

# **Map Guide to Green Turtle (*Chelonia mydas*) Foraging Areas Located in Proximity to Basking Sites in the Hawaiian Islands**

Data mapping product by NOAA-PIFSC Marine Turtle Assessment and Biology Program

by Denise Parker and George Balazs

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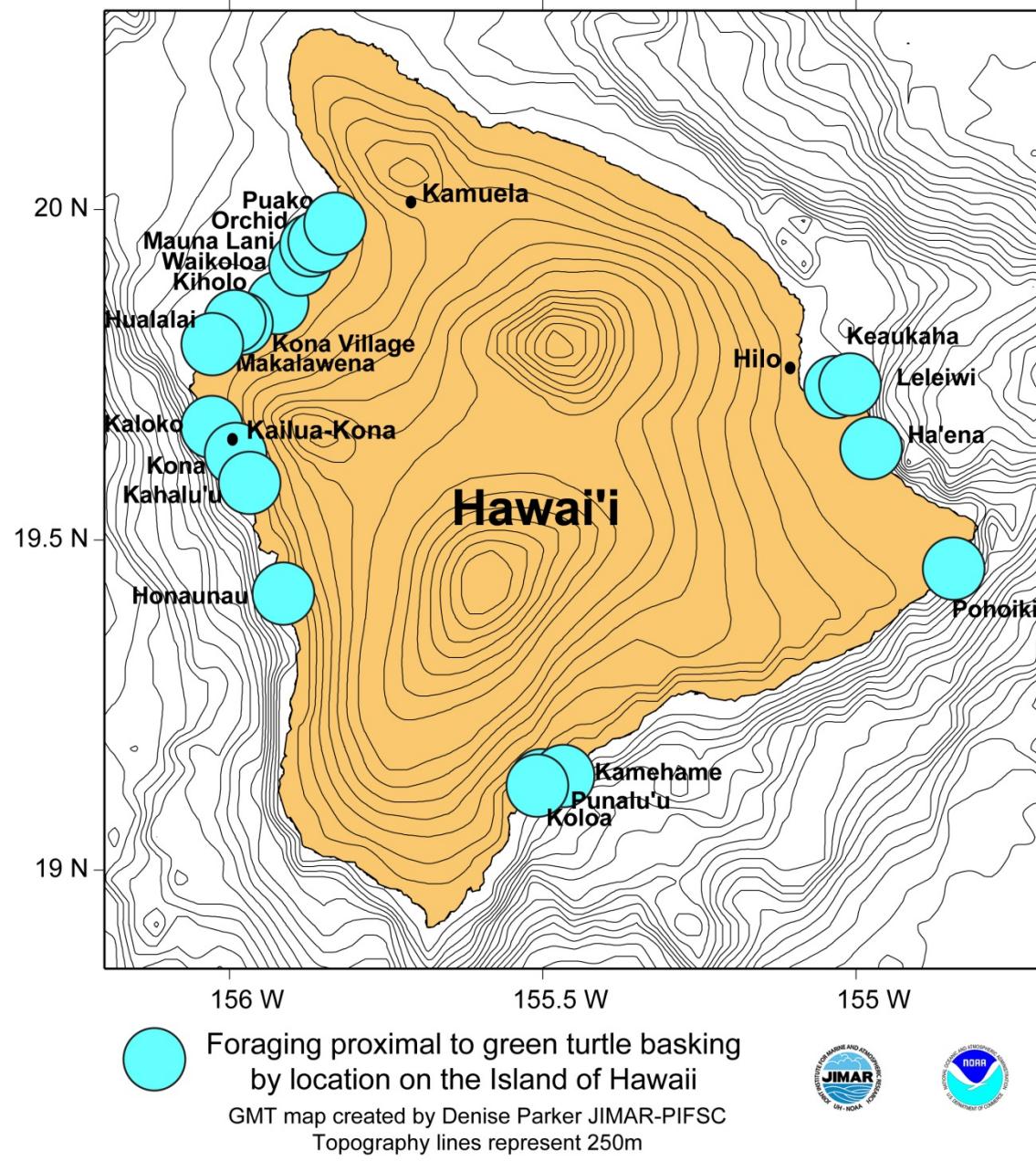
**Numerous other foraging areas used by green turtles occur throughout the Hawaiian Islands that are not displayed on these maps.**

