5.0 Summary and Conclusions

Based on modeled sediment inputs and physiographic features, it appears that most Oakland Bay creeks have small sediment contributions to the bay, with the exception of Goldsborough Creek. Historical sources of sediment from the adjacent shore bluffs have been greatly reduced by shoreline development. Near Goldsborough Creek, a large sand and gravel delta has formed in recent times. Accumulation rates of sand and gravel on the delta in Shelton Harbor likely exceed 1 cm/year. Most suspended material delivered via the creeks is transported into the main body of Oakland Bay. This includes material from Goldsborough Creek, Shelton Creek and other points in Shelton Harbor.

Past work describing geologic and hydrographic conditions in Oakland Bay indicates a low-energy, tidally influenced estuary that occupies a drowned drainage network. The extreme tide range in Oakland Bay ensures strong near-bed flood currents, little ebb tide flushing (mostly through surface waters), and a high retention rate of local sediment inputs (Albertson 2004). This means that although there are local high velocity tidal currents at the junction between Oakland Bay and Hammersley Inlet, most sediment that originates in Oakland Bay remains there. Evidence from marine bedforms found at the entrance to the bay confirms this hypothesis of density stratified tidal flow. The dense seawater delivered to the bay may be flowing along the drowned channel bottom (Figure 3), as evidenced by marine bedforms at its south end (Figure 4). Shallow-water marine bedforms oriented toward the rest of Puget Sound in Hammersley Inlet also confirm that less dense, less saline flow is occurring out of Oakland Bay in shallower depths (Albertson 2004).

Subbottom profiling of the sea bed in the harbor identified a strong acoustic reflector that varied between 1 and 8 feet beneath the sediment surface. Observed accumulation rates (between 0.27 and 0.51 cm/year, or 2 to 3 feet in the 100 years since development) suggest that this reflector is likely an indication of the onset of deforestation. The onset of deforestation associated with European settlement has been shown to create significant sediment composition transitions in similar environments (Gomez et al. 2007). In Oakland Bay, the presence of wood waste may enhance the geophysical expression of this transition.

A sediment budget comparing the estimated sediment inputs with sedimentological characteristics and radioisotopic measurements suggests that very little if any sediment that originates Oakland Bay basin is transported into Hammersley Inlet and beyond.

