

## Appendix A: Aerial photograph inventory

Source	Date	Flight/ project number	Scale	Stereo/ mono	Photo number
<i>Whittier College</i>	3/23/1941	C-6660	24K	stereo	1
					2
					3
					13
					14
					15
					16

<i>Whittier College</i>	3/23/1941	C-6660	15,840	mono	86
					87

<i>Pacific Aerial Surveys</i>	5/6/1955	AV170	10K	stereo	01-14
					01-15
					01-16
					01-17
					01-18
	5/10/1955	AV170	10K	stereo	02-24
					02-25
					02-26
					02-27
					02-28
					02-29
					02-30
					03-28
					03-29
					03-30
					03-31
					03-32
					03-33
					03-34
					04-24
					04-25
					04-26
					04-27
					04-28

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					04-29
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					04-30
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<i>Agricultural stabilization office</i>	5/27/1956	ddb-ir-32	20K	mono	sw
					se
					nw
					ne
					csw
					cse
					cne
					cnw
USGS	9/08/1956	gs-vlx	24K	mono	1.113
					1.114
					1.115

<i>Aerial Viewpoint</i>	7/9/1963	1330	12K	stereo	4-2197
					4-2198
					4-2199
					4-2200
					4-2201
					4-2202
					4-2203
					5-2139
					5-2140
					5-2141
					5-2142
					5-2143
					5-2144
					5-2145
					6-2129
					6-2130
					6-2131
					6-2132
					6-2133
					6-2134
					6-2135

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USGS	4/18/1968	gs-vbzj	24K	mono	1-106
					1-107

<i>Pacific Aerial</i>	4/28/1975	AV1188	12K	stereo	01-20
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<i>Surveys</i>					
					01-21
					01-22
					01-23
					02-25
					02-26
					02-27
					02-28
					02-29
					02-30
					03-22
					03-23
					03-24
					03-25
					03-26
					03-27

<i>Pacific Aerial Surveys</i>	6/6/1983	AV2265	12K	stereo	01-20
					01-21
					01-22
					01-23
					02-22
					02-23
					02-24
					02-25
					02-26
					02-27
					03-20
					03-21
					03-22
					03-23
					03-24
					03-25

<i>Pacific Aerial Surveys</i>	7/1/1991	AV4075	12K	stereo	03-25
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					03-26
					03-27
					03-28
					03-29
					03-30

					03-31
					04-24
					04-25
					04-26
					04-27
					04-28
					04-29
	7/2/1991				02-22
					02-23
					02-24
					02-25
					02-26
					02-27

<i>USGS</i>	6/08/1991	gs-vfnz-c	24K	mono	3-131
					3-132

<i>Pacific Aerial Surveys</i>	6/23/1997	AV5434	12K	stereo	2-22
					2-23
					2-24
					2-25
					2-26
					3-19
					3-20
					3-21
					3-22
					104-19
					104-20
					104-21
					104-22

<i>USGS</i>	?	DOQ	1 meter pixels	mono	
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## Appendix B: GIS layers used

Most of the data layers used were directly from federal sources with modifications either from the San Pedro Creek Watershed Coalition or by the author. Below is a complete list of GIS layers analyzed with source and any modifications. All orthorectifications were matched to the stream network. Most layers are in both vector and raster format, were clipped to match the study area, and analyzed in ArcView 3.2, ArcMap 8.2, and ArcInfo 4.0. All layers were projected to UTM zone 10N using North American Datum 1983.

### Connectivity

Derived from buffer distances to the stream and slope gradients.

### Contours

Derived from USGS data from the SPCWC.

### Digital Elevation Model (DEM)

USGS data used to create hillshade, slope, aspect, flow direction, flow accumulation, and ultimately watershed and subwatershed boundaries.

### Effective drainage density

Incorporates the total lengths of the stream network, roads, and trails with drainage channels stabilizing hillslopes. Roads and streams from SPCWC and trails and drainage channels digitized from USGS DEM.

### Geology and Faults

A detailed USGS geology map by Pampayen (1994) with fault lines and some landslide deposits was digitized. The faults layer from SPCWC was modified to correspond with this map and others were added. Names were attributed where possible.

### Landslides, Landslide Tracks, and Gullies

Landslide and gullies were traced from aerial photographic analysis. Additional landslides were digitized from Pampayen's geology map (1994) and detailed landslide maps by Smith (1988) and Wentworth (1986). Attributed with dates first visible on photos, type of source including obvious trigger mechanisms (natural v. anthropogenic), phase of event (fresh, mature, old), surface area of scars/gullies, volume of material displaced, and volume of material delivered to the stream network.

### Past land use

Digitized developed, farmland, and natural areas from stereo aerial photographs for 1941, 1955, 1975, 1983, 1991, and 1997.

### Perennial flow points

Digitized from field collected GPS data indicating perennial flow initiation points. Collected mostly in the fall of 2002 with few additions in the summer of 2003.

