W.E.O.P.

WATERSHED ECOLOGY OUTREACH PROGRAM

TECHNICAL REPORT
MARCH 1995

• 1995 FLOOD •

Photo by Mark Silberstein

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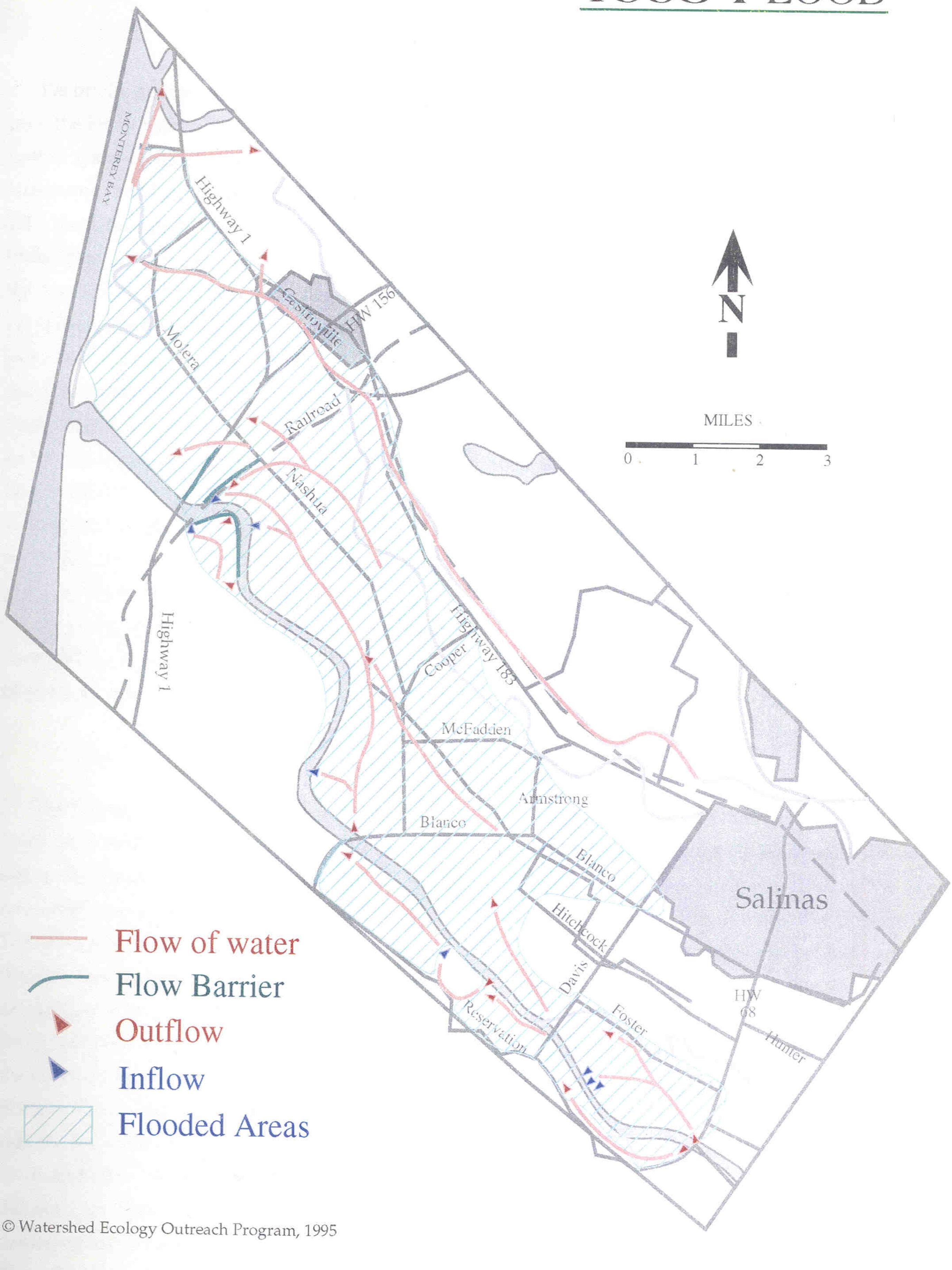
1995 Flood



MONTEREY BAY
Highway 1
Castroville
HW 156
Molera
Railroad
Nashua
Highway 183
Cooper
Highway 1
McFadden
Armstrong
Blanco
Blanco
Hitchcock
Davis
Reservation
Foster
HW 68
Hunter
Salinas
N
MILES
0
1
2
3
Flow of water
Flow Barrier
Outflow
Inflow
Flooded Areas

1995 FLOOD

We briefly describe the 1995 flooding pattern from the lower Salinas River, and suggest a flood control system which annually holds water and protects homes and land from flood damage. On March 12th, the Salinas and Pajaro Rivers flowed over and broke through their containment dikes, producing the largest flood in 100 years. The flood control channel system was too small to accommodate the massive water volume. The flood peaked at 22,500 cubic feet per second along the Pajaro River in a ditch originally designed to overflow at 19,000 cfs. If unprotected by vegetation, much or more of the dikes would have eroded open well before this overflow capacity was reached. More important, the flood control channel system moved water off the land instead of ponding and holding water for our use.

