TMDLs for Salts (EC), Chloride, Sodium and Boron in the Santa Maria River Watershed

Kickoff Meeting March 19, 2015

CALIFORNIA
Water Boards
STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS

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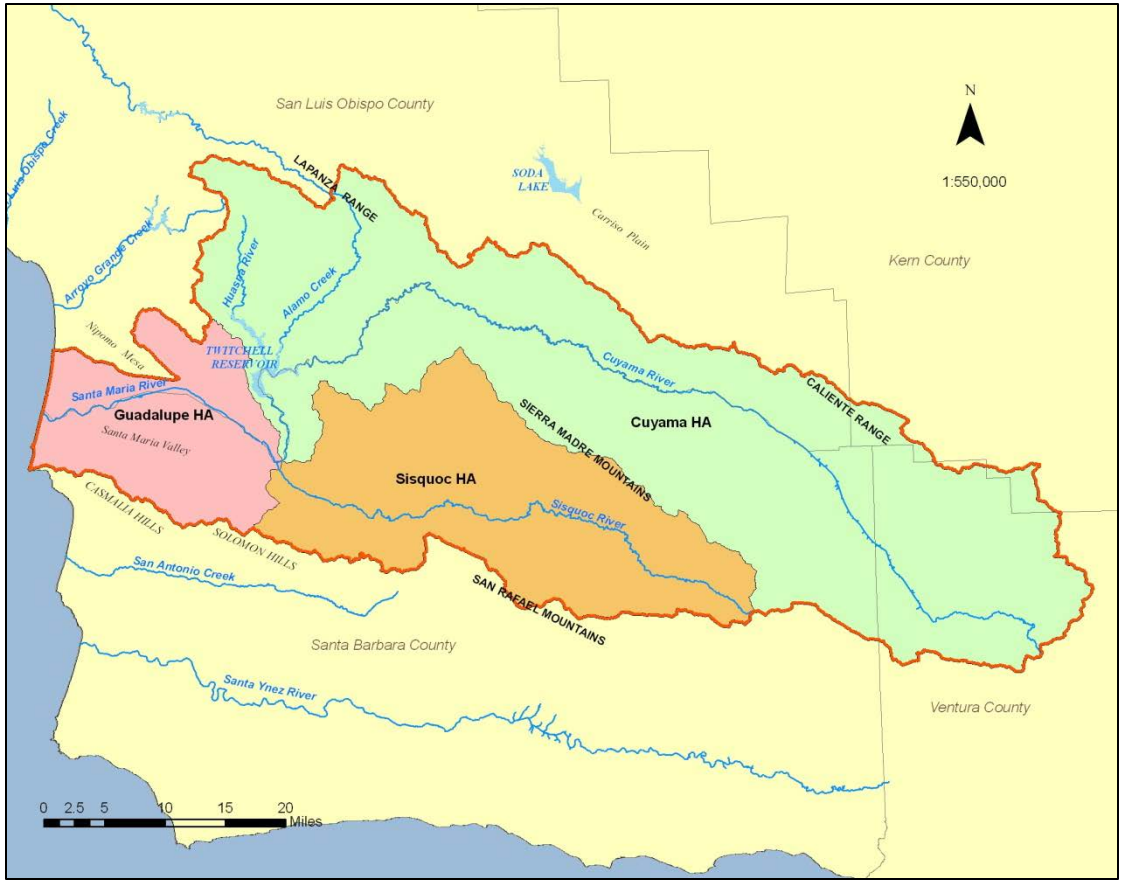
Agenda

- Introductions
- Background on TMDLs
- Water Quality Assessment
- Sources of Salts
- TMDL Project Summary
- Questions and comments

Project Area



Purpose of a TMDL Project

Water quality planning project to address impaired waters on the Clean Water Act 303(d) list

Impaired Water: *A waterbody not meeting water quality standards or may be threatened in the future…*

Protection of Beneficial Use

Agricultural Supply (AGR) *- Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.*

AGR Water Quality Objective

Chemical Constituents (Salts)

Waters shall not contain concentrations of chemical Constituents in amounts which adversely affect the agricultural beneficial use. Interpretation of adverse effect shall be as derived from the University of California Agricultural Extension Service guidelines provided in Table 3-3.