### Perennial point drainage area

Derived drainages for known pour points of perennial flow initiation. Indicates drainage required to sustain perennial flow in SPCW.

### Present land use and ownership

Land use and public land ownership available from SPCWC. Names of public landowners were attributed.

### Prioritizations

Highlights areas per each subwatershed where sediment abatement management is needed.

### Relative slope stability

Generated from SHALSTAB model based on USGS DEM and landslides digitized from stereo air photos. Indicates probable slope failure during varying levels of precipitation events.

### Roads

USGS data attributed by the SPCWC and modified by the author. Roads far outside of the study area were deleted and roads within the watershed that are inaccessible to the general public and mainly used as trails were moved to the trails layer. Attributed with year of construction.

### Sediment Erosion Model (SEM)

Derived from k factor and slope. Qualitatively indicates areas highly susceptible to surface erosion.

### SEM connectivity

Qualitatively identifies areas of sediment delivery to the stream network through the vegetation buffer. Derived by merging the SEM with the vegetation buffer based on slope and distance to stream network.

### Soils

US Department of Agriculture Soil Conservation Service data (Kashiwagi and Hokholt 1991) attributed by SPCWC.

### Soil k-factor

Derived from soil layer by the k factor attribution. Weighted final value for K factor as a factor of percent composition per soil complex. Used in sediment erosion model (SEM).

### Slope

Derived from USGS DEM data from SPCWC.

### Stream buffers

Generated from literature review to surround the stream riparian corridors.

### Stream network

Derived from hydrologic flow model and modified by SPCWC. Attributed perennial flow data and tributary codes. Modified lines in Pedro Point I and Shamrock to known drainage routes.

### Subwatershed

Demarcates the boundaries of each subwatershed examined.

### Trails

Traced from the Digital Orthophoto Quad and field collected GPS points. Attributed with levels of use, maintenance, year of construction, and names where applicable.

### Vegetation

Detailed vegetation data was assessed and compiled under the direction of Mike Vasey and entered into GIS format by Brendan Thompson.



### Appendix C: Past and current land use cover per subwatershed

Developed	1941		1955		1975		1983		1991		1997	
	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total
North	15200	6.2%	16100	3.5%	2301300	69.2%	2316500	69.4%	2321600	68.9%	2321600	68.9%
Middle	1300	0.5%	3300	0.7%	9600	0.3%	8400	0.3%	8400	2.5%	8400	0.2%
Middle/South	6400	2.6%	22700	4.9%	78100	2.3%	77800	2.3%	83000	2.5%	83000	2.5%
South	0	0.0%	400	0.1%	20700	0.6%	20300	0.6%	20300	0.6%	20300	0.6%
Sanchez	0	0.0%	47100	10.3%	81200	2.4%	81800	2.4%	89000	2.6%	89000	2.6%
Shamrock	12400	5.0%	124300	27.1%	219100	6.6%	219100	6.6%	231800	6.9%	231800	6.9%
Hinton	211200	85.7%	33600	7.3%	367600	11.1%	367600	11.0%	367600	10.9%	367600	10.9%
Pedro Point I	0	0.0%	211400	46.1%	247800	7.5%	247800	7.4%	247800	7.4%	247800	7.4%
Pedro Point II	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
All subwatersheds	<b>246,500</b>		<b>458,900</b>		<b>3,325,400</b>		<b>3,339,300</b>		<b>3,369,500</b>		<b>3,369,500</b>	
<i>All subwatersheds total ha</i>	<i>24.7</i>		<i>45.9</i>		<i>332.5</i>		<i>333.9</i>		<i>337.0</i>		<i>337.0</i>	
<i>% of total land use for entire SPCW</i>		<b>1.4%</b>		<b>2.6%</b>		<b>18.9%</b>		<b>19.0%</b>		<b>19.1%</b>		<b>19.1%</b>

Farmland/ Ranchland	1941	1955	1975	1983	1991	1997

	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total
North	563200	40.5%	439700	47.7%	18900	13.5%	18900	14.2%	18900	14.1%	18900	14.1%
Middle	172700	12.4%	99600	10.8%	6000	4.3%	0	0.0%	0	0.0%	0	0.0%
Middle/South	97800	7.0%	51900	5.6%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
South	45400	3.3%	30600	3.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Sanchez	90100	6.5%	43200	4.7%	600	0.4%	0	0.0%	0	0.0%	0	0.0%
Shamrock	290100	20.9%	189100	20.5%	114400	81.8%	114400	85.8%	115500	85.9%	115500	85.9%
Hinton	78800	5.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pedro Point I	1600	0.1%	49100	5.3%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pedro Point II	49300	3.5%	19500	2.1%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
All subwatersheds	<b>1,389,000</b>		<b>922,700</b>		<b>139,900</b>		<b>133,300</b>		<b>134,400</b>		<b>134,400</b>	
<i>All subwatersheds total ha</i>	<i>138.9</i>		<i>92.3</i>		<i>14.0</i>		<i>13.3</i>		<i>13.4</i>		<i>13.4</i>	
<i>% of total land use for entire SPCW</i>		<b>7.9%</b>		<b>5.2%</b>		<b>0.8%</b>		<b>0.8%</b>		<b>0.8%</b>		<b>0.8%</b>

