Sea Turtle reports for DWH support

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By: Sheryan Epperly

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Resources at Risk – Sea Turtles

Sea turtles are at risk, both in the deep waters in the vicinity of the Deepwater Horizon rig and in nearshore and inshore (bays and sounds) waters. At least four species are present in the northern Gulf of Mexico and represent all life stages. Winter aerial surveys conducted in 2007 found loggerheads, leatherbacks, and Kemp's ridleys in the nearshore and offshore waters of the northern Gulf of Mexico, and generally were more abundance in offshore. As waters warm, the turtles disperse farther, into the nearshore and inshore waters. Summer (2007) and autumn (1992-94) aerial surveys and recreational fisher intercept surveys (1991-92) found them to be abundant in both nearshore and offshore waters. Incidental captures of leatherbacks and loggerheads by the pelagic longline fleet targeting tunas and swordfish in the northern Gulf also documented their presence in offshore waters year-round. Additionally, cold stun events in the vicinity of St. Joe Bay, near Cape San Blas (both inshore and nearshore waters) indicate the presence of green turtles in the area; small green turtles are not detected in aerial surveys. In January 2010, nearly over 1800 cold stunned animals (mostly green turtles, but also included were loggerhead and Kemp's ridleys) were found stranded. Most survived and were released in warmer water off Cape San Blas. Nesting by the loggerhead turtle occurs in the northern Gulf, focused primarily in the Florida Panhandle.

In the southern Gulf, in addition to the 4 species mentioned above, a fifth, the hawksbill turtle, can be found. There is limited nesting by the hawksbill in the eastern Gulf/Florida Keys, but substantial nesting occurs in the eastern Gulf on the Yucatan Peninsula, especially in Campeche, Mexico. Loggerhead nesting is high on the beaches of southwest Florida and peak activity is in late May – early July. The only nesting beaches in the world for Kemp's ridleys are in the western Gulf of Mexico, predominately in Tamaulipas, Mexico, with limited nesting to the north (Texas beaches) and to the south (Veracruz, Mexico); peak nesting is in late April-early June. After a 50-70 day incubation period, hatchlings leave the beaches in the Gulf of Mexico and are entrained in the offshore currents where they spend time (as much as a decade, or longer, in the case of loggerheads; about 2 years in the case of Kemp's ridleys) in the oceanic environment before returning to the neritic environment as small juveniles.

Sea Turtle Distributions in the Gulf of Mexico

Five species of endangered or threatened sea turtles inhabit the Gulf of Mexico and possibly a six could be present. These are the Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*) leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), and possibly the olive ridley (*Lepidochelys olivacea*). While a great deal of information is available for the turtles with respect to beach nesting areas, data are much more limited for oceanic and neritic distributions and seasonal changes in occurrence in waters of the Gulf.

At least four species are resident in the northern Gulf of Mexico and represent all life stages. Densities appear to be higher in the eastern Gulf than to the west. Winter aerial surveys conducted in 2007 found loggerheads, leatherbacks, and Kemp's ridleys in the nearshore and offshore waters of the northern Gulf of Mexico, and generally were more offshore. As waters warm, the turtles disperse farther, into the nearshore and inshore (sounds and bays) waters. Aerial surveys, recreational fisher intercept surveys, and fishery observers found sea turtles to be abundant in both nearshore and offshore waters. Incidental captures of leatherbacks and loggerheads by the pelagic longline fleet targeting tunas and swordfish in the northern Gulf also documented their presence in deep offshore waters year-round. Additionally, cold stun events in the vicinity of St. Joe Bay, near Cape San Blas (both inshore and nearshore waters) indicate the presence of green turtles in the area; small green turtles and Kemp's ridleys are not detected in aerial surveys. In January 2010, over 1800 cold stunned animals (mostly green turtles, but also included were loggerhead and Kemp's ridleys) were found stranded. Most survived and were released in warmer water off Cape San Blas. Nesting by the loggerhead turtle occurs in the northern Gulf, focused primarily in the Florida Panhandle.

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Dispersant effects document prepared for DWH

In 2005, the National Academies Press published Oil Spill Dispersants: Efficacy and Effects by the Ocean Studies Board's Committee on Understanding Oil Spill Dispersants.

Table 5.3 catalogs what was known at the time about the effects of a Corexit product on various aquatic organisms. The point at which half of the test animals died was reached after 48 hours of exposure for menhaden and red drum embryo and larvae, after 96 hr of exposure for white shrimp postlarvae, and after 48 hr exposure for embryos of the Pacific oyster.

Below are excepts from the book, which can be read online at http://www.nap.edu/catalog.php?record_id=11283

Although the research and management communities recognize the importance of considering higher order ecological effects, not enough is known to extrapolate from toxicity tests to population or community-level impacts—an issue that concerns all applications of ecotoxicology. Consequently, the explicit consideration of these impacts, and formulation of research to address them, is beyond the scope of this report on the application of ecotoxicological principles to oil spill research.

Due to implementation of several of the recommendations made in 1989 (NRC, 1989), particularly the standardization of toxicity testing methods and information garnered from long-term monitoring of field studies, some general conclusions about the toxicity of dispersants and dispersed oil can be reached. However, there are still areas of uncertainty that will take on greater importance as the use of dispersants is considered in shallow water systems. Specifically, there is insufficient understanding of the fate of dispersed oil in aquatic systems, particularly interactions with sediment particles and subsequent effects on biotic components of exposed ecosystems. In addition, the relative importance of different routes of exposure, that is, the uptake and associated toxicity of oil in the dissolved phase versus dispersed oil droplets versus particulate-associated phase, is poorly understood and not explicitly considered in exposure models. Photoenhanced toxicity has the potential to increase the impact "footprint" of dispersed oil in aquatic organisms, but has only recently received consideration in the assessment of risk associated with spilled oil.

In addition to acute toxicity, dispersants may have more subtle effects that influence organism health. Dispersant has been reported to significantly affect the uptake, but not necessarily bioaccumulation, of oil constituents (Wolfe et al., 1998a,b,c; 1999a,b; 2001).

Sea Turtle Nesting in the Gulf of Mexico

The only nesting beaches in the world for Kemp's ridleys are in the western Gulf of Mexico, predominately in Tamaulipas, Mexico, with limited nesting to the north (Texas beaches) and to the south (Veracruz, Mexico). Peak nesting is in mid April-mid June. In 2009 there were over 21,000 nests laid in Mexico and nearly 200 were laid in Texas.

Loggerhead nesting in the Gulf of Mexico is highest on the beaches of southwest Florida (Pinellas through Collier counties). Peak activity is in late May – early July. In 2009 over 4500 nests were laid in southwest Florida. A separate recovery unit of loggerheads nests in the northern Gulf, particularly in Franklin, Gulf, and Bay counties, Florida. In 2009 nearly 800 nests were laid in northwest Florida. Loggerhead nesting throughout the rest of the Gulf is sporadic.

There is limited nesting by the hawksbill in the Florida Keys, but substantial nesting occurs in the western Gulf on the Yucatan Peninsula, especially in Campeche, Mexico.

Similarly, nesting by greens is infrequent in the Gulf of Mexico, but highest in the southern Gulf, particularly in Mexico (<30 nests laid in 2009 in southwest Florida)

Leatherback nesting in the Gulf of Mexico is rare and most often in Mexico.

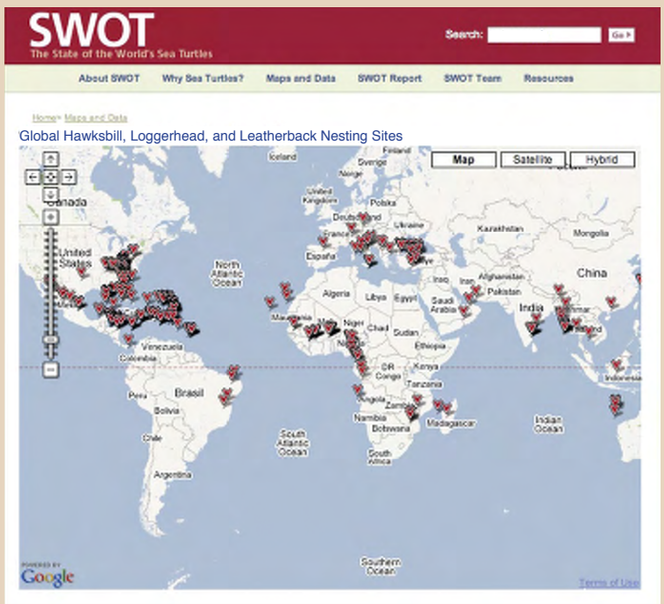
The State *of the* World's Hawksbills

A hawksbill turtle propels itself through waters off the coast of Israel. © DAVID DOUBILET

The hawksbill sea turtle has been one of the most persecuted of the world's sea turtles; hunted not only for its meat and eggs like other sea turtle species, it is further cursed by its beauty. The mottled, translucent shell plates—called *scutes* by scientists and *bekko* by Japanese artisans—have been coveted for centuries as raw material for jewelry, spectacle frames, spurs for fighting roosters, and furniture embellishments.

The *2007 IUCN Red List of Threatened Species* assessment of global hawksbill populations reveals that hawksbills still endure this menace and many others. They are especially threatened in the Indian and Pacific oceans and along the mainland Caribbean Coast. Historic and recent accounts indicate extensive declines—estimated at 90 percent globally—in all major oceans during the past 100 years. Much of the decline occurred in the 20th century, driven by intense international trade in *bekko.* (See "Trade Routes for Tortoiseshell," p. 24–25.) Although the volume of international trade has declined significantly in the past 10 to 15 years, it remains an active menace, especially in Southeast Asia and the Americas.

A relatively new threat is the massive trade in large stuffed hawksbills, intentionally netted in Southeast Asian waters, preserved with formaldehyde aboard Chinese vessels, and sold intact as adornments in Asia. Accidental capture in fisheries is another major concern. Meanwhile, hawksbills continue to suffer intense levels of



In addition to mapping the hawksbill nesting sites of the world, the SWOT Team has added another year of data (2006) to the global maps of leatherback and loggerhead nesting sites that were featured in volumes I and II of *SWOT Report.* These maps are now featured in interactive and downloadable formats on the SWOT website, www.SeaTurtleStatus.org.

egg exploitation in many areas; in Southeast Asia, egg take often approaches 100 percent.

Habitat destruction may turn out to be an even greater threat. Hawksbills nest in some 60 of the 108 countries whose waters they ply—mostly on tropical beaches—with unregulated coastal development, especially for tourism, becoming a huge problem. Oil exploration and seaborne pollution threaten hawksbill habitats in the Middle East and other parts of the Indo-Pacific. Likewise, the global scourge of climate change looms large, given hawksbills' dependence on coral reefs vulnerable to altered water temperatures and the potential loss of nesting beaches to rising waters.

Because much of the available data on global hawksbill populations come from protected sites, the actual rate of their decline is likely underestimated. What we do know is that hawksbill populations continue to decline at many sites, including important rookeries in eastern Mexico, northeastern Australia, and Indonesia.

With protection, however, some populations have stabilized, and a few are increasing at protected islands in the Caribbean and Indian oceans. Meanwhile, public awareness is at an all-time high, and international and regional agreements are addressing the issues at the governmental level. These are certainly causes for optimism that bring the solutions for hawksbill recovery into clear focus. If careful attention is paid to preserving beaches, curtailing the trade in bekko and stuffed turtles, stopping egg take, addressing fisheries bycatch, and eliciting the broad human behavioral changes that will reduce pollution and halt climate change, the hawksbill can find its way along the road to resurgence.

Dr. Jeanne A. Mortimer *is a sea turtle biologist and conservationist who has worked in some 20 countries during the past 30 years. She coauthored (with Marydele Donnelly) the forthcoming* IUCN Hawksbill Red List Assessment *for the IUCN Marine Turtle Specialist Group.*

Globally, hawksbill turtles have declined an estimated 90 percent in the past 100 years, but conservationists retain hope for this species as new solutions are developed. © ERIC MADEJA

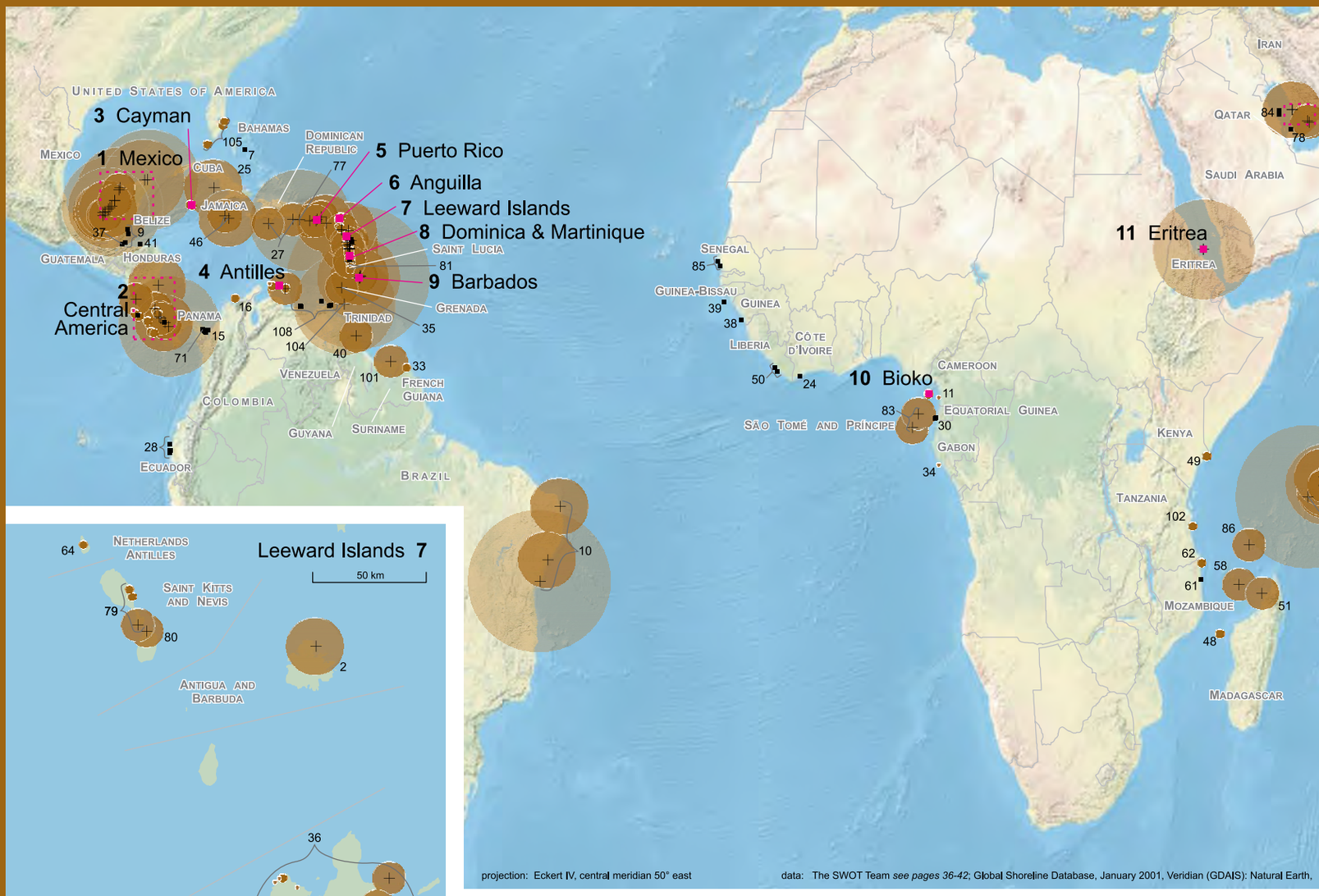
The Global Hawksbill Nesting Map

Hawksbills are well known for their tendency to nest on remote and obscure tropical beaches. Perhaps the result of centuries of exploitation, they appear determined to nest wherever humans are not. This presents real challenges to the people who monitor hawksbills' nesting populations or wish to globally map their nesting distribution. Special recognition is therefore warranted for the hundreds of data contributors that are listed in the citations of this publication (pp. 36–42)—not only for their determination to study and protect these animals in all of their remote habitats, but for their willingness to work together as the "SWOT Team." They have created the linchpin of this report, the foldout map that is SWOT's (and the world's) first global depiction of hawksbill nesting sites, featuring 2006 data.

Compiling these data and mapping the hawksbill's global nesting distribution has provided its own set of challenges and has been as much a lesson in geography as anything. Thoughtful consideration has gone into the preparation of the map, with mapping protocols based on the standards developed by the SWOT Scientific Advisory Board in 2006.

This map demonstrates the number of nests recorded or estimated at every available nesting site in the 2006 or 2005–2006 season. All points are numbered to correspond with their original sources (pp. 36–42). Where nest counts were not available, the number of nesting females was converted into an estimated number of nests using a bracketed conversion figure of 3 to 5 nests per female, taken from Mortimer and Donnelly's forthcoming *IUCN Hawksbill Red List Assessment*. Similarly, when only crawl counts were available they were converted into an estimated number of nests using a conversion figure of 1.8 crawls per nest, also from Mortimer and Donnelly. In total, 348 hawksbill nesting sites were recorded from 110 sources.

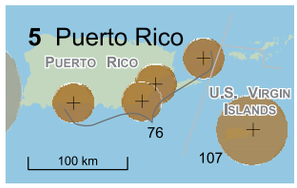
Alec Hutchinson *is data coordinator for SWOT and director of nesting beach projects for PRETOMA.* ***Brian J. Hutchinson*** *is program officer of Conservation International's (CI) Sea Turtle Flagship Program and of the IUCN Marine Turtle Specialist Group.* ***Kellee Koenig*** *is GIS specialist and outcomes mapping cartographer for the CI Center for Applied Biodiversity Science.*


United States of America
3 Cayman
Bahamas
Dominican Republic
5 Puerto Rico
Mexico
1 Mexico
Cuba
6 Anguilla
Jamaica
7 Leeward Islands
8 Dominica & Martinique
Belize
Saint Lucia
Guatemala
Honduras
4 Antilles
9 Barbados
2 Central America
Grenada
Panama
Trinidad
Venezuela
French Guiana
Colombia
Guyana
Suriname
Ecuador
Brazil
Iran
Qatar
Saudi Arabia
11 Eritrea
Eritrea
Senegal
Guinea-Bissau
Guinea
Liberia
Côte d'Ivoire
Cameroon
10 Bioko
Equatorial Guinea
São Tomé and Príncipe
Gabon
Kenya
Tanzania
Mozambique
Madagascar
projection: Eckert IV, central meridian 50° east
data: The SWOT Team see pages 36-42; Global Shoreline Database, January 2001, Veridian (GDAIS): Natural Earth,

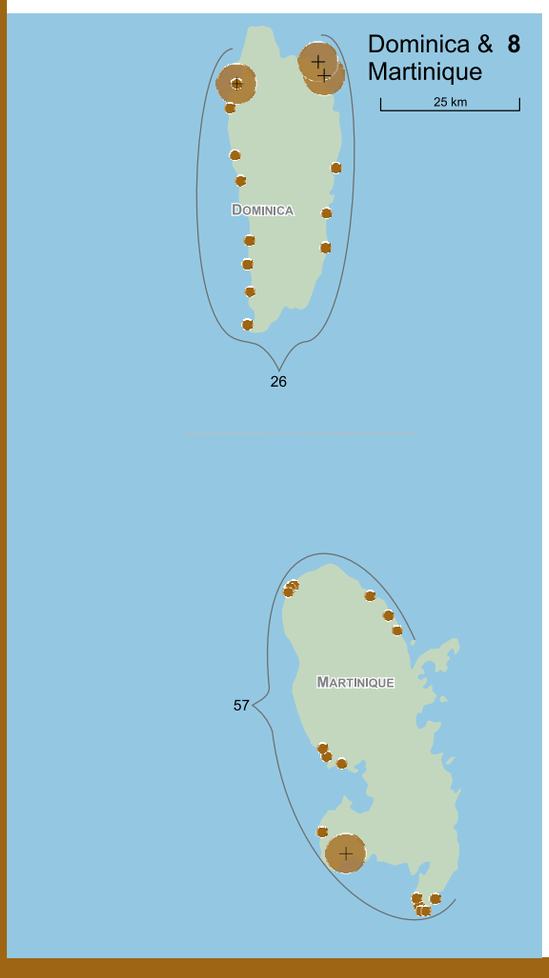
Leeward Islands 7
50 km
Netherlands Antilles
Saint Kitts and Nevis
Antigua and Barbuda
Guadeloupe

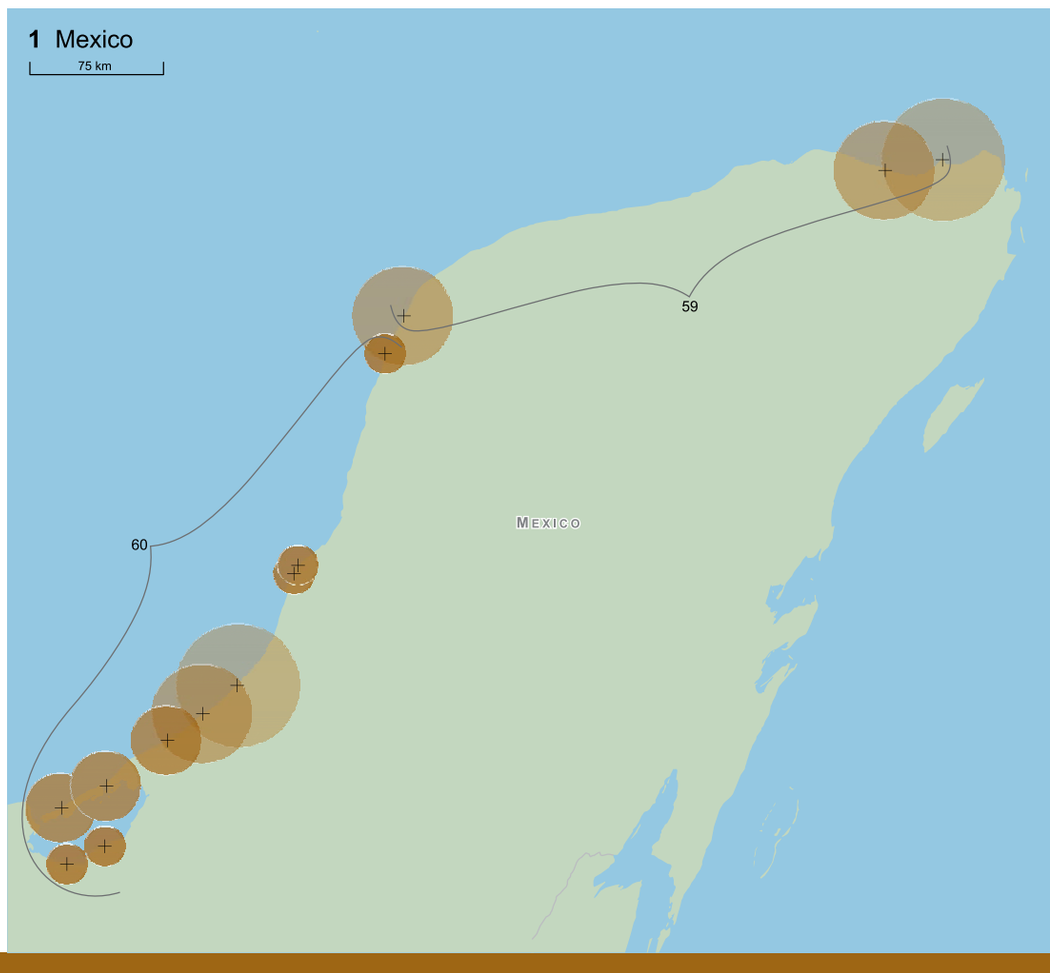

3 Cayman
Cayman
20 km

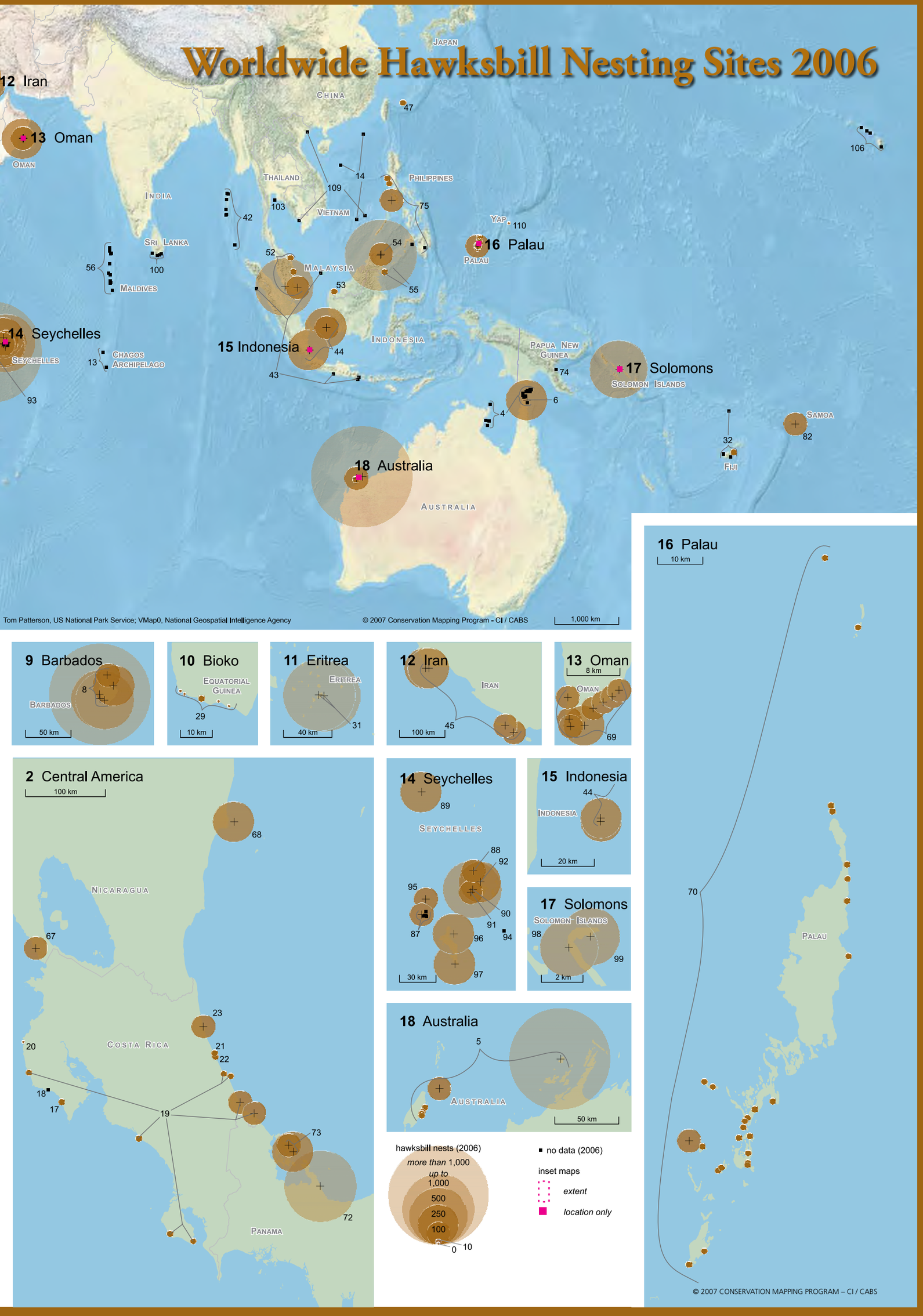

4 Antilles
Aruba
Netherlands Antilles
80 km


5 Puerto Rico
Puerto Rico
U.S. Virgin Islands
100 km


6 Anguilla
Anguilla
Netherlands Antilles
20 km

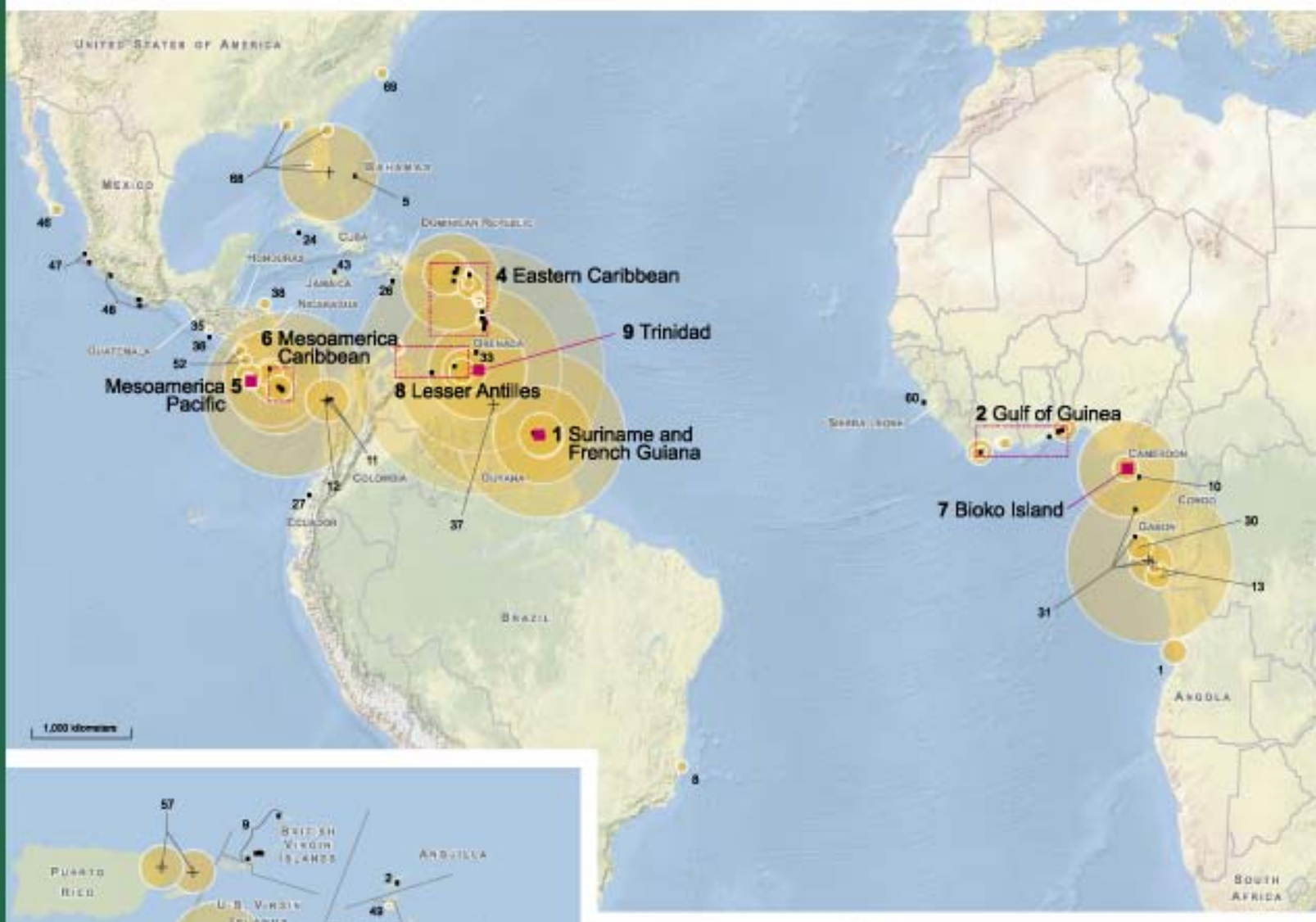

Dominica & Martinique 8
25 km
Dominica
Martinique

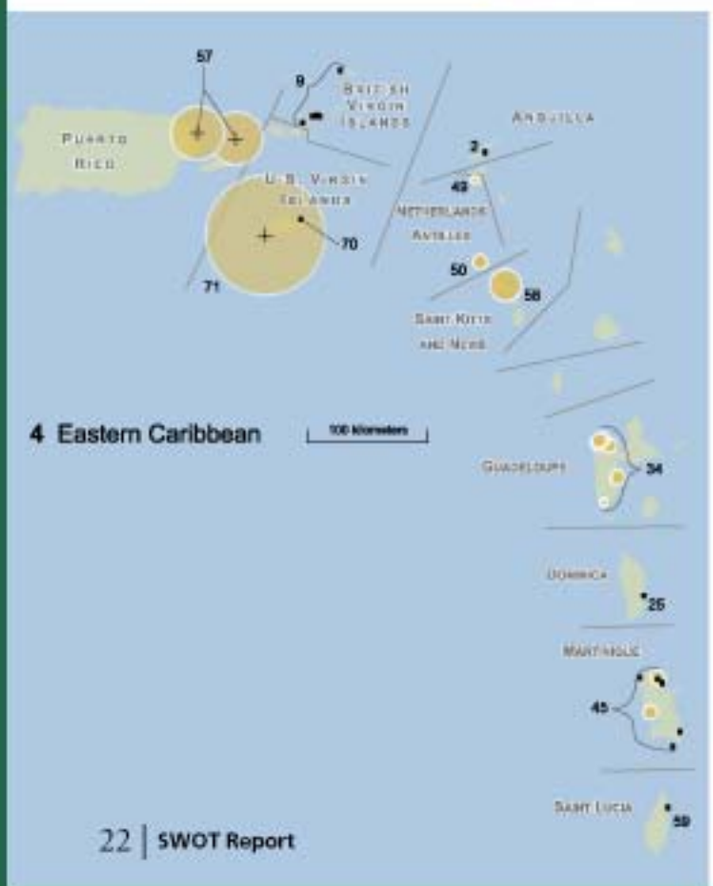

1 Mexico
75 km
Mexico


Worldwide Hawksbill Nesting Sites 2006
12 Iran
13 Oman
OMAN
JAPAN
CHINA
47
106
THAILAND
14
PHILIPPINES
109
INDIA
103
75
VIETNAM
42
YAP
110
16 Palau
PALAU
SRI LANKA
54
52
56
100
MALAYSIA
MALDIVES
53
55
14 Seychelles
SEYCHELLES
15 Indonesia
INDONESIA
CHAGOS ARCHIPELAGO
13
44
43
PAPUA NEW GUINEA
74
17 Solomons
SOLOMON ISLANDS
93
6
4
SAMOA
82
32
FIJI
18 Australia
AUSTRALIA
Tom Patterson, US National Park Service; VMap0, National Geospatial Intelligence Agency
© 2007 Conservation Mapping Program - CI / CABS
1,000 km
9 Barbados
8
BARBADOS
50 km
10 Bioko
EQUATORIAL GUINEA
29
10 km
11 Eritrea
ERITREA
31
40 km
12 Iran
IRAN
45
100 km
13 Oman
8 km
OMAN
69
2 Central America
100 km
68
NICARAGUA
67
23
20
COSTA RICA
21
22
18
17
19
73
72
PANAMA
14 Seychelles
89
SEYCHELLES
88
92
95
90
91
87
96
94
97
30 km
15 Indonesia
44
INDONESIA
20 km
17 Solomons
SOLOMON ISLANDS
98
99
2 km
18 Australia
5
AUSTRALIA
50 km
hawksbill nests (2006)
more than 1,000
up to
1,000
500
250
100
0
10
no data (2006)
inset maps
extent
location only
16 Palau
10 km
70
PALAU
© 2007 CONSERVATION MAPPING PROGRAM – CI / CABS

Worldwide Leatherback Nesting Sites

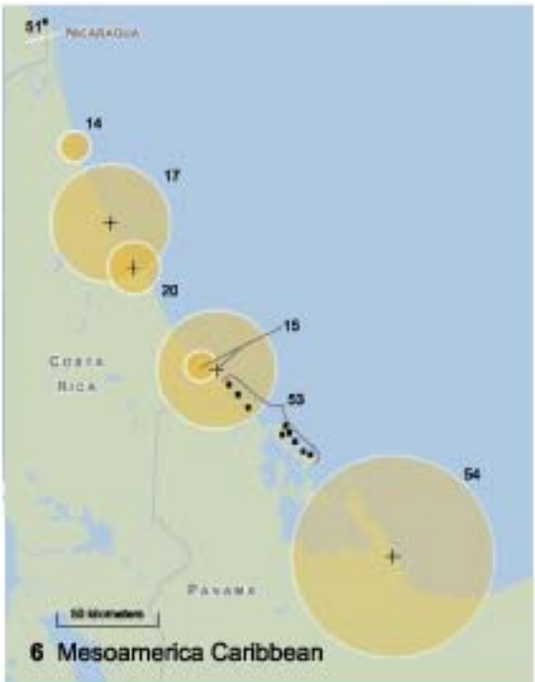
1 Suriname and French Guiana



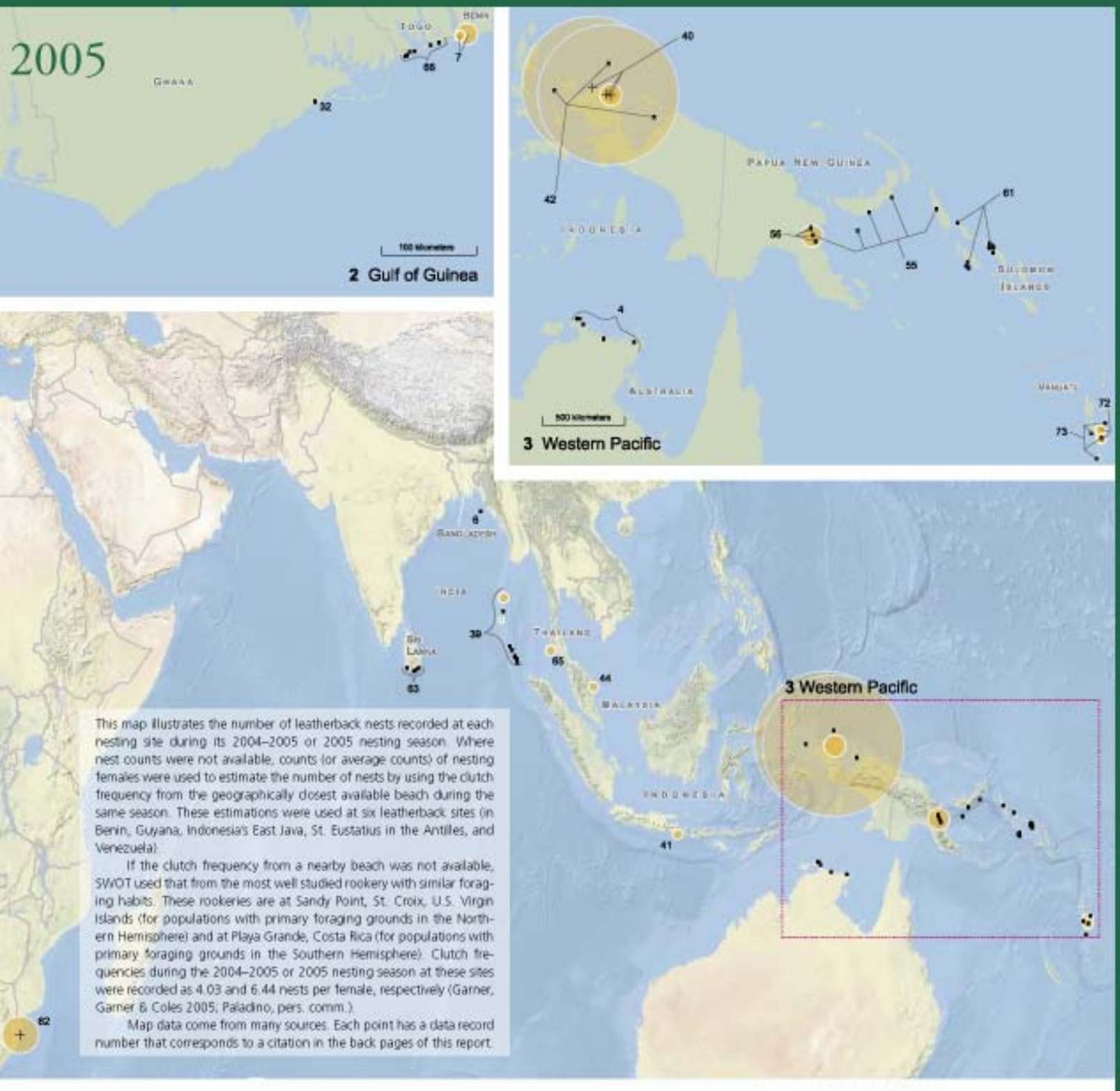


4 Eastern Caribbean

5 Mesoamerica Pacific



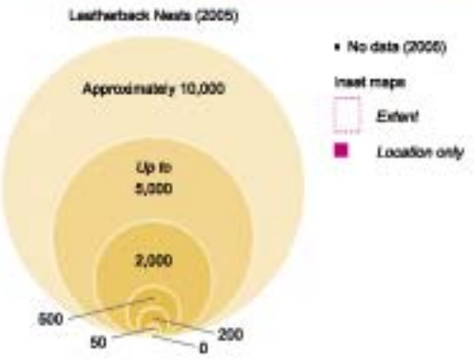
6 Mesoamerica Caribbean



This map illustrates the number of leatherback nests recorded at each nesting site during its 2004–2005 or 2005 nesting season. Where nest counts were not available, counts (or average counts) of nesting females were used to estimate the number of nests by using the clutch frequency from the geographically closest available beach during the same season. These estimations were used at six leatherback sites (in Benin, Guyana, Indonesia's East Java, St. Eustatius in the Antilles, and Venezuela).

If the clutch frequency from a nearby beach was not available, SWOT used that from the most well studied rookery with similar foraging habits. These rookeries are at Sandy Point, St. Croix, U.S. Virgin Islands (for populations with primary foraging grounds in the Northern Hemisphere) and at Playa Grande, Costa Rica (for populations with primary foraging grounds in the Southern Hemisphere). Clutch frequencies during the 2004–2005 or 2005 nesting season at these sites were recorded as 4.03 and 6.44 nests per female, respectively (Garner, Garner & Coles 2005; Paladino, pers. comm.).

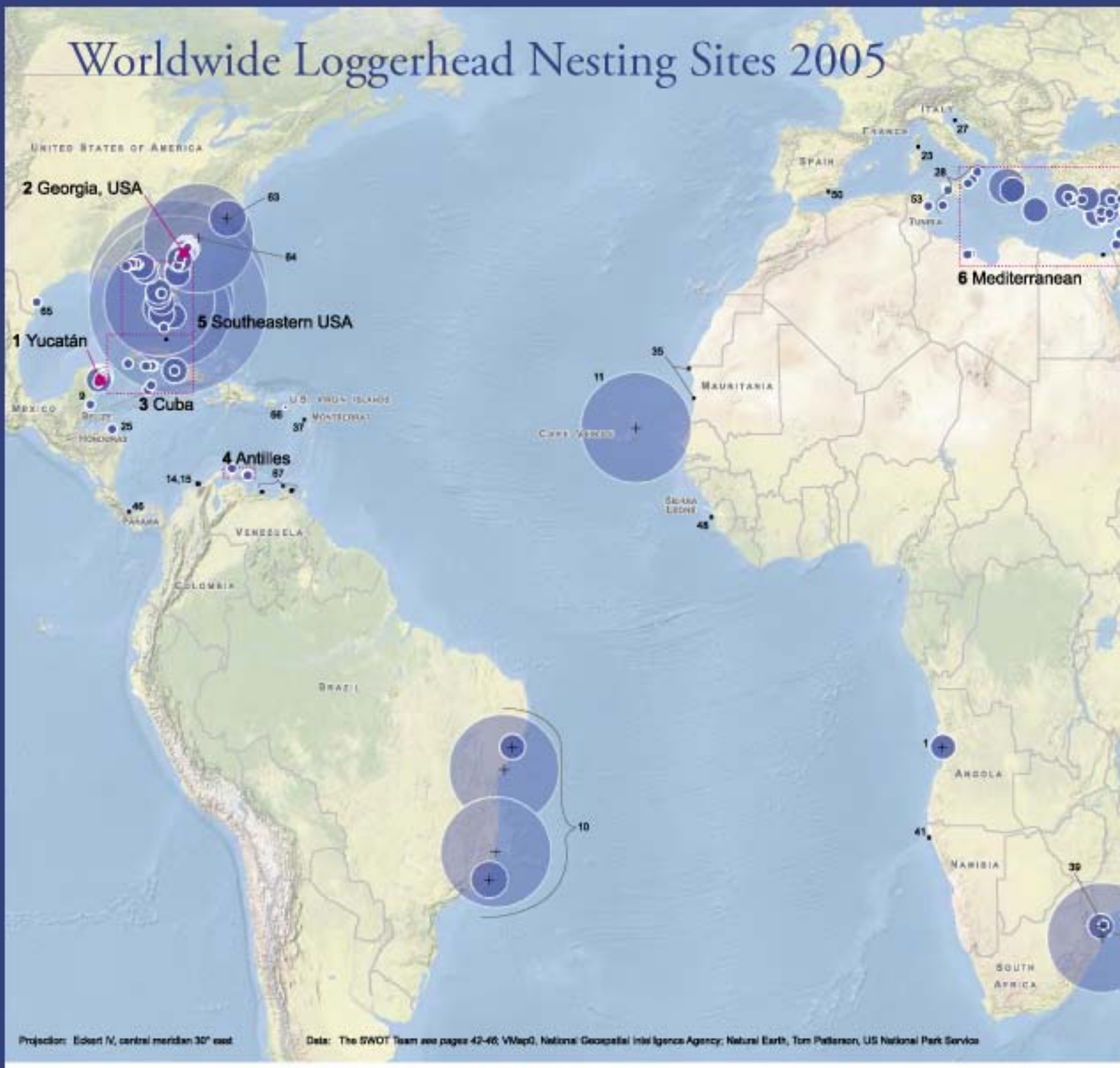
Map data come from many sources. Each point has a data record number that corresponds to a citation in the back pages of this report.



Projection: Eckert IV

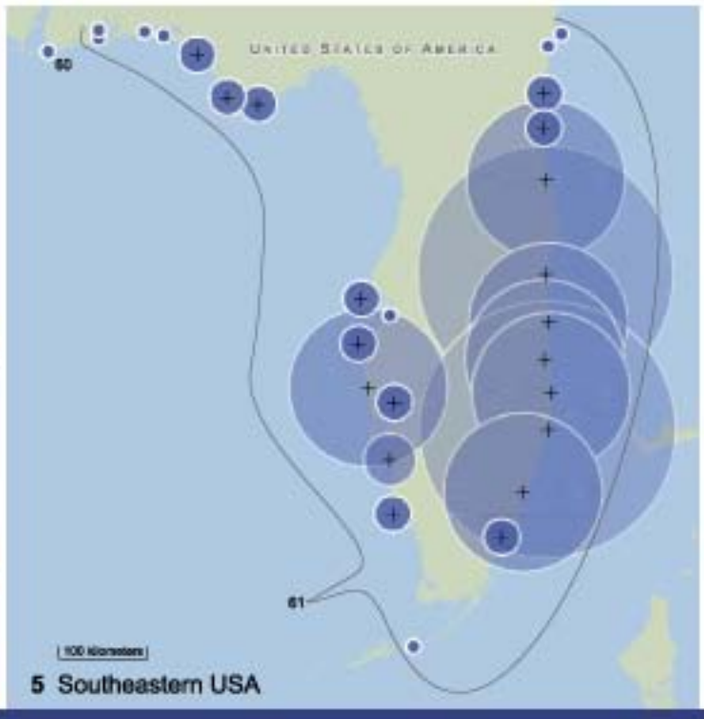
Data: The SWOT Team *see pages 47-48*
VMap0, National Geospatial Intelligence Agency
Natural Earth, Tom Patterson, US National Park Service

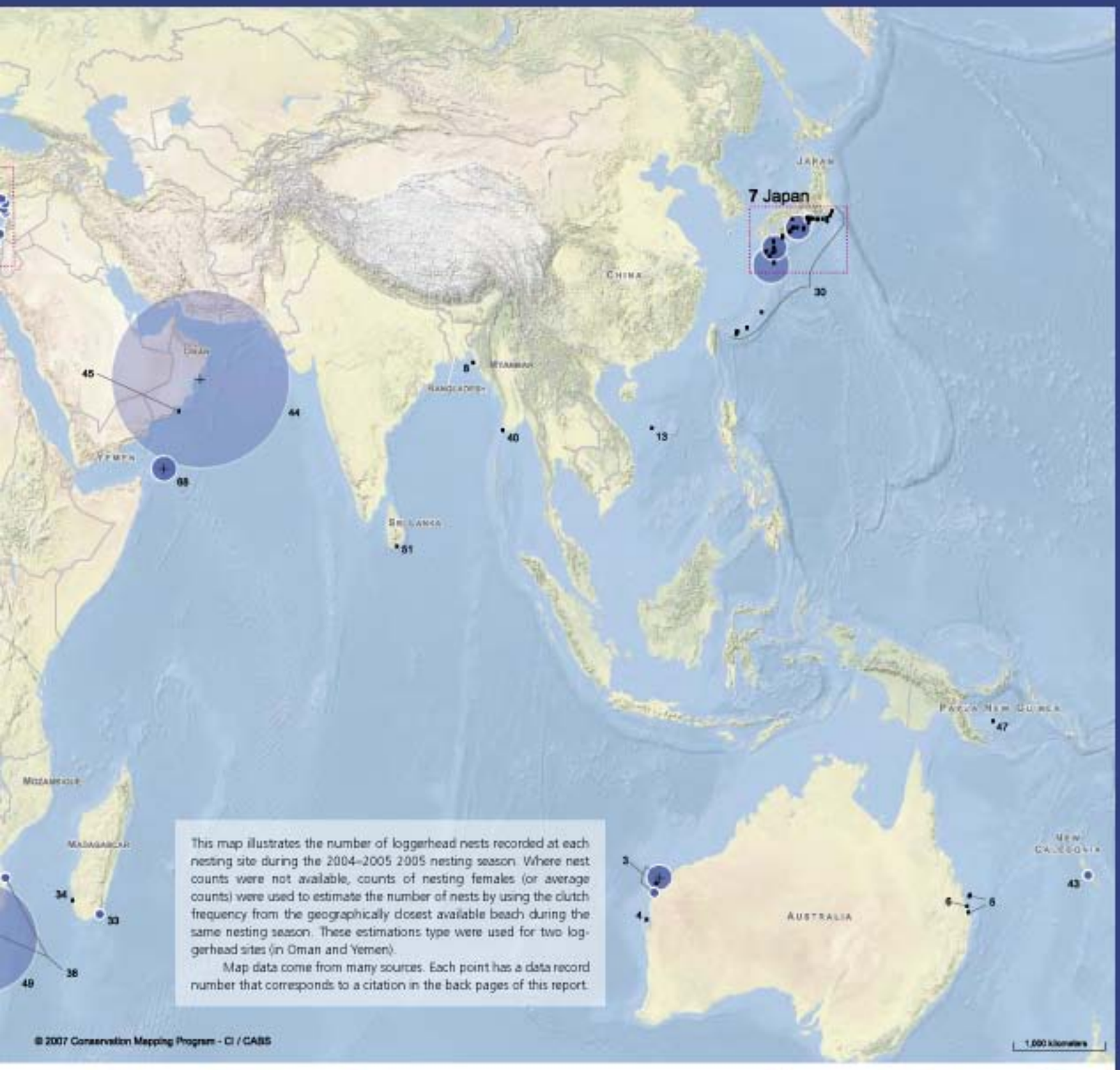
Worldwide Loggerhead Nesting Sites 2005



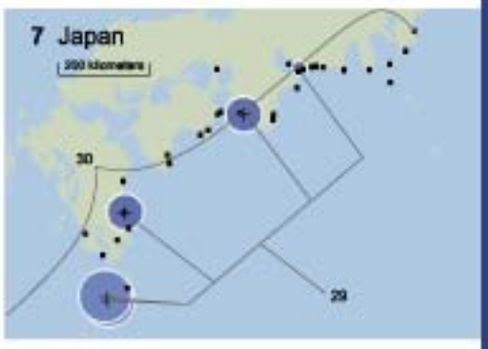
Projection: Eckert IV, central meridian 30° east

Data: The SWOT Team see pages 42-46; VMap0, National Geospatial Intelligence Agency; Natural Earth, Tom Patterson, US National Park Service




7 Japan
Japan
China
Oman
Yemen
Myanmar
Bangladesh
Sri Lanka
Papua New Guinea
Mozambique
Madagascar
Australia
New Caledonia
45
44
68
8
40
13
30
51
47
3
4
6
6
43
34
33
38
49
This map illustrates the number of loggerhead nests recorded at each nesting site during the 2004–2005 2005 nesting season. Where nest counts were not available, counts of nesting females (or average counts) were used to estimate the number of nests by using the clutch frequency from the geographically closest available beach during the same nesting season. These estimations type were used for two loggerhead sites (in Oman and Yemen).
Map data come from many sources. Each point has a data record number that corresponds to a citation in the back pages of this report.
© 2007 Conservation Mapping Program - CI / CABS
1,000 kilometers


Turkey
Greece
Syria
Cyprus
Lebanon
Israel
Egypt
54
24
59
56
58
55
57
18
19
52
21
20
31
26
22
150 kilometers
6 Mediterranean


7 Japan
200 kilometers
30
29

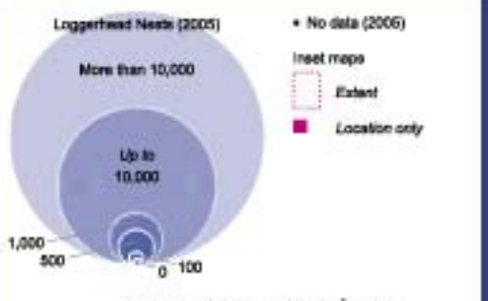

Loggerhead Nests (2005)
More than 10,000
Up to 10,000
1,000
500
0
100
• No data (2006)
Inset maps
Extent
Location only

Figure 1. Major nesting beaches in the State of Tamaulipas, Mexico, and proportion of total nests documented for each beach in 2007 (*Source*: Jaime Pena, Gladys Porter Zoo), and location of nests recorded in U.S. (*Source:* Padre Island National Seashore, FWS, Florida Marine Research Institute, Georgia Department of Natural Resources, South Carolina Department of Natural Resources, and North Carolina Wildlife Resources
Commission