## **Relevant References in Chronological Order:**

- Balazs, G. H. 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-7 and University of Hawaii Sea Grant Cooperative Report UNIHI-SEAGRANT CR-81-02, 141 p.
- Whittow, G. C. and G.H. Balazs. 1982. Basking behavior of the Hawaiian green turtle (*Chelonia mydas*). *Pac. Sci.* 36(2):129-139.
- Whittow, G. C. and G.H. Balazs. 1985. The thermal ecology of basking green turtles (*Chelonia mydas*). *Natl. Geogr. Res. Rep.*, 1977 projects, p. 789-796.
- Balazs, G. H., R. G. Forsyth, and A. K. H. Kam. 1987. Preliminary assessment of habitat utilization by Hawaiian green turtles in their resident foraging pastures. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-71, 107 p.
- Balazs, G. H. 1996. Behavioral changes within the recovering Hawaiian green turtle population. In J.A. Keinath, D.E. Barnard, J.A. Musick, and B.A. Bell (comps.), *Proceedings of the Fifteenth Annual Symposium on Sea Turtle Biology and Conservation*, February 20-25, 1995, Hilton Head, South Carolina, p. 16-21. U.S. Dep. Commer. NOAA Tech. Memo. NMFS-SEFSC-387.

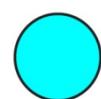
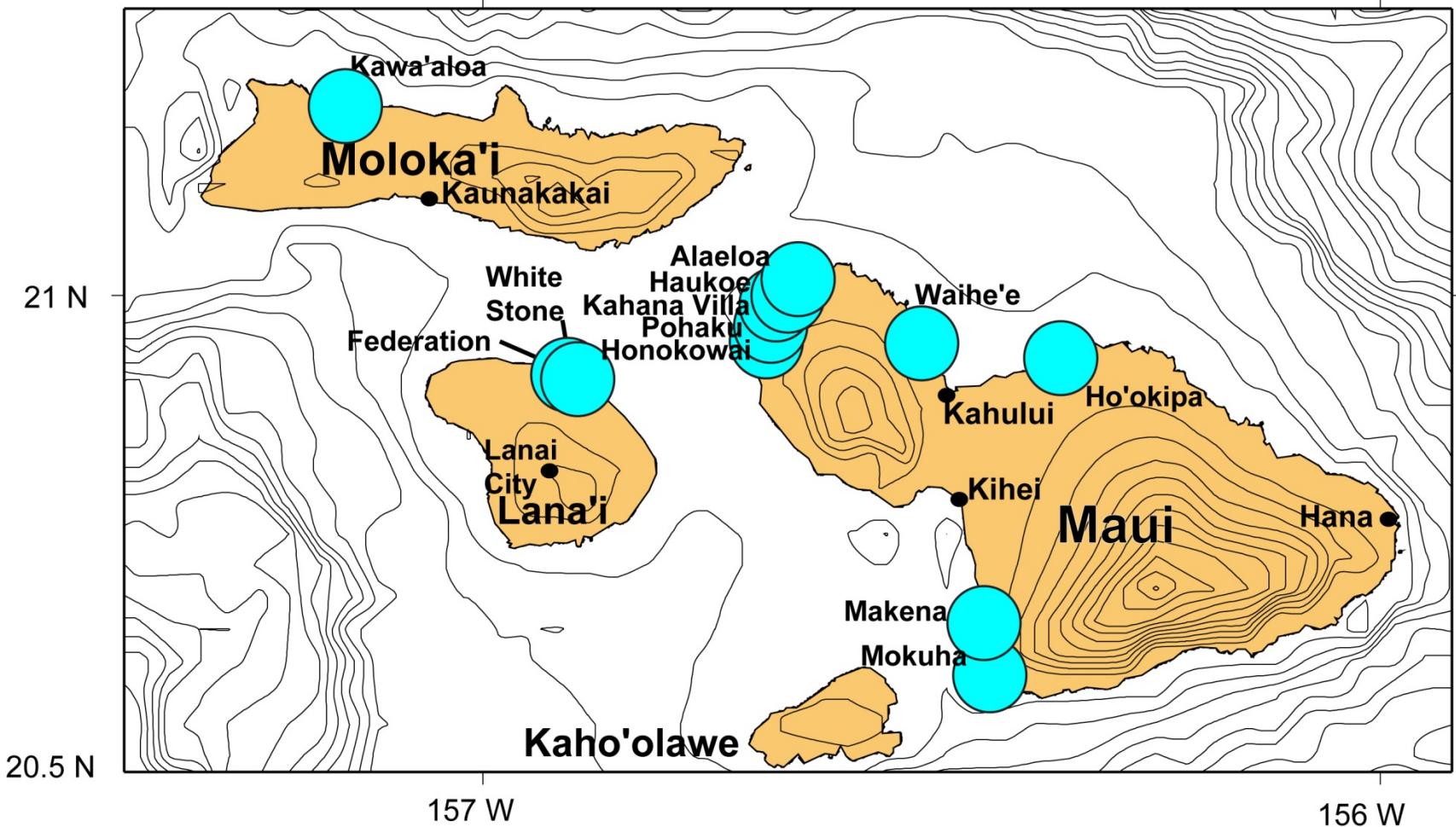
- Davis, E. E., M. R. Rice, K. A. Harrington, and G.H. Balazs. 2000. Green turtle diving and foraging patterns at Puako, Hawaii. In H. Kalb and T. Wibbels (comps.), Proceedings of the Nineteenth Annual Symposium on Sea Turtle Biology and Conservation, March 2-6, 1999, South Padre Island, Texas, p. 153-154. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-443.
- Rice, M. R., G.H. Balazs, L. Hallacher, W. Dudley, G. Watson, K. Krusell, and B. Larson. 2000. Diving, basking and foraging patterns of a sub-adult green turtle at Punalu'u, Hawaii. In F.A. Abreu-Grobois, R. Briseño-Dueñas, R. Márquez-Millán, and L. Sarti-Martínez (comps.), Proceedings of the Eighteenth International Sea Turtle Symposium, March 3-7, 1998, Mazatlán, Sinaloa, México, p. 229-231. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-436.
