

NOAA/CRCP-DAR Coral Reef Cooperative Agreement Final Report

Project Title: South Kohala Coastal Community Naturalist Program

PI: (Name and affiliation) Chad Wiggins (The Nature Conservancy)

PO #: C52292

Award Period: (use the start date on the PO and end 1-year later or no cost extension date): March 18, 2015 – September 30, 2016

Period Covered by this Report: (list same dates as award period) March 18, 2015 – September 30, 2016

1. **Executive Summary** (*A brief and succinct summary of final report.*)

To evaluate coastal activities and increase compliance with natural resource regulations, two trained coastal naturalists, or Kilo Kapakai, hiked the entire South Kohala coastline for a twelve-month period (August 2015-August 2016) to engage the public, record use information, and document violations. Kilo Kapakai translates to one who observes the shoreline and will be used preferentially to designate coastal naturalists for this report. Kilo Kapakai completed 16,635 surveys by repeatedly surveying 34 sites along approximately 22 miles of shoreline based on randomly stratified schedule. At each site, they obtained use 'snapshots' based upon a standard observational protocol. The entire district was surveyed approximately once per week, so the 105,360 individuals observed engaging in coastal activities in South Kohala represent a small fraction of the total number of ocean users. Over 12 months, a total of five natural resource violations were confirmed indicative of a 99.99% total compliance rate with regulations. Observed violations declined throughout the course of the project, although data based on a sample size this small should not be considered definitive. Members of the public were supportive participants in conversations about this survey and management efforts in West Hawai'i, as were local businesses, organizations, clubs, and school groups. Based on these findings, coastal natural resource managers may be encouraged by the high level of compliance with fishing rules and should find the information in this assessment useful in determining locations for interpretive signage and educational programs in South Kohala, and in considering when and where illegal activity may still be occurring. We are particularly grateful to the Division of Aquatic Resources (DAR) and National Oceanic and Atmospheric Administration (NOAA) Coral Reef Conservation Program (CRCP) for matching private financial support to enable successful completion of this project and to the South Kohala Coastal Partnership (SKCP), Makai Watch Program, Fairmont Orchid, KUPU Hawai'i, the Division of Conservation and Resource Enforcement (DOCARE), The Kohala Center (TKC), West Hawai'i Explorations Academy (WHEA), University of Hawai'i at Hilo (UHH) Pacific Internships Program for Exploring Science (PIPES), Marine Option Program (MOP), and Marine Science Program, Fairmont Orchid, Kohala Coast Resort Association (KCRA), and the National Parks Service (NPS) Ala Kahakai National Historic Trail (ALKA) for providing on the ground and in the water support and helping to share what was learned through the Kilo Kapakai program.

2. **Purpose**

- a. Overarching goal(s) of the project.
 1. Quantify natural resource violations in South Kohala.
 2. Evaluate the change in violations concurrent with coastal presence, especially in remote areas of the coast.
 3. Quantify coastal use levels, correlations to publicly available data, and protected species habitat utilization.

4. Distribute materials, engage coastal users, and provide assistance while completing all other goals.

- b. Hypothesis (if applicable) and/or objectives of the project.

H₀: Increased coastal presence will increase compliance with fishing regulations in South Kohala.

3. Approach

- c. Detailed description of the work performed.

Following training and meetings with DAR, DOCARE, South Kohala Coastal Partnership, Ala Kahakai National Historic Trail, and West Hawai'i Fishery Council members and staff, Kilo Kapakai teams hiked coastal trails to survey 6-10 miles of shoreline three days/week in three zones within South Kohala (Fig. 1), parking a vehicle at both ends of the daily survey zone. Surveys began at either 6am or 12pm based on a randomly stratified schedule where day of the week, time of day, survey zone, and survey direction were each randomly derived using the Microsoft Excel random number generator function. Survey time was approximately 8 hours, and a standard survey protocol was followed throughout the duration of the project (Appendix 1).

Weather conditions, endangered marine life presence, and all coastal activities were recorded within each subzone using protocols based on the Puakō Makai Watch coastal use survey. Upon arriving at a new survey subzone (Appendix 2), the number of people was immediately recorded per activity. Individuals arriving subsequent to survey initiation were not counted, and individuals who left the survey area after being counted were not removed from the dataset. A standard datasheet was used to record this data and provide a record following data entry (Appendix 3).

Interactions with the public were recorded, with basic information about the content of interactions. Surveyors shared materials such as maps, fishing regulations booklets, measuring guides, water, and sunscreen and provided information on community events and partner initiatives, distributing materials to 529 individuals and families documented during the course of the program. Natural resource violations were documented based on Observation and Incident Reporting protocols and shared with DOCARE agents.

Data was entered into a Microsoft Access database and exported to Excel for analysis. Quality assurance was performed prior to analysis and exporting data to ArcGIS to generate 'heat maps' demonstrating



Figure 1: South Kohala zone sections designated by color. Survey days focused on a single section.

relative intensity of coastal use (Figs. 2-6) Observed human use patterns were compared to expected patterns assuming random use, e.g. observed number of surfing events was compared to an expected usage pattern based on percent of days with different wave height conditions. Where appropriate, human use was correlated (Pearson product-moment) with socio-economic and tourism information to examine potential relationships with human use. Quarterly summaries of interactions, violations, and use levels were prepared and submitted to DLNR and results shared with the South Kohala Coastal Partnership Marine Advisory Committee, Puakō Makai Watch, Kohala Coast Resort Association, Kai Kuleana Coastal Community Network, Alex and Duke Derego Foundation Ocean Safety and Invasive Fish Removal Event, and Kona Division of Aquatic Resources staff.

- d. Project management: List of individuals and/or organizations actually performing the work and how it was done.

The Nature Conservancy’s Hawai’i Island Marine Program managed this project start to finish. The two Kilo Kapakai were Christopher Peters and James Bounos – they conducted all surveys.

Survey effort was allocated based on a randomized schedule, with a summary of 148 survey days provided in Table 1.

Table 1. Number of days surveyed per month by weekday/weekend

Month	Weekday	Weekend	Grand Total
July 2015	5	2	7
August	10	3	13
September	11	2	13
October	11	3	14
November	10	0	10
December	8	2	10
January	9	4	13
February	8	2	10
March	12	4	16
April	8	1	9
May	11	1	12
June	12	3	15
July 2016	4	2	6
Grand Total	119	29	148

Kilo Kapakai were joined by volunteers, interns, and partners throughout the year of survey effort.

Training support was provided by the following:

- John Kahiapo (DLNR), Makai Watch Observation and Incident Reporting
- Verl Nakama (DOCARE), Violations Reporting and Information Sharing
- Stephanie Donaho (KCRA), Resort Engagement
- Zach Caldwell (TNC), Emergency First Response and First Aid
- Rebecca Most (TNC), Data Entry
- Rick Gmirkin and crew (NPS, ALKA), Place Names and Trail History
- Jaisy Jardine (Fairmont Orchid), National Ocean Day Coastal Clean-up
- Randy Clarke and James Heacock (Puakō Makai Watch), Survey Methodology
- Sierra Tobiason (DAR/SeaGrant), South Kohala Conservation Action Plan Integration

4. Findings

- e. Actual accomplishments and findings (by each objective).

Objective 1 - Quantify natural resource violations in South Kohala.

Kilo Kapakai quantified natural resource violations in the South Kohala region for the first time, observing five violations and three suspected violations over the course of the coastal Kilo Kapakai program. Kilo Kapakai had many interactions with individuals who may have otherwise violated rules and provided information to members of the public as indicated in Table 2. Note that surveys only occurred during daylight hours, and do not represent a complete record of illegal activity. Based on the results of this extensive 12-month long effort, natural resource rule compliance is above 99.9%. All of the confirmed violations were fishing rules. Of the 1,200 fishers observed, the compliance rate is 99.3%, which is a strong testament in support of DLNR training and education programs, enforcement, and community self-policing.

