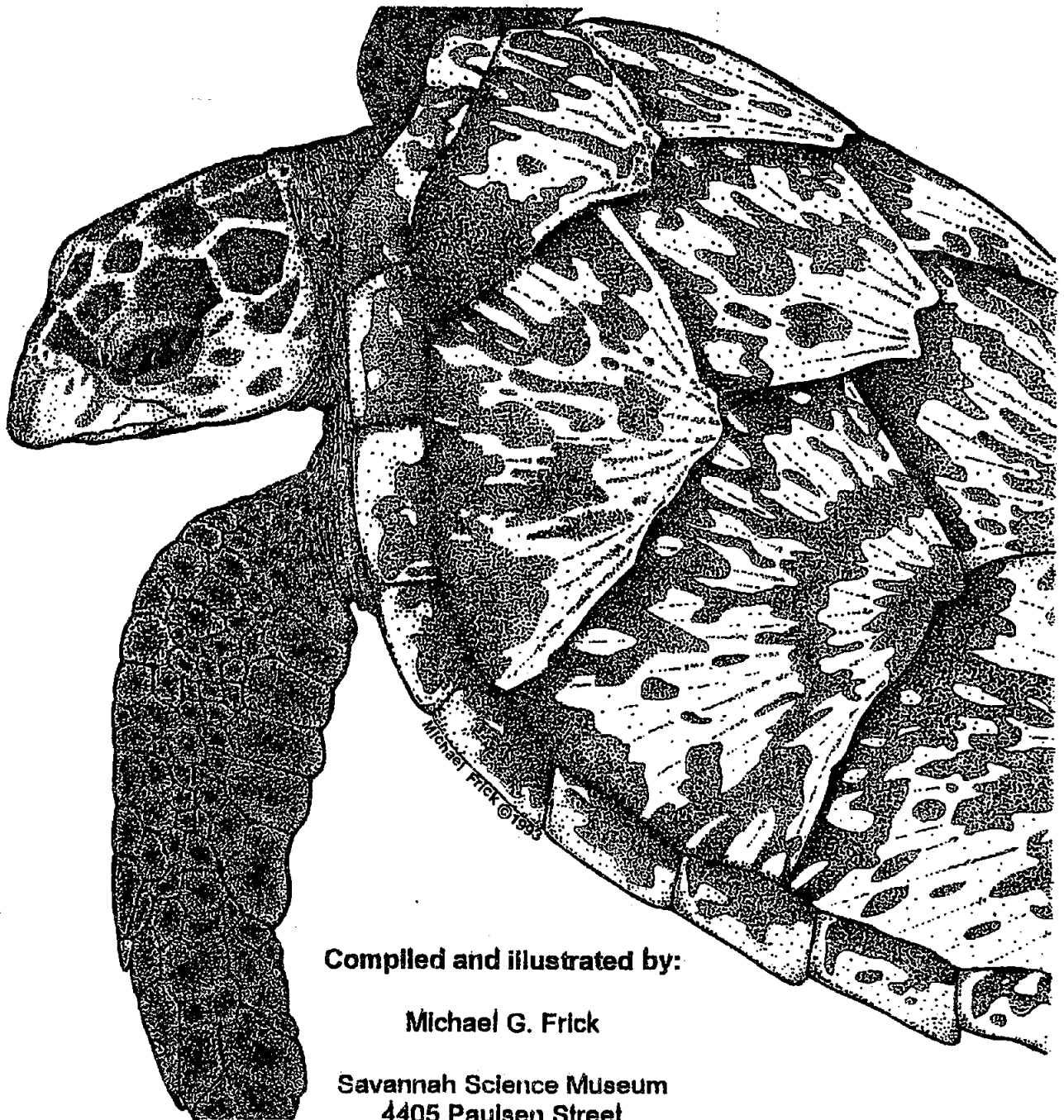


Savannah Science Museum Inc.,  
Special Publication No. 4

**A Guide for the Identification of Stranded Sea Turtles:  
The Eastern United States and the Gulf of Mexico.**



**Compiled and illustrated by:**

**Michael G. Frick**

**Savannah Science Museum  
4405 Paulsen Street  
Savannah, Georgia 31405  
(912)-355-6705**

# **A Guide for the Identification of Stranded Sea Turtles: The Eastern United States and the Gulf of Mexico**

by:

**Michael G. Frick**

**Caretta Research Project  
Savannah Science Museum  
4405 Paulsen Street  
Savannah, Georgia 31405**

**(912) 355-6705**

in association with:

**U.S. Fish and Wildlife Service  
Savannah Coastal Refuges  
1000 Business Center Dr.  
Savannah, Georgia 31405**

and

**Georgia Department of Natural Resources  
Coastal Resources Division  
One Conservation Way  
Brunswick, Georgia 31523-8600**

**@ Copyright 1996. Savannah Science Museum, Inc.**

## **Dedication**

This manual is dedicated to **Charles Warnock** and **Randy Isbister** of the U.S. Fish and Wildlife Service, two individuals who make sea turtle research on Wassaw Island (Georgia) possible, and to all the other volunteers and workers on the Georgia Coast.

## **Acknowledgements**

I would like to thank the following individuals who assisted in the preparation of this manuscript:

Patricia Mouchet and Todd Gedamke (Wassaw Island, Georgia), Karen Leigh Creech (Jekyll Island, Georgia), Heather Woodson (Bald Head Island, North Carolina), Kristine Davis (Univ. of Georgia Marine Extension Service), Kate Mansfield (Key Biscayne, Florida), and finally the U.S. Fish and Wildlife Service and Georgia Department of Natural Resources, for their constant support for sea turtle research off the Georgia coast. From these departments I'd especially like to thank: Brad Winn, Mike Harris, John Robinette, Sam Drake, Mark Musaus, Randy Isbister, Charles Warnock, and Pat Metz.

# Table of Contents

Introduction to the Manual.....	p. 2
Figure 1. Bones of the Turtle Skull.....	p. 4
Figure 2. Scute Diagram.....	p. 5
Figures 3 and 4. Bones of the Carapace.....	p. 6
Figure 5. Cheloniidae Plastron Diagram.....	p. 7
Section 1. Sea Turtle Species Accounts.....	p. 8
Section 2. Keys to Stranded Sea Turtles.....	p. 14
Section 3. Glossary.....	p. 21
References.....	p. 22.

# **Introduction to the Manual.**

This manual has been compiled using a variety of sources, including past keys to various aspects of sea turtle anatomy. The object of this guide is to provide as much information as possible on ways to identify sea turtles while keeping procedures easy to follow. There are many features one could examine to identify a particular sea turtle species. Unfortunately conclusions often seem to be a matter of opinion as well as comparison based. In the key portion of this manual, areas using comparison between two turtle species have been reduced as much as possible since the opportunity to have more than one stranding to look at and compare for identification does not occur frequently.

After working in the field it is easy to see the difficulty of identifying a "liquid" turtle which has probably been floating out at sea for three to four days and had an abundant host of scavengers consistently nibbling on it. Upon receiving this turtle it can be discolored and beaten up beyond recognition. To combat this problem detailed and accurate illustrations have been included. The illustrations have been interpreted from over a hundred different strandings catalogued in the Savannah Science Museum collection and represent the average specimen observed as a stranding.

Other sections in this manual include charts of common species characteristics, a quick reference chart for identification between two very similar species, a glossary of sea turtle biology terms used in the literature, and figures showing various aspects on sea turtle anatomy to be used when filling out stranding forms. (example: listing specific bone damage to a turtle carcass)

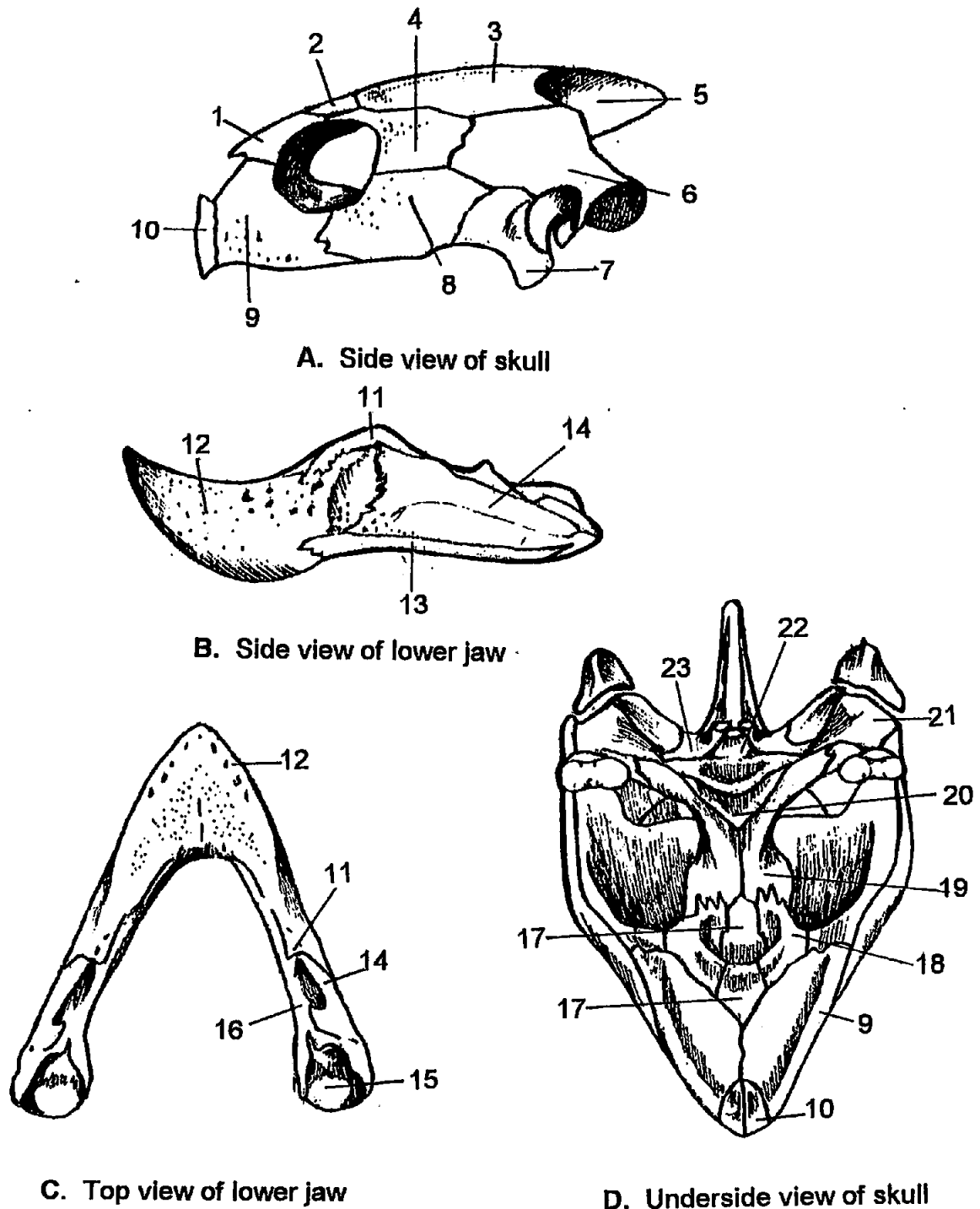
While sea turtle research has its veterans, it continues to grow by leaps and bounds each year with novice field researchers. Hopefully this text will serve not only as an updated collection of marine turtle characteristics, but also as a tool for 'new recruits' who are often thrown into sea turtle field work and left to learn on a trial and error basis.

## **Figures 1-5. Sea Turtle Morphology.**

The following figures may be useful in understanding terminology in the proceeding keys and species accounts; they may also be useful when filling out stranding forms to describe damage to a specific part or bone of a sea turtle (example: "A obvious bruise extended across the turtle's carapace from the nuchal scute, across the first two vertebral scutes, and then terminated on the third costal scute").

The terminology concerning turtle biology may change from place to place and could prove confusing. Terms in this manual are considered commonplace and historic as determined through literature searches.

**Figure. 1** Schematic skull of a juvenile Loggerhead turtle, (adapted from Romer, 1956).

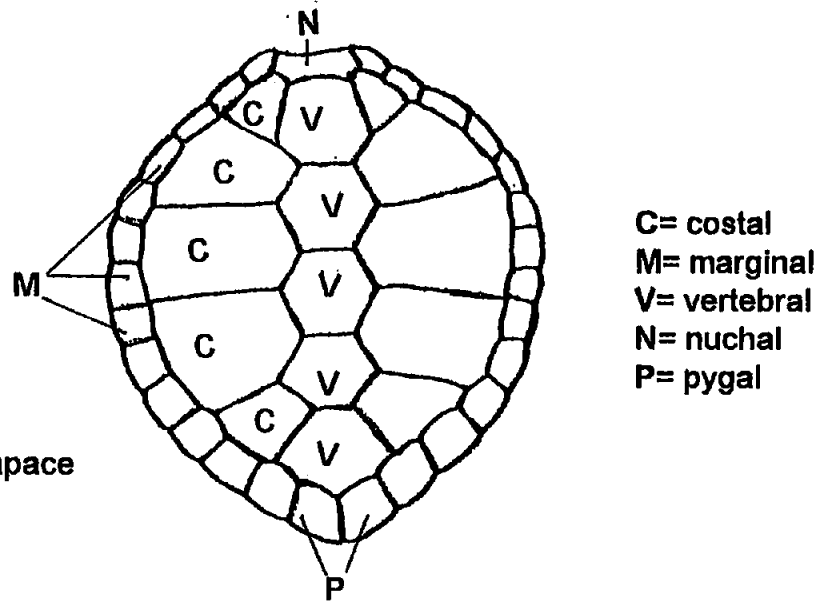


### Bones of the Turtle Skull:

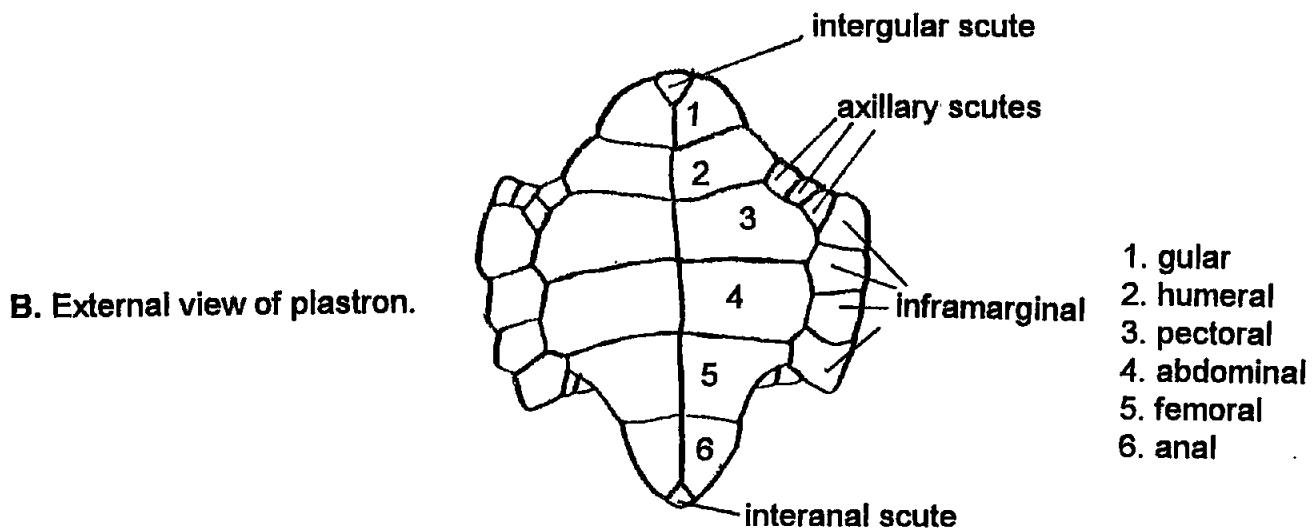
- |                   |                  |                   |
|-------------------|------------------|-------------------|
| 1. prefrontal     | 9. maxilla       | 17. vomer         |
| 2. frontal        | 10. premaxilla   | 18. palatine      |
| 3. parietal       | 11. coronoid     | 19. pterygoid     |
| 4. postorbital    | 12. dentary      | 20. basisphenoid  |
| 5. supraoccipital | 13. angular      | 21. quadrate      |
| 6. squamosal      | 14. surangular   | 22. basioccipital |
| 7. quadratojugal  | 15. articular    | 23. exoccipital   |
| 8. jugal          | 16. prearticular |                   |



**Figure 2.** Carapace and plastron scute diagrams for Cheloniidae turtles.

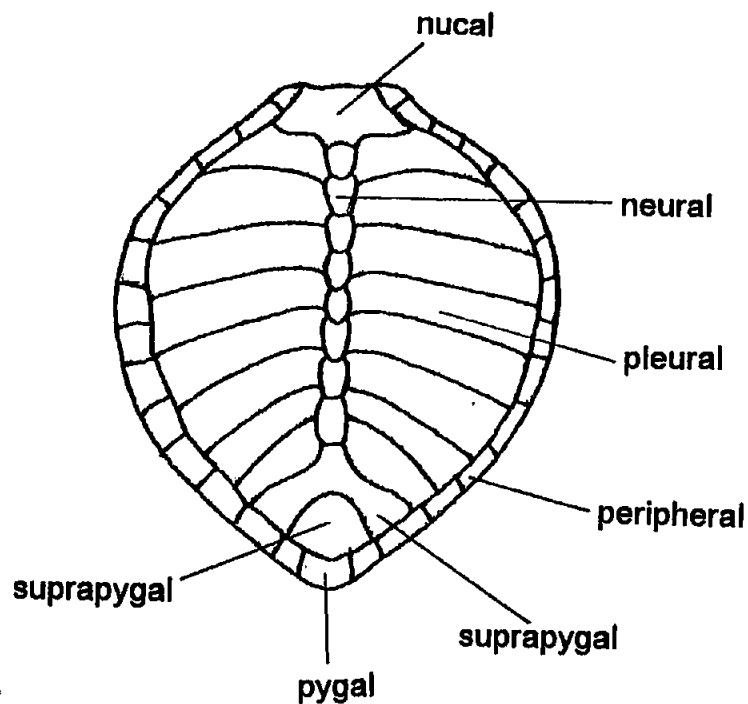


**A.** Top view of carapace



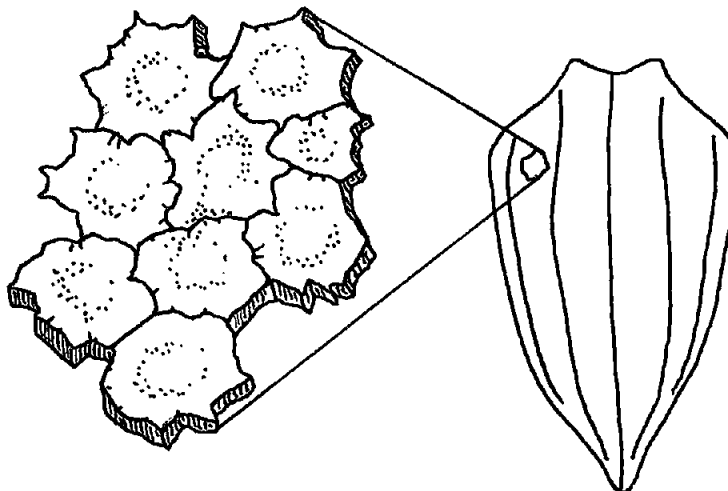
**B.** External view of plastron.

**Figure 3. Bones of the Chelonidae carapace.**