- Bennett, P. A., U. Keuper-Bennett, and G.H. Balazs. 2002. Remigration and residency of Hawaiian green turtles in coastal waters of Honokowai, West Maui, Hawaii. In A. Mosier, A. Foley, and B. Brost (comps.), Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation, February 29-March 4, 2000, Orlando, Florida, p. 289-290. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-477.
- Rice, M. R., G.H. Balazs, D. K. Kopra, and G. C. Whittow. 2002. Ecology and behavior of green turtles basking at Kiholo Bay, Hawaii. In A. Mosier, A. Foley, and B. Brost (comps.), Proceedings of the Twentieth Annual Symposium on Sea Turtle Biology and Conservation, February 29-March 4, 2000, Orlando, Florida, p. 153-155. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-477.
- Quaintance, J. K., M. R. Rice, and G.H. Balazs. 2003. Basking, foraging, and resting behavior of two sub-adult green turtles in Kiholo Bay Lagoon, Hawaii. In J.A. Seminoff (comp.), Proceedings of the Twenty-second Annual Symposium on Sea Turtle Biology and Conservation, April 4-7, 2002, Miami, Florida, p. 225-226. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-503.
- Balazs, G. H. and M. Chaloupka. 2004. Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock. *Biological Conservation* 117(2004):491-498.
- Balazs, G. H. and M. Chaloupka. 2004. Spatial and temporal variability in somatic growth of green sea turtles (*Chelonia mydas*) resident in the Hawaiian Archipelago. *Mar. Biol.* 145:1043-1059.
- Balazs, G. H., M. R. Rice, N. Hoffman, S. K. K. Murakawa, D. M. Parker, and R. J. Shallenberger. 2005. Green turtle foraging and resting habitats at Midway Atoll: Significant findings over 25 years, 1975-2000. In M.S. Coyne and R.D. Clark (comps.), Proceedings of the Twenty-first Annual Symposium on Sea Turtle Biology and Conservation, February 24-28, 2001, Philadelphia, Pennsylvania, p. 102-104. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-528.
- Quaintance, J. K., M. R. Rice, and G.H. Balazs. 2005. Monitoring sea turtle basking behavior with remote video cameras. In M.S. Coyne and R.D. Clark (comps.), Proceedings of the Twenty-first Annual Symposium on Sea Turtle Biology and Conservation, February 24-28, 2001, Philadelphia, Pennsylvania, p. 282-283. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-528.