Table 2. Documented protected species interactions, observed violations & suspected violations

Date	Location	Description	Action
07/17/15	Nanuka Inlet, Mauna Lani Hotel	family of 6 interacting with turtle. No violation.	No action taken.
07/24/16	Honokoa, just northwest of Kawaihae Small Boat Harbor	Several lobster carcasses show apparent 3 prong use.	No action taken
07/26/15	Puakō	2 boys watching turtle closely. No violation.	No action taken.
8/8/15	Pelekane	Suspicious activity noted throw net fishing team that put their net in a bag and exited the area.	DOCARE notified
8/13/15	Puakō Fisheries Management Area	Use of a scoop net in Puakō Fisheries Management Area.	Offender informed of rule and DOCARE notified.
9/20/15	Ka Lae 'Ana'e, in 'Anaeho'omalū Bay	Undersized male <i>Chlorurus spilurus</i> taken by speargun.	Offender given regulation foldout book.
10/05/15	Pua ka 'ilima	Harvest of 2 uhu believed to be undersized by 2 spear fisherman around 1pm. Fisherman were not confronted and so the fish could not be measured to confirm size. The species could also not be determined. Additionally, ~100 kole were harvested legally.	DOCARE notified
10/08/15	Puakō Bay	Secondhand account given by beachgoers of illegal	DOCARE notified

South Kohala Community Naturalist Final Report

		fishing practice: Witnesses reported finding a long line setup with multiple hooks and a bait trap that washed ashore.	
12/20/15	Approximately 1 mile northwest of Honokoa Gulch, near shoreline.	Discovered several dozen opihi shells, evidently harvested, many of which were undersized.	Evidence photographed
01/03/16	Paniau, at the south end of Puakō Beach Drive.	Discovered several dozen undersized opihi shells around 7am. Many of the opihi still contained meat, indicating recent harvest almost certainly from the day before.	Evidence photographed. Additionally, nearby beachgoers were made aware of the violation and educated on the current opihi regulations.
01/31/16	'Anaeho'omalu Bay	Witnessed a man using a throw net in the nearshore waters at approximately 12:45pm. The man captured a dozen or so fish and immediately was joined by 2 women with a small cooler. The individuals placed the fish in the cooler although many of them appeared to be undersized Manini and ama ama (out of season). A single Moorish idol was released. As we approached, the individuals made notable attempt to conceal the fish inside the cooler.	We spoke with each of the individuals and advised in a friendly manner of our efforts to support DOCARE and pono fishing practices. Each individual was given a DAR Fish Regulation Measurement foldout. A language barrier was apparent during this friendly exchange. We did not ask to inspect their fish and did not directly acknowledge the violation.
3/28/16	Puakō	Witnessed a family of 4 encircle a swimming turtle in order to get photos. They appeared to offer the turtle leaves to feed on.	The Kilo Kapakai had a friendly conversation with the family about the rules protecting turtles.
3/29/16	Papakonani, near Fairmont Orchid	Witnessed a young man photographing a basking turtle repeatedly at a distance of less than a meter until the turtle crawled down the beach toward the water. The man continued to photograph the turtle into the shallows.	The Kilo Kapakai asked the man not to pursue the turtle.
3/30/16	Waiulua Bay, near the Hilton	Witnessed a girl splashing a basking turtle with seawater. She explained she thought the turtle was sick and was trying to help.	The Kilo Kapakai had a friendly conversation explaining that basking is a normal healthy behavior of the Hawaiian sea turtles.
3/30/16	Papakonani, near Mauna Lani	Witnessed a family in close proximity to a basking turtle, including a young boy who ran circles around the turtle.	The Kilo Kapakai had a friendly conversation with the family about the rules protecting sea turtles, and requested to give the basking turtle more space.
6/6/16	Puakō Beach, in the vicinity of Paniau.	Witnessed harvest of 1 undersized moano (<i>Parupeneus multifasciatus</i>) using a ~10ft 3-prong. Additionally, ~20 fish were harvested of legal size or of unregulated species.	The Kilo Kapakai did their best to overcome an apparent language barrier with the violator, as he struggled to speak English. The conversation was friendly and focused on importance of fisheries management. The violator graciously accepted a DAR 'Measurement Guide for Regulated Species' and agreed to give several other foldouts to family and friends.
7/1/16	Pua Ka'Ilima at Kawaihae Harbor	Witnessed harvest of 1 undersized uhu by a single fisherman using a speargun. 2 other uhu of legal size were also harvested. All fish appeared to be of the species <i>Chlorurus spilurus</i> .	The Kilo Kapakai and fisherman had a friendly conversation about the need for fishing regulations, including the size limits for uhu. The fisherman then graciously accepted a DAR 'Measurement Guide for Regulated Species.'
07/10/16	The Hilton Hotel at Waiulua Bay	Snorkeler pursuing and photographing turtle at close range.	No action taken.
07/14/16	The Hilton Hotel at Waiulua Bay	Girl sitting next to basking sea turtle, concerned the turtle was sick.	The Kilo Kapakai explained that basking behavior was normal and necessary for healthy turtles.

Note: "Action" column indicates the Kilo Kapakai response according to instructions/requests from DOCARE provided during initial meeting at Holoholokai (9/5/2015)

Objective 2 - Evaluate the change in violations concurrent with coastal presence, especially in remote areas of the coast.

One objective of the Kilo Kapakai program was to reduce natural resource rule violations by increasing the presence of observers in remote coastal areas. As previously noted, the number of actual violations was minimal and sometimes several weeks would pass without any observation of illegal activity, making statistical analysis difficult. However, behavior that might constitute violations fell into three categories, observed violations of fishing rules, suspected violations of fishing rules based on evidence or suspicious behavior, and protected species interactions. Because the harassment of protected species is not clearly defined and suspected violations may not constitute actual violations, those observations are considered separately, but are offered because natural resource managers and protection specialists may be interested in understanding patterns with regard to interactions. No egregious or demonstrably harmful interactions (e.g. poaching protected species) were observed during the course of this project.

While the number of violations was small, and results should therefore be viewed with caution, we noted a significant decline in the total number of violations over the course of this project (Logistic Regression, $p=0.080$). Additional data would be needed to determine if this decline was the result of the presence and outreach of the Kilo Kapakai, but suggests their presence and activities along the Kohola shore were beneficial to natural resource protection.



© The Nature Conservancy – Photo by Chris Peters

Objective 3 - Quantify coastal use levels, correlations to publicly available data, and protected species habitat utilization

Figures 2-7 represent relative intensity of coastal use and protected species habitat utilization observed during survey events. In figures 2-4, the frequency of protected species observations is signified by the size of the icon for each survey zone where observations occurred. The relative magnitude of coastal use is indicated by a scale from green to red along a gradient of least to most use compared to other sites surveyed in South Kohala. Figures 5-7 show specific ocean uses using a color ramp scale similar to the total use rankings in Figures 2-4.

Coastal Use

Some clear trends emerged from the data collected by Kilo Kapakai. Non-fishing activities accounted for nearly 98% of the human use along the South Kohala coastline, with sunbathing and reef walking (hiking or walking along the shoreline) being the most frequently conducted activities (Table 2). Average non-fishing use of the South Kohala coastline appeared higher during winter months - average activity between December 2015 and March 2016 was nearly twice that observed during other months. Average daily use was similar between weekend (49% of activity) and weekdays (51%). About half of all non-

fishing activity was observed at four access points: Hapuna Bay (20.9%), Wailea Bay (9.5%) 'Anaeho'omalu Bay (9.3%) and Kauna'oa beach (9%) and with most other access points having <5% of the non-fishing activity.

Table 2. Percent of people engaged in non-fishing activities. Non-fishing activities account for approximately 98% of all observed use on the South Kohala coastline.

Activity	Percent of non-fishing use
Sunbathing	31.9%
Reefwalking	35.7%
Swimming	15.7%
Other	16.6%

Fishing

Fishing accounted for 2% of the observed activity. Fishing poles were the most frequently used gear (78.6%), with many fishers using multiple poles (Table 3). Unlike non-fishing activities, fishing did not show a distinct seasonal trend, and fishing activity was nearly equally split between weekend (52%) and weekdays (48%). Fishing activity tended to occur at different access points than non-fishing activity. Just over a third of the fishing activity centered on four access points: Kawaihae Small Boat Basin (14.1%), Spencer Beach Park (8.5%), Puakō Bay (7.5%) and Kanekanaka Point (6.2%). All of the remaining 31 access points had <5% of the fishing activity.

Table 3. Percent of people engaged in fishing activities by gear type. Fishing activities account for approximately 2% of all observed use on the South Kohala coastline.

