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GEOMORPHIC SIGNATURES OF TSUNAMI IN COASTAL SAND DUNE FIELDS OF NORTHWESTERN CALIFORNIA

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Coastal sand dune fields present a unique opportunity to investigate potential tsunamigenic evidence. Historic and stratigraphic evidence from several coastal localities in Northwestern California supports inundation by tsunami during the late Holocene. The North Spit (Humboldt Bay) and Tolowa Dunes State Park (Crescent City), have extensive dune fields, estimated middle to late Holocene in age. Utilizing recently acquired high resolution digital elevation models and digital orthoquad imagery as base maps, we conducted detailed geomorphic mapping of these dune fields. Mapped features include: the active beach and foredune complex, deflated surfaces, individual parabolic and transverse sand dunes, gravel and cobble deposits, and hummocky topography. Map interpretation and field observation suggest both dune fields exhibit: 1) abandoned inland wave-cut or wave-modified escarpments that typically truncate the tailing, western ends of parabolic dunes, 2) generally subdued, hummocky broad sand dune fields suggestive of the remnants of extensive parabolic dunes, and 3) beach gravel and cobble sheets and/or scatterings either capping dune crests, mantling the deflation plain, or interspersed within the dune slacks (up to 175+ meters inland from the lee of the existing foredune and up to 5 meters above the current high-high tide elevation). Assessment of several alternative mechanisms capable of producing the observed geomorphic and stratigraphic features including: local and regional land level changes, changes to coastal hydrology, and large storm events, leads us to conclude the features are likely the result of late Holocene tsunami inundation of the dune fields. Observations of tsunamigenic features in dune fields could be used to support or augment evidence of tsunami inundation from adjacent coastal geomorphic environments such as coastal marshes and lakes, they could also be used to identify areas susceptible to tsunami inundation that are devoid of geomorphic environments more typically associated with archiving tsunami deposition. This evidence is important to ground truth numerical simulations of tsunami inundation which is currently the approach being used to develop estimates of tsunami hazard.