Bauer Class I Beach Mapping in San Juan County

Prepared for: the San Juan County Marine Resources Committee
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Introduction

Coastal Geologic Services (CGS) was contracted by the San Juan County Marine Resource Committee (SJC MRC) to create an accurate digital version of "Class I" beach mapping conducted by Wolf Bauer in the early 1970s. Bauer's mapping was intended to identify broad accretionary beaches in the county. Bauer's Class I beach definition was developed for easy public recognition and use; and is based on the presence, absence or marginal extent of walk-able dry backshore at high tide. Class I beaches encompass stable, infrequently wetted backshore berms, dunes or marshes. Bauer further described these shoreforms as….

- "…Having a more or less permanent backshore composed of a storm-tide berm of sand, gravel and driftwood that is wetted only under extreme tide and wave conditions. Class I "dry" beaches are, with only few exceptions, accretion shore deposits that represent both driftway and net accretion terminal within their drift sector…Class I beaches are more characteristically associated with shoreforms such as spits and points, tombolos and the barrier berms accreted across marsh or estuarine embayments…" (Bauer 1974).

According to Hugh Shipman with Department of Ecology, Bauer included only undeveloped Class I beaches in his inventory. His objective for doing so was that these shores could still be preserved in their (relatively) pristine condition. Bauer described in a text report provided to CGS by the county, that only larger Class I beaches were mapped, and those that were less than one-acre in area were left out of the inventory. Thus, it is important to understand that Bauer's mapping effort does not represent a comprehensive mapping product of accretion shoreforms within the county. Nor does it represent the historic or current extent of these Class I beaches, instead the Bauer Class I mapping dataset represents major, undeveloped, accretion shoreform beaches, that are generally larger than one-acre in size, as observed by Bauer at the time of his original mapping effort (generally in September 1973). Also it is important to note that the sites mapped as Class I beaches by Bauer followed a much more restrictive screening process than as mapping carried out by CGS in parts of Whatcom County (Johannessen and Chase 2005), King and Southern Snohomish counties (Johannessen et al 2005), Island County (Johannessen and Chase 2005), and Eastern Jefferson County (Johannessen 1999).

Bauer Beach Mapping Methods

The San Juan County MRC provided CGS with a 1974 Bauer report titled Class I Beach Inventory, which consisted of 41 field forms detailing 41 Class I beaches. The general characteristics of each site were described and sketched including estimated shoreform lengths, which appeared to be rounded to the nearest 100 feet (ft). Oblique aerial photos of each beach were also provided to document the 1973 appearance of each shoreform. Bauer's sketches were *not* drawn to scale and have very few references to accurately identify the extent of each shoreform. As a result, CGS used the Bauer Inventory information in combination with the following datasets to achieve the greatest possible level of accuracy: Washington State Department of Natural Resources Shorezone database shoreline (Shorezone shoreline, DNR 2001), recent vertical (2003) and oblique (2001) aerial photography, USGS topographic maps, Department of Natural Resources surface geology mapping, georeferenced vertical 1977 air photos and historic T-sheets (where necessary).

Bauer's shoreform sketches and field notes were initially paired with his oblique air photos and the Washington State Department of Natural Resource's Shorezone shoreline (DNR 2001) in ArcMap Geographic Information System (GIS) 9.2. If the 1977 configuration the shoreform resembled the general configuration of the Shorezone shoreline the shoreform was mapped while "snapping" to this best-available science statewide shoreline. If the shoreline was considerably different, then a new shoreline was digitized, primarily using georeferenced vertical aerial photography from 1977, while referencing the other previously mentioned air photo sets. The position of the shoreline was delineated slightly landward of the wet-dry line, where visible, and alternatively adjacent to the waterward edge of the logline.

Bauer's estimated Class I beach lengths and the landmarks identified in his sketches were used to map the extent of each shoreform. Where his field estimates and landmarks did not sufficiently match or identify shoreform endpoints, the previously mentioned datasets were referenced. Delineating the boundaries of Bauer's mapping required concurrence between the Bauer mapping (including Bauer's oblique aerial photos of each site) and visible Class I beach characteristics in the 2003 orthorectified vertical air photos, 2001 oblique aerial photos and USGS topographic maps. Visible characteristics that were used to identify shoreform boundaries include: the presence of a storm berm, marsh and dune vegetation assemblages growing landward of Shorezone shoreline (except where the Shorezone shoreline was clearly in error), and a lack of visible topographic relief and bedrock shores. When conflicting shoreform termini were interpreted from the various datasets, georeferenced 1977 vertical aerial photographs were used to assure that mapping represented the 1970s shoreform. However, when site topography was the sole indicator of the shoreform boundary, then the USGS topographic map was the primary reference. In some cases, surface geology maps were referenced to note the extent of quaternary beach deposits, which are commonly associated with accretionary beaches. The surface geology data was not used extensively, however due to poor resolution/large scale of the mapping.

