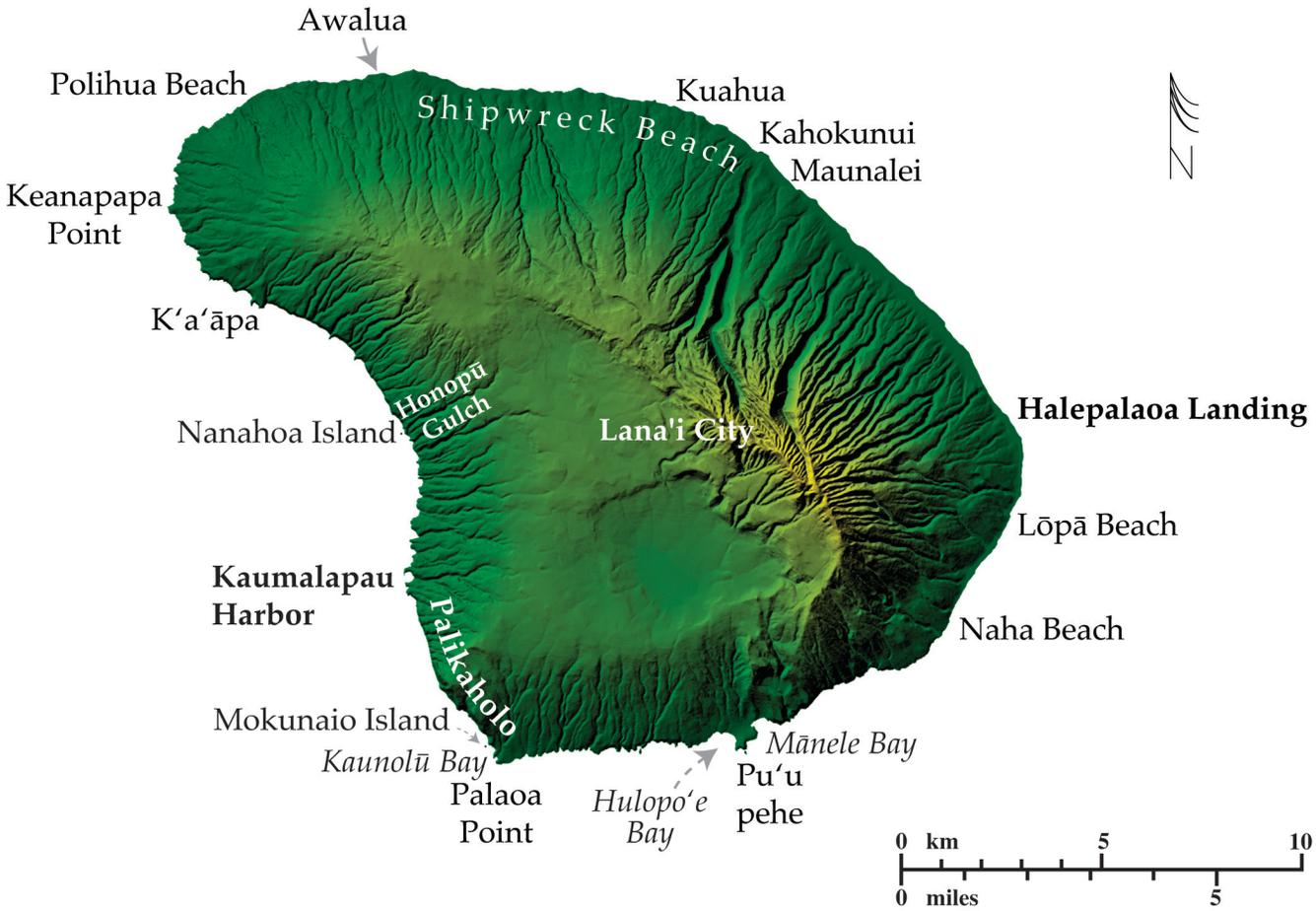


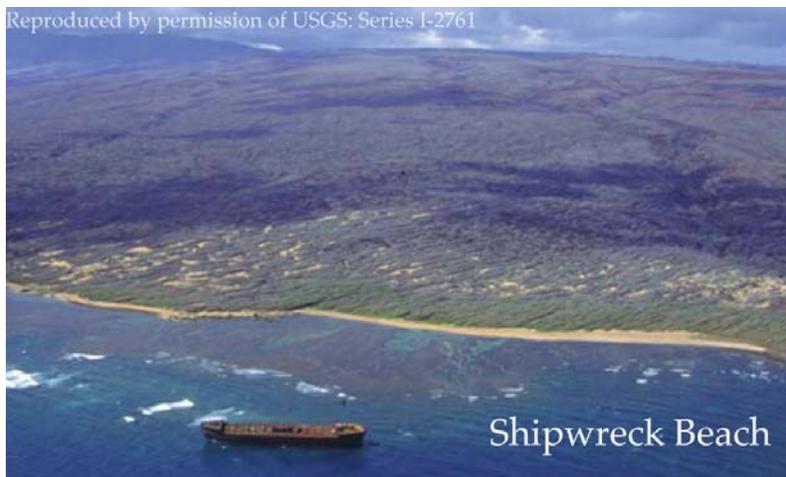
Lānaʻi



Lānaʻi is a single shield that formed from summit eruptions and along three rift zones between 1.2 and 1.46 Ma; a classic example of a Hawaiian shield with a gently sloping profile. The small sub-circular island has 76 km of general coastline, and a dry climate with minimal stream activity. Similar to Molokaʻi, overgrazing of domestic and feral animals in the 19th century and widespread deforestation on Lānaʻi have drastically changed the stability of the soil. The vegetation has never fully recovered and there is considerable wind erosion on the island (Macdonald et al. 1986).

Three paved roads all lead to the coast from centrally located Lānaʻi City, but a network of four wheel drive roads criss-cross the island from the coast to lookouts atop steep sea cliffs. The edges of the island bear the marks of both wind and wave erosion. Lānaʻi is different from the other Hawaiian islands however, because north and northeast Pacific swells are blocked by the islands of Maui and Molokaʻi, thus protecting Lānaʻi from this source of erosive energy.

Along the northern coastal terrace from Kuahua to Awalua windy conditions have led to the development of a series of sandy beaches and low sand dunes that are fronted offshore by a narrow fringing reef. The beaches, known collectively as Shipwreck Beach, extend along ~13 km of shoreline



between Kahokunui beach (to the east) and Polihua Beach (to the west). These beaches are composed mostly of calcareous sand punctuated by

expanses of lithified beachrock. Rocky cobble and boulder deltas occur at the mouths of numerous small streams, which become shallow gulches as they descend from interior Lānaʻi. Wind transported sediments from the island's northeastern mountains lie in suspension directly offshore, while shallow gulches, between the windward mountains and the coast, provide a route to the sea for terrigenous material during severe rain storms.

