

## **Pocket Beach Mapping in San Juan County**

Prepared for: Friends of the San Juan

Prepared by: Andrea MacLennan, MS and Stephanie Williams BS/BA

Coastal Geologic Services, Inc.



**May 10, 2011**

---

### **Introduction**

The objective of this mapping effort is to revise and refine existing pocket beach mapping in San Juan County. Pocket beaches are a particularly common shoretype in San Juan County. Natural pocket beaches are found only along shores with bedrock outcrops, which are generally more prevalent the northern Puget Sound sub-basins. Regional mapping efforts have identified and mapped pocket beaches, however at coarse scale and relying on Puget Sound-wide data sets. As a result, mapping resolution is low and many small pocket beaches were left unidentified. These previous mapping efforts include the Puget Sound Nearshore Ecosystem Restoration Change Analysis mapping (Shipman et al. 2008, Simenstad et al. 2010) and the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP, Odum et al. 2008). Pocket Beaches (PB) have also been mapped by Coastal Geologic Services (CGS) in small portions of San Juan, Skagit, and Kitsap counties.

A pocket beach is defined as a beach that is contained between two bedrock headlands that essentially functions as a closed system in terms of littoral sediment transport. Pocket beaches do not typically occur within a drift cell and there is little or no exchange of sediment between the pocket beach and adjacent shores. They can be found waterward of a rocky bank or cliff, or they may form barriers, sometimes partially or completely isolating a back-barrier lagoon or wetland (Figures 1 and 2). Pocket beaches are typically swash aligned, or oriented perpendicular to the direction of predominant wave approach. They are relatively short in length, as compared to the length of a barrier beach. In plan view their shape is crescentric and they often have well-sorted sediment.



Figure 1. Pocket beach with backshore wetland



Figure 2. Pocket beach with higher elevation banks

### Methods

All shores that are mapped as having no appreciable drift (NAD) were reviewed for presence of pocket beaches using vertical aerial photographs (2008), Color IR vertical aerial photographs (2004 & 2006) and WA Dept. of Ecology shoreline oblique air photos (2006-2007). A pocket beach was mapped where the WDNR high water shoreline extended more than 50 ft along a beach (defined as a loose collection of sediment) that was contained between bedrock headlands or large bedrock promontories. Conditions at each site were then further examined by scaling out to observe wave approach and further refine the linear extent of the shoreform and assure that the beach met other mapping criteria listed below in Table 1. Example questions were used to enable consistent interpretation. For example, if the beach was so narrow that it would be less than 3 ft wide at mean higher high water, such that one could not stop for while kayaking, it did not meet the mapping criteria.

Pocket beach mapping from the PSNERP Change Analysis was also reviewed during this mapping effort and the boundaries of the mapping units were adjusted where necessary. Some pocket beaches were mapped by PSNERP in areas where littoral drift occurs or net shore-drift cells exist, these beaches were not included in this revised pocket beach dataset due to their erroneous nature.

Table 1. Pocket beach mapping criteria.

#### **Pocket Beach Mapping**

##### ***Presence of:***

1. NAD mapping (MacLennan et al. 2010)
2. Beach contained by bedrock headlands, *often* short in length
3. Crescentric in plan view
4. Swash aligned beach

##### ***Absence of:***

1. Active sediment sources along adjacent shores
2. Sediment sorting alongshore

### Results

This mapping method was applied to all of the non-drift cell portions of San Juan County. This included each of the largest (and ferry-serviced) islands (Lopez, Orcas, Shaw and San Juan), as well as 35 smaller islands. In total 235 new pocket beaches were mapped throughout the County. A total of 117 pocket beaches were deleted from the PSNERP data set due to erroneous mapping of pocket beaches within drift cells. The spatial extent of 409 pocket beaches was adjusted as part of this mapping effort.