During this mapping effort it became evident that the position of the Shorezone shoreline was occasionally inaccurate and did not capture some of the spits and other low relief shoreforms both mapped in the USGS topographic maps and identified by Bauer. Such was the case at Davidson Head, the spit-marsh complexes on the east shore of Henry Island, in a lagoonal-marsh in southern Griffin Bay, in Reid's Bay, Squaw Bay, Shoal Bight, and Terrill Beach on the north end of Orcas Island. The shortcomings in this "best available science" and standard statewide shoreline presents a major issue to shoreline planners that are trying to conserve and restore shoreforms that apparently do not exist. To address this issue CGS provided a list of the erroneously mapped shorelines to the individuals at DNR, who are responsible for the Shorezone database. Furthermore, CGS mapped the shoreforms by delineating a new mean high water shoreline using the 2003 orthorectified vertical air photo and the 1977 georeferenced vertical air photos. The position of the shoreline was delineated at the wet-dry line, where visible, and alternatively adjacent to the waterward edge of the logline.

Conclusion

Digitized mapping data was presented in an ArcGIS shapefile. The forty-one shoreforms were digitized in multiple parts where necessary, totaling 58 units. Each unit and shoreform was labeled as Bauer originally identified in the attribute file (associated with the Bauer beaches shapefile). The island upon which each shoreform is found was also added to the attribute file for quick reference. The average length of each digitized unit measured 1057 ft. The longest unit measured 4236 ft, and was located on southwest San Juan Island. The shortest unit measured only 27.3 ft and was associated with a larger barrier spit with backshore lagoon located on northwest Shaw Island. In general, the distribution of shoreforms across the county had clusters of Bauer beaches in the southeastern and northwest portions of the county, and along the northwest shores of Shaw and Waldron Islands.

Over the course of digitizing Bauer's mapping it became apparent that the limited scope of this dataset may limit its utility for its intended application of designating critical areas. The weakness is derived from a lack of comprehensive coverage of the study area and consistency in mapping. For example, Bauer originally included pocket accretionary beaches in his definition of Class I beaches, but largely did not include them in his inventory. In addition, the fact that Bauer mapped only undeveloped sites provides no reference of the historic extent of these shoreforms and the degree to which they have been lost (due to fill and development) from the coastal landscape. Additionally, there are numerous partially developed accretion shoreforms that were not included in the inventory, which would still benefit from conservation of the remaining extent of unmodified shore. Class I beaches that are smaller than one acre were also not included, despite the fact that they continue to provide both recreational and ecological value. Overall, this inventory is quite useful for documenting large generally undeveloped accretion beaches in San Juan County, but it is essentially not complete.

References

Bauer, W., 1974. Puget Sound Accretion Beach Inventory. Prepared for the Interagency Committee for Outdoor Recreation.

Johannessen, J. W. and M. A. Chase, 2005. Final Technical Memorandum: Whatcom County Feeder Bluff Mapping and Drift Cell Ranking Analysis, Prepared for: Parametrix and Whatcom County PDS. 25 p. plus Appendices.

Johannessen, J. W., A. J. MacLennan, and A. McBride, 2005. Inventory and Assessment of Current and Historic Beach Feeding Sources/ Erosion and Accretion Areas for the Marine Shorelines of Water Resource Inventory Areas 8 and 9, Prepared by Coastal Geologic Services, Prepared for King Co. Department of Natural Resources and Parks, Seattle, WA.

Johannessen, J. W. and M. A. Chase, 2005. Feeder Bluff and Accretion Shoreform Mapping in Island County, WA, Prepared by: Coastal Geologic Services Inc, Prepared for: Island County Marine Resources Committee.

Johannessen, J. W., 1999. Critical Shoreline Areas Relative to Critical Nearshore Habitats at Tala Point to Kala Point, Eastern Jefferson County, WA, Prepared for: Jefferson County Planning Department, 27 p., 3 Maps.

Washington State Department of Natural Resources, 2001. Washington State ShoreZone Inventory, Nearshore Habitat Program, Olympia, WA.

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Attachments – Table of Bauer Beach attributes and hard copy map

Table 1. Attributes of Bauer Beaches as digitized by Coastal Geologic Services, Inc.

BauerID	Island	Length (ft)
F2-1	Lopez	1,974
F2-1	Lopez	410
F2-1	Lopez	936
F2-10	Henry	1,111
F2-10	Henry	753
F2-10	Henry	57
F2-11	San Juan	246
F2-12	Henry	492
F2-13	San Juan	4,237
F2-14	San Juan	2,823
F2-16	San Juan	251
F2-2A	Decatur	339
F2-2A	Decatur	375
F2-2B	Decatur	2,171
F2-2B	Decatur	578
F2-2C	Decatur	468
F2-2C	Decatur	485
F2-3A	Decatur	2,881
F2-4	Lopez	396
F2-5	Lopez	2,959
F2-6	Shaw	252
F2-7	Shaw	397
F2-7	Shaw	27
F2-8	San Juan	472
F2-8	San Juan	101
F2-8	San Juan	296
F2-9	Henry	433
F2-9	Henry	1,406
F3-28	Clark	1,078
F3-29	Sucia	499
F3-30	Sucia	259
F3-31	Sucia	241
F3-32	Orcas	555
F3-33	Waldron	2,168
F3-33	Waldron	1,051
F3-34	Waldron	716
F3-35	Waldron	2,267
F3-36	Henry	193
F3-36	Henry	206
F3-37	Blakely	884
F7-14	Lopez	647
F7-15	Lopez	2,120
F7-15	Lopez	463
F7-16	San Juan	219
F7-17	San Juan	1,385

