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HYDROLOGY OF THE MEADOW  
CREEK DRAINAGE, SAN LUIS OBISPO  
COUNTY, CALIFORNIA

for

Meadow Creek Wetlands Evaluation  
California Dept. of Parks and Recreation

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## EXECUTIVE SUMMARY

The configuration, past history, and rainfall information are presented for the Meadow Creek watershed. The 3,735 acre upper watershed drains into Pismo Lake, which in turn contributes to the lower watershed of 2,688 acres, where much of the runoff is derived from the streets of Grover City. Annual average rainfall is 16 inches, but highly variable. The present Meadow Creek channel below Pismo Lake was formerly the channel of Pismo Creek, which drained into Oceano Lagoon. The present mouth of Pismo Creek developed in 1911.

The peak runoff characteristics of the creek above Pismo Lake are presented, and the flood volumes entering the lake are calculated using a simple triangular hydrograph model. Flow into the lower watershed is constrained by the capacity of the railroad bridge, and in 100-year storms flooding over the railroad tracks will occur. The recent modifications to Pismo Lake are seen to have much reduced its flood retention capacity. Calculations from theoretical hydrographs are compared with the data from the 1969 storm, supposedly a 100-year storm. FEMA flood maps are seen to show the degree of flooding experienced in 1969.

Hydrologic conditions downstream of the railroad bridge are examined. The channel has a low capacity, due to low levees and low channel slope, and will flood at discharges of 200 cubic feet per second. This may be compared to 100-year storm discharges of 1,000-2,000 cubic feet per second. Flood volumes are calculated, and the flood height is largely determined by the flow from Carpenter Creek, and the ability of the outlet culverts in Oceano Lagoon to flow freely. Flood heights of about 10 feet can be expected over the Oceano Lagoon area after a 100-year storm. Creek restoration between Grand Avenue and Oceano Lagoon will have little effect on flood characteristics, but creation of islands could much diminish flood storage and increase flood height. Proposed modifications to Oceano Lagoon could similarly have a deleterious effect on flood storage.

It is the opinion of the author that Carpenter Creek should be maintained as a flood relief channel, and that it will be vital <sup>to</sup> reducing flood damage in the Oceano Lagoon area. The role of Carpenter Creek in the past is discussed, as is the potential for sea water intrusion, which is not considered a serious hazard. A flooding sequence for the Carpenter Creek area is presented for the present landform configuration.

Sedimentation is not considered a major problem for the watershed below Pismo Lake.

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## I - A DESCRIPTION AND BRIEF HISTORY OF THE MEADOW CREEK WATERSHED

### DESCRIPTION

The Meadow Creek watershed can be divided into two sections (see figure I-1). The larger section lies on the east and northeast side of Pismo Lake and the Southern Pacific Railroad tracks, and passes under the tracks into the lower section, which drains the bulk of Grover City and the surface of the Grover City- Oceano Mesa. The channel in the lower section drains to the south southeast parallel to, and behind, the line of coastal dunes, and enters the north end of the Oceano Lagoon. Water finally reaches the ocean through culverts under the levees of Arroyo Grande Creek, entering the latter at its mouth.

The upper section of the watershed, including Pismo Lake, has an area of 3,735 acres. Most of the watershed lies in gently sloping hills on the east side of the Highway 101 freeway, and drains into Pismo Lake via Meadow Creek and creeks in Canyon No.1 and Canyon No.2, all of which unite above the freeway culvert. These portions of the watershed either have been, or are likely to be, developed with both housing and commercial structures. The geology is dominated by relatively poorly consolidated Pliocene marine sands, called the Squire Member of the Pismo Formation, or by similar but younger sands of similar composition that were derived from the Pismo Formation and which today lie in a veneer above the Pismo Formation.

The channels, united as Meadow Creek below the freeway, flow almost due west into Pismo Lake. The south side of the channel is the northern flank of the Grover City- Oceano Mesa, dominated by Pleistocene stabilized dune sands. It is likely that the original courses of drainages in the area were diverted to the east and west by the advance of the ancient dune sands.

Below the freeway culverts the channel of Meadow Creek is a densely vegetated riparian corridor that terminates in Pismo Lake. Some water is added to the Lake from the drainage of a narrow zone of streets on the edge of the Mesa, and by water flowing under the freeway from smaller drainages west of Canyon No.1. Some additional water is developed from a narrow but dense commercial strip between the lake and the freeway.

Pismo Lake used to be a swampy area, with relatively little open water surface, but has recently <sup>been</sup> deep dredged and deepened, and island wildlife refuges have been constructed in the center of the lake.

Runoff from the lake flows under the railroad into a leveed channel that passes on the east side of the California Division of Parks and Recreation North Campground, past the golf course, under Grand

Avenue, and into a densely vegetated riparian zone that terminates in the South Campground and Oceano Lagoon. The North Campground and Golf Course have been constructed in the flood plain of the creek. Drainage from the west-sloping Mesa reaches the riparian corridor and creek through a series of storm drains and as channel flow. The collection area for the lower section of the watershed is about 4.2 square miles, or 2,688 acres, and is dominated by developed, urban land.

