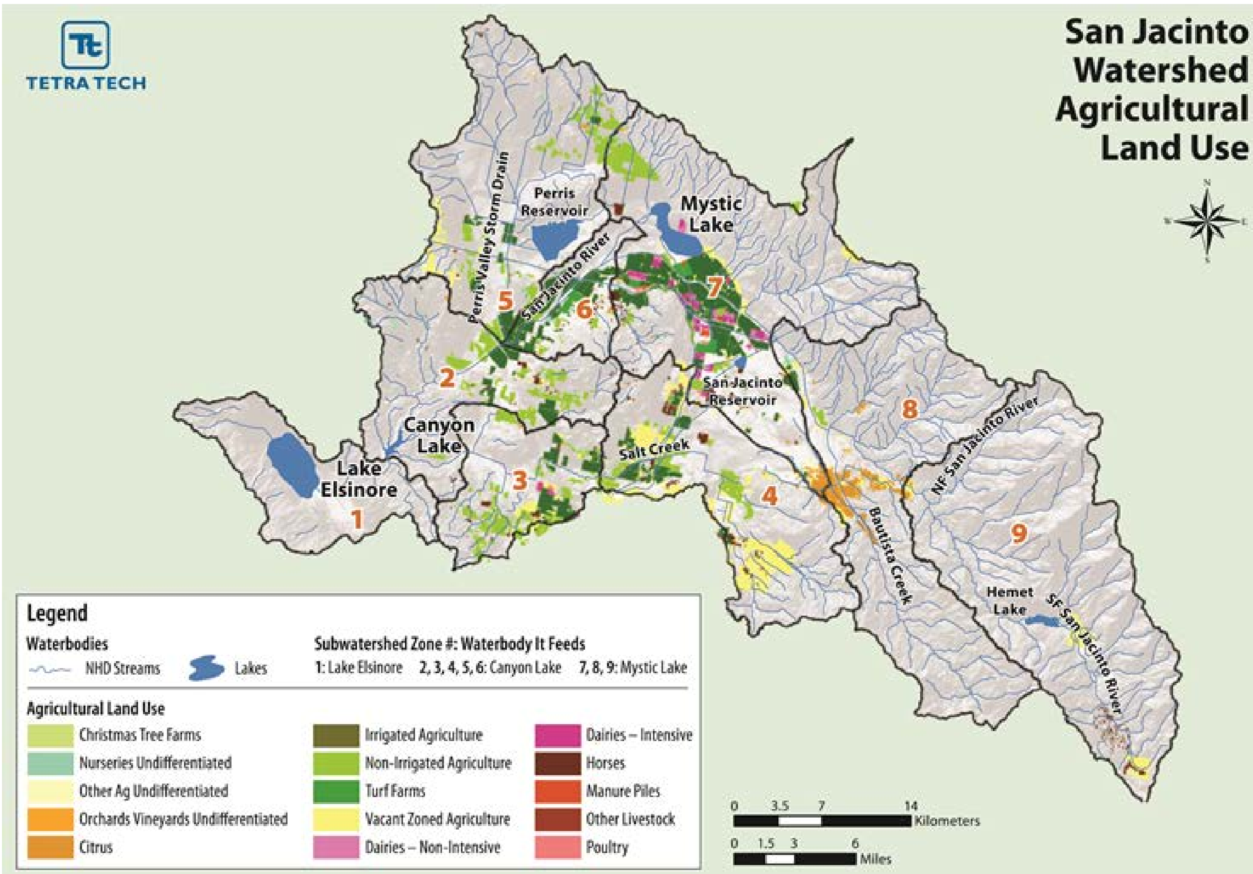

Figure 3. Agricultural land uses by subwatershed zone in the San Jacinto River watershed[3]

From Figure 3, it is apparent that a majority of agricultural acreage is located in subwatershed zones 2–6, above Canyon Lake and below Mystic Lake. Agricultural acreage does exist above Mystic Lake, primarily in zone 7, but to a lesser extent. As shown in Figure 3, zone 1 (below Canyon Lake and above Lake Elsinore) does not contain any agricultural land uses; therefore, WQT involving agricultural operators will not occur in zone 1. Estimates of agricultural acreage by agricultural land use category are available in Technical Memo #2 in Appendix A.