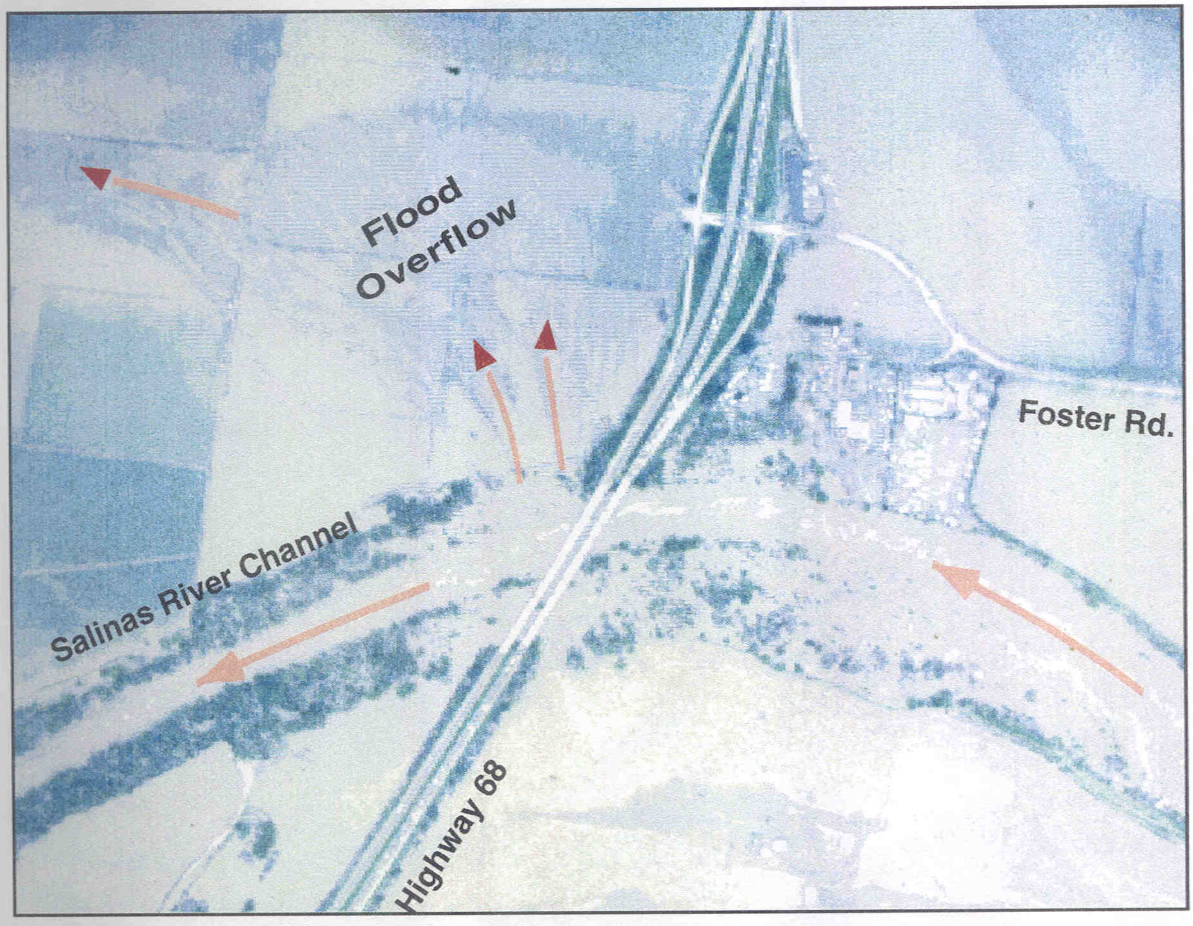
Before the channels were made, natural wet corridors (rivers, creeks, and marshes) held large volumes of water for long periods of the year at groundwater recharge sites throughout the watershed. The wet corridor also provided the best water cleaning system for non-point source pollution, with wildlife habitat and outstanding flood control. This wet recharge system is nearly gone. Salt water intrusion of our aquifers is caused by draining the landscape via the channel system as well as over pumping.

Fresh water is the most precious and limiting resource in all warm temperate climates. The most economically sound water retention and flood control system is the wet corridor in a natural watershed. WEOP is restoring sections of wet corridor in Monterey Bay by widening ditches and spreading water into natural low areas for groundwater recharge, water quality, and flood control. The pattern of flooding from the rivers indicated natural low areas for flood storage as well as roads and other barriers to flood retreat. These barriers pond water and extend flood impacts for many days and weeks.