Gear	Percent of fishing use
Pole	49.2%
Extra gear – Poles	29.4%
3 Prong	5.9%
Other	15.5%

As noted, few violations were observed by Kilo Kapakai. Out of 1,200 observations of fishing recorded in South Kohala from July 2015 to July 2016, eight observed or suspected violations were noted, suggesting 99.3% of fishers may currently be complying with fishing regulations. Therefore, non-compliance by fishers does not appear to be a driving factor for observed resource declines. However, based on reports and observations of residents and on evidence found by Kilo Kapakai, most illegal fishing likely happens at night when observation is more difficult. Lacking data on nighttime activity, we should therefore consider the possibility that more illegal activity is occurring along the coastline.

Fishers are far from the only resource users in South Kohala. Many near-violations were the result of protected species interactions. Coastal use intensity maps demonstrate the hot spots for ocean users and protected species that may warrant consideration for interpretation, programs, or further observation by natural resource managers and regulators.

Protected Species Interactions

Places where coastal use and protected species habitat utilization overlap are likely areas for interpretive signage and education programs. Hot spots for both Pacific Green Sea Turtles (*Chelonia mydas*) and coastal users are: 'Ohai 'Ula (Spencer Beach Park), Kauna'oa Bay (Mauna Kea Beach Hotel), Pauoa Bay

(Fairmont Orchid), Nanuku Inlet (Mauna Lani Bay Hotel), and ‘Anaeho‘omalu Bay (Marriott Resort). One of these hot spots is a county park, while the rest are all adjacent to resort properties.

Some amount of self-policing is likely occurring in these areas, as social pressure plays a role in the character of interactions. Puakō is an area with very high sea turtle density but relatively low coastal use, which might make this population more vulnerable to illegal activity. Notably, the Puakō community has reported poaching and harassment of turtles for several years and is currently supporting a Makai Watch partnership with DOCARE to eliminate illegal take.

Humpback Whales (*Megaptera novaeangliae*) and Pantropical Spinner Dolphins (*Stenella longirostris*) are both protected under the Marine Mammal Protection Act. Figure 7 demonstrates a strong pattern of boating intensity at Kawaihae and a less intense spike at Puakō, which is not surprising given the commercial boat harbor and slips at the former and boat ramp at the latter. Kawaihae is also a heavily used area by Humpback Whales and the two bays just North of the commercial harbor.

Additional Patterns - Weather

Weather appears to have played a role in people's use of the coast. Activity decreased with increasing cloud cover. However, coastal use as a function of activity compared to no activity, is higher than expected on cloudy days.

Table 4. Cloud cover noted during activities. Counts are observations of representative activities.

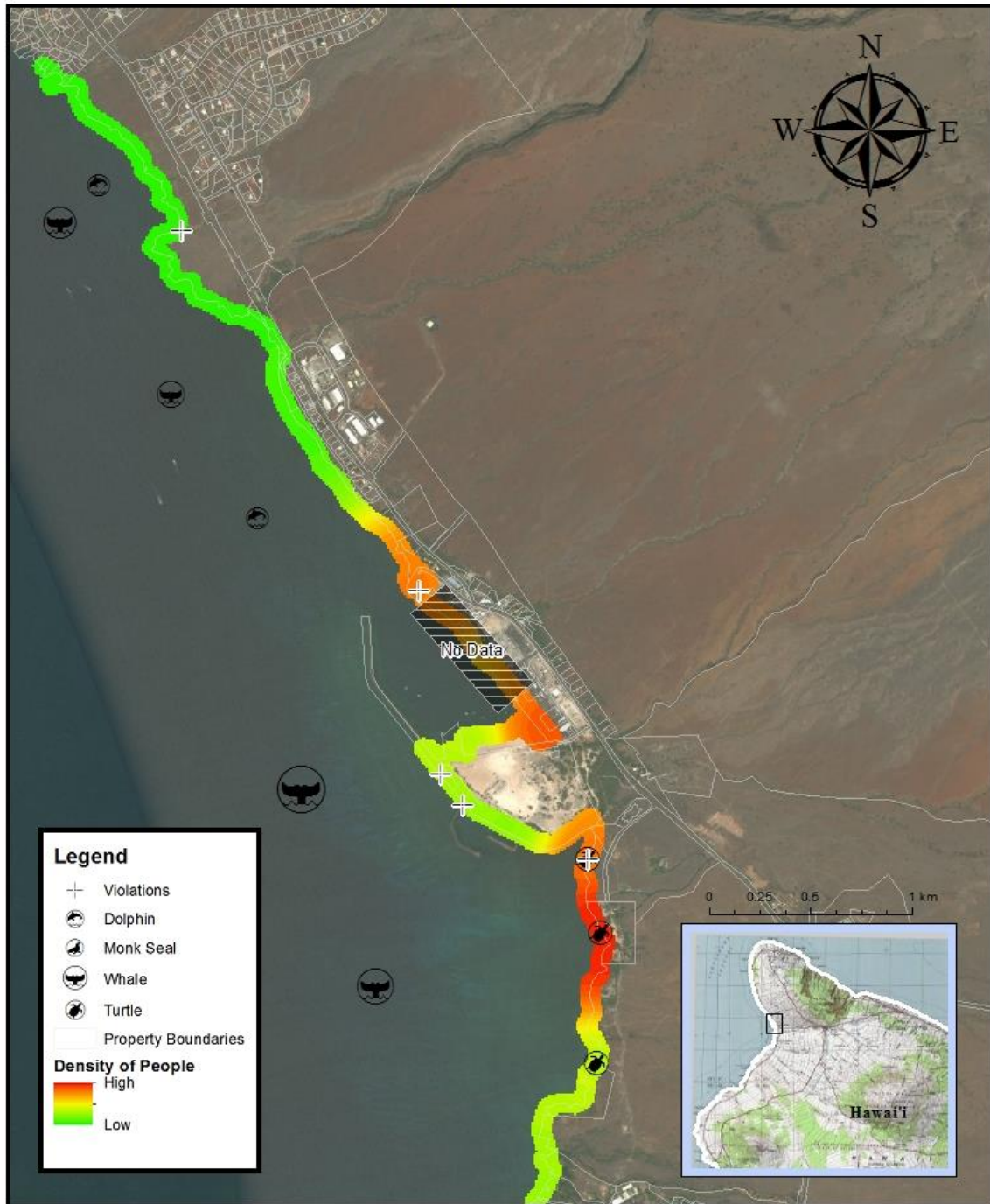
	<25%	0.25	0.5	0.75	1	Total
Count	541	564	305	207	52	1669
%	32.4	33.8	18.3	12.4	3.1	100

Table 5. Cloud cover noted for location/days without observed non-fishing activities. These percentages can serve as the expected distribution of human use if observed human (Table 4) use was not affected by cloud cover. Comparing the observed and expected, more human occurred along the coastline on days with cloud cover than would be expected if people were visiting randomly.

	<25%	0.25	0.5	0.75	1	
Count	292	188	72	48	12	612
%	47.7	30.7	11.8	7.8	2	100

South Kohala Coastal Use

1:24,000



Map Created by The Nature Conservancy
Transverse Mercator Projection
July 2016
Map ID: SKCN_North_2



Figure 2 Relative coastal use and protected species coastal and nearshore habitat utilization in the north region of South Kohala – Ka 'Opae to Ma'umae.