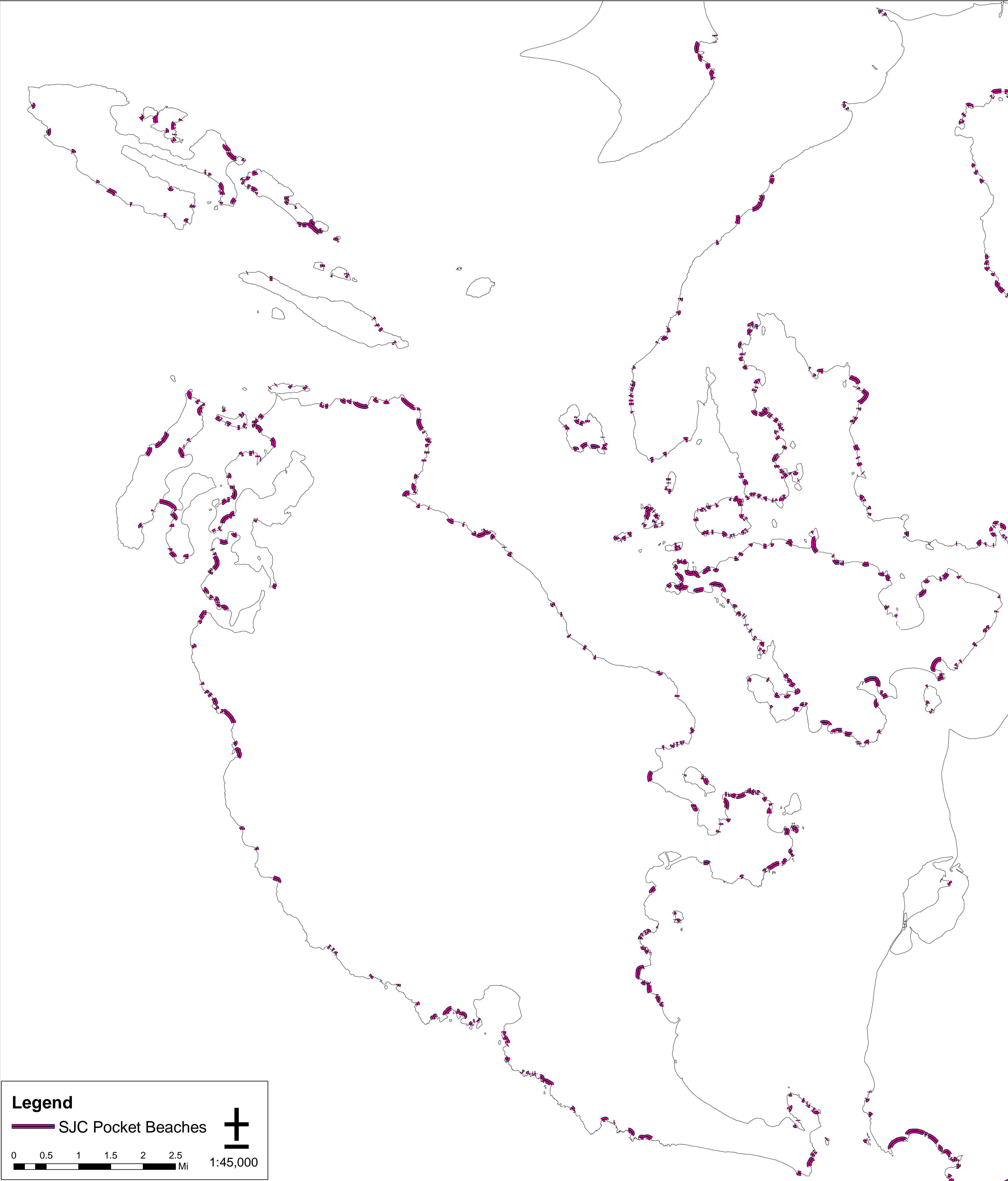
New mapping resulted in a total of 941 pocket beaches county-wide, the average length of which was 271.6 ft. The longest pocket beach in the county was mapped on Lopez Island and measured 3,235 ft. Most (76%) of all pocket beaches measured longer than 100 ft (717 pocket beaches). Pocket beaches were mapped along 39 islands. San Juan County pocket beaches are predominantly found on Orcas Island (24.3%), followed by (southern) Lopez (18.3%) and San Juan Islands (20.7%, Table 2). Maps 1 – 3 display the spatial distribution of all pocket beaches throughout San Juan County.