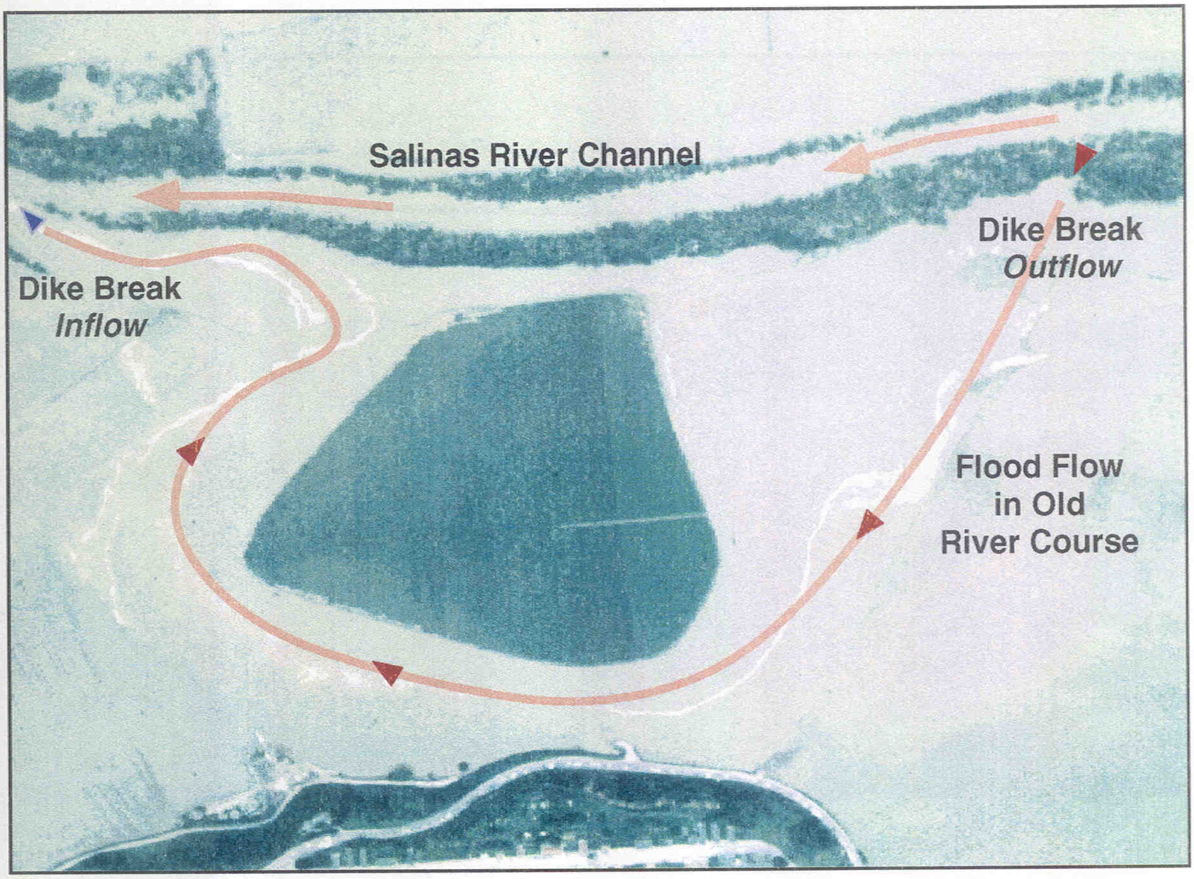
THE FLOODING PATTERN

The flooding events along the lower Salinas River were similar to the upper river and the Pajaro, including river overflow, dike breaks, return flow, and ponding behind roads and other barriers. The river, which had been confined to a narrow flood control channel, overflowed and broke into natural low areas which were once part of the river (Map 1, Picture 1 & 2). At sites like Blanco Road, the overflow eroded a large opening in the dike (Picture 3 & 4). The natural flow of flood water outside the flood control channel was intercepted by roads and other barriers creating flood ponds that did not drain back to the river (Picture 7). The most damaging barrier was Highway 1 next to the Pajaro River. The river dike itself often prevented the return of flood water into the river creating additional flood ponds (Picture 7). Eventually the flood spilled into the river downstream (Picture 5 & 6) or returned by breaking through the dike (Picture 7 & 8), leaving water in low areas and behind barriers.

