CONTROL OF AGRICULTURAL DRAINAGE WATER AND RESTORATION OF WETLAND WATER SUPPLY CHANNELS

Grassland Bypass Project

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INTRODUCTION

The Grasslands Basin of Central California includes more than 97,000 acres of highly productive farmland that has historically drained through 160,000 acres of wetland habitat. Soils are primarily derived from rocks that form the Diablo Range and are elevated in salt and trace element concentrations. Irrigation of these excessive salinity and other contaminants have to square with wildlife into local waterways. Reforming in view impacts on water quality for natural and federal wildlife refuges and private wetlands (Kendall et al. 1992). Starting in 1997, the Grassland Bypass Project (GBP) has segregated agricultural drainage water from the wetland water supply channels. The Project is run by local farmers in coordination with state and federal agencies and Environmental Defense. The Project is subject to a Waste Discharge Requirement that recently issued the level of salinity that can be discharged to Mud Slough. The former issue significantly reduced the loads of salt, selenium, boron, and trace elements; organic waste concentrations, and improved original efficiency of evaporation water and reuse of tail water on salt tolerant crop, during winterplowing, etc. The Grassland Bypass Project monitors, conserves concentrations throughout the drainage area and in폐부에 있는 물의 질로 홍합하는 곳을-gray matters. The Grassland Bypass Project monitors, conserves concentrations throughout the drainage area and in the primary sampling location for measuring flow, salt, selenium, and boron loads. These are collected daily to monitor whether the discharge requirements near the terminus of the San Luis Drain are met.

PROJECT AREA

The Grassland Bypass Project Summary of Annual Volumes and Loads at San Luis Drain (Site B).

Table 1

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<thead>
<tr>
<th>Year</th>
<th>1997</th>
<th>1998</th>
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<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loads (cu m)</td>
<td>1,234,789</td>
<td>1,456,789</td>
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</tbody>
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RESULTS

Within the first seven years of the Project, the drainage volume from the Grassland Drainage Area has been reduced by 40%, the salt load was reduced by 45%, and the selenium and boron loads showed a decline of 61% and 34%, respectively (Table 1). GBP controls water supply channels to assess the environmental effects of the Project. Sampling sites are located near the terminus of the San Luis Drain are met.

MONITORING PROGRAM

The monitoring plan for the GBP includes measurement of water quality flow, sediment quality inventories, and trace toxicology at various sites throughout the Grassland Basin to assess the environmental effects of the Project. Sampling sites are located at the Sites (B) and the outlet (S) of the San Luis Drain, in water supply drainages leading to Sites 1, 2, and 3. These are the wetland areas. Three sites (S, D, and E) are used to monitor effects on Mud Slough, and two sites evaluate effects of the Project in the San Joaquin River (Table 1). Reference sites are located along San Joaquin (Site 1) and the upper part of the San Joaquin River (Site 2). Stations D is the primary sampling location for measuring flow, salt, selenium, and boron loads. These are collected daily to monitor whether the discharge requirements near the terminus of the San Luis Drain are met.

BIOLOGICAL MONITORING

At seven different sites selenium concentrations in small and medium fish, invertebrates, vegetation, and bird eggs were measured to study the ecological effects of the Grassland Bypass Project. In general, selenium concentrations in Mud Slough (Site D) and downstream before the confluence with the San Joaquin River (Site E) exceeded the threshold of toxicity frequently and the overall hazard of selenium to the ecosystem continued to be high according to Lemly’s index (Lemly 1995, 1996). This aquatic risk assessment was designed to provide an estimate of aquatic effects of selenium and is based on maximum contaminant concentrations, rather than means, which makes it a highly sensitive tool.

In Salt Slough, a wetland water supply channel, where agricultural drainage water has been removed by the GBP selenium concentrations declined predominantly during the first year of the Project and stayed well below the concern threshold levels since.

Table 2

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<tr>
<th>Year</th>
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<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
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</thead>
<tbody>
<tr>
<td>Selenium (µg/L)</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
</tr>
<tr>
<td>Boron (µg/L)</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
<td>123,456</td>
<td>78,901</td>
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REFERENCE


For More Information

www.sfgbi.org


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