Appendix 4A: Methodology for Identifying Potential Groundwater Dependent Ecosystems

INTRODUCTION

Groundwater dependent ecosystems (GDEs) within the Salinas Valley are identified in accordance with §354.16(g) of the Groundwater Sustainability Plan regulations. The procedure for identifying GDEs follows guidance developed by The Nature Conservancy (TNC) and detailed in the *Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans* report (Rohde et al., 2018). This process differentiates between indicators of Groundwater Dependent Ecosystems (iGDEs), potential Groundwater Dependent Ecosystems, and true Groundwater Dependent Ecosystems.

- iGDEs were developed by The Nature Conservancy in partnership with the California Department of Fish and Wildlife (DFW) and DWR using the best available statewide data. The iGDEs are identified using locations of springs and seeps, wetlands, and vegetation known to rely on groundwater. The Nature Conservancy also uses the term "Natural Communities Commonly Associated with Groundwater" to refer to these iGDEs.
- Potential GDE are iGDEs that, through mapping analyses, may be connected to shallow groundwater and therefore be supported by shallow groundwater.
- True GDEs are potential GDE's that have been field verified to establish that they are supported by groundwater. The methodology described herein does not identify true GDEs.

The procedure consists of the following steps:

- Review geospatial data from TNC that show indicators of groundwater dependent ecosystems (iGDEs) within the Salinas Valley
- Assess the connection to groundwater for indicators of groundwater dependent ecosystems
- Identify potential GDEs. Potential GDEs are iGDEs that might be connected to groundwater. Potential GDEs should be field verified before they are established as true GDEs.

Geospatial data showing iGDEs were downloaded from TNC's website for Natural Communities Commonly Associated with Groundwater (https://gis.water.ca.gov/app/NCDatasetViewer). The iGDEs present in the Salinas Valley include areas identified as Wetlands or GDE Vegetation. All iGDEs in the 180/400-Foot Aquifer Subbasin, as identified by TNC, are shown on Figure 4A-1.