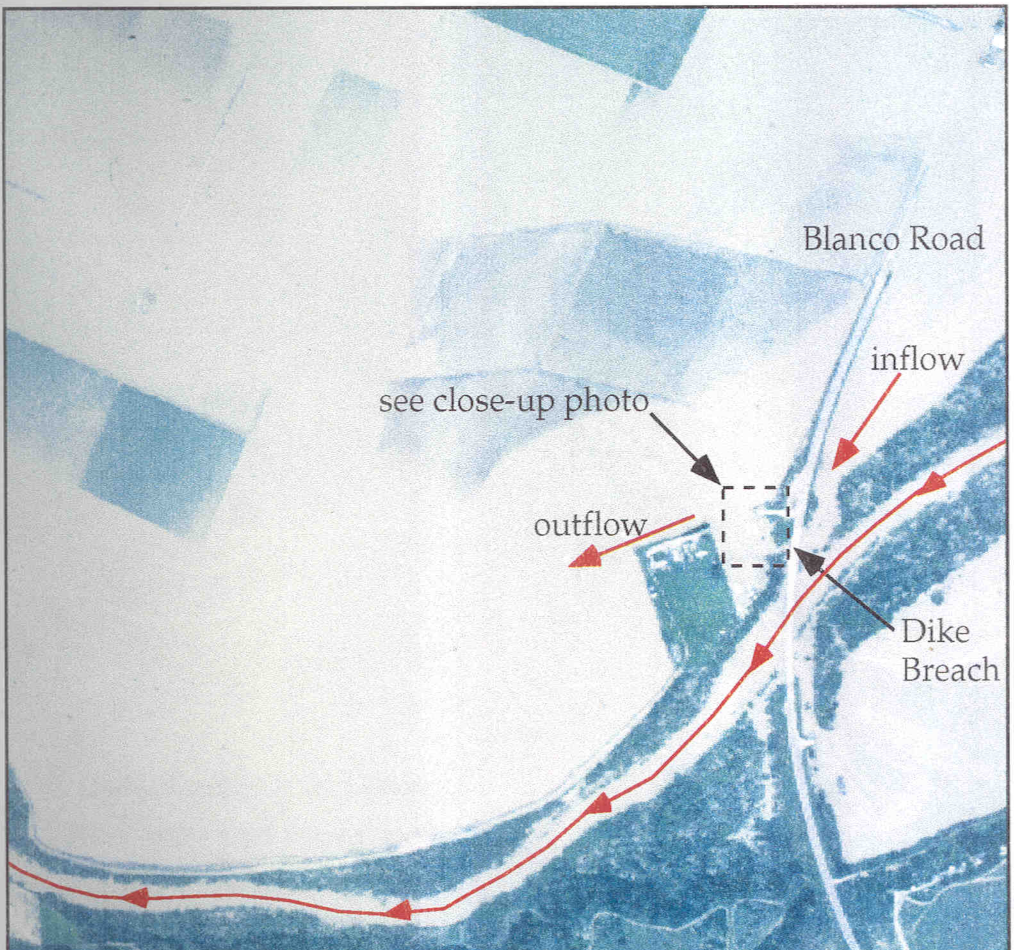
The worst impacts of the flooding were caused by breaking dikes and by ponding flood water behind roads and other barriers. Dike breaks can be prevented by making gradual back slopes and protecting both the front and back dike with erosion resistant native vegetation. Barriers to flood flow outside the main river course can be avoided by diverting flood water over specific spillways where downstream flow is least impacted by barriers.