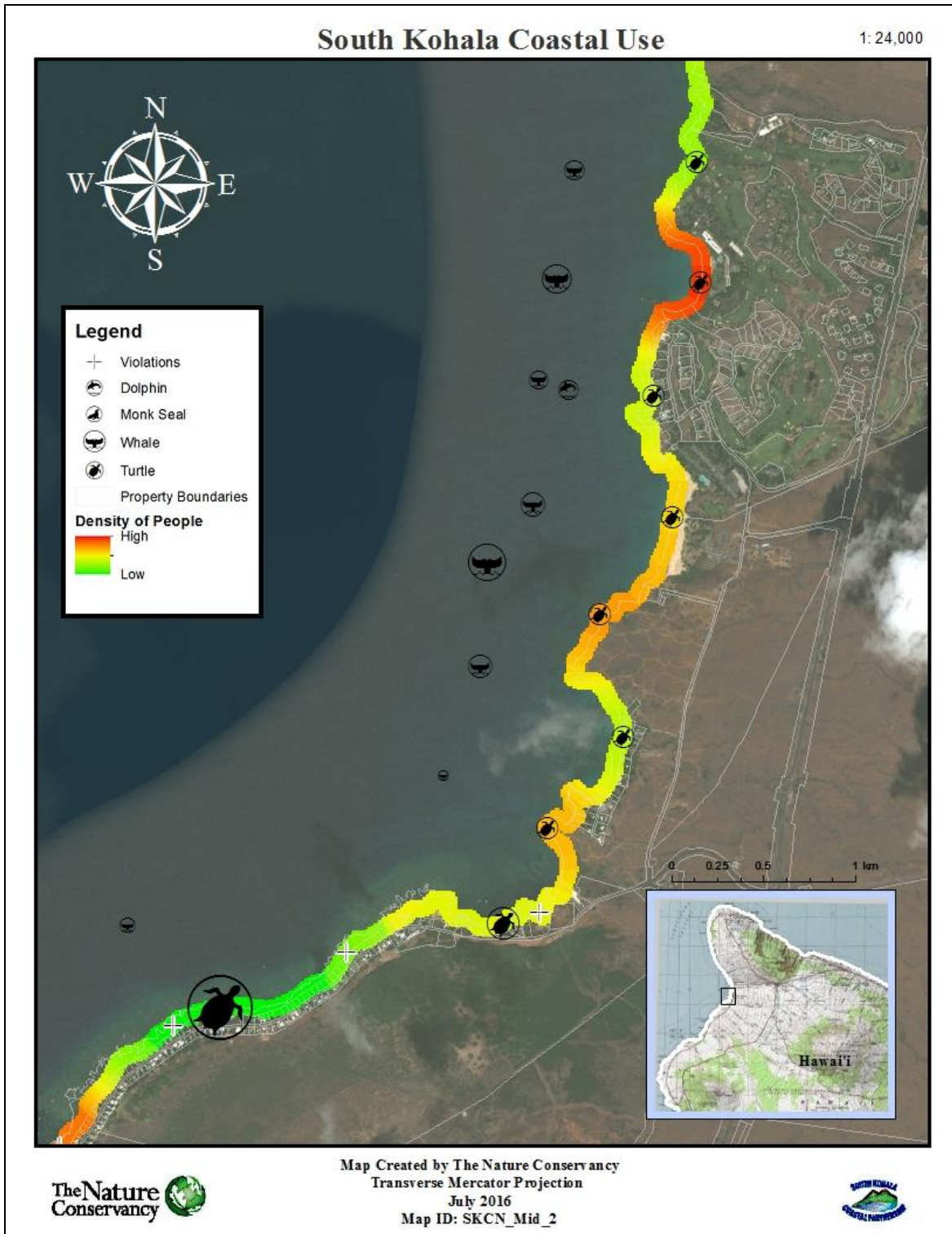


Figure 3 Relative coastal use and protected species coastal and nearshore habitat utilization in the central region of South Kohala – Kauna’oa to Puakō.

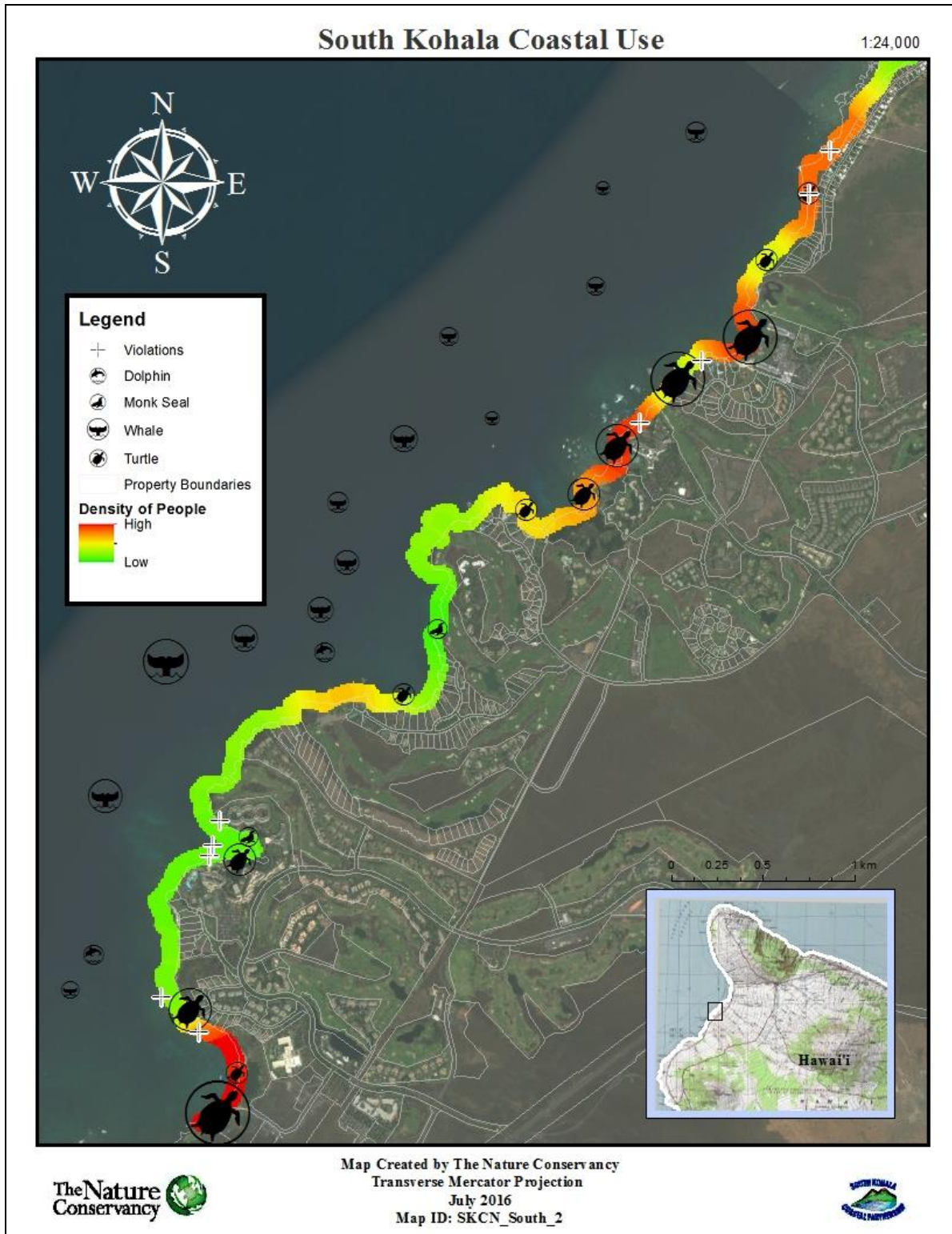


Figure 4 Relative coastal use and protected species coastal and nearshore habitat utilization in the south region of South Kohala – Puakō to Kapālaoa.

