

Hurricane Lane

Hawaiian Islands, August 2018

By Ian Robertson¹, Ph.D., P.E.

Hurricane Lane, a major Pacific Ocean hurricane, narrowly missed making landfall on the main Hawaiian Islands, but still caused considerable damage due to high winds and heavy rainfall (Figure 1).

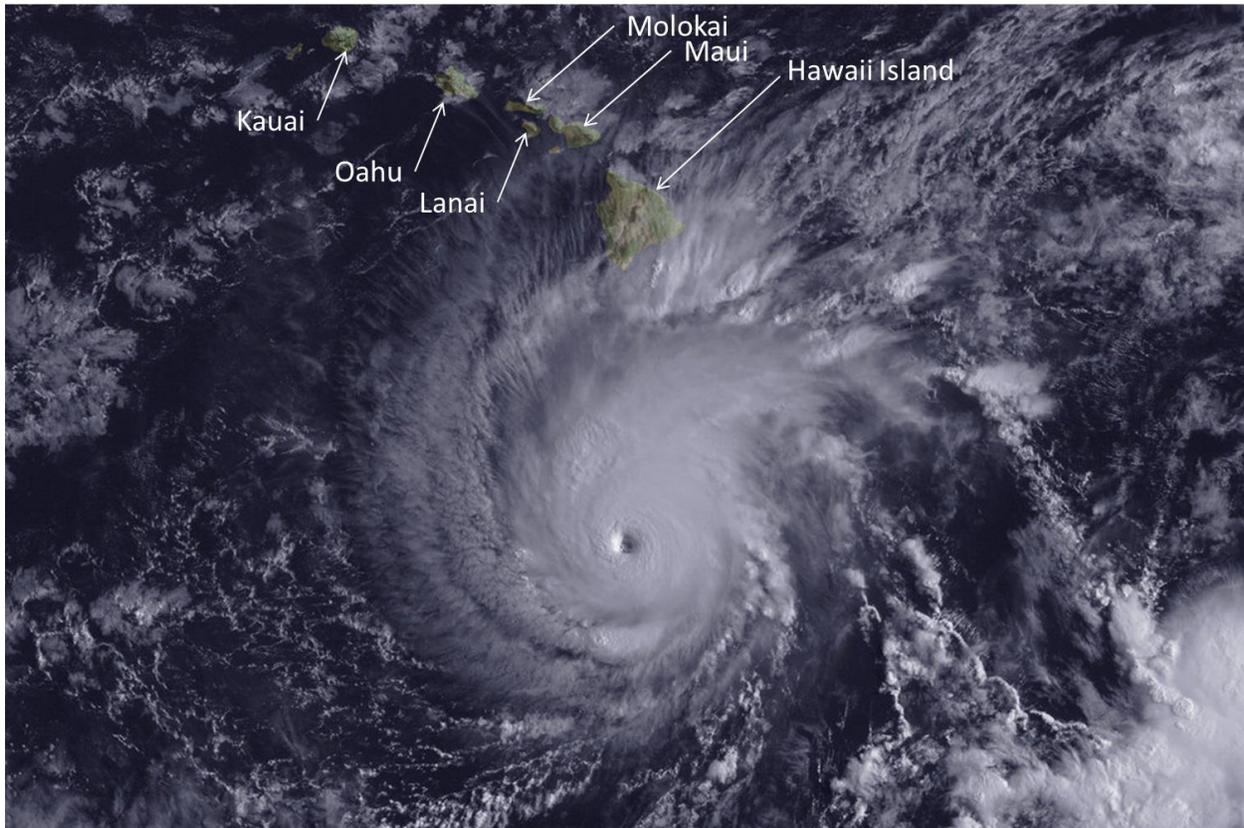


Figure 1: NOAA satellite image of Hurricane Lane approaching Hawaii. <https://www.inverse.com/article/48347-maps-hawaii-hurricane-lane-kilauea-volcano>

INTRODUCTION

Hurricane Lane formed in the East Pacific as a tropical depression and strengthened as it moved westward over warm waters (Figure 2). It briefly reached Category 5 status just southeast of the Hawaiian Islands on August 22nd as it began to turn northwards. It then encountered high level winds from the southwest. In conjunction with the low level tradewinds from the northeast, this resulted in a strong wind shear which led to rapid weakening of the system from Category 4 to Category 1 as it passed to the west of Hawaii Island. Once the storm had weakened to a tropical storm, the tradewinds

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were able to redirect it to the west, thereby avoiding a direct landfall on any of the main Hawaiian Islands.

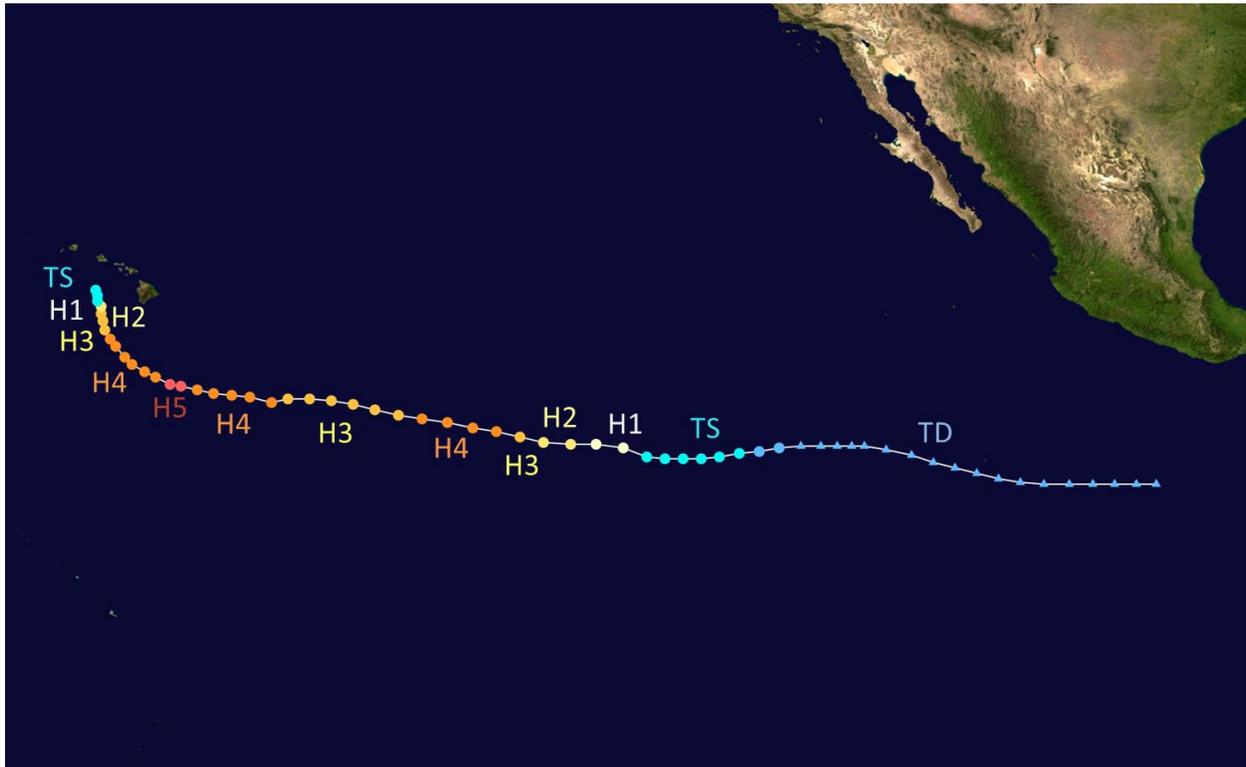


Figure 2: Hurricane Lane track – Based on image created by Master0Garfield using WikiProject Tropical cyclones/Tracks. Public Domain, <https://commons.wikimedia.org/w/index.php?curid=71647004>

Hurricane models were somewhat uncertain of the likely path Hurricane Lane might follow as it passed the Hawaiian Islands. Some models showed a wide berth to the southwest, while others showed it making landfall in Maui County, Oahu or Kauai (Figure 3). In the end, Hurricane Lane followed a path between these two extremes. The five day forecast of the likely hurricane track and cone of uncertainty predicted by NOAA on Monday, August 20 was in fact extremely close to the final route taken by Hurricane Lane (Figure 4). This provides some confidence in the NOAA interpretation of the various disparate models. It's not so much that Hawaii dodged a bullet, it is more that the bullet dodged Hawaii.

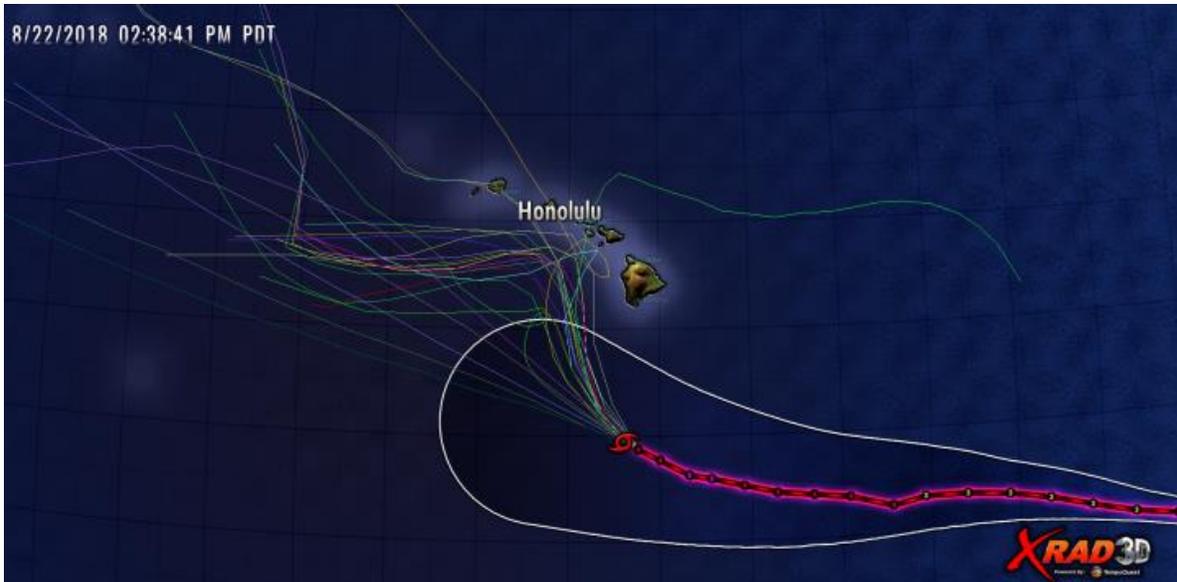


Figure 3: Forecast tracks by various hurricane models. <https://wattsupwiththat.com/2018/08/22/latest-track-forecast-suggests-hawaii-dodges-hurricanelane-bullet/>

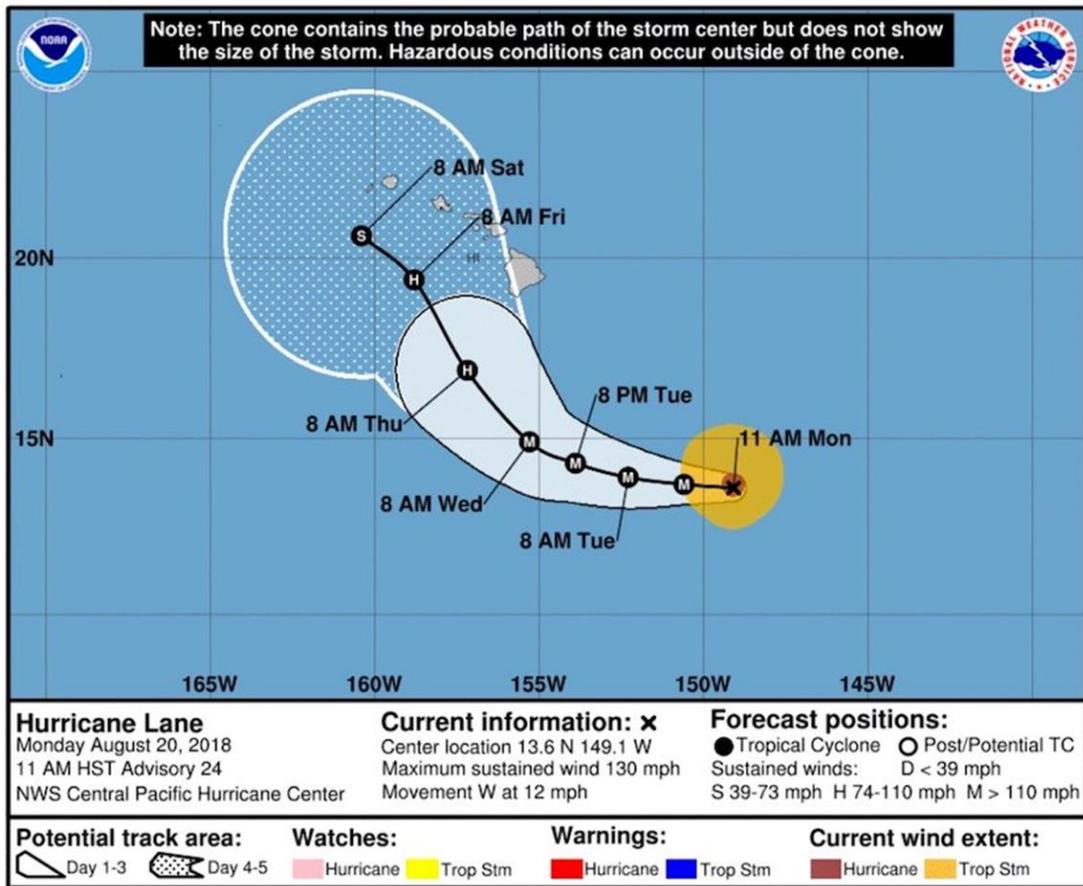


Figure 4: Five day forecast of track and "cone of uncertainty" for Hurricane Lane as of 5 pm EDT (11 am HST) Monday, August 20, 2018, issued by the Central Pacific Hurricane Center. Image credit: [NOAA/NWS/CPHC](https://www.noaa.gov/)

HURRICANE EFFECTS

Even without making a direct landfall, Hurricane Lane was large enough to have a significant effect on the Hawaiian Islands, most notably Hawaii and Maui Counties (Figure 5). These effects were primarily due to extreme rainfall levels and coincident high winds. Areas along the windward (eastern) side of Hawaii Island received rainfall exceeding 36 inches over the duration of the storm passing southwest of the island. This rainfall resulted in swollen streams (Figure 6 and Figure 7), flooded roadways and parks (Figure 8 and Figure 9), overtopped bridges (Figure 10), damaged roadways (Figure 11) and numerous landslides (Figure 12 and Figure 13).

A number of power outages were reported on all islands as a result of Hurricane Lane, though most of them were limited in extent and did not last more than a few hours. Of more concern were a series of brush fires presumed to have been caused by downed power lines on Maui and Oahu. The fires on Maui resulted in the loss of over 30 homes, while a fire on Oahu threatened the main power station on the Waianae Coast, but did not result in damage to any structures. Numerous fire crews responded to these blazes, but were unable to use helicopter water drops because of the high winds. They were still able to contain the fires within hours of them starting.



Figure 5: Satellite image by NASA - <https://commons.wikimedia.org/w/index.php?curid=71987223>



Figure 6: Floodwaters coursed down the Wailuku River near Hilo, Hawaii, on Thursday, August 23, 2018 (Photo Credit: Jessica Henricks, Associated Press)



Figure 7: The Wailuku River swelled after heavy rainfall from Hurricane Lane on Thursday, August 23, 2018 in Hilo, Hawaii. (Photo Credit: Hollyn Johnson/Hawaii Tribune-Herald, via Associated Press)



Figure 8: A car is submerged in floodwaters on Hawaii's Big Island as Hurricane Lane approaches (Photo Credit: Agence France-Presse)



Figure 9: Flooding in Hilo, Hawaii. Photo Credit New York Times



Figure 10: Clearing mud and debris from overtopped bridge on Hawaii Island (Photo Credit: Jessica Henricks, via Associated Press)



Figure 11: Flooding on roadway in Hilo, Hawaii (Photo Credit: Lynn Kawano/Twitter/National Weather Service/Hawaii DOT/Business Insider)



Figure 12: Landslide blocking both lanes of Hana Highway at mile marker 20. (Photo Credit: HDOT Twitter Feed - 2:30 PM 8/24)



Figure 13: Akoni Pule (HWY 270) landslide at MM 25 blocking both lanes (Photo Credit: HDOT Twitter Feed - 7:25 AM 8/24)

EMERGENCY RESPONSE

State, County and City emergency responders were well prepared and rehearsed for a hurricane threat. Because of the long forewarning there was ample time to inform the public and encourage them to prepare for any eventuality. Evacuation shelters were opened on all islands with ample time for residents to voluntarily evacuate. About 1000 people took advantage of the shelters across the state. Events such as downed trees and landslides that blocked roadways were addressed almost immediately (Figure 14 and Figure 15), while the brush fires were brought under control relatively quickly. All commercial ports on Hawaii Island, Maui and Oahu were closed and all large ships and barges were evacuated to safer waters until the hurricane threat had passed. The ports were re-opened soon after the cyclone was downgraded to a tropical storm.

The emergency response was therefore as good as could be expected. Had the hurricane made landfall on one of the islands, resulting in more extensive damage, it may have resulted in more strain on the relief efforts, but fortunately this was not the case.



Figure 14: County crews clearing rockfalls and downed trees on Hana Highway, Maui. (Photo Credit: HDOT Twitter Feed – 8 AM and 8:30AM 8/23)



Figure 15: Downed tree cleared by county crews on the Pali Highway, Oahu (Photo Credit: HDOT Twitter Feed - 2:33 PM Aug 25, 2018)