The narrow Polihua Beach marks the west end of Shipwreck Beach, and the fringing reef. Polihua is the longest calcareous beach on Lānaʻi, and extends across 2.4 km of the northwest corner of the island.

Between Polihua and Nānāhoa, the coast is rocky and wave eroded with only small offshore coral patches and no calcareous sand. The coast wraps the broad, elongate, westernmost end of the island at Keanapapa Pt. and becomes gradually steeper and more irregular south of the point. Southeast of



Keanapapa are numerous sea caves and arches carved into rocky headlands, and offshore rocky islets occur along the

coast. The wave-beaten character of the coast extends the length of the west and southern coast, a signal of the erosive power of southwestern Kona storm waves.

From K'a'ā pa to Nānāhoa, the gently sloping uplands of western Lāna'i are cropped into blunt sea cliffs that periodically release boulders to narrow platforms fronting the headlands below (Fletcher et al. 2002). Offshore of Nānāhoa lies a beautiful assembly of sea stacks, isolated by the retreating coast. The Nānāhoa sea stacks are near the mouth of Honopū Gulch, one of the few stream gulches that have cut through the thickness of the shield down to sea level on the east side, where many others end as hanging valleys.

Between Nānāhoa and Kaumalapau Harbor the sea cliffs reach heights of 105 m and the coast maintains an irregular character to the south, punctuated by

low-lying embayments.

These east-facing embayments are exposed to the open ocean.

However, the north point of the



largest embayment, Kaumalapau Bay, is a curved arm that wraps the north portion of the semi-circular bay to point due south at the tip.

The main Lāna'i shield reveals the mechanism of its landward retreat in large rockslides and slumps along the southwestern coast. This creates great vertical gouges in the Pali wall, producing tall piles of rocky debris that fan out along the shoreline where they are eventually reworked and washed away by

waves (Macdonald et al. 1986; Fletcher et al. 2002).

South of Kaunalapau Harbor the sea cliffs rise up to 300 m above the ocean along the Palikaholo, extending to Mokunaio at the southwest corner of the island near Palaoa Pt. This portion of the wave-truncated shield affords exceptional cross-sectional views of layered pāhoehoe flows, particularly because the arid conditions on the island have prevented extensive stream erosion.

A layer of red colluvium up to 0.5 m thick lies between the lava flows in the cliff along the Palikaholo ~1 km south of Kaunalapau, this is an indication of an erosional period between flows, and is unusual on Lānaʻi (Macdonald et al. 1986). Less than 2 km northwest of Kaunolū, the Kaholo coastal cliffs cut across the southwest rift zone of Lānaʻi. Here, numerous nearly vertical dikes and the cross section of a small shield are exposed in the cliff wall (Macdonald et al. 1986).

The sea cliffs are reduced to just 30 m in height as they approach

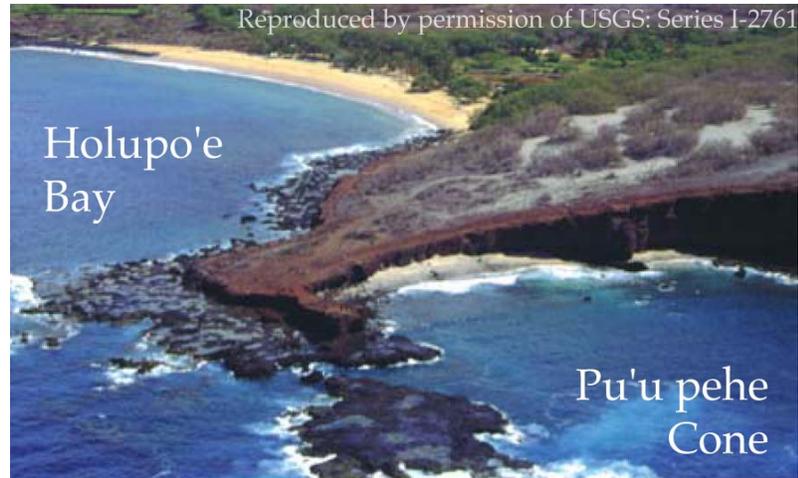


southwest corner of Lānaʻi at Kaunolū Bay on Palaoa Pt. East of Palaoa Pt. the shoreline has a southern exposure

and becomes increasingly irregular with small embayments and caves carved into the steep rocky headlands. This wave-eroded shoreline has left numerous isolated rock islets offshore.

The Mānele-Hulopoʻe Marine Life Conservation District lies along the

central south shore where the low-lying embayments at Hulupo'e and Mānele interrupt a sea cliff coast. Protruding out into the ocean between the bays is Pu'u pehe,



an eroded volcanic cinder and spatter cone that has been eroded into a cove at its seaward end. This cove is bordered on the west by a low-lying rocky point that harbors a wide crescent of white sand in its lee, and on the east by a steep cliff with a wave cut terrace running its length along the inside of the cove. The large rock islet isolated offshore of the east point has been separated from the remnant cone by wave erosion.

Of additional interest in this area is the famed Hulupo'e Gravels hypothesized by Moore and Moore (1984) as having been emplaced by a catastrophic tsunami Ca.100, 000 yrs Bp, resulting from a large landslide. Much has been made of this event with deposits and features on the Australian shoreline and elsewhere having been attributed to its occurrence. Rubin et al. (2000) however find coral gravels on Lana'i dating from 3 separate interglacial sea level highstands, and the elevations of the Hulupo'e Gravels to be the result of flexural uplift of the island.

Near Naha and Lōpā southeast Lāna'i is a narrow low lying coastal terrace fronted nearshore by a narrow and continuous fringing reef. Vegetation overhangs the shoreline here and indicates that the coast is actively retreating.

Beyond the easternmost point near Halepalaoa Landing the coast turns to face northeast and is out of direct exposure to Kona storm waves, allowing the fringing reef to widen offshore while the coast is skirted by broad expanses of alluvium and beaches.

Southeast of Maunalei massive lithified sand dunes extend as far as 3.2 km inland and reach heights of 285 m. Alluvium deltas tend to form at the base of large erosional gulches along this coast, where they lie along the shoreline where they are deposited.



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