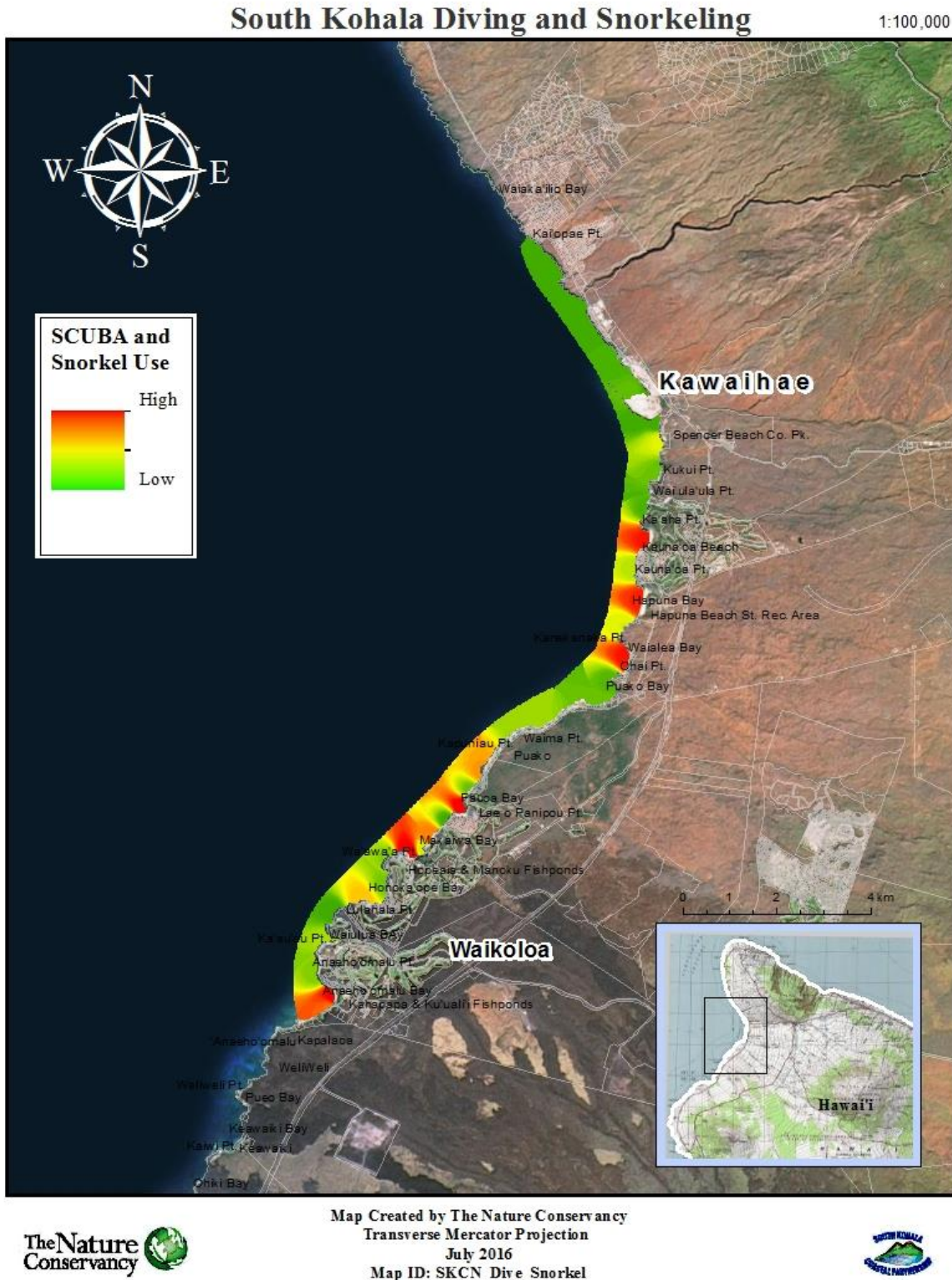
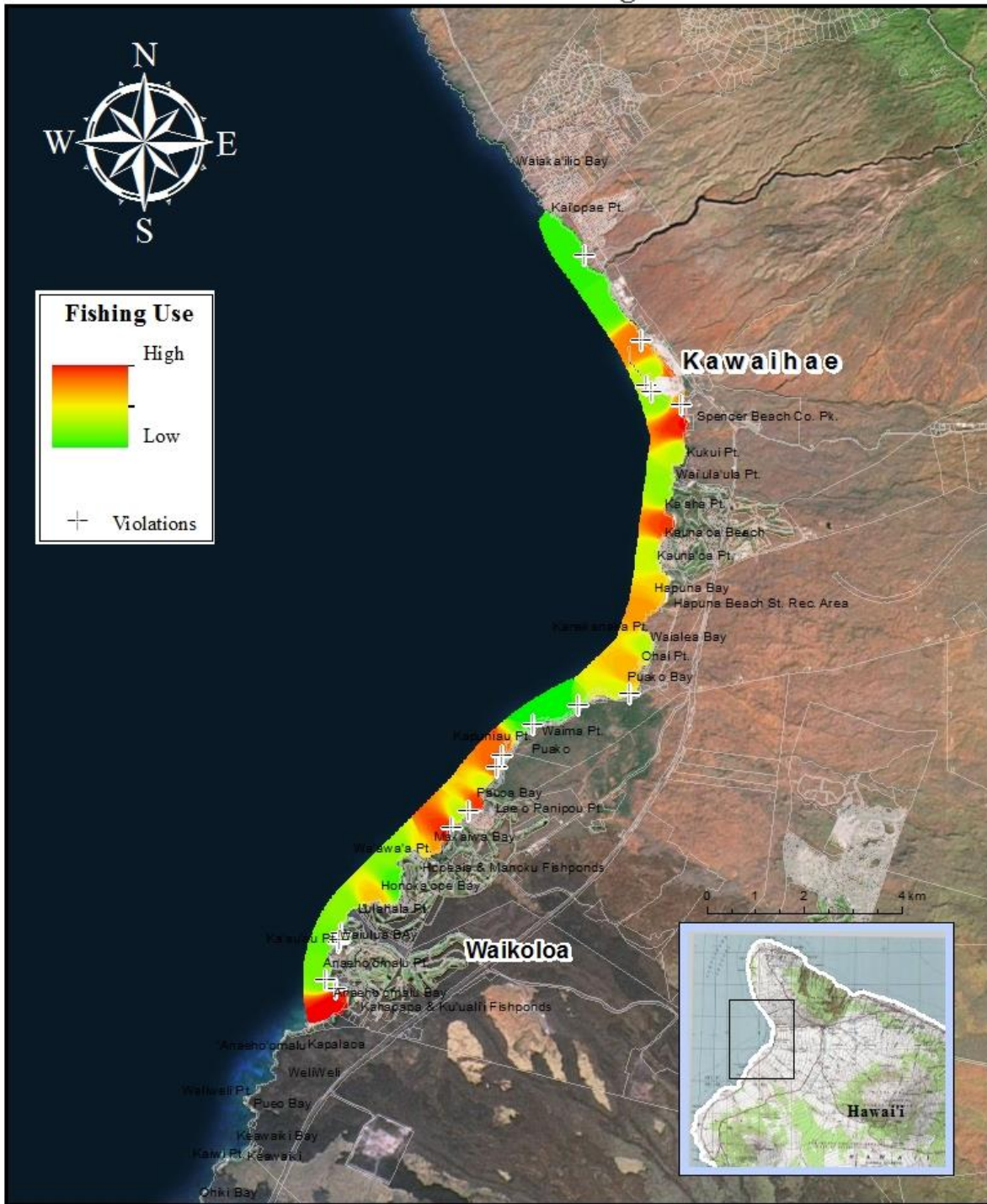


Figure 5 Relative dive and snorkel activity in South Kohala.