- Rice, M. R., G.H. Balazs, and D. Zatz. 2005. Seaturtlecam: Live interactive video feed of basking Hawaiian green turtles. In M.S. Coyne and R.D. Clark (comps.), Proceedings of the Twenty-first Annual Symposium on Sea Turtle Biology and Conservation, February 24-28, 2001, Philadelphia, Pennsylvania, p. 297-298. U.S. Dep. Commer., NOAA. Tech. Memo. NMFS-SEFSC-528.
- Arthur, K. and G.H. Balazs. 2008. A comparison of immature green turtle (*Chelonia mydas*) diets among seven sites in the main Hawaiian islands. *Pac. Sci.* 62(2):205-217.
- Rice, M. R. and G.H. Balazs. 2008. Diving behavior of the Hawaiian green turtle (*Chelonia mydas*) during oceanic migrations. *J. Exp. Mar. Biol. Ecol.* 356(1-2):121-127.
- Russell, D. F. and G.H. Balazs. 2009. Dietary shifts by green turtles (*Chelonia mydas*) in the Kane'ohe Bay region of the Hawaiian Islands: A 28-year study. *Pac. Sci.* 63(2):181-192.
- Van Houtan, K. S., S. K. Hargrove, G.H. Balazs. 2010. Land use, macroalgae, and a tumor-forming disease in marine turtles. *PLoS ONE* 5(9):e12900, 9p.
- Wabnitz, G. Balazs, S. Beavers, K. A. Bjorndal, A. B. Bolten, V. Christensen, S. Hargrove, and D. Pauly. 2010. Ecosystem structure and processes at Kaloko Honokōhau, focusing on the role of herbivores, including the green sea turtle *Chelonia mydas*, in reef resilience. *Mar. Ecol.Prog. Ser.* 420:27-44.
- Rice, M. and G. Balazs. 2011. Survey of basking green turtles at Midway Atoll. In T.T. Jones and B.P. Wallace (comps.), Proceedings of the Thirty-first Annual Symposium on Sea Turtle Biology and Conservation, April 10-16, 2011, San Diego, California, p. 171. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SEFSC-631.
- Francke, D., S.A. Hargrove, E.W. Vetter, C.D. Winn, G.H. Balazs, K.D. Hyrenbach. 2013. Behavior of juvenile green turtles in a coastal neritic habitat: Validating time-depth-temperature records using visual observations. *JEMBE*. 444: 55-65.
- Parker, D.M., Balazs G.H. and 23 other agencies and individuals. 2015. Map guide to marine turtle nesting and basking in the Hawaiian Islands. NOAA National Marine Fisheries Service, Pacific Islands Fisheries Science Center, Marine Turtle Biology and Assessment Program Internal Report. Honolulu, HI. Data Provided 20 October 2014. Provider Website: [https://pifsc-www.irc.noaa.gov/marine\\_turtle/](https://pifsc-www.irc.noaa.gov/marine_turtle/) (Site Accessed 8 June 2016)
- Roberson, K., M.S. Kendall, D. Parker, and S. Murakawa. 2016. pp. 197-226. In: B.M. Costa and M.S. Kendall (eds.), Marine Biogeographic Assessment of the Main Hawaiian Islands. Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration. OCS Study BOEM 2016-035 and NOAA Technical Memorandum NOS NCCOS 214. 359 pp.
- Balazs, G.H., D.M. Parker, M.A. Rice. In Review. Ocean pathways and residential foraging locations for satellite tracked green turtles breeding at French Frigate Shoals in the Hawaiian Islands. *Chelonian Conservation and Biology*.



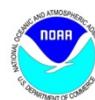
Green turtle (*Chelonia mydas*) foraging locations recorded proximal to basking locations on the Island of Hawai'i