Table 2. Pocket beaches in San Juan County. Results of updated mapping arranged by Island.

Island (Organized Geographically)	New Pocket Beaches Mapped	Pocket Beaches Deleted	PB Extent Modified	Total No. Pocket Beaches	Total Pocket Beach Length	Percent of Pocket Beach shore in SJC
Lopez	21	9	50	103	46,893	18.3%
Long	2	0	0	4	446	0.2%
Charles	5	0	4	8	1,005	0.4%
Deadman	1	0	0	1	161	0.1%
Orcas	65	40	115	263	62,044	24.3%
Barnes	3	0	0	2	661	0.3%
Clark	6	0	2	8	1,878	0.7%
Doe	1	0	0	1	85	0.0%
Double	3	0	0	3	273	0.1%
Crane	5	0	0	21	3,571	1.4%
Reef	4	0	0	4	498	0.2%
Cliff	0	1	3	3	399	0.2%
Yellow	4	0	1	5	771	0.3%
McConnell	3	0	7	11	2,038	0.8%
Jones	2	0	9	12	2,991	1.2%
Obstruction	2	2	4	10	1,361	0.5%
Blakely	5	0	0	10	3,805	1.5%
Decatur	6	3	5	18	3,707	1.5%
James	0	0	2	5	1,373	0.5%
Trump	0	0	0	2	449	0.2%
Center	2	0	4	10	1,487	0.6%
Shaw	8	7	32	89	26,387	10.3%
Canoe	1	0	2	3	294	0.1%
San Juan	37	38	117	203	53,034	20.7%
Turn	0	1	1	3	518	0.2%
Brown	0	3	0	3	664	0.3%
Dinner	2	0	1	4	373	0.1%
Goose	1	0	0	1	121	0.0%
Pearl	9	1	0	9	1,177	0.5%
Flower	1	0	0	1	139	0.1%
Henry	6	4	9	18	7,920	3.1%
Spieden	6	0	0	6	849	0.3%
Cactus	2	0	2	4	449	0.2%
Ripple	0	0	0	2	300	0.1%
Johns	0	0	0	18	4,442	1.7%
Stuart	6	7	14	21	5,648	2.2%
Satellite	5	0	6	11	2,122	0.8%
Waldron	2	2	4	7	2,473	1.0%
Patos	1	0	5	7	2,501	1.0%
Sucia	8	0	10	23	8,475	3.3%
Matia	0	0	0	7	1,839	0.7%
<b>TOTAL</b>	<b>235</b>	<b>117</b>	<b>409</b>	<b>941</b>	<b>255,619</b>	<b>100.0%</b>

## **References**

- MacLennan, A., J. Johannessen, and S. Williams, 2010. Current and Historic Coastal Geomorphic (Feeder Bluff) Mapping of San Juan County, Washington. Prepared for Friends of the San Juans.
- Shipman, H., 2008. A Geomorphic Classification of Puget Sound Nearshore Landforms. Puget Sound Nearshore Partnership Report No. 2008-01. Published by Seattle District, U.S. Army Corps of Engineers, Seattle, Washington.
- Simenstad, C. M. Ramirex, J. Burke, M. Logsdon, H. Shipman, C. Davis, J. Fung, P. Bloch, C. Tanner, K. Fresh, S. Campbell, D. Myers, E. Iverson, A. Bailey, P. Schlenger, C. Kiblinger, P. Myre, W. Gerstel, and A. MacLennan, 2010. Historic Change and Impairment of Puget Sound Shorelines – Atlas and Interpretation of Puget Sound Nearshore Ecosystem Project Change Analysis.
- Todd, S. N. Fitzpatrik, O. Odum, M. Koschak, A. McBride. 2008. SSHIAP Mapping of Puget Sound Shoreline Geomorphology. Northwest Indian Fisheries Commission.
- Washington Department of Natural Resources. 2001. Washington State ShoreZone Inventory, Nearshore Habitat Program, Washington State Department of Natural Resources. Olympia, Washington. Available: <http://www2.wadnr.gov/nearshore/>