South Kohala Fishing Use

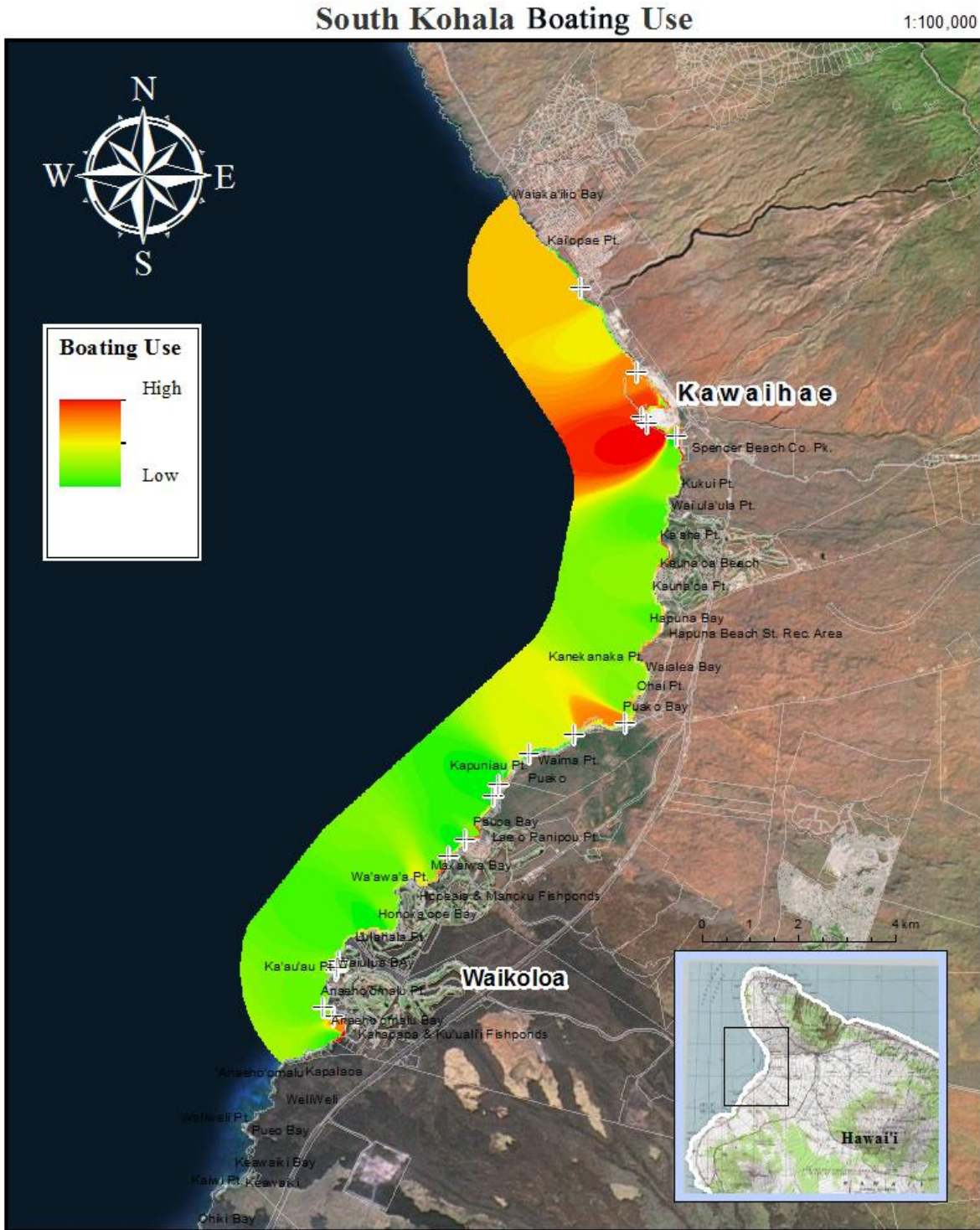
1:100,000



Map Created by The Nature Conservancy
Transverse Mercator Projection
July 2016
Map ID: SKCN_Fishing



Figure 6 Relative fishing activity in South Kohala.



Map Created by The Nature Conservancy
Transverse Mercator Projection
July 2016
Map ID: SKCN_Boating



Figure 7 Relative boating activity in South Kohala.

Time of Day

The highest percentage of all activities occurred in the "middle" of the day, with 60% of non-fishing activity and 56% of all fishing activity occurring between 10 am and 2 pm.

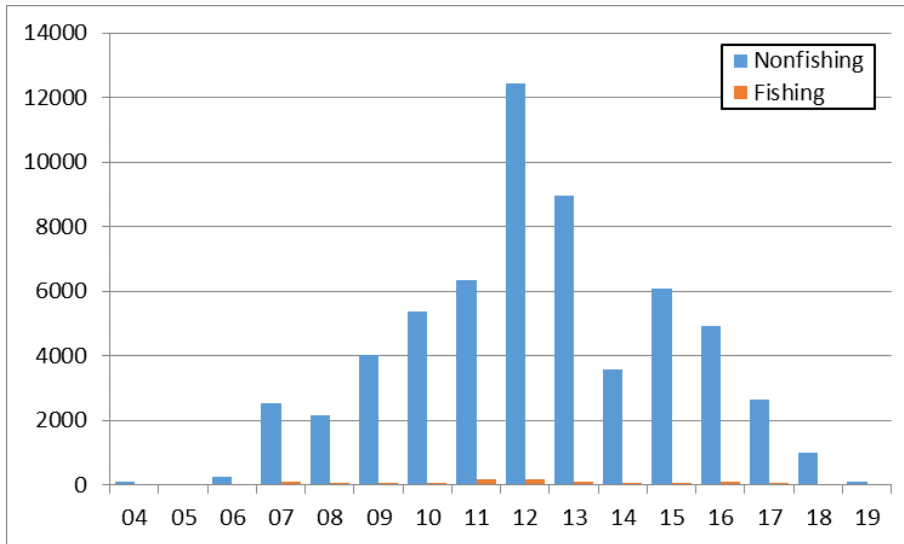


Figure 8. Sum of all non-fishing (blue bars) and fishing (red bars) activity by hour of the day. Counts are people taking part in the activity and are summed over all sites and dates.

Not all activities followed the daily pattern as described above. Reefwalking, sunbathing, and swimming (the most popular activities) drive the overall non-fishing activity pattern, but camping and partying showed different daily use patterns. Camping was most noted in the morning and partying most noted at noon and around 4-5 pm.

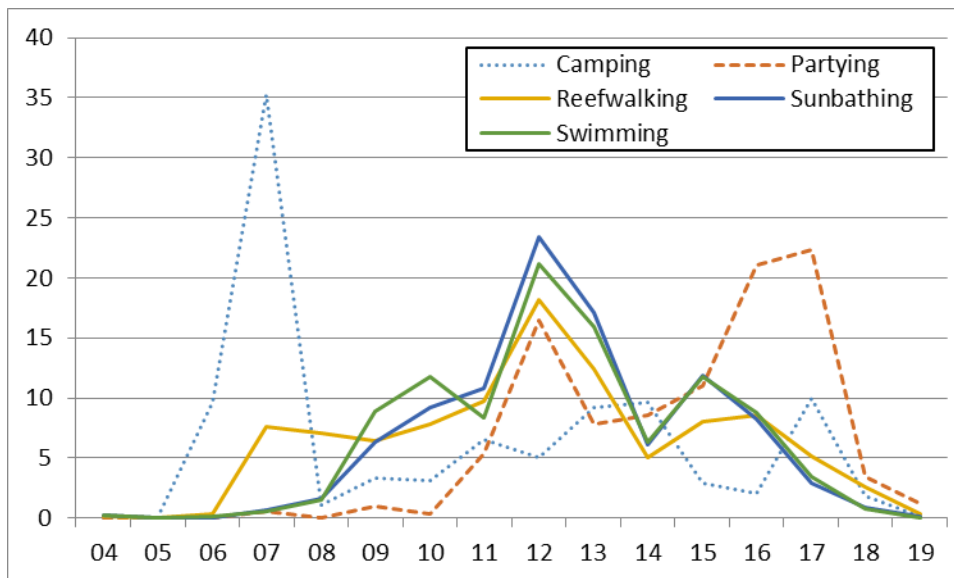


Figure 9. Percent of all five non-fishing activities by hour of the day. Reefwalking, sunbathing, and swimming drive the overall non-fishing activity pattern, but camping and partying (both numerical less common activities) diverge from the general daily pattern.

Wave Height

Average monthly wave height was higher in the winter-spring months (between January and April), but appeared to have little effect on non-fishing activity, except for surfing.

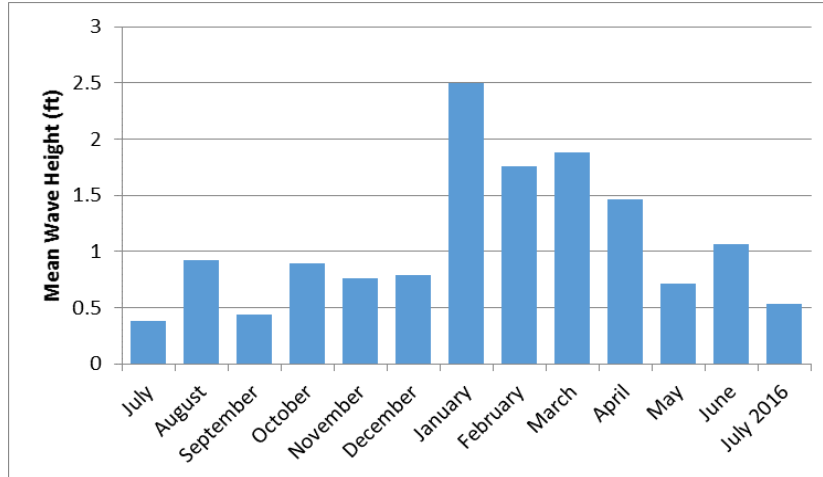


Figure 10. Average wave height by survey month

Unsurprisingly, surfing showed a different yet logical relationship with surf height. Surfing activity (events and total surfers) was highest at moderate surf heights and dropped quickly once surf exceeded three feet.

Table 6. Number of surf events, total number of surfers, and mean number of surfers per event (mean ± SEM) vs. wave height.

Wave Height	Surf Events	Total Surfers	Surfers/event
0	5	72	14.4 ± 6.7
1	9	53	5.9 ± 1.8
2	32	283	8.8 ± 3.0
3	47	291	6.2 ± 0.9
4	19	132	6.9 ± 1.0
5	3	34	11.3 ± 5.2
6	1	10	10
Grand Total	116	875	14.4 ± 6.7

This was not a sampling artifact. While moderate and low surf days were considerably more common than high surf days, surf events on low surf days were less common than would be expected if surfers were randomly selecting surf days. Conversely, the observed events on moderate to high surf days were

more common than expected. Surfers appeared to preferentially select moderate surf height days to surf, appearing to prefer 3 ft waves over all other wave heights.

