PROPOSED GUIDELINES

SALINITY/NUTRIENT MANAGEMENT PLANNING

in the

SAN DIEGO REGION (9)

Suggested framework and guidelines for salinity/nutrient management plans required by the State of California Recycled Water Policy

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Abbreviations and Terms

AF	acre-feet
AFY	acre-feet per year
CDC	Centers for Disease Control and Prevention
CDPH	State of California Department of Public Health
CDWR	State of California Department of Water Resources
CFR	Code of Federal Regulations
CSD	Community Service District
EPA	United States Environmental Protection Agency
GIS	geographic information system
HSA	Hydrologic Subarea
HU	Hydrologic Unit
MCL	Maximum Contaminant Level (drinking water standard)
mgd	million gallons per day
mg/l	milligrams per liter
MWD	Municipal Water District
MWDSC	Metropolitan Water District of Southern California
NWRI	National Water Research Institute
Policy	State of California Recycled Water Use Policy
RCWD	Rancho California Water District
Region	San Diego Region (9)
Regional Board	Regional Water Quality Control Board, San Diego Region
SCSC	Southern California Salinity Coalition
State Board	State Water Resources Control Board
TDS	total dissolved solids
USGS	U.S. Geological Survey
Water Authority	San Diego County Water Authority

Section 1
INTRODUCTION

SUMMARY: The San Diego Regional Water Quality Control Board is encouraging local agencies, water users, and other stakeholders to develop salinity/nutrient management plans required under the State of California Recycled Water Policy. To assist interested agencies and stakeholders, the Southern California Salinity Coalition and San Diego County Water Authority have coordinated with the Regional Board to develop proposed guidelines for the salinity/nutrient management efforts. The proposed guidelines establish a standardized approach and framework for developing salinity/nutrient management plans within the San Diego Region.

California Recycled Water Policy. The State Water Resources Control Board (State Board) in February 2009 adopted Resolution No. 2009-011 which establishes a statewide Recycled Water Policy (hereinafter Policy). The Policy requires the State Board and the Regional Water Quality Control Boards (Regional Boards) to exercise the authority granted to them by the Legislature to the fullest extent possible to encourage the use of recycled water, consistent with state and federal water quality laws. To achieve this goal, the Policy provides direction to California's nine Regional Boards on appropriate criteria to be used in regulating recycled water projects. (State Board, 2009a,b)

The Policy recognizes that wastewater and recycled water projects may represent only a portion of the overall salinity/nutrient loads within a watershed or groundwater basin. Section 6.a.2 of the Policy establishes that:

> *(2) It is the intent of this policy that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The State Board finds that the appropriate way to address salt and nutrient issues is through the development of regional or subregional salt and nutrient management plans rather than through imposing requirements solely on individual recycled water projects.*

Requirements 6.b.1 (a) and (b) of the Policy state that:

> *(a) It is the intent of this Policy for every groundwater basin/sub-basin in California to have a consistent salt/nutrient management plan. The degree of specificity within these plans and the length of these plans will be dependent on a variety of site-specific factors, including but not limited to size and complexity of a basin, source water quality, stormwater recharge, hydrogeology, and aquifer water quality. It is also the intent of the State Water Board that because stormwater is typically lower in nutrients and salts and can augment local water supplies, inclusion of a significant stormwater use and recharge component within the salt/nutrient management plans is critical to the long-term sustainable use of water in California. Inclusion of stormwater recharge is consistent with State Water Board Resolution No. 2005-06, which establishes sustainability as a core value for State Water Board programs and also assists in implementing Resolution No. 2008-30, which requires sustainable water resources management and is consistent with Objective 3.2 of the State Water Board Strategic Plan Update dated September 2, 2008.*
>
> *(b) Salt and nutrient plans shall be tailored to address the water quality concerns in each basin/sub-basin and may include constituents other than salt and nutrients that impact water quality in the basin/sub-basin.. Such plans shall address and implement provisions, as appropriate, for all sources of salt and/or nutrients to groundwater basins, including recycled water irrigation projects and groundwater recharge reuse projects.*

It should be noted that the goal of recharging stormwater may not be consistent with the goal of attaining water quality objectives where the stormwater is of poor quality. This should be considered on a case by case basis, but is expected to be a common issue in San Diego.

In addition to being required by the Policy, the California Department of Water Resources (CDWR) endorses the development of salinity/nutrient management plans within the *California Water Plan Update 2009.* Both the State Board and SWDR identify all users of water as potential stakeholders in the salinity/nutrient management process.

The Policy includes provisions for the State Board to request funding from the CDWR for the development of salt and nutrient management plans, with priority funding for projects that incorporate major water recycling components. The Policy also notes that:

> *Statewide associations of water and wastewater agencies strongly support funding of locally driven and controlled, collaborative processes open to all stakeholders that will prepare salt and nutrient management plans for each basin/subbasin in California, including compliance with CEQA and participation by Regional Board staff.*

In developing stakeholder-driven salinity/nutrient management plans, the Regional Boards and stakeholders are required to:

- assess water quality and salinity/nutrient loads within each basin, and
- identify and evaluate strategies for achieving compliance with Basin Plan water quality objectives and protecting beneficial uses.

The Policy requires that the salinity/nutrient plans be completed and proposed to the Regional Boards by May 2014. The Policy, however, allows for additional time if the Regional Board finds that stakeholders are making substantial progress towards completing a plan.

The Policy states an intent that every groundwater basins and sub-basin within California should have a consistent salinity/nutrient management plan. The Policy, however, does not provide a definition of "groundwater basin" or "sub-basin". The Policy further does not specify whether salinity/nutrient management plans should be developed for entire watersheds, specific hydrologic units within watersheds, specific defined groundwater aquifers, or portions of aquifers.

Because the Policy requires assessment of water quality, salinity/nutrient loads, and salinity/nutrient management strategies within each "basin", it may be inferred that the Policy applies to groundwater aquifers which through study, monitoring, or analysis can be sufficiently well defined to allow for:

- identification and quantification of groundwater recharge (and identification of groundwater recharge areas),
- assessment of groundwater and pollutant transport, and
- assessment of salinity/nutrient management strategies.

Given these requirements, it is evident that salinity/nutrient management plans cannot be developed for areas which do not have usable quantities of groundwater. Further, salinity/nutrient management plans cannot be developed for aquifers which by their composition or nature (e.g. groundwater transport via random rock fractures, etc.) cannot be defined through a reasonable degree of testing, monitoring, or analysis.

The guidelines presented herein are based on agencies/stakeholders defining specific study areas for individual salinity/nutrient management plans. At the discretion of agencies/stakeholders, salinity/nutrient management planning areas can be comprised of a specific groundwater basin, a portion of a groundwater basin, or an entire watershed. It is recognized that agencies/stakeholders that assess specific

groundwater basins (or portions thereof) must evaluate contributing salinity/nutrient loads that occur within the tributary watershed.

Need for Salinity Management Coordination. The San Diego Regional Board has indicated that it does not currently have the funding or staff resources to prepare the salinity/nutrient management plans required under the Policy. The Regional Board could consider modifying existing recycled water permits to require recycled water agencies to prepare salinity/nutrient management plans and implement applicable salinity/nutrient management strategies.

While requiring agencies to complete salinity/nutrient management plans as part of their recycled water permits may be an option, the Regional Board has indicated its preference to seek the cooperative assistance of interested local agencies, water users, source contributors, and other interested stakeholders for completing the salinity/nutrient management plans. To achieve goals of promoting recycled water use in a manner consistent with protecting existing and potential groundwater use, the Regional Board has coordinated with the Southern California Salinity Coalition (SCSC) and San Diego County Water Authority (Water Authority) to explore approaches to encourage local agency participation in the development of salinity/nutrient management plans within the San Diego Region.

Initial San Diego Region Salinity Management Workshops. As a first step in this effort, the SCSC, Water Authority, and Regional Board staff conducted initial salinity/nutrient management coordination workshops on October 6, 2009, January 19, 2010, and June 15, 2010. The workshops, which were attended by San Diego Region water and recycled water agencies and other interested stakeholders, focused on:

- discussing salinity/nutrient management plan requirements,
- educating local agencies and stakeholders on potential benefits associated with completing the salinity/nutrient management plans,
- identifying, engaging, and involving stakeholders in the salinity/nutrient management plan process,
- identifying other potential stakeholders not present at the workshops,
- discussing future stakeholder outreach needs, and
- discussing potential regional coordination that could assist local agencies in better understanding salinity/nutrient management benefits, requirements, and the level of effort required to prepare salinity/nutrient management plans.

At the workshops, a general consensus was developed among regulators and local water and recycled water agencies that:

- the development of salinity/nutrient management plans within the San Diego Region could help local groundwater agencies protect groundwater resources and potentially lead to increased local water supply development,
- compliance with Regional Board recycled water total dissolved solids (TDS) concentration objectives is a growing concern among many San Diego Region recycled water agencies,
- the development of salinity/nutrient management plans (and implementation of appropriate management strategies) could potentially help local recycled water agencies achieve relief on recycled water effluent concentration limitations that may impact existing and proposed recycled water use projects,
- additional guidance to local agencies would be helpful to allow agencies to understand salinity/nutrient management plan requirements and to define the required level of effort to complete required salinity/nutrient management plan tasks, and
- in accordance with the Policy, the level of effort for developing salinity/nutrient management plans for a given groundwater basin should be tailored to the size, complexity, source loads, hydrodynamics, water quality, and beneficial use of that particular basin.

Purpose of Proposed Salinity/Nutrient Management Plan Guidelines. To help promote the development of San Diego Region salinity/nutrient management efforts, SCSC and the Water Authority agreed to take a lead role in coordinating with the Regional Board to develop regional guidelines (including work plan templates) that would:

- establish a framework under which San Diego Region groundwater salinity/nutrient management plans may be established by interested agencies and stakeholders,
- assess San Diego Region aquifers and identify aquifers that are suitable for the development of salinity/nutrient management plans,
- present a suggested framework for prioritizing the Region's groundwater basins for the development of salinity/nutrient management plans,

- present a suggested framework for addressing salinity/nutrient management issues in areas of the San Diego Region where no agency or stakeholder interests may exist for developing salinity/nutrient management plans,
- present suggested tasks and procedures to be used in developing salinity/nutrient management plans in the San Diego Region,
- identify roles of agencies,
- identify and engage stakeholders,
- provide guidance on which salinity and nutrient constituents should be addressed within the plans,
- identify suggested approaches for completing the required salinity/nutrient management tasks to better define the expected level of required effort,
- identify management strategies to be considered in managing salinity/nutrient sources and loads, and
- outline the process for regulatory review and approval of developed salinity/nutrient management plans.

The guidelines presented herein propose a standardized approach and framework for salinity/nutrient management planning within the San Diego Region. Such standardized salinity/nutrient management guidelines should allow for:

- greater consistency between basin-specific salinity/nutrient management plans developed within the San Diego Region,
- improved focus and increased efficiency in the preparation of San Diego Region salinity/nutrient management plans,
- increased local agency confidence and decreased regulatory uncertainty in the salinity/nutrient management process,
- increased local agency participation in the salinity/nutrient management planning effort,
- increased stakeholder involvement,
- increased efficiency in regulatory review of developed salinity/nutrient plans,
- increased probability for regulatory approval of developed salinity/nutrient management plans, and
- decreased regulatory conflicts with the development of local water and recycled water supplies within the San Diego Region.

Regional Board Review and Approval. Prior to implementation, it is anticipated that the guidelines will be evaluated and approved by the Regional Board. At the Regional Board's discretion, this approval may be in the form of a Regional Board Resolution or an Executive Officer directive.

The draft guidelines presented herein have been revised to reflect initial review comments and guidance provided by the Regional Board staff in correspondence dated July 1, 2010. (See Appendix D.)

While the approved guidelines would represent a suggested framework for salinity/nutrient management planning within the San Diego Region, the guidelines are not intended to represent a required approach. Approval of these guidelines by the San Diego Regional Board will not preclude agencies or other stakeholders from developing and pursuing alternative salinity/nutrient management approaches that are consistent with State and Regional Board policies.

Section 2
SALINITY/NUTRIENT CONSTITUENTS OF CONCERN

SUMMARY: Total dissolved solids (TDS) is the salinity constituent of greatest concern within San Diego Region aquifers. Recycled water noncompliance with Basin Plan chloride, sulfate, percent sodium, and boron objectives is rare. No need appears to exist for addressing fluoride as part of salinity/nutrient management plans, as the current Basin Plan objective is not consistent with current state and federal drinking water Maximum Contaminant Levels. At the discretion of agencies/stakeholders, recycled water nitrogen, iron and manganese compliance issues may be best addressed as part of salinity/nutrient management plans or as part of project-specific uptake or assimilative capacity studies.

Overview. The Recycled Water Policy salinity/nutrient management requirements are directed toward encouraging recycled water use. As a result, recycled water quality conformance with Basin Plan groundwater objectives is a key consideration in determining which constituents are of concern within the salinity/nutrient management process. Other important considerations include identifying beneficial uses of groundwater and identifying the water quality necessary to support the beneficial uses.

Basin Plan Salinity Parameters of Concern. The Basin Plan establishes groundwater quality concentration objectives for a number of salinity constituents, including:

- TDS,
- chloride,
- sulfate,
- percent sodium,
- boron, and
- fluoride.

Basin Plan TDS, chloride and sulfate groundwater concentration objectives vary significantly from watershed to watershed within the San Diego Region. As a rule, TDS, chloride and sulfate groundwater objectives are most stringent in the upstream (eastern) portion of the Region's watersheds. Basin Plan groundwater quality objectives for these constituents are typically more relaxed toward the downstream coastal areas. No Basin Plan groundwater concentration objectives for TDS, chloride, and sulfate are established along many portions of the San Diego Region coastline.

Little geographic variation exists in Basin Plan groundwater quality objectives for boron, fluoride, and percent sodium. Fluoride and percent sodium objectives are respectively established at 1.0 mg/l and 60 percent throughout virtually all of the San Diego Region's groundwater basins (except for basins where no objectives are established). Basin Plan boron objectives are established at 0.75 mg/l throughout the San Diego Region, except for several coastal basins where no objective exists or the objective has been relaxed to 2.0 mg/l.

Table 2-1 (page 2-3) summarizes general salinity management issues associated with these salinity constituents within the San Diego Region. As shown in Table 2-1, TDS is the parameter that causes the most compliance difficulty among San Diego Region recycled water agencies.

Total Dissolved Solids. While Basin Plan TDS objectives vary significantly from basin to basin, most San Diego Region recycled water agencies serve a portion of their recycled water supply in basins where a Basin Plan TDS objective of 1000 mg/l exists. As a result, most agencies are required to achieve a long-term TDS concentration average (typically expressed as an annual average) of approximately 1000 mg/l. This long-term average 1000 mg/l TDS concentration is also cited by local agencies as a common concentration goal for marketing recycled water as an irrigation supply.

The TDS increment between potable and recycled water supplies has increased in recent years with increased water conservation and fluctuations in imported water blends provided to San Diego Region water agencies by the Metropolitan Water District of Southern California (MWDSC). As a result, many San Diego Region recycled water agencies have reported periodic or chronic difficulties in achieving compliance with recycled water TDS requirements. Several agencies (City of Carlsbad, Ramona Municipal Water District, and City of San Diego) have implemented partial demineralization at their recycled water facilities in order to (1) comply with effluent limits established by the Regional Board, and/or (2) ensure the marketability of the recycled water supply.

Table 2-1
Salinity Management Planning Issues and Approach
Basin Plan Groundwater Objectives for Salinity Parameters

Salinity Parameter	Salinity Management Issue	Recommended Approach
TDS	• Recycled water effluent limits of approximately 1000 mg/l are typical within the San Diego Region. • Agencies typically target 1000 mg/l for marketing purposes. • With increased water conservation, the incremental TDS increase between potable supplies and recycled water supplies has increased. • Compliance with recycled water TDS effluent limits is problematic for many San Diego Region recycled water agencies. • Because most San Diego Region groundwater basins contain TDS concentrations near or above the corresponding Basin Plan objective, assimilative capacity is typically not available.	TDS will likely be the prime salinity parameter in watershed-specific salinity/nutrient management plans developed within the San Diego Region.
Chloride	• Compliance with the Basin Plan chloride limit is normally not a problem for most San Diego Region recycled water agencies.	Address chloride as part of basin-specific salinity management plans only if basin-specific needs exist.
Sulfate	• Compliance with the Basin Plan sulfate limit is normally not a problem for most San Diego Region recycled water agencies.	Address sulfate as part of basin-specific salinity management plans only if basin-specific needs exist.
Percent sodium	• 60% Basin Plan limit is not normally a recycled water compliance issue, but an exception is in the Temecula/Murrieta area due to the high percent sodium in the Temecula Formation. • Significant assimilative capacity is normally available due to natural calcium and magnesium most San Diego Region soils.	No need appears to exist to address percent sodium as part of watershed-specific salinity/nutrient management plans. Percent sodium assimilative capacity (if required) can be handled on project-by-project basis.
Boron	• 0.75 mg/l Basin Plan boron objective is not normally a recycled water compliance issue. • Exceptions are typically limited to agencies with industrial dischargers that employ boric acid etching operations.	No need appears to exist to address boron as part of watershed-specific salinity/nutrient management plans, except perhaps in basins where unblended seawater desalination product water is the predominant water supply.
Fluoride	• Compliance with the Basin Plan 1.0 mg/l fluoride objective may become more of a problem with the Region's water agencies employing fluoridation. • Fluoride concentrations in most groundwater basins are moderate or low and a degree of groundwater assimilative capacity typically exists.	The Basin Plan groundwater concentration objective for fluoride is not consistent with current state and federal Maximum Contaminant Levels. Action is required by the Regional Board to update the Basin Plan fluoride objective to make it consistent with current MCLs. No advantage or need appears to exist to address fluoride as part of watershed-specific salinity/nutrient management plans, as the fluoride Basin Plan objective is MCL-derived and is not dependent on basin-specific source loads or data.

Groundwater TDS concentrations typically exceed 750 mg/l within the western (downstream and developed) portions of the San Diego Region. As a result, TDS is a key salinity constituent of concern for water agencies or private users that develop groundwater supply within these areas.

Overall, for both recycled water agencies and groundwater supply stakeholders, TDS is almost certain to be the prime salinity/nutrient constituent of concern within each of the salinity/nutrient management plans developed within the San Diego Region.

Chloride and Sulfate. Except on rare occasions, chloride and sulfate are not normally parameters of concern with respect to recycled water compliance. Additionally, Basin Plan chloride and sulfate objectives are typically established at concentrations that represent significant fractions of the overall TDS objective. Since concentrations of chloride and sulfate typically represent a much smaller percent of TDS, TDS is almost always a more critical parameter for recycled water agencies than chloride or sulfate.

State and federal secondary drinking water standards are established at 250 mg/l for both chloride and sulfate, while secondary drinking water standards for TDS are 500 mg/l. Chloride and sulfate typically comprise significantly less than 50 percent of TDS, so TDS is almost always a more critical parameter for water agencies than chloride or sulfate. For these reasons, it is probable that water agencies choosing to develop salinity/nutrient management plans will focus on TDS as a primary parameter of concern. In special circumstances, however, the implementing agencies may also see value in addressing chloride and sulfate individually along with TDS as part of the salinity/nutrient management process.

Boron. Basin Plan boron groundwater objectives in most basins were universally raised to 0.75 mg/l during the 1994 revision of the Basin Plan. Since that time, recycled water compliance with Basin Plan boron objectives has not been a significant concern within the San Diego Region. Exceptions to this compliance (such as the City of Escondido) have been traced to industrial discharge sources (boric acid etching operations) which have since been discontinued or reduced.

Boron concentrations in most of the Region's alluvial aquifers are believed to be at or within the Basin Plan boron objectives. As a result, boron is not likely to be a constituent of interest in most of the Region's basins. If locally warranted, however, agencies choosing to implement salinity/nutrient management plans may elect to consider boron a constituent of concern.

While boron is not a regional constituent of concern, one potential area of concern with respect to recycled water boron compliance may occur when the proposed Carlsbad seawater desalination facility becomes operational. Boron concentrations in potable supplies developed by the desalination facility will vary with seawater temperature, but will typically be in excess of the boron concentrations in the MWDSC imported supply. When diluted and blended into the regional imported water distribution system, the seawater desalination facility will not result in any boron-related impacts to regional potable or recycled water supplies.

Carlsbad and the Vallecitos Water District, however, are considering receiving the desalination plant product water directly from the plant (without blending in the regional water distribution system). Without blending in the regional system, the seawater desalination seawater product water may cause boron concentrations in the Carlsbad and Vallecitos recycled water to exceed 0.75 mg/l. Poseidon Resources Corporation (the desalination facility developer), Carlsbad, and the Vallecitos Water District are working to assess strategies for ensuring recycled water boron compliance. Potential boron compliance options being assessed include

- demonstrating assimilative capacity,
- implementing potable or recycled water blending,
- implementing source control,
- recycled water treatment,
- potable water treatment, or
- Basin Plan modifications.

As part of this assessment, it may prove beneficial to address boron compliance or Basin Plan modification options as part of salinity/nutrient management plans developed for the Carlsbad and Vallecitos areas.

Percent Sodium. The Basin Plan percent sodium objective of 60 percent does not represent a compliance problem with most of the Region's recycled water agencies. San Diego Region alluvial groundwater tends to be hard (higher concentrations of calcium and magnesium), so percent sodium is also not a problem within the Region's alluvial groundwater aquifers.

As a result, it is unlikely that San Diego Region water or recycled water agencies choosing to implement salinity/nutrient management plans will see value in addressing percent sodium. An exception to this may be in southern Riverside County. The Temecula Formation in southern Riverside County is the only area in the San Diego

Region with naturally high percent sodium. Within this formation, TDS is low but sodium comprises a significant portion of the total cations (positively charged ions).

Fluoride. Historic recycled water noncompliance with Basin Plan fluoride objectives has been rare, and has typically been related to industrial discharges (hydrofluoric acid). Fluoride compliance concerns of recycled water agencies have increased during the past several years, however, as California law now requires water agencies with more than 10,000 service connections to implement fluoridation. The Water Authority's treated imported supply is currently fluoridated to an average fluoride concentration of approximately 0.7 to 0.8 mg/l. Additionally, the Region's larger water agencies have implemented fluoridation or are in the process of implementing a fluoridation program.

A number of the Region's recycled water agencies are concerned that wastewater sources of fluoride will add to their wastewater source water load to cause recycled water fluoride concentrations to exceed the 1.0 mg/l Basin Plan water quality objective.