Table 3-3 and 3-4

Chemical of Parameter	303d Listing Criteria
Electrical Conductivity (EC)	3.0 mmho/cm (Table 3-3)
Boron (B)	0.75 mg/L (Table 3-4)
Chloride (Cl)	106 mg/L(Table 3-3)
Sodium (Na)	69 mg/L (Table 3-3)

Salinity (Ec)

- The ability of a crop to tolerate concentrations of salts is defined by agriculturalists as: “the extent to which the relative growth or yield of a crop is decreased when the crop is grown in a saline soil as compared to its growth in a non-saline soil.” (Hanson et al., 2006)

Salinity

Crop	Salinity Threshold (EC in Us)	Rating
Blackberry	1,500	Sensitive
Broccoli	2,800	Moderately sensitive
Grape	1,500	Moderately sensitive
Lettuce	1,300	Moderately sensitive
Strawberry	1,000	Sensitive
Sugar Beets	7,000	Tolerant

Source: Agricultural Salinity and Drainage (Hanson et al., 2006)

Chloride and Sodium Toxicity

- *Usually occurs in only tree and vine crops*
- *Chloride and sodium can accumulate at toxic amounts in shoots and leaves of woody plants and cause damage*
- *Leaves can directly absorb chloride from overhead sprinkler irrigation*

Water Quality Guidelines for Crops

Basin Plan Table 3-3

	Water Quality Guidelines		
Constituent	**No Problem**	**Increasing Problems**	**Severe Problems**
Root Absorption (surface irrigation)			
Sodium	< 69	69 - 207	>207
Chloride	<142	142 - 355	>355
Foliar Absorption (sprinkler irrigation)			
Sodium	< 69	>69	
Chloride	<106	>106	

Crop Susceptibility to Foliar Injury

from Cl or Na in Sprinkler Irrigation Water

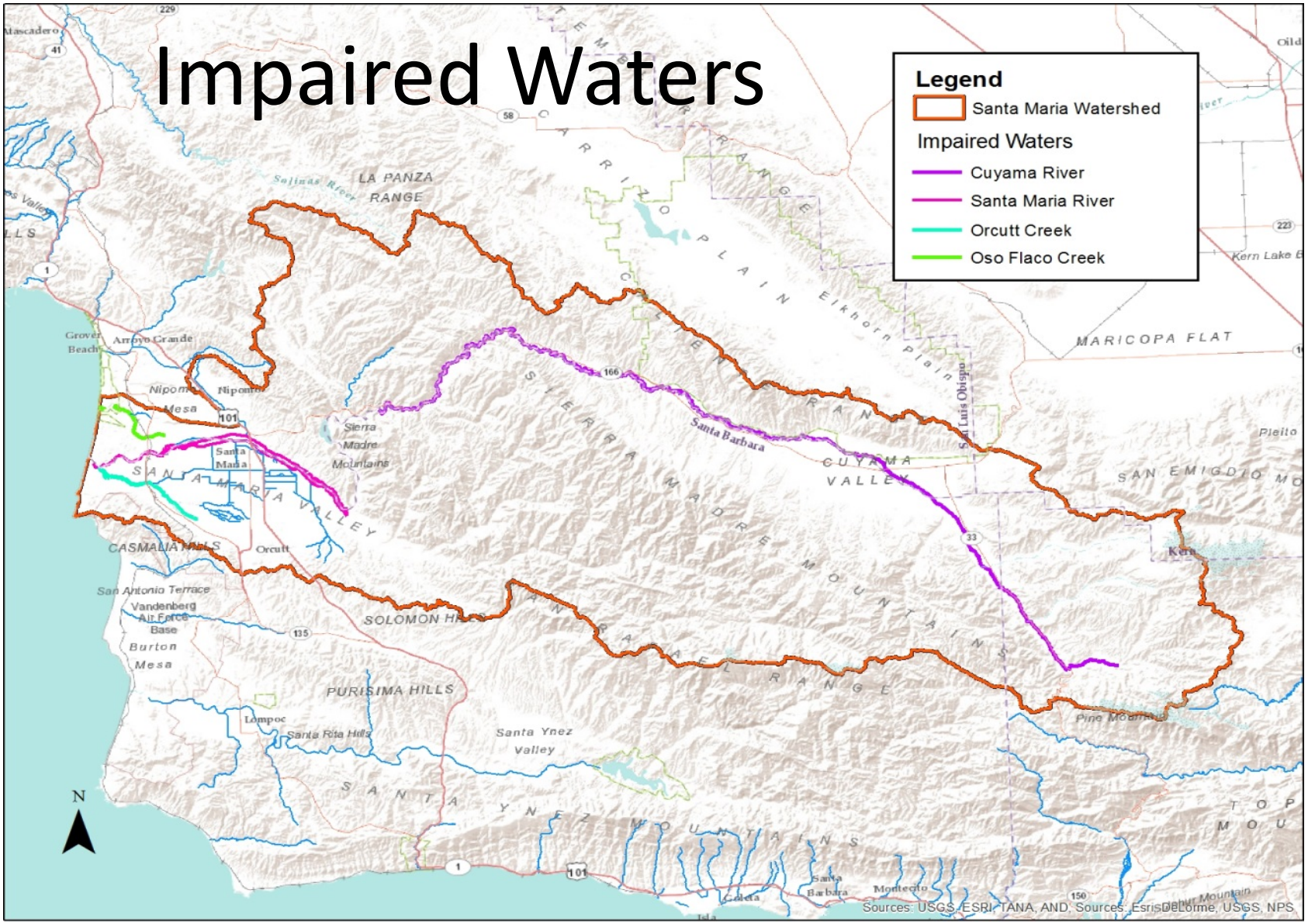
Concentration	< 5 (meq/l)	5 – 10 (meq/l)	10 – 20 (meq/l)	> 20 (meq/l)
	< 177 (mg/l Cl)	177 – 353 (mg/l Cl)	353 – 706 (mg/l Cl)	> 706 (mg/l Cl)
	< 65 (mg/l Na)	65 – 130 (mg/l Na)	130 – 260 (mg/l Na)	> 260 (mg/l Na)
Crop	Almond Apricot Citrus Plum	Grape Pepper Potato Tomato	Alfalfa Barley Corn Cucumber	Cauliflower Cotton Sugar Beet Sunflower

Source: Agricultural Salinity and Drainage (Hanson et al., 2006)

Salt Impairments

Water Body	303(d) Listing
Cuyama River (Upstream of Twitchell Reservoir)	Electrical Conductivity Boron Chloride Sodium
Santa Maria River	Chloride Sodium
Orcutt Creek	Electrical Conductivity Boron Chloride Sodium
Oso Flaco Creek	Chloride Sodium

Impaired Waters



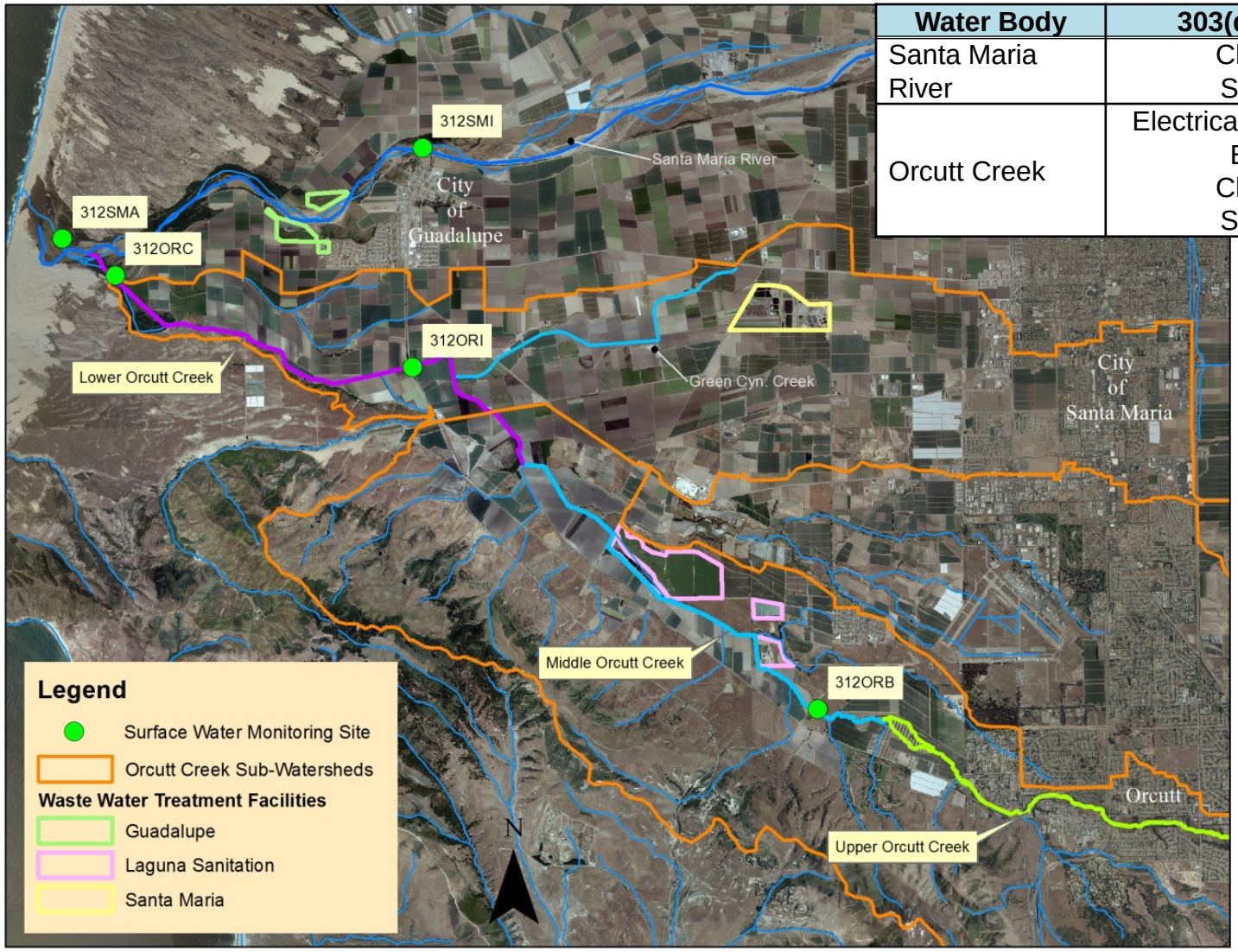
Cuyama

Site Id	Site Description	Excedances
312CUT	Cuyama River below Twitchell at White Rock Lane	Sodium
312CUY	Cuyama River d/s Buckhorn Road	Sodium
312CCC	Cuyama River d/s Cottonwood Canyon	Boron, Chloride, Sodium, Ec
312CUL	Cuyama River above Lockwood turnoff	
312CAV	Cuyama River at Highway 33	Sodium

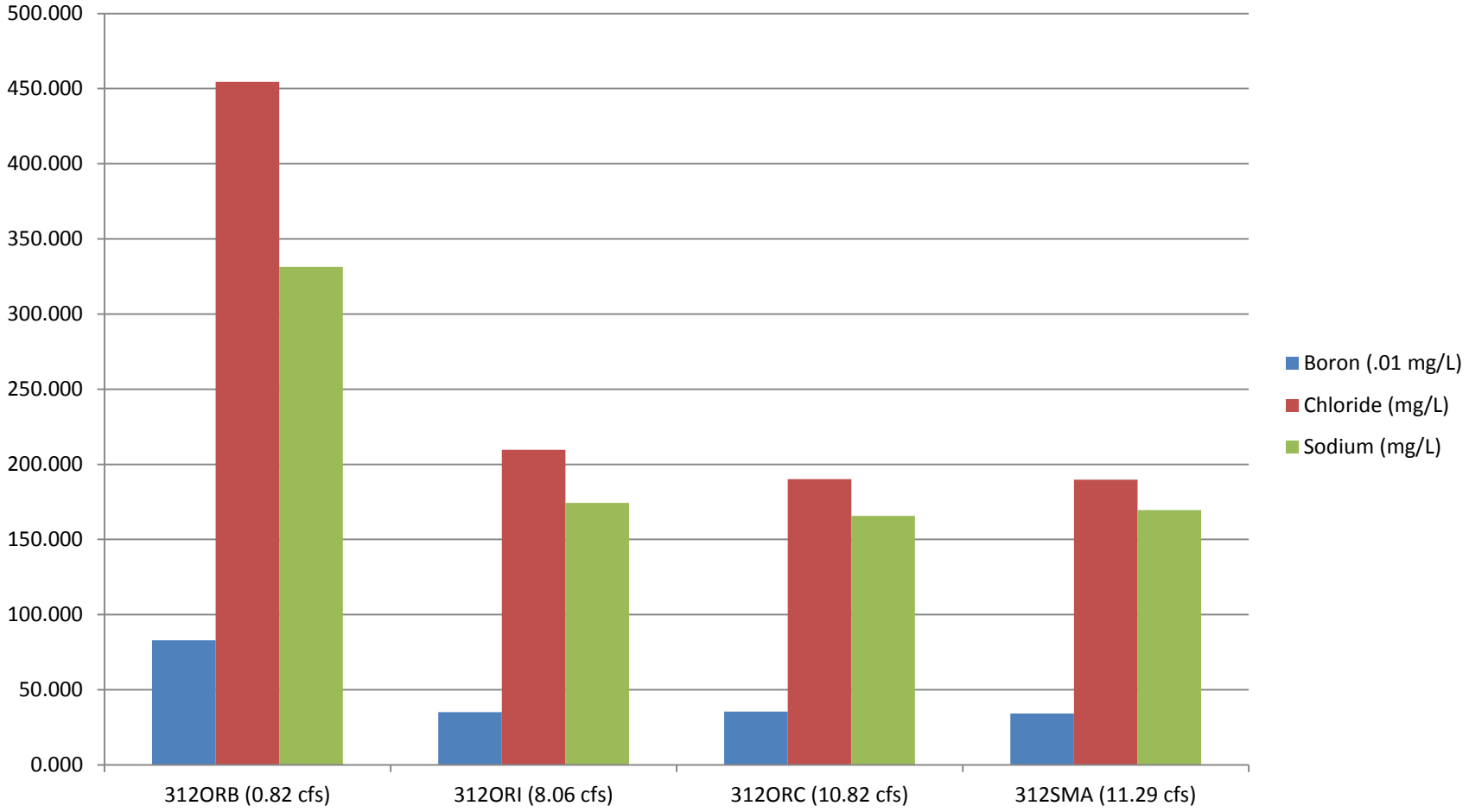
Geologic Sources

Santa Maria River and Orcutt Creek

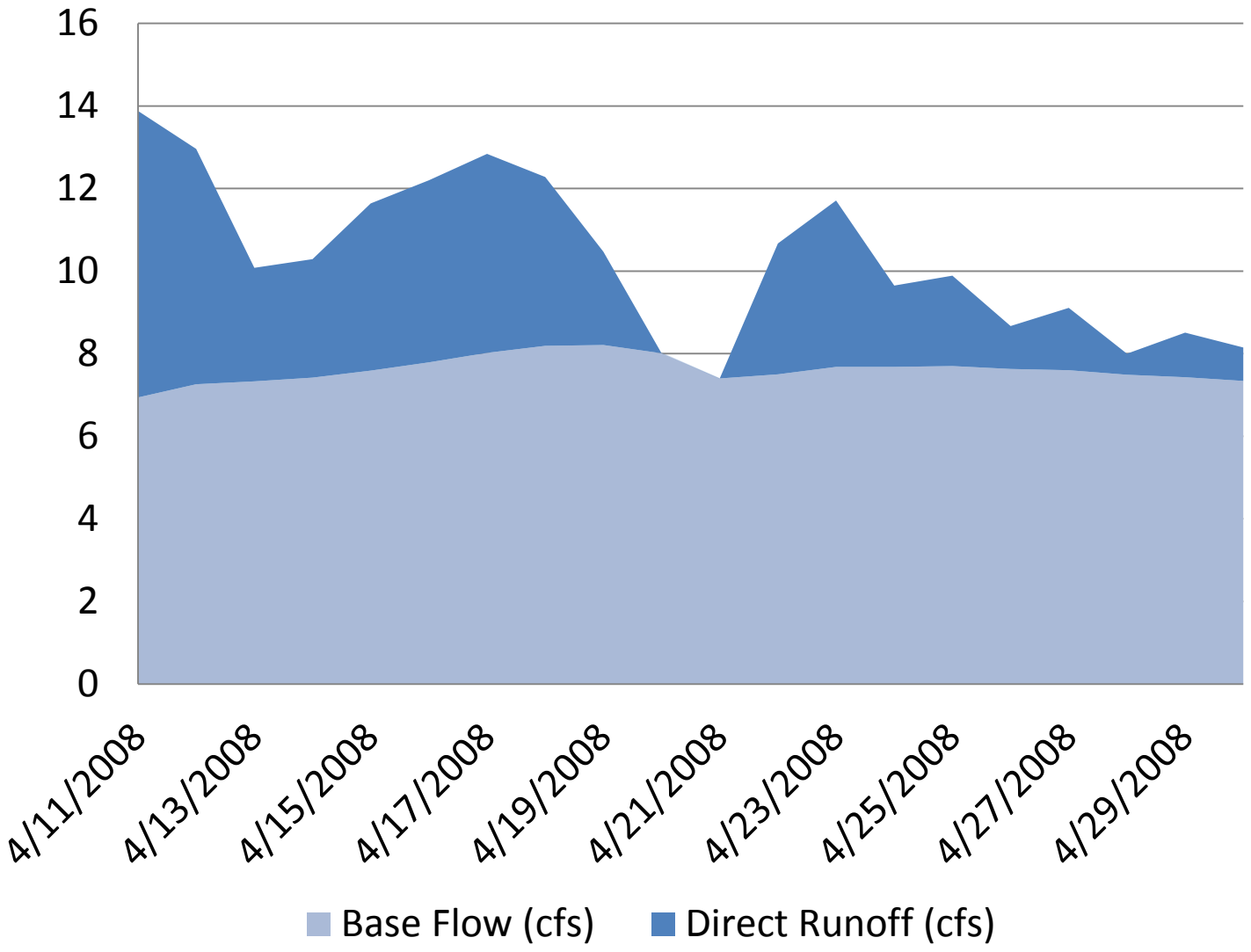
Water Body	303(d) Listing
Santa Maria River	Chloride Sodium
Orcutt Creek	Electrical Conductivity Boron Chloride Sodium



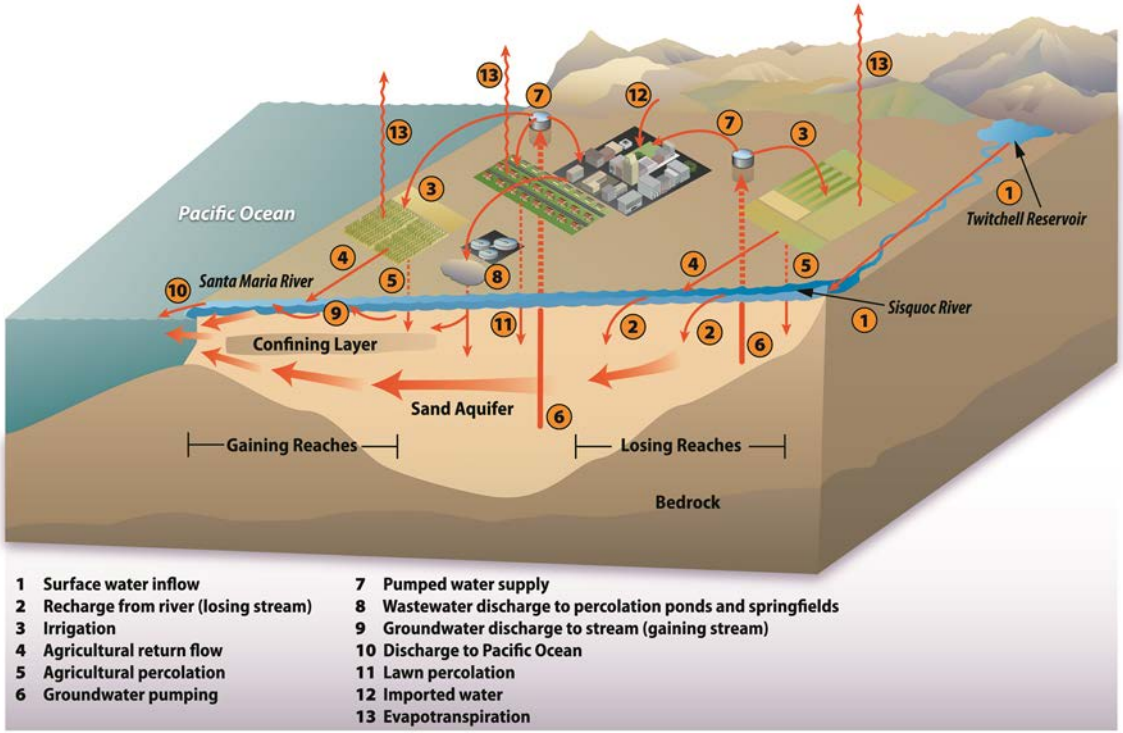
Average Concentrations and Flow



Orcutt Creek Base Flow and Direct Runoff

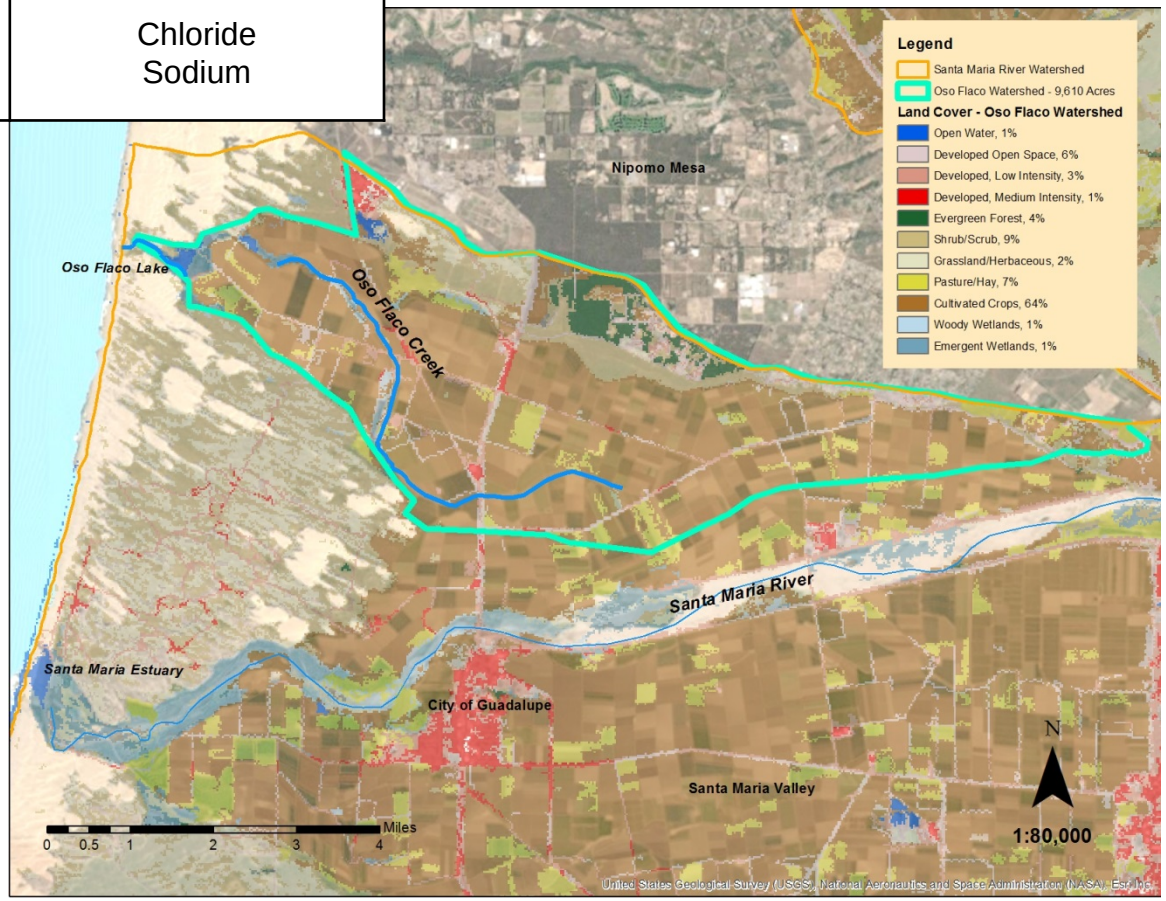


Salt Pathways