1. Flood overflow of Salinas River near Highway 68. There is no dike.

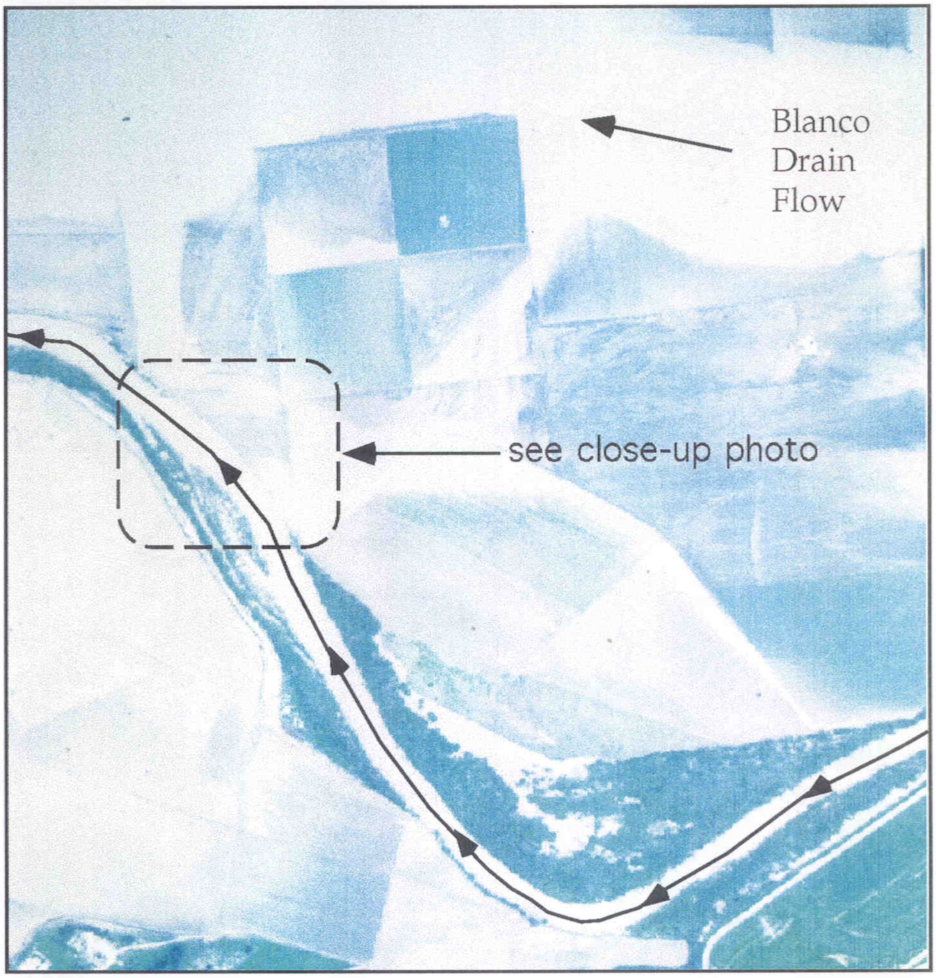


2. Flood flow into an old meander channel of the Salinas River.

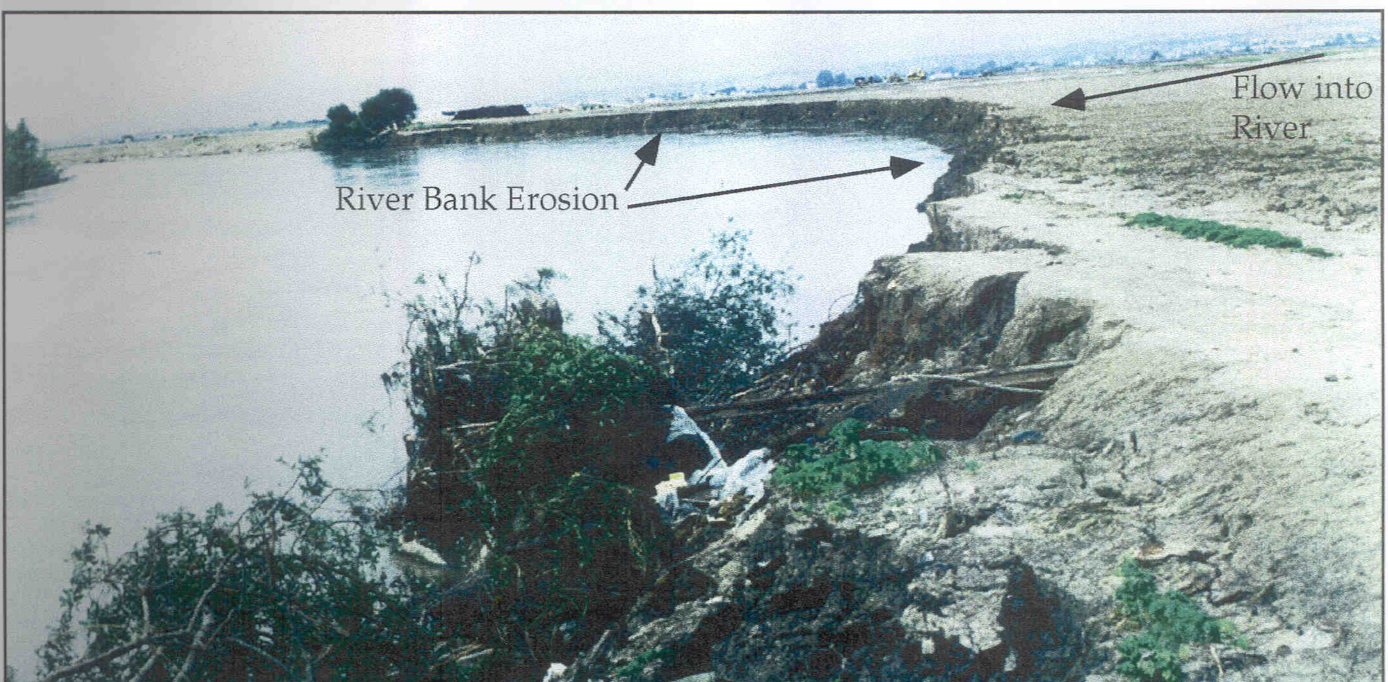


3. Dike break and flood overflow from the Salinas River at Blanco Road.

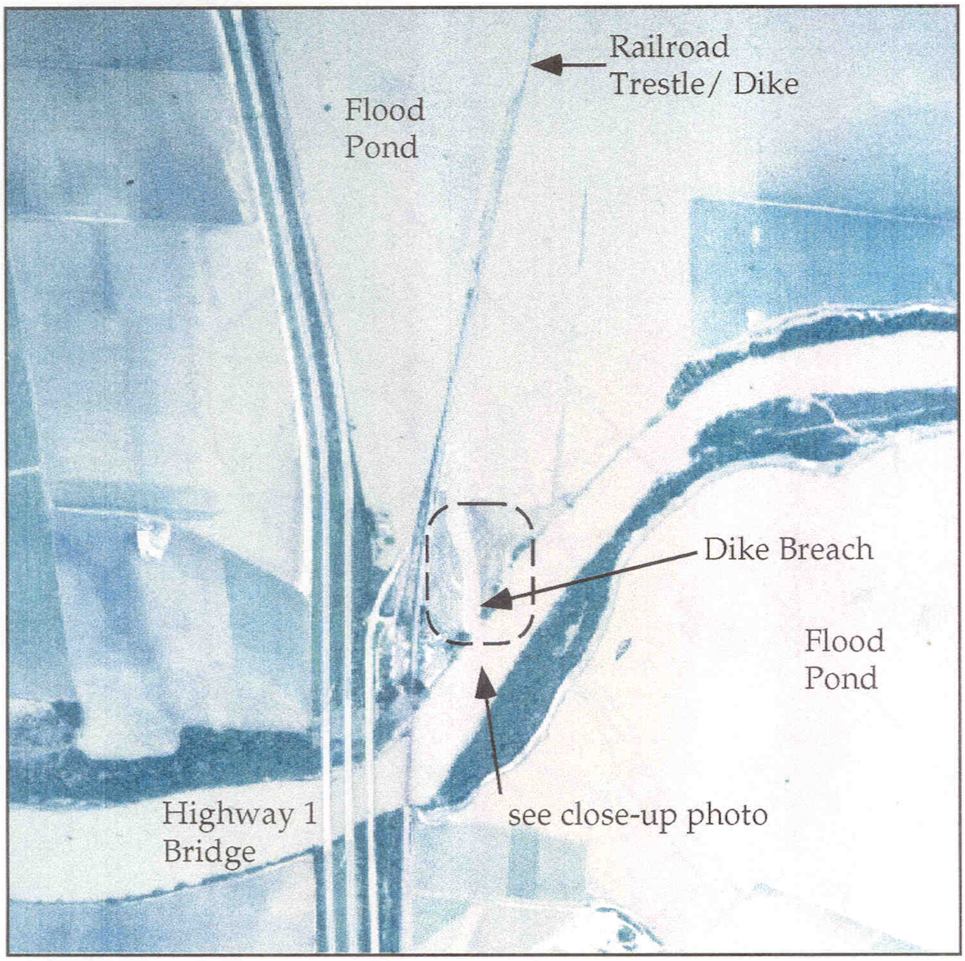
4. Flood flow through the cactus nursery at the Blanco Road dike break.