It is important to note that agricultural acreage is projected to decrease over time as the amount of urban land uses increases. As stated in the AgNMP, the rate of attrition for agriculture and dairy land

[3] Note: Figure 3 does not reflect September 2013 revisions to the boundaries of subwatersheds 4, 6, and 7 in the area south of Mystic Lake. See Section 2.3.2.

uses corresponds to projected land use change included in the urban Comprehensive Nutrient Reduction Plan (CNRP).

2.4.2 Summary of potential credit buyers and sellers

Potential credit buyers and sellers among agricultural operators in the San Jacinto River basin vary according to land-ownership type (non-state/federal/tribal versus state/federal/tribal), regulatory driver, land use category, and location. A detailed description of each group is provided in Technical Memo #2 in Appendix A.

Based on the information about water quality trading drivers and the inventory of potential participants, Table 1 provides a preliminary assessment of agricultural operators and their associated drivers that might cause them to participate as buyers or sellers in a water quality trading program.

Table 1. Preliminary Assessment of Potential Credit Buyers and Sellers Based on Applicable Regulatory Driver for the San Jacinto River Watershed

Type of Source	Applicable Zones	Regulatory Driver	Pollutant-specific Potential Buyer/Seller Status	
			TN[a]	TP
Agricultural Nonpoint Sources				
Non-state/federal/tribal (WRCAC) Agricultural Operators with irrigated or livestock (other than dairy) agricultural land uses over 20 aggregated acres	2–9	CWAD requirements	Seller	Buyer/Seller
Non-state/federal/tribal (WRCAC) Agricultural Operators with irrigated or livestock (other than dairy) agricultural land uses under 20 aggregated acres or non-irrigated land use	2–9	No regulatory requirements[b]	Seller	Seller
Federal/state Agricultural Operators with irrigated or livestock agricultural land uses over 20 aggregated acres	4, 7–9	CWAD requirements	Seller	Buyer/Seller
Federal/state Agricultural Operators with irrigated or livestock agricultural land uses less than 20 aggregated acres	4, 7–9	No regulatory requirements[b]f	Seller	Seller
Tribal Agricultural Operators	8	No regulatory driver	Seller	Seller
Agricultural Point Sources				
WRCAC Dairies	3, 7	Order No. R8-2013-0001 (dairy permit)	Buyer/Seller	Buyer/Seller

a. 2010 model update shows existing TN load is lower than TMDL LA (WRCAC 2013).
b. Irrigated or livestock (other than dairy) agricultural land uses under 20 aggregated acres may be subject to the CWAD if found to cause or contribute to water quality problems.

2.5 Trade Ratio Considerations

Nutrient reductions achieved through BMPs do not generate tradeable credits until they are subject to factors that account for pollutant fate and transport, BMP performance uncertainty, and risk. Collectively, these factors are referred to as trade ratios. It is important to understand trade ratios in the context of a WQT feasibility assessment because of their effect on estimates of supply and demand and on the cost of credits. Trade ratios were mentioned previously in this report under the Section 2.3, Geographic Scope. The influence of trade ratios will be seen in subsequent sections of this report. It is important to note that some trade ratios are specific to a trade and cannot be estimated or calculated ahead of time. Therefore, for purposes of this analysis, where actual trade ratios exist, they were applied to components of the WQT feasibility assessment. Where trade ratios require development by WRCAC and stakeholders through WQT program development, ranges are provided, as described in Technical Memo #4 (Appendix A). Table 2 provides a summary of the types of trade ratios, the applicability of each type of ratio to the San Jacinto River basin, and watershed-specific considerations for each type of trade ratio in the context of an agricultural operator-focused WQT program. More information on trade ratios is available in Technical Memo #4 in Appendix A.

Table 2. Summary of Trade Ratios and Applicability to WQT Involving Agricultural Operators in the San Jacinto River Basin

Type of Trade Ratio	Description	Applicability to San Jacinto	San Jacinto Considerations
Delivery	Accounts for the fate and transport of nutrients between two trading partners.	Yes	Consider river mile distances between potential trading partners. Use of zones for delivery ratios might not account for varying distances within larger zones.
Location	Addresses the fate and transport of nutrients, watershed characteristics, time and distance between the point of entry to a surface waterbody and the waterbody of concern.	Yes	Necessary for discharges entering surface waters upstream of Canyon Lake & Lake Elsinore. Referred to as loading factors in AgNMP and Technical Memo #3. Calculated through AgNMP for zones 2–6 and 7–9 for Canyon Lake. TMDL modeling estimates derived for Mystic Lake.
Equivalency	Adjusts for the relative impact of different pollutants or different forms of the same pollutant.	No	Not necessary with a focus on nonpoint to nonpoint source trading (agricultural and potentially urban runoff) using TN and TP at this point in time. Might need revisiting if program expands to include permitted wastewater treatment facilities or other point source dischargers such as MS4s.
Uncertainty	Accounts for the relative increase in uncertainty of load reduction estimates and variability in the performance of nonpoint source best management practices when compared to other load reduction estimates.	Yes	Necessary for any trade involving nonpoint sources, particularly when effectiveness will be estimated and not measured. Recommend watershed-wide option for simplicity and assuming there is insufficient data to rigorously determine variability by direct BMPs.