Visitor Rates and Unemployment Effects

During community consultations it was suggested that unemployment rates may be related to camping activities and that visitor arrivals may relate to coastal use outside of resort areas. We evaluated these questions by correlating coastal use data (specific to type as applicable) and publicly available datasets of monthly visitor arrivals and unemployment (from the Hawai'i's Department of Business, Economic Development, and Tourism).

No relationship was found between "visitor number" or "number of visitor days" and reefwalking, sunbathing and swimming, the three dominant uses in which visitors engaged (Table 7).

Table 7. Pearson Product Moment Correlation coefficient (p-value) between visitor number and visitor days with three most common activities on the S. Kohala coastline.

	Visitor number	Visitor Days
Reefwalking	0.388 (0.195)	0.106 (0.731)
Sunbathing	0.438 (0.134)	0.131 (0.669)
Swimming	0.394 (0.182)	0.155 (0.613)

Likewise, there was no relationship among employment rates, numbers unemployed, seasonally adjusted (SA) unemployment rate, and camping or fishing activities (Table 8).

Table 8. Correlation (p-value) of number of people unemployed, unemployment rate, and seasonally adjusted (SA) unemployment rate with camping and fishing activities on the S. Kohala coastline.

	Numbers UnEmp	UnEmp Rate	UnEmp Rate (SA)
Camping	-0.028 (0.929)	-0.040 (0.898)	-0.272 (0.369)
Fishing	0.108 (0.729)	0.172 (0.574)	0.198 (0.518)

- f. If significant problems developed which resulted in less than satisfactory or negative results, they should be discussed.

No significant problems to report.

- g. Description of need, if any, for additional work.

This analysis constitutes both a real-time assessment and a robust baseline of coastal use in South Kohala. It could be revisited using the same methods at a future date to evaluate the success of educational programs or land use management changes. At this time, it is complete, although the data

may be useful for a variety of research and management applications beyond the scope of this current initiative.

1. Applications:

h. Outputs/Deliverables: Outputs are defined as products (e.g. publications, models, new methods/technology, new or advanced tools, workshops, presentations, outreach activities or produces, like websites or newsletters or articles) or activities that lead to outcomes (changes in user knowledge or action).

- Coastal use and protected species habitat utilization maps (Fig. 2-6)
- Erosion photo presentation (See 2.I)
- Improved compliance with fishing regulations
- Moku-scale methodology for collecting use data and improving compliance (Appendix 1)
- Coastal Use Database
- Coastal Erosion Presentation
- Stories from the Field

i. Management outcomes: How was your information shared and used by resource managers

As noted, few violations were observed by naturalists. Out of 1,200 observations of fishing recorded in South Kohala from July 2015 to July 2016, eight observed or suspected violations were noted, suggesting 99.3% of fishers may currently be complying with fishing regulations. Therefore, non-compliance by fishers does not appear to be a driving factor for observed resource declines. However, based on reports and observations of residents and on evidence found by Kilo Kapakai, most illegal fishing likely happens at night when observation is more difficult. Lacking data on nighttime activity, we should therefore consider the possibility that more illegal activity is occurring along the coastline.

Given the high rate of compliance with existing fishing regulations among daytime users, it appears management efforts should focus on developing more effective fishing rules, and working closely with coastal communities to assist enforcement agents by documenting and reporting illegal activities around the clock so that officers can curtail, and eventually eliminate egregious illegal activity at night based on patterns of behavior. Education programs targeting coastal users in South Kohala should keep in mind the high rates of compliance and might focus on areas where knowledge may be lacking about biology and management beyond current fishing regulations.

Fishers are far from the only resource users in South Kohala. Coastal use intensity maps demonstrate the hot spots for ocean users and protected species and warrant consideration for interpretation or further observation by natural resource managers and regulators. Additionally, specific uses can be called out for evaluation in order to target management activities and programs as indicated in the previous figures. The frequency of protected species observations is signified by the size of the icon for each survey zone where observations occurred. The relative magnitude of coastal use is indicated by a scale from green to red along a gradient of least to most use compared to other sites surveyed in South Kohala.

This information has been shared with staff and members of DAR Kona, DOCARE, Makai Watch, South Kohala Coastal Partnership, Kohala Coast Resort Association, and Kai Kuleana Coastal Community Network and this report will be made available at the [South Kohala Coastal Partnership Webpage](#).

2. Evaluation:

j. Describe the extent to which the project goals and objectives were attained. How did this project address critical management needs?

Project goals were exceeded based on the observed benefits of increased compliance with regulations in concurrence with the Kilo Kapakai program. This finding directly addresses the South Kohala Conservation Action Plan strategy of non-compliance with natural resource regulations, while quantifying a low level of violations generally. These findings demonstrate the success of state and community initiatives to educate coastal goers in Hawai'i regarding rules pertaining to protected species and fish. By

quantifying illegal activity and demonstrating reductions in violations concurrent with increased presence, the Kilo Kapakai program accomplished its stated objectives.

3. Data Management

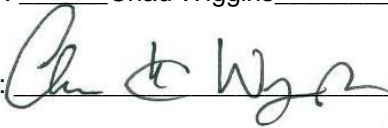
k. Describe how your information was shared and used by resource managers.

Data will be uploaded to an online platform maintained by The Nature Conservancy and available for download. Users are asked to please give attribution to The Nature Conservancy and contact cwiggins@tnc.org with any questions about the data or ideas for additional research.

l. Provide the location (internet address) of the submitted data.

<https://tnc.box.com/s/8ix4iy3j9ivrnr5qxcg1d9wsgjzyc1y6>

Progress Report Prepared by: _____ Chad Wiggins _____

Signature of Point of Contact:  _____

Appendix 1 – Survey Protocols

South Kohala Coastal Use Survey Protocols and Methods

Developed by The Nature Conservancy for South Kohala, Hawai'i Island

Purpose: To measure coastal use across South Kohala.

Survey Area: For the purpose of this survey, the South Kohala shoreline was divided into 34 survey zones, which begin at the Ala Kahakai National Historic Trail and extend seaward and perpendicular to the shoreline approximately 1 mile offshore. Zones were predetermined based on a combination of factors, including land use, geology, line of sight and boundaries of Fishery Management Areas.

Required Survey Equipment

- Accurate timepiece
- Datasheet
- Writing implement
- Mobile phone or radio
- Camera

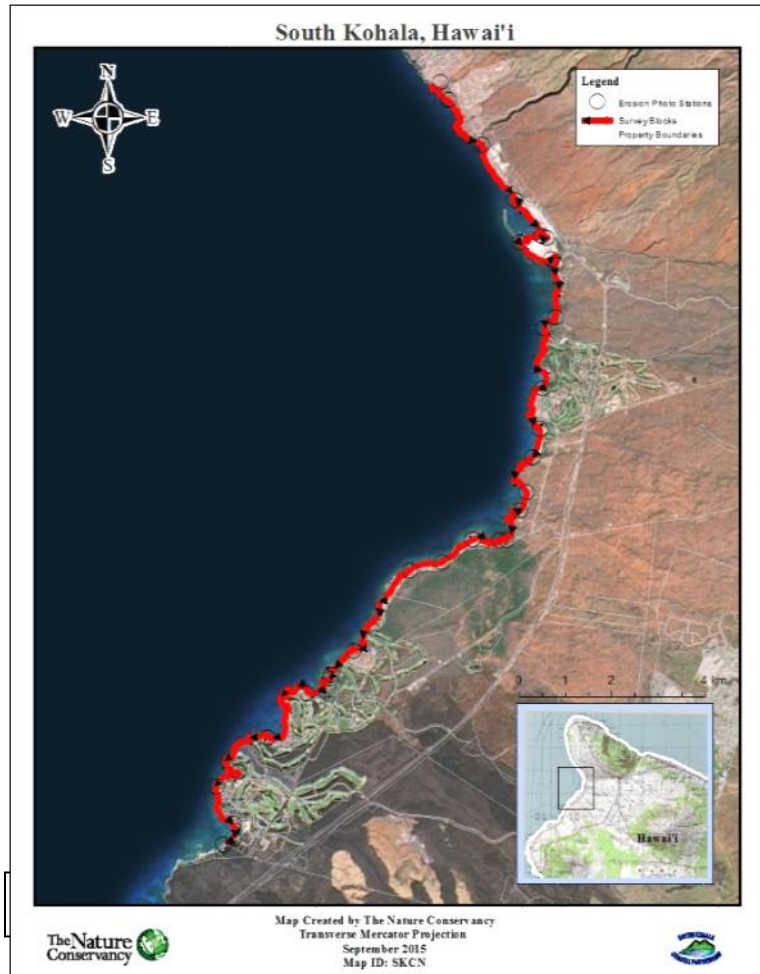
Optional/Recommended Equipment

- Sun Protection
- Water
- Clipboard
- Notebook
- Binoculars
- Tide Calendar
- GPS Unit
- Informational handouts
- First Aid Kit