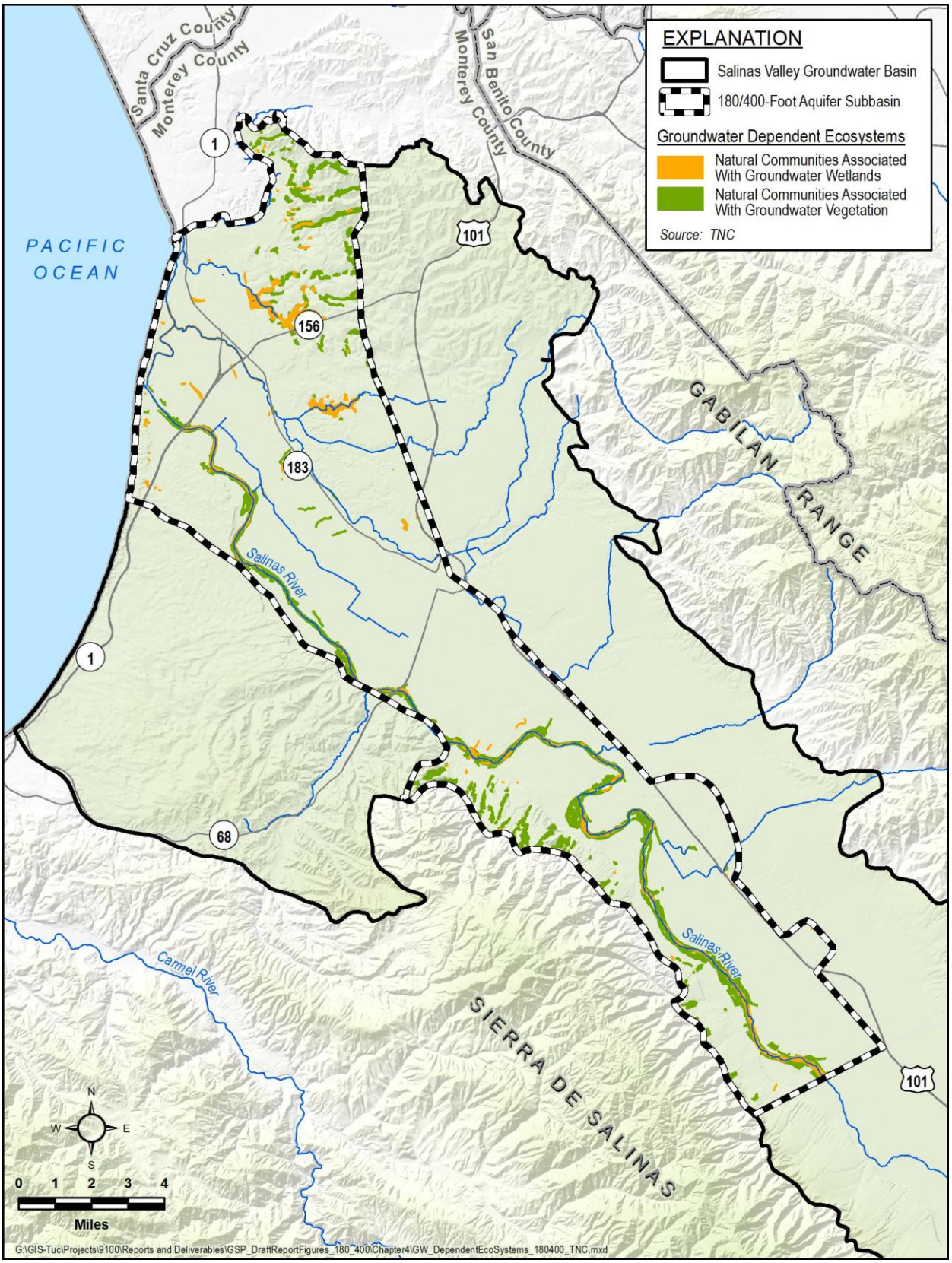

Figure 4A-1: Areas with Indicators of Groundwater Dependent Ecosystems (iGDEs) (TNC, 2018)

CRITERIA FOR CONNECTION TO GROUNDWATER

The iGDEs identified by TNC data can only be potential GDEs if they are connected to a groundwater source that supports the vegetation or wetlands. Identified iGDEs that are supported by streamflows, soil moisture, or shallow perched aquifers, rather than by a regional groundwater aquifer, are not considered potential GDEs for this report. The report by Rohde et al. (2018) provides a general list of questions, or criteria, applicable to all iGDEs for assessing connection to groundwater. These general questions are:

1. Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?
2. Is the depth to groundwater under the iGDE less than 30 feet?
3. Is the iGDE located in an area known to discharge groundwater (e.g. springs/seeps)?

Datasets used to assess the potential connection of the iGDEs to groundwater include the Monterey County surface geologic map (County of Monterey, 2007), measured and interpolated groundwater levels in the Monterey County groundwater monitoring network, and geospatial data included in the National Hydrographic Dataset (NHD) provided by the U.S. Geological Survey showing the location of mapped springs and seeps.

The datasets described above are used to assess the potential connection of iGDEs to groundwater based on the three criteria listed above. To be considered a potential GDE, the iGDEs must satisfy at least one of the three criteria described above; or the landforms around the iGDE must suggest the area could support potential GDEs. Following the suggestions in Rhode (2018), example landforms that could support potential GDEs might be mapped springs, seeps, or a break in the slope of the ground. In the absence of more formal field reconnaissance, the results of this screening level analysis only identify potential GDEs in the Subbasin. Additional field verification is necessary to definitively determine the true GDEs in the 180/400-Foot Aquifer Subbasin.

Question 1: Is the iGDE underlain by a shallow unconfined or perched aquifer that has been delineated as being part of a Bulletin 118 principal aquifer in the Subbasin?

Bulletin 118 (DWR, 2004) identifies the blue clay layer known as the Salinas Aquitard as a confining unit above the 180-Foot Aquifer. This feature is present in the lower Salinas Valley north of the town of Chualar. North of Chualar, the Salinas Valley Aquitard separates the surficial deposits from the principal aquifers. Therefore, only iGDEs overlying Quaternary alluvial units in the 180/400-Foot Aquifer Subbasin south of Chualar, are classified as potential GDEs. Figure 4A-2 shows the iGDEs associated with the shallow, unconfined Quaternary Alluvial (Qa) Aquifer.