PLACE NAME	LATITUDE (N)	LONGITUDE (W)
Honaunau	19° 25.3'	155° 54.7'
Kahalu'u	19° 34.8'	155° 58.0'
Kona Tennis Club	19° 37.8'	155° 59.4'
Kaloko-Honokohau	19° 40.3'	156° 1.6'
Makalawena	19° 47.5'	156° 1.6'
Hualalai North Resort	19° 49.3'	155° 59.8'
Kona Village	19° 49.9'	155° 58.1'
Kiholo	19° 51.6'	155° 55.4'
Waikoloa	19° 55.5'	155° 53.3'
Mauna Lani	19° 56.6'	155° 52.2'
Orchid Hotel	19° 57.1'	155° 51.7'
Puako	19° 57.8'	155° 51.3'
CarlSmith Park (4-mile)	19° 44.0'	155° 1.7'
Lelewi Park (Waiuli, Wai'olena)	19° 44.1'	155° 0.8'
Ha'ena (Shipman)	19° 38.5'	154° 58.6'
Pohoiki	19° 27.4	154° 50.5'
Kamehame	19° 8.7'	155° 28.1'
Punalu'u	19° 8.1	155° 30.3'
Koloa	19° 7.6'	155° 30.7'



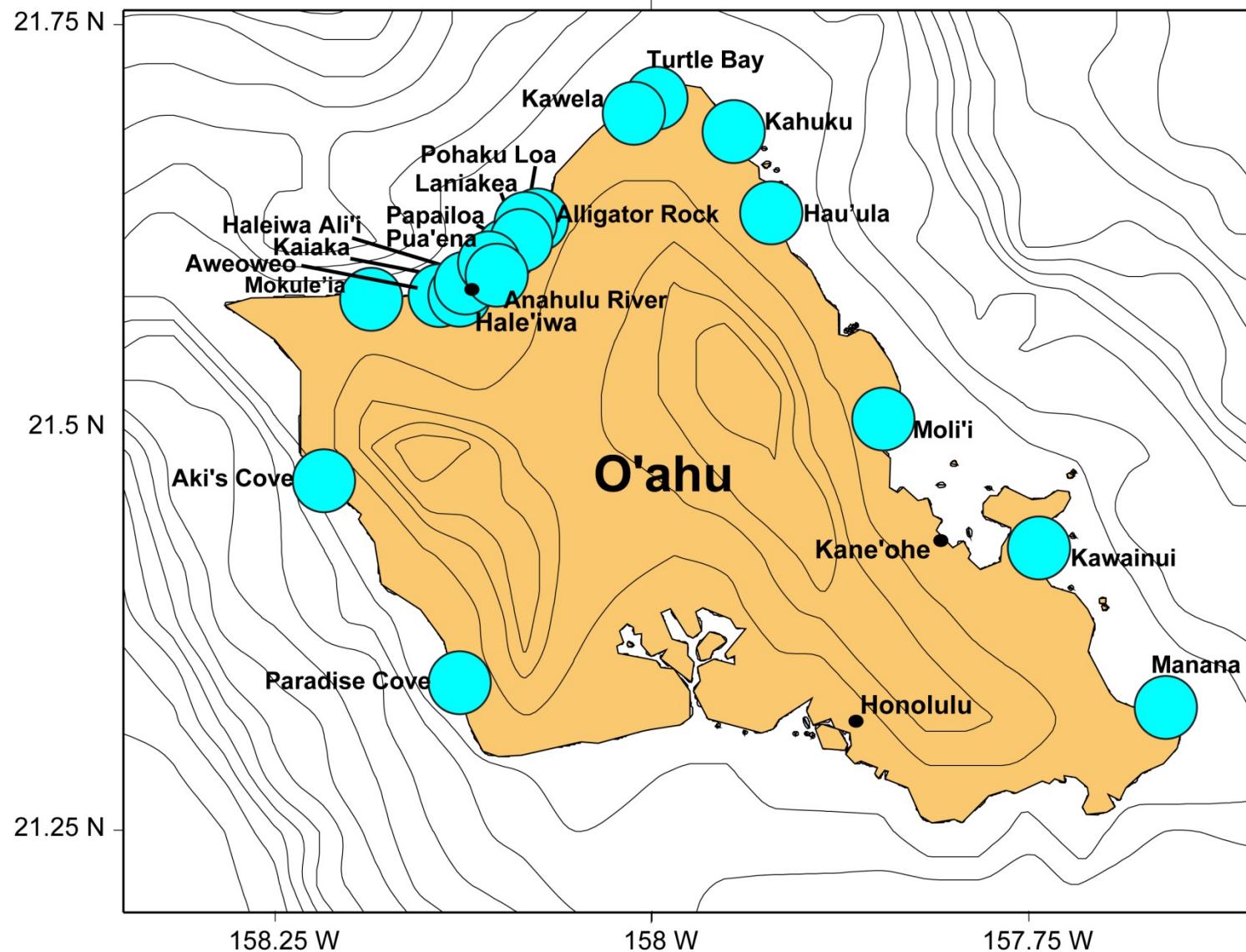
Foraging areas proximal to green turtle basking  
by location in Maui County

