



# Ecological Dynamics of Wetlands at Lisbon Bottom, Big Muddy National Fish and Wildlife Refuge, Missouri

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Chapter 1

## **Hydrology of Lisbon Bottom**

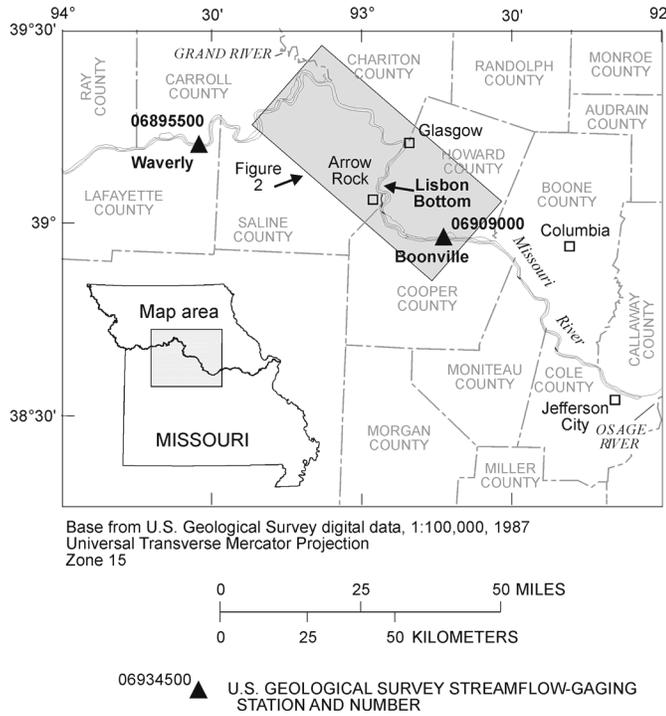
by Robert B. Jacobson and Brian P. Kelly

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Big Muddy National Fish and Wildlife Refuge, Columbia, MO  
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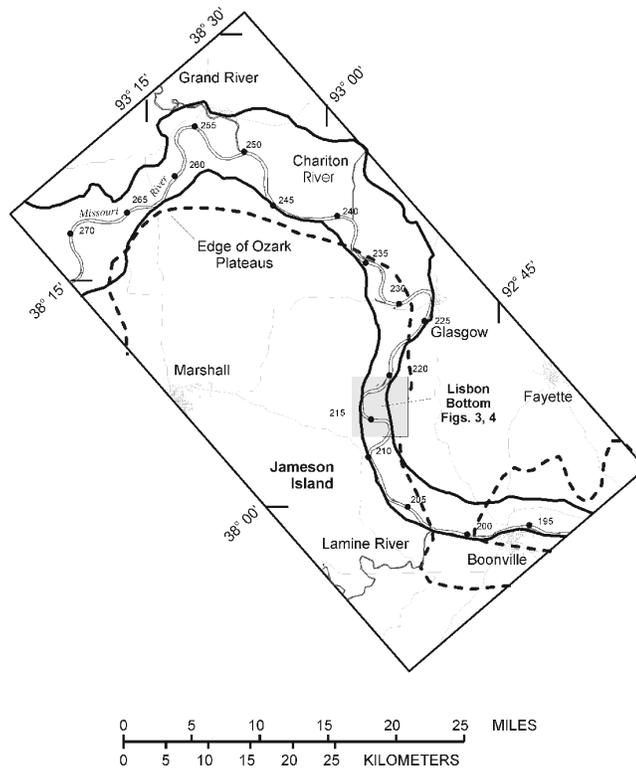
Open-File Report 2004-1036