As can be seen in the following section, the lower section of the watershed was once the channel of lower Pismo Creek, which now flows to the ocean north of the Meadow Creek channel.

#### A BRIEF HISTORY OF THE PISMO-MEADOW CREEK WATERSHED

The first maps of the watershed are dated at about 1837. Map Espediente 513 shows Arroyo Grande Creek and the land to the south and east. This is a very crude sketch with notations in Spanish, developed for the purposes of illustrating the bounds of a land grant, and does not reveal any information on the Oceano Lagoon area (see figure I-2).

In 1837 a Diseno, or Picture Map, was filed by Frances Branch as part of a filed request for a land grant from Mexico for the Rancho Santa Manuela. This and the first-mentioned map were prepared by the same person. The map shows Pismo Creek and/or Meadow Creek joining Arroyo Grande Creek at the Oceano Lagoon area, although a lagoon is not specifically shown. The width of the channel behind the dunes is shown to be substantial (see figure I-3).

In 1873 the first of a number of subdivision maps was filed, indicating the economic end, and resultant breakup, of the Ranchos. The map was titled 'Map of Parts of the Ranchos, Corral de Piedra-Pismo- Bolsa de Chamisal, San Luis Obispo County, California, subdivided by Jas. T. Stratton'. The map shows Arroyo Grande Creek entering the eastern end of Oceano Lagoon, at which point it is shown joining a stream from the north, presumably Pismo Creek (see figure I-4).

In September of 1874 an 'official' County Map was produced. The 'Map of San Luis Obispo County, California, surveyed by R.R. Harris' can be seen today in the County Assessors Office and at Cal Poly's Special Collections Library, where the maps clearly show Pismo Creek flowing southward behind the dunes to Oceano Lagoon. There is no indication of a Pismo Creek mouth at the present location (see figure I-5).

A map filed in April 1880, was titled 'Plat of Part of the Ranchos El Pismo and San Miguelito, San Luis Obispo Co. Cal., owned by J.M. Price, subdivided by H.C. Ward'. The map shows Pismo Creek running behind the dunes to Oceano Lagoon, and being clearly labelled as 'Pismo Creek' as it entered the lagoon (see figure I-6). Oceano

Lagoon is shown extending a considerable distance inland through the area presently occupied by the airport and sewer plant. The Oceano Lagoon is shown to be a different shape than that shown in the Stratton 1873 map. It is clear from both maps that Oceano Lagoon's primary drainage is Arroyo Grande Creek, and that the lagoon is elongated along the line of that creek. Pismo Lake is shown to be extensive and reaching well above 4th Street to close to the present freeway bridge. The lower end of Pismo Lake is not receiving inflow from Pismo Creek, but drains westward to connect with Pismo Creek in the area of the North Campground.

In 1886 a map was filed on April 30, titled 'Map of the Subdivisions of a Part of the Ranchos El Pismo and San Miguelito, San Luis Obispo Co., California: R.R.Harris'. Pismo Creek is shown heading to the north end of Pismo Lake, although the junction is covered by notations. Pismo Lake is shown covering about the same area as the present lake, and is elongated to the northwest into what is presumably the inflow channel from Pismo Creek. It would appear to have connected with the lake at present low spot on the railroad, adjacent to the northwest corner of the present lake (see figure I-7).

This map has an inset Plan of the Town of El Pismo, which shows two coastal lagoons (?) flanking the north and south edges of the odd shaped parcel at the western end of Main and Pismo Streets.

In 1887 the developer of Pismo Beach prepared a colored map for promotional purposes. Two coastal lagoons or drainage swales (?) are clearly shown in the vicinity of the western ends of Main and Pismo Streets. The map is on file in Special Collections, Cal. Poly. State Univ. Library, San Luis Obispo, Ca. It is presumed that the map was based on a more official 1887 map, filed on June 11, and titled 'Map of the Town of El Pizmo' (Book A, Page 156, San Luis Obispo County Book of Maps, County Assessor's Office). In this map there is a suggestion that lakes (?) or drainage swales (?) still exist in the vicinity of the western end of Pismo and Main, based on the shape of the subdivided map boundaries. Neither of these maps provides significant information on the Meadow Creek drainage.

Again in 1887, a 'Map of the Town of Grover, San Luis Obispo County' (Book A, Page 6, San Luis Obispo County Book of Maps, County Assessor's Office) was filed (see figure I-8). It shows a channel for Meadow Creek which leaves Pismo Lake at, or close to, the present railroad bridge, running more-or-less along the line of the present channel through the North Campground area, but running well to the west of the present channel through the area of the present golf course, past Grand Avenue, and through the northern portion of the riparian corridor north of the South Campground. There is another channel shown entering Pismo Lake from the northwest side, possibly the Pismo Creek inflow channel shown in 1886 maps. A Southern Pacific Railroad right-of-way is shown on the map, but it is presumed that no track or embankment had been constructed, and that there was no interference with the Pismo Lake inflow and