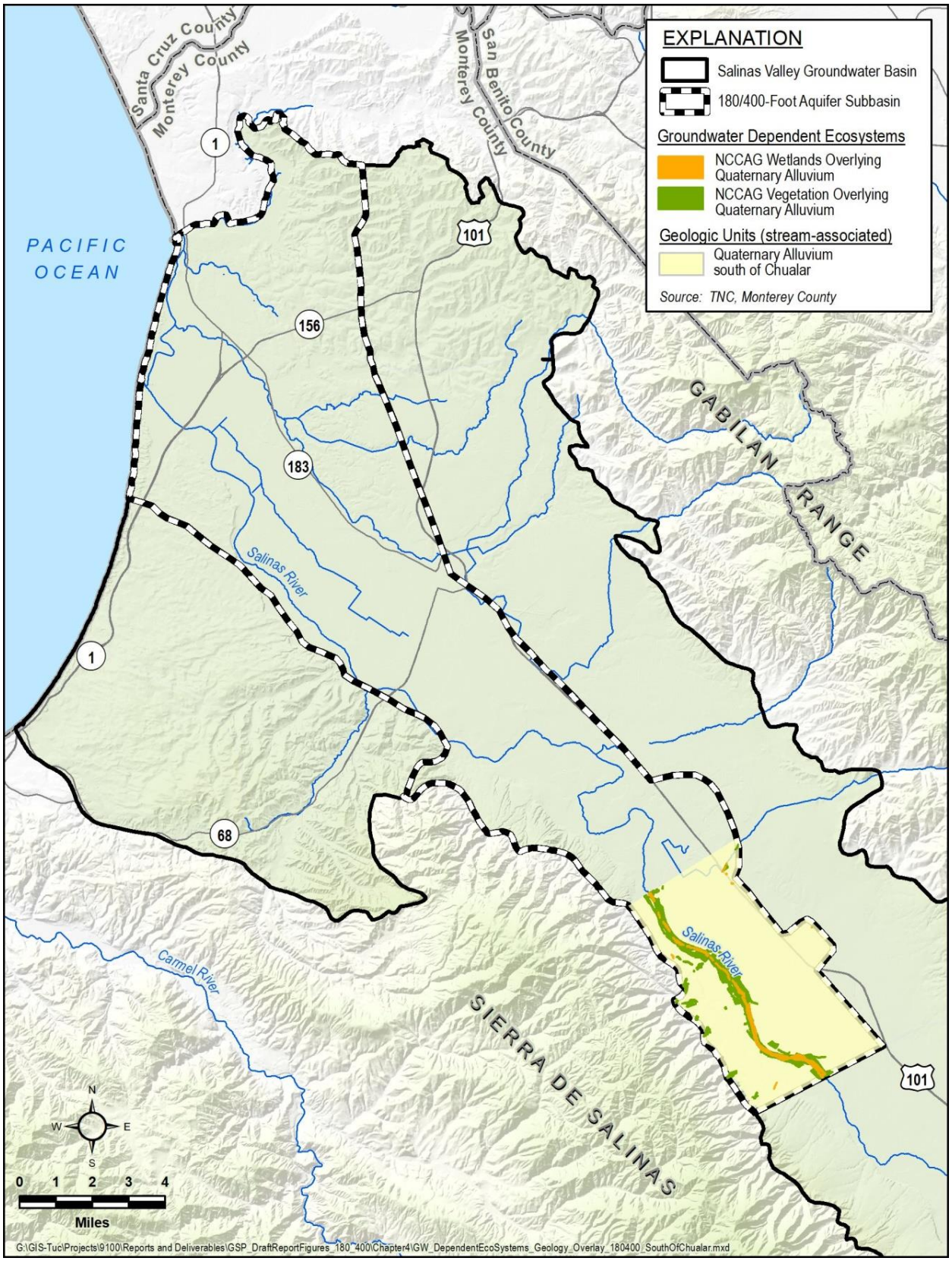

Figure 4A-2: iGDEs Associated with the Shallow, Unconfined Quaternary Alluvial (Qa) Aquifer

This criterion clearly has the potential to overestimate the number of potential GDEs in the Subbasin. The subjective assessment of what constitutes a shallow unconfined aquifer may result in identifying potential GDEs in areas that do not have the underlying groundwater to support the GDE. This emphasizes the need for field verification of the potential GDEs identified in this GSP.

Question 2: Is depth to groundwater under the iGDE less than 30 feet?

Depth to water is routinely measured by MCWRA staff within a network of monitoring wells. This analysis uses Fall 2013 depth to water data from MCWRA, where available, to interpolate a surface showing depth to water throughout the 180/400-Foot Aquifer Subbasin. Based on the measured groundwater level data and interpolation results, iGDEs overlying areas where estimated depth to groundwater is less than 30 feet are shown on Figure 4A-3.