Type of Trade Ratio	Description	Applicability to San Jacinto	San Jacinto Considerations
Reserve	Percentage of credits placed in reserve to cover shortfalls from natural occurrences and project failure.	Yes	Recommended to act as a programmatic insurance against shortfalls created by individual BMPs not being maintained. Also serves to accelerate improvement, as with a retirement factor, if excess credits remain at the end of the year.
Retirement	Indicates the proportion of credits that must be purchased in addition to the credits needed to meet regulatory obligations. These excess credits are taken out of circulation (retired) to accelerate water quality improvement.	No	Not recommended, especially if reserve factor is used, as it is likely to create an unnecessary economic impediment to trading

At this point in time, the location ratios for Canyon Lake and Mystic Lake are available through the analysis conducted for the AgNMP, which refers to these values as loading factors. Table 3 presents the location ratios, or loading factors, for each pollutant and subwatershed zone by waterbody of concern.

Table 3. TN and TP Loading Factors for Subwatershed Zones by Waterbody of Concern

Subwatershed Zone(s)	Canyon Lake Loading Factors		Mystic Lake Loading Factors	
	TN	TP	TN	TP
2 – 6	0.65	0.63	-	-
7	0.0001	0.0001	0.793	0.803
8			0.769	0.768
9			0.767	0.764

The location ratios, or loading factors, presented in Table 3 were applied to nutrient load estimates from each subwatershed zone to generate estimates of supply and demand.

2.6 Estimates of Supply and Demand

Using the information about potential buyers and sellers with regulatory drivers, as well as information from the AgNMP on current and expected nutrient loads from agricultural operators over time, the Project Team developed estimates of potential nutrient credit supply and demand. While the WQT feasibility analysis process is able to give a watershed-wide view of credit supply and demand, it is important to note that supply and demand is truly driven at the individual agricultural operator level based on economic considerations driven by regulatory requirements. Table 4 presents a comprehensive summary of the supply and demand estimates for agricultural operators in the San Jacinto River basin. More information on the analysis developed to derive the information contained in Table 4 is available in Technical Memo #3 contained in Appendix A.

Table 4. Summary of Supply and Demand Estimates for all Potential Agricultural Sources in the San Jacinto River Watershed

Type of Source	Applicable Zones[a]	Potential Baseline	Driver/Implementation Approach	Estimate of (Supply) and Demand (kg/yr)[a]							
				TN				TP			
				2003	2007	2015	2020	2003	2007	2015	2020
Non-state/federal/tribal (WRCAC member) Agricultural Operators	2–6 (below Mystic Lake to Canyon Lake)	% reduction based on TMDL LA allowable load (analyzed in AgNMP) or BMPs specified by CWAD	TMDL LA allowable load	3,474	(499)	(993)	(927)	3,230	348	292	231
			Remaining load or surplus achieved through CWAD (BMP-based)[b] and reduction of manure spreading	3,474	(643)	(1,855)	(2,143)	NA	264	56	(75)
			Surplus achieved through CWAD (BMP-based)[b] and reduction of manure spreading with in-lake remediation projects	3,474	(643)	(1,855)	(2,143)	NA	(3,345)	(3,553)	(3,684)
	7–9 (above Mystic Lake)	% reduction based on TMDL LA allowable load (not analyzed in AgNMP) or BMPs specified by CWAD	CWAD (BMP-based)	Estimated TN load to Mystic Lake: 7,599 kg/yr Estimated TP load to Mystic Lake: 3,415 kg/yr Trading above Mystic Lake would be triggered by CWAD requirements if WRCAC determined a need for a quantifiable load reduction from these sources to help with TMDL implementation. There is no subwatershed zone demand for nutrient reductions from sources above Mystic Lake at this time; demand could possibly exist at agricultural operator level to meet CWAD BMP requirements.							
State/federal/tribal Agricultural Operators	2–6 (below Mystic Lake to Canyon Lake)	% reduction based on TMDL LA allowable load (not analyzed	Surplus achieved through CWAD (BMP-based)[b]		(321)	(321)	(321)		(49.5)	(49.5)	(49.5)