<b>Other (Natural/ Undeveloped)</b>	1941	1955	1975	1983	1991	1997

	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total	m <sup>2</sup>	% of total
North	5560600	34.8%	5683200	35.0%	3818800	27.0%	3803600	26.9%	3798500	26.9%	3798500	26.9%
Middle	3106300	19.4%	3177400	19.6%	3264700	23.1%	3271900	23.1%	3271900	23.2%	3271900	23.2%
Middle/South	0	0.0%	29600	0.2%	26100	0.2%	26400	0.2%	21200	0.2%	21200	0.2%
South	2774600	17.4%	2789000	17.2%	2799300	19.8%	2799700	19.8%	2799700	19.8%	2799700	19.8%
Sanchez	2235600	14.0%	2235400	13.8%	2243900	15.9%	2243900	15.9%	2236700	15.9%	2236700	15.9%
Shamrock	1133900	7.1%	1123000	6.9%	1102900	7.8%	1102900	7.8%	1089100	7.7%	1089100	7.7%
Hinton	567800	3.6%	613000	3.8%	279000	2.0%	279000	2.0%	279000	2.0%	279000	2.0%
Pedro Point I	240600	1.5%	240600	1.5%	253300	1.8%	253300	1.8%	253300	1.8%	253300	1.8%
Pedro Point II	360100	2.3%	342200	2.1%	361700	2.6%	361700	2.6%	361700	2.6%	361700	2.6%
All subwatersheds	<b>15,979,500</b>		<b>16,233,400</b>		<b>14,149,700</b>		<b>14,142,400</b>		<b>14,111,100</b>		<b>14,111,100</b>	
<i>All subwatersheds total ha</i>	<i>1598.0</i>		<i>1623.3</i>		<i>1415.0</i>		<i>1414.2</i>		<i>1411.1</i>		<i>1411.1</i>	
<i>% of total land use for entire SPCW</i>		<b>90.7%</b>		<b>92.2%</b>		<b>80.3%</b>		<b>80.3%</b>		<b>80.1%</b>		<b>80.1%</b>

### Appendix D: Current effective drainage density per subwatershed

Subwatershed	Total lengths per subwatershed												Total effective drainage density		
	Streams			Roads			Trails			Terraced culverts					
	m	% of total	density (km/km <sup>2</sup> )	m	% of total	density (km/km <sup>2</sup> )	m	% of total	density (km/km <sup>2</sup> )	m	% of total	density (km/km <sup>2</sup> )	m	% of total	density (km/km <sup>2</sup> )
North	15197	31.0%	2.5	25352	61.7%	4.1	16761	29.5%	2.7	10770	100.0%	1.8	68080	43.2%	11.1
Middle	9444	19.3%	2.9	47	0.1%	0.0	10144	17.9%	3.1	0	0.0%	0.0	19635	12.5%	6.0
Middle/South	483	1.0%	4.8	1031	2.5%	10.3	0	0.0%	0.0	0	0.0%	0.0	1514	1.0%	15.1
South	7339	15.0%	2.6	255	0.6%	0.1	9141	16.1%	3.2	0	0.0%	0.0	16735	10.6%	5.9
Sanchez	7915	16.2%	3.4	1449	3.5%	0.6	8246	14.5%	3.5	0	0.0%	0.0	17610	11.2%	7.5
Shamrock	4389	9.0%	3.0	4402	10.7%	3.0	6241	11.0%	4.3	0	0.0%	0.0	15032	9.5%	10.4
Hinton	1817	3.7%	2.8	4322	10.5%	6.6	138	0.2%	0.2	0	0.0%	0.0	6277	4.0%	9.7
Pedro Point I	1148	2.3%	2.3	3529	8.6%	9.8	2439	4.3%	4.8	0	0.0%	0.0	7116	4.5%	16.8
Pedro Point II	1276	2.6%	3.5	674	1.6%	1.9	3643	6.4%	10.1	0	0.0%	0.0	5593	3.5%	15.5
All subwatersheds (total m)	<b>49008</b>			<b>41061</b>			<b>56753</b>			<b>10770</b>			<b>157592</b>		
<i>All subwatersheds (total km)</i>	<i>49.0</i>			<i>41.1</i>			<i>56.8</i>			<i>10.8</i>			<i>157.6</i>		
Total Density (km/km <sup>2</sup> )	<b>2.8</b>			<b>2.3</b>			<b>3.2</b>			<b>0.6</b>			<b>8.9</b>		