GMT map created by Denise Parker JIMAR-PIFSC  
Topography lines represent 250m



Green turtle (*Chelonia mydas*) foraging locations recorded proximal to basking locations in Maui County

<b>PLACE NAME</b>	<b>LATITUDE (N)</b>	<b>LONGITUDE (W)</b>
<b>Moloka'i</b>		
Kawa'aloa	21° 11.9'	157° 9.2'
<b>Lana'i</b>		
White Stone	20° 53.7'	156° 52.4'
Federation Camp	20° 54.7'	156° 53.8'
<b>Maui</b>		
Mokuha (Fishbowl)	20° 36.0'	156° 26.2'
Makena Landing/5 caves	20° 39.4'	156° 26.5'
Honokowai	20° 57.3'	156° 41.2'
Pohaku Park (S-Turns)	20° 58.0'	156° 40.9'
Kahana Villa Resort	20° 58.1'	156° 40.8'
Napili (Honolani)	20° 58.4	156° 40.7'
Haukoe (Hale Malia Rd)	20° 59.2'	156° 40.3'
Alaeloa	20° 59.3'	156° 40.2'
Waihe'e	20° 57'	156° 30.7'
Ho'okipa	20° 56.0'	156° 21.5'

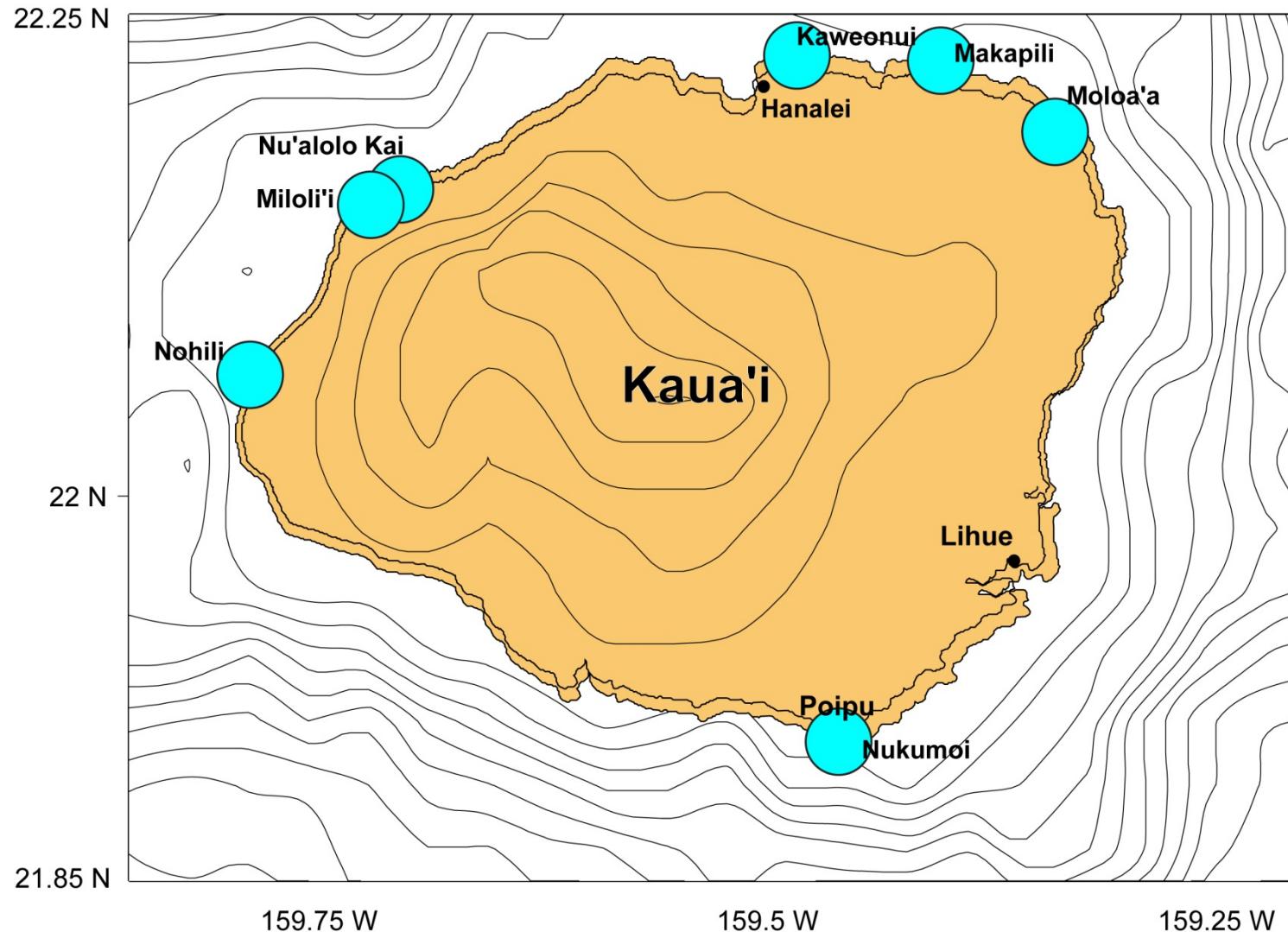


GMT map created by Denise Parker JIMAR-PIFSC  
