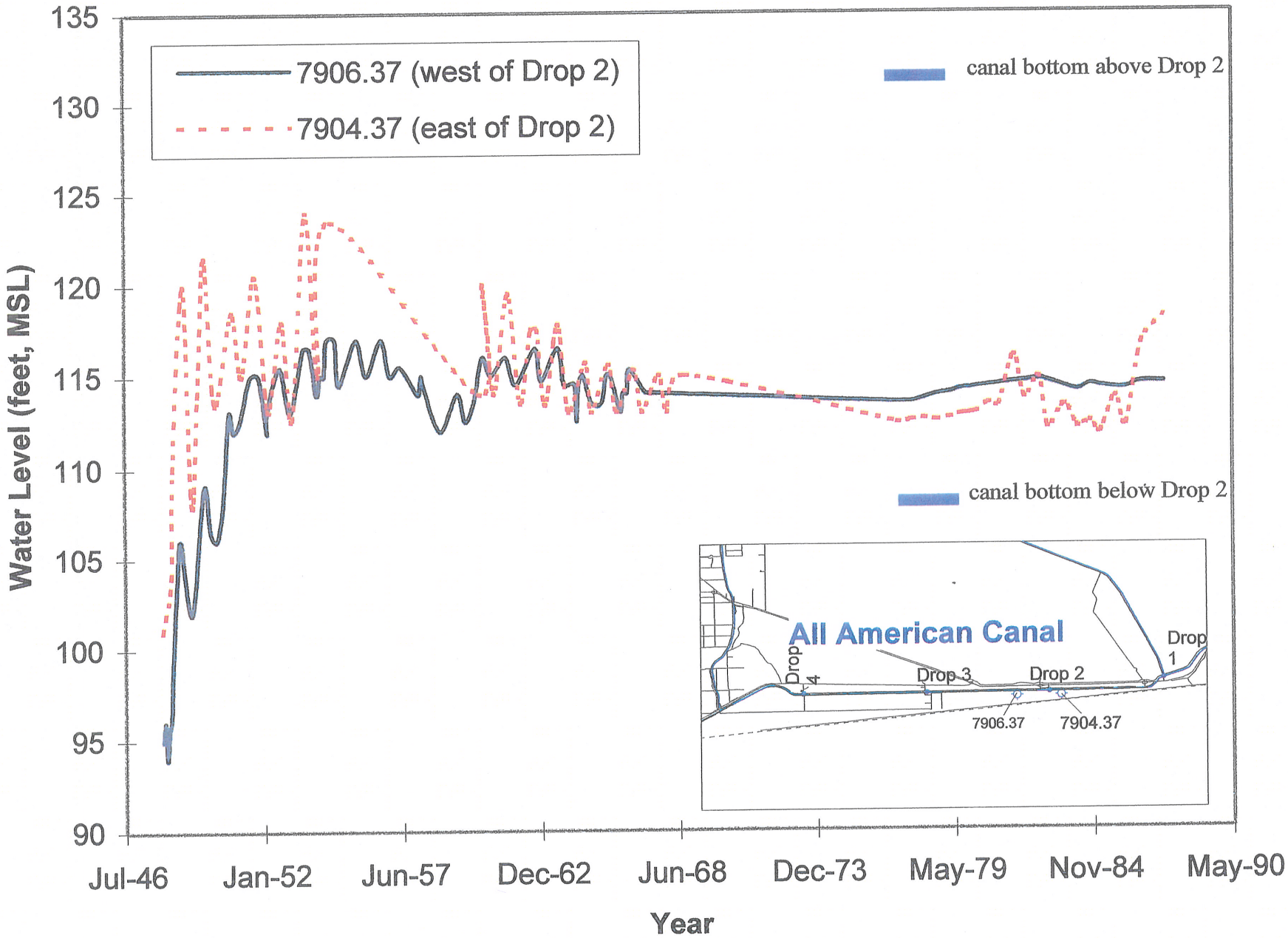

Figure 4-4. Groundwater levels for two wells along the AAC

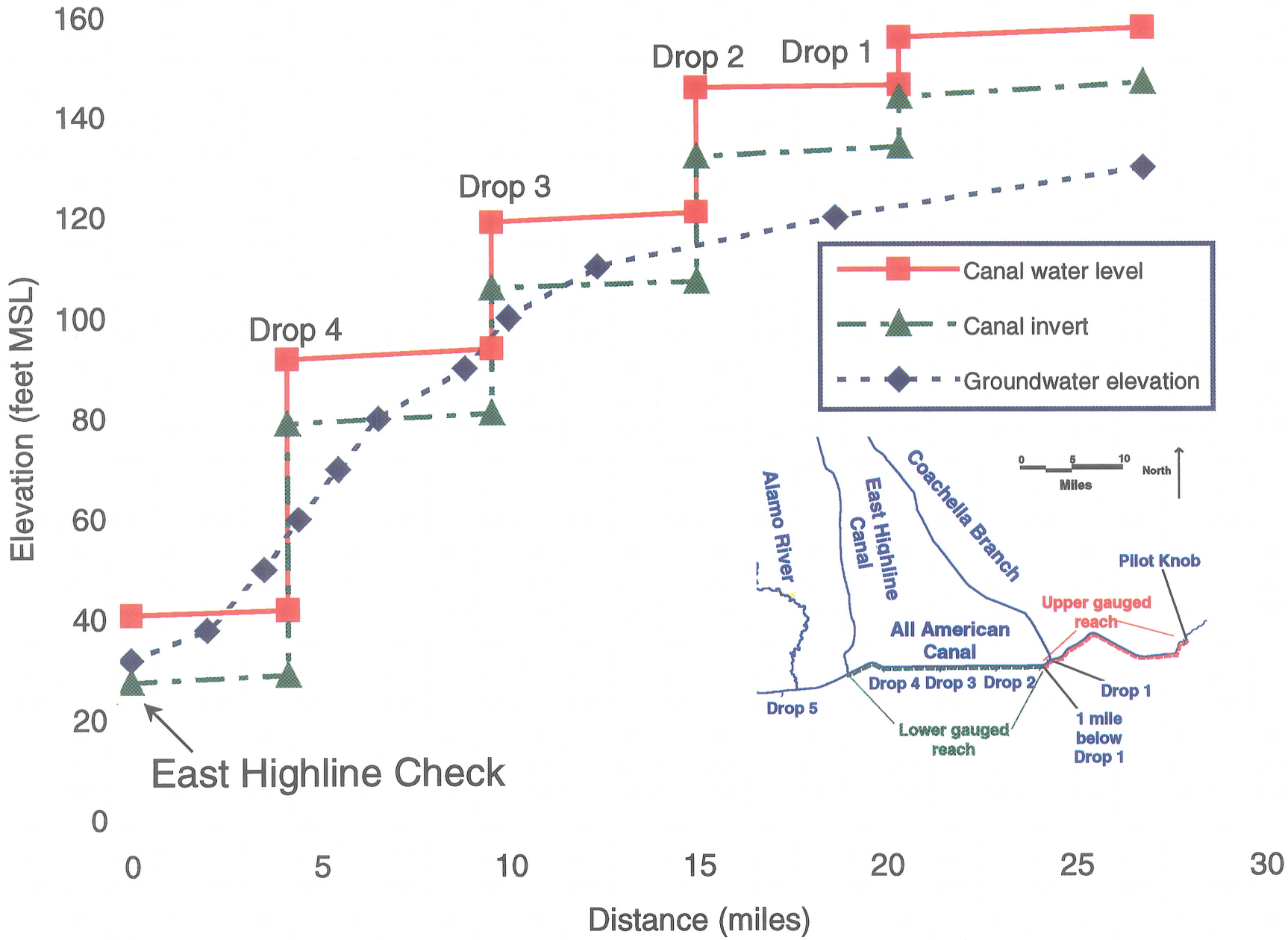

Figure 4-5. Groundwater and Canal Bottom Elevations Along the AAC in 1965.

The water-level rise in East Mesa wells 7906.37 and 7904.37 indicates that by the 1960s, the rising groundwater table attributable to canal seepage had stabilized in a near steady-state condition. Figures 4-6 and 4-7 depict the 1965 water levels and the changes that had occurred in water levels from 1939 to 1965 along the AAC. Note that a significant groundwater mound has risen approximately 40 feet beneath the canal relative to pre-canal conditions. Groundwater flow directions are both northward and southward, away from the mounding water table under the AAC.

