

# The Aloha State

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## Abstract:

In this paper, we explore the utilization of ArcGIS Map visualization on Hawaii, one of the most interesting places in the world. In order to intuitively present organized data information and explicitly tell a story about the Hawaii cultural, we apply general visualization principles and theories, infographics and some other factors that we learned from class to showcase a geographical storytelling visualization about Hawaii. We also dedicated in learning about how to create relevant and attracting storytelling presentations using the ArcGIS platform, specifically using the map feature where we can pinpoint desired locations and attach relevant add-on information to best illustrate the unique traits of the Hawaii Islands.

## I. INTRODUCTION

Hawaii has always been a popular place to visit. The Hawaii Islands are top notch tourists' destinations, and the unique Hawaiian characteristics not only attract people wanting to learn more about Hawaii, but also having a great deal of Scientists and litterateurs to explore about Hawaii's geography, natural environment, and their welcoming culture and history. Our goal is to implement a vivid story telling presentation that propagates useful and interesting information and facts about Hawaii Islands to the audience who wish to learn more about Hawaii, or simply just curious about this mysterious place. We choose to develop out story presentation using the ArcGIS platform, as it is extremely flexible and processes great in-depth functionalities. The ArcGIS platform offers more than enough for us to create our ideal story presentation and utilizing the visualization principles and concepts that we learned from lectures, we aim to offer the audience an exciting but also relaxing experience to really get to know the lovely Hawaiian Islands. Our story telling presentation covers the history and culture of Hawaii Islands, the must visit attractions and significant national parks, snorkeling at the wildest oceans, interesting Hawaiian facts, and the famous road-tour to the beautiful Hana.

## II. RELATED WORK

Hawaii is the youngest state among all the states of the United States. It has a unique traditional culture and history over time. Many researchers dedicated their time to explore Hawaiian history and Culture. In 1899, a brief history was

written by Alexander [1]. In this book, the author described the life of the Native Hawaiian people, worship and ceremonial system, wars between chiefs, and the formation of the Kingdom of Hawaii. This book also provides some ancient map visualization. After Captain Cook's naming Hawaii as the 'Sandwich Island', Dibble and Sheldon wrote the history of the Sandwich island [2]. There are many scholarly articles on the Hawaiian history of world war II and how the islands became the 50th state of the U.S.A. The author presented the Japanese attack on the United States at the pearl harbor which is located on the south coast of Oahu [3]. The author has chronologically written about the Hawaiian history and statehood in [4].

National Geographic also researched on the Hawaiian culture. They published a media (video) [5] on Hula which tells us not only the origin and rebirth of Hula, but also how it preserved the Hawaiian stories through dance. The Polynesian cultural center in Oahu kept the island's culture alive by replicating villages and presenting visually aesthetic cultural shows [6]. The U. S. National Park service presented a list of the parks and the key attractions for tourists along with the map [7]. We can get an idea of the Hawaiian foods and Luau from [8]. From [9], we learned about the island formation by tectonic plates, Polynesian migration history, plant and animal evolution and the natural history of the islands. Along with the scholarly articles, we have also read some interesting travel blogs from where we could learn about some interesting facts about Hawaii [10].

## III. NARRATIVE

### *History & Culture:*

The narrative of the story begins with the position of the islands in the map and the history of Hawaii. The Hawaiian Islands were first settled as early as 300A. D. -500 A.D., when Polynesians traveled to Hawaii's Big Island. Hawaiians lived in small communities ruled by chiefs who battled one another for territory. Before the arrival of foreign settlers and missionaries, ancient Hawaiians used to follow a system for land ownership and resources management which is named 'Kapu'. In 1778, Hawaii got the first European contact. Captain James Cook first landed on the island of Kauai and the map navigated to the location. After several battles between 1780 and 1890s, King Kamehameha united the entire islands into one kingdom. From the 1820s, Cristian sailors boarded the sailing ship to Hawaii and anchored in Kealakekua Bay. After King Kamehameha II, American Christianity converted many Hawaiians. Map navigates to the location of Kealakekua Bay, Big Island. During King Kamehameha III, Catholic and Mormon missionaries were also active in the Kingdom around 1840. After Cook's visit,

many people were attracted to Hawaii reading his books. People landed with diseases like influenza, measles. Almost half of the native Hawaiians were killed by the foreign diseases. In 1887, The first constitution of the Kingdom of Hawaii was signed by King Kalakaua. After his death, his sister Queen Liliokalani proposed a new constitution in 1893. Proceedings of the Committee of Safety and establishment of the Provisional Government. A constitution was proclaimed for the Republic of Hawaii with Stanford B. Dole as the first president in 1894. Hawaii received Annexation to the United States in 1897. The U. S. flag was first raised in the Iolani Palace of Oahu, the location is presented on the map. In 1941, Japan attacked Pearl Harbor which brought the United States to World War II. Map navigates to the location of Pearl Harbor. In 1959, Hawaii became the 50th state of the USA. Honolulu became the state capital which is pinpointed in the map.

Hawaii is known all over the world for the unique art and culture. The Polynesian Cultural Center is established in Oahu, HI to preserve the cultures of Polynesia. This is one of the most visited tourist destinations in Hawaii. There are replicated Polynesian villages and a handful of shows. Many movies filmed in Hawaii because of the breathtaking views of the islands. Their traditional feast is called Luau. They eat traditional foods like Poi, Lauau, Kalua pig, Poke, etc. to celebrate Luau with a cultural show. The show includes hula dance. In ancient times, Hawaiian did not have a written language, the kept the stories alive through generations by native chants and hula dance.

#### *National Parks:*

The magical stories of Hawaiian nation parks are accurate: there are multiple national parks with ancient stories in the middle of the Pacific Ocean. Two active volcanoes compose the Hawaiian Volcano Nation Park in the south of the Big Island. The best-preserved and most remarkable Hawaiian monumental architectures propagate the spirit of Pu'uohonua o Honaunau, translated into English means "place of refuge at Honaunau." More than half of the sanctuary area of native wildlife in Kaloko-Honokohau Nation Historical Park is open ocean, a paradise for ocean species fans. The epic story of two warriors' seals on the Pu'uukohola Heiau National Historic Site, which persists as a symbol of unification and lasting peace [22]. Haleakala Nation Park is a wonderland of nature lovers since countless unique species only can be found in this park, and it has one of the darkest stargazing. [23] The last mention is Nation Historical Park on Kalaupapa, which is dedicated to conserving the culture for leper colonies, discloses how people used to prevent and handle the transmission of leprosy with their accessible knowledge and supplies. Each national park owns its unique characteristics. There is no doubt that some national parks particularly attract you and trigger your interests after taking a short tour of each national park by above introduction order. The national parks map tour starts from the Big Island toward the Moloka'i island, south toward the west-north direction in the geographic map. In the Big

Island, the map tour is launched clockwise and starts with Hawaiian Volcanoes Nation Park. Experience all this and much more, only at the Aloha state.

Hawaii Volcanoes National Park, created in 1916, boasts both the world's most active Kilauea volcano and the world's largest volcano Mauna Loa. "Its deserved star attractions are the landmasses that give the park its name: 13,677-foot Mauna Loa, the world's most massive volcano, and 4,091-foot Kilauea, the world's most active volcano." [22] The Volcanoes Park covers 505 square-mile, is asked to spend days to have a full view of those two enormous volcanoes. There are unlimited mystical paths to discover the park. "There are at least six different climate zones in the park, including desert, tropical forest, and tundra." [24] For instance, Crater Rim Trail owes the secret view close-look of Volcano Kilauea, which is one of the most active volcanoes. While traversing the edge of the Kilauea summit caldera to Keanakao'i Crater, Crater Rim Trail shows dramatic views, steam vents, and fantastic plant life. [25] There is an excellent hint from the guardian website, "The Crater Rim road takes visitors past many of the park's highlights, including the Jaggar Museum and the Kilauea overlook. Also, making sure to get out of the car at the marked scenic stops for a better look at the steam vents, lava tubes, and historical lava flows along the route." [22] Besides, there are many other great and excellent ways to hand in touch with this national park's specialties, such as Crater Rim Drive Tour, Chain of Craters Road Tour, The Kahuku Unit, or Backcountry Hiking.

Puuhonua o Honaunau National Historical Park protects one of the most sacred and significant archeological sites in the Hawaiian island chain. [23] Puuhonua o Honaunau, translated into English, means "place of refuge at Honaunau". "In ancient times, the islands were governed by strict laws and violating certain rules, called kapu, was punishable by death, unless the accused could make it to the "place of refuge," to have their crimes absolved by a priest." [23] A gigantic "L" shape wall, 295 meter-long and 3.6 meter-high enclose the sacred archaeological site. [23] The Pu'uohonua is built around 450 years ago, and the 420-acre site is rich with critical archeological sites.

Kaloko-Honokohau National Historical Park, authorized as a national historical park on November 10, 1978, is located in the Kona District on west of the Big Island. [22] The total area of this park is 1,161 acres, but half of the sanctuary area of native wildlife in Kaloko-Honokohau Nation Historical Park is the open ocean. Kaloko means "the pond" in the Hawaiian language. The Kaloko is a famous site of fishponds in ancient, native survived in a hot environment by ancient fishing skills, including the building of fishponds and the knowledge of location fresh water. [26]

Puukohola Heiau National Historic Site was established as a national historic site on October 15, 1996 and is located on the northwestern coast of the Big Island. The area of the park is 76.6 acres. The national site mainly involves protecting the last major temple and maintaining the undersea temple dedicated

to the shark gods. “The epic story of two great warrior chiefs - Kamehameha and his first cousin, Keoua Ku’ahu’ula poses when their entangled destinies and fates are forever memorialized at Pu’ukohola Heiau, a nation is born.” [27] Thus, Pu’ukohola Heiau National Historic Site continues to be a symbol of unification and lasting peace.

Haleakala National Park, authorized as a part of Hawaii Volcano Nation in 1916, centered on Haleakala Crater, south-central Maui island, Hawaii. It took until 1961 for Haleakala to be split and named Haleakala National Park. Haleakala is one of the giant shield volcanoes. “Its rim reaches an elevation of 10,023 feet (3,055 meters) at Red Hill on the southwest. The crater is 7.5 miles (12 km) long and 2.5 miles (4 km) wide and has a circumference of about 20 miles (30 km).” [27] Haleakala is an inactive volcano; the last time of eruption is around 1500AD. Thus, it is possible to hike down into the crater for a closer look at the volcano. [22] Two popular and endangered species. Visitors can close the widespread and endangered species Nene (Hawaiian goose) in the park. The Silverswords, a gorgeous plant that takes as long as 50 years to flower once and then dies, are only found at the higher altitudes of Haleakala and in the Mauna Kea Forest Reserve of the Big Island.

National Historical Park on Kalaupapa, authorized as one of the national historical parks on January 7, 1976, and protected the culture and nature of two leper colonies on the island of Moloka’i. “When Hansen’s disease (leprosy) was introduced to the Hawaiian Islands, King Kamehameha V banished all afflicted to the isolated Kalaupapa peninsula on the north shore of Molokai. Since 1866, more than 8000 people, mostly Hawaiians, have died at Kalaupapa.” [28] The disease had been presented to the islands around 1830. At the time it was incurable.

#### *Tourism:*

Besides the fascinating and pleasurable national site tour, other enjoyable non-national sites also catch the alternative specialties of the Aloha state. In our storyline, there are six spots on the list which does not include many fascinating places. This fun tourism map demonstrates an alternative tour route, starting from Honolulu instead of the Big Island.

The tourism tour map begins with Pearl Harbor in Honolulu, in the order: (1) USS Arizona Memorial at Pearl Harbor, is ranked as the rank one visitor destination in the Hawaiian Islands by multiple travel magazines for years. Over 2 million people travel from the world every year to see where WW II began for America. [29] (2) North Shore of Oahu, which refers to the geographic area between West Oahu’s Ka’ena Point and East Oahu’s Kahuku Point, is most well-renowned for its larger-than-life waves during the Winter, stunning coastlines, and for attracting global surfers to the North Shore. [29] (3) Waikiki Beach means the beach of “spouting waters” and refers to the freshwater rivers that once flowed towards the ocean. [29] (4) Na Pali Coast State Wilderness Park is undoubtedly one of the most beautiful places on earth, where people praise it as fantasy. This coastal region not only is one of the best places

to visit in Hawaii, but also cover super-rich Hawaiian cultural history. [29] (5) Trip to Lana’i, is breathtakingly gorgeous, privately owned in the Hawaiian Islands. It is small island, also known as the “Pineapple Island”. [29] (6) Kona Coffee Farms, definitely worth the time to visit at least one coffee farm in Big Island, incorporate with hundreds of coffee farms. [29] Recommending pick few coffee farms and tour them throughout a day, like a wine tasting adventure.

#### *Interesting Facts & Finishing Scene:*

One of the most famous outdoor activity at Hawaii is snorkeling, and Molokini Crater is the best place in the world for snorkeling. This is because this wild and natural environment is so special that there are no others like it. On a clear day at Molokini, people can see up to 150 feet of visibility inside the water, and there are about 250 diverse species of fish and 38 species of coral at the Molokini habitat. Molokini crater is so huge that it has a size of 23 acres, and its highest elevation is 165 feet. What’s more impressive is that Molokini is next to the world’s largest dormant volcano, and it has a history of 230,000 years! There are so many interesting facts about Hawaii, such as you can literally mail a coconut from Hawaii, and you do not need to box it or wrap it. The popular activity surfing was also invented and originated from Hawaii. The Hawaiian language is also particularly intriguing, as the Hawaiian word Aloha means both “hello” and “goodbye”. Last but not least, any forms of gambling are illegal in Hawaii, so Hawaiians love to go to Las Vegas.

#### IV. IMPLEMENTATION OF THE STORY

We are using the ArcGIS platform to construct our story telling presentation, and to be more specific, we utilize the story maps to create interactive and intuitive graphical visualizations to showcase the unique characteristics of Hawaiian Islands. We applied the ArcGIS map search engine to locate and pinpoint the specific locations in our presentation, and we inserted numerous story slides to incorporate text, images, and external links to our story map. We manipulated different layout settings to create diverse presentation views, where we designed our story with distinct and collaborative visual elements. We also utilized the gallery slides to showcase the Hawaiian Islands’ amazing geographical landscape, and we incorporated add-on text and descriptions to capture the main points of every image so our audience can read only minimal of texts. We designed some of the texts with quotation format, which puts a huge emphasize on the idea that these texts represent literal facts, and the text formatting functionality of ArcGIS made this implementation very convenient. In terms of building location maps, we used the express maps of ArcGIS to design and construct customized map views. We manipulated the color and background settings to modify the maps as relevant as our theme, and express map functionality enables us to create a list of location objects that can be ordered and customized, and also be shown with adjustable parameters based on users’ preferences.

## V. RESULTS

*The figures used in this research can be found on the last page to accommodate fast and easy referencing. It also avoids clutter in this section.*

### *History & Culture:*

Figure 1 shows the map by zooming the Hawaiian Islands. Additionally, in the left sidebar, it shows an art that the native Hawaiians are arriving from Polynesia to the Maui island [11]. Figure 2 presents that in 1778, Captain James Cook landed on the island of Kauai [12] and the map location zooms in on that island. King Kamehameha's battle to unite all the Hawaiian Islands under one Kingdom is presented in Figure 3. The statue in the figure is located near his birthplace Kapaau, HI [13]. The place of the statue is pointed on the map. Figure 4 shows the timeline of King Kalakaua in history [14]. Figure 5 shows the timeline of Queen Liliuokalani [15]. Figure 6 presents the first president of Hawaii [16]. Figure 7 shows the first US Flag raised on the land of Hawaii and the Iolani palace of Oahu is marked in the map [17]. Figure 8 shows the pearl harbor attack [18] and the location of pearl harbor in the map. Figure 9 shows the statehood of Hawaii [19] and the capital Honolulu is marked in the map. Figure 10 shows the image of Polynesian Cultural Center in Oahu. Figure 10, 11, 12 displays the image of Polynesian Cultural Center, the modern setting of Luau, the preparation of Kalua Pig, and Hula dance [20]. Figure 13 displays the filming location of the movie Jurassic Park [21]. Figure 14 refers to the link of National Geographic's short film on Hula [22].

### *Nation Parks & Tourism:*

Figure 15 shows the general location of national parks and starts with Hawaii Volcanoes National Park, the southeast on the geographic map.[30] The demonstration tour of the Big Island starts clockwise in the ArcGIS tour map layout. Figure 16 exposes a zoom-in of the Big Island. [31] Figure 17,18 zooms in each location. [32][33] Figure 19 moves from the big island to Maui for Haleakala National Park and reveals the geographic location between Figures 19 and 20. [34] Figure 20 moves to Moloka'i. [35] Figure 21-23 has two image swap maps and one swap national trail map. Figure 21 is an image swap for Haleakala Summit Area Hikes, shows a map with the national site trail level layout on the left and official hiking trails and descriptions on the right. The left side of the swap map Figure 22 has the national site trail level layout and the legend of development level of load, which provides additional hiking information for the user. [36]The Swap Map only keep the trails data of the six Hawaiian national park. The color and shape were changed for a clear view and better visualization impact. The right side of Figure 22 is a Topographic Map. Users can use the swap bar and zoom in or out to find the difference and wanted information. Fig 23 is a swap image for Big Island, similar to Fig 21. [37] Fig 24 uses an explorer tour map to demonstrate each favorite tourism location by images. Users

can efficiently pick and check their interesting posts. There multiple images for each location.[38 – 55]

### *Interesting Facts &Finishing scene:*

Figure 25 presents the experience and description of snorkeling at Molokini Crater. Figure 26 shows the whole area of the attractions on the road to Hana. Figure 27 shows the first stop which is Kaulanapueo Church. The church was Constructed in 1853 of coral blocks and surrounded by a manicured green lawn, this tidy church remains the heart of the village. It was built in early Hawaiian missionary style, with a spare interior and a tin roof topped by a green steeple. Figure 28 shows the Huelo lookout, where visitors can order delicious fruit smoothies. Figure 29 shows the Waikamoi stream. Visitors can take a short stroll through the rainforest to reach a great waterfall. Figure 30 shows the Garden of Eden Arboretum, which is a great place to learn to identify Hawaiian local plants. Figure 31 shows the Honomanu Bay. Visitors can stop here to see Hana highway landscape. Figure 32 shows the Keanae Peninsula and Village. Visitors can stop here to see lava flows up close. Figure 33 shows the Halfway to Hana, and this spot is famous for its banana bread. Figure 34 shows the Nahiku Marketplace. This is a Hana shopping center, where visitors can shop for great souvenirs. Figure 35 shows the Waianapanapa black sand beach. Figure 36 shows the final destination, the beautiful Hana. Figure 37 wraps up the story with a phenomenal question in the finishing scene.

## VI. DISCUSSION

From this project, the audience can learn the benefit of information visualization with images based on a story. The story became more effective with the use of ArcGIS maps which the audience could not visualize from a simple text story. The map and the interactivity allowed the affordance of imaginary connection to the story.

The audience can also learn about the Hawaiian Culture by visualizing the images. A short film by national geographic is embedded in the story which can provide the information on the cultural Hula dance. The national parks and key tourism attractions are also presented with the location in the map. Therefore, it helps the audience to get an idea of the map while gathering the information of the parks at the same time. They can also visualize the trail maps with interactivity.

At the end, the audience will learn some interesting facts about Hawaii along with images. The map of the iconic Road to Hana is displayed in the map with key attractions along the road. The overall story presents the history and culture, tourism, and interesting facts with map interactivity. At the end, the audience will visualize that this unique culture can be kept alive only as long as the Native Hawaiian will carry on their own traditions.

## VII. FUTURE WORK

We intend to design our content and map in the plan, which can better present our ideas. It directly solves our current issue. We want to pin some locations where also need to be hover in

another color for highlighting. Besides, putting some signature local logos or signs can provide a superior Hawaiian vibe for readers. It also mean creating our own map can update our map quality, improve our visualization performance. The future design map will follow the visualization guideline to achieve and maintain significant efficiency.

Secondly, we will continue to work on the swap. We have collected multiple official trails map for the Hawaiian National Parks. We had a creative idea that uses a swap map to precisely present the official trail maps and geographic map at the same time. However, the ArcGIS online platform online allows the map to map and image to image swap. Thus, the future working director is building a swap map with an image inserted map.

### VIII. LESSON LEARNED

This project allows us to tell the story for the Aloha state with ArcGIS online tools. There are some lessons we have learned:

#### A. Who is the audience

The settle project will determine who the audience will be. The story of Hawaii might not attract Hawaiian, but the people who have not been to Hawaii and have plan travel to Hawaii, need the precise story to reveal the mystery of Hawaii. Thus, we decide to start with few critical points of Hawaii features, such as History & Culture, Nation Park & Tourism, Interesting facts & Fishing scene.

#### B. How to catch the audience's attention

We split the storyline into few small parts that can be better organized. In each subsection, such as Nation Park, the topic and clear focus are different from the fishing scene. However, Kaloko-Honokohau National Historical Park inherits the knowledge of fishing and the name "fishpond." We try to tell the full view story of the Aloha state from different perspectives.

#### C. The benefits of using ArcGIS

Compared with traditional text stories, our ArcGIS story map is more interactive with users. The tour map in ArcGIS allows users to reveal site location while reading the site description. Besides, each location-allocation process is smooth so that users can feel more comfortable.

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- [51] [https://media-prideofmaui.netdna-ssl.com/blog/wp-content/uploads/2014/09/Top-10-Places-to-Visit-in-Hawaii\\_Lanai\\_2-960x540.jpg](https://media-prideofmaui.netdna-ssl.com/blog/wp-content/uploads/2014/09/Top-10-Places-to-Visit-in-Hawaii_Lanai_2-960x540.jpg)
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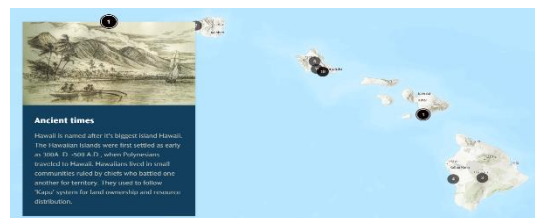


Fig. 1. Hawaiian islands in the map and Polynesian migration history.

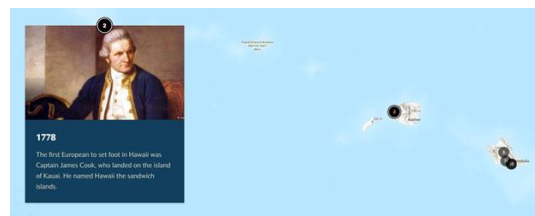


Fig. 2. Captain James cook landed on the island of Kauai.

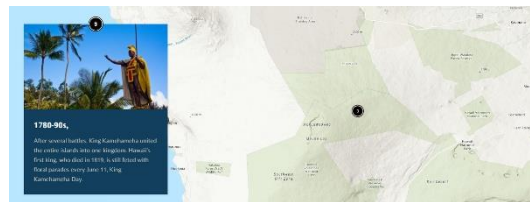


Fig. 3. The statue of King Kamehameha the Great near his birthplace Kapaau, Hi.



Fig. 4. King Kalakaua from the island of Oahu.



Fig. 5. Queen Liliokalani from the House of Kalakaua.

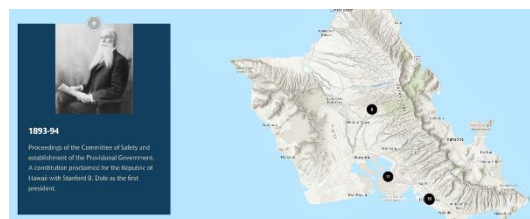


Fig. 6. Stanford B. Dole, the first president of Hawaii.



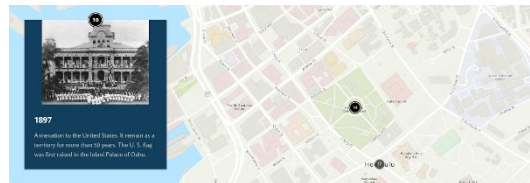


Fig. 7. The first US flag was raised at Iolani palace, Honolulu in 1897.

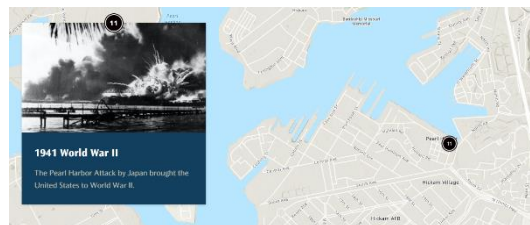


Fig. 8. Pearl Harbor attack during World War II and the location in the map.



Fig. 9. Hawaii became the 50th US State and Honolulu, pointed in the map, became the state capital.



Fig. 10. The Polynesian cultural center in the island of Oahu.





Fig. 11. Modern Luau set-up.



Fig. 12. Preparation of Kalua pig, a traditional slow-roasted pork cooked in an underground oven.



Fig. 13. Movies filmed in Hawaii.



Fig. 14. A short film by National Geographic on Traditional Hula Dance.



Fig. 15. Hawaii Volcanoes National Park (HAVO)

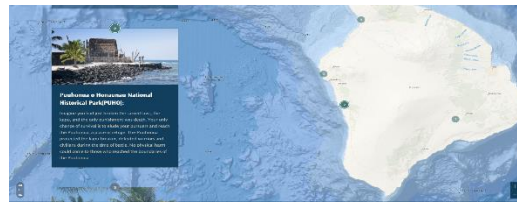


Fig. 16. Puuhonua o Honaunau National Historical Park (PUHO)



Fig. 17. Kaloko-Honokohau National Historical Park (KAHO)

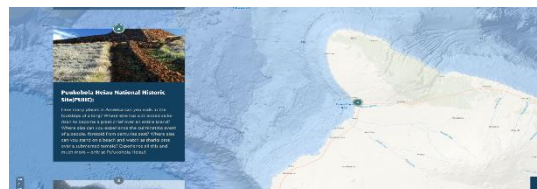


Fig. 18. Puukohola Heiau National Historic Site (PUHE)



Fig. 19. Haleakala National Park(HALE)

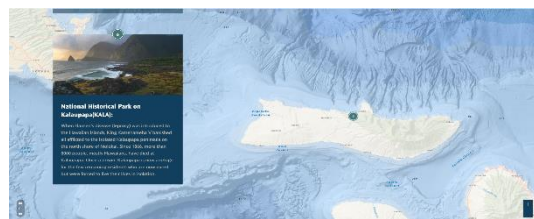


Fig. 20. National Historical Park on Kalaupapa(KALA)



Fig. 21. Haleakalā Summit Area Short Hikes with trails and descriptions- swap map



Fig. 22. National Park Service Trails in the Aloha State – Swap map



Fig. 23. ALKA Official Map-swap map

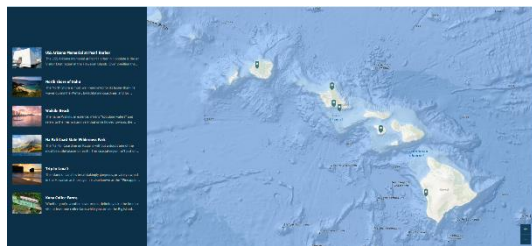


Fig. 24. Six beautiful tour sites with explorer layout

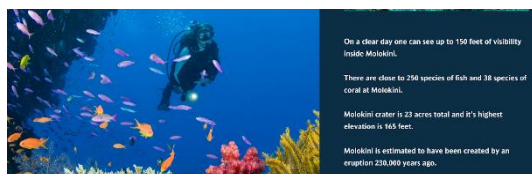


Fig. 25. Snorkeling at Molokini Crater



Fig. 26. Road to Hana



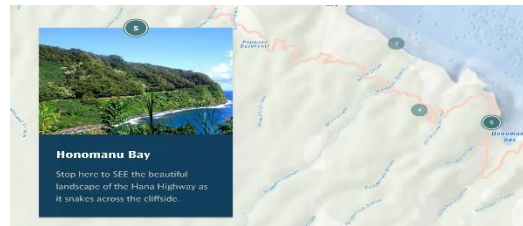


Fig. 31. Honomanu Bay

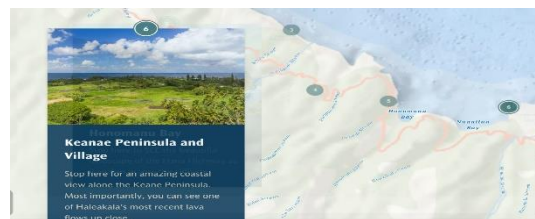


Fig. 32. Keanae Penninsula and Village

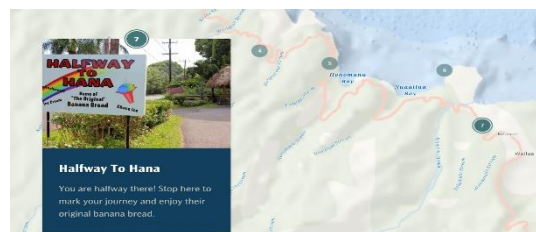


Fig. 33. Halfway to Hana



Fig. 34. Nahiku Marketplace



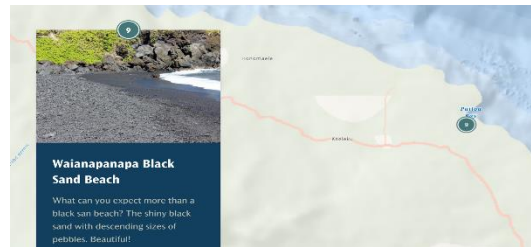


Fig. 35. Wainapanapa Black Sand Beach

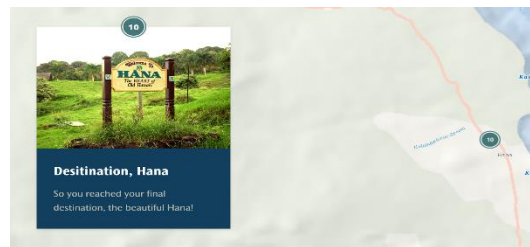


Fig. 36. Destination, Hana



Fig. 37. Finishing Scene