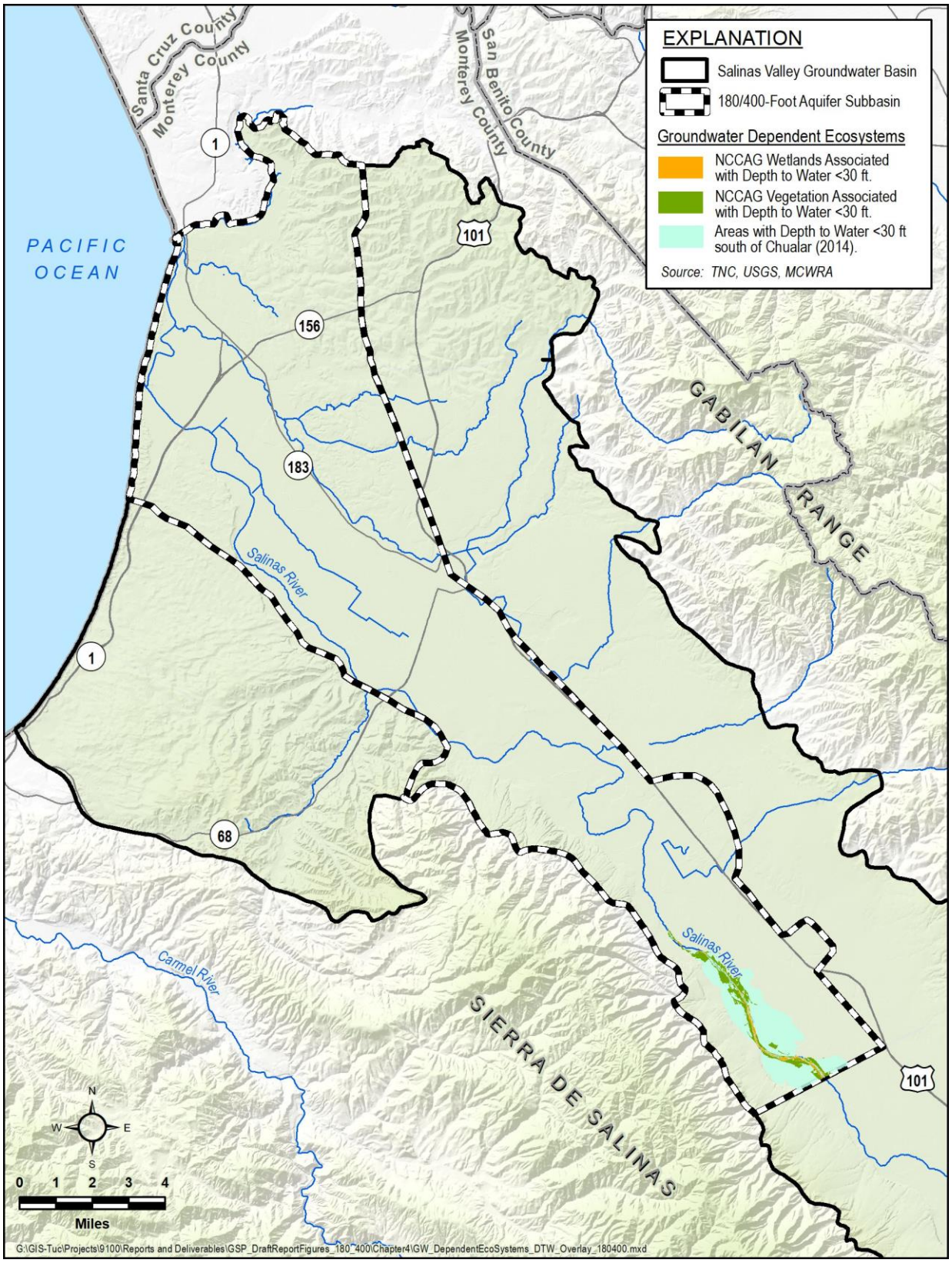

Figure 4A-3: Potential GDEs based on Depth to Groundwater Less than 30 Feet

Question 3: Is the iGDE located in an area known to discharge groundwater (e.g., springs/seeps)?

There are no springs and seeps identified by the National Hydrography Dataset (NHD) within or in the immediate vicinity of the Subbasin. Therefore, no potential GDEs in the 180/400-Foot Aquifer Subbasin are in an area known to discharge groundwater.

FINAL DELINEATION OF POTENTIAL GROUNDWATER DEPENDENT ECOSYSTEMS

The final delineation of potential GDEs are the combination of all the potential GDEs identified by the three criteria listed above. A map showing the final delineated potential GDEs in the 180/400-Foot Aquifer Subbasin is shown in Figure 4A-4.