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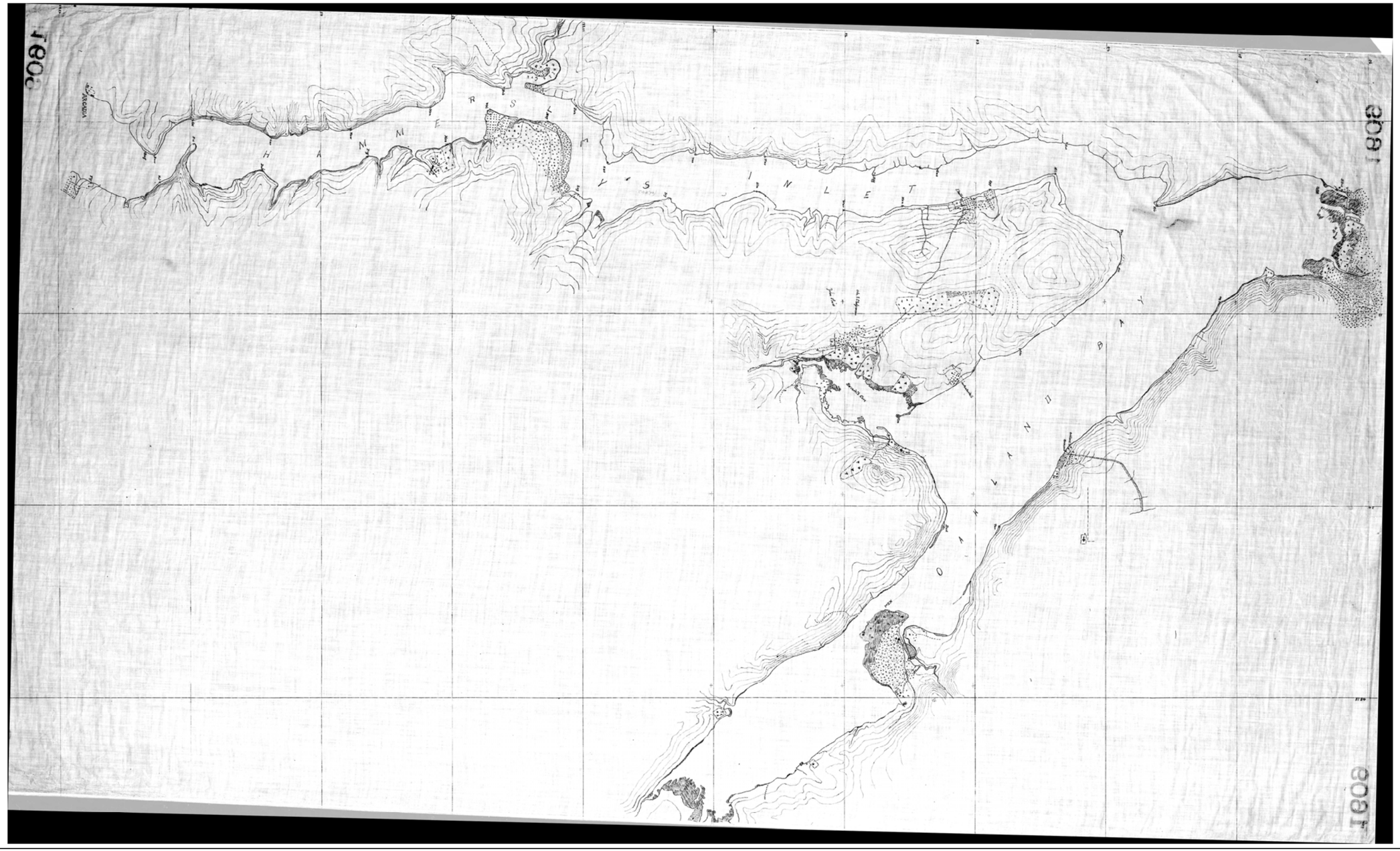
APPENDIX A

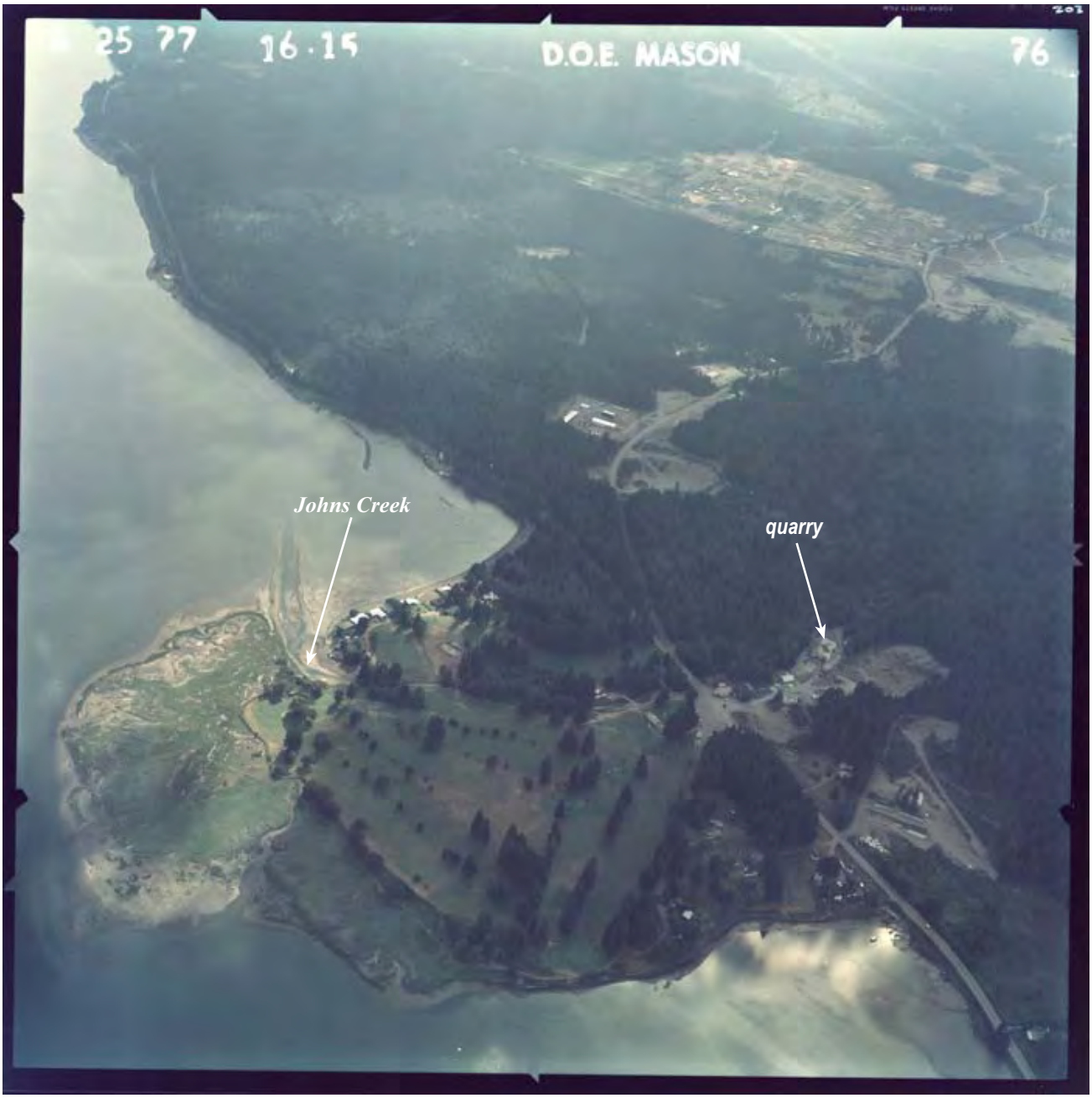
Topographic Survey of Oakland Bay in 1878



