

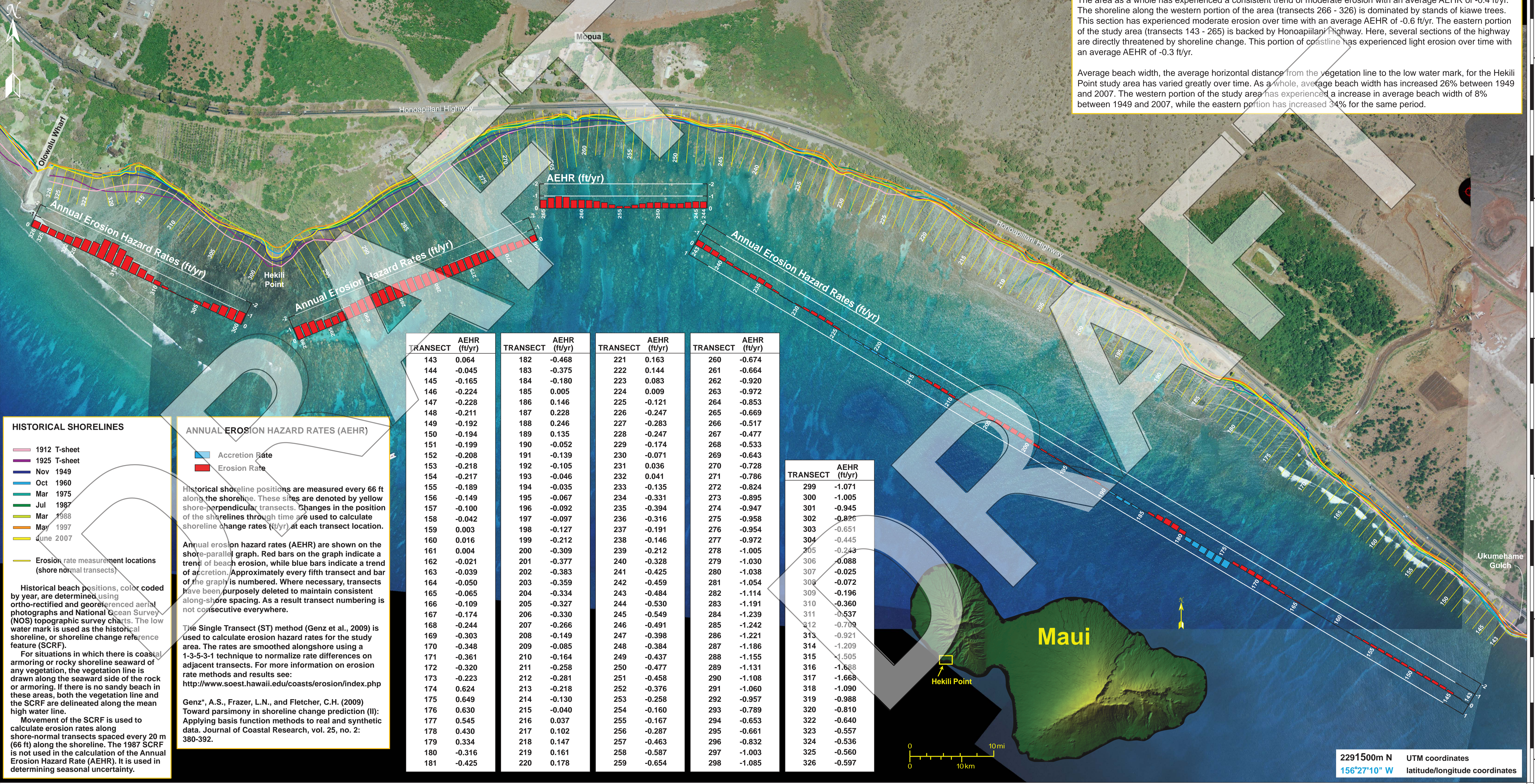
Hekili Point, Maui, Hawaii

Annual Erosion Hazard Rates

The Hekili Point study area (transects 143 – 326) extends from Ukumehame Gulch in the southeast to Olowalu Wharf in the northwest. The shoreline is composed of both sandy and cobble beach. A fringing reef fronts the shoreline while the back shore is dominated by Honoapiilani Highway and stands of kiawe trees. The vegetation line and low water mark in this area is difficult to delineate in sections characterized by canopy along the shoreline. An approximation of the base of the trunks was necessary in all years of aerial photograph coverage.

The area as a whole has experienced a consistent trend of moderate erosion with an average AEHR of -0.4 ft/yr. The shoreline along the western portion of the area (transects 266 - 326) is dominated by stands of kiawe trees. This section has experienced moderate erosion over time with an average AEHR of -0.6 ft/yr. The eastern portion of the study area (transects 143 - 265) is backed by Honoapiilani Highway. Here, several sections of the highway are directly threatened by shoreline change. This portion of coastline has experienced light erosion over time with an average AEHR of -0.3 ft/yr.

Average beach width, the average horizontal distance from the vegetation line to the low water mark, for the Hekili Point study area has varied greatly over time. As a whole, average beach width has increased 26% between 1949 and 2007. The western portion of the study area has experienced a increase in average beach width of 8% between 1949 and 2007, while the eastern portion has increased 34% for the same period.