Type of Source	Applicable Zones[a]	Potential Baseline	Driver/Implementation Approach	Estimate of (Supply) and Demand (kg/yr)[a]							
				TN				TP			
				2003	2007	2015	2020	2003	2007	2015	2020
	7–9 (above Mystic Lake)	in AgNMP) or BMPs specified by CWAD	CWAD (BMP-based)	Estimated TN load to Mystic Lake: 544 kg/yr Estimated TP load to Mystic Lake: 275 kg/yr Trading above Mystic Lake would be triggered by CWAD requirements if WRCAC determined a need for a quantifiable load reduction from these sources to help with TMDL implementation. There is no subwatershed zone demand for nutrient reductions from sources above Mystic Lake at this time; demand could possibly exist at agricultural operator level to meet CWAD BMP requirements.							
WRCAC Dairies	3, 4	Order No. R8-2013-0001 (dairy permit)		No additional TN/TP reduction required; TN/TP supply could be generated by individual dairies that choose to implement controls above and beyond permit requirements. Could potentially supply up to 93 kg/yr TN and 20 kg/yr TP (estimated existing nonpoint source load that could be controlled through implementation of additional BMPs).							

a. Data do not reflect recent revisions to subwatershed zone boundaries, which are anticipated to increase estimated allowable loads and load reductions in subwatershed zones 2–6 (net increase including a decrease in zone 4 acreage) and decrease allowable loads and load reductions in zones 7–9 (net decrease in zone 7 after shifting acres from zone 4 and into zone 6).

b. Supply and demand estimates shown here are from the AgNMP, which anticipated CWAD applicability to irrigated and non-irrigated agricultural land uses. If the CWAD applies only to irrigated agricultural land, nutrient reductions from implementation of CWAD BMPs will be lower than the estimates shown.

As shown in Table 4, agricultural operators are likely to have a demand for TP credits to achieve the TMDL allowable load between 2015 and 2020, in the absence of in-lake remediation projects for Canyon Lake. There is no driver for trading above Mystic Lake in subwatershed zones 7–9, unless the CWAD requirements included a quantifiable nutrient load reduction target. The estimates in Table 4 reflect the loading factors in Table 3 relative to Canyon Lake; therefore, the location ratio has already been accounted for in the supply and demand estimate. It can be assumed that a minimum of a 2:1 uncertainty ratio would also apply, resulting in approximately 112 TP credits needed to achieve the additional 56 kg/yr of TP reduction necessary to achieve the allowable load in 2015.

2.7 CWAD Considerations Affecting Supply and Demand

A specific evaluation of how CWAD requirements might affect credit supply and demand and the likelihood of individual agricultural operators' participation in WQT requires knowledge of the CWAD requirements. In the absence of actual CWAD requirements, this assessment uses the best information currently available to establish several scenarios that explore the CWAD's potential impact on trading feasibility using assumptions about what the program will require. The scenarios assume CWAD applicability as described above in section 2.1.2, *Conditional Waiver [of WDRs] for Agricultural Discharges (CWAD) program*. Further, the scenarios assume that the CWAD will require implementation of an appropriate filter strip/field border along waterways and certain associated easements and implementation of other non-specified agricultural BMPs to address nitrogen and phosphorus loads discharged from agricultural sites. The BMPs and associated nutrient reduction efficiencies evaluated in the AgNMP were used to estimate the CWAD's potential effect on credit supply and demand in the CWAD scenarios.

Scenario 1: Compliance with initial CWAD requirements.

Under Scenario 1, the CWAD imposes only BMP implementation requirements on acreage subject to the CWAD. There is no quantifiable load reduction target to accompany the BMP-based requirements. As a result, the CWAD under this implementation scenario does not drive a demand for nutrient reduction credits. However, the initial BMP-focused CWAD requirements could result in off-site BMP offset projects where an operator subject to the CWAD determines that it is more desirable to pay for implementation of BMPs elsewhere. Any BMPs implemented under the initial CWAD requirements by WRCAC member agricultural operators would count toward the overall TMDL allowable load requirements for WRCAC. It should be noted, however, that many agricultural operators have already implemented BMPs that might meet the initial CWAD requirements. Therefore, the potential for off-site BMP offset projects to comply with CWAD requirements might be very low.