5. Undiked section of the Salinas River where flood water flowed back into the river.



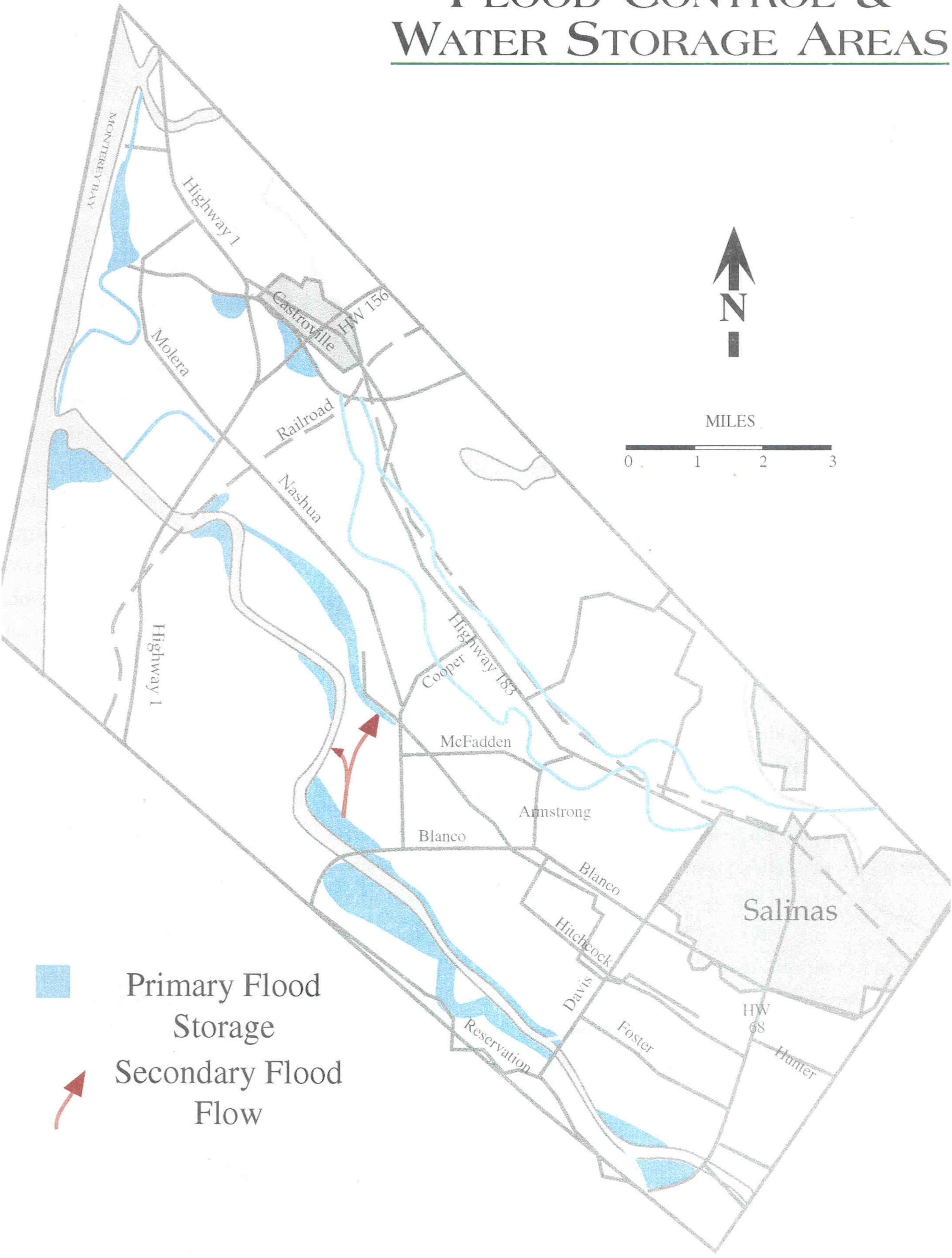
6. Erosion of the river bank by down river currents and flood inflow. The worst bank erosion occurred where there was little or no protecting vegetation.



7. Flood water piled against the railroad dike and broke into the river above the Highway 1 bridge.

8. Ground view of the extensive erosion and deep gully formed as the flood reentered the river above the Highway 1 bridge.