4.2.3 Impacts of the CB Lining

The first 49 miles of the Coachella Branch canal were lined in 1979, reducing seepage along this section. Water levels for several wells near the turnout of the CB are presented in Figure 4-8. Well 6905.83, located 7.5 miles north of the CB turnout from the AAC, dropped more than 7 feet since the 1979 lining. In contrast, Wells 72006.69 and 7903.37, located along the AAC, have not declined since the 1979 lining. Although water levels dropped significantly along most of the first 49 miles of the CB after its lining, the water levels immediately along the AAC did not decline in response to the Coachella Branch lining.

4.2.4 Current Conditions

Groundwater level contours for the East Mesa and Mexicali areas adjacent to the AAC in 1993 are presented in Figure 4-9. In the vicinity of the AAC, water level contours were generally quite similar to those under 1965 conditions. However, groundwater declined north of the AAC along the CB as a consequence of its lining, and remained relatively stable south of the U.S.-Mexico border. The water levels in the Mexicali area fluctuate, rising periodically due to excess Colorado River flows into Mexico and falling periodically due to pumping. There is no apparent long-term rising or falling trend in the water levels in the Mexicali area. Groundwater levels between the Cargo Muchacho Mountains and Pilot Knob are also higher in 1993 than the 1960s.

The change in groundwater levels from 1939 to 1993 is given in Figure 4-10. The groundwater mound is quite similar to that under 1965 conditions (Figure 4-7) near the AAC, but is smaller along the CB due to its 1979 lining. The maximum increase in the water table level is 40 feet in 1993, the same as under 1965 conditions. The exception is between the Cargo Muchacho Mountains and Pilot Knob, where water levels have risen over 10 feet alone in the 1990s.

4.3 WETLAND DEFINITION ALONG AAC

The depth to groundwater along the AAC from Drop 1 to the East Highline canal in 1965 is given in Figure 4-11. Between Drop 3 and Drop 4, the water table is very shallow at depth of 6 feet or less below ground surface. There is a large area between Drops 3 and 4 where the water table is less than 10 feet below ground surface. This shallow groundwater correlates well with the 1,422 acre wetlands complex previously mapped along this section of the canal.

4.4 ALL AMERICAN CANAL SEEPAGE FATE

From 1948 to 1988, seepage from the AAC between Pilot Knob and the East Highline Check totaled 4,929,000 acre-feet, with 3,105,000 acre-feet (63%) in the upper gauged reach and 1,824,000 acre-feet (37%) in the lower gauged reach (Bureau of Reclamation 1991). Seepage from the first 49 miles of the CB prior to its 1979 lining was 4,810,000 acre-feet.

Seepage from the AAC and CB has resulted in significant mounding of the groundwater table beneath the AAC as depicted in Figures 4-7 and 4-10. The lining of the first 49 miles of the Coachella Branch in 1979 reduced the mounding along the CB in East Mesa, but had very little impact on the water levels along the AAC. There was virtually no change in the water table from lining the first 49 miles of the Coachella Branch observed immediately at the turnout from the AAC. However, because the groundwater gradient away from the AAC near the CB turnout did change after the lining of the first 49 miles of the Coachella Branch, the fate of the AAC seepage may be different for the 1965 and 1993 conditions. Note that this section discusses the fate of AAC seepage based on both 1965 and 1993 water table conditions; 1993 is the most recent period for which data are available for the Mexicali Valley.

4.4.1 Canal-Induced Aquifer Storage

An increase of 1,500,000 acre-feet of aquifer storage can be calculated for the water table rise depicted in Figure 4-7 using a specific yield of 20 percent for the East Mesa sediments (Bureau of Reclamation 1988). The increase in groundwater storage in East Mesa between 1939 and 1979 was previously estimated to be 700,000 acre-feet for the area between the Coachella Branch and the East Highline Canal (Le Roy Crandall and Associates 1983). An increase in groundwater storage of 590,000 acre-feet is estimated for the same area using the data in Figure 4-7. This value increases to 660,000 acre-feet using