BauerID	Island	Length (ft)
F7-18	San Juan	1,399
F7-19	San Juan	1,445
F7-20	Lopez	3,452
F7-21	Lopez	2,242
F7-22	Lopez	1,414
F7-22	Lopez	757
F7-23	Shaw	636
F7-23	Shaw	139
F7-24	Shaw	690
F7-24	Shaw	1,926
F7-25	Shaw Island	539
F7-26	Shaw	481
F7-27	Lopez	3,911

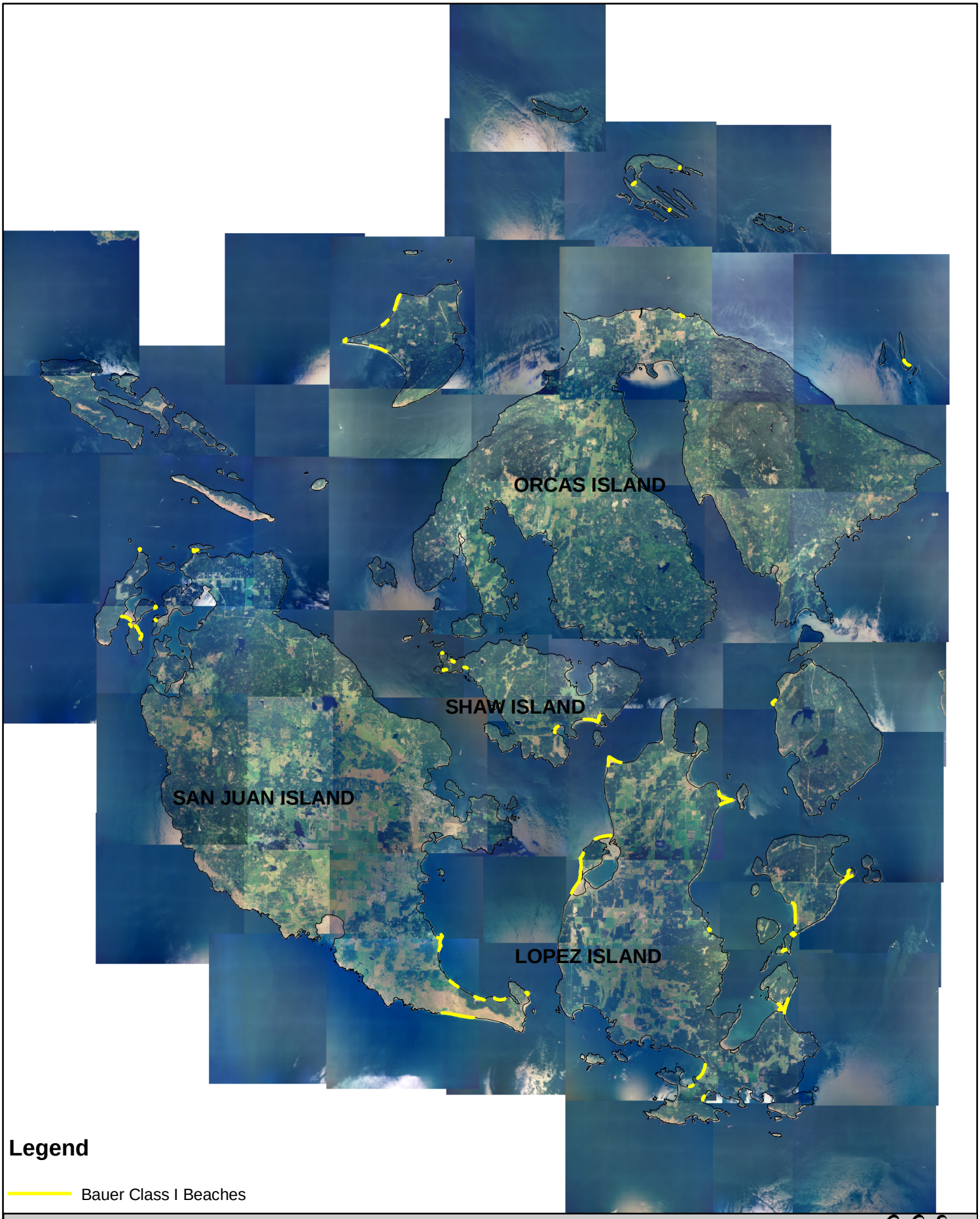

Figure 1. W. Bauer Class I Beach (accretion shoreform) Inventory of San Juan County, as digitized by Coastal Geologic Services, Inc.

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