FLOOD CONTROL & WATER STORAGE AREAS



FLOOD CONTROL WITH WATER RETENTION

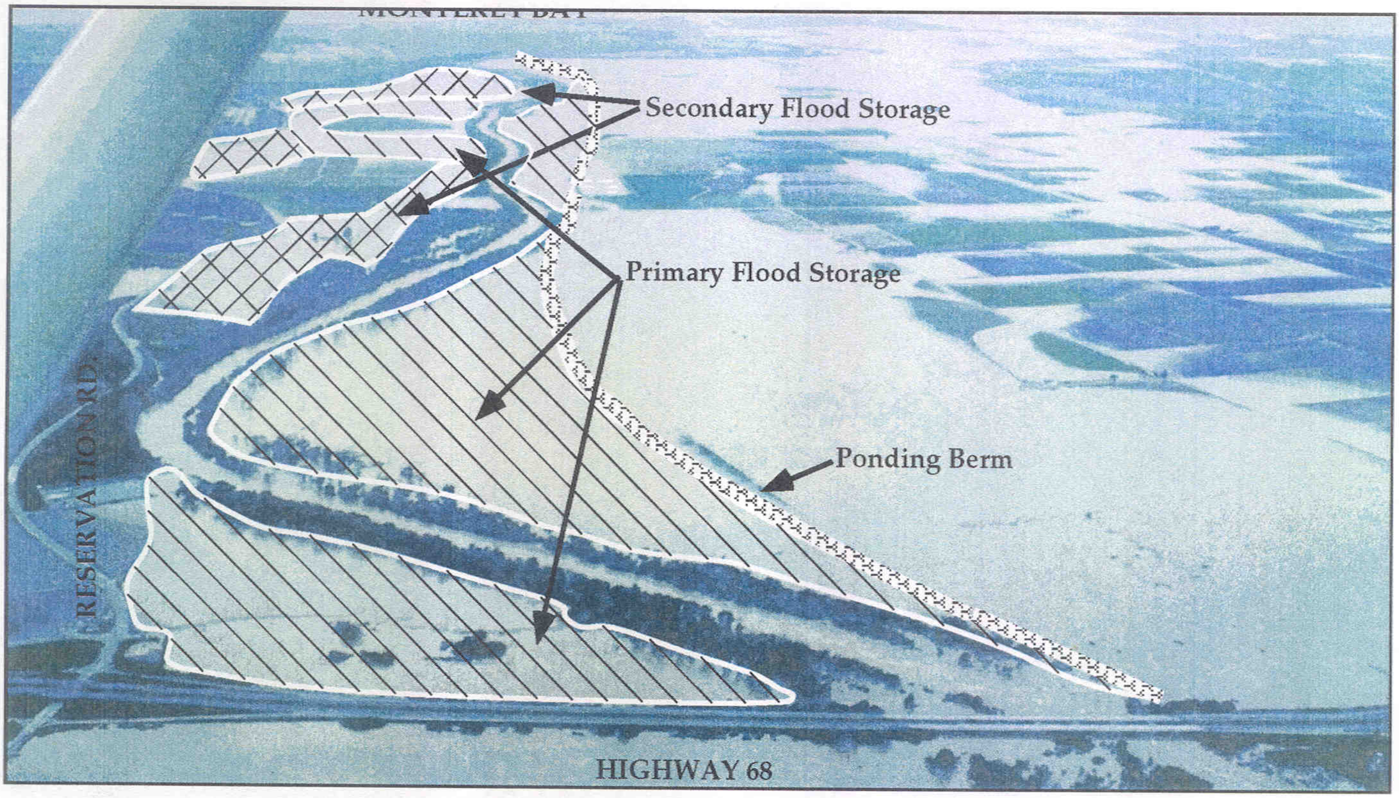
The river needs to be spread into a wider and more natural course by spilling into overflow ponds along the flood control channel (Map 2, Picture 9). The ponds are natural low areas which were once part of the river. River water can be ponded behind a second dike system made of berms with broad slopes and covered with native vegetation. Rooted vegetation greatly decreased dike erosion from the 1995 flood. The overflow ponds are fed by upstream river water, which then flows back to the river downstream. The flow of water is controlled by the height of spillway openings in the existing flood control dike. In this way, overflow areas can become natural river habitat storing water each year, or be used only for large flood storage and farmed in normal years. The effect is to widen the entire river and to disperse the flow more naturally, providing water storage for irrigation, groundwater recharge, wildlife, and flood control.

This wide river can contain the 100 year flood by simply providing a safety valve, a lowest overflow site where flood water can be directed downstream with minimum damage. This is the berm near Blanco Road (Map 2). If the entire river fills, water overflows here and usually flows back to the adjacent river. A very large overflow event can be captured in a naturally vegetated Blanco Drain and directed to river inflow areas upstream from the only major barriers to downstream flow, the railway dike and Highway 1. This flood corridor and inflow region can be protected from erosion by stabilizing natural vegetation. Vegetation also protects the entire dike and berm system, containing a flood until it overflows into a known flood corridor (Blanco Drain). The same vegetation insures that flood waters spill over a stable berm without erosion and break through.