Survey Protocols

Environmental Conditions

Environmental conditions were assessed upon entering each survey zone. Recorded times reflect when the survey began, while conditions were recorded to summarize the zone as a whole. Water visibility was described as clear (>20ft) or cloudy (<20ft). Wave height was estimates maximum height of the back of the wave (not the face). Wind speed, wind direction and cloud cover were also estimated and recorded.



Survey Definitions

All activity was recorded on and to the makai side of the Ala Kahakai National Historic Trail. In areas where the location of the Ala Kahakai Trail was unclear, surveyors used the boundary of the natural area as the makua boundary to the survey zones.

PEOPLE

Reefwalking – hiking or walking near the shoreline (includes tide pools, nearshore sand, hiking on the beach or path above the waterline, and those walking in the water at a depth less than thigh-high)

Snorkeling – *swimming* and using a mask and snorkel [**includes** individuals with gear who have just finished snorkeling or who intend to immediately go snorkeling; **excludes** SCUBA, spearfishing, and swimming]

SCUBA – using a Self Contained Breathing Underwater Breathing Apparatus [**includes** individuals with gear who have just finished SCUBA diving or who intend to go SCUBA diving; **excludes** SCUBA Spearfishing]

Swimming – moving through or floating in water deeper than thigh high [**includes** exercise, race events, and use of personal floatation devices (e.g. life jackets, waterwings, noodles); **excludes** snorkeling]

Surfing – using an implement to ride on the surface of the ocean without assistance [**includes** short, long, body, and knee boarding; **excludes** stand up paddling, windsurfing]

SUPaddling – paddling a board across the surface of the ocean while seated, kneeling, or standing [**includes** stand up paddle surfing; **excludes** kayaking, canoeing]

Windsurfing – using a fixed sail connected by a mast to a board to move across the surface of the ocean [**includes** waveriding with a windsurboard; **excludes** kitesurfing and sailing]

Sunbathing – laying or sitting [includes those in the shade (excludes those eating or consuming alcoholic beverages)]

Picnicking – eating or preparing to eat (excludes those with coolers who are not eating)

Partying – drinking alcoholic beverages

Kitesurfing – kitesurfing

Paddlebiking – using a hydrobike or paddle bike

Camping – staying or stayed overnight in an impermanent structure [includes people in campsites with tents, and overnight hammocks, and long-term houseless residents (excludes umbrellas and pop tents)]

Tents – tents and overnight hammocks (excludes pop tents)

BOATS

For the purposes of this section a **boat** is: *a vessel for transport by water, constructed to provide buoyancy by excluding water and shaped to give stability and permit propulsion.* As stated previously, boards upon which individuals sit or stand are counted in “ACTIVITY”.

BOAT types

Recreational – privately owned vessel not engaged in an identifiable commercial activity [**excludes** other types of vessels specified in this section]

Commercial – privately or publicly owned vessel engaged in commercial activity including carrying passengers, charter operations, fishing, or transportation [**excludes** other types of vessels specified in this section]

Kayaks - long, narrow vessels propelled by two-bladed paddles, pedals, small motors, or some combination thereof [**excludes** other types of vessels specified in this section]

Canoes – long, narrow vessels propelled by single bladed paddles [**excludes** other types of vessels specified in this section]

PWC/Jetski – impeller or turbo powered craft designed for 1-3 passengers with a handlebar steering console, straddle seat, and footwells [**excludes** other types of vessels specified in this section]

Total boaters estimated – an estimate of the total people onboard all boats

FISHING

Harvesting – Gathering along the shoreline or intertidal zone [**includes**, ‘opihi harvest, hā‘uke‘uke harvest, or other extractive use not associated with fishing]

Pole – any fishing from shore that includes a pole and line [includes dunking, whipping, etc. [excludes trolling from a boat]]

Spear-Free/Spear gun – using a speargun, or similar device to catch fish while swimming or wading

Spear-SCUBA – using SCUBA gear and a speargun, pole spear, Hawaiian sling or similar device to catch fish underwater

Lay Net – using a relatively long net of interwoven fibers or monofilament that is set out for a period of time to catch fish

Throw Net – using a net of interwoven fibers or monofilament that is thrown by a single fisherman to catch fish

Hand Net – using a small net to scoop fish or marine life out of the water

Extra gear – extra fishing way also identified, counted and categorized individually (including gear in use or not in use). For example, a single ulua fisherman with 4 active poles, and 2 inactive poles would be logged at 1 Pole and 5 extra poles. The notes would then be used to denote active fishing effort.

ANIMALS

Basking Turtles – turtles out of the water

Grazing Turtles – turtles swimming or submerged in the water

Monk Seal – monk seals

Dolphins - dolphins

Whales – whales

Interactions – instances when humans appear to interrupt to normal behavior of the endangered species listed above.

VIOLATIONS

Resource violations were recorded in detail and reported to The Division of Conservation and Resource Enforcement (DOCARE)

Appendix 2 – Survey zone names and codes

Zone Site Name	Zone Code
Anaehoomalu Bay	ANA
Hawaiian Homelands	HHL
Holoholokai	HOL
Honokaope Bay	HBV
Honokaope Beach	HON
Honokoa Gulch	HKO
Ka Lae 'anae	KLA
Kanekanaka Point	KKP
Kauna'oa Beach	KOA
Kawaihae Harbor	KWH
Kawaihae Shipping Docks	KSD
Kawaihae Small Boat Basin	KSB
Kawaihae Small Boat Harbor	KSH
Keawa Nui Boat Landing	KEA
Lae Wa'awa'a	WAA
Lai O Hiiaka	LOH
Makaiwa Bay	MAK
Mauumae Bay	MAU
Nanuka Inlet	NAN
Nawahine	NAW
Ohai Point	OHP
Ouli	OUL
Paniau	PAN
Papakonani	PAP
Pauoa Bay	PAU
Pelekane	PEL
Pua Ka 'Ilima	PKL
Puako Bay	PBY
Puako Beach	PBH
Spencer Beach Park	SBP
Waialea Bay	WBY
Waiulaula Point	WUP
Waiulua Bay	WUB

Appendix 3 – Survey Datasheet

South Kohala Coastal Activity Data Sheet

Date:		Start Time:		End Time:							
Location: Place Name or Nearest Feature						Water Visibility: A) Clear; B) Cloudy					
Waves: A) Flat 0ft; B) Slight 1-2ft; C) Moderate 2-4ft; D) High Surf >4ft											
Wind V(elocity): A) Calm 0-5 knots; B) Lt. breeze/5-15 knots; C) Strong breeze/15-25 knots; D) Strong wind/>25 knots											
Wind Direction: A) North; B) Northeast; C) East; D) Southeast; E) South; F) Southwest; G) West; H) Northwest											
Clouds: A) <25%; B) 25%; C) 50%; D) 75%; E) 100%											
LOCATION											
TIME											
Water Vis.											
Waves:											
Wind V/Dir											
Clouds:											
PEOPLE											
Reefwalking*											
Snorkeling											
SCUBA											
Swimming											
Surfing											
Sunning											
Picnicking*											
Camping											
SUPaddling											
# Engaged*											
BOATS											
Recreational*											
Commercial*											
Kayaks											
Canoes											
PWC/Jetki*											
FISHING											
Pole											
3 prong											
Speargun											
Lay Net											
Throw Net											
Other*											
ANIMALS											
Turtles*											
Monk Seals*											
Other ES*											
Interaction*											
VIOLATIONS											
Description*											
Action Taken*											

*details: