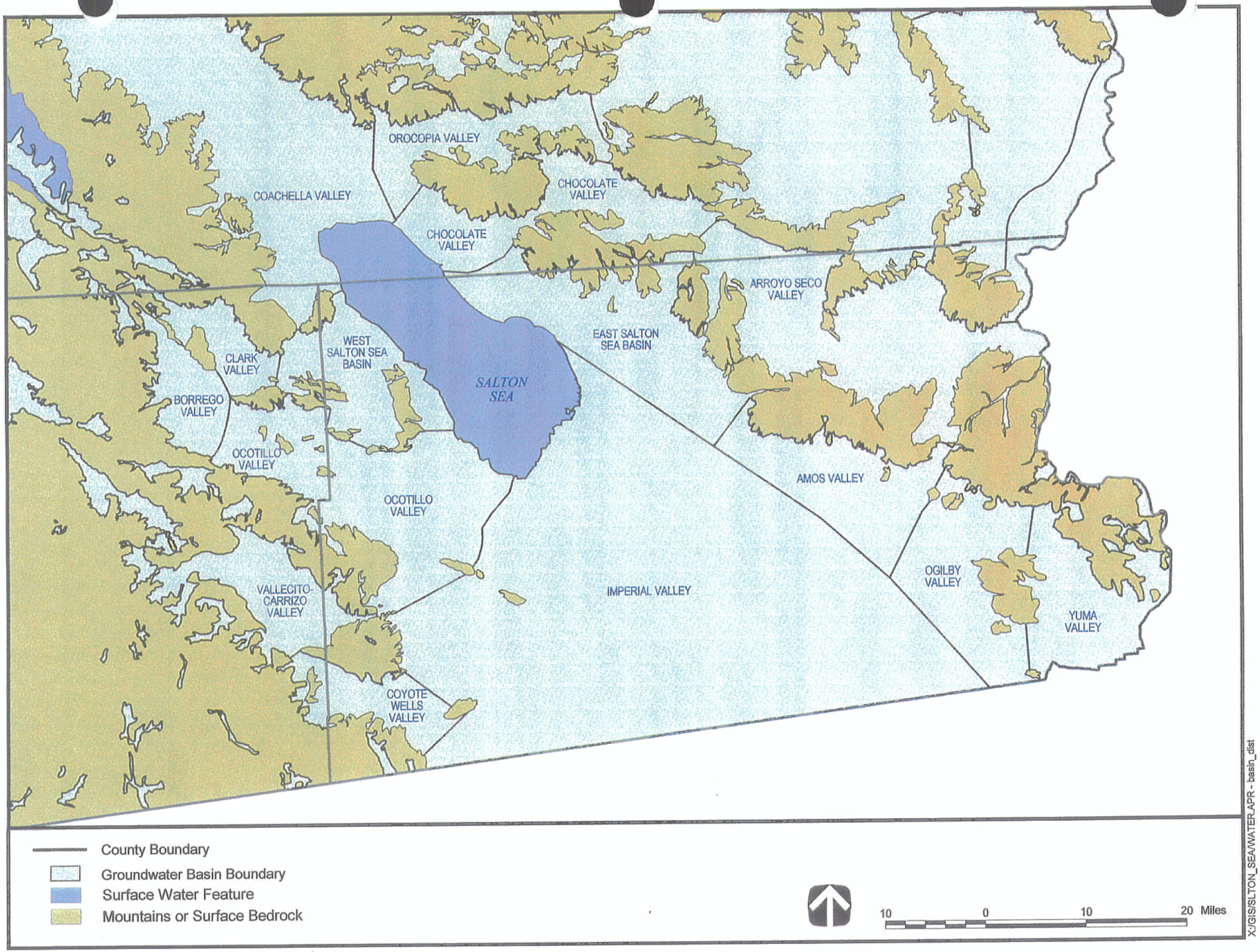

Figure 2-7 Groundwater Basins for Study Area

brought in by the Colorado River (Loeltz *et al.* 1975). Well-sorted, fine-to-medium sand of windblown origin overlies the confining lacustrine clay layers (Bureau of Reclamation 1989).

2.1.5.2 Hydrogeology

Recharge to the groundwater reservoir by underflow from tributary areas is small compared with recharge from the imported Colorado River water. Groundwater underflow from tributary areas in the San Felipe Creek drainage basin in western Imperial Valley is about 10,000 acre-feet per year. Total recharge to the groundwater system from precipitation within the valley has been estimated to be somewhat less than 10,000 acre-feet per year (Loeltz *et al.* 1975). However, the U.S.G.S. model for the Ocotillo area (Skrivan 1977) cites a more reasonable recharge rate of 0.02 inch per year, which equates to approximately 800 acre-feet of recharge per year, over the 0.5-million-acres of unirrigated land in the Imperial Valley.