Scenario 2: Compliance with CWAD requirements to meet a quantified nutrient load reduction target based on initial CWAD compliance analysis.

Scenario 2 assumes that, after a period of time, WRCAC will estimate the nutrient load reductions generated under Scenario 1 to determine progress toward the TMDL allowable load. Based on that analysis, WRCAC would quantify the additional nutrient load reductions necessary to meet the TMDL allowable loads and assign WRCAC members either a required nutrient load reduction or a percent reduction that must be achieved through the next cycle of CWAD compliance. This establishment of a quantifiable nutrient load reduction target would influence water quality trading credit supply and demand. The numeric target serves as a baseline for generating credits for sale. In addition, the requirement would generate a credit demand among operators who do not find it feasible or desirable to implement additional BMPs on their land to achieve further nutrient load reductions.

Scenario 3: BMP Implementation on CWAD-Exempt Non-State/Federal/Tribal Agricultural Acreage

Scenario 3 evaluates the potential nutrient load reductions that could be achieved by applying CWAD-based trading baselines and implementing BMPs on agricultural acreage not subject to the CWAD (i.e., those owned by operators having, in aggregate, fewer than 20 acres of agricultural land; parcels that are not irrigated or used for livestock production; parcels under tribal ownership). These sources would participate as credit suppliers only, since they are not subject to the regulatory driver that creates a credit demand. The credits generated by CWAD-exempt agricultural operators could be sold directly to operators subject to the CWAD to meet their credit demand or could supply a reserve pool of credits to be used as insurance for trades among other agricultural operators. Calculations conducted for Scenario 3 indicate that CWAD-exempt agricultural operators could generate sufficient credits to satisfy both purposes.

Additional detail and hypothetical examples illustrating the CWAD scenarios are provided in Appendix A, CWAD Scenarios: Potential Effects of the CWAD Requirements on Supply and Demand; Supplemental Analysis to Technical Memorandum #3.

2.8 Economic Factors Affecting Trading

WQT trading is a market based program. The price paid for a credit will be determined by what the market will bear. The buyer desires the lowest cost available but only has control of the maximum payment that will be made. The seller considers the value of the BMP not only for installation cost reimbursement, but also for production goals, quality of life, and future opportunities that may be lost if the land is tied up in a contract.

Economic incentive is a key factor that influences whether sources in a watershed are likely to participate in WQT. Without adequate economic incentive, there is no market-based driver for buyers and sellers to engage in a trade. In the San Jacinto River basin, the CWAD requirements for agricultural operators will act as a driver for potential water quality trades, with the strongest driver being quantifiable nutrient load reduction goals to meet the TMDL targets. When faced with these requirements, agricultural operators will then have to consider the costs associated with implementing existing BMPs and, where necessary, the cost of implementing additional BMPs to meet the CWAD requirements. The CWAD requirements have not been defined to date, although more information about potential requirements became available toward the end of this project. The lack of information about actual CWAD requirements, coupled with limited information about current BMP implementation in the San Jacinto River basin, created a challenge for conducting a comprehensive economic feasibility analysis. As a result, the WQT feasibility assessment considered recent survey information on BMP implementation compiled by WRCAC and identified data needs to conduct a more thorough economic feasibility analysis for agricultural operators in the San Jacinto River basin.

2.8.1 WRCAC agricultural operator survey findings related to BMP implementation and costs

According to WRCAC, understanding and recognizing the specific BMPs implemented by agricultural operators in the San Jacinto River basin is an important need to support TMDL implementation. This information, coupled with associated costs and input on farmers' willingness to pay for either increased controls or credits, helps to define the economic factors that will influence the viability and sustainability of a WQT program in the San Jacinto River basin.

