

## Water Quality Management Planning

**B**rown and Caldwell helped the city of Portland, Ore., set priorities for rehabilitating the Columbia River Slough.



**BROWN AND  
CALDWELL**

**Brown and Caldwell helped the City of Portland develop effective management plans to improve the water quality and aesthetics of the Columbia Slough.**

### BACKGROUND

The poor water quality and degraded habitat of the Columbia River Slough have been impediments to Portland's development objectives along the northern boundary of the city. Expanding urban, recreational, and regulatory demands now require the city to improve the slough's aesthetics and water quality.

The Columbia River floodplain, once a complex system of lagoons, marshes, and channels has

suffered devastating changes during Portland's development. Early on, dikes were built and wetlands filled to convert the floodplain into developable land, making the slough little more than a sluggish drainage channel. Subsequent urban expansion has polluted it with industrial waste, combined sewer overflows (CSOs), storm water runoff, and groundwater contaminated by cesspools and septic tanks.

CONTINUED ON BACK

## Solutions

Portland contracted with Brown and Caldwell to help develop effective management plans to improve water quality and aesthetics. Our contributions included:

- Clearly identifying water quality problem areas and focusing management planning on key problems—wet-weather bacteria levels and dry-weather algae growth.
- Setting objectives for site-specific pollutant control options. We formulated management alternatives to promote compliance with the Clean Water Act, including eliminating cesspools and septic tanks, reducing volume and frequency of CSO events, treating dilute sewage before it enters the slough, and augmenting flow during dry weather.
- Working with the public to develop use alternatives for the slough. The final plan reflected public priorities in several combinations of possible uses.
- Developing models to assess potential impacts of water quality management alternatives. Portland used the data to make informed decisions about which alternatives to pursue.
- Using CSO, stormwater, and water quality models to characterize flows and pollutant loads. Modeling also assessed effectiveness of potential control measures, such as reducing the number and duration of CSOs.



The slough's proximity to metropolitan Portland makes it a prime area for urban and recreational development. Brown and Caldwell helped develop appropriate use alternatives that promote compliance with water quality regulations and discharge permits.

### Data

- Slough length: 18 miles
- Drainage area: 34,200 acres
- Land uses: industrial and commercial activity, urban and suburban residences, produce farms, airport open space, and wildlife habitat
- Outfalls: 13 CSOs and more than 100 storm sewers
- Discharge point: Willamette River near confluence with Columbia River
- Relevant regulations: Clean Water Act, National Pollutant Discharge Elimination System permit requirements
- Models used:
  - QUAL2E: a steady-state water quality model that simulates in-stream water quality
  - SIMPTM (Simplified Particle Transport Model): computes urban runoff pollutant loads for storm events
  - SIMCSO: a simplified, planning-level model that describes CSO characteristics from storm event precipitation data

**BROWN AND  
CALDWELL**

Environmental Engineers & Consultants