Regional groundwater generally mimics surface flow, moving toward the axis of the valley and then northwest towards the Salton Sea. The principal area of discharge is the central, cultivated part of the valley. While the amount of water stored in the Imperial Valley groundwater basin is large, few wells have been drilled for production purposes because the yield is low and the water is of poor quality (Montgomery Watson 1995). The storage capacity of the Imperial Valley groundwater basin has been estimated as approximately 14 million acre-feet (California State Department of Water Resources 1975) and 7 million acre-feet (County of Imperial General Plan 1997).

2.1.5.3 Interaction with Surface Waters and Wetlands

Major sources of groundwater recharge to the aquifer include seepage from the unlined portions of the AAC and CB, percolation in the agricultural fields and the extensive canal network in central Imperial County, mountain-front recharge along the edges of the valley floor, recharge during high flow years in the Colorado River in Mexico, and Colorado River water diverted for use in Imperial Valley.

Major sources of groundwater discharge from the aquifer include; groundwater discharging directly into the New and Alamo Rivers and the Dran La Mesa in Mexico, pumping in Mexicali Valley, drainage of intercepted shallow groundwater from the agricultural fields and the extensive drain network in central Imperial County, and subsurface discharge into the Salton Sea. In addition, springs northeast of the Salton Sea are associated with discharge of groundwater along the San Andreas Fault system. Phreatophytes also

remove groundwater by evapotranspiration in areas where the groundwater table is shallow, especially near the AAC and CB.

2.2 LAND USE

The Imperial Valley is predominantly an agricultural region. Approximately one-fifth of the nearly 3 million acres of Imperial County is irrigated for agricultural purposes. In addition, approximately 50 percent of County lands are largely undeveloped and under federal ownership. Figure 2-6a illustrates the extensive nature of irrigated areas in the central Imperial Valley, where red areas indicate vegetation on the infrared image. The developed areas in which the incorporated cities, unincorporated communities, and supporting facilities are situated comprise less than one percent of the land surface (County of Imperial General Plan 1977). The seven incorporated cities in the County are Brawley, Calexico, Calipatria, El Centro, Holtville, Imperial, and Westmorland. State, Indian, and private land make up approximately 24 percent of the land surface, and the surface of the Salton Sea makes up the remaining 7 percent.

2.3 WATER USE

2.3.1 Surface Water

The existence of surface water, with the exception of San Felipe Creek and groundwater discharging springs to the northeast, is dependent primarily upon the inflow of irrigation water from the Colorado River. Generally, surface water is nonpotable without treatment. Figure 2-8 shows water use for the study area.

There are three general categories that describe surface water in Imperial Valley. They are freshwater, brackish water, and saline water. The freshwater (with TDS generally less than 1,000 ppm) includes the AAC and other canals and laterals that deliver irrigation water to the agricultural areas. The brackish water (with TDS in the range of 2,000 to 4,000 ppm) includes the Alamo River, New River, and the agricultural drains that flow into these rivers or directly into the Salton Sea. The Alamo River derives nearly all of its flow from irrigation water return in Imperial County. The New River derives roughly 65 percent of its flow from irrigation water return in Imperial Valley, with the remaining 35 percent derived from inflow from the Mexicali Valley across the international border.

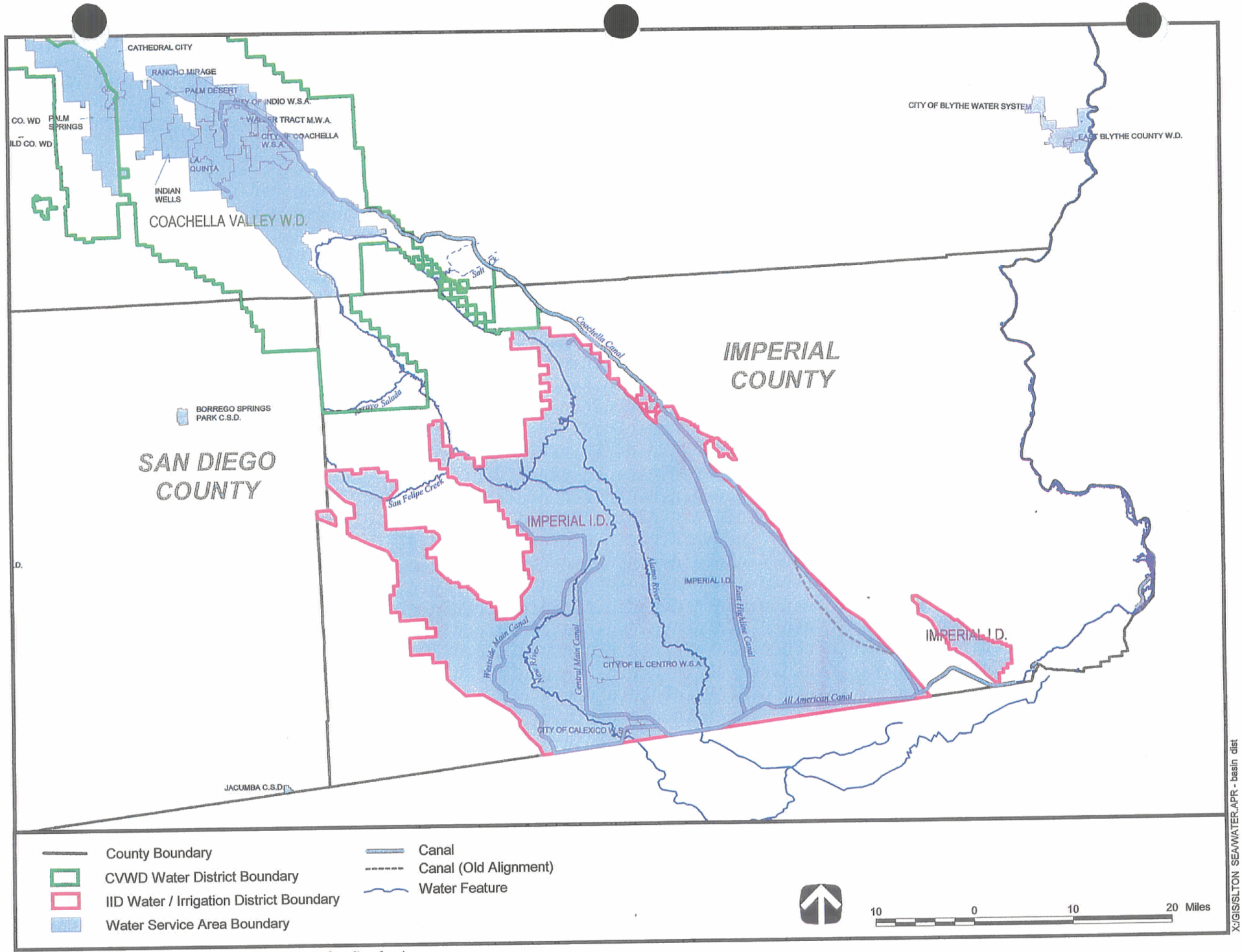

Figure 2-8 Water District Boundary Map for Study Area

2.3.2 Groundwater

The Imperial Basin contains a large area of poor quality groundwater that is unsuitable for domestic or irrigation use. The chemical quality of groundwater in the Imperial Valley differs greatly. Total dissolved solids (TDS) range from a few hundred to more than 10,000 milligrams per liter (mg/L). Generally, groundwater that is derived locally from recent precipitation and that has not yet reached the more saline deposits of the central part of the valley contain only a few hundred mg/L of dissolved solids.

The extent to which groundwater is used for domestic or irrigation purposes in the central part of Imperial Valley is not known, but on the basis of past attempts to develop usable water in this part of the valley, such occurrence is thought to be extremely limited. Concentrations of fluoride higher than the concentration recommended for drinking water are common, as are concentrations of boron higher than those recommended for certain agricultural crops.

2.3.3 Agricultural Irrigation

Over 120 types of crops are grown in Imperial County, including field crops (such as alfalfa) and row crops (such as lettuce, carrots, and melons). The agricultural system is currently diversifying by the establishment of aquaculture and possible reintroduction of significant dairy production. The numerous canals, irrigated fields, reservoirs and evaporation ponds, aquaculture facilities, and the Salton Sea provide important habitats for various listed, protected, and other animal, bird, reptile, and fish species (County of Imperial General Plan 1997).

Imperial County covers an area of 4,597 square miles or 2,942,080 acres. Approximately 20 percent of the land is irrigated for agricultural purposes, most notably the central area of Imperial Valley. In the Imperial Valley, approximately 2.9 million acre-feet of water is delivered annually to over 500,000 acres of agricultural land.

2.3.4 Wetlands (Phreatophyte Losses)

For the wetlands described in more detail in Section 2.1.4.3, a generally conservative evapotranspiration rate (EVT) of 4 to 5 feet per year has been used in areas dominated by natural and/or induced phreatophyte growth (Bureau of Reclamation 1993).

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