As documented in Chapter 3 of the Basin Plan, the Basin Plan fluoride objective is based on an assumption that fluoride concentrations in excess of 1.0 mg/l can increase the risk of mottled enamel in children and dental fluorosis in adults. While the Basin Plan fluoride objective is consistent with health recommendations from 20 years ago, the value is no longer consistent with drinking water Maximum Contaminant Levels (MCLs) established by the California Department of Public Health (CDPH) and EPA. CDPH has established the fluoride MCL at 2 mg/l. (CDPH, 2010) The U.S. Environmental Protection Agency (EPA) has established the fluoride MCL at 4 mg/l (40 CFR 141) and has established a secondary MCL (40 CFR 143.3) at 2 mg/l. EPA established these MCLs on the basis of balancing the beneficial effects of protection from tooth decay and the undesirable effects of excessive exposures leading to discoloration.

The Basin Plan fluoride value is also not consistent with health recommendations published by the Centers for Disease Control and Prevention (CDC). CDC currently recommends maintaining a 1.0 mg/l fluoride concentration in drinking water supplies for achieving maximum protection against dental caries and disease while reducing the likelihood of enamel fluorosis. (CDC, 2001)

Because the current Basin Plan groundwater quality objective for fluoride is MCL-derived (and is independent of watershed specific source loads or water quality data), no advantage or need appears to exist to address fluoride as part of watershed-specific salinity/nutrient management plans. Instead, it is recommended that the Regional

Board update the fluoride Basin Plan groundwater objective on a region-wide basis to make it consistent with current state and federal MCLs.

Basin Plan Nutrient Parameters of Concern. Table 2-2 summarizes nutrient constituents for which Basin Plan groundwater quality objectives are established within the San Diego Region.

Table 2-2
Nutrient Management Planning Issues and Approach
Basin Plan Groundwater Objectives for Nutrient Parameters

Nutrient Parameter	Nutrient Management Issue	Recommended Approach
Nitrate	• Nitrate effluent limits are not normally established for recycled water irrigation use, as recycled water nitrate loads are less than vegetation nitrogen nutrient demands. Increased future regulation of nitrogen in recycled water supplies, however, may occur. • Recycled water users can reduce fertilizer use commensurate with the fertilizer value in the recycled water. • Recycled water groundwater recharge operations (percolation basin or injection well) may not comply with Basin Plan nitrate objectives.	Nitrate (per Regional Board recommendation) may be considered a constituent of concern and addressed within salinity/nutrient management plans. Alternately, agencies/stakeholders may choose to address nitrate through project-specific nutrient uptake evaluations.
Iron and Manganese	• Recycled water compliance with assigned effluent limits for iron and manganese is a concern to many San Diego Region recycled water agencies. • Most existing recycled water discharge permits do not account for the fact that iron and manganese are nutrients, are taken up by vegetation, and are also found within many applied fertilizers. • Source loads of iron and manganese are difficult to assess, as iron and manganese naturally occur in many San Diego Region groundwaters.	Iron and manganese may be considered a constituent of concern and addressed as part of watershed-specific salinity/nutrient management plans. Alternately, iron and manganese may be addressed as part of project-specific assimilative capacity evaluations that address trace nutrient uptake and allowable recycled water concentrations.
Phosphorus	• The Basin Plan does not establish groundwater quality objectives for phosphorus. Phosphate and phosphorus compounds are not readily transmitted through soil.	Phosphorus need not be addressed as part of salinity/nutrient management plans.

Nitrate. The Basin Plan establishes groundwater quality objectives for nitrate throughout most of the San Diego Region. Typical Basin Plan groundwater quality objectives for nitrate (as nitrogen) range from 2.2 mg/l to 10 mg/l.

Nitrate is readily transported in groundwater, but is also readily taken up in surface soils as a vegetation nutrient. Consistent with the Basin Plan implementation policies, the Regional Board typically assigns nitrate effluent limits at the corresponding Basin Plan objective for recycled water groundwater recharge (percolation basin) projects. As part of such recharge projects, nutrient uptake by vegetation is negligible; recharged waters percolate or are injected directly to saturated groundwater.

Occasional noncompliance with Basin Plan nitrate concentration objectives has occurred for several San Diego Region projects that involve disposal through wastewater percolation to groundwater (e.g. Rancho California Water District, Pauma Valley Community Services District). In such circumstances, agencies discharging to groundwater may benefit from assessing nitrate as part of salinity/nutrient management plans. Where the recycled water is in compliance with the nitrate objective, no further assessment or action related to nitrate is required by the recycled water agencies..

For regulating recycled water irrigation operations, the Regional Board can make use of Basin Plan implementation provisions that allows for consideration of vegetation nutrient uptake (which represents a form of assimilative capacity) within the root zone. As part of this approach, the existing Basin Plan implementation policies would not obligate the Regional Board to implement effluent nitrate standards for recycled water irrigation operations under the rationale that:

- vegetation demands for nitrogen exceed nitrogen loads in irrigated recycled water supplies (e.g. the surface soils provide assimilative capacity), and
- fertilizer use on the irrigated site can be reduced commensurate with the nitrogen applied in the recycled water.

With the demand for fertilizer reduced, the end result is that overall nitrate loads to any given irrigated site are approximately the same regardless of whether recycled water, MWDSC imported water, or local water supplies are used. In accordance with this concept and existing Basin Plan provisions, the Regional Board could choose to regulate recycled water nitrogen loads to groundwater on a use site basis by requiring dischargers to:

1) estimate the nutrient value (pounds of nitrogen per acre-foot) in recycled water supplies,
2) notify and educate users of how this nutrient value can offset the need for fertilizer use,
3) ensure that the users track fertilizer use to assess whether the reductions been achieved by the users as a result of the nutrient value within the recycled water.

While the Regional Board has not yet implemented such an approach, Regional Board staff has identified a potential need for increased regulatory scrutiny of recycled water nitrogen loads. Citing a recent State Board decision regarding the State's *General Permit for Landscape Irrigation* (see Appendix D), Regional Board staff have identified nitrogen as a potential constituent of concern that may need to be addressed as part of salinity/nutrient management plans. The General Permit was designed to be used as a last resort and applies to any agency in the State. Therefore the standards are set high to meet any possible circumstance without consideration of local conditions. This type of regulation of nutrient standards should apply only in basins and sub-basins where there is an established need for the approach,

While recycled water nitrate may represent an issue in other areas of California, many San Diego Region recycled water agencies believe that addressing nitrogen via a salinity/nutrient management plan is unnecessary, as the majority of applied nitrogen is taken up in the root zone before reaching saturated groundwater. Instead, San Diego Region recycled water agencies may prefer to address nitrate issues on an as-needed, project-by-project basis, as:

- except in special circumstances (e.g. high load rates and porous soils), recycled water nitrate loads to irrigation lands within the San Diego Region are less than fertilizer demands (in some cases significantly less),
- the nutrient value of nitrates in recycled water allows irrigators to reduce fertilizer applications and save money,
- recycled water nitrate loads are typically a small percentage of the basin-wide nitrate loads,
- it is difficult to assess basin-wide fertilizer use, fertilization efficiencies, and the fate of nitrate in applied fertilizer,
- nitrate uptake in the soil/root zone is complex to assess, and it is difficult to translate nitrate applications to the unsaturated root zone into nitrate loads to saturated groundwater, and
- in assessing source loads and sinks, it is difficult to accurately simulate biological denitrification and nitrogen fixation.

For these reasons, it is possible that agencies/stakeholders within the San Diego Region may find it more practical to utilize a project-specific mass-balance approach to evaluate recycled water nitrate effects (when such effects are a concern). Such a mass-balance approach can focus on a specific project site, and could entail:

- identifying nitrogen loads in applied recycled water at the site,

- identifying project-specific nutrient uptake and fertilization demands at the site,
- documenting the degree of offsetting fertilizer reduction that can be implemented, and
- identifying appropriate project-specific monitoring to assess groundwater quality effects.

Agencies/stakeholders that choose to address nitrogen within a salinity/nutrient management plan must address potential cumulative effects that could occur as a result of all nitrate loads associated with all projects within the watershed.

Phosphorus. No need appears to exist to address phosphorus or phosphate as part of salinity/nutrient management plans. The Basin Plan does not establish any groundwater quality objectives for phosphorus or phosphate, and phosphorus compounds are not readily transported through soil.

Iron and Manganese. Groundwater concentrations of iron and manganese vary significantly throughout the San Diego Region. The Basin Plan establishes groundwater quality objectives throughout much of the Region at the state and federal secondary (aesthetic) MCLs of 0.3 mg/l for iron and 0.05 mg/l for manganese. In the absence of assimilative capacity information submitted by the discharger, the Regional Board typically assigns recycled water effluent limits at or near these secondary MCLs.

Iron and manganese concentrations in the MWDSC imported supplies distributed within the San Diego Region are typically well within the 0.3 mg/l iron and 0.05 mg/l manganese secondary drinking water MCLs. Concentrations of iron and manganese within the Region's recycled water supplies, on the other hand, may approach or exceed the secondary MCL concentrations. As a result, recycled water iron and manganese compliance is becoming an increasing concern for many of the Region's recycled water agencies. Sources that may contribute to iron and manganese in recycled water vary from agency to agency, and may include:

- iron and manganese within locally derived water supplies,
- residential and commercial/industrial sewer discharges, and
- chemical use for water and wastewater treatment.

Assessing iron and manganese as part of watershed-specific salinity/nutrient management plans is complicated by the fact that iron and manganese are trace nutrients that are essential in the growth and sustenance of turf, landscaped vegetation, and agricultural crops. Iron and manganese are used by vegetation in the manufacture

of chlorophyll, and help plants to absorb carbon dioxide in the photosynthesis process. Iron and manganese have been estimated to comprise from 0.05 to 0.003 percent of the mass of sod grass. Iron and manganese nutrient demands vary depending on vegetation species, soil pH, time of year, and hydrologic conditions, but have been estimated to range from 0.5 to 12 pounds per acre. These demands may approach or exceed iron and manganese loading rates typical for recycled water irrigation operations. As a result, concentrations of iron and manganese in the irrigation supply do not translate to the same concentration being recharged below the root zone.

Although iron and manganese may be present in many local soils, it is not uncommon for professional landscapers to seasonally apply fertilizers that contain iron and manganese. (Such fertilization is common at golf courses and landscaped areas for a "greening" effect.) While fertilizer needs may vary depending on vegetation, soil type, and whether or not grass cuttings and crops are removed, iron and manganese in recycled water supplies can help meet the nutrient demands of irrigated vegetation.

While nutrient uptake of iron and manganese increases the difficulty in assessing source loads to groundwater, this nutrient uptake provides an assimilative capacity effect for recycled water irrigation operations. As a result of this uptake, higher concentrations of iron and manganese can be applied to irrigated lands without adversely impacting underlying groundwater.

Regional Board staff (see Appendix D) note that recycled water iron and manganese loading issues may be addressed (similar to nitrate) through the development of salinity/nutrient management plans. Recognizing difficulties associated with assessing naturally-occurring iron and manganese loads in local groundwaters, however, San Diego Region recycled water agencies may choose to address recycled water iron and manganese issues through :

- regional coordination to document (1) probable iron and manganese demands for typical San Diego Region recycled water operations, (2) typical fertilization practices within the Region, and (3) probable root zone iron and manganese uptake from recycled water use, and
- submittal of recycled water agency requests for modification of recycled water iron and manganese effluent limits consistent with the iron and manganese uptake assessments.

Under this approach, San Diego Region recycled water agencies could achieve a degree of relaxation of iron and manganese effluent concentration limits without the

need for the completion of complex and time-consuming Basin Plan modification efforts or salinity management plans. Additionally, because the approach implements existing Basin Plan water quality objectives and implementation provisions, the approach should not require review for compliance with the California Environmental Quality Act.

Whether local agencies/stakeholders choose to address iron and manganese within a salinity/nutrient management plan or through individual project-specific permit modification requests will be dependent on:

- agency/stakeholder needs,
- Regional Board input, and
- basin-specific or project-specific considerations.

Toxic Inorganic and Organic Parameters. The Basin Plan incorporates by reference State of California drinking water MCLs for toxic organic chemicals and toxic inorganic chemicals. Such toxic organic and inorganic parameters are not addressed within this salinity/nutrient planning framework as:

- the parameters do not measurably contribute to salinity,
- with the exception of some trace metals (e.g. copper and zinc), the parameters do not provide any meaningful nutrient value,
- recycled water compliance with existing toxic organic and inorganic standards is typically not a problem, and,
- modification of these parameters within the Basin Plan would not be practical or warranted, and would not result in any additional potential for expanded recycled water use.

For similar reasons, this salinity/nutrient planning framework does not address constituents of emerging concern (e.g. endocrine disruptors, pharmaceuticals, and other unregulated compounds of unknown risk). It is recognized, however, that the State Recycled Water Policy addresses an ongoing approach for the State Board and CDPH to evaluate future monitoring and regulatory needs for constituents of emerging concern. While addressing constituents of emerging concern in the salinity/nutrient management plan framework is unnecessary at this time, future State Board policy changes may be considered by the Regional Board as part of the Regional Board assessment of the effectiveness of developed salinity/nutrient management plans.

Section 3
AQUIFER CHARACTERIZATION

SUMMARY: This section characterizes the types of groundwater aquifers that occur within the San Diego Region. The Region's alluvial aquifers are concluded as being appropriate for developing salinity/nutrient management plans. One of the Region's deep aquifers (the Temecula Formation) also is appropriate for consideration within a salinity/nutrient management planning effort. A tiered approach is proposed for developing San Diego Region salinity/nutrient management plans. Under the tiered approach, the level of effort for developing a salinity/nutrient management plan would be tailored to the complexity of the aquifer. San Diego Region aquifers are categorized into five tiers of complexity.

Groundwater Occurrence in the San Diego Region. Groundwater resources within the San Diego Region exist in a number of types of aquifers, including:

- alluvial aquifers that exist along the Region's streams and river valleys,
- shallow aquifers comprised of residuum (weathered semi-consolidated sediments) which exist below alluvium or along weathered exposed surfaces,
- deep aquifers comprised of consolidated, semi-consolidated or unconsolidated older sediments, and
- fractured rock aquifers.

Table 3-1 (page 3-2) summarizes general characteristics of these aquifer types. Figure 3-1 (page 3-3) presents the location of principal groundwater aquifers in the San Diego Region.

Table 3-1
Overview of Aquifer Types in the San Diego Region[1]

Aquifer Type	Typical Characteristics
Alluvium	• aquifer media comprised of unconsolidated alluvial sediments • depths of alluvium typically less than 200 feet • transmissivity is typically high • well yields can be significant (hundreds of gallons per minute) • aquifer storage coefficients can be significant (10-18%) • storage volumes can be high (tens of thousands of acre-feet) • alluvial aquifers are aligned along all major watercourses of the San Diego Region • alluvial aquifers comprise the most productive aquifers in the San Diego Region • recharge is primarily from the infiltration of surface flow from the surrounding tributary watershed • groundwater quality can be adversely affected by applied waters, over-pumping, seawater intrusion, or natural geologic conditions
Residuum	• aquifer media comprised of eroded, weathered consolidated or semi-consolidated sediments • depths typically shallow (typically no more than 30 feet) • permeability and well production is typically low • the shallow aquifer media is typically not suited for municipal production • recharge is typically dependent on surface infiltration within the tributary watershed
Deep, Thick Older Sediments	• aquifer media can consist of consolidated material, semi-consolidated material, or unconsolidated material • aquifer depths can be great (1000 feet or more) • groundwater can exist in confined or unconfined conditions • storage coefficients typically small, but storage volumes can be significant due to extent and depth of aquifers • the aquifers can extend over large areas and underlie several surface watersheds • well yields can be significant • water quality can be variable, but can be significantly better than the quality of overlying alluvial groundwater
Fractured Rock	• irregular fractures in granitic, metamorphic, and igneous rocks make groundwater movement difficult to trace • aquifer depths can be great (in excess of hundreds of feet) • aquifer storage coefficients extremely small (typically 0.1% or less) • long-term yields are typically limited due to irregular nature of fractures • fractured rock aquifers are not generally suited for municipal production • recharge sources are uncertain and difficult to trace, and recharge may not come from the same surface watershed

1 Summary of information presented in San Diego County Water Authority *Groundwater Report* (1997)

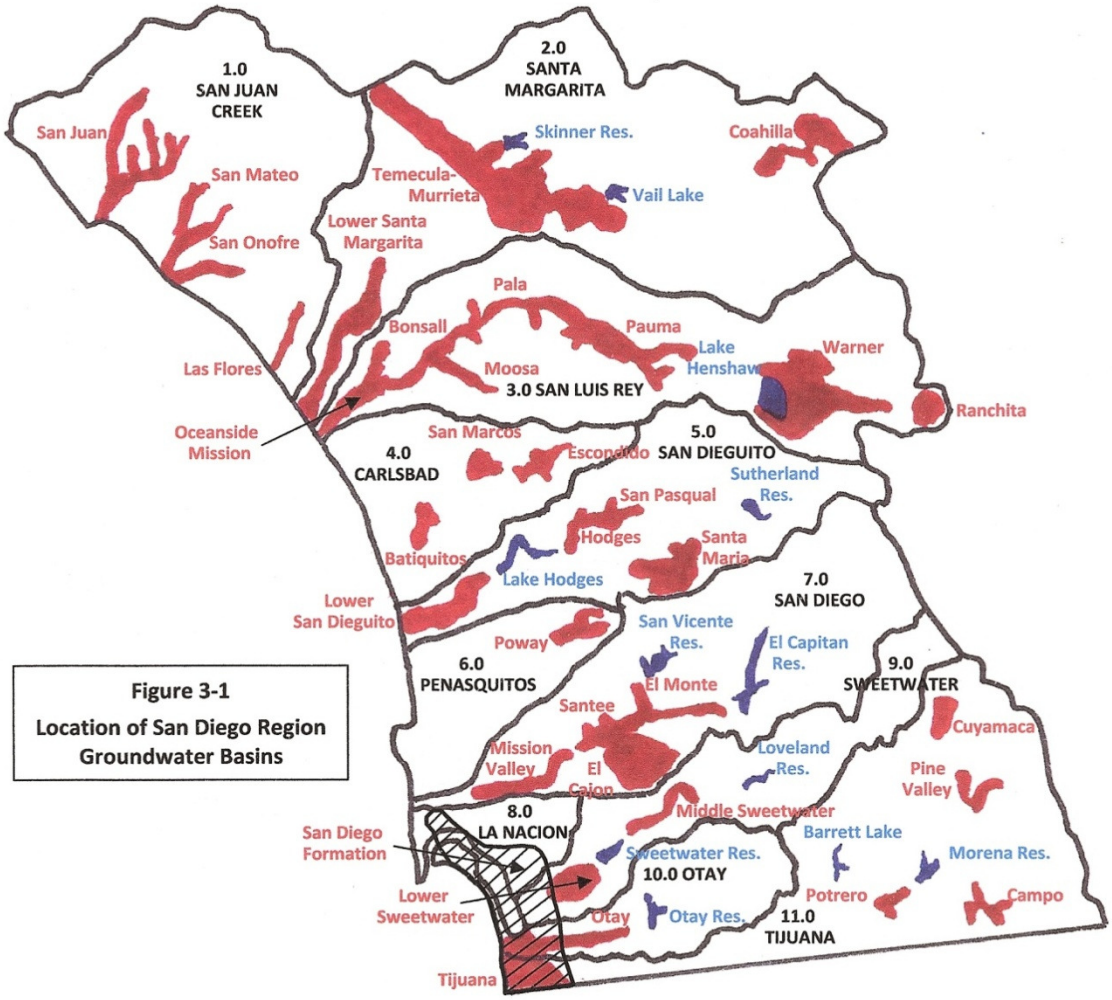

Figure 3-1
Location of San Diego Region Groundwater Basins

Alluvial Aquifers. A significant majority of the municipal groundwater supply developed within the San Diego Region is from alluvial aquifers. Alluvial aquifers exist along each of the principal watercourses of the San Diego Region, and rarely exceed depths of 200 feet. The alluvial aquifers vary significantly in size, production, and quality. (Water Authority, 1997)

Table 3-2 (page 3-4) summarizes principal alluvial aquifers within the San Diego Region. Table 3-2 also identifies groundwater basins within the MWDSC service area (which includes the service area of the Water Authority and the service areas of municipal water supply agencies in southern Riverside and Orange Counties). Total groundwater stored in the alluvial aquifers of the San Diego Region is estimated to exceed 700,000 acre-feet. Each of the alluvial aquifers occurs within a single watershed, and directions of groundwater flow in the alluvial aquifers typically follow surface topography. Recharge to the alluvial aquifers is predominantly from infiltrating streamflow and surface runoff, but applied water can also represent a significant source of recharge. (Water Authority, 1997)

Table 3-2
Summary of Principal Alluvial Aquifers within the San Diego Region[1]

Watershed	Groundwater Basin	Estimated Storage Capacity (AF)	Pubic Agency Water Supply Production[4] (AF/year)	Within MWDSC Service Area	Recycled Water Purveyed[12]	Wastewater Recharged to Groundwater[13]
San Juan (HU 1.0)	San Juan	90,000[1]	2,100[5]	■	■	
	San Mateo	14,000[1]	1,500[6]	□[11]		■
	San Onofre	6,500[1,2]	500[6]	□[11]		■
	Las Flores	8,400[2]	500[6]	□[11]		■
Santa Margarita (HU 2.0)	Lower Santa Margarita	62,000[1]	6,000[6]	□[11]	■	
	Temecula/Murrieta	250,000[1]	40,000[7]	■	■	■
	Coahuila	75,000[1]	0			
San Luis Rey (HU 3.0)	Mission	90,000[1]	7,000[8]	■	■	
	Bonsall/Moosa	25,000[1]	0	■	■	■
	Pala/Pauma	50,000[2]	2,700[6]	■		■
	Warner	550,000[1]	9,000[6]			
Carlsbad (HU 4.0)	Batiquitos, Buena Vista, Agua Hedionda Encina	Unknown[1,3]	0	■	■	
	San Marcos	Unknown[1,3]	0	■	■	
	San Elijo	8,500[1]	0	■	■	
	Escondido	24,000[1]	0	■	■	
San Dieguito (HU 5.0)	Lower San Dieguito	50,000	0	■	■	■
	Hodges/San Pasqual	63,000[1]	0	■	■	
	Santa Maria	37,000[1]	200[6]	■	■	
Peñasquitos (HU 6.0)	Poway	>2,000[1]	0	■	■	
San Diego (HU 7.0)	Mission Valley	40,000[1]	0	■		
	Santee/El Monte	70,000[2]	1,600[6]	■	■	
	El Cajon	32,000[1]	0	■	■	
Sweetwater (HU 9.0)	Lower Sweetwater	13,000[1]	4,400[9]	■		
	Middle Sweetwater	30,000[2]	0	■		
Otay (HU 10.0)	Otay Valley	Unknown[1,3]	0	■	■	
Tijuana (HU 11.0)	Lower Tijuana	50,000[1]	0	■	■	
	Campo	63,000[1]	70[10]			■

1 Storage capacity estimate from State of California DWR Bulletin No. 118, updated 2003 (DWR, 2003).
2 Storage capacity estimate from the 1997 Water Authority *Groundwater Report* (Water Authority, 1997).
3 Storage capacity is unknown but is believed to be less than 10,000 acre-feet.
4 Includes groundwater production from public water supply wells operated by cities, municipal water agencies and water districts. Does not include wells operated by private water companies, mutual water companies, or Native American tribes.
5 From *Groundwater Assessment Study* (Metropolitan Water District of Southern California, 2007).
6 From San Diego County Water Authority *Groundwater Report* (Water Authority, 1997).
7 From *Rancho California Water District Integrated Water Resources Management Plan* (RCWD, 2007). Includes groundwater production from both the Pauba/Murrieta alluvial aquifers and underlying Temecula Formation.
8 Based on expanded 6.37 mgd capacity of City of Oceanside groundwater desalination facility.
9 Based on expanded 4.0 mgd capacity of Sweetwater Authority groundwater desalination facility. Includes production from the underlying San Diego Formation.
10 Computed value based on service population of 290.
11 Imported MWDSC water is not normally used at Camp Pendleton, but is available for emergency purposes.
12 Recycled water purveyed by municipal agencies per recycled water requirements established by the Regional Board.
13 Treated municipal wastewater recharged to groundwater via percolation basins per requirements established by the Regional Board. Does not include wastewater discharges from Native American tribes or from private wastewater systems.

As shown in Table 3-2, six large alluvial basins (capacities exceeding 60,000 acre-feet) are located within the MWDSC service area. These basins, each of which has been the subject or extensive prior groundwater studies, include:

- San Juan Creek Basin,
- Temecula/Murrieta Basin,
- Lower Santa Margarita Basin,
- Oceanside Mission Basin,
- Hodges/San Pasqual Basin, and
- Santee/El Monte Basin.

Recycled water is served within the watersheds of each of these basins, and significant municipal supplies are currently developed within the Temecula/Murrieta, San Juan Creek, Lower Santa Margarita, Oceanside Mission, and Santee/El Monte Basins. Plans exist to develop municipal supply from the Hodges/San Pasqual Basin.

Other key alluvial San Diego Region groundwater basins within the MWDSC service area, in part, include:

- San Mateo,
- San Onofre,
- Las Flores,
- Pala/Pauma,
- Bonsall/Moosa,
- Lower San Dieguito,
- Mission Valley,
- El Cajon,
- Middle and Lower Sweetwater,
- Lower Sweetwater, and
- Lower Tijuana.

Brackish groundwater desalination operations currently exist in four San Diego Region alluvial aquifers, including facilities operated by the:

- San Juan Basin Authority in the San Juan Creek Basin,
- South Coast Water District in the San Juan Creek Basin,
- City of Oceanside in the Oceanside Mission Basin, and
- Sweetwater Authority in the Lower Sweetwater Basin.

The Warner Basin is the largest and most productive alluvial basin outside the MWDSC service area. Groundwater from the Warner Basin is used by the Vista Irrigation District as a source of recharge for Lake Henshaw. Other San Diego Region alluvial groundwater basins outside the MWDSC service area, in part, include:

- Coahilla and Aguanga (Santa Margarita River watershed),
- Ranchita and Santa Ysabel (San Luis Rey watershed),
- Cuyamaca (San Diego River watershed),
- Japatul and Descanso (Sweetwater River watershed), and
- Pine Valley, Campo, Cottonwood, and Potrero (Tijuana River watershed).

Deep Aquifers. Deeper, thick aquifers comprised of older sediments also represent a significant groundwater resource within the San Diego Region. Groundwater in these deeper aquifers can exist both in a confined or unconfined state. The two principal large deep aquifers known to exist in the San Diego Region include:

- Temecula Formation, and
- San Diego Formation.

The Temecula Formation underlies a large portion of southern Riverside County, including much of the Temecula/Murrieta alluvial aquifer. Confined groundwater exists in the thick consolidated sediments of this aquifer. A significant portion of the total 35,000-40,000 acre-feet per year yield from Temecula/Murrieta area is derived from this deep aquifer. The Temecula Formation has been extensively delineated and studied by the Rancho California Water District. A confining layer separates the majority of the deeper Temecula Formation from overlying Temecula/Murrieta alluvial aquifer. Evidence indicates, however, that the Temecula Formation is hydraulically connected to (and recharged by) the upstream portions of the Temecula/Murrieta alluvial aquifer.

The San Diego Formation is comprised of thick semi-consolidated and unconsolidated older sediments that underlie a large portion of San Diego, National City, and Chula Vista. The San Diego Formation is characterized by complex geology with extreme vertical and horizontal non-uniformity. The San Diego Formation extends eastward to the Rose Canyon and La Naçion faults, but the western, northern, and southern boundaries of the aquifer are less well documented. Little is known about the recharge sources of the San Diego Formation, and overdraft and seawater intrusion implications are yet to be assessed.

Because of the large areal extent and depth of these two aquifers, each is believed to contain on the order of one million acre-feet of groundwater. Both deep aquifers underlie a number of surface watersheds, and groundwater flow patterns within these two deep aquifers may be significantly different than ground surface topography.

Other Aquifer Types. Groundwater production from residuum or fractured rock aquifers is typically small, and groundwater use from such aquifers is typically limited to individual homes or small water systems.

Aquifer Applicability to Salinity/Nutrient Management. The State of California Recycled Water Policy is directed toward encouraging recycled water use through the identification and management of salinity/nutrient sources. Because the Policy is directed toward encouraging recycled water use, addressing the salinity/nutrient requirements in basins where recycled water use occurs or may potentially occur will allow for streamlining the permitting and implementation of recycled water projects.

Further, the intent of Recycled Water Policy is to address source loads, impacts to groundwater, and strategies to manage or mitigate source loads. Accordingly, preparation of salinity/nutrient management plans requires the ability to:

- identify the areal extent of the aquifers,
- characterize the ambient quality of the basin and determine its assimilative capacity by considering historical and ambient conditions and appropriate beneficial uses,
- identify locations and quantities of recharge to the aquifers,
- identify patterns of groundwater movement and pollutant transport,
- identify salinity/nutrient sources that may impact groundwater quality, and
- develop and evaluate strategies for controlling or managing salinity/nutrient loads to aquifers, as appropriate and necessary.

Not all aquifer types within the San Diego Region are suited to the salinity/nutrient source assessment and analysis requirements of the Recycled Water Policy. In order to develop a salinity/nutrient management plan, it is essential to be able to identify salinity/nutrient sources and loads and assess pollutant transport and fate. Figure 3-2 (page 3-8) summarizes the relative technical feasibility of salinity/nutrient source assessment and pollutant transport with the aquifer types found in the San Diego Region.

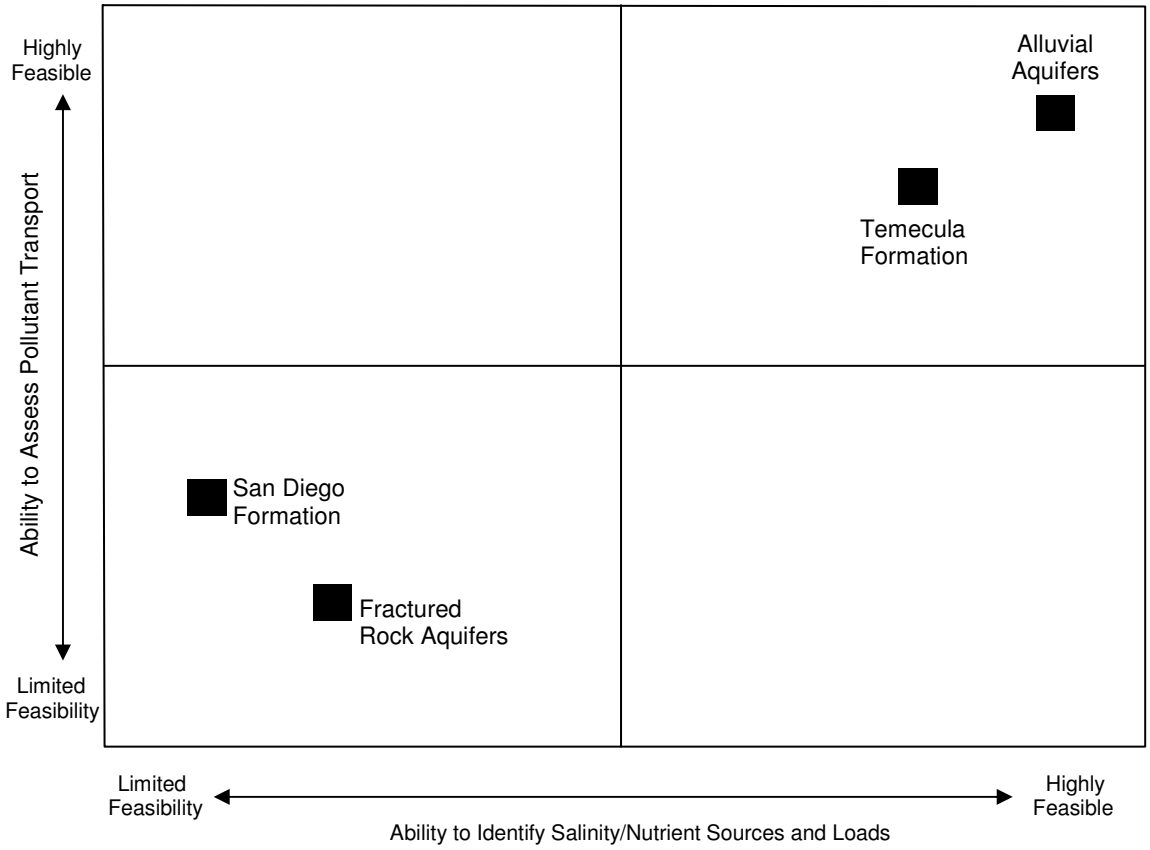

Figure 3-2 Applicability of Aquifer Types to Salinity/Nutrient Planning

Alluvial Aquifers. As indicated in Figure 3-2, alluvial aquifers within the San Diego Region (including hydraulically connected underlying residuum) appear well-suited for the development of salinity/nutrient management plans, as:

- alluvial aquifers represent the primary source of municipal supply production within the San Diego Region,
- recycled water use occurs within many of the alluvial basins of the San Diego Region,
- the areal extent of the alluvial basins are easily delineated through geologic information, soils reports, topography and aerial photographs,
- the aquifers exist within Regional Board-designated watersheds (for which specific Basin Plan groundwater quality objectives have been established),

- the aquifers receive recharge from defined topographic watersheds, and recharge sources are reasonably well understood,
- existing Basin Plan groundwater quality objectives were largely established on the basis of (1) data developed within alluvial aquifers and (2) beneficial uses that occur within the alluvial aquifers,
- conditions within many of the alluvial basins are reasonably uniform, allowing for relatively straight-forward assessment of pollutant transport,
- groundwater table elevations and groundwater flow patterns typically follow surface topography,
- it is relatively straight forward to identify sources and quantities of pollutant loads that may impact the alluvial basins,
- it is relatively straight forward to identify groundwater use and production within a given alluvial basin,
- groundwater quality in alluvial aquifers can be directly impacted by applied waters, land use, and surface activities, and
- numerous potential strategies exist for managing, reducing, or mitigating pollutant loads within alluvial aquifers.

Deep Aquifers. The San Diego Formation would not appear to represent a viable aquifer suited for the salinity/nutrient management approach set forth in the Recycled Water Policy at this time, as:

- the areal extent of the San Diego Formation is not well defined,
- little is known about how (or where) the aquifer is recharged,
- little is known about how (or if) the San Diego Formation is connected to other regional aquifers,
- it is uncertain whether the aquifer is influenced by source loads applied to surface soils,
- little is known about transport within the aquifer, and
- the aquifer underlies a number of watersheds, and hydraulic movement within the aquifer may significantly different that in the overlying watersheds.

The San Diego Formation, however, is a valuable and extensive aquifer, and ongoing efforts to better define the aquifer are underway by the San Diego County Water Authority, Sweetwater Authority, Otay Water District, and U.S. Geological Survey to better define the formation. As the depth, areal extent, recharge characteristics, and

groundwater movement characteristics of the San Diego Formation become better defined in future years, the aquifer may become a viable candidate for salinity analysis and management.

The Temecula Formation, on the other hand, is significantly better defined. The vertical and horizontal extent of the Temecula Formation is well documented. The Temecula Formation is known to be hydraulically connected to upstream portions of Temecula Murrieta alluvial aquifer. Salinity/nutrient source loads applied in the upstream recharge zones can be transported within the Temecula Formation. As a result of this hydraulic connection and the well-defined nature of the Temecula Formation, it would be appropriate to include the Temecula Formation aquifer as part of any salinity/nutrient management effort that addresses the overlying Temecula/Murrieta alluvial aquifer.

Fractured Rock Aquifers. Fractured rock aquifers predominantly exist in the eastern portions of the San Diego Region outside urbanized areas where recycled water and MWDSC imported water is served. In addition to being predominantly outside the area where recycled water is used, the Region's fractured rock aquifers do not readily lend themselves to the type of analysis required for the development of salinity/nutrient management plans, as these aquifers feature:

- low well yields, low storage coefficients, and irregular permeability,
- irregular and ill-defined hydrogeologic properties and groundwater movement,
- significant uncertainties regarding recharge zones and salinity/nutrient sources, and
- uncertain and irregular groundwater transport that may not follow surface topography or watershed boundaries.

Proposed Tiered Salinity/Nutrient Management Approach. As shown in Table 3-2 (page 3-4) recycled water use or municipal wastewater discharges occur in almost all of the Region's alluvial groundwater basins that are within the MWDSC service area. As a result, the Region's alluvial aquifers (with associated residuum) within the MWDSC service area represent viable candidates for the development of salinity/nutrient management plans.

As also documented in Table 3-2, the size, use, and complexity of San Diego Region alluvial groundwater aquifers vary significantly. The level of effort required to develop a salinity/nutrient management plan will be, in part, dependent on groundwater basin size,

complexity, use, source loads, hydrodynamics, and the degree of prior analysis and study that has been conducted. Groundwater basins with expansive areal extents and larger volumes should entail greater effort than smaller basins with less complex hydrodynamics and salinity/nutrient loading issues. Additionally, each of the Region's larger groundwater basins (with their increased potential for water supply development) has been the subject of comprehensive groundwater supply and groundwater quality evaluations.

Recognizing that the level of salinity/nutrient assessment effort should be proportional to the size and complexity of the basin, a "tiered" approach is proposed under which the Region's groundwater basins are grouped into several categories on the basis of similar characteristics. Under such a tiered approach, suggested guidelines and levels of effort for each group of basins can be tailored to be consistent with aquifer size, complexity and use. Such a tiered approach allows for flexibility among the basins in assessing salinity/nutrient management issues, while ensuring a level of consistency in salinity/nutrient management planning efforts within individual groundwater basins of the San Diego Region.

Classification of San Diego Region Aquifers. Under this approach, San Diego Region groundwater basins are grouped into five categories (or "tiers") on the basis of storage volumes, yields, water quality considerations, municipal water supply use/potential, degree of available information, and similarities in salinity/nutrient load issues. Table 3-3 (page 3-12) summarizes the five selected categories of basins. Table 3-3 also classifies San Diego Region alluvial aquifers into appropriate categories.

Tier A Basins. As shown in Table 3-3, five of the Region's large groundwater basins are classified as Tier A, including:

> **San Juan Creek Basin**. The San Juan Creek basin is a long, narrow alluvial basin that extends along the lower portions of the San Juan Creek watershed in the southern portion of Orange County. The San Juan Creek Basin is comprised of four subbasins: the Upper San Juan, Middle San Juan, Lower San Juan, and Lower Trabuco. The San Juan Creek Basin has been extensively studied, and is managed by the San Juan Basin Authority. Salinity concentrations are increased in the downstream portions of the basin. Groundwater pumped from approximately half of the basin's municipal supply wells receives demineralization treatment.

Table 3-3
Summary of Proposed Groundwater Basin Categories
Salinity/Nutrient Management Planning within the San Diego

Group	Description	Groundwater Basins
Tier A	Large groundwater basins (storage capacities in excess of 60,000 acre-feet) within the MWDSC service area with significant existing or proposed municipal groundwater use. Groundwater quality in the upstream portion of the basin is good, but groundwater quality in the downstream potion of the basin may not comply with existing Basin Plan objectives. The hydrogeology and groundwater of Tier A basins have been extensively studied and documented, and groundwater quality and transport have been studied using computer models. Potential groundwater management alternatives within the Tier A basins have also been extensively studied.	• San Juan • Lower Santa Margarita • Temecula/Murrieta[1] • Hodges/San Pasqual • Santee/El Monte
Tier B	Moderate-sized groundwater basins (50,000 AF or less in capacity) in urbanized or agricultural areas within the MWDSC service area with variable groundwater quality that remains usable as a source of irrigation or municipal supply. Basin Plan TDS groundwater objectives within the Tier B basins range from 500 mg/l to 1000 mg/l, and wastewater and recycled water agencies within the Tier B basins may experience periodic noncompliance with Basin Plan groundwater quality objectives. In general, Tier B basins have been studied less extensively than the Tier A basins, and potential yields from the Tier B basins (Pala/Pauma and Middle Sweetwater are exceptions) are significantly less than the Tier A basins.	• San Mateo[2] • San Onofre[2] • Las Flores[2] • Pala/Pauma[3] • San Marcos • Escondido • Santa Maria • Poway • Middle Sweetwater
Tier C	Remaining smaller, shallow groundwater aquifers (capacities of less than 20,000 AF) in unconsolidated sediments within urbanized or agricultural areas of the MWDSC service area. Basin Plan groundwater TDS objectives in these basins range from 500 mg/l to 1100 mg/l, and wastewater and recycled water agencies within the Tier C basins may experience periodic noncompliance with Basin Plan groundwater quality objectives. Storage capacities and well yields from the Tier C basins are modest or small. Fewer studies and resources exist to characterize basin hydrogeology, groundwater quality, and groundwater transport.	• Valley Center • Keys Creek • Vista • Miramar • San Vicente/Gower • National City • Other small similar basins
Tier D	Tier D-1 Large to moderate-sized urbanized coastal groundwater basins within the MWDSC service area with higher salinity groundwater quality and existing Basin Plan groundwater quality objectives for TDS that exceed 1200 mg/l. Recycled water compliance with existing Basin Plan TDS objectives is not a problem within these basins. Municipal supply is developed (or proposed) via groundwater demineralization in these basins.	• Oceanside Mission • Mission Valley • Lower Sweetwater
	Tier D-2 Moderate to small-sized coastal or inland groundwater basins within the MWDSC service area with higher salinity groundwater quality and existing Basin Plan groundwater quality objectives for TDS that exceed 1200 mg/l. Recycled water compliance with existing Basin Plan TDS objectives is not a problem within these basins. Public water supplies are not currently developed within these higher salinity groundwater basins.	• Bonsall/Moosa • Batiquitos, Buena Vista, • Agua Hedionda, Encina • San Elijo • Lower San Dieguito • El Cajon • Otay • Lower Tijuana • Other small similar basins
Tier E	Groundwater basins in the rural eastern portion of the San Diego region outside the MWDSC service area and outside the recycled water service area.	• Coahilla • Santa Ysabel • Warner • Pine Valley • Descanso • Potrero • Campo • Cottonwood • Other small similar basins

1 Includes underlying confined Temecula Formation.
2 Camp Pendleton is a member of the Water Authority and maintains an emergency connected to the MWDSC imported water system, but normally utilizes on base groundwater as s source of supply.
3 Portions of the Pala/Pauma basin are within the MWDSC service area, but the basin is included as a Tier B basin on the basis of size and yield. Groundwater TDS concentrations are typically low in the Pala/Pauma basin, but nitrate concentrations in portions of the basin have approached or exceeded the Basin Plan objective.

Lower Santa Margarita Basin. The Lower Santa Margarita River basin is an interconnected basin that extends through the Chappo, Upper Ysidora, and Lower Ysidora hydrologic subunits. The basin serves as the exclusive source of supply to the U.S. Marine Corps Base Camp Pendleton. Salinity concentrations in the downstream portion of the basin are increased, but upstream groundwaters remain a viable source of potable supply. The basin has the potential both for expanded recycled water use and expanded groundwater supply storage and development. Salinity/nutrient source load concerns include both on base sources and upstream sources. The basin has been the subject of several comprehensive groundwater management and modeling studies.

Temecula/Murrieta Basin. The Temecula Murrieta Basin (alluvial aquifers and underlying Temecula Formation) extends through the Temecula and Murrieta Valleys and represents a key source of local supply for the Rancho California Water District (RCWD). RCWD has extensively studied the basin, and actively manages groundwater storage, recharge, and production in the basin in accordance with water quality needs, supply needs, and water rights requirements. Increased salinity concentrations occur in the downstream portion of the basin. Significant recycled water use occurs within the basin.

San Pasqual/Hodges Basin. The San Pasqual/Hodges Basin is owned by the City of San Diego, and is currently used as an agricultural preserve. Increased groundwater salinity concentrations occur in the downstream (Hodges) portion of the basin, but groundwater quality in the upstream portion of the basin is of better quality. The City of San Diego has developed several comprehensive studies assessing how the basin could be more efficiently utilized. The City's studies demonstrate that the San Pasqual/Hodges Basin offers significant potential for the development of municipal supply, management of groundwater quality, and the recharge/storage of recycled water or imported water supplies.

Santee/El Monte Basin. While several water agencies currently utilize the Santee/El Monte Basin as a source of supply, the potential exists for significantly expanded production within the basin. Increased groundwater salinity occurs in the downstream portion (Santee) but excellent quality groundwater exists in the upstream (El Monte) portion of the basin. The basin has been studied by several agencies. The City of San Diego is exploring the potential for expanded groundwater production in the basin. The Helix Water District and Padre Dam Municipal Water District are exploring the potential for developing a recycled water groundwater recharge project in the eastern end of the basin.

Tier B Basins. A number of the moderately-sized alluvial groundwater basins within the San Diego Region may be classified as Tier B basins. Common features found within the Tier B basins include:

- the basins are within the MWDSC service area, and urban or agricultural land use is dominant,
- Basin Plan groundwater quality TDS objectives that range from 500 to 1000 mg/l,
- municipal supply development within the basins is typically several thousand acre-feet per year or less,
- existing groundwater quality within significant portions of the basin is adequate for irrigation or municipal use without the need for demineralization treatment,
- existing recycled water use (or wastewater discharge) occurs within the basin,
- concerns may exist among recycled or wastewater water agencies regarding recycled water compliance with Basin Plan salinity/nutrient requirements,
- the potential exists for expanded recycled water use, and
- the potential exists for expanded municipal supply development, recharge, or storage with implementation of appropriate groundwater management strategies.

Tier C Basins. Tier C basins are smaller in volume and provide smaller yields. Groundwater production in the Tier C basins tends to be small compared to overall water use. In part because of the smaller yields, the Tier C basins have been less well studied and hydrogeologic characteristics are less well defined than the Tier B basins. Common features found within the Tier C basins include:

- the basins are within the MWDSC service area, and urban or agricultural land use is dominant,
- groundwater use in the basin is limited to private use; no public water agency groundwater supply development occurs,
- Basin Plan groundwater quality TDS objectives range from 500 to 1100 mg/l,
- the potential exists for expanded recycled water use, and
- concerns may exist among recycled or wastewater water agencies regarding recycled water compliance with Basin Plan salinity/nutrient requirements.

Tier D Basins. Tier D basins include coastal (or near-coastal) basins in the MWDSC service area with higher salinity concentrations and Basin Plan TDS objectives that exceed 1200 mg/l. Tier D-1 basins include large or moderate-sized basins with higher

salinity concentrations that feature existing or planned groundwater demineralization projects. Tier D-2 basins include small to moderate-sized groundwater basins with higher salinity concentrations which are not currently used for purposes of developing public water supplies. Common features found within the Tier D basins include:

- the basins are within the MWDSC service area, and urban or agricultural land use is dominant,
- significantly higher salinity concentrations, particularly in the downstream portion of the basin,
- existing groundwater quality within significant portions of the basin requires demineralization treatment for use as an irrigation or municipal supply,
- Basin Plan groundwater objectives for TDS exceed 1200 mg/l and recycled water compliance with Basin Plan TDS objectives is not a concern,
- the potential exists for expanded recycled water use, and
- the potential exists for expanded municipal supply development, recharge, or storage with implementation of appropriate groundwater treatment and management.

Tier E Basins. The Tier E basins include large to moderate sized groundwater basins outside the MWDSC service area. Salinity loads within these rural basins are predominantly from natural sources, groundwater-based agriculture, or septic tanks. Recycled water use in the basins is limited to Native American tribes or privately operated facilities (e.g. campgrounds, trailer parks, vacation areas).

Potential Stakeholder Agencies. Most of the San Diego Region groundwater basins involve multiple water and wastewater jurisdictions.

Tier A and B Basins. Both water and wastewater agencies may have interest in influencing groundwater salinity/nutrient management within the Tier A and Tier B basins. Table 3-4 (page 3-16) summarizes water and wastewater agencies that provide service within the Tier A and B basins.

Tier C Basins. Table 3-5 (page 3-17) summarizes water and wastewater agencies within the Tier C and Tier D basins. Within the Tier C basins, the potential for recycled water use is significantly greater than the potential for groundwater supply development. As a result, recycled water agencies may have a greater interest in salinity/nutrient management planning in the Tier C basins than water agencies.

Table 3-4
Municipal Water and Wastewater Agencies within Tier A and B Basins

Group	Groundwater Basin	Municipal Water Agencies	Municipal Wastewater Agencies
Tier A	San Juan Creek	• San Juan Basin Authority[1,2] • San Juan Capistrano[1,2] • Santa Margarita Water District[1] • Moulton Niguel Water District[1] • South Coast Water District[1]	• South Orange County Reclamation Auth.[5] • Santa Margarita Water District[4,5] • Moulton Niguel Water District[4,5] • South Coast Water District[4,5]
	Lower Santa Margarita	• Camp Pendleton[1,2] • Fallbrook Public Utility District[3]	• Camp Pendleton[4,5]
	Temecula/Murrieta	• Rancho California Water District[1,2] • Western MWD[1]	• Rancho California Water District[4,5] • Eastern MWD[4,5] • Western MWD[4]
	Hodges/San Pasqual	• City of San Diego[1]	• City of San Diego[4] • City of Escondido[6]
	Santee/El Monte	• City of San Diego[1] • Padre Dam MWD[1] • Helix Water District[1,2] • Lakeside Water District[1,2]	• Padre Dam MWD[4,5] • Alpine/Lakeside Sanitation District[4]
Tier B	San Mateo Creek	• Camp Pendleton[1,2] • Santa Margarita Water District[1] • City of San Clemente[1]	• Camp Pendleton[4,5] • Santa Margarita Water District[4,5] • City of San Clemente[4,5]
	San Onofre	• Camp Pendleton[1,2]	• Camp Pendleton[4,5]
	Las Flores	• Camp Pendleton[1,2]	• Camp Pendleton[4,5]
	Pauma/Pala	• Yuima MWD[1,2]	• Pauma Valley CSD[4,5]
	San Marcos	• Vista Irrigation District[1] • Rincon Del Diablo Water District[1] • Vallecitos Water District[1] • City of Escondido[1]	• Vallecitos Water District[4] • Rincon Del Diablo Water District[4,5] • City of Escondido[4,5]
	Escondido	• City of Escondido[1] • Rincon Del Diablo Water District[1]	• City of Escondido[4,5] • Rincon Del Diablo Water District[5]
	Santa Maria	• Ramona MWD[1,2]	• Ramona MWD[4,5]
	Poway	• City of Poway[1]	• City of Poway[4] • City of San Diego[4,5]
	Middle Sweetwater	• Sweetwater Authority[1] • Otay Water District[1]	• Otay Water District[4]

1 Agency distributes treated municipal supply within the basin.
2 Agency produces municipal groundwater supplies from the basin.
3 Fallbrook PUD maintains water rights in Santa Margarita basin and has interest in developing water supply.
4 Agency collects wastewater within the basin.
5 Agency regulated by Regional Board to discharge wastewater or recycled water within the basin.
6 Agency provides water and wastewater service within the tributary watershed in areas immediately adjacent to the groundwater aquifer.

Table 3-5
Municipal Water and Wastewater Agencies within Tier C and D Basins

Group	Groundwater Basin	Municipal Water Agencies	Municipal Wastewater Agencies
Tier C	Valley Center	• Valley Center MWD[1]	• Valley Center MWD[5,6]
	Keys Creek	• Valley Center MWD[1]	• Valley Center MWD[6]
	Vista	• Vista Irrigation District[1] • Vallecitos Water District[1]	• City of Vista[5] • Encina Joint Powers Authority[5] • Vallecitos Water District[5,6]
	Miramar	• City of San Diego[1]	• City of San Diego[5,6]
	San Vicente/Gower	• Ramona Municipal Water District[1] • City of San Diego[2]	• Ramona Municipal Water District[5,6]
	National City	• City of San Diego[1] • City of National City[1,3] • Sweetwater Authority	• City of San Diego[5] • City of National City[5]
Tier D-1	Oceanside Mission	• City of Oceanside[1,4]	• City of Oceanside[5,6]
	Mission Valley	• City of San Diego[1]	• City of San Diego[5]
	Lower Sweetwater	• Sweetwater Authority[1,4]	• City of National City[5] • City of Chula Vista[5]
Tier D-2	Bonsall/Moosa	• Rainbow MWD[1]	• Rainbow MWD[5] • Valley Center MWD[5,7]
	Batiquitos, Buena Vista, Agua Hedionda, Encina	• Carlsbad Municipal Water District[1]	• City of Carlsbad[5] • Carlsbad Municipal Water District[6] • Leucadia Wastewater District[5,6]
	San Elijo	• Olivenhain MWD[1] • San Dieguito Water District[1]	• Olivenhain MWD[5,6] • San Elijo JPA[5,6]
	Lower San Dieguito	• Olivenhain MWD[1] • Santa Fe Irrigation District[1]	• Olivenhain MWD[5,6] • Rancho Santa Fe CSD[7] • Fairbanks Ranch CSD[5,6]
	El Cajon	• Helix Water District[1] • Otay Water District[1]	• City of El Cajon[5]
	Otay	• City of San Diego[1] • Otay Water District[1]	• City of San Diego[5,6] • Otay Water District[5,6]
	Lower Tijuana	• City of San Diego[1]	• City of San Diego[5,6]

1 Agency distributes treated municipal supply within the basin.
2 The City of San Diego operates the downstream San Vicente Reservoir, and periodically conveys Sutherland Reservoir water (from the San Dieguito River watershed) to San Vicente Reservoir via San Vicente Creek.
3 The City of National City is a member of Sweetwater Authority
4 Agency produces municipal groundwater supplies from the basin through groundwater demineralization.
5 Agency collects wastewater within the basin.
6 Agency distributes recycled water within the basin.
7 Agency recharges treated wastewater to groundwater via percolation ponds.

Tier D Basins. Recycled water compliance with existing Basin Plan salinity objectives is not a concern within the Tier D basins. As a result, salinity management plans are not required within the Tier D basins. Existing Basin Plan salinity objectives are deemed to be adequate in the Tier D basins for purposes of (1) protecting existing groundwater quality and (2) encouraging recycled water use. While salinity management plans are not required for purposes of supporting or expanding recycled water use, it is possible that water agencies in Tier D-1 basins may have an interest in addressing salinity/nutrient management issues:

- to protect against further water quality degradation (including seawater intrusion) that may affect existing or proposed groundwater demineralization projects, or
- as part of assessing or developing groundwater quality improvement projects (such as recharge/recovery projects).

As water agencies move forward in the future to assess additional brackish groundwater demineralization opportunities in the San Diego Region, several of the Tier D-2 basins (e.g. Lower San Dieguito and Lower Tijuana) may warrant re-designation as Tier D-1 basins.

Tier E Basins. Tier E basins are located outside the MWDSC service area. Salinity/nutrient loads within the Tier E basins are limited to storm runoff, agricultural runoff, septic tank discharges, discharges from small community wastewater systems, and natural geologic sources. As a result of these factors, the development of salinity/nutrient management plans is unlikely to lead to increased recycled water supply development in the Tier E basins. Consequently, it is not anticipated that salinity/nutrient management plans will be required within the Tier E basins. Additionally, with the possible exception of the Warner Basin (a local source of supply for the Vista Irrigation District), the development of salinity/nutrient management plans in the Tier E basins may be beyond the resource capabilities of agencies or stakeholders.

Other Unnamed Basins. In addition to the groundwater basins identified in Tables 3-4 and 3-5, numerous additional smaller groundwater basins exist within the San Diego Region.

Section 4
PROPOSED APPROACH AND PRIORITIES

SUMMARY: Basin-specific salinity/nutrient management plans may not be appropriate for all areas of the San Diego Region. A significant degree of prior Basin Plan work has already been completed within the San Diego Region that is consistent with the salinity/nutrient management plan requirements of the Recycled Water Policy. Additionally, it may not be technically feasible to developed salinity/nutrient management plans within ill-defined aquifers within the Region. Local agencies and stakeholders will determine which aquifers or basins warrant the development of basin-specific salinity/nutrient management plans. On the basis of need and value to stakeholders, the five tiers of San Diego Region aquifers are prioritized for implementation of basin-specific salinity/nutrient management plans.

Prior Salinity Management Planning within the Region. As described in Section 1, the intent of the Recycled Water Policy is to encourage recycled water use and to ensure consistent regulation of recycled water projects. The Policy also recognizes the importance of managing all salinity/nutrient sources within a basin, not just salinity/nutrient sources associated with recycled water use.

Unlike in many areas of the State where recycled water use is a relatively new concept, the San Diego Regional Board has more than 40 years experience in regulating recycled water treatment and use. During this time, the regulation of recycled water within the San Diego Region has significantly evolved. In the 1980s and 1990s, for example, the Regional Board implemented numerous modifications to numerical Basin Plan groundwater quality objectives in coastal and urbanized areas of the Region. Basin Plan modifications were implemented within each of the Region's ten hydrologic units for which Basin Plan numerical groundwater quality objectives had been established. These Basin Plan modifications included were implemented to promote recycled water use while reflecting existing groundwater source loads and water quality.

In addition to the Region-wide Basin Plan modification efforts led by the Regional Board (which resulted in modification of Basin Plan objectives along the coastal strip), numerous agencies coordinated with the Regional Board to achieve basin-specific modification of Basin Plan groundwater quality objectives, including:

- southern Orange County agencies which now comprise SOCWA (San Juan Hydrologic Unit),
- the Rancho California Water District and Eastern MWD (upper Santa Margarita River basin),
- Valley Center MWD (San Luis Rey Hydrologic Unit),
- member agencies of the Encina Wastewater Authority (Carlsbad HU),
- the City of Escondido (Carlsbad HU and San Dieguito HU),
- San Elijo JPA member agencies (San Dieguito HU),
- Padre Dam MWD (San Diego HU),
- Otay Water District (Sweetwater and Otay HUs),

Additionally, in the early 1990s, the Regional Board implemented significant changes to Basin Plan implementation policies that govern how recycled water projects are regulated. With these modifications, the Regional Board significantly increased its flexibility to promote recycled water use and improve consistency in regulating regional recycled water use.

The Basin Plan modifications implemented in the 1980s and 1990s followed the general salinity/nutrient management plan principles and procedures that are now required as part of the part of the State's Recycled Water Policy, including:

- characterization of basin water quality, including supplemental monitoring (if required),
- assessment of beneficial uses,
- identification and quantification of salinity/nutrient sources,
- identification of salinity/nutrient management strategies,
- technical and economic/social evaluation of salinity/nutrient management strategies (including Basin Plan modification strategies),
- stakeholder participation,
- applicable approvals through the California Environmental Quality Act (CEQA), or CEQA-equivalent approvals, and
- Regional Board consideration and approval of the Basin Plan modification.

In addition to the efforts which led to modification of the Basin Plan, several additional comprehensive studies during the 1990s employed these general salinity/nutrient management plan principles in assessing the appropriateness of Basin Plan groundwater quality objectives. Comprehensive salinity management assessment efforts which concluded that existing Basin Plan objectives were consistent with water quality, recycled water use promotion, and salinity sources/loads included:

- an evaluation of the upper Santa Margarita Basin watersheds (completed by the Rancho California Water District),
- a comprehensive water quality and modeling assessment of the San Juan watershed (completed by the South Orange County Wastewater Authority), and
- an evaluation of watersheds within the San Pasqual, Peñasquitos, San Diego, Otay, and Tijuana Hydrologic Units (completed by the Clean Water Program for Greater San Diego).

San Diego Region Salinity/Nutrient Management Needs. In accordance with the above, a strong argument exists that a significant portion of the Region's recycled water service area has already been addressed by prior salinity/nutrient management planning efforts that were prepared in a manner consistent with the Recycled Water Policy. Agency interest for preparing salinity/nutrient management plans in such watersheds may be limited (or nonexistent), as salinity management and recycled water compliance needs have already been addressed.

Additionally, as discussed in Section 3, not all areas of the San Diego Region may be appropriate for the development of basin-specific salinity/nutrient management plans. Areas of the Region for which basin-specific salinity/nutrient management plans may not be appropriate may include:

- areas outside the service areas of the Region's recycled water agencies (no benefits to recycled water use would occur in these areas and salinity/nutrient loads are largely limited to rural and natural sources),
- aquifers which are insufficiently defined to allow for salinity/nutrient source identification, assessment, or pollutant transport (e.g. fractured rock aquifers or the San Diego Formation), and
- miscellaneous small aquifers which have groundwater yields and recharge areas that are too limited to warrant the expense and effort of completing a separate salinity/nutrient management plan.

Local agencies and stakeholders have expressed little or no interest in performing basin-specific salinity/nutrient management plans in such areas of the San Diego Region. (Salinity/nutrient plans for such basins would entail significant expenses yet yield little or no value to the agencies and stakeholders). To most efficiently use public resources, it is proposed that local agencies and stakeholders determine where basin-specific salinity/nutrient management plans are warranted and are of value.

Within areas of the San Diego Region where agencies/stakeholders see no value in preparing basin-specific salinity/nutrient management plans, the Regional Board may wish to consider one or more of the following alternatives:

1) Coordinating with the State Board to clear up uncertainties regarding where basin-specific salinity/nutrient management plans are required.
2) Coordinating with the State Board to, if appropriate, redefine Recycled Water Policy needs and requirements to eliminate the need for basin-specific salinity/nutrient plans in:
    - areas with ill-defined aquifers where salinity/nutrient sources cannot reliably quantified and pollutant transport assessed,
    - areas outside of existing or potential recycled water service spheres,
    - areas for which prior Basin Plan modification studies have been completed, or
    - areas for which existing Basin Plan groundwater quality objectives are deemed to be consistent with protecting existing water quality, protecting beneficial uses, and meeting the intent of the Recycled Water Policy goals.
3) Preparing a general region-wide salinity/nutrient management assessment (consistent with the Recycled Water Policy) that covers all areas of the San Diego Region not addressed in basin-specific salinity/nutrient management plans and addresses region-wide salinity sources and management alternatives (including development and implementation of best management practices for salinity management).

Proposed Aquifer Prioritization. In determining which basins warrant basin-specific salinity/nutrient management plans, local recycled water and wastewater agencies will assess the benefits that such plans may provide. As noted in Section 1, recycled water agencies may benefit from implementing salinity/nutrient plans through (1) enhancing the potential for recycled water compliance and (2) enhancing the potential for expanded recycled water use. Salinity/nutrient management plans may benefit water

agencies through (1) protecting and enhancing groundwater quality, and (2) enhancing the potential for increased local yield.

Figure 4-1 summarizes recycled water compliance and groundwater supply/quality benefits associated with salinity/nutrient management planning within the Tier A, B, C, D, and E basins identified in Section 3. As shown in Figure 4-1, salinity management plans can achieve significant recycled water and groundwater quality protection benefits within the Tier A, B, and C basins.

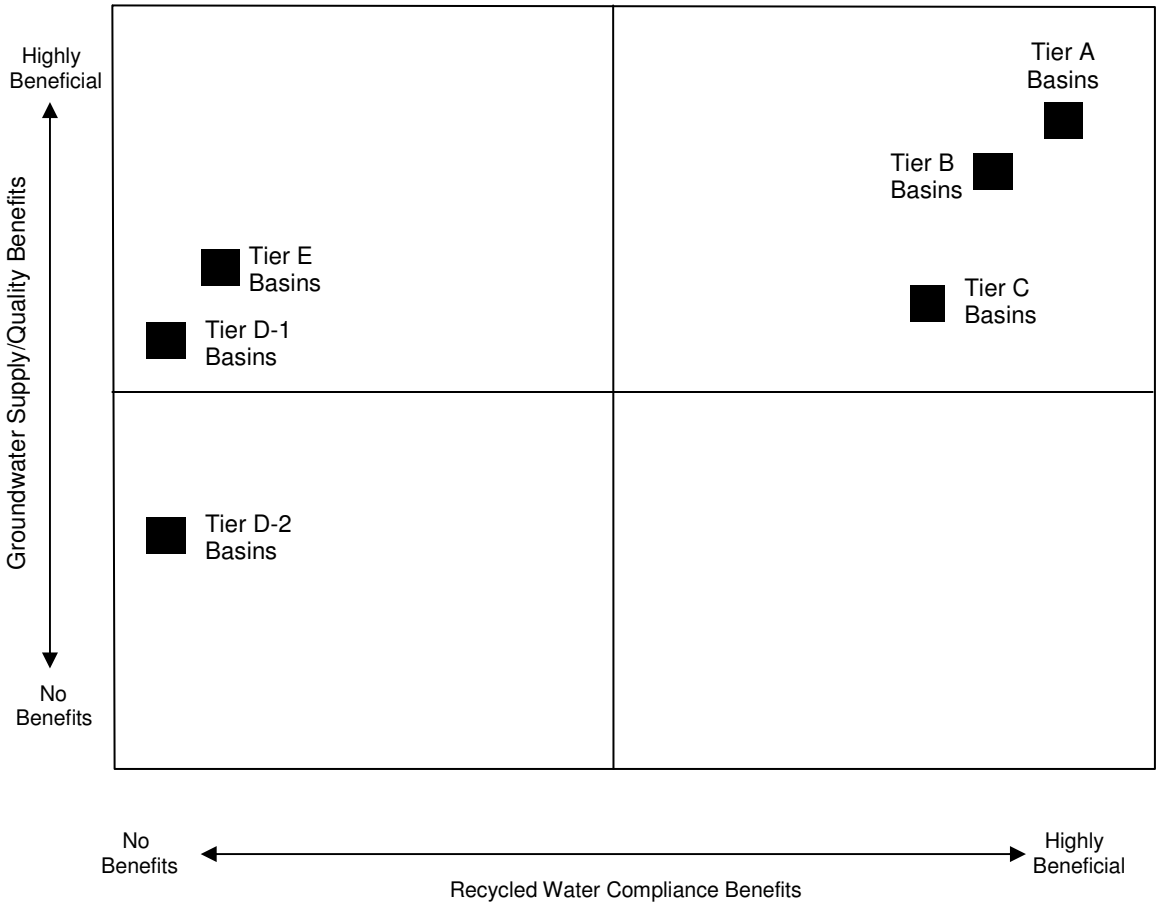

Figure 4-1 Salinity/Nutrient Planning Benefits and Prioritization

In addition to the strength of benefits shown in Figure 4-1, the criteria (see Table 3-3 on page 3-12) used to classify the San Diego Region groundwater basins groups may also be used for purposes of prioritizing the importance of salinity/nutrient plan development. Table 4-1 (page 4-6) summarizes salinity/nutrient management plan development priorities for San Diego Region groundwater basins.

Table 4-1
Proposed Prioritization Groups
San Diego Region Alluvial Basins

Group	Priority	Priority Rationale
Tier A	High	• Large groundwater basins • Significant existing groundwater production • Potential exists for expanded recycled water use, and concerns exist for recycled water compliance with existing Basin Plan objectives • Higher Salinity groundwater concentrations in portions of basins • Agency interest exists in expanding municipal supply production • Significant prior study in basins offer starting point for salinity/nutrient management plans
Tier B	Medium	• Moderate to large groundwater basins • Moderate to low degree of existing groundwater production • Potential exists for expanded recycled water use, and concerns exist for recycled water compliance with existing Basin Plan objectives • Higher salinity groundwater concentrations occur in portions of the basins • Agency interest may exist in expanding municipal supply production
Tier C	Medium	• Small groundwater basins with low overall annual groundwater use • No public water supply development; groundwater use limited to private pumpers • Higher salinity groundwater concentrations occur in portions of the basin • Potential exists for expanded recycled water use, and concerns exist for recycled water compliance with existing Basin Plan objectives
Tier D-1	Low (Plan Not Required)	• Higher salinity groundwater concentrations are already reflected in existing Basin Plan water quality objectives • No problems exist with recycled water compliance with existing Basin Plan salinity objectives • Modification of Basin Plan objectives not required to support future recycled water use or to protect groundwater supplies • Tier D-1 water agencies may be interested in protecting against further degradation or assessing groundwater quality improvement projects
Tier D-2	None (Plan Not Required)	• Higher salinity groundwater concentrations are already reflected in existing Basin Plan water quality objectives • No problems exist with recycled water compliance with existing Basin Plan salinity objectives • Modification of Basin Plan objectives not required to support future recycled water use or to protect groundwater supplies • No public water supplies are currently developed in the basin
Tier E	None (Plan Not Required)	• Land use limited to rural, open space, government land, or tribal lands • No municipal agency recycled water use occurs in the basin • MWDSC imported water is not served within the basin • Groundwater quality remains good to excellent • Salinity source loads limited to natural sources, groundwater-based agriculture, septic tanks, or small private (or tribal) wastewater systems

Because of their size and potential for expanded recycled water use and groundwater supply production, Tier A basins represent the highest priority. Tier B and C basins represent a medium priority. For Tier A, B, and C basins, agencies/stakeholders will develop time schedules for preparing salinity/nutrient management plans that are consistent with the needs, interests, and project schedules of the stakeholders.

Higher salinity groundwater concentrations in the Tier D basins are already reflected in existing Basin Plan objectives, and future Basin Plan modifications are not required for supporting expanded recycled water use or groundwater production in the Tier D basins. As a result, developing salinity/nutrient management plans in the Tier D basins is not necessary to support existing or expanded recycled water use.

While salinity/nutrient management plans are not required within the Tier D basins, it is recognized that water agencies may have interests (not related to recycled water) in developing salinity/nutrient plans within Tier D-1 basins. Because salinity/nutrient plans in the Tier D-1 basins would not be required for supporting recycled water use, however, a low priority is assigned to the Tier D-1 basins.

Because of a lack of recycled water use, imported water use, a lesser degree of salinity/nutrient loading, Tier E basins do not represent a priority and no salinity/nutrient management plans are required. With the possible exception of the Warner Basin, Tier E basins are unlikely to warrant agency interest for developing salinity/nutrient management plans.

Implementation Approach. It is anticipated that Regional Board staff will be involved within the agency/stakeholder process to develop basin-specific salinity/nutrient management plans in the San Diego Region. This involvement and coordination will include:

- review of the salinity/nutrient management plan guidelines,
- participation in stakeholder processes for basin-specific salinity/nutrient management plans,
- review of tasks and milestones associated with basin-specific salinity/nutrient management plans,
- providing input on proposed Basin Plan modification alternatives associated with basin-specific salinity/nutrient management plans,

- participation in the CEQA review process, and
- taking action (see text on page 4-4) to ensure that existing Basin Plan objectives are deemed to remain appropriate in areas where local agencies and stakeholders do not prepare basin-specific salinity/nutrient management plans.

Basin-specific salinity/nutrient management plans may result in proposals for basin-specific modifications of Basin Plan groundwater quality objectives. Compliance with the State's Non-Degradation Policy must be assessed as part of any such Basin Plan modification proposals.

If compliance with the Non-Degradation Policy can be demonstrated, it is envisioned that the stakeholder-driven salinity/nutrient management planning process will result in Regional Board staff support for Basin Plan modification proposals that are being considered for formal approval by the Regional Board. It should be noted, however, that the Regional Board's most recently rejected a proposal to relax Basin Plan water quality objectives that would have increased groundwater quality concentration objectives to levels above the existing groundwater quality.

Section 5
MANAGEMENT PLAN TASKS AND GUIDELINES

SUMMARY: This section presents recommended tasks for developing San Diego Region salinity/nutrient management plans. Suggested work approaches and tasks are presented for developing salinity/nutrient management plans within Tier A, Tier B, and Tier C basins. Salinity management plans are not required within Tier D and Tier E basins, as existing Basin Plan groundwater quality objectives are consistent with (1) protecting existing groundwater quality, and (2) encouraging recycled water use.

Overview. A five step salinity/nutrient management approach is recommended for San Diego Region groundwater basins:

Step 1 - Initial Basin Characterization
Step 2 - Identify and Quantify Salinity/Nutrient Sources
Step 3 - Supplemental Monitoring
Step 4 - Salinity Nutrient Management Strategies
Step 5 - Assessment of Plan Effectiveness

As described in Sections 3 and 4, a tiered approach is appropriate for developing salinity/nutrient management planning guidelines for the San Diego Region. Under this approach, guidelines can be tailored to the characteristics and complexities of each of the aquifer groups. In presenting the guidelines, it is recognized that many of the required salinity/nutrient management tasks are applicable to all aquifers, regardless of complexity. As a result, a number of the basic salinity/nutrient management tasks will be similar for all aquifer groups. Differences in work efforts, however, are warranted with respect to basin characterization, source quantification, pollutant transport and modeling, monitoring needs, and management strategies.

For purposes of encouraging recycled water use in the San Diego Region, three sets of salinity/nutrient management planning guidelines are presented, including guidelines for:

- Tier A basins (high priority basins),
- Tier B basins (moderate priority basins), and
- Tier C basins (moderate priority basins).

While salinity/nutrient management plans are not required for the Tier D and E basins, agencies or stakeholders interested in developing salinity/nutrient management plans in these basins can make use of the guidelines for the Tier B or C basins. Agencies or stakeholders with interest in developing a salinity/nutrient management plan for a Tier D basin can use the Tier B guidelines. Agencies or stakeholders interested in developing a salinity nutrient management plan for a Tier E basin may use the Tier C guidelines.

Table 5-1 (pages 5-3 and 5-4) outlines the proposed approaches for the Tier A, B, and C aquifers. Rationale for these approaches is summarized below:

Tier A: The Tier A basins are the largest in the San Diego Region, involve the greatest potential for recharge/recovery, involve highly variable groundwater quality from upstream to downstream, and may involve complex hydrogeology. The Tier A basins have been extensively studied, and hydrogeologic characteristics within the basins are well documented. Computer groundwater transport/flow models have been used to assess each Tier A basin, and each Tier A basin has been previously evaluated for a variety of potential salinity management strategies. Because of this prior work, little or no additional monitoring is anticipated in order to characterize basin hydrogeology, groundwater quality, or basin hydrodynamics. After an assessment of the validity of prior models, updated modeling (using existing models or revised models) will likely be required to assess new or revised salinity/nutrient management strategies. While principal stakeholders within the Tier A basins have been documented, additional outreach will likely be required to ensure that applicable stakeholders and key stakeholder issues are identified. Salinity/nutrient plans within the Tier A basins can rely heavily on this prior work. The size, degree of beneficial use, and water quality conditions of the Tier A basins, however, warrant a higher level of technical analysis than the other designated tiers.

Table 5-1
Summary of General Approach
San Diego Region Salinity/Nutrient Management Planning

Task	Suggested Tiered Approach		
	Tier A Basins	Tier B Basins	Tier C Basins
1. Initial basin characterization	• Identify potential stakeholders and key stakeholder issues • Review the constituents of concern identified in prior studies and update the list • Rely on existing aquifer-specific studies to characterize groundwater quality, occurrence, and use • Rely on existing studies to estimate hydrogeologic parameters • Identify areas where additional data are required due to changed conditions or special needs	• Identify potential stakeholders and key stakeholder issues • Review any constituents of concern identified in prior studies and update the list • If no prior basin-specific studies are available, identify pollutants of concern on the basis of recycled water noncompliance or groundwater quality needs • If basin-specific studies are not available, prior regional studies can be used to characterize groundwater quality and basin hydrogeology • Assess whether existing groundwater quality data adequately characterizes the geographic and depth-dependent quality of groundwater	• Identify potential stakeholders and key stakeholder issues • Identify constituents of concern on the basis of recycled water noncompliance or groundwater quality needs • Basin-specific studies and data are unlikely to be available, but prior regional studies can be used to characterize groundwater quality and basin hydrogeology • Assess whether existing groundwater quality data adequately characterizes the geographic and depth-dependent quality of groundwater
2. Identify and quantify source loads	• Source loads for the Tier A basins have been evaluated as part of prior modeling studies • Assess prior studies and update source load estimates as necessary to reflect changed conditions • Review prior modeling input data, results, and model capabilities • Identify type of model required for assessing potential management strategies • Adapt input from prior modeling studies to the selected model • Use the model to assess source loads, pollutant transport, and impacts to groundwater quality • Rank the identified sources as to impact on groundwater quality	• Use prior studies for source load data, if available • If no prior source load information is available, reasonable estimates should be developed on the basis of water use practices, water and wastewater records, land use, aerial photos, and other available data • Determine if a flow/transport computer model or spreadsheet-based mass balance approach is appropriate to assess source loads and groundwater impacts • Use the model or a spreadsheet mass balance approach to assess probable source load effects on groundwater quality • Rank the identified sources as to impact on groundwater quality	• It is likely that only limited basin-specific source load information is available • As a result, source load information should be developed using reasonable estimates based on water use practices, water and wastewater records, land use, aerial photos, and other available data • Determine if a flow/transport computer model or spreadsheet-based mass balance approach is appropriate to assess source load and groundwater impacts • Rank the identified sources as to impact on groundwater quality
3. Supplemental monitoring	• Prior studies should be reviewed and any changed conditions should be identified • Supplemental monitoring may not be required due to significant amount of existing data for the Tier A basins	• Supplemental monitoring may be required to better assess basin hydrogeology or to provide a complete geographic and depth-dependent characterization of groundwater quality	• Supplemental monitoring may be required to ensure complete geographic coverage of the basin or to assess depth-dependent quality

Table 5-1
Summary of General Approach
San Diego Region Salinity/Nutrient Management Planning

Task	Suggested Tiered Approach		
	Tier A Basins	Tier B Basins	Tier C Basins
4. Management strategies	• Potential management strategies and key stakeholders have been identified in prior studies • Management strategies addressed in prior studies in each of the Tier A basins have included groundwater recharge and recovery facilities and a coordinated groundwater management program • Prior studies of the Tier A basins indicate that the basins may be suited to different strategies in the upstream and downstream portions of the basin • Computer modeling may be used to assess water quality effects of alternative groundwater management strategies • Computer modeling may be used to assess depth-to-water impacts on groundwater-dependent habitat • A comprehensive stakeholder process may be required, including web-based outreach • A decision model approach may be required to balance conflicts between groundwater uses and recycled water uses	• Prior studies may or may not have identified basin-specific strategies • Potential strategies should be reviewed to develop alternatives, focusing on alternatives that address the key source loads identified in Task 2 • The Tier A basins may be suited to different strategies in the upstream and downstream portions of the basin • Special management considerations may be required in Tier B basins upstream from potable supply reservoirs (e.g. Santa Maria, San Vicente/Gower, Middle Sweetwater) • Private groundwater pumpers in some Tier B basins may represent significant stakeholders • The stakeholder outreach approach and decision methodology should be tailored to the level of stakeholder interest	• Prior studies assessing management strategies have not been completed for most Tier C basins • A wide variety of potential management strategies may be applicable • Potential strategies should be reviewed to develop alternatives, focusing on alternatives that address the key source loads identified in Task 2 • Private groundwater pumpers in some Tier C basins may represent significant stakeholders • A spreadsheet-based mass balance approach (or a computer flow/transport model, if warranted) may be used to assess water quality effects of alternative management strategies • The stakeholder outreach approach and decision methodology should be tailored to the level of stakeholder interest
5. Assess plan effectiveness	• Identify metrics on the basis of proposed salinity/nutrient management strategies • Identify responsible parties • Identify monitoring program required to measure the metrics	• Identify metrics on the basis of proposed salinity/nutrient management strategies • Identify responsible parties • Identify monitoring program required to measure the metrics	• Identify metrics on the basis of proposed salinity/nutrient management strategies • Identify responsible parties • Identify monitoring program required to measure the metrics

Tier B: The moderate-sized Tier B basins are within urbanized or agricultural areas within the service area of the Metropolitan Water District of Southern California. A few of the Tier B basins (Escondido, Middle Sweetwater) have been studied extensively, but many of the Tier B basins have not been extensively evaluated with respect to hydrogeology, source loads, pollutant transport, and groundwater use. Nevertheless, it may be possible to adequately characterize the Tier B basins using information available regional groundwater assessments.

Tier C: Tasks and guidelines for Tier C basins will be similar to the Tier B basins, except the level of source load analysis would be less stringent, commensurate with the smaller basin size, lack of existing municipal production, and limited private pumping.

The following sections outline recommended tasks and suggested work efforts for developing salinity/nutrient management plans within the San Diego Region.

STEP 1 - INITIAL BASIN CHARACTERIZATION

Task 1.1: Identify the Basin and Delineate the Study Area. The objective of Task 1.1 is to identify the groundwater basin to be assessed and define the exact areal extent study area to be evaluated. The implementing agency or agencies should select a study area that is appropriate for achieving their desired salinity/nutrient management goals. Recommended subtasks to define the study area include:

A. Identify the groundwater aquifer to be evaluated.

B. Identify the areal extent of the groundwater aquifer.

C. Identify the upstream tributary area that may contribute source loads to the aquifer.

D. Determine the study area for salinity/management planning. The study area should include the extent of the aquifer itself, but may include tributary lands that are suspected or known to influence groundwater quality within the aquifer. include:

- the areal extent of the selected aquifer or basin,
- the watershed area tributary to the aquifer,
- known or suspected source loads or impacts from the upstream watershed areas,
- the location of existing or proposed facilities or projects,
- recycled water use areas, and/or
- jurisdictional boundaries.

At the discretion of the implementing agency or agencies, the defined salinity/nutrient management area to be assessed can include:

- the area overlying a specific groundwater aquifer,
- a portion of the upstream watershed deemed most important in influencing groundwater quality within the aquifer,
- a specific hydrologic area or subarea,
- multiple hydrologic areas or subareas, or
- a portion of a hydrologic area or subarea.

Agencies interested in focusing on groundwater supply development or groundwater quality protection should define the study area to encompass anticipated project sites or source control needs. Agencies interested in promoting recycled water use may choose to define the study area to encompass (1) recycled water use areas or (2) areas where recycled water compliance with Basin Plan salinity/nutrient groundwater quality objectives are problematic.

In developing salinity/nutrient management plans, it is recognized that agencies and stakeholders may wish to address study areas that focus only on a portion of one of the listed Tier A, B, C, or D basins. These guidelines support such an approach.

In this event, implementing agencies/stakeholders would utilize guidelines listed for the appropriate basin tier. (For example, agencies wishing to focus on a portion of a Tier A basin would utilize guidelines for Tier A basins.) In this event, agencies/stakeholders as part of Task 1.1 would identify and address a specific study area that comprises a specific portion of the basin. Such a subbasin approach is most appropriate in conditions in which:

- salinity/nutrient management planning targets the downstream portion of the basin, and existing Basin Plan water quality policies/objectives are preserved in the upper basin, or
- salinity/nutrient management planning targets the upstream portion of the basin, and the proposed salinity/nutrient management strategies do not materially impact downstream portions of the basin.

Suggested Approach. Appendices A, B, and C respectively present the suggested approach for identifying and delineating the study area. As shown in the appendices, no substantive differences exist among the Tier A, B and C basins in the suggested approach for completing Task 1.1. Due to increased aquifer complexity and potentially increased number of source loads, however, a GIS (Geographic Information System) approach would appear warranted for Tier A basins. For smaller basins with less

complex use, it may be appropriate (at the implementing agencies discretion) to use either a GIS-based mapping system or conventional mapping supported by spreadsheet databases.

Task 1.2: Identify, Collect and Review Existing Groundwater Studies. As a starting point to developing a salinity/nutrient plan, the objective of Task 1.2 is to identify and review prior studies or evaluations that have assessed issues relevant to salinity/nutrient planning within the selected study area groundwater basin or watershed.

A significant amount of information on groundwater quality, use, supply development, and salinity loads has been developed in prior studies conducted within the San Diego region. Region-wide studies include:

- State of California Department of Water Resources (DWR) Bulletin No. 106-2, *Groundwater Quality and Occurrence in San Diego* County (DWR, 1967),
- DWR Bulletin No. 118, *California's Groundwater* (DWR, 2009),
- San Diego County Water Authority *Groundwater Report* (Water Authority, 1997),
- Metropolitan Water District of Southern California Groundwater Assessment Study (MWDSC, 2007), and
- San Diego County Water Authority *Emergency Water Storage Groundwater Feasibility Study* (NBS/Lowry, 1995).

In addition to the region-wide studies, a number of basin-specific studies have been completed for specific watersheds within the San Diego Region. Many basin-specific studies are referenced within DWR Bulletin 118 and the Water Authority *Groundwater Report*. (Water Authority, 1997) Other studies may be found through contacts with water and recycled water agencies in the basin, the Water Authority, DWR, the San Diego County Groundwater Well Monitoring Program, or the U.S. Geological Survey, and may include:

- groundwater supply, storage, or conjunctive use studies,
- groundwater aquifer hydrogeologic investigations,
- groundwater quality studies or groundwater protection studies,
- recycled water compliance, assimilative capacity and Basin Plan studies,
- pollutant modeling and transport studies,
- watershed studies, and

- sanitary surveys or source assessment evaluations.

Recommended subtasks to collect and review existing groundwater studies include:

A. Collect and review available and applicable regional groundwater and salinity/nutrient management studies.

B. Contact water agencies, wastewater agencies, storm runoff co-permittees, and/or watershed management groups within the basin to groups to identify applicable local studies that have been conducted.

C. Develop a preliminary list of potential reference studies.

D. Collect and review available basin-specific reference studies.

E. Review the list of references in the collected studies to determine if additional pertinent studies are available.

F. Collect and review such additional studies.

Suggested Approach. Appendices A, B, and C respectively present the suggested approach for addressing Task 1.2 for the Tier A, B, and C basins. As shown in the appendices, no significant difference exists among the Tier A, B, and C basins in the nature of the tasks required to collect and review prior studies. Because Tier A basins have been more extensively studied, it is anticipated that a larger number of prior studies will have to be collected and reviewed for the larger Tier A basins.

Task 1.3: Stakeholder Identification and Outreach Approach. The objective of Task 1.3 is to identify stakeholders and develop and implement a process for engaging stakeholders in the salinity/nutrient management effort.

Stakeholder involvement is an essential component of the salinity/nutrient management plans required under the Recycled Water Policy. Recommended subtasks for identifying stakeholders and developing an outreach approach include:

A. Develop a preliminary list of stakeholders (including type of stakeholder, potential interest, contact person, and contact information).

B. Develop preliminary outreach information that describes the proposed salinity/nutrient management process and goals.

C. Distribute the information to potential stakeholders via mail or email to gauge stakeholder interest in participating in the salinity/nutrient management

process. Distributed information may include survey material to gauge stakeholder interests and potential involvement.

D. Develop a preliminary outreach plan that is tailored to obtain stakeholder feedback and suggestions on:

- initial planning direction,
- the potential salinity/nutrient management goals, and
- appropriate means for continuing to engage stakeholders, which may include scheduling workshops or meetings, distributing informational updates, conducting other stakeholder activities, or implementing web-based outreach.

E. Develop a plan for updating the stakeholder list, including adding new stakeholders as they become known or modifying contact information for interested stakeholders.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 1.3 for the Tier A, B, and C basins, respectively. As shown in the appendices, the same general stakeholder identification approach is applicable to all three basin groups. Because of the greater potential for conflict between recycled water use and groundwater quality protection within the Tier A basins, the stakeholder outreach process will need to involve a greater and more complex outreach effort.

Task 1.4: Document Beneficial Uses. The objective of Task 1.4 is to identify and quantify existing and potential uses of groundwater in the selected groundwater basin or watershed.

Beneficial uses designated in the Basin Plan may or may not actually occur within the selected groundwater basin. Suggested subtasks for identifying and quantifying beneficial uses include:

A. Identify beneficial uses of groundwater designated in the Basin Plan.

B. Identify and characterize existing and planned municipal supply wells or projects within the basin and quantify existing and planned pumping.

C. Identify and characterize private groundwater wells and users within the basin.

D. Quantify or estimate irrigation pumping from private wells.

E. Identify areas where groundwater dependent habitat (habitat that depends on the presence of a near-surface water table for survival) is known to exist and quantify the estimated amount of groundwater uptake by the habitat.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 1.4 for the Tier A, B, and C basins. Because of better water quality and larger yields, Tier A basins will require a significantly greater effort to identify groundwater users and uses. A GIS-based database will likely be required for the Tier A basins to characterize well locations, uses, owners, and pumping quantities. For Tier B and C basins, field reconnaissance or aerial photos can be used to supplement groundwater well surveys presented in prior studies.

Task 1.5: Characterize Groundwater Quality and Occurrence. The objective of Task 1.5 is to characterize existing and historic groundwater quality and the distribution of groundwater within the basin.

As part of this task, it will be necessary to collect available data to develop a geographic, depth-dependent, and temporal characterization of groundwater quality within the basin for the salinity/nutrient parameters of interest. It will also be necessary to assess compliance with Basin Plan groundwater quality objectives, and compare the existing groundwater quality with the quality required to support existing and potential beneficial uses. Further, it will be necessary to collect and organize available data that describes groundwater occurrence, movement, and transport. Suggested subtasks required to characterize the quality and occurrence of groundwater within the basin include:

A. Review prior reference studies (collected as part of Task 1.2C) and assess the reliability and specificity of the groundwater quality data, depth to water data, and estimates for hydrogeologic parameters.

B. Cull out data deemed to be unreliable, and collect data deemed to be reliable into a data base.

C. On the basis of available hydrogeological, water quality, or geologic studies, determine fault lines, bedrock constrictions, or vertical stratification that may affect transport and groundwater quality.

D. Identify known hydrogeologic parameters for the basin (e.g. hydraulic conductivity, storage coefficient, etc.) and the bases on which these parameters were estimated.

E. Assess the geographic completeness of existing groundwater quality data, depth-to-water data, and hydrogeologic parameters and determine if any data gaps exist that prevent geographic, seasonal, or depth-dependent characterization of groundwater quality, occurrence or transport.

F. Identify agencies or groups that are engaged in ongoing groundwater data collection.

G. Contact organizations engaged in groundwater monitoring to determine if the collected data can be made available for use in the salinity/nutrient management plan.

H. Assess reliability of updated groundwater data, screen out unreliable data, and update the basin groundwater database as required.

I. Assess the geographic distribution of water quality concentrations for the salinity/nutrient parameters of interest, and assess the depth-dependent distribution of water quality.

J. Identify additional data gaps that remain that prevent complete characterization of groundwater quality within the aquifer

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 1.5 for the Tier A, B, and C basins. The greater size and water quality variation associated with the Tier A basins may require a GIS-based database. It may be appropriate to use spreadsheet databases for less complex Tier B and Tier C basins.

Task 1.6: Identify Salinity/Nutrients Constituents of Interest. The objective of Task 1.6 is to identify salinity/nutrient parameters to be addressed within the salinity/nutrient management plan. Salinity/nutrient constituents of interest may include parameters that:

- do not or may not comply with currently assigned Basin Plan groundwater quality objectives,
- represent constituents of interest for groundwater supply developing agencies/users,
- cause or may cause water agencies to implement additional groundwater treatment,
- cause or may cause noncompliance with secondary drinking water standards, or
- cause or may cause recycled water agencies to not comply with assigned recycled water effluent limits.

Suggested subtasks required to characterize the quality and occurrence of groundwater within the basin include:

A. Develop preliminary list of salinity/nutrient parameters of concern on the basis of collected groundwater quality information, consultation with Regional Board staff, consultation with water agencies, recycled water agencies, and other stakeholders.

B. Revise the list of parameters of concern on the basis of received feedback.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 1.6 for the Tier A, B, and C basins. As shown in the appendices, no difference exists among the Tier A, B, and C basins for identifying salinity/nutrient parameters of concern.

STEP 2 - IDENTIFY AND QUANTIFY SALINITY/NUTRIENT SOURCES

Task 2.1: Identify Salinity/Nutrient Sources. The objective of this task is to identify salinity/nutrient loads to the groundwater basin for the constituents of concern identified in Task 1.6. Potential salinity/nutrient source loads to be assessed as part of the salinity/nutrient management plan include:

- applied imported agricultural and landscape irrigation water (includes water from all sources imported to the basin, including local water from other San Diego Region watersheds),
- applied recycled water irrigation water,
- artificial recharge using imported water supplies,
- artificial recharge using recycled water,
- artificial recharge of stormwater runoff,
- septic tank discharges,
- point-source wastewater discharges (municipal or industrial) to groundwater,
- applied fertilizer,
- streamflow infiltration,
- incidental percolation from streamflow runoff containment basins or other surface impoundments,
- precipitation recharge and natural geologic sources, and

- subsurface inflow, including upstream inflow and seawater intrusion.

The following subtasks are suggested for identifying potential sources of salinity/nutrient loads within the basin.

A. Identify general land uses within the basin.

B. Identify known point source discharges to the basin.

C. Identify known or suspected sources of salinity/nutrient loads within the basin (which includes the tributary watershed).

D. Identify the locations where the source loads are recharged to the basin. This may include:

   - specific point source loads (e.g. injection wells, small percolation basins, industrial or other point sources of discharge),
   - line source loads (streamflow infiltration, storm runoff infiltration),
   - boundary sources of source loads (e.g. subsurface inflow) or
   - areal sources of recharge (e.g. applied imported water, applied recycled water, fertilizer applications, large recharge or containment basins, precipitation recharge.

*Suggested Work Product***.** Appendices A, B, and C present the suggested approach for addressing Task 2.1 for the Tier A, B, and C basins. As shown in the appendices, no significant difference exists among the Tier A, B, and C basins for identifying salinity/nutrient sources.

Task 2.2. Quantify Salinity/Nutrient Source Loads. The objective of Task 2.2 is to quantify the salinity/nutrient loads to the groundwater basin for the constituents of concern. As part of Task 2.2, it will be necessary to develop mass emission estimates for each known or suspected source of salinity/nutrient loading to the basin. The following tasks are suggested for quantifying salinity/nutrient source loads:

A. Prepare an initial estimate of the quantity of recharge flow to the basin from surface and subsurface sources.

B. Prepare an initial estimate of the quantity of discharge/withdrawal from the basin.

C. Refine recharge and discharge/withdrawal estimates on the basis of a mass balance approach.

D. Using the refined recharge estimates, prepare initial source load (mass load) estimates for identified constituents of concern on the basis of available recharge estimates and water quality information.

Suggested Approach. Appendices A, B, and C present the suggested approach for quantifying salinity/nutrient source loads for the Tier A, B, and C basins. As shown in the appendices, no significant differences exist among the approaches recommended for the Tier A, B, and C basins. .

Task 2.3: Develop Salinity/Nutrient Source Loads Assessment Tools. The objective of Task 2.3 is to develop tools for use in evaluating the fate and transport of the identified salinity/nutrient loads. Assessment tools developed as part Task 2.3 will also be used (see Task 4) to evaluate performance of groundwater management strategies.

Prior studies of the Tier A basins have included assessments of groundwater recharge and withdrawal strategies. In order to assess such recharge and withdrawal strategies, past analysis of the Tier A Basins by stakeholder agencies has included groundwater flow and transport modeling. Such modeling allows for analysis of groundwater movement between site-specific recharge and recovery locations. The flow/transport modeling also allows for evaluation of pollutant transport and groundwater quality effects associated with site-specific recharge and recovery strategies. For basins in which recycled water is proposed as a source of recharge, the flow/transport modeling is also required to assess conformance with DPH groundwater recharge guidelines.

Computer flow/transport modeling may be warranted as part of salinity/nutrient management plans in basins where (1) site-specific recharge and/or recovery management strategies are proposed, (2) where recycled water is proposed as a source of groundwater recharge, or (3) where location-specific groundwater quality issues or Basin Plan compliance problems are known to exist. Flow/transport computer models thus appear to be warranted for salinity/nutrient management assessments within Tier A basins as:

- stakeholder agencies within the Tier A basins have expressed interested in location-specific groundwater recharge or recovery strategies,
- significant differences in groundwater quality are known to exist between the upstream and downstream portions of the Tier A basins,

- assessing location-specific pollutant transport will be essential in evaluating salinity/nutrient management strategies proposed within the Tier A basins, and
- prior modeling efforts within the Tier A basins have indicated the importance of evaluating groundwater travel and pollutant transport in assessing groundwater management strategies.

Depending on complexity and proposed management strategies, some Tier B and Tier C basins may also require computer modeling to assess groundwater flow and pollutant transport. For some Tier B and Tier C basins, however, spreadsheet-based mass balance computations should prove adequate for addressing source load impacts on groundwater quality and evaluating alternative groundwater management strategies. Using a mass balance approach similar to surface water Total Daily Mass Load (TMDL) analyses, spreadsheet-based mass load computations can be used to assess and compare how alternative management strategies may increase or decrease overall mass loads to a given basin, portion of a basin, or watershed. Where management strategies show a net reduction in mass loads, it may be presumed that long-term net improvements in groundwater quality will occur. Spreadsheet-based mass balance computations may be useful in certain Tier B or Tier C basins where:

- proposed management strategies are directed toward reducing long-term mass loads,
- analysis of long-term mass load or water quality trends is a desired goal,
- proposed management strategies do not involve actions that create significant short-term changes in recharge or water quality,
- proposed management strategies are not location-specific (e.g. best management strategies, mass load reduction, land use strategies, etc.),
- basin size and complexity, stakeholder involvement, or water quality concerns do not warrant the use of more costly computer flow/transport models, or
- geologic inconsistencies, uncertainty or reliability considerations, data acquisition costs, or other similar factors limit the effectiveness or viability of flow/transport models.

Where such conditions warrant, spreadsheet-based mass balance computations provide the advantage of being able to cost-effectively assess overall mass loads and groundwater quality trends, while eliminating the need for complex location-specific input data. Additionally, such mass balance computations can be performed without the need for costly field testing to determine or confirm location-specific and depth-

dependent hydrogeological parameters such as hydraulic conductivity and storage coefficient. .

The following tasks are suggested for developing salinity/nutrient source load assessment tools:

A. Determine pollutant transport assessment needs for the aquifer in question.

B. Identify the proposed mechanism (e.g. computer groundwater flow/transport model or spreadsheet-based mass balance computations) for assessing salinity/nutrient source load mass balance and transport.

C. Identify and assess required input data for the assessment tool.

D. If a computer flow/transport model is used, calibrate and verify the model.

E. Utilize the tool or model (spreadsheet mass balance computations or computer groundwater transport/flow model) to assess existing conditions (e.g. existing recharge/discharge mass balance, mass balance of source loads),

F. Utilize the tool or model to rank salinity/nutrient load sources in order of effect on groundwater quality.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 2.3 for the Tier A, B, and C basins. As noted, prior computer models have been developed and applied to each of the Tier A basins and several of the Tier B basins. For such basins that have previously been modeled, analysis will be required to determine if the prior models remain valid or if updated models will be required.

As noted above, within Tier B and C basins, at the discretion of implementing agencies, a spreadsheet mass balance approach may prove viable to (1) assess the relative contributions of the respective source loads, and (2) evaluate probable groundwater quality improvement or degradation trends associated with the loads.

TASK 3 - SUPPLEMENTAL MONITORING

Task 3.1: Develop Plan for Data Gaps. The objective of Task 3.1 is to identify additional data needs and develop a plan for collecting the required additional data. Subtasks for identifying and addressing data gaps include:

A. Identify data gaps and identify groundwater monitoring data needs necessary to complete the characterization of basin groundwater quality (per Task 1.5).

B. Identify salinity/nutrient source characterization data needs.

C. Identify data needs with respect to salinity/nutrient transport.

D. Identify parties responsible for collecting data.

E. Develop a proposed plan and schedule for collecting the required additional data.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 3.1 for the Tier A, B, and C basins. As noted, significant data gaps are unlikely within the extensively studied Tier A basins. Additional groundwater quality monitoring within the Tier B and Tier C basins may be warranted.

Task 3.2: Collect Data and Refine Basin Characterization. The objective of Task 3.2 is to implement the data collection plan developed in Task 3.1. Recommended subtasks required to implement the data plan include:

A. Collect the data identified in Task 3.1.

B. Incorporate the data into the database developed under Task 1.5.

C. Assess consistency of additional data with basin characterization developed as part of Task 1.5.

D. If necessary, refine basin characterization to incorporate the new data.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 3.2 for the Tier A, B, and C basins.

TASK 4 - ASSESS SALINITY/NUTRIENT MANAGEMENT STRATEGIES

Task 4.1. Identify Management Goals. The objective of Task 4.1 is to identify the principal goals to be achieved by the salinity/nutrient management process.

A stakeholder driven approach should be used to identify and rank overall management goals to be achieved within each basin. Desired goals may focus on source load reduction, treatment, providing other forms of water quality protection, or increased recycled water use. The selected goals should be specific to the needs and conditions of the basin, and will, in part, depend on:

- existing groundwater quality and occurrence,
- existing salinity/nutrient source loads and locations,
- water agency needs and proposed supply projects,
- recycled water agency needs and proposed projects,
- existing Basin Plan objectives and compliance issues,
- water conservation considerations,
- the potential within the basin to implement specific groundwater management strategies, and
- funding/implementation considerations.

The following subtasks are suggested for identifying management goals for the basin:

A. Identify the preferred goals of agencies/groups implementing the salinity/nutrient management plan.

B. Identify the appropriate process for receiving stakeholder input on the preferred goals.

C. Identify and resolve potential stakeholder conflicts, and finalize management goals.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 4.1 for the Tier A, B, and C basins. Because of the greater potential for conflict between recycled water use and groundwater quality protection within the Tier A basins, the stakeholder outreach process for Tier A basins may need to involve a greater and more complex outreach effort than less complex basins.

Task 4.2: Identify Available Management Strategies. The objective of Task 4.2 is to develop an initial list of salinity/nutrient management strategies that may be appropriate for achieving the management goals established in Task 4.1.

Table 5-2 (page 5-20) lists a wide range of example salinity/nutrient management strategies agencies and stakeholders can consider within their respective management plans. Suggested tasks for identifying available management strategies include:

A. Review potential salinity/nutrient management strategies and eliminate strategies that are not applicable to the basin.

B. Develop a preliminary list of alternative management strategies that may be feasible in the basin.

C. Solicit stakeholder comment on the list of preliminary list, and revise the list of alternative management strategies to be considered.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 4.2 for the Tier A, B, and C basins.

Task 4.3: Assess Load Reduction/Water Quality Improvement. The objective of Task 4.3 is to evaluate the ability of the available management strategies in achieving load reduction or groundwater quality improvement.

A. Using the groundwater model or spreadsheet-based tool from Task 2.3, assess the potential load reduction and water quality improvements effects associated with each alternative management strategy.

B. Rank strategies with respect to load reduction and groundwater quality improvement.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 4.3 for the Tier A, B, and C basins. As noted, source load reductions associated with management strategies in Tier A basins can be assessed using the computer model developed in Task 2.3 It may be appropriate to use a spreadsheet-based mass balance analysis to assess less complex Tier B and Tier C basins.

Table 5-2
Summary of Potential Salinity/Nutrient Management Strategies

Category	Potential Salinity/Nutrient Management Strategy
Wastewater salinity/nutrient source control	• Water softener control (ordinance and/or rebates) • Industrial discharge controls (local pretreatment limits) • Recycled water nutrient treatment • Recycled water demineralization treatment
Public Education	• Salinity source reduction best management practices • Water softener use • Irrigation best management practices • Fertilizer use best management practices
Source load reduction	• Agency lease-holder requirements • Fertilizer reduction requirements for recycled water users • Source load diversion
Source water salinity control	• Source water demineralization (brackish groundwater or seawater desalination) • Modify ratios of local or imported water sources

Salt export	• Ocean outfalls • Brine line • Salt flushing to the ocean via surface streams, rivers or lagoons, and/or subsurface flows • Concentrate management including disposal • Zero liquid discharge involving salt sequestration
Groundwater recharge	• Imported water recharge • Recycled water recharge • Stormwater recharge • Percolation basins • Injection wells • Aquifer Storage Recovery (ASR) wells
Groundwater Management	• Conjunctive use • Demineralization treatment • In lieu (exchange use of untreated groundwater for recycled water) • Decrease detention time • Seasonal storage • Carryover storage • Emergency storage
Seawater intrusion control	• Physical barriers • Injection wells • Modified pumping strategies
Institutional	• Groundwater management agency • Joint Powers Authority
Land Use Regulation	• Modify land use policy • Require sewer connections
Landscape Conservation	• Landscape ordinance • Water use restrictions • Water conservation rate structures • Public education/behavior change
Stormwater/Runoff Management	• Stormwater BMPs to reduce salinity/nutrient loading • Stormwater diversion to beneficial use • Low flow runoff diversion

Task 4.4: Evaluate Alternative Management Strategies. Objectives of Task 4.4 are to (1) evaluate and compare the alternative management strategies, and (2) select the preferred strategy (or strategies) for implementation. At the discretion of the agencies/groups implementing the salinity/nutrient management plans, alternative management strategies may be evaluated on the basis of:

- anticipated water quality improvements,
- local water supply development potential, including increasing the use of recycled waters or enhanced development of groundwater supplies,
- regulatory compliance,
- sustainability,

- costs,
- funding considerations,
- ability to implement, and
- environmental impacts.

Suggested tasks for evaluating alternative salinity/nutrient management strategies and selecting the preferred strategy or strategies include:

A. Select an appropriate process (e.g. survey, submittal of comments, workshop) for receiving stakeholder feedback on alternative salinity/nutrient management strategies.

B. Through the selected stakeholder process, select parameters to be used in evaluating alternative salinity/nutrient management strategies, and assign a level of importance to each evaluation parameter.

C. Select an applicable decision process (decision model, matrix, ranking process) for evaluating alternative management strategies with respect to the selected performance parameters.

D. Evaluate performance of the alternative management strategies on the basis of he selected evaluation parameters.

E. Rank alternatives consistent with the assigned importance of evaluation parameters and select the preferred salinity/nutrient management strategy or strategies.

F. Solicit stakeholder feedback (including feedback from regulators) on the preferred salinity/nutrient management strategy or strategies.

Suggested Approach. Appendices A, B, and C present the suggested approach for Tier A, B, and C basins for evaluating and selecting the preferred salinity/nutrient management strategy or strategies.

Task 4.5: Assess Basin Plan Modification Needs. The objective of this task is to address Basin Plan modification needs associated with the recommended salinity/nutrient management strategies.

In addition to strategies directed toward achieving reduction in salinity/nutrient loads or improving salinity/nutrient quality, Basin Plan modification strategies may also be considered, including modification of:

- designated beneficial uses,
- numerical groundwater concentration objectives, or
- implementation policies.

Basin Plan modification strategies may also be considered that involve assigning different beneficial uses and groundwater quality objectives for overlying shallow and underlying deeper groundwaters. Other Basin Plan modification strategies that can be assessed include modifying Basin Plan groundwater quality objectives in portions of hydrologic subareas.

Suggested tasks for assessing Basin Plan modification needs include:

A. Identify required Basin Plan modifications (modification of numerical objectives, implementation policies, or beneficial uses) associated with preferred salinity/nutrient management strategies selected under Task 4.4.

B. Coordinate with Regional Board staff to (1) reach agreement on the approach for Basin Plan modification and (2) identify information needs necessary for the proposed Basin Plan modifications.

C. Prepare the technical documentation required by the Regional Board to document the salinity/nutrient management planning actions that led to the recommendation for Basin Plan modification.

D. Submit the documentation to the Regional Board for review.

E. Coordinate with the Regional Board and establish a plan for developing and submitting the supplemental documentation to the Regional Board, as required.

Suggested Approach. Appendices A, B, and C present the suggested approach for Tier A, B, and C basins for evaluating Basin Plan modification needs.

Task 4.6: Assess CEQA/NEPA Compliance. Objectives of Task 4.6 are to assess conformance with requirements of the California Environmental Quality Act (CEQA) and National Environmental Protection Act (NEPA). Suggested tasks for evaluating CEQA/NEPA compliance include:

A. Identify whether projects or actions proposed as part of the recommended salinity/nutrient management strategies are subject to review under CEQA or NEPA.

B. Identify the appropriate governing body for CEQA compliance and, if applicable, federal agency for NEPA compliance.

C. Develop the project description, conduct the CEQA/NEPA Initial Study, and identify the appropriate means of addressing CEQA/NEPA documents,

D. Prepare draft CEQA/NEPA documents.

E. Conduct peer and public review of the CEQA/NEPA documents.

F. Final governing body action on CEQA/NEPA documents.

TASK 5 - ASSESS PLAN EFFECTIVENESS

Task 5.1: Identify Metrics and Develop Monitoring Program. The objectives of Task 5.1 are to:

- identify metrics (measureable parameters) that can be used to evaluate the effectiveness of selected salinity/nutrient management strategies, and
- develop and implement a monitoring program to measure the effectiveness of the implemented groundwater management strategies.

Selected success metrics and the associated monitoring program will depend on the nature of the salinity/nutrient strategies and the goals of the strategies. Suggested tasks include:

A. Identify the specific goals (e.g. groundwater quality improvement, increase recycled water use, etc.) of the selected salinity/nutrient management plan strategies.

B. Identify metrics that can be used to measure the success of the strategies.

C. Identify the responsible agency for conducting the monitoring information.

D. Develop a proposed monitoring program and schedule for measuring the success parameters.

Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 5.1 for the Tier A, B, and C basins. The same metrics and monitoring approach would be applicable to the Tier A, Tier B, and Tier C basins.

Task 5.2: Salinity/Nutrient Management Plan Audit. The objective of Task 5.2 is to establish the framework and schedule for auditing and periodically updating the salinity/nutrient management plan. Suggested tasks include:

A. Identify the responsible agency or agencies for assessing the effectiveness of the salinity/nutrient management plan.

B. Develop a schedule and framework for future audits and update of the salinity/nutrient management plan.

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Suggested Approach. Appendices A, B, and C present the suggested approach for addressing Task 5.2 for the Tier A, B, and C basins. As shown in the appendices, the same plan effectiveness approach is applicable to the Tier A, Tier B, and Tier C basins.

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Appendix A

Suggested Approach and Tasks Tier A Basins

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
STEP 1 - INITIAL BASIN CHARACTERIZATION		
Task 1.1 Identify and Delineate Basin and Study Area	A	• Identify the Tier A groundwater aquifer to be evaluated
	B	• Identify the areal extent of the groundwater aquifer using prior studies of the Tier A basin
	C	• Identify the upstream tributary area that may contribute source loads to the aquifer
	D	• Determine the study area for salinity/management planning. The study area should include the extent of the aquifer itself, but may include tributary lands that are suspected or known to influence groundwater quality within the aquifer • Prepare a GIS-based map that depicts the areal extent of the groundwater aquifer, the proposed salinity/nutrient management study area, and the tributary watershed • Identify the rationale for the selected study area
Task 1.2 Identify, Collect and Review Existing Studies	A	• Identify, collect and review prior groundwater management studies and hydrogeologic assessments of the Tier A basin • Identify, collect, and review backup technical data or technical assessments on which the groundwater management studies were based, including: ➢ surveys of existing groundwater users, well descriptions, and pumping totals ➢ hydrogeologic and geologic evaluations and surveys ➢ well logs, pump tests, and geologic ➢ descriptions of prior computer models used in the basin ➢ input data bases for the models that characterize historic depth-to-water and water quality
	B	• Contact water and recycled water agencies, storm runoff co-permittees, watershed management groups, and regulatory agencies to determine if any additional studies, updates, or continuing monitoring has been performed, including ➢ updated well surveys or groundwater pumping assessments ➢ ongoing groundwater quality monitoring ➢ recycled water compliance or assimilative capacity evaluations ➢ storm runoff or watershed studies ➢ sanitary surveys or source assessment evaluations
	C	• Using the prior Tier A studies as a guide, develop a preliminary list of other reference studies and databases • Distribute the list to known stakeholders requesting information on additional studies
	D	• Collect and review other available basin-specific reference studies • Summarize estimates for hydrogeological parameters
	E	• Review the list of references in the collected studies to determine if additional pertinent studies are available
	F	• Collect and review such additional pertinent studies

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
Task 1.3 Stakeholder Identification and Outreach Approach	A	• Review prior Tier A groundwater studies to identify prior stakeholders and stakeholder issues • Develop a preliminary list of stakeholders (including type of stakeholder, potential interest, contact person, and contact information) which may include: ➢ water agencies ➢ wastewater and recycled water agencies ➢ private groundwater users ➢ golf courses and significant agricultural concerns ➢ potential industrial sources ➢ resource agencies (e.g. Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Bureau of Reclamation) ➢ regulatory agencies (e.g. Regional Board, County Department of Environmental Health, State Department of Public Health) ➢ watershed planning groups ➢ stormwater NPDES co-permittees ➢ non-government interest groups ➢ other known interested parties • Identify stakeholders whose participation is critical in the salinity/nutrient management effort • Identify stakeholders who may have interest in partnering in the salinity/nutrient management effort
	B	• Develop preliminary outreach information that describes the proposed salinity/nutrient management process and goals and surveys stakeholder areas of interest
	C	• Distribute the information and survey to potential stakeholders via mail or email to gauge stakeholder interest in participating in the salinity/nutrient management process
	D	• Develop a preliminary outreach plan that is tailored to obtain stakeholder feedback and suggestions on: ➢ initial planning direction ➢ potential salinity/nutrient management goals ➢ appropriate means for continuing to engage stakeholders • Outreach to be considered for the Tier A basins include scheduled workshops or meetings, web-based or email information updates, or the establishment of ad hoc committees
	E	• Designate a person to maintain the stakeholder list • Develop a plan for updating the stakeholder list, including adding new stakeholders as they become known or modifying contact information for interested stakeholders

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
Task 1.4 Document Beneficial Uses	A	• Identify beneficial uses of groundwater designated in the Basin Plan • Prepare a table that compares actual and designated beneficial uses of groundwater
	B	• Using prior studies and known information, identify and characterize existing and planned municipal supply wells or projects within the Tier A basin • Quantify existing and planned pumping • Prepare a table that identifies well owners, uses, well identification information, diameter yield, and perforated depth • Prepare a GIS-based map that shows the location of known municipal supply wells and depicts the status of operation
	C	• Identify and characterize private groundwater wells and users within the basin on the basis of: ➢ well surveys from prior studies ➢ Department of Water Resources well records ➢ County of San Diego well permit records ➢ aerial photos, ➢ groundwater quality and uses acceptable for the quality ➢ water agency service meter records ➢ field reconnaissance, inspection, or surveys • Prepare a table that identifies well owners, uses, well identification information, diameter yield, and perforated depth • Prepare a GIS-based map that shows the location of known private groundwater wells and depicts the use of the well and status of operation
	D	• Quantify irrigation pumping from private wells by: ➢ using existing reports or information from prior Tier A modeling studies ➢ identifying changed conditions that may have occurred since the prior Tier A studies were prepared, and ➢ updating the prior pumping estimates per the changed conditions
	E	• Based on information from prior studies, aerial photo evaluation and field reconnaissance, Identify areas where groundwater dependent habitat (habitat that depends on the presence of a near-surface water table for survival) is known to exist and quantify habitat use. • Contact resource agencies (California Department of Fish and Game and/or U.S. Fish and Wildlife Service) to confirm groundwater-dependent areas and depth-to-groundwater thresholds • If estimates are unavailable from prior Tier A basin studies, suggested steps to quantify groundwater use by groundwater-dependent habitat include: ➢ identify acreage of groundwater dependent through aerial photos or prior studies ➢ assign a unit extraction rate applicable to the habitat zone (e.g. 4 AF/acre in coastal areas, 5 AF/acre in inland areas).

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
Task 1.5 Characterize Groundwater Quality and Occurrence	A	• Review prior reference studies (collected as part of Task 1C) and assess the reliability and specificity of the groundwater quality data, depth to water data, and estimates for hydrogeologic parameters
	B	• Cull out data deemed to be unreliable, and collect data deemed to be reliable into a data base
	C	• On the basis of available hydrogeological, water quality, or geologic studies, determine fault lines, bedrock constrictions, or vertical stratification that may affect transport and groundwater quality
	D	• Identify hydrogeologic parameters (e.g. hydraulic conductivity, storage coefficient, etc.) from prior Tier A modeling studies and identify the bases on which the parameters were estimated • Identify if updated information is required to assess hydrogeologic parameters
	E	• Assess the geographic completeness of existing groundwater quality data, depth-to-water data, and hydrogeologic parameters and determine if any data gaps exist that prevent geographic, seasonal, or depth-dependent characterization of groundwater quality, occurrence or transport
	F	• Identify agencies or groups that are engaged in ongoing groundwater data collection
	G	• Contact organizations engaged in groundwater monitoring to determine if the collected data can be made available for use in the salinity/nutrient management plan
	H	• Assess reliability of updated groundwater data, screen out unreliable data, and update the basin groundwater database as required
	I	• Use results from prior Tier A basin model analyses and studies to assess the geographic and depth-dependent distribution of concentrations for the salinity/nutrient parameters of interest • Prepare a GIS-based map that depict groundwater quality, concentration contours, depth-to-water, groundwater flow directions, and key hydrogeologic features that may affect pollutant transport (e.g. faults, constrictions) • Present a statistical evaluation of available groundwater quality data and assess adequacy of groundwater quality to support beneficial uses.
	J	• Identify additional data gaps that remain that prevent complete characterization of groundwater quality within the aquifer • Develop a list of additional data (water quality, depth-to-water, or hydrogeologic parameters) required to characterize basin groundwater quality, occurrence, or pollutant transport
Task 1.6 Identify Salinity & Nutrient Constituents of Concern	A	• Identify salinity/nutrient parameters within the Tier A basins which: ➢ do not or may not comply with currently assigned Basin Plan groundwater quality objectives ➢ represent constituents of concern for groundwater supply developing agencies/users ➢ cause or may cause water agencies to implement additional groundwater treatment ➢ cause or may cause noncompliance with secondary drinking water standards ➢ cause or may cause recycled water agencies to not comply with assigned recycled water effluent limits • Develop preliminary list of salinity/nutrient parameters of concern on the basis of: ➢ Prior groundwater studies within the Tier A basins ➢ collected groundwater quality information ➢ consultation with Regional Board staff ➢ consultation with water agencies, recycled water agencies and other stakeholders
	B	• Revise the list of parameters of concern on the basis of received feedback

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
STEP 2 - IDENTIFY AND QUANTIFY SALILNITY/NUTRIENT SOURCES		
Task 2.1 Identify Salinity & Nutrient Sources	A	• Identify land uses from prior studies of the Tier A basins • Compare to current land use (use land use documents or aerial photos)
	B	• Identify point source discharges from prior modeling studies of the Tier A basins
	C	• Identify sources and loads within the tributary area from prior modeling studies of the Tier A basins
	D	• Identify the locations where the source loads are recharged to the basin using prior computer modeling assessments of the Tier A basins
Task 2.2. Quantify Salinity & Nutrient Source Loads	A	• On the basis of available data and information from prior Tier A basin modeling studies, prepare an initial estimate of the quantity of recharge flow to the basin from surface and subsurface sources
	B	• On the basis of available data and information from prior Tier A basin modeling studies, prepare an initial estimate of the quantity of discharge/withdrawal from the basin
	C	• Refine recharge and discharge/withdrawal estimates on the basis of known changes in conditions since the prior studies were performed
	D	• Using the refined recharge estimates, prepare initial source load (mass load) estimates for identified constituents of concern on the basis of available recharge estimates and water quality information
Task 2.3 Develop Salinity& Nutrient Source Load Assessment Tools	A	• Review prior modeling studies of the Tier A basin and determine groundwater flow/transport model needs for assessing the aquifer
	B	• Select an appropriate computer flow/transport model for assessing the Tier A basin • Select the modeled area and boundary conditions
	C	• On the basis of available information and prior studies, identify hydrologic, depth-to-water, and water quality data sets that can be used for model calibration and verification and assign initial model conditions
	D	• Make initial calibration runs and refine geographic and depth-dependent distribution of hydrogeologic input parameters (e.g. hydraulic conductivity, boundary conditions, storage coefficient, assigned point source and non-point source loads • Calibrate the model • Using a second data set, verify the model
	E	• Utilize the model assess preliminary source loads identified in Task 2.1
	F	• Utilize the tool or model to rank salinity/nutrient load sources in order of effect on groundwater quality

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
TASK 3 - SUPPLEMENTAL MONITORING		
Task 3.1 Develop Plan for Data Gaps	A	• Identify data gaps in groundwater quality data and identify groundwater monitoring data needs necessary to complete the characterization of basin groundwater quality (per Task 1.5)
	B	• Identify supplemental salinity/nutrient source characterization data needs, if any
	C	• Identify additional data needs with respect to hydrogeologic parameters and other modeling parameters/input required for groundwater flow and transport modeling
	D	• Identify parties responsible for collecting data
	E	• Develop a proposed plan and schedule for collecting the required additional data, if applicable
Task 3.2 Collect Data and Refine Basin Characterization	A	• Collect the data identified in Task 3.1
	B	• Incorporate the data into the database developed under Task 1.5
	C	• Assess consistency of additional data with basin characterization developed as part of Task 1.5
	D	• If necessary, refine basin characterization to incorporate the new data • If necessary, refine the calibration of the groundwater flow and transport model • If necessary, re-verify the groundwater flow and transport model using the updated data
TASK 4 - ASSESS SALINITY/NUTRIENT MANAGEMENT STRATEGIES		
Task 4.1 Identify Management Goals	A	• Identify the preferred goals of agencies/groups implementing the salinity/nutrient management plan
	B	• Identify the appropriate process for receiving stakeholder input on the preferred goals, considering the type and number of stakeholders, level of stakeholder interest, and known stakeholder issues
	C	• Identify and resolve potential stakeholder conflicts, and finalize management goals
Task 4.2 Identify Available Management Strategies	A	• Review the salinity/nutrient management strategies identified and assessed in prior Tier A basin studies • Review the list of potential salinity/nutrient management strategies and eliminate strategies that are not applicable to the basin
	B	• Develop a preliminary list of alternative management strategies that may be feasible in the basin
	C	• Solicit stakeholder comment on the list of preliminary list, and revise the list of alternative management strategies to be considered
Task 4.3 Assess Load Reduction/Water Quality Improvement	A	• Use the calibrated groundwater flow/transport model to evaluate projected water quality effects associated with the alternative management strategies • Assess sustainability of the proposed strategies in maintaining the water quality improvements or source load reductions
	B	• Rank strategies with respect to load reduction and groundwater quality improvement

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
Task 4.4 Evaluate Alternative Management Strategies	A	• Select an appropriate process (e.g. survey, submittal of comments, workshop) for receiving stakeholder feedback on alternative salinity/nutrient management strategies
	B	• Through the selected stakeholder process, select parameters to be used in evaluating alternative salinity/nutrient management strategies • Select a decision methodology (e.g. matrix, weighted rankings, costs, etc.) on which to rate the alternative management strategies • On the basis of stakeholder input, assign weighting factors (relative importance) to each evaluation parameter
	C	• Select an applicable decision process (decision model, matrix, ranking process) for evaluating alternative management strategies with respect to the selected performance parameters
	D	• Evaluate performance of the alternative management strategies on the basis of the selected evaluation criteria and weighting factors
	E	• Rank alternatives consistent with the assigned importance of evaluation parameters and select the preferred salinity/nutrient management strategy or strategies
	F	• Solicit stakeholder feedback (including feedback from regulators) on the preferred salinity/nutrient management strategy or strategies
Task 4.5 Assess Basin Plan Modification Needs	A	• Identify required Basin Plan modifications associated with preferred salinity/nutrient management strategies selected under Task 4.4
	B	• Coordinate with Regional Board staff to identify information needs necessary for the proposed Basin Plan modifications
	C	• Prepare the technical documentation required by the Regional Board to document the salinity/nutrient management planning actions that led to the recommendation for Basin Plan modification
	D	• Submit the documentation to the Regional Board for review
	E	• Coordinate with the Regional Board and establish a plan for developing and submitting the supplemental documentation to the Regional Board, as required
Task 4.6 Assess CEQA/NEPA Compliance	A	• Identify whether projects or actions proposed as part of the recommended salinity/nutrient management strategies are subject to review under CEQA or NEPA
	B	• Identify the appropriate governing body for CEQA compliance and, if applicable, federal agency for NEPA compliance
	C	• Develop the project description, conduct the CEQA/NEPA Initial Study, and identify the appropriate means of addressing CEQA/NEPA documents
	D	• Prepare draft CEQA/NEPA documents
	E	• Conduct peer and public review of the CEQA/NEPA documents
	F	• Final governing body action on CEQA/NEPA documents

Appendix A Suggested Approach and Tasks - Tier A Basins		
Task No.		Task Description
STEP 5 - ASSESS PLAN EFFECTIVENESS		
Task 5.1 Identify Metrics and Develop Monitoring Program	A	• Through a stakeholder-driven process, identify specific goals (e.g. groundwater quality improvement, increase recycled water use, etc.) to be achieved by the selected salinity/nutrient management plan strategies
	B	• Identify metrics that can be used to measure the success of the strategies
	C	• Identify the responsible agency for conducting the monitoring information
	D	• Develop a proposed monitoring program and schedule for measuring the success parameters
Task 5.2 Salinity/Nutrient Management Plan Audit	A	• Identify the responsible agency or agencies for assessing the effectiveness of the salinity/nutrient management plan
	B	• Develop a schedule and framework for future audits and update of the salinity/nutrient management plan

Appendix B

Suggested Approach and Tasks Tier B Basins

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
STEP 1 - INITIAL BASIN CHARACTERIZATION		
Task 1.1 Identify and Delineate Basin and Study Area	A	• Identify the Tier B groundwater aquifer to be evaluated
	B	• Identify the areal extent of the groundwater aquifer using prior studies or the information from the following: ➢ State of California Department of Water Resources Bulletin Nos. 106-2 or 118 ➢ Water Authority *Groundwater Feasibility Study* (NBS/Lowry, 1995) or *Groundwater Report* (Water Authority, 1997) ➢ U.S. Department of Agriculture, Natural Resource Services soil maps ➢ U.S. Geological Survey geologic maps ➢ State of California Department of Conservation geologic maps
	C	• Identify the upstream tributary area that may contribute source loads to the aquifer. Resources available to identify watershed boundaries and tributary areas, in part, include: • the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) • State of California Department of Water Resources hydrographic maps • U.S. Geological Survey topographic quadrangle maps • Calwater 2.2.1 (California Interagency Watershed Mapping Committee)
	D	• Determine the study area for salinity/management planning. The study area should include the extent of the aquifer itself, but may include tributary lands that are suspected or known to influence groundwater quality within the aquifer • Prepare a map that depicts the areal extent of the groundwater aquifer, the proposed salinity/nutrient management study area, and the tributary watershed • Identify the rationale for the selected study area
Task 1.2 Identify, Collect and Review Existing Studies	A	• Collect and review available groundwater and salinity/nutrient management studies. In addition to basin-specific studies, regional studies of interest may include: ➢ State of California Department of Water Resources Bulletin No. 106-2 (DWR, 1967) ➢ San Diego County Water Authority *Groundwater Report* (Water Authority, 1997) ➢ San Diego County Water Authority *Groundwater Feasibility Study, Emergency Storage in San* Diego County (NBS/Lowry, 1995) ➢ State of California Department of Water Resources *California's Groundwater*, Bulletin No. 118 (DWR, 2003) ➢ Metropolitan Water District Metropolitan Water District of Southern California *Groundwater Assessment Study* (MWDSC, 2007)
	B	• Contact water agencies, wastewater agencies, storm runoff co-permittees, and/or watershed management groups within the basin to identify local studies that have been prepared, including: ➢ groundwater supply, storage, or conjunctive use studies ➢ groundwater aquifer hydrogeologic investigations ➢ groundwater quality studies or groundwater protection studies ➢ recycled water compliance, assimilative capacity and Basin Plan studies ➢ pollutant modeling and transport studies ➢ watershed studies ➢ sanitary surveys or source assessment evaluations
	C	• Develop a preliminary list of potential reference studies • Distribute the list to known stakeholders requesting information on additional studies

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 1.2 (continued) Identify, Collect and Review Existing Studies	D	• Collect and review available basin-specific reference studies • Summarize estimates for hydrogeological parameters from prior studies
	E	• Review the list of references in the collected studies to determine if additional pertinent studies are available
	F	• Collect and review such additional pertinent studies
Task 1.3 Stakeholder Identification and Outreach Approach	A	• Develop a preliminary list of stakeholders (including type of stakeholder, potential interest, contact person, and contact information). Potential stakeholders in the salinity/nutrient management process may include: ➢ water agencies ➢ wastewater and recycled water agencies ➢ private groundwater users ➢ golf courses and significant agricultural concerns ➢ potential industrial sources ➢ resource agencies (e.g. Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Bureau of Reclamation) ➢ regulatory agencies (e.g. Regional Board, County Department of Environmental Health, State Department of Public Health) ➢ watershed planning groups ➢ stormwater NPDES co-permittees ➢ non-government interest groups ➢ other known interested parties • Identify stakeholders whose participation is critical in the salinity/nutrient management effort
	B	• Develop preliminary outreach information that describes the proposed salinity/nutrient management process and goals and surveys stakeholder areas of interest
	C	• Distribute the information to potential stakeholders (via mail or email) to gauge stakeholder interest in participating in the salinity/nutrient management process
	D	• Develop a preliminary outreach plan that is tailored to obtain stakeholder feedback and suggestions on: ➢ initial planning direction ➢ potential salinity/nutrient management goals ➢ appropriate means for continuing to engage stakeholders • Outreach to be considered for the Tier B basins may include meetings, email information updates, or the establishment of ad hoc committees
	E	• Designate a person to maintain the stakeholder list • Develop a plan for updating the stakeholder list, including adding new stakeholders as they become known or modifying contact information for interested stakeholders

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 1.4 Document Beneficial Uses	A	• Identify beneficial uses of groundwater designated in the Basin Plan • Prepare a table that compares actual and designated beneficial uses of groundwater
	B	• Identify and characterize existing and planned municipal supply wells or projects within the basin • Quantify existing and planned pumping using available agency groundwater pumping records • Prepare a table that identifies agency well owners, uses, well identification information, diameter yield, and perforated depth. • Prepare a map that shows the location of known municipal supply wells and depicts the status of operation
	C	• Identify and characterize private groundwater wells and users within the basin on the basis of: ➢ well surveys from prior studies, ➢ Department of Water Resources well records ➢ County of San Diego well permit records ➢ aerial photos ➢ groundwater quality and uses acceptable for the quality, ➢ water agency service meter records ➢ field reconnaissance, inspection, or surveys • Prepare a table that identifies well owners, uses, well identification information, diameter yield, and perforated depth • Prepare a map that shows the location of known private groundwater wells and depicts the use of the well and status of operation
	D	• Quantify irrigation pumping from private wells by: ➢ existing reports or information ➢ contacts with well owners ➢ quantification of agricultural and landscape irrigated acreage by groundwater through prior reports, water agency service area and meter records, information from the San Diego County Department of Agriculture, information from aerial photos, information from agricultural associations, or field reconnaissance ➢ assigning a unit application rate appropriate to the crop and geography
	E	• Determine whether groundwater-dependent habitat exists within the basin • Identify areas where groundwater dependent habitat (habitat that depends on the presence of a near-surface water table for survival) is known to exist and quantify habitat use. Suggested steps to identify groundwater-dependent habitat areas include: ➢ identify known conservation areas ➢ collect and review available reports (including prior CEQA evaluations for groundwater use or streambed projects) ➢ contacts with resource agencies (California Department of Fish and Game and/or U.S. Fish and Wildlife Service) ➢ aerial photo evaluation ➢ field reconnaissance • Suggested steps to quantify groundwater use by groundwater-dependent habitat include: ➢ identify acreage of groundwater dependent through aerial photos or prior studies ➢ assign a unit extraction rate applicable to the habitat zone (e.g. 4 AF/acre in coastal areas, 5 AF/acre in inland areas)

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 1.5 Characterize Groundwater Quality and Occurrence	A	• Review prior reference studies (collected as part of Task 1C) and assess the reliability and specificity of the groundwater quality data, depth to water data, and estimates for hydrogeologic parameters
	B	• Cull out data deemed to be unreliable, and collect data deemed to be reliable into a data base
	C	• On the basis of available hydrogeological, water quality, or geologic studies, determine fault lines, bedrock constrictions, or vertical stratification that may affect transport and groundwater quality • If applicable, Identify subbasins created by the faults, constrictions or basin features
	D	• Identify known hydrogeologic parameters for the basin (e.g. hydraulic conductivity, storage coefficient, etc.) and the bases on which these parameters were estimated
	E	• Assess the geographic completeness of existing groundwater quality data, depth-to-water data, and hydrogeologic parameters and determine if any data gaps exist that prevent geographic, seasonal, or depth-dependent characterization of groundwater quality, occurrence or transport
	F	• Identify agencies or groups that are engaged in ongoing groundwater data collection
	G	• Contact organizations engaged in groundwater monitoring to determine if the collected data can be made available for use in the salinity/nutrient management plan
	H	• Assess reliability of updated groundwater data, screen out unreliable data, and update the basin groundwater database as required
	I	• Assess the geographic distribution of water quality concentrations for the salinity/nutrient parameters of interest, and assess the depth-dependent distribution of water quality • Organize the collected data for Tier B basins • Prepare a map that depict groundwater quality, concentration contours, depth-to-water, groundwater flow directions, and key hydrogeologic features that may affect pollutant transport (e.g. faults, constrictions) • Present a statistical evaluation of available groundwater quality data and assess adequacy of groundwater quality to support beneficial uses • Summarize best available estimates for storage coefficient, vertical hydraulic conductivity, and horizontal hydraulic conductivity • Identify known geographic or depth-dependent variations in hydrogeologic characteristics
	J	• Identify additional data gaps that remain that prevent complete characterization of groundwater quality within the aquifer • Develop a list of additional data (water quality, depth-to-water, or hydrogeologic parameters) required to characterize basin groundwater quality, occurrence, or pollutant transport

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 1.6 Identify Salinity & Nutrient Constituents of Concern	A	• Identify salinity/nutrient parameters within the Tier B basins which: ➢ do not or may not comply with currently assigned Basin Plan groundwater quality objectives ➢ represent constituents of concern for groundwater supply developing agencies/users ➢ cause or may cause water agencies to implement additional groundwater treatment ➢ cause or may cause noncompliance with secondary drinking water standards ➢ cause or may cause recycled water agencies to not comply with assigned recycled water effluent limits • Develop preliminary list of salinity/nutrient parameters of concern on the basis of: ➢ collected groundwater quality information ➢ consultation with Regional Board staff ➢ consultation with water agencies, recycled water agencies and other stakeholders
	B	• Revise the list of parameters of concern on the basis of stakeholder feedback
STEP 2 - IDENTIFY AND QUANTIFY SALILNITY/NUTRIENT SOURCES		
Task 2.1 Identify Salinity & Nutrient Sources	A	• Identify general land uses within the basin
	B	• Identify known point source discharges to the basin
	C	• Identify known or suspected sources of salinity/nutrient loads within the basin (which includes the tributary watershed)
	D	• Identify the locations where the source loads are recharged to the basin. This may include: ➢ specific point source loads (e.g. injection wells, small percolation basins, industrial or other point sources of discharge) ➢ line source loads s of recharge (streamflow infiltration, storm runoff infiltration) ➢ boundary sources of source loads (e.g. subsurface inflow) ➢ areal sources of recharge (e.g. applied imported water, applied recycled water, fertilizer applications, large recharge or containment basins, precipitation recharge.
Task 2.2 Quantify Salinity & Nutrient Source Loads	A	• On the basis of available data and information from prior studies, prepare an initial estimate of the quantity of recharge flow to the basin from surface and subsurface sources
	B	• On the basis of available data and information from prior Tier B basin modeling studies, prepare an initial estimate of the quantity of discharge/withdrawal from the basin
	C	• Refine recharge and discharge/withdrawal estimates on the basis of a mass balance approach
	D	• Using the refined recharge estimates, prepare initial source load (mass load) estimates for identified constituents of concern on the basis of available recharge estimates and water quality information.

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 2.3 Develop Salinity& Nutrient Source Load Assessment Tools	A	• Determine whether pollutant travel and transport will be an important consideration in assessing the Tier B basin, or whether a mass-balance approach would be appropriate
	B	• Review prior Tier B studies (if applicable) and determine assessment tool needs for evaluating basin groundwater quality ➢ in Tier B basins where groundwater recharge and recovery is proposed, a computer flow/transport model may be necessary ➢ a spreadsheet-based mass balance approach may be applicable in Tier B basins where recharge recovery (or other such groundwater management) occurs
	C	• Determine required input: ➢ if a computer flow/transport model is to be used, identify required input data, including hydrogeologic parameters, physical parameters, initial conditions, and boundary conditions ➢ if a spreadsheet-based mass balance approach is to be used, identify basin storage, existing water quality, mass load inputs (sources) and mass load outputs (sinks)
	D	• Perform initial model testing and refinement ➢ if a computer flow/transport model is used, calibrate the model, and verify the calibrated model using a second data set ➢ if a spreadsheet-based mass balance approach is to be used, (1) conduct an initial mass-balance estimate using existing data to project changes in groundwater quality, (2) compare the projected groundwater quality changes with observed historic trends, and (3) refine or calibrate the mass-balance estimates to better fit the observed conditions
	E	• Utilize the assessment tool (computer flow/transport model or spreadsheet-based mass balance model) to assess preliminary source loads identified in Task 2.1
	F	• Utilize the tool or model to rank salinity/nutrient load sources in order of effect on groundwater quality
TASK 3 - SUPPLEMENTAL MONITORING		
Task 3.1 Develop Plan for Data Gaps	A	• Identify data gaps in groundwater quality data and identify groundwater monitoring data needs necessary to complete the characterization of basin groundwater quality (per Task 1.5)
	B	• Identify salinity/nutrient source characterization data needs
	C	• Identify data needs with respect to hydrogeologic parameters and other modeling parameters/input required for groundwater flow and transport modeling
	D	• Identify parties responsible for collecting data
	E	• Develop a proposed plan and schedule for collecting the required additional data
Task 3.2 Collect Data and Refine Basin Characterization	A	• Collect the data identified in Task 3.1
	B	• Incorporate the data into the database developed under Task 1.5
	C	• Assess consistency of additional data with basin characterization developed as part of Task 1.5
	D	• If necessary, refine basin characterization to incorporate the new data • If necessary, refine the calibration of the groundwater flow/transport model • If necessary, re-verify the groundwater flow/transport transport model using the updated data

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
TASK 4 - ASSESS SALINITY/NUTRIENT MANAGEMENT STRATEGIES		
Task 4.1 Identify Management Goals	A	• Identify the preferred goals of agencies/groups implementing the salinity/nutrient management plan
	B	• Identify the appropriate process for receiving stakeholder input on the preferred goals, considering the type and number of stakeholders, level of stakeholder interest, and known stakeholder issues
	C	• Identify and resolve potential stakeholder conflicts, and finalize management goals
Task 4.2 Identify Available Management Strategies	A	• Review the list of potential salinity/nutrient management strategies and eliminate strategies that are not applicable to the basin
	B	• Develop a preliminary list of alternative management strategies that may be feasible in the basin
	C	• Solicit stakeholder comment on the list of preliminary list, and revise the list of alternative management strategies to be considered
Task 4.3 Assess Load Reduction/Water Quality Improvement	A	• Use the assessment tool, evaluate projected water quality effects associated with the alternative management strategies ➢ use the computer flow/transport model, if applicable, to assess each management strategy's effects on water quality and depth-to-water ➢ use the spreadsheet-based mass balance model, if applicable, to assess projected groundwater quality trends and source mass loads • Assess sustainability of the proposed strategies in maintaining the water quality improvements or source load reductions
	B	• Rank strategies with respect to load reduction and groundwater quality improvement
Task 4.4 Evaluate Alternative Management Strategies	A	• Select an appropriate process (e.g. survey, submittal of comments, workshop) for receiving stakeholder feedback on alternative salinity/nutrient management strategies
	B	• Through the selected stakeholder process, select parameters to be used in evaluating alternative salinity/nutrient management strategies • Select a decision methodology (e.g. matrix, weighted rankings, costs, etc.) on which to rate the alternative management strategies • On the basis of stakeholder input, assign weighting factors (relative importance) to each evaluation parameter
	C	• Select an applicable decision process (decision model, matrix, ranking process) for evaluating alternative management strategies with respect to the selected performance parameters.
	D	• Evaluate performance of the alternative management strategies on the basis of the selected evaluation criteria and weighting factors
	E	• Rank alternatives consistent with the assigned importance of evaluation parameters and select the preferred salinity/nutrient management strategy or strategies
	F	• Solicit stakeholder feedback (including feedback from regulators) on the preferred salinity/nutrient management strategy or strategies

Appendix B Suggested Approach and Tasks - Tier B Basins		
Task No.		Task Description
Task 4.5 Assess Basin Plan Modification Needs	A	• Identify required Basin Plan modifications associated with preferred salinity/nutrient management strategies selected under Task 4.4
	B	• Coordinate with Regional Board staff to identify information needs necessary for the proposed Basin Plan modifications
	C	• Prepare the technical documentation required by the Regional Board to document the salinity/nutrient management planning actions that led to the recommendation for Basin Plan modification
	D	• Submit the documentation to the Regional Board for review
	E	• Coordinate with the Regional Board and establish a plan for developing and submitting the supplemental documentation to the Regional Board, as required
Task 4.6 Assess CEQA/NEPA Compliance	A	• Identify whether projects or actions proposed as part of the recommended salinity/nutrient management strategies are subject to review under CEQA or NEPA
	B	• Identify the appropriate governing body for CEQA compliance and, if applicable, federal agency for NEPA compliance
	C	• Develop the project description, conduct the CEQA/NEPA Initial Study, and identify the appropriate means of addressing CEQA/NEPA documents
	D	• Prepare draft CEQA/NEPA documents
	E	• Conduct peer and public review of the CEQA/NEPA documents
	F	• Final governing body action on CEQA/NEPA documents
STEP 5 - ASSESS PLAN EFFECTIVENESS		
Task 5.1 Identify Metrics and Develop Monitoring Program	A	• Through a stakeholder-driven process, identify specific goals (e.g. groundwater quality improvement, increase recycled water use, etc.) to be achieved by the selected salinity/nutrient management plan strategies
	B	• Identify metrics that can be used to measure the success of the strategies
	C	• Identify the responsible agency for conducting the monitoring information
	D	• Develop a proposed monitoring program and schedule for measuring the success parameters
Task 5.2 Salinity/Nutrient Management Plan Audit	A	• Identify the responsible agency or agencies for assessing the effectiveness of the salinity/nutrient management plan
	B	• Develop a schedule and framework for future audits and update of the salinity/nutrient management plan

Note: Above Guidelines for Tier B basins are also applicable to Tier D basins.

Appendix C

Suggested Approach and Tasks Tier C Basins

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
STEP 1 - INITIAL BASIN CHARACTERIZATION		
Task 1.1 Identify and Delineate Basin and Study Area	A	• Identify the Tier C groundwater aquifer to be evaluated
	B	• Identify the areal extent of the groundwater aquifer using prior studies or the information from the following: ➢ State of California Department of Water Resources Bulletin Nos. 106-2 or 118 ➢ Water Authority *Groundwater Feasibility Study* (NBS/Lowry, 1995) or *Groundwater Report* (Water Authority, 1997) ➢ U.S. Department of Agriculture, Natural Resource Services soil maps ➢ U.S. Geological Survey geologic maps ➢ State of California Department of Conservation geologic maps
	C	• Identify the upstream tributary area that may contribute source loads to the aquifer. Resources available to identify watershed boundaries and tributary areas, in part, include: • the *Water Quality Control Plan for the San Diego Basin* (Basin Plan) • State of California Department of Water Resources hydrographic maps • U.S. Geological Survey topographic quadrangle maps • Calwater 2.2.1 (California Interagency Watershed Mapping Committee)
	D	• Determine the study area for salinity/management planning. The study area should include the extent of the aquifer itself, but may include tributary lands that are suspected or known to influence groundwater quality within the aquifer • Prepare a map that depicts the areal extent of the groundwater aquifer, the proposed salinity/nutrient management study area, and the tributary watershed • Identify the rationale for the selected study area
Task 1.2 Identify, Collect and Review Existing Studies	A	• Collect and review available groundwater and salinity/nutrient management studies. In addition to basin-specific studies, regional studies of interest may include: ➢ State of California Department of Water Resources Bulletin No. 106-2 (DWR, 1967) ➢ San Diego County Water Authority *Groundwater Report* (Water Authority, 1997) ➢ San Diego County Water Authority *Groundwater Feasibility Study, Emergency Storage in San* Diego County (NBS/Lowry, 1995) ➢ State of California Department of Water Resources *California's Groundwater*, Bulletin No. 118 (DWR, 2003) ➢ Metropolitan Water District Metropolitan Water District of Southern California *Groundwater Assessment Study* (MWDSC, 2007)
	B	• Contact water agencies, wastewater agencies, storm runoff co-permittees, and/or watershed management groups within the basin to identify local studies that have been prepared, including: ➢ groundwater supply, storage, or conjunctive use studies ➢ groundwater aquifer hydrogeologic investigations ➢ groundwater quality studies or groundwater protection studies ➢ recycled water compliance, assimilative capacity and Basin Plan studies ➢ pollutant modeling and transport studies ➢ watershed studies ➢ sanitary surveys or source assessment evaluations

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
Task 1.2 (continued) Identify Collect and Review Existing Studies	C	• Develop a preliminary list of potential reference studies • Distribute the list to known stakeholders requesting information on additional studies
	D	• Summarize basin characteristics on the basis of information from regional studies or available data
	E	• Review the list of references in the collected studies to determine if additional pertinent studies are available
	F	• Collect and review such additional pertinent studies
Task 1.3 Stakeholder Identification and Outreach Approach	A	• Develop a preliminary list of stakeholders (including type of stakeholder, potential interest, contact person, and contact information). Potential stakeholders in the salinity/nutrient management process may include: ➢ water agencies ➢ wastewater and recycled water agencies ➢ private groundwater users ➢ golf courses and significant agricultural concerns ➢ potential industrial sources ➢ resource agencies (e.g. Department of Fish and Game, U.S. Fish and Wildlife Service, and U.S. Bureau of Reclamation) ➢ regulatory agencies (e.g. Regional Board, County Department of Environmental Health, State Department of Public Health) ➢ watershed planning groups ➢ stormwater NPDES co-permittees ➢ non-government interest groups ➢ other known interested parties • Identify stakeholders whose participation is critical in the salinity/nutrient management effort
	B	• Develop preliminary outreach information that describes the proposed salinity/nutrient management process and goals and surveys stakeholder areas of interest
	C	• Distribute the information to potential stakeholders (via mail or email) to gauge stakeholder interest in participating in the salinity/nutrient management process
	D	• Develop a preliminary outreach plan that is tailored to obtain stakeholder feedback and suggestions on: ➢ initial planning direction ➢ potential salinity/nutrient management goals ➢ appropriate means for continuing to engage stakeholders • Outreach to be considered for the Tier C basins may include meetings, email information updates, or the establishment of ad hoc committees
	E	• Designate a person to maintain the stakeholder list • Develop a plan for updating the stakeholder list, including adding new stakeholders as they become known or modifying contact information for interested stakeholders

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
Task 1.4 Document Beneficial Uses	A	• Identify beneficial uses of groundwater designated in the Basin Plan • Prepare a table that compares actual and designated beneficial uses of groundwater
	B	• Confirm that no current municipal groundwater users exist within the Tier C basin, and assess whether any planned municipal supply wells are proposed within the basin
	C	• Identify and characterize private groundwater wells and users within the basin on the basis of: ➢ well surveys from prior studies, ➢ Department of Water Resources well records, ➢ County of San Diego well permit records, ➢ aerial photos, ➢ groundwater quality and uses acceptable for the quality, ➢ water agency service meter records ➢ field reconnaissance, inspection, or surveys • Prepare a table that identifies well owners, uses, well identification information, diameter yield, and perforated depth • Prepare a map that shows the location of known private groundwater wells and depicts the use of the well and status of operation
	D	• Quantify irrigation pumping from private wells by: ➢ existing reports or information ➢ contacts with well owners ➢ quantification of agricultural and landscape irrigated acreage by groundwater through prior reports, water agency service area and meter records, information from the San Diego County Department of Agriculture, information from aerial photos, information from agricultural associations, or field reconnaissance ➢ assigning a unit application rate appropriate to the crop and geography
	E	• Determine whether groundwater-dependent habitat exists within the basin • Quantify groundwater uptake by the groundwater-dependent habitat on the basis of: ➢ estimated acreage of groundwater dependent habitat (using aerial photos) ➢ assign a unit extraction rate applicable to the habitat zone (e.g. 4 AF/acre in coastal areas, 5 AF/acre in inland areas)
Task 1.5 Characterize Groundwater Quality and Occurrence	A	• Review prior reference studies (collected as part of Task 1C) and assess the reliability and specificity of the groundwater quality data, depth to water data, and estimates for hydrogeologic parameters
	B	• Cull out data deemed to be unreliable, and collect data deemed to be reliable into a data base
	C	• On the basis of available hydrogeological, water quality, or geologic studies, determine fault lines, bedrock constrictions, or vertical stratification that may affect transport and groundwater quality • If applicable, Identify subbasins created by the faults, constrictions or basin features

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
Task 1.5 (continued) Characterize Groundwater Quality and Occurrence	D	• Identify known hydrogeologic parameters for the basin (e.g. hydraulic conductivity, storage coefficient, etc.) and the bases on which these parameters were estimated
	E	• Assess the geographic completeness of existing groundwater quality data, depth-to-water data, and hydrogeologic parameters and determine if any data gaps exist that prevent geographic, seasonal, or depth-dependent characterization of groundwater quality, occurrence or transport
	F	• Identify agencies or groups that are engaged in ongoing groundwater data collection
	G	• Contact organizations engaged in groundwater monitoring to determine if the collected data can be made available for use in the salinity/nutrient management plan
	H	• Assess reliability of updated groundwater data, screen out unreliable data, and update the basin groundwater database as required
	I	• Assess the geographic distribution of water quality concentrations for the salinity/nutrient parameters of interest, and assess the depth-dependent distribution of water quality • Prepare a map that depict groundwater quality, concentration contours, depth-to-water, groundwater flow directions, and key hydrogeologic features that may affect pollutant transport (e.g. faults, constrictions) • Identify average groundwater quality and the range of observed quality, and assess the adequacy of groundwater quality to support beneficial uses
	J	• Identify additional data gaps that remain that prevent complete characterization of groundwater quality within the aquifer • Develop a list of additional data (water quality, depth-to-water, or hydrogeologic parameters) required to characterize basin groundwater quality, occurrence, or pollutant transport
Task 1.6 Identify Salinity & Nutrient Constituents of Concern	A	• Identify salinity/nutrient parameters within the Tier C basins which: ➢ do not or may not comply with currently assigned Basin Plan groundwater quality objectives ➢ represent constituents of concern for groundwater supply developing agencies/users ➢ cause or may cause water agencies to implement additional groundwater treatment ➢ cause or may cause noncompliance with secondary drinking water standards ➢ cause or may cause recycled water agencies to not comply with assigned recycled water effluent limits • Develop preliminary list of salinity/nutrient parameters of concern on the basis of: ➢ collected groundwater quality information ➢ consultation with Regional Board staff ➢ consultation with water agencies, recycled water agencies and other stakeholders
	B	• Revise the list of parameters of concern on the basis of stakeholder feedback
STEP 2 - IDENTIFY AND QUANTIFY SALILNITY/NUTRIENT SOURCES		

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
Task 2.1 Identify Salinity & Nutrient Sources	A	• Identify general land uses within the basin
	B	• Identify known point source discharges to the basin
	C	• Identify known or suspected sources of salinity/nutrient loads within the basin (which includes the tributary watershed)
	D	• Identify the locations where the source loads are recharged to the basin. This may include: ➢ specific point source loads (e.g. injection wells, small percolation basins, industrial or other point sources of discharge) ➢ line source loads s of recharge (streamflow infiltration, storm runoff infiltration) ➢ boundary sources of source loads (e.g. subsurface inflow) ➢ areal sources of recharge (e.g. applied imported water, applied recycled water, fertilizer applications, large recharge or containment basins, precipitation recharge.
Task 2.2 Quantify Salinity & Nutrient Source Loads	A	• On the basis of available data and information from prior studies, prepare an initial estimate of the quantity of recharge flow to the basin from surface and subsurface sources
	B	• On the basis of available data and information from prior Tier C basin modeling studies, prepare an initial estimate of the quantity of discharge/withdrawal from the basin
	C	• Refine recharge and discharge/withdrawal estimates on the basis of a mass balance approach
	D	• Using the refined recharge estimates, prepare initial source load (mass load) estimates for identified constituents of concern on the basis of available recharge estimates and water quality information.
Task 2.3 Develop Salinity& Nutrient Source Load Assessment Tools	A	• Evaluate pollutant transport assessment needs for the Tier C basin
	B	Determine whether a mass-balance approach represents an appropriate tool for assessing the Tier C basin. If not, identify the proposed modeling approach or assessment tool for evaluating source loads.
	C	• Determine required input: ➢ if a computer flow/transport model is to be used, identify required input data, including hydrogeologic parameters, physical parameters, initial conditions, and boundary conditions ➢ if a spreadsheet-based mass balance approach is to be used, identify basin storage, existing water quality, mass load inputs (sources) and mass load outputs (sinks)
	D	• Perform initial model testing and refinement ➢ if a computer flow/transport model is used, calibrate the model, and verify the calibrated model using a second data set ➢ if a spreadsheet-based mass balance approach is to be used, (1) conduct an initial mass-balance estimate using existing data to project changes in groundwater quality, (2) compare the projected groundwater quality changes with observed historic trends, and (3) refine or calibrate the mass-balance estimates to better fit the observed conditions
	E	• Utilize the assessment tool (computer flow/transport model or spreadsheet-based mass balance model) to assess preliminary source loads identified in Task 2.1
	F	• Utilize the tool or model to rank salinity/nutrient load sources in order of effect on groundwater quality

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
TASK 3 - SUPPLEMENTAL MONITORING		
Task 3.1 Develop Plan for Data Gaps	A	• Identify data gaps in groundwater quality data and identify groundwater monitoring data needs necessary to complete the characterization of basin groundwater quality (per Task 1.5)
	B	• Identify salinity/nutrient source characterization data needs
	C	• Identify data needs with respect to hydrogeologic parameters and other modeling parameters/input required for groundwater flow and transport modeling
	D	• Identify parties responsible for collecting data
	E	• Develop a proposed plan and schedule for collecting the required additional data
Task 3.2 Collect Data and Refine Basin Characterization	A	• Collect the data identified in Task 3.1
	B	• Incorporate the data into the database developed under Task 1.5
	C	• Assess consistency of additional data with basin characterization developed as part of Task 1.5
	D	• If necessary, refine basin characterization to incorporate the new data • If necessary, refine the calibration of the groundwater flow/transport model • If necessary, re-verify the groundwater flow/transport transport model using the updated data
TASK 4 - ASSESS SALINITY/NUTRIENT MANAGEMENT STRATEGIES		
Task 4.1 Identify Management Goals	A	• Identify the preferred goals of agencies/groups implementing the salinity/nutrient management plan
	B	• Identify the appropriate process for receiving stakeholder input on the preferred goals, considering the type and number of stakeholders, level of stakeholder interest, and known stakeholder issues
	C	• Identify and resolve potential stakeholder conflicts, and finalize management goals
Task 4.2 Identify Available Management Strategies	A	• Review the list of potential salinity/nutrient management strategies and eliminate strategies that are not applicable to the basin
	B	• Develop a preliminary list of alternative management strategies that may be feasible in the basin
	C	• Solicit stakeholder comment on the list of preliminary list, and revise the list of alternative management strategies to be considered

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
Task 4.3 Assess Load Reduction/Water Quality Improvement	A	• Use the spreadsheet-based mass balance model, evaluate projected water quality effects associated with the alternative management strategies ➢ use the computer flow/transport model, if applicable, to assess each management strategy's effects on water quality and depth-to-water ➢ use the spreadsheet-based mass balance model, if applicable, to assess projected groundwater quality trends and source mass loads • Assess sustainability of the proposed strategies in maintaining the water quality improvements or source load reductions
	B	• Rank strategies with respect to load reduction and groundwater quality improvement
Task 4.4 Evaluate Alternative Management Strategies	A	• Select an appropriate process (e.g. survey, submittal of comments, workshop) for receiving stakeholder feedback on alternative salinity/nutrient management strategies
	B	• Through the selected stakeholder process, select parameters to be used in evaluating alternative salinity/nutrient management strategies
	C	• Determine the best approach for stakeholder input to the decision process
	D	• Evaluate performance of the alternative management strategies on the basis of the selected evaluation criteria
	E	• Rank alternatives consistent with the assigned importance of evaluation parameters and select the preferred salinity/nutrient management strategy or strategies
	F	• Solicit stakeholder feedback (including feedback from regulators) on the preferred salinity/nutrient management strategy or strategies
Task 4.5 Assess Basin Plan Modification Needs	A	• Identify required Basin Plan modifications associated with preferred salinity/nutrient management strategies selected under Task 4.4
	B	• Coordinate with Regional Board staff to identify information needs necessary for the proposed Basin Plan modifications
	C	• Prepare the technical documentation required by the Regional Board to document the salinity/nutrient management planning actions that led to the recommendation for Basin Plan modification
	D	• Submit the documentation to the Regional Board for review
	E	• Coordinate with the Regional Board and establish a plan for developing and submitting the supplemental documentation to the Regional Board, as required
Task 4.6 Assess CEQA/NEPA Compliance	A	• Identify whether projects or actions proposed as part of the recommended salinity/nutrient management strategies are subject to review under CEQA or NEPA
	B	• Identify the appropriate governing body for CEQA compliance and, if applicable, federal agency for NEPA compliance
	C	• Develop the project description, conduct the CEQA/NEPA Initial Study, and identify the appropriate means of addressing CEQA/NEPA documents
	D	• Prepare draft CEQA/NEPA documents
	E	• Conduct peer and public review of the CEQA/NEPA documents
	F	• Final governing body action on CEQA/NEPA documents

Appendix C Suggested Approach and Tasks - Tier C Basins		
Task No.		Task Description
STEP 5 - ASSESS PLAN EFFECTIVENESS		
Task 5.1 Identify Metrics and Develop Monitoring Program	A	• Through a stakeholder-driven process, identify specific goals (e.g. groundwater quality improvement, increase recycled water use, etc.) to be achieved by the selected salinity/nutrient management plan strategies
	B	• Identify metrics that can be used to measure the success of the strategies
	C	• Identify the responsible agency for conducting the monitoring information
	D	• Develop a proposed monitoring program and schedule for measuring the success parameters
Task 5.2 Salinity/Nutrient Management Plan Audit	A	• Identify the responsible agency or agencies for assessing the effectiveness of the salinity/nutrient management plan
	B	• Develop a schedule and framework for future audits and update of the salinity/nutrient management plan

Note: The above Guidelines for Tier C basins are also applicable to Tier E basins.