TRANSECT	AEHR (ft/yr)	TRANSECT	AEHR (ft/yr)	TRANSECT	AEHR (ft/yr)	TRANSECT	AEHR (ft/yr)
143	0.064	182	-0.468	221	0.163	260	-0.674
144	-0.045	183	-0.375	222	0.144	261	-0.664
145	-0.165	184	-0.180	223	0.083	262	-0.920
146	-0.224	185	0.005	224	0.009	263	-0.972
147	-0.228	186	0.146	225	-0.121	264	-0.853
148	-0.211	187	0.228	226	-0.247	265	-0.669
149	-0.192	188	0.246	227	-0.283	266	-0.517
150	-0.194	189	0.135	228	-0.247	267	-0.477
151	-0.199	190	-0.052	229	-0.174	268	-0.533
152	-0.208	191	-0.139	230	-0.071	269	-0.643
153	-0.218	192	-0.105	231	0.036	270	-0.728
154	-0.217	193	-0.046	232	0.041	271	-0.786
155	-0.189	194	-0.035	233	-0.135	272	-0.824
156	-0.149	195	-0.067	234	-0.331	273	-0.895
157	-0.100	196	-0.092	235	-0.394	274	-0.947
158	-0.042	197	-0.097	236	-0.316	275	-0.958
159	0.003	198	-0.127	237	-0.191	276	-0.954
160	0.016	199	-0.212	238	-0.146	277	-0.972
161	0.004	200	-0.309	239	-0.212	278	-1.005
162	-0.021	201	-0.377	240	-0.328	279	-1.030
163	-0.039	202	-0.383	241	-0.425	280	-1.038
164	-0.050	203	-0.359	242	-0.459	281	-1.054
165	-0.065	204	-0.334	243	-0.484	282	-1.114
166	-0.109	205	-0.327	244	-0.530	283	-1.191
167	-0.174	206	-0.330	245	-0.549	284	-1.239
168	-0.244	207	-0.266	246	-0.491	285	-1.242
169	-0.303	208	-0.149	247	-0.398	286	-1.221
170	-0.348	209	-0.085	248	-0.384	287	-1.186
171	-0.361	210	-0.164	249	-0.437	288	-1.155
172	-0.320	211	-0.258	250	-0.477	289	-1.131
173	-0.223	212	-0.281	251	-0.458	290	-1.108
174	0.624	213	-0.218	252	-0.376	291	-1.060
175	0.649	214	-0.130	253	-0.258	292	-0.957
176	0.630	215	-0.040	254	-0.160	293	-0.789
177	0.545	216	0.037	255	-0.167	294	-0.653
178	0.430	217	0.102	256	-0.287	295	-0.661
179	0.334	218	0.147	257	-0.463	296	-0.832
180	-0.316	219	0.161	258	-0.587	297	-1.003
181	-0.425	220	0.178	259	-0.654	298	-1.085

TRANSECT	AEHR (ft/yr)
299	-1.071
300	-1.005
301	-0.945
302	-0.826
303	-0.651
304	-0.445
305	-0.243
306	-0.088
307	-0.025
308	-0.072
309	-0.196
310	-0.360
311	-0.537
312	-0.709
313	-0.921
314	-1.209
315	-1.505
316	-1.688
317	-1.668
318	-1.090
319	-0.988
320	-0.810
322	-0.640
323	-0.557
324	-0.536
325	-0.560
326	-0.597

HISTORICAL SHORELINES

- 1912 T-sheet
- 1925 T-sheet
- Nov 1949
- Oct 1960
- Mar 1975
- Jul 1987
- Mar 1988
- May 1997
- June 2007

Erosion rate measurement locations (shore normal transects)

Historical beach positions, color coded by year, are determined using ortho-rectified and georeferenced aerial photographs and National Ocean Survey (NOS) topographic survey charts. The low water mark is used as the historical shoreline, or shoreline change reference feature (SCRF).

For situations in which there is coastal armoring or rocky shoreline seaward of any vegetation, the vegetation line is drawn along the seaward side of the rock or armoring. If there is no sandy beach in these areas, both the vegetation line and the SCRF are delineated along the mean high water line.

Movement of the SCRF is used to calculate erosion rates along shore-normal transects spaced every 20 m (66 ft) along the shoreline. The 1987 SCRF is not used in the calculation of the Annual Erosion Hazard Rate (AEHR). It is used in determining seasonal uncertainty.

ANNUAL EROSION HAZARD RATES (AEHR)

- Accretion Rate
- Erosion Rate

Historical shoreline positions are measured every 66 ft along the shoreline. These sites are denoted by yellow shore-perpendicular transects. Changes in the position of the shorelines through time are used to calculate shoreline change rates (ft/yr) at each transect location.

Annual erosion hazard rates (AEHR) are shown on the shore-parallel graph. Red bars indicate a trend of beach erosion, while blue bars indicate a trend of accretion. Approximately every fifth transect and bar of the graph is numbered. Where necessary, transects have been purposely deleted to maintain consistent along-shore spacing. As a result transect numbering is not consecutive everywhere.

The Single Transect (ST) method (Genz et al., 2009) is used to calculate erosion hazard rates for the study area. The rates are smoothed alongshore using a 1-3-5-3-1 technique to normalize rate differences on adjacent transects. For more information on erosion rate methods and results see: <http://www.soest.hawaii.edu/coasts/erosion/index.php>

Genz, A.S., Frazer, L.N., and Fletcher, C.H. (2009) Toward parsimony in shoreline change prediction (II): Applying basis function methods to real and synthetic data. Journal of Coastal Research, vol. 25, no. 2: 380-392.

2291500m N UTM coordinates
156°27'10" W latitude/longitude coordinates