Topography lines represent 250m



Green turtle (*Chelonia mydas*) foraging locations recorded proximal to basking locations on O'ahu

<b>PLACE NAME</b>	<b>LATITUDE (N)</b>	<b>LONGITUDE (W)</b>
Paradise Cove (Ko Olina)	21° 20.5'	158° 7.7'
Aki's Cove	21° 28.1'	158° 13.0'
Mokule'ia	21° 34.8'	158° 9.1'
Aweoweo Beach Park	21° 35.0'	158° 8.4'
Kaiaka Beach	21° 35.3'	158° 7.0'
Haleiwa Ali'i Beach Park	21° 35.6'	158° 6.6'
Anahulu River	21° 35.7'	158° 6.3'
Pua'ena Point	21° 36.1'	158° 6.4'
Papailoa	21° 36.8'	158° 5.6'
Laniakea	21° 37.1'	158° 5.1'
Chun's Reef	21° 37.3'	158° 4.9'
Pohaku Loa Way	21° 37.7'	158° 5.0'
Alligator Rock	21° 37.8'	158° 4.4'
Kawela Bay	21° 41.7'	158° 0.7'
Turtle Bay	21° 42.3'	157° 59.8'
Kahuku	21° 41.1'	157° 56.7'
Hau'ula	21° 36.7'	157° 54.6'
Moli'i	21° 30.4'	157° 50.8'
Kawainui Canal	21° 25.5'	157° 44.6'
Manana	21° 19.7'	157° 39.6'



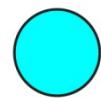
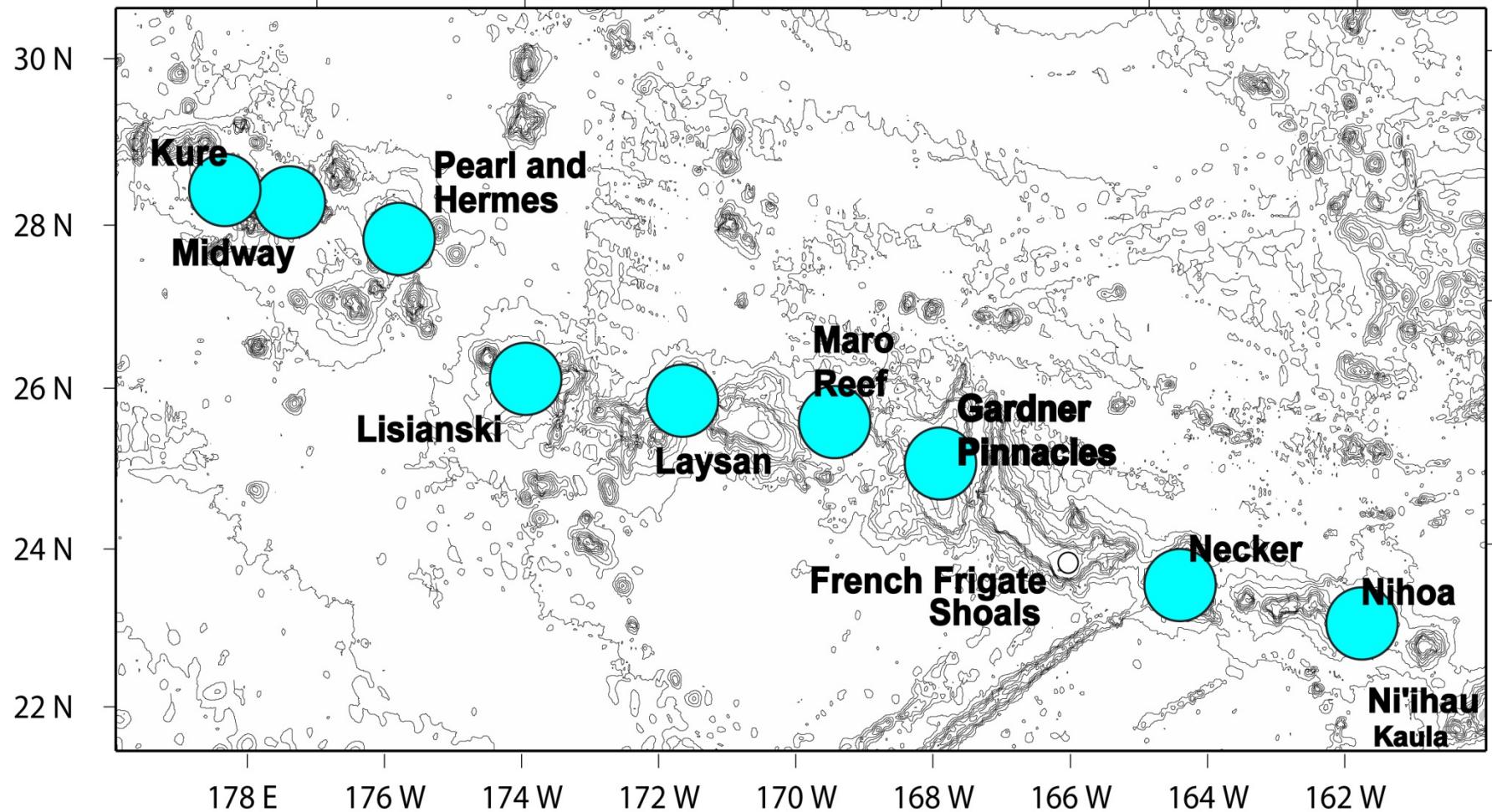
Foraging area proximal to green turtle basking  
by location on the Island of Kaua'i

GMT map created by Denise Parker JIMAR-PIFSC  
Topography lines represent 250m



Green turtle (*Chelonia mydas*) foraging locations recorded proximal to basking locations on Kaua'i

<b>PLACE NAME</b>	<b>LATITUDE (N)</b>	<b>LONGITUDE (W)</b>
Nukumoi, Poipu	21° 52.3'	159° 27.3'
Nohili (PMRF)	22° 3.8'	159° 47.0'
Miloli'i	22° 9.1'	159° 43.1'
Nu'alolo Kai	22° 9.5'	159° 42.0'
Hanalei	22° 12.8'	159° 29.8'
Kaweonui	22° 13.7'	159° 28.7'
Makapili (Crater Hill)	22° 13.5'	159° 23.8'
Moloa'a	22° 11.6'	159° 20.0'



Foraging areas proximal to green turtle basking  
by location in the NWHI

GMT map created by Denise Parker JIMAR-PIFSC  
Topographic lines represent 500m



Green turtle (*Chelonia mydas*) foraging locations

Recorded in proximity to basking locations in the Northwestern Hawaiian Islands

PLACE NAME	LATITUDE (N)	LONGITUDE (W)
Nihoa	23° 23.5'	161° 55.5'
Necker	23° 35.0'	164° 42.0'
Gardener Pinnacle	25° 1.0'	167° 59.0'
Maro Reef	25° 25.0'	170° 35.0'
Laysan	25° 50.0'	171° 50.0'
Lisianski	26° 2.0'	174° 0.0'
Pearl and Hermes	27° 55.0'	175° 45.0'
Midway	28° 13.0'	177° 22.6'
Kure	28° 25.0'	178° 25.0'