Oakland Bay 1878 Topographic Survey

APPENDIX B

Historical Photographs of Creek Deltas in Oakland Bay



B-1. Johns Creek, 1977 Coastal Atlas oblique aerial photograph.

B-2. Johns Creek, 1992 Coastal Atlas oblique aerial photograph.

B-3. Johns Creek, 2001 Coastal Atlas oblique aerial photograph.

B-4. Johns Creek, 2006 Coastal Atlas oblique aerial photograph.

B-5. Malaney Creek, 1977 Coastal Atlas oblique aerial photograph.

B-6. Malaney Creek, 1992 Coastal Atlas oblique aerial photograph.

B-7. Goldsborough and Shelton Creeks, 1977 Coastal Atlas oblique aerial photograph.

B-8. Goldsborough and Shelton Creeks, 1992 Coastal Atlas oblique aerial photograph.

B-9. Goldsborough and Shelton Creeks, 2001 Coastal Atlas oblique aerial photograph.

B-10. Goldsborough and Shelton Creeks, 2006 Coastal Atlas oblique aerial photograph.

B-11. Uncle John and Campbell Creeks, 1977 Coastal Atlas oblique aerial photograph.,

B-12. Uncle John and Campbell Creeks, 1992 Coastal Atlas oblique aerial photograph.

B-13. Uncle John and Campbell Creeks, 2001 Coastal Atlas oblique aerial photograph.

B-14. Uncle John and Campbell Creeks, 2006 Coastal Atlas oblique aerial photograph.

B-15. Deer and Cranberry Creeks, 1977 Coastal Atlas oblique aerial photograph.

B-16. Deer and Cranberry Creeks, 1992 Coastal Atlas oblique aerial photograph.

B-17. Deer and Cranberry Creeks, 2001 Coastal Atlas oblique aerial photograph.

B-18. Deer Creek, 2006 Coastal Atlas oblique aerial photograph.

B-19. Cranberry Creek, 2006 Coastal Atlas oblique aerial photograph.

APPENDIX C

Historical Aerial Photographs of Oakland Bay

Figure C-1. 1942 University of Washington historical aerial photograph.

Figure C-2. 1957 University of Washington historical aerial photograph.

Figure C-3. 1965 University of Washington historical aerial photograph.

Figure C-4. 1980 University of Washington historical aerial photograph.

Figure C-5. 2003 University of Washington historical aerial photograph.