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## Executive Summary



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*The purpose of Phase 1 of the Pajaro River Watershed Study was to model both the hydrologic and sediment regimes of the Pajaro River watershed, providing a foundation and stepping-stone for the development of flood protection solutions for the Pajaro Valley.*

Several lessons can be gleaned from Phase 1 modeling results. The flooding effects of urbanization, agriculture, flood protection projects, in-stream channel conditions or vegetation, and in-stream sediment factors are summarized below:

## Hydrology

- Since 1947, the addition of three reservoirs significantly reduced the probability of flooding in the lower Pajaro River.
- Neither current agriculture conditions nor potential agricultural changes have a significant effect on design discharge or flood impacts.
- Urbanization increases the runoff from frequent events (2-year to 25-year) but has little impact on runoff from large storms (50-year to 200-year).
- Soap Lake provides significant flow attenuation and flood storage benefits for the upper Pajaro River and is key to flood protection.

## Sediment

- The small, predicted changes in peak design discharges should not significantly alter sedimentation conditions within the Pajaro River channel.
- Significant growth of shrubby vegetation could increase hydraulic channel roughness and could be expected to cause an increase in sediment deposition.
- Changes in sediment load may have localized impacts at the confluence of the San Benito and Pajaro Rivers but do not affect the system as a whole.
- Soap Lake limits sediment discharge from the upper to the lower Pajaro River.

As currently calibrated, both models meet the goals of Phase 1. The models can be further refined in future phases if required. Also, Soap Lake operation and flood protection capabilities could be examined in greater detail.

*The Pajaro River is the largest coastal stream between the San Francisco Bay and the Salinas Watershed with a watershed of over 1,300 square miles.*

The watershed covers portions of Santa Cruz, Santa Clara, San Benito, and Monterey Counties (Figure ES-1). The large size of the watershed contributes to the number of diverse environments, physical features, and land uses within its boundaries. Development within the watershed, both urban and rural, is clustered around the major cities of Watsonville, Gilroy, Morgan Hill, Hollister, and San Juan Bautista. Agriculture and grazing are the dominant land uses in these areas but represent a small portion of the total watershed land use. The majority of the watershed land cover is grassland, shrubland, and forest.

### Four Watershed Conditions

Land use is one of the factors that affects flood frequency and magnitude. One of the major goals of Phase 1 of the study was to understand the potential flooding affects of land use changes over time. Four different land use conditions were chosen to span the extent of the reasonable land use changes and associated flooding affects. Modeling the watershed in different conditions gives insight into potential future flooding problems and allows the impacts of development trends to be identified.

Each of the four conditions was chosen based on both individual characteristics and patterns that can be established between them. First, the model was developed and calibrated using existing conditions. Then, the four conditions were selected and modeled. The following four conditions allow the model to explore watershed response to changes that might affect downstream flooding.