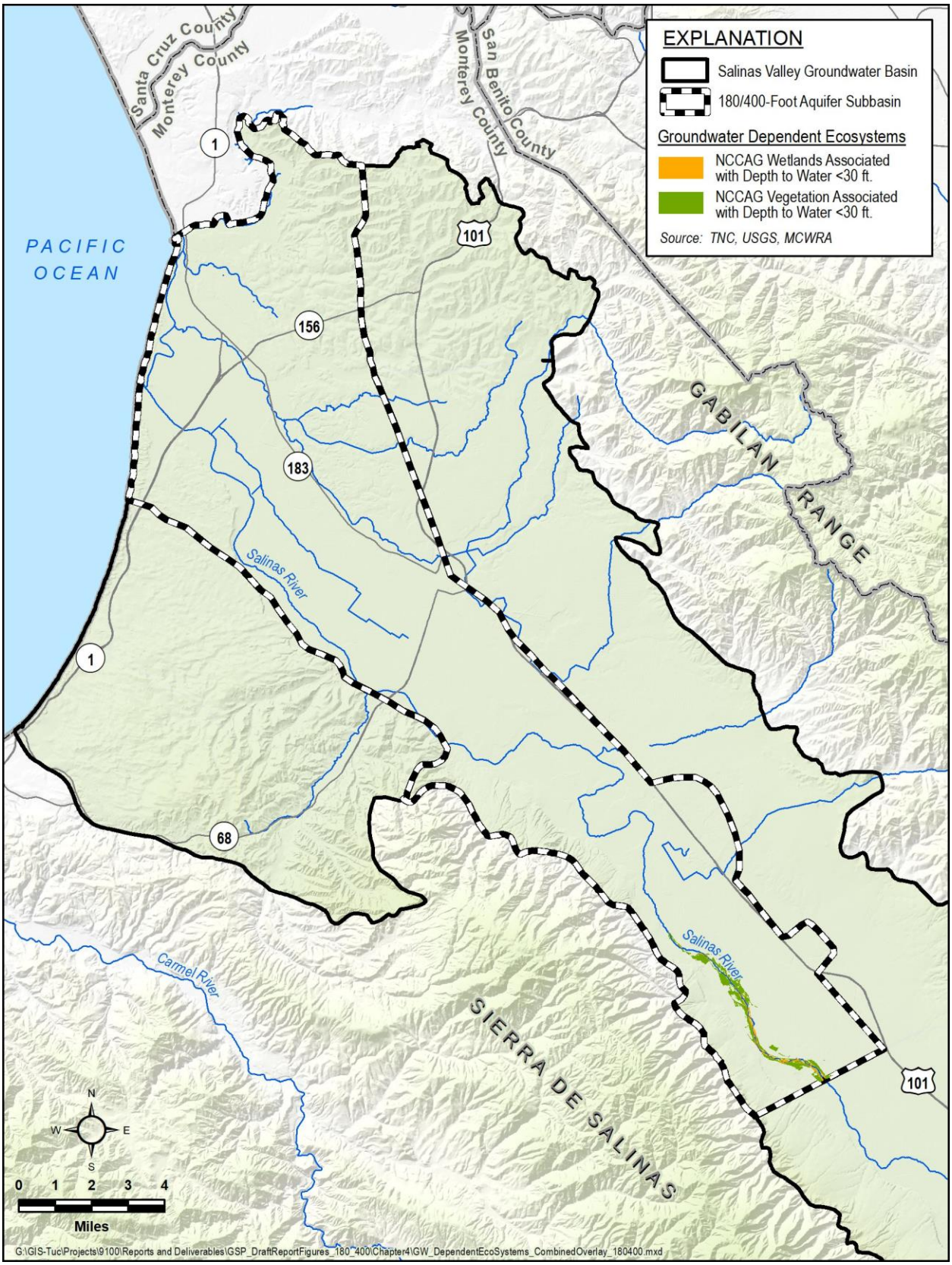

Figure 4A-4: Final Delineation of Extent of Potential GDEs

REFERENCES

Rohde, M. M., S. Matsumoto, J. Howard, S. Liu, L. Riege, and E.J. Remson, 2018, Groundwater Dependent Ecosystems under the Sustainable Groundwater Management Act: Guidance for Preparing Groundwater Sustainability Plans: The Nature Conservancy, San Francisco, California.

California Department of Water Resources (DWR), 2004, Bulletin 118 Basin Descriptions: Salinas Valley Groundwater Basin, 180/400 Subbasin, accessed at https://water.ca.gov/Programs/Groundwater-Management/ Bulletin-118

County of Monterey, Planning Department, 2007, Surface geology map, accessed at https://earthworks.stanford.edu/catalog/stanford-cm427jp1187