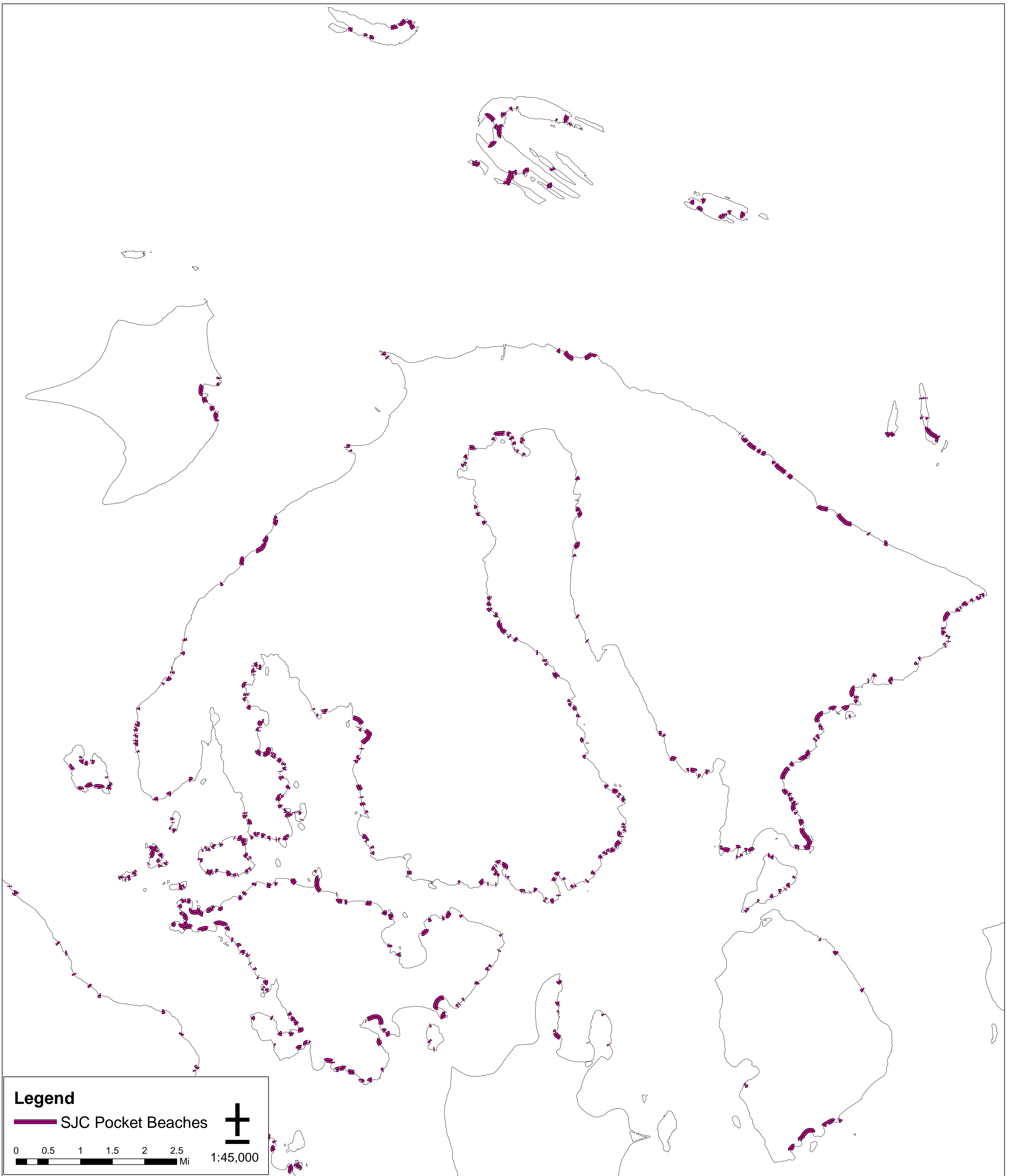


**Legend**

— SJC Pocket Beaches

0 0.5 1 1.5 2 2.5 Mi 1:45,000

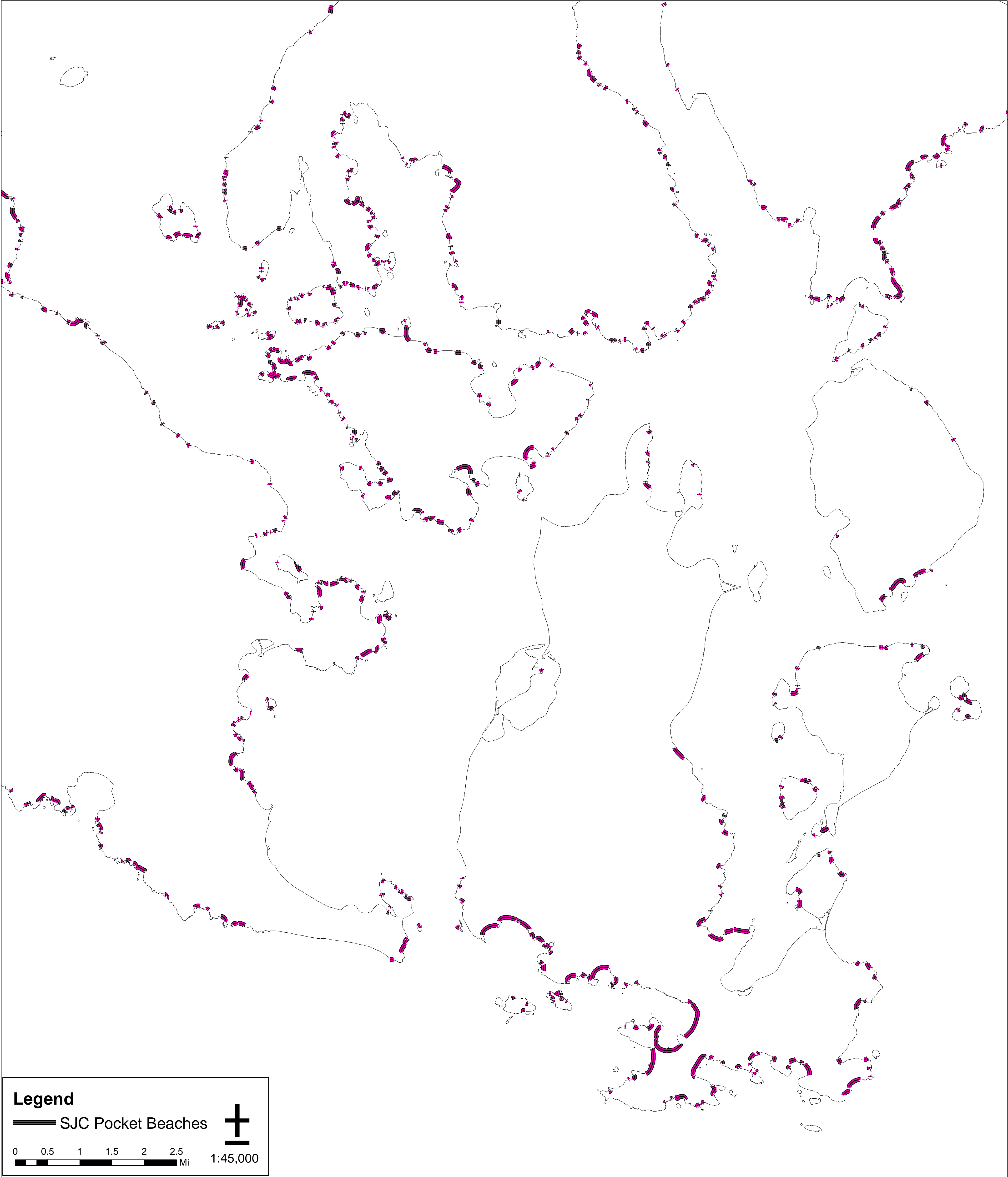
**Map 1.** Pocket Beach Mapping of San Juan County.  
*USDA NAIP aerial photography (2006)*



**Map 2.** Pocket Beach Mapping of San Juan County.

*USDA NAIP aerial photography (2006)*





**Legend**

 SJC Pocket Beaches



0 0.5 1 1.5 2 2.5  
Mi

1:45,000

**Map 3.** Pocket Beach Mapping of San Juan County.  
*USDA NAIP aerial photography (2006)*