U.S. Department of the Interior  
U.S. Geological Survey





**Figure 1-1.** Location of Lisbon Bottom and nearby stream gages on the Lower Missouri River.



**Figure 1-2.** Location of Lisbon Bottom and Jameson Island within the Grand-Osage segment of the Missouri River.

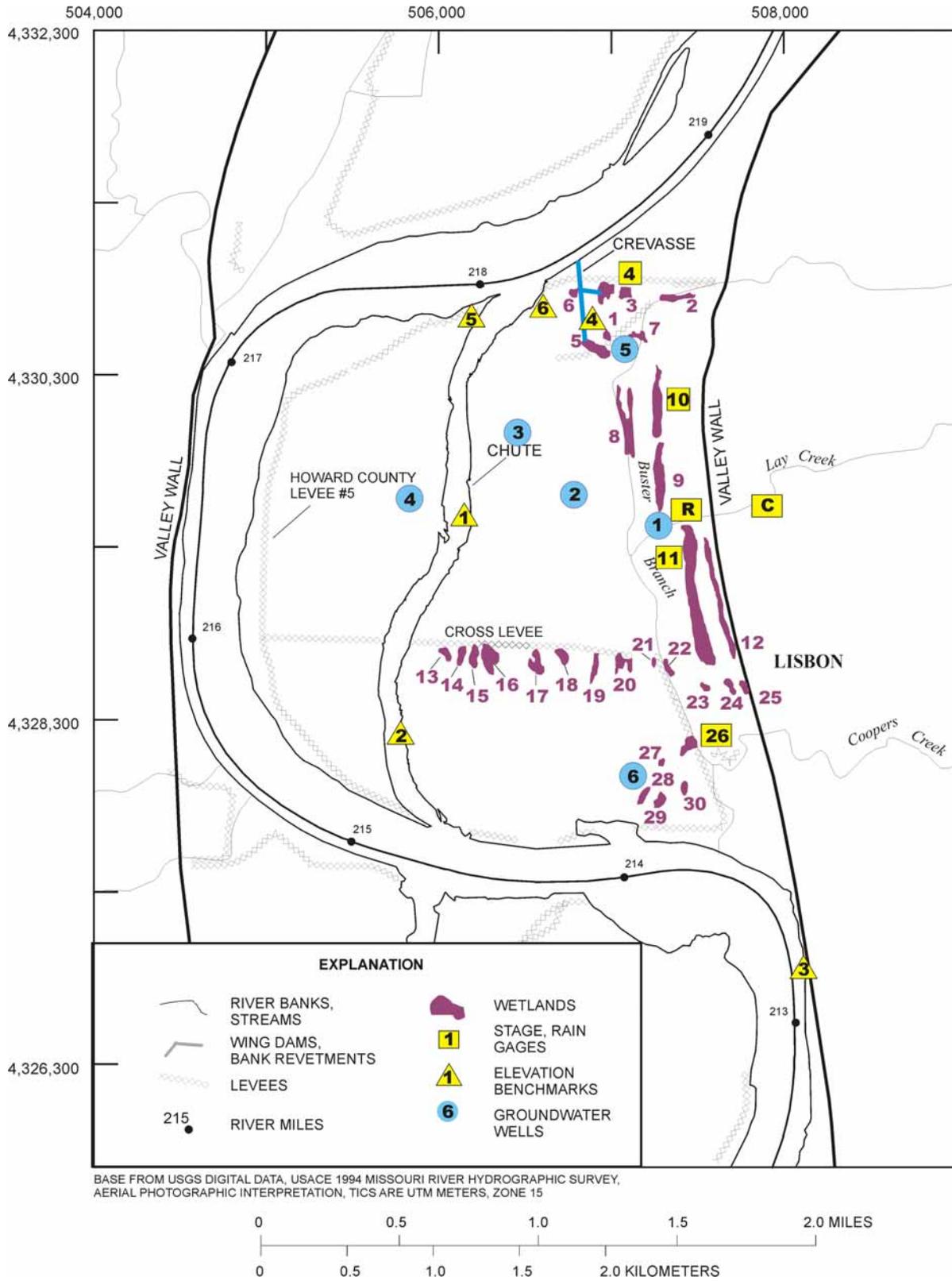
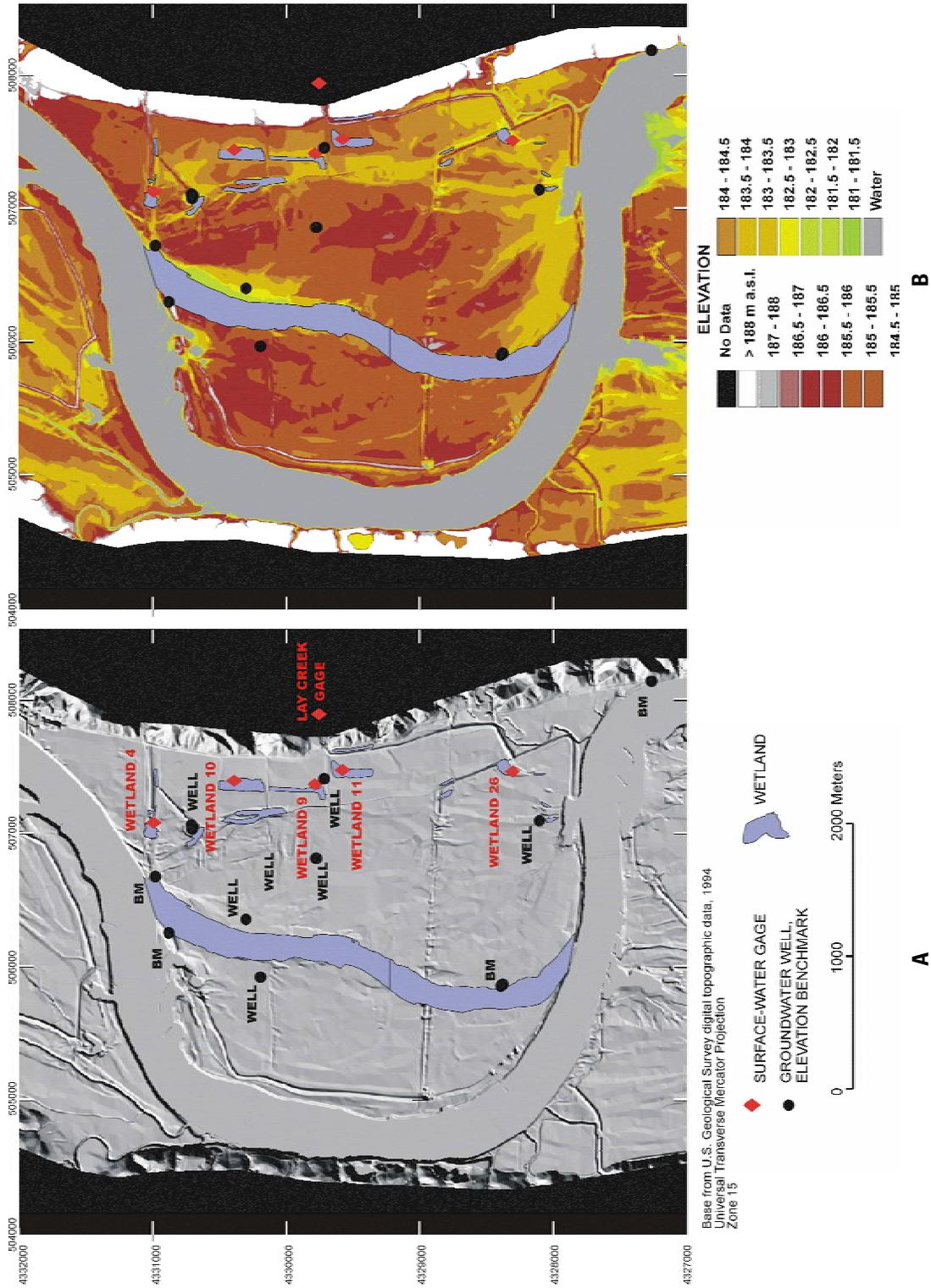
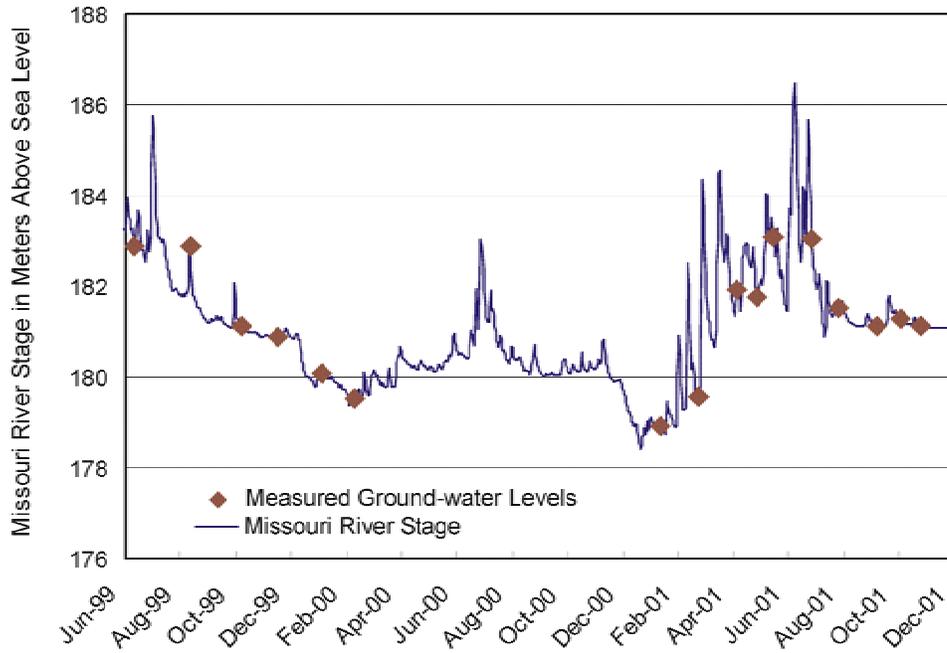


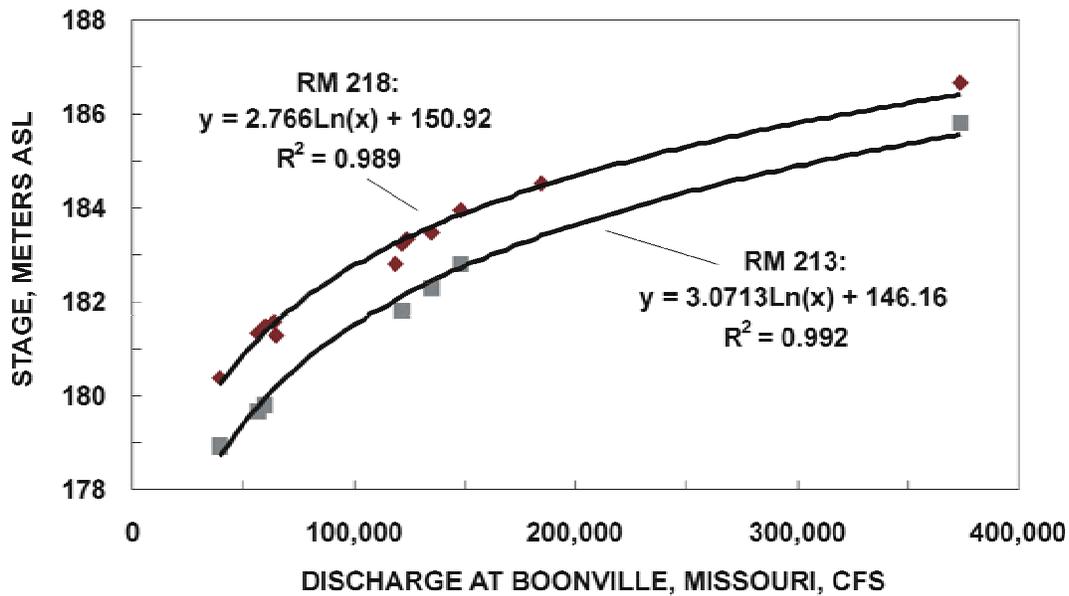
Figure 1-3. Detailed location of Lisbon Bottom showing geographic features, wetlands, and instrumentation.



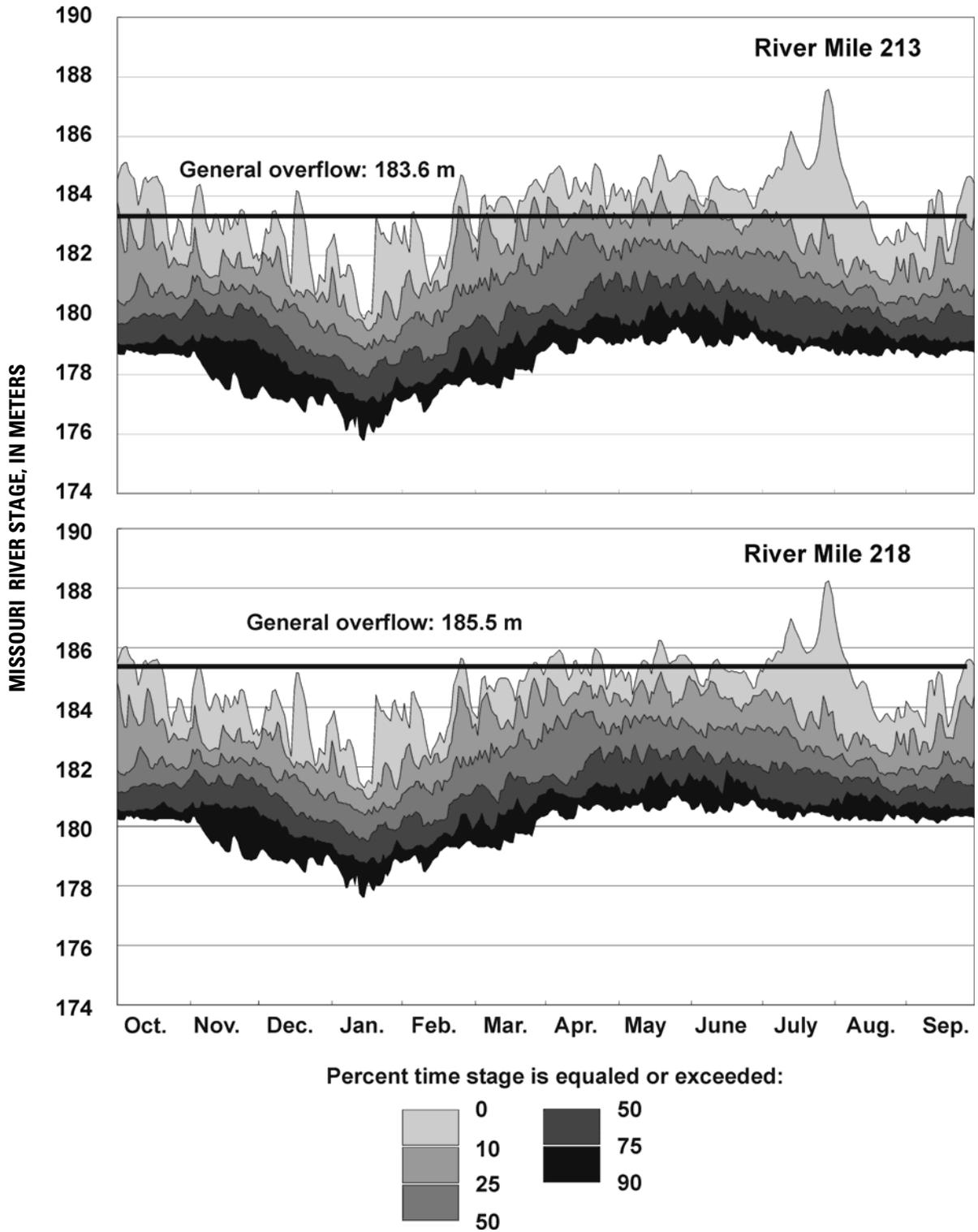
**Figure 1-4. A.** Shaded relief map of Lisbon Bottom showing wetlands, groundwater wells, and instrumentation in hydrologic study. **B.** Elevation map of Lisbon Bottom showing general topography.



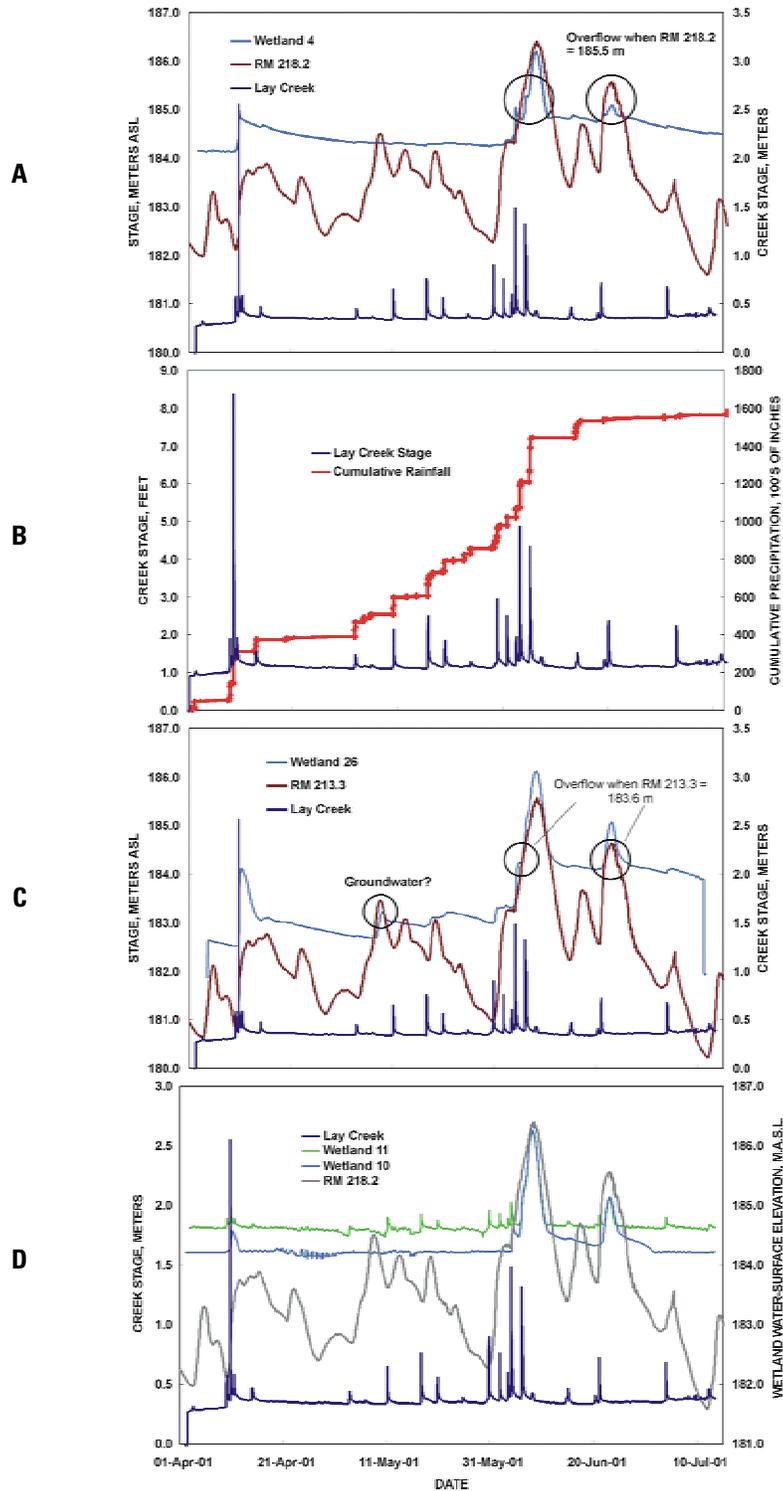
**Figure 1-5.** Missouri River stage at RM 218.5 and dates of ground-water measurements at Lisbon Bottom.



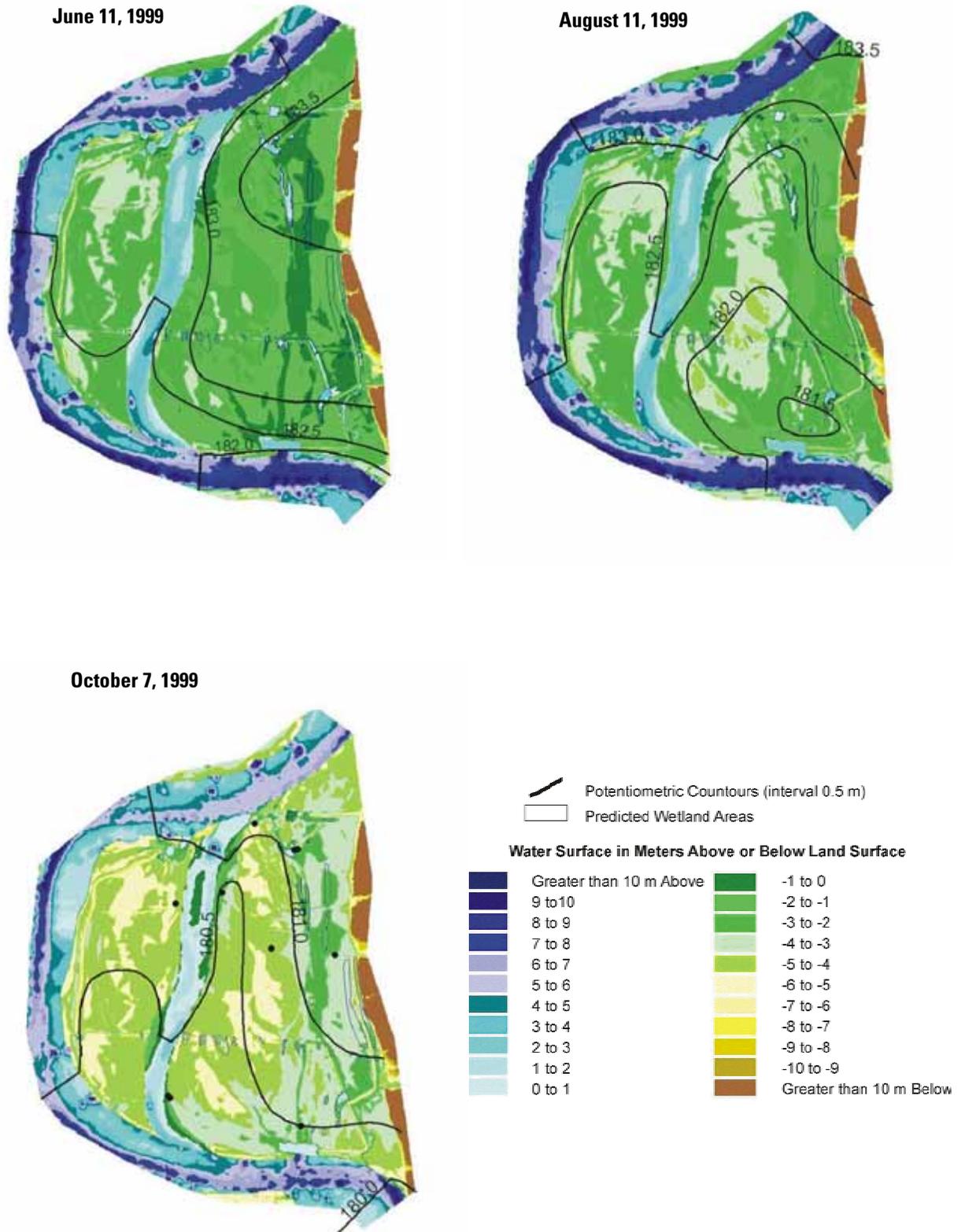
**Figure 1-6.** Stage-discharge relations for the Missouri River at Lisbon Bottom, River Miles 213.3 and 218.2.



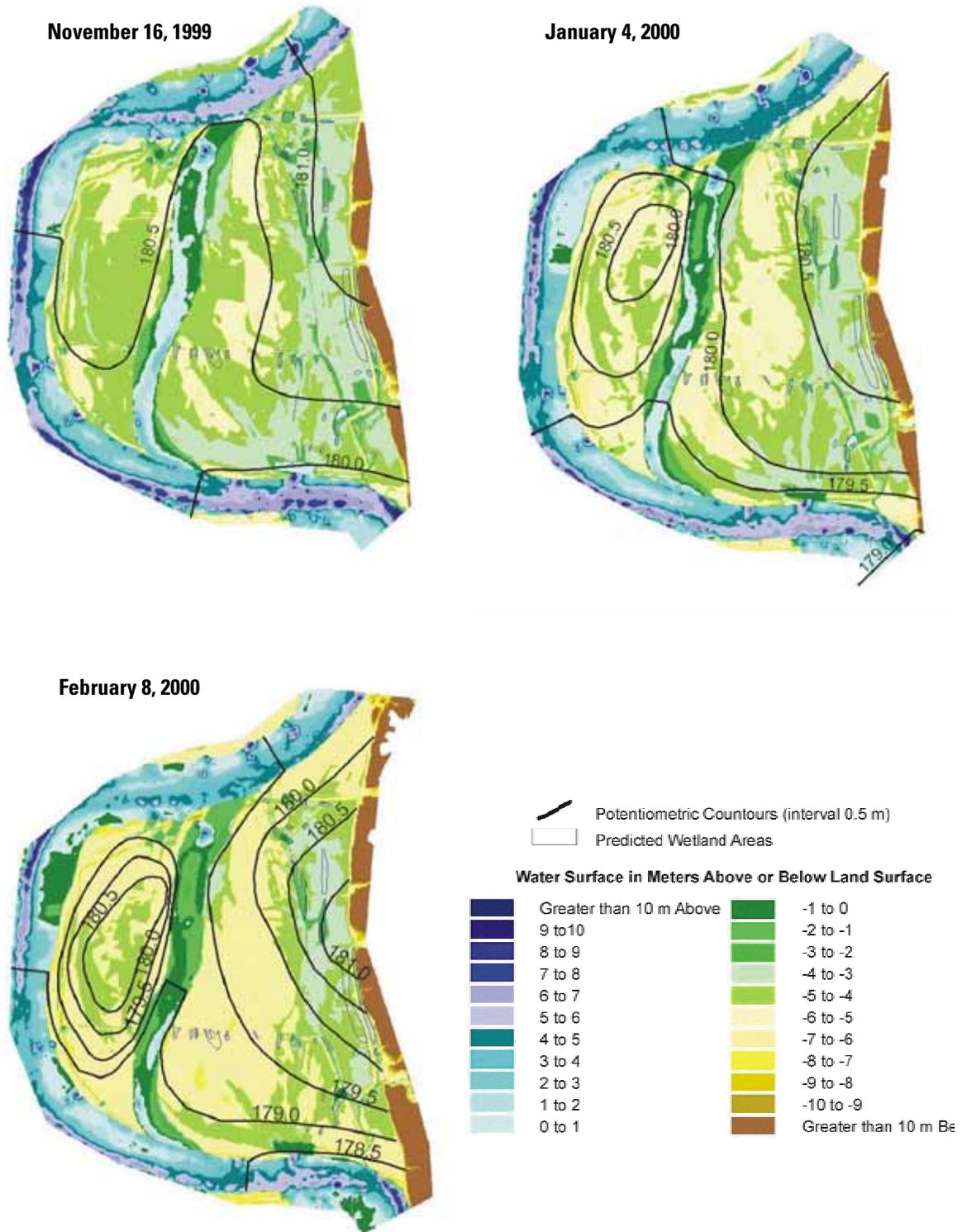
**Figure 1-7.** Stage-frequency diagrams for the Missouri River at River Miles 213.3 and 218.2. The frequency of flow is circulated for each day of the year for the 33-year post regulation historical record, 1967–2000.



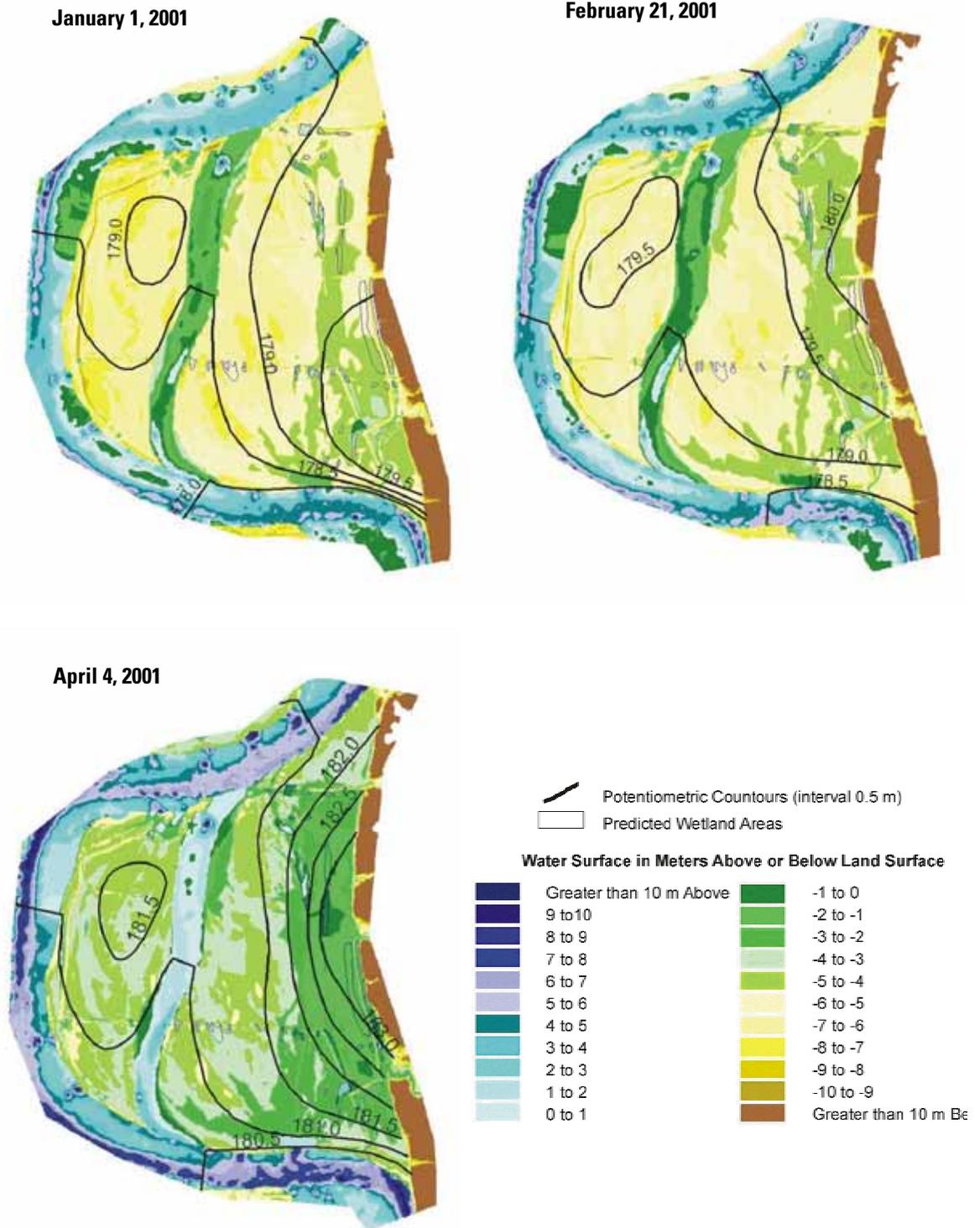
**Figure 1-8. A.** Water-surface elevation in Wetland 4, Missouri River stage at RM (river miles) 218.2, and stage in Lay Creek, April 1, 2001–July 14, 2001. **B.** Cumulative rainfall and stage in Lay Creek, April 1, 2001–July 14, 2001. **C.** Water-surface elevation in Wetland 26, Missouri River stage at RM 213.3, and stage in Lay Creek, April 1, 2001–July 14, 2001. **D.** Water-surface elevation in Wetlands 10 and 11, Missouri River stage at RM 218.2, and stage in Lay Creek, April 1, 2001–July 14, 2001.



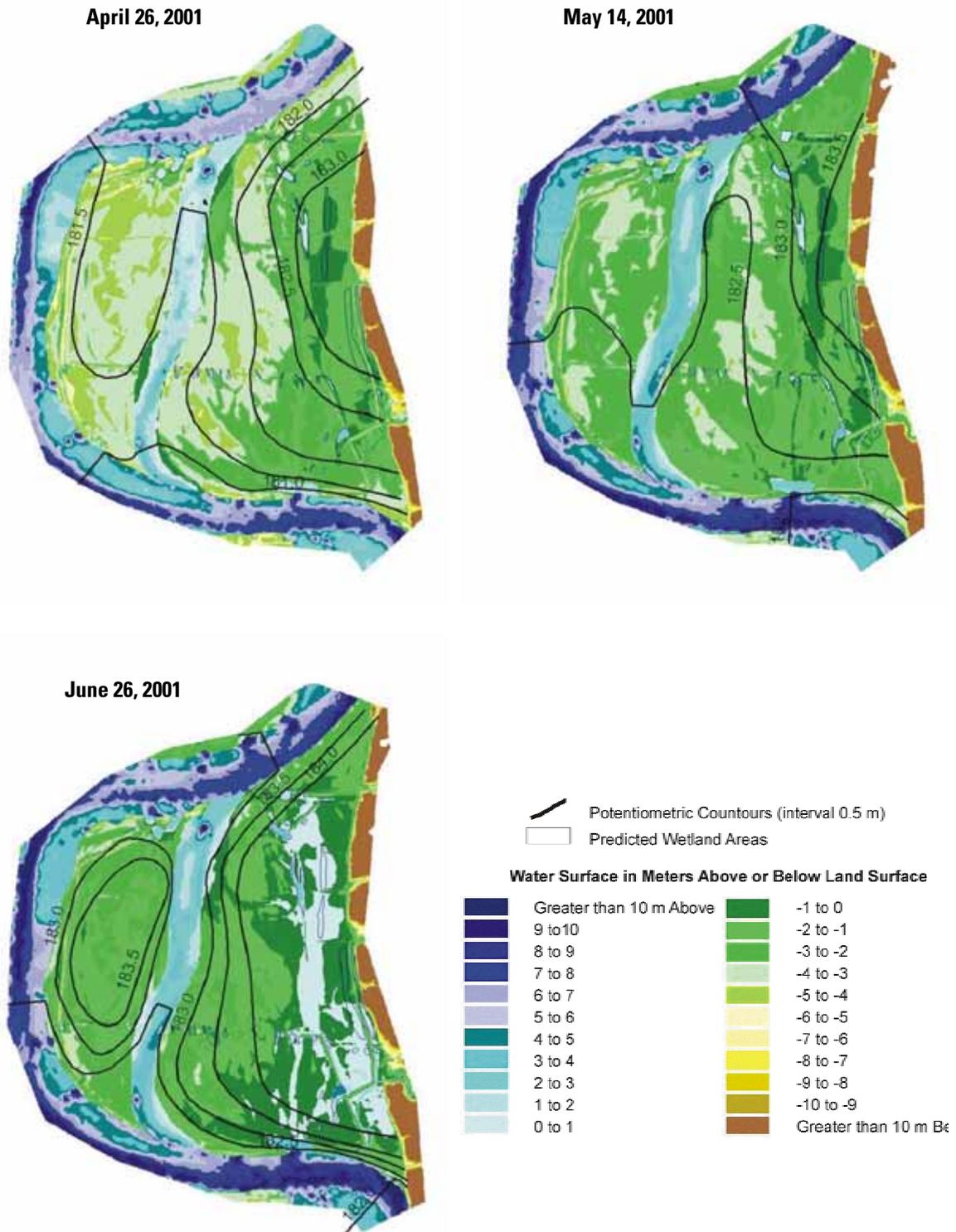
**Figure 1-9.** Potentiometric contours and distance of water surface above/below land surface on dates indicated.



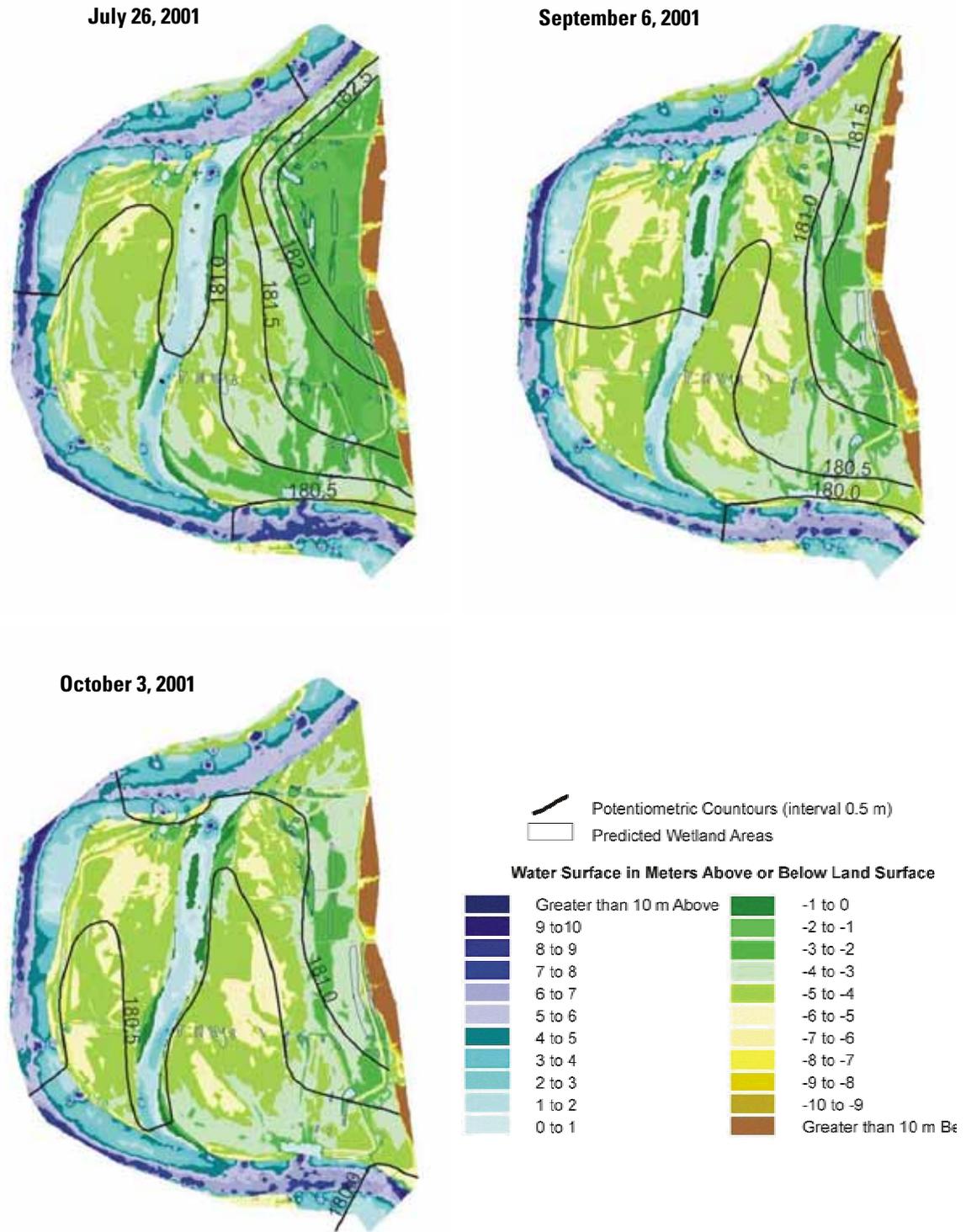
**Figure 1-9.** Potentiometric contours and distance of water surface above/below land surface on dates indicated—Continued.



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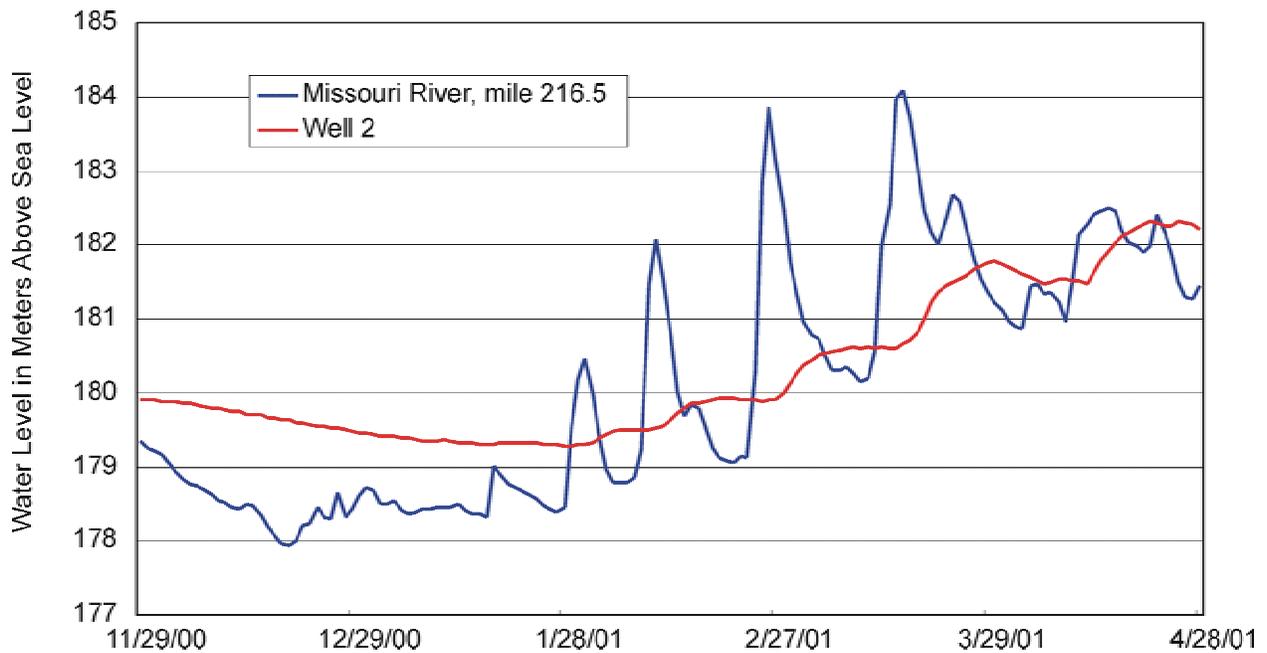
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**Figure 1-10.** Missouri River stage at RM 216.5 and Well 2 groundwater level, November 29, 2000 to April 28, 2001.