Recreating the 1955 Christmas Flood

Lodi Awaits Mokelumne River Crest

Holy Land Quiet
Pilgrims Travel To Bethlehem

City Of Darkness
9000 Quit Homes In Marysville

Lowlands Facing Threat Of Flood

LONE HOUND—Thousands of tons of water hurled over the gorge to infiltrate the flood. The masses of water in the canyon were left to flow as it swept the city.

—Photo by Richard S. Hart
Anadon Progress News

Marysville Dark, Ghost City As Flood Looms

SAN FRANCISCO, Dec. 25—Invalids from the streets of flood-areas in the city of Marysville, Calif., were housed in the city's school buildings until the floodwaters recede.

The swollen waters of the Mokelumne River, which fed the flood waters of the Marysville area, were estimated at 600 feet high and 800 feet wide at the latter's height of 3,000 feet. The floodwaters were expected to reach the city's outskirts by tomorrow morning.

The city of Marysville, the center of the flood area, was declared a disaster area by the state government. All residents were ordered to vacate their homes and seek higher ground.

In the town, the water level reached up to the second story of houses, and the streets were filled with water up to the knee.

With the Mokelumne River expected to continue its rise, residents were urged to leave their homes and seek higher ground. The city was under a state of emergency and all non-essential services were closed.

In other areas, the water level continued to rise, with reports of damage and evacuations. The situation was described as critical, with the potential for further flooding.

KSELDENK SNICK & NEUDECK
CIVIL ENGINEERS & LAND SURVEYS
Outline

• History of the 1955 Flood
• Project Purpose
• Data Sources
• Modeling Approach
• Results
Goal of this discussion
December 1955
1955 IN SUMMARY

Dwight D. Eisenhower is US President
Richard Nixon is Vice President
Kermit the Frog is born
US Involvement in Vietnam begins
The Salk Polio Vaccine approved by FDA
Albert Einstein died
Disneyland opens
Gunsmoke debuts on CBS
The Vietnam War begins
Dale Carnegie died
Rosa Parks is arrested
First American Corporation to earn $1B profit - GM
Lodi, California
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Project Purpose
Project Purpose

Field Data Collection

- 5 Bridges
- 1 Dam
- 1 Fish screen
- Selected channel bathymetry

W.I.D. Dam

Lower Sacramento Road

California Highway 99

Woodbridge Country Club
Project Purpose

Topography Acquisition

Two different data sets

- Hydrology
  - 50ft hydro-corrected DEM
  - Sourced from USGS NED
Topography Acquisition
Two different data sets

- Hydrology
  - 50ft hydro-corrected DEM
  - Sourced from USGS NED

- Hydraulics
  - 10ft DEM
  - Composite data provided by EBMUD
    - CVFED LIDAR (2008)
    - PG&E LIDAR (2016)
    - EBMUD Bathy & LIDAR (2015)
Hydrology

Develop and calibrate rainfall runoff model

- December 1955 historic flood
- 200-year flood event
Project Purpose

Hydraulics

- Develop hydraulic model
- Model extents of Lodi
- Major hydraulic features
  - Mokelumne River
  - Woodbridge Irrigation District Canal
  - Woodbridge Irrigation District Dam
  - Lodi Lake
Floodplain Mapping

Update 200yr floodplain
Better, safer, floodplain management
Reduce flood risk for the citizens of Lodi
Data Sources
National Centers for Environmental Information

https://www.ncdc.noaa.gov

Interactive Map

https://gis.ncdc.noaa.gov/maps/noai/summaries/daily

Locate and download station data (e.g. precip, snow, temp)

NOAA - NCEI
DATA SOURCES – STANDARD

Web Soil Survey


Locate and download soil data

USDA – NRCS
DATA SOURCES – STANDARD

National Land Cover Database

https://www.mrlc.gov/index.php

Locate and download land cover data

Estimated 2016 Database Release ~ 12/28/18

Managed by the Multi-Resolution Land Characteristics Consortium (Lead Agency USGS)
Coastal Change Analysis Program (C-CAP)

https://coast.noaa.gov/ccapatlas/

Locate and download land cover data. Same source data as the NLCD, but more categorization of wetlands and coasts.