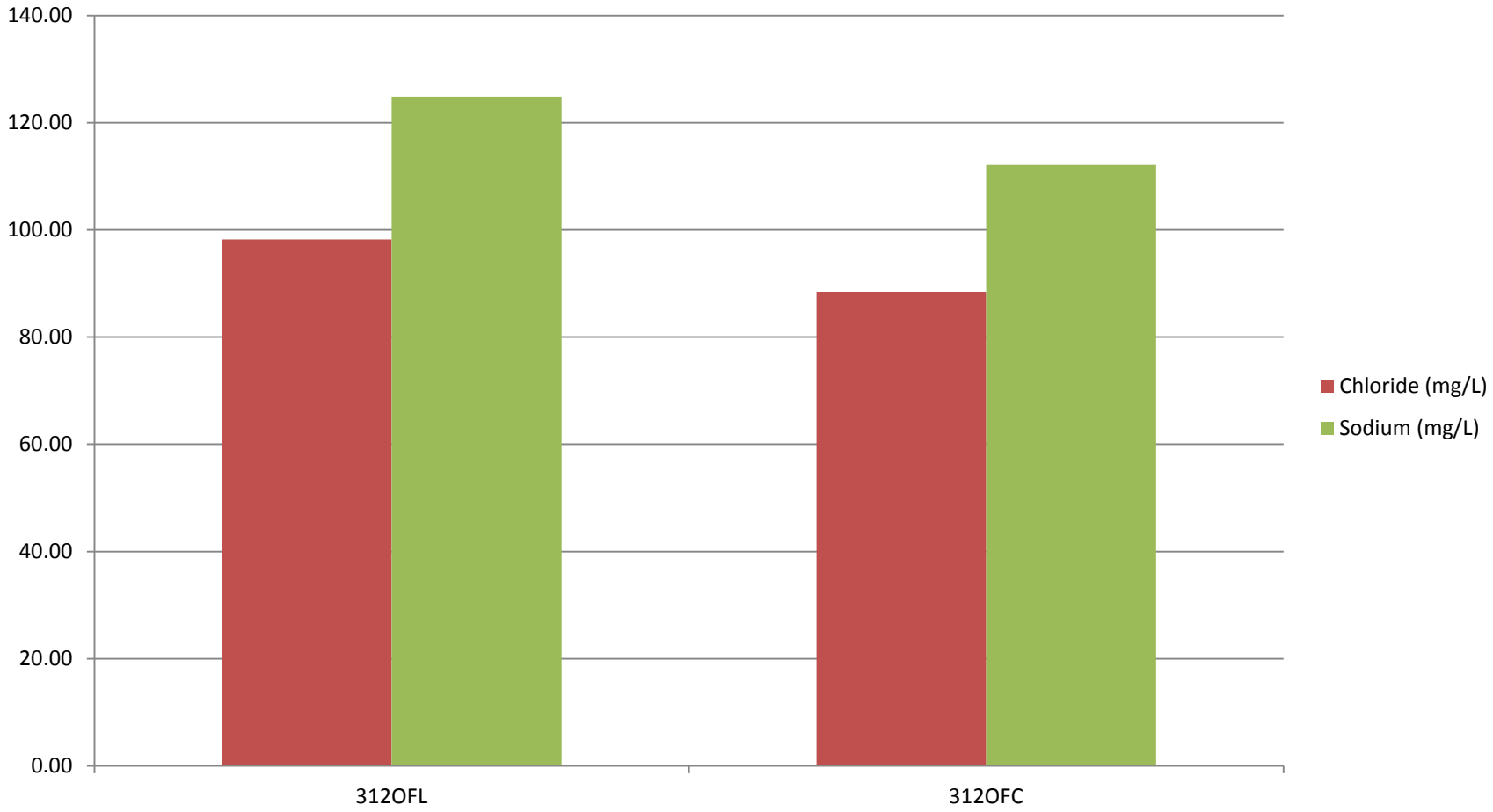


Oso Flaco Creek

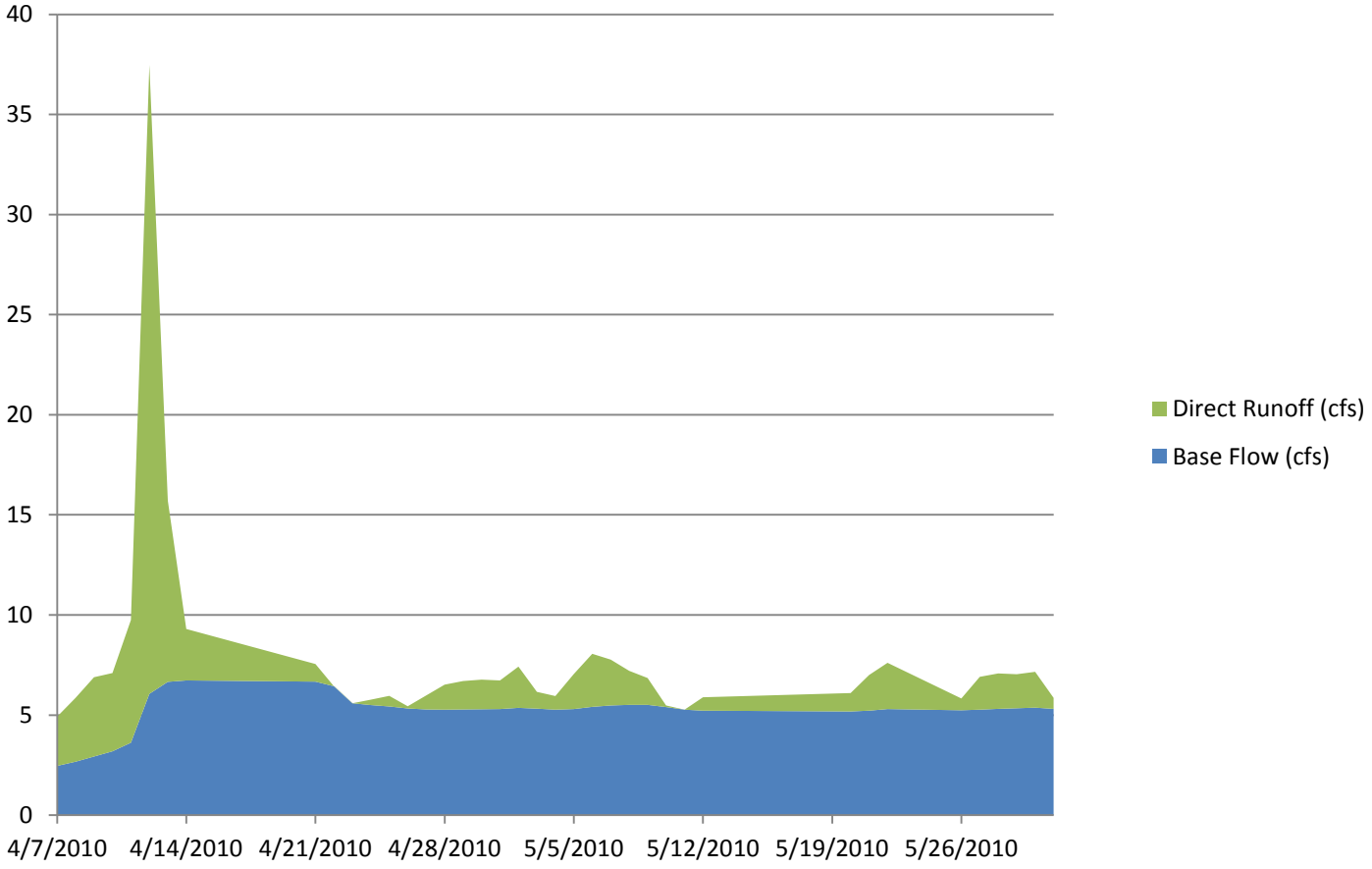
Water Body	303(d) Listing
Oso Flaco Creek	Chloride Sodium



Average Concentrations



Oso Flaco Creek Baseflow



AGR Beneficial Use

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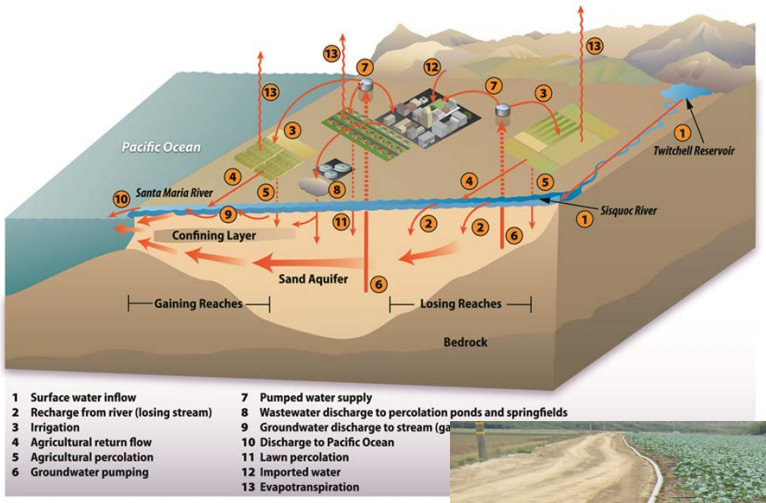
TMDL Assessment



Questions / Comments