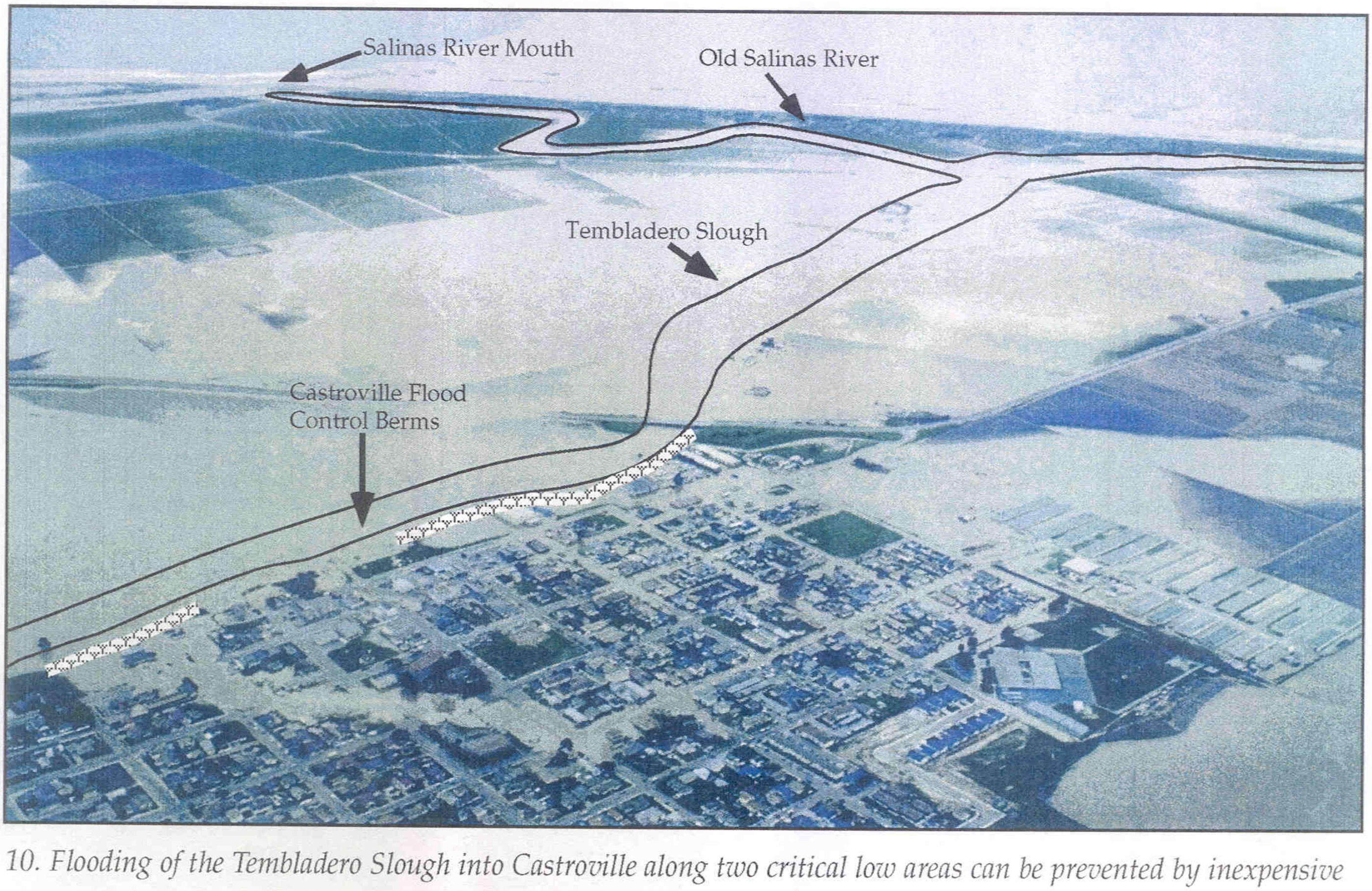
This ponding and spillway system also works for inland sections of the Salinas River up to the reservoirs as well as the Pajaro River. The Pajaro can be widened into naturally low areas adjacent to the flood channel, protected by erosion resistant berms, and plumbed with a safety spillway to direct the largest floods into the Watsonville Creek and Elkhorn Slough. This will avoid flood ponding behind Highway 1 and protect the town of Pajaro.

Erosion resistant berms contain water in the river and flood storage ponds. They are highly effective barriers, inexpensive to build, and excellent habitat. They are constructed from a broad mixture of soils with gradual slopes and covered with native plant communities that prevent erosion. Soil waste from the Granite Rock quarry can be obtained for the price of hauling, shaped by farm tractors, and planted by students from area schools. As an example, WEOP is constructing a flood control berm to protect the Salinas River residential neighborhood next to Highway 1, and seeking funds to protect Castroville along the Tembladero Slough (Picture 10).

The water retention system provides dependable flood control at little or no extra cost. Most importantly, the wider river and pond system provides groundwater recharge along the entire river by holding more water for longer periods everywhere. Vegetation helps to slow the movement of water down the river, which maximizes the natural recharge of shallow and deep aquifers while filtering non-point pollution from the water.



9. Widening of the river in water retention and flood storage areas looking down the Salinas River over Highway 68.



10. Flooding of the Tembladero Slough into Castroville along two critical low areas can be prevented by inexpensive berms protected from erosion by vegetation.