To develop a baseline understanding of BMP implementation in the San Jacinto River basin, WRCAC conducted an agricultural operator survey in 2011. Findings from the agricultural operator survey provide insights about BMP implementation, investments in BMPs, and willingness to pay for future BMPs. The survey results indicate that 68.62 percent of responding agricultural operators currently use BMPs, while 32 percent either did not know if they used BMPs or did not respond to the question. WRCAC noted that several respondents stated that they did not use BMPs when, in fact, they do. The survey also revealed that landowners who leased farm land to others had less knowledge of BMP practices than those who farmed the land they owned. According to the survey results, an almost equal percentage of respondents indicated that BMPs implemented increase costs and decrease costs. When asked if they would be receptive to new BMPs, 47 percent of responding agricultural operators said yes while 14 percent said no. An additional 39 percent either had no response or did not know. BMPs listed as most frequently used in the San Jacinto watershed were as follows: sprinklers/micro-emitters, berms, wheel lines, buffer zones, mulch, and erosion control. The amount of money invested in BMPs varied from $0 to $100,000. The majority did not know their costs or there was no response. When asked how much money they would invest in new BMPs, 12 percent of responding agricultural operators said none, 55 percent did not respond, 27 percent didn't know and only one respondent said they would invest more money in BMPs.

The agricultural operator survey concluded that a large number of BMPs are implemented but had not been accounted for by the agricultural operators, and agricultural operators are not likely to spend any significant amount of money on new BMPs on their property in the current economic climate. The complete report developed by WRCAC to summarize the results of the survey is included in Appendix B.

2.8.2 Data needs for economic feasibility analysis

To conduct a more thorough analysis of the economic feasibility of WQT, more information on existing BMPs and associated BMP costs is needed to determine what level of nutrient load reduction is achieved and the cost of the unit of reduction. Using that information, coupled with information about potential nutrient load reduction targets that WRCAC might identify as necessary through CWAD compliance, the economic feasibility analysis can examine the control costs associated with additional BMP implementation to comply with requirements and costs associated with generating credits. The goal is to compare the total annual costs of complying with CWAD requirements without trading and the total annual costs of the trading least-cost solution (e.g. implementing a low-cost BMP and purchasing the remaining credits to achieve the baseline load or percent reduction).

Ideally, the process would involve conducting a present worth cost analysis and a life cycle cost analysis. Determining the present worth cost of each BMP involves establishment costs, operation and maintenance costs, and opportunity costs, analyzed over a specified time period with an inflation rate to project future annual costs. Present worth costs should be calculated on a per-acre basis. The life cycle cost (LCC) analysis for BMP scenarios would provide an estimate of the average annual cost of each BMP. The LCC of each BMP would be determined by annualizing the total present worth cost. Considerations in calculating the LCC include installation, replacement, operation and maintenance, and opportunity costs.

In addition to collecting information on BMP implementation and associated costs, gauging farmers' willingness to participate in trading and to pay for credits as a way to comply with CWAD requirements is key information to the economic feasibility analysis. If farmers would rather comply with CWAD requirements of additional BMP implementation on an individual basis, the demand for credits will be diminished and agricultural operator focused WQT in the San Jacinto River basin will not be feasible. A market flush with supply and no demand is not viable for trading. At that point, it would be necessary to determine the credit demand from non-agricultural sources (e.g., regulated urban stormwater). The intent under this project was to conduct focus groups with agricultural operators to obtain information on BMP implementation perspectives and potential interest in WQT as a means to comply with CWAD requirements. This activity was not conducted because there was no specific information on CWAD requirements to use as the basis for discussion during the focus groups. This activity could be conducted once draft CWAD requirements become available.

3.0 Water Quality Trading Feasibility Assessment Findings

The information presented in Section 2 helps to assemble a preliminary understanding of where WQT might be most feasible for agricultural operators in the San Jacinto River basin.

3.1 Feasibility Findings

Based on the findings of the supply and demand analysis, using information from the AgNMP, it appears that there will be a demand for TP credits between 2015-2020 to meet WRCAC's allowable load to Canyon Lake in the absence of in-lake load reduction projects. This demand will gradually decrease over time due to attrition in agricultural acreage as it transitions to urban land use. During that period of time, the demand for credits at the individual agricultural operator level isn't likely to materialize until the CWAD moves from BMP-implementation requirements to more performance-based requirements (e.g., quantifiable load reduction or percent load reduction). A performance-based approach will potentially result from WRCAC's analysis of implementation progress under the first two years of the CWAD using the weBMP tool and a yet to be identified agricultural nutrient load reduction software program as described in Appendix B.

