CHAPTER 3
SUSTAINABLE MANAGEMENT CRITERIA

3.3 UNDESIRABLE RESULTS

3.3.1 Chronic Lowering of Groundwater Levels

The FCGMA Board of Directors resolution discussed in Section 3.1 calls for groundwater management that will promote water levels that mitigate or minimize the undesirable results of the chronic lowering of water levels. The chronic lowering of water levels is indicated by a significant and unreasonable depletion of supply if continued over the planning and implementation period. Groundwater overdraft during a period of drought is not sufficient to establish a chronic lowering if reductions in groundwater levels during periods of drought are offset by increases in groundwater levels during other periods.

For the Oxnard Subbasin, most well hydrographs do not show a chronic lowering of water levels (Figures 3.2 and 3.3). Hydrographs show that groundwater levels declined during past drought conditions, but the groundwater levels recovered to what they were before drought conditions in both the UAS and LAS. However, a few coastal wells show groundwater levels that have not recovered to above sea level, indicating a potential chronic lowering of groundwater levels in their area. Chronic lowering of groundwater levels could occur in the Oxnard Subbasin if groundwater production exceeds the sustainable yield of the basin. However, water level declines from over-production in the Oxnard Subbasin can be masked by seawater intrusion. Should chronic reduction in groundwater levels occur in the Oxnard Subbasin the beneficial uses and users of the groundwater would be adversely affected. Those affected would include agricultural, municipal, and industrial users of groundwater in the Oxnard Subbasin (Section 1.3.2).

Reduction of groundwater levels will be determined from groundwater level elevations measured in key monitoring wells and monitoring well locations identified by FCGMA. Groundwater elevations in these wells will be measured according to the proposed monitoring schedule in Section 4. Reduction of groundwater levels will be determined by comparing groundwater elevation in the monitoring wells at the end of a wetter than average period, or drought recovery period, to the elevation in the well at the end of a comparable time in the past. Details on the quantitative determination of the minimum threshold and water level elevations relative to groundwater in storage are developed in Section 3.4.

3.3.2 Reduction of Groundwater Storage

The groundwater levels discussed in Section 3.3.1 serve as a proxy for the quantity of groundwater in storage. Because groundwater levels in the Oxnard Subbasin recover during

periods of above average precipitation (Figures 3.2 and 3.3), significant and unreasonable reduction of groundwater in storage is not currently occurring in the Oxnard Subbasin.

As discussed in Section 3.3.1, reduction of fresh water groundwater storage could occur if groundwater production exceeds fresh water groundwater recharge in the future. Groundwater production in excess of the fresh water recharge can induce seawater intrusion, which is not easily flushed from the Oxnard Subbasin. Should reduction of fresh water groundwater storage occur in the Oxnard Subbasin the beneficial uses and users of the groundwater would be adversely affected. Those affected would include agricultural, municipal, and industrial users of groundwater in the Oxnard Subbasin (Section 1.3.2).

Reduction of groundwater storage will be determined based on water level elevations measured in key monitoring wells and monitoring well locations identified by FCGMA. Groundwater elevations in these wells will be measured according to the proposed monitoring schedule in Section 4. Reduction of groundwater storage will be determined by comparing groundwater elevation and groundwater quality in the monitoring wells at the end of a wetter than average period, or drought recovery period, to the elevation and quality in the well at the end of a comparable time in the past. Details on the quantitative determination of the minimum threshold and water level elevations relative to groundwater in storage are developed in Section 3.4.

3.3.3 Seawater Intrusion

The FCGMA Board of Directors resolution discussed in Section 3.1 calls for groundwater management that will control the seawater intrusion front at its current (2015) position. Seawater intrusion in the Oxnard Subbasin was originally discovered in the 1930s adjacent to the Hueneme and Mugu submarine Canyons as a result of groundwater production from the UAS. The current (2015) extent of seawater intrusion in the Semi-Perched Aquifer, the UAS (the Oxnard and Mugu Aquifers), and the LAS (the Hueneme, Fox Canyon, and Grimes Canyon Aquifers) is shown in figures 2-XX through 2-YY.

Section 1.3.2 provides a discussion of beneficial uses in the Oxnard Subbasin, which includes agricultural, domestic, municipal, and industrial users of groundwater. The current location of the seawater intrusion at the coastal areas near Port Hueneme and Mugu Lagoon affects the beneficial use of water to all groundwater users.

Seawater intrusion in the Oxnard Subasin is induced by groundwater production from the UAS and LAS, which causes groundwater levels to decline near the coast and generates a landward groundwater gradient (UWCD 2016).

An existing network of approximately 70 coastal monitoring wells is currently used to identify the extent of seawater intrusion in the aquifers of the Oxnard Subbasin (UCWD 2016). These

wells, which were installed by the USGS, have screen intervals of 20 or 40 feet in order to target discrete zones within each aquifer, and are sampled regularly by staff of the United Water Conservation District (UCWD 2016). Seawater and saline intrusion will continue to be monitored using the existing monitoring well network and additional monitoring well locations identified by FCGMA. The chloride concentration, in combination with the concentrations of other major ions, will determine the measure of the seawater intrusion in wells and will be measured according to the proposed monitoring schedule in Section 4. Details on the quantitative determination of the minimum threshold and water level elevations relative to seawater intrusion are developed in Section 3.4.

3.3.4 Degraded Water Quality

The FCGMA Board of Directors resolution discussed in Section 3.1 calls for groundwater management that will promote water levels that mitigate or minimize the undesirable results of the degradation of water quality. The potential degradation of groundwater quality by total dissolved solids (TDS), sulfate (SO4), chloride (Cl), boron (B), and nitrate (NO_3) are discussed in Section 2.3.4. Of these constituents, NO_3 and Cl are the primary constituents of concern in the Oxnard Subbasin.

Chloride concentrations that exceed 150 mg/L are measured in both the UAS and LAS throughout the Oxnard Subbasin. In the LAS, elevated concentrations of Cl result from water level declines that cause the compaction of aquitards (Section 2.3.3). Groundwater level declines also promote the migration of brines along faults and brine upwelling from deeper formations, and cause direct seawater intrusion along the coast.

Nitrate concentrations above WQOs and BMOs are a continuing problem in the Oxnard Subbasin forebay. High concentrations of NO_3 are related to groundwater fluctuations as the NO_3 in soil from agriculture is remobilized by recharged water, or as it moves naturally downward through the soil.

The forebay area also has occasional, but not persistent concentrations of SO_4 and TDS that exceed either the WQO or BMO in the UAS.

Section 1.3.2 provides a discussion of beneficial uses in the Oxnard Subbasin, which include agricultural, domestic, municipal and industrial (M&I) users of groundwater. Concentrations of NO_3 in the forebay area of the Oxnard Subbasin can affect all beneficial uses of groundwater. However, the forebay area is primarily used for M&I purposes, and to a lesser extent for agricultural extraction and domestic use.

Water quality degradation will continue to be monitored using key monitoring wells and monitoring well locations identified by FCGMA. The concentrations of TDS, SO_4, Cl, B, and

NO_3 will determine the measure of the water quality degradation in wells and will be measured according to the proposed monitoring schedule in Section 4. Details on the quantitative determination of the minimum threshold and water level elevations relative to seawater and saline intrusion are developed in Section 3.4.

3.3.5 Land Subsidence

The FCGMA Board of Directors resolution discussed in Section 3.1 calls for groundwater management that will not result in net subsidence due to groundwater withdrawal.

Currently no groundwater beneficial users have been impacted by land subsidence. DWR ranks the Oxnard Subbasin as a medium to high risk for future subsidence (DWR 2014). Future subsidence could occur if groundwater levels decline below their previous historical lows.

Subsidence will be monitored at U.S. Geological Survey (USGS) bench marks and will be tied to groundwater elevations measured in monitoring wells. Subsidence measurements will be according to the proposed monitoring schedule and method identified in Section 4. Details on the quantitative determination of minimum subsidence threshold are developed in Section 3.4.

3.3.6 Depletions of Interconnected Surface Water

(This section to be completed when Sections 2.3.6 (Groundwater and Surface Water Interaction) and 2.3.7 (GDEs) are completed).

Determination of whether undesirable result is occurring and/or discussion of whether a certain undesirable result will be unlikely to occur

Beneficial uses / users impacted by undesirable result

Cause of groundwater conditions and undesirable results

Criteria used to define undesirable results (for each relevant sustainability indicator)