GEOMORPHOLOGY AND SEDIMENTOLOGY OF MAPLE CREEK DELTAIC MARSH IN BIG LAGOON, HUMBOLDT COUNTY, CALIFORNIA

by

John T.C. Parker

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John T. C. Parker

APPROVED BY THE MASTER'S THESIS COMMITTEE

Gary A. Carver

K.R. Aalto

Raymond M. Burke

Andre K. Lehre

APPROVED BY THE DEAN OF GRADUATE STUDIES

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ABSTRACT

Geomorphic and sedimentologic processes have been little studied in northwest California coastal fluvial depositional environments such as the 81-ha Maple Creek deltaic marsh in Big Lagoon, Humboldt County. Numerous investigators have documented effects of land use practices and large, destructive floods on northwest California upper drainage basin slopes and channels including widespread landsliding,coarse-grained overbank deposition, channel aggradation and bank erosion. An investigation of Maple Creek marsh employing detailed mapping of marsh physical features and surficial sediments; examination of 70 cores and borings; and analysis of aerial photographs shows that the effect of large floods and watershed disturbance has been quite limited in that fluvial system.

Depositional environments of Maple Creek marsh include the active channel, the floodplain, flood channels and paleochannels, a peat bog and the delta plain. Coarse-grained sediments are generally confined to channels, but sands and fine gravels episodically deposited in interdistributary bays near the distal margin of the subaerial marsh and at the mouth of the main channel are important elements of floodplain vertical accretion. The Maple Creek floodplain is constructed primarily from overbank deposits resulting from moderate, frequent floods.

The minimum age of the marsh within the study area is 315 years based on historic progradation rates, but that age is probably considerably underestimated due to increased sedimentation rates resulting from watershed disturbance in the 20th century. At least 3, and probably 4, generations of channel development and floodplain formation are preserved as paleochannels on the floodplain surface showing the northeastward migration of Maple Creek until a reversal in migration direction occurred and the channel entered its present course.

Intrinsic geomorphic and sedimentologic agents are more important in governing floodplain formation, channel morphology and migration and distribution of sediments than extrinsic factors. Most important intrinsic conditions seem to be the water level in Big Lagoon, floodplain physiography and floodplain vegetation. Fluctuating water levels in Big Lagoon produce sudden, large changes in Maple Creek base level thereby affecting the geomorphic effectiveness of any given stream discharge. In particular, high lagoon water levels damp the impact of high flood discharges on marsh channels and floodplain surfaces. Floodplain physiography controls the distribution of coarse overbank deposits and affects the rate of vertical accretion. As the floodplain grows by vertical accretion, overbank deposition becomes less frequent and rate of accretion slows. Coarse-grained deposits are not deposited on surfaces above about 0.5 m above mean sea level. Width of the Maple Creek floodplain results in spreading and lowering of flood discharge energy and low gradient of the channel through the study area produces lower stream velocities. Floodplain vegetation stabilizes marsh landforms and promotes deposition on floodplain surfaces and in paleochannels by increasing roughness.