Trading considerations exist for each of the three trading areas. These considerations are as follows:

Above Mystic Lake (zones 7–9). Trading here is likely only to occur for purposes of demonstrating good stewardship, due to the fact that nutrient contributions from zones 7–9 have a minimal downstream contribution to Canyon Lake, even in overflow years. Trading would potentially be more meaningful and economically viable for stakeholders if Mystic Lake was the focus of nutrient reductions (e.g., less distance between agricultural operator and waterbody of concern equals a smaller trade ratio and potentially less credits to achieve the baseline). A trade ratio that considers the impact of nutrient reductions in Mystic Lake on overflow events could be developed with expanded data to better ascertain impacts on Canyon Lake.

Below Mystic Lake/Above Canyon Lake (zones 2–6). This is likely where the most trading activity will occur due to the amount of agricultural acreage and the hydrologic connection to Canyon Lake as the waterbody of concern. Closer proximity to Canyon Lake will help to keep trade ratio values to a minimum, improving the economics related to credits. However, trading is not likely to generate interest among agricultural operators until the CWAD has a quantifiable nutrient load reduction target associated with BMP implementation.

Lake Elsinore (zone 1). Trading with a focus on agricultural operators is not viable in zone 1 due to the absence of agricultural land use in zone 1.

Although not explored through this assessment, there is the possibility that credits generated by agricultural operators throughout the basin could meet the demand for credits from other sources with TMDL WLAs, such as permitted MS4s with stormwater discharges.

3.2 Potential Challenges

Based on the WQT feasibility assessment process, it appears that one of the potential challenges to WQT in the San Jacinto River basin will be timing. Having the necessary administrative infrastructure in place early is critical to success. Considering the time it takes to construct BMPs and establish vegetation, acquiring adequate levels of credits for compliance will take some time. The program is likely to experience the most efficient use when it is developed slightly ahead of demand and does not exist too long without use and support.

According to the AgNMP, demand within zones 2–6 for TP reductions will occur between 2015–2020. However, the CWAD requirements have yet to be issued. WRCAC projects that it will take approximately two years after CWAD issuance to obtain BMP implementation information and assess implementation progress against the TMDL allowable load to determine what, if any, reductions are still needed. With this timeframe, it is unlikely that there would be a true CWAD-driven demand for trading until almost 2017. The question is whether the infrastructure to support a WQT program could be put in place by 2017 and if it makes sense for this type of investment into a program that might only be needed for a three year timeframe before agricultural acreage attrition renders the program potentially unnecessary. It is possible, however, that the projected attrition might not occur, in which case the program could last beyond 2020.

Another potential challenge for WQT feasibility is the availability and reliability of the water quality targets and associated requirements that will form the basis of the program. As mentioned throughout the report, CWAD requirements are a critical driver for trading; demand for credits will be insufficient to support trading if the CWAD program is not in place and being enforced in advance of WQT program implementation. In addition, some uncertainty exists surrounding the TMDL analyses that underpin most of the requirements and programs expected to drive trading in the watershed. Although the TMDL analysis is not currently being revised, stakeholders speculate that such a revision is likely in the future. Dramatic shifts in the TMDL LAs and WLAs could undermine an existing trading program based on the current water quality goals or could drive even greater demand for agricultural nutrient reduction credits.

Finally, uncertainty surrounding TMDL water quality targets as well as future regulatory requirements and enforcement of existing requirements could serve as a disincentive for potential trading partners to participate in WQT. Existing relationships between WRCAC, the SARWQCB, and EPA should be maintained and strengthened to support the ongoing dialogue about expectations and needs for all stakeholders to be confident in the potential for WQT to support achievement of water quality goals. WRCAC recognizes that trading among agricultural nonpoint sources or between agricultural nonpoint and point sources trade is not the typical approach in WQT; however, WRCAC also recognizes the potential benefits of such trades.

4.0 Next Steps to Support WQT for Agricultural Operators in the San Jacinto River Basin

As stated in the introduction, a WQT feasibility study provides insight as to where WQT might encounter barriers in a particular watershed and what type of trading framework might be most appropriate based on the sources with the greatest potential for participation. It is an initial step in investigating the potential for WQT success in a watershed. Based on the information compiled and analyzed for the San Jacinto River basin, the Project Team has developed recommendations on next steps for moving WQT beyond the feasibility assessment phase. These next steps include finalizing and issuing the CWAD requirements, compiling and assessing an initial BMP inventory (include the identification of BMP nutrient load reduction software) during the first two years of CWAD compliance, conducting a detailed WQT economic feasibility analysis based on CWAD requirements, exploring potential WQT frameworks and technical program considerations (e.g., baselines and trade ratios), and conducting more in-depth outreach and education with stakeholders. These recommendations are discussed in more detail below.