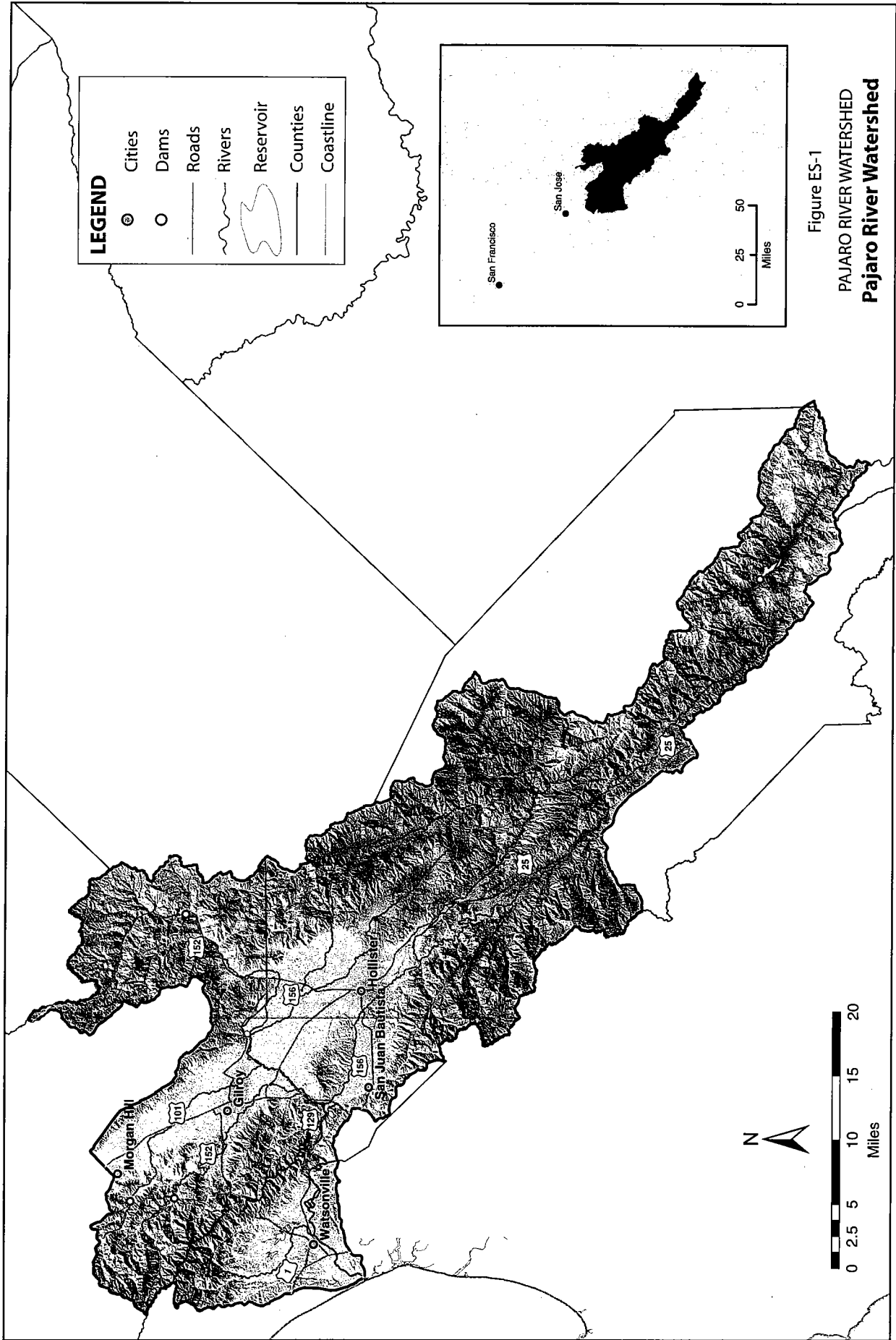
- **Back in Time to 1947:** The historical perspective provides a glimpse of how flooding has changed due to known shifts in land use. The year 1947 is significant because it was just before the Corps' levees were built and had conditions similar to when the 1955 flood occurred. In addition, three of the four existing reservoirs and some additional levees were not yet in place in 1947.

- **General Plan Buildout:** This scenario allows the model to predict the watershed flood potential using the urban and agricultural land uses for each city and county designated by the individual planning departments. This is the best estimate available for future conditions within the watershed. While the horizons of the individual general plans vary greatly, this scenario is intended to approximately represent the years between 2015 and 2020.
- **Ultimate Buildout in 2050:** This scenario represents a worst-case scenario, in terms of flooding, due to urbanization. The model predicts how the watershed would respond to significantly increased growth in the cities beyond what the general plans currently allow. The year 2050 is the approximate end of the economic life of a project started at the time of this report.
- **Changes in Agriculture:** Agriculture can play a large role in the amount of runoff and therefore flooding in an area. This scenario does not represent any particular time period but parallels the Ultimate Buildout scenario in that it represents a worst-case agricultural hydrologic conditions.

### Hydrology Model Results of Four Watershed Conditions

- **Back in Time to 1947:** Peak and average design discharges were higher in 1947 than they are today. Reservoirs existing today in the upper reaches of the watershed provide some incidental flood protection in the lower Pajaro River area.
- **General Plan Buildout and Ultimate Buildout in 2050:** These two watershed scenarios have been grouped together due to similarities in both their goals and results. Both conditions were chosen to see the effects of urbanization on runoff but at different times in the future; consequently, results show similar trends.

The model results indicate that urbanization affects small storm discharge more than it affects large storm discharge. For the General Plan Buildout scenario, all changes in storms larger than the 50-year event are less than 3% for both peak and 3-day average discharges. For the Ultimate Buildout



**LEGEND**

- ⊙ Cities
- Dams
- Roads
- ~ Rivers
- ▨ Reservoir
- - - Counties
- Coastline

San Francisco

San Jose

0 25 50 Miles

Figure ES-1  
**PAJARO RIVER WATERSHED**  
**Pajaro River Watershed**

N

0 2.5 5 10 15 20 Miles