Numbering Scheme is different from NLCD
National Water Information System Mapper

https://maps.waterdata.usgs.gov/mapper/

Locate and download stream gage data

USGS
California Data Exchange Center

https://cdec.water.ca.gov

Locate and download historic precipitation data
Locate and download historic stream gage data
Locate and download historic reservoir data

Forecasts

CADWR
USACE HIGH WATER MARKS

Provided by City of Lodi Staff
DATA SOURCES – PROJECT SPECIFIC

1955 Outflow Hydrograph

Pardee Reservoir Inflow & Outflow Hydrographs

EBMUD
Google Newspaper Archives

Qualitative Information

https://news.google.com/newspapers

No new papers being scanned, project was discontinued.

Lodi News-Sentinel was available.

Google, Inc.
December 23, 1955

Provides rough timing of discharge ramp up and approximate flood wave travel time.

DATA SOURCES – The Lodi News-Sentinel

Mokelumne River Watched For Sign Of High Water.

Potential high water conditions along the Mokelumne river were being watched closely by ranchers last night as dozens of Northern California and Oregon rivers left their banks yesterday.

However it appeared that there was adequate storage space in the two Pacific Gas & Electric reservoirs on the upper Mokelumne watershed. At last report there were 140,000 acre feet of storage space remaining. Normal annual runoff is approximately 900,000 acre feet.

Based on past experience a release of 4,000 acre feet of water from Pardee, if continued, would bring high water levels from Lockeford down to about the Highway 65 bridge. On a 7 p.m. release of that amount the flood level of the increased stream flow should be about noon today.

Normally that amount of flow would not bother the lands lying west of Woodbridge along the Mokelumne.
December 24, 1955

Precipitation Forecasted
Localized flooding (Lodi High School)
Golf Course ~ 2ft deep (projected, already inundated)
Woodbridge Irrigation Dam Construction
And occasionally some light humor
MODELING APPROACH

HYDROLOGY

1955 Reconstruction

• 8 Historic rain gages (hourly)
  • Theissen polygon weighting
• 1 Streamflow gage (hourly)
• Inflows/Outflows at Pardee
• Stage/Storage Data for Pardee
• 2 previous studies
• SCS/ILCL
• ModPuls Routing
MODELING APPROACH

Hydraulics

- No existing previous hydraulic model
- HEC-RAS 1D/2D
- Model limits
  - Upstream
  - Downstream
  - SOI
- Structures
  - Dams
  - Bridges
  - W.I.D. Canal Structure
- Mesh Adjustments
Results
RESULTS

Hydrology

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# Hydrology

## RESULTS

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*WBR – HEC-RAS routing 14,286 cfs*
## RESULTS

### Hydraulics

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![Diagram showing water levels and analysis results.](image)
RESULTS

Hydraulics & Floodplain Mapping

Plan Laurel Street Levee

With high waters again predicted within the next week, the city engineering department plans to start work on an emergency levee east of Laurel Ave. today, according to City Engineer Arthur Heckenlaible.

The engineer said he will seek rights of way this morning for construction of the fill. If property owners in the area consent, work is expected to start this afternoon.

Heckenlaible said he was informed last night by District Engineer Frank Watson of the East Bay Municipal Utilities District that heavy rains are again expected in the area of the upper Mokelumne River within 48 hours, bringing with them the possibility of another flood.

While levees around the Lodi Lake area held the high waters of the Christmas flood, water escaped into lower land vineyards east of Laurel Ave., flooding houses along that street.

Heckenlaible said the situation is not yet serious enough to warrant sandbagging, adding that the proposed fill would greatly ease the sandbagging chore in case of more high waters.
RESULTS

Hydraulics & Floodplain Mapping
RESULTS

Hydraulics & Floodplain Mapping

WATER HAZARD—This picture reveals the flooded condition of the Woodbridge Golf and Country Club, a course on which golfers now have no difficulty sinking a putt—or an approach, a drive or any other shot. It may be some time before the fairways are in shape for play, provided no further water hazards develop.

—News-Sentinel Photo
Questions?

Thank you
Joseph Thomas
jthomas@ksninc.com
916.403.5900
STORM WATERS—The debris choked Mokelumne River was threatening this pump yesterday afternoon before the water overran the levees on the Neil Locke ranch. Water was reported rising at Lodi Lake late last night although the crest was not expected to arrive until 7 this morning.

—News-Sentinel Photo
Yuba City Braces As New Flood Threatens Town

Lodi News-Sentinel

Armed Men Patrol In Levee Area

Terminus Area Fears New Flood

Lodi Recovers From Weekend Flood
With Only Slight Damage Sustained

Weller Reports City Fortunate

Water Level At Lake Dropping Rapidly;
Pardee Dam Flow No Longer Threatens

Lodi still tightly secured with a mild flood damage from the
near Federation Flood of the past weekend with the continue
of over 2,000 people who still remain in the town. Lodi
which was under almost constant stream of water
in the past few days has been quiet today with

Community Effort

Hundreds In Battle To Save Lodi

Several hundred residents still remain in the town
continuing to work on the levee system to prevent
further flooding.
Red Cross In Effort To Get Flood Damage

Seeking an overall picture of damage in the Lodi and Woodbridge vicinities, the National Red Cross has asked for individual reports on the nature and extent of damage to buildings.

Announcing this project, Lou Parnworth, assistant director of Lodi Civil Defense, said anyone with "any flood damage whatsoever" is urged to call him at 9-4400, before Wednesday, Dec. 28.

Information requested includes the name of the person reporting, his telephone number, and address.

Damage should be reported as follows: 1—Buildings destroyed or collapsed; 2—Whether the damage is minor; 3—Whether the houses involved are occupied by their owners or are rented.

Parnworth said this information is required before a National Red Cross representative can investigate flood damage.

He emphasized that damage reported should be within the city limits of Lodi, the community of Woodbridge, and the strictly immediate vicinity.

END OF LINE—This yawning hole in Lower Sacramento, just north of the town of Woodbridge and east of the Woodbridge Country Club was torn out to a width of approximately 40 feet by the raging flood waters washing over Woodbridge Dam on Saturday.
Terminus Area Faces New Flood

(Continued from Page One)

ed the auto from going into the water.

Worker Found Dead

Eugene Kangol, 60, Stockton construction worker, was found drowned in his inundated car in Mormon Channel.

The Delta area west of Lodi also had trouble.

The Delta flood reached its critical point shortly after 1 p.m. PST when the downrushing water collided with a six-foot, three-inch high tide backing up from the bay, but the levees weathered the crisis without any serious flooding.

Water was reported spilling over the top of the levee at several points on Bradford and Jersey Islands at the peak and repair crews, including some 50 county jail prisoners, hastily piled on sandbags to prevent any major breaks.
Lodians Mobilized To Meet Threat Of Flood

DEC 27
BATTLE ZONE—The battle being waged in this aerial photo of the Turner Rd.-Lodi Lake area saved property owners in that area untold thousands of dollars in property damage. Turner rd. (lower portion) is shown lined with sand bags to keep the water under control while Laurel ave. (center homes) is already surrounded by the muddy river water. The efforts of volunteer workers and National Guard personnel is being praised by city, county, and state officials.
RUSTY TOOL.—The old shed at Ledc Lake was up to its roof in water. One of the first buildings to go under it attracted other debris and soon appeared as a heap in the city dump.

—News-Sentinel Photo
WATER HAZARD—This picture reveals the flooded condition of the Woodbridge Golf and Country Club, links, a course on which golfers now would have no difficulty sinking a putt—or an approach, a drive or any other shot. It may be some time before the fairways are in shape for play, provided no further water hazards develop.

—News-Sentinel Photo
Death Toll From Flood Waters Rises To 60

Lodi Industrial Development Is Speeded

Lodi School Problem Not New

Prohibition Work Now Under Way

Extension Of Terminal Site Planned

Lodi City Damaged Second Time

A. F. Anderson, Knight, Calls Passing Away Flood Victim

Levies At Terminus Hold
City Plans Better Roads and Buildings

B. E. Anderson

Rough Cuts

Passed Away

Passed Away

Postman and Postgirl

Grade Crossing

Covered Bridge
Levees At Terminous Hold

The Terminous area witnessed the high tide yesterday although Potato Slough was lagging within a foot of the levee top.

Charles Stone, clerk of the Terminous school board, said water had broken through a low spot near the ferry landing but quick sandbagging stopped the flow before it could cause damage.

"We are keeping a careful eye on the water," Stone said, "but it appears the immediate danger is passed."

Numerous gaps in the levee were reported on Hondo Island but crews worked all night to keep the water from flooding the area.

Levee Break Aids

Stone credited the break at Empire Tract with relieving the pressure on the Terminous levee. He said the post levees were easily saturated and more likely to give way than dikes built of more solid soil.

Traffic on Highway 87 was halted as the Terminous bridge with a California Highway Patrol station was closed.

(Continued on Page Seven)
Lower Road Span To Open

The Lower Sacramento road bridge over the Mokelumne River is expected to be opened to traffic early next week, it was learned yesterday from Louie Kreiss, county civil engineering assistant.

Kreiss said the 80 foot gap in the bridge was inspected yesterday morning by County Road Commissioner Lloyd Bridger and work began shortly afterward.

The county official said some 1700 tons of fill would be required to close the hole. He said pit run material would be dumped to bring the level up to the remaining portion. Kreiss estimated the water was some seven feet deep at the fill point.

The remaining portion of the bridge appears to be in good shape, Kreiss said, but the structure will be thoroughly checked before it is opened to traffic.

The Claude G. Wood company of Lodi is in charge of the operation.

The gap opened during the flooding of the Mokelumne River Saturday and Sunday.

Meanwhile, work on the fish ladder at the Woodbridge Dam has been halted because of high water and it appeared yesterday that it might be several days before construction would be resumed.

General Mills Buys Property

Purchase of the 30-acre Otto Konig vineyard immediately west of the present General Mills plant on Turner rd. was announced yesterday by the company.

A. V. Dunkley, office manager for the Lodi cereal packing company, said the acquisition of the property brings to a total of 70 acres land held by the company.

The 30-acre vineyard, which had been owned by Konig, Stockton public accountant, for the past 30 years will continue to be operated as such at least for the time being, Dunkley said.

When General Mills first came to Lodi in 1917, it acquired a 20-acre plant site in the Gerard tract facing Lodi Lake where it erected its present plant.

In the past several months, the property was expanded by purchase of a 20-acre piece of land from W. J. Erich to the south of the plant.

Purchase of the properties is in line with the company policy to have an adequate site providing for future plant expansion.
County Officials
Wire Solon Asking
Dam Construction

A telegram urging legislation

to speed construction of the new
Hogan Dam on the Clovison River,
was sent to Secretary of War Mr. 

Roosevelt yesterday by Congress-
man Lever Johnson following a

meeting of county superintendents

Stockton, city council members and

farmers from flooded areas in the
county.

Inclusion of a clause for the lower
Mokelumne was favorable pend-
ings of the current struggle

for Mokelumne water rights be-

tween the El Dorado Municipal

Utilities District and the Woodbridge

Water Users Association.

Officials agreed, however, that

a good control dam on the lower
Mokelumne is an intime essential

after Walter Hogan, county water

consultant, and Lt. Col. Gruenier

of the U. S. Engineers had suggest-

ed Pauley Dam cannot be used for

flood control. The low water ex-

erts agreed that Pauley is licensed

for water conservation and power,

and is not therefore empowered to

release water for flood control.

The Woodbridge Irrigation Dis-

trict, represented by Elmgard

Jones, requested aid in clearing

dam. The request was referred to the

Civil Defense Agency.

At the close of the meeting a

telegram including its findings was

drafted by Jack Kempfield, Repre-

sentative for Congressman John-

son.
DEC 31
Completed Projects
Save Many Cities

Rage Areas Kept Dry by Shasta,
Other Barriers

(Continued from Page One)

dramatically as a man-made device
to control floods. Had it not been
for the dam, the Sacramento River
would have overflowed to more
than three times higher than its danger
point. The dam controlled 1,156-
000 acre feet of water during the
critical days of the storm.

Martin Blute of the Sacramento
office of the Reclamation Bureau
said at the peak of its intake, Shas-
ta received 200,000 cubic feet per
second and discharged just 5000.

The dam has a top capacity of
4,000,000 and now holds 3,600,000
cubic feet. It is releasing enough
water to bring the level to 3,500-
000 to reach a tolerance.

Leech and Red Bluff stood al-
most undamaged because of Shas-
ta protection.

Sakramento was protected by the
new Folsom Dam while Cresso was
left untouched because of the new
Fresno Irrigation Dam on the Kings River
and the Fenway Dam on the San Joa-
quin.

Because the Reclamation Bureau
opened its San Luis reservoirs, dis-
versing San Joaquin River water,
Los Banos was saved.

President Carl F. Wisnec of the
State Chambers of Commerce said
that the flood disaster therefore
convinced Californians that we must
speed up the completion of our
statewide flood control system.

DEC 31