Finalizing and issuing the CWAD requirements. As discussed, the TMDL might drive the need for nutrient load reductions, but the CWAD requirements will ultimately serve as the regulatory mechanism necessary to generate the sufficient demand to spur a WQT program. Finalization of the CWAD will help agricultural operators make BMP implementation decisions and allow WRCAC to generate the implementation information necessary to determine if trading is actually needed to help with TMDL implementation.

Compiling and assessing an initial BMP inventory during the first two years of CWAD compliance. Understanding the economics that drive trading requires data on BMP implementation and associated costs. Through WRCAC's weBMP efforts (including the identification of BMP nutrient load reduction software), this information will become readily available to support the economic feasibility analysis necessary to understand the viability of trading and determine implementation progress toward achieving the TMDL allowable load.

Conducting a detailed WQT economic feasibility analysis based on CWAD requirements. Using BMP information and associated cost data, WRCAC can perform a detailed economic feasibility analysis that examines the cost of complying with the CWAD in the absence of trading and potential cost savings to agricultural operators through the use of trading. This analysis should include an evaluation of the overhead costs associated with the monitoring, accounting, and reporting that will be needed to identify BMPs, calculate credits, and facilitate trading. In addition, this analysis should include meeting with agricultural operators in focus group settings to obtain information on willingness to participate in trading and willingness to pay for BMP implementation to comply with CWAD requirements or water quality trading credits. This should ideally be conducted after the first year of CWAD compliance using available implementation data. As mentioned throughout this report, the costs of credit generation and trading will be better defined as CWAD requirements and improved land use information become available. Findings from the economic feasibility analysis could prevent unnecessary investment in WQT program development if the program does not have adequate economic incentives for participation.

Exploring potential WQT frameworks and technical program considerations. If the findings of the economic feasibility analysis support trading as a viable economic option for agricultural operators in the San Jacinto River basin, the next step is to explore and identify the most appropriate WQT framework. Options to consider include the following:

- Single agricultural operator-to-agricultural operator trades; where an agricultural operator can find the credits or use a middleman/broker to provide credits from a site (includes the use of electronic tools to find trades).
- Single or multiple agricultural operator-to-agricultural operator trades using an aggregator where the middleman collects and sells cumulative larger blocks of credits to the buyer.
- Nonpoint source credit exchange, where the exchange host purchases credits from one or more sites to dispense among buyers or to use as a reserve pool of insurance credits.

In addition to the format of the WQT program, it is necessary to consider how the program would define the trading baselines and trade ratios, both of which have the potential to drive credit supply and demand as well as costs. Another factor to explore during the WQT program design phase is the possibility of credit demand from non-agricultural sources (e.g., MS4s) that would make the trading program sustainable beyond 2020.

Conducting more in-depth outreach and education with stakeholders. Understanding the attitudes and perceptions of key stakeholders towards WQT is essential to determining the potential success of this water quality management tool. This feasibility analysis obtained informal input from regulators and agricultural landowners through personal communications and surveys. However, much more in-depth outreach and education would be necessary with key stakeholder groups to develop the WQT program in the San Jacinto River basin.

Coordinating with SARWQCB and EPA to ensure regulatory support for WQT approach. As discussed, regulatory certainty is necessary to sustain a successful water quality trading program. While education and outreach to stakeholders is key, it is also important to engage regulatory staff early in the WQT program development process. SARWQCB was involved in the development of this WQT feasibility assessment, providing technical and policy input over the course of the project. As the project moves into a program design phase, including an in-depth economic feasibility analysis, continuing RWQCB's involvement will be essential. This is particularly important as the CWAD requirements go into effect. WRCAC will need to work closely with SARWQCB staff to monitor CWAD compliance and implementation progress over time, determining how implementation under this program translates into water quality improvements required under the TMDL.

5.0 Conclusion

While the WQT feasibility analysis indicates that trading could be a viable option for achieving the TMDL allowable load from 2015–2020, it also indicates that additional analysis is needed to better understand the economic factors that would influence trading viability. Strategic information on CWAD requirements is missing. Issuance of the CWAD will help to drive information collection to support the WQT economic feasibility analysis and overall TMDL implementation progress. Timing for both CWAD issuance and WQT program final analysis and development is critical, given the estimated timeframe for water quality trading is potentially limited to a five year period and the program will have limited national experience to draw from since this will be the first of its kind (e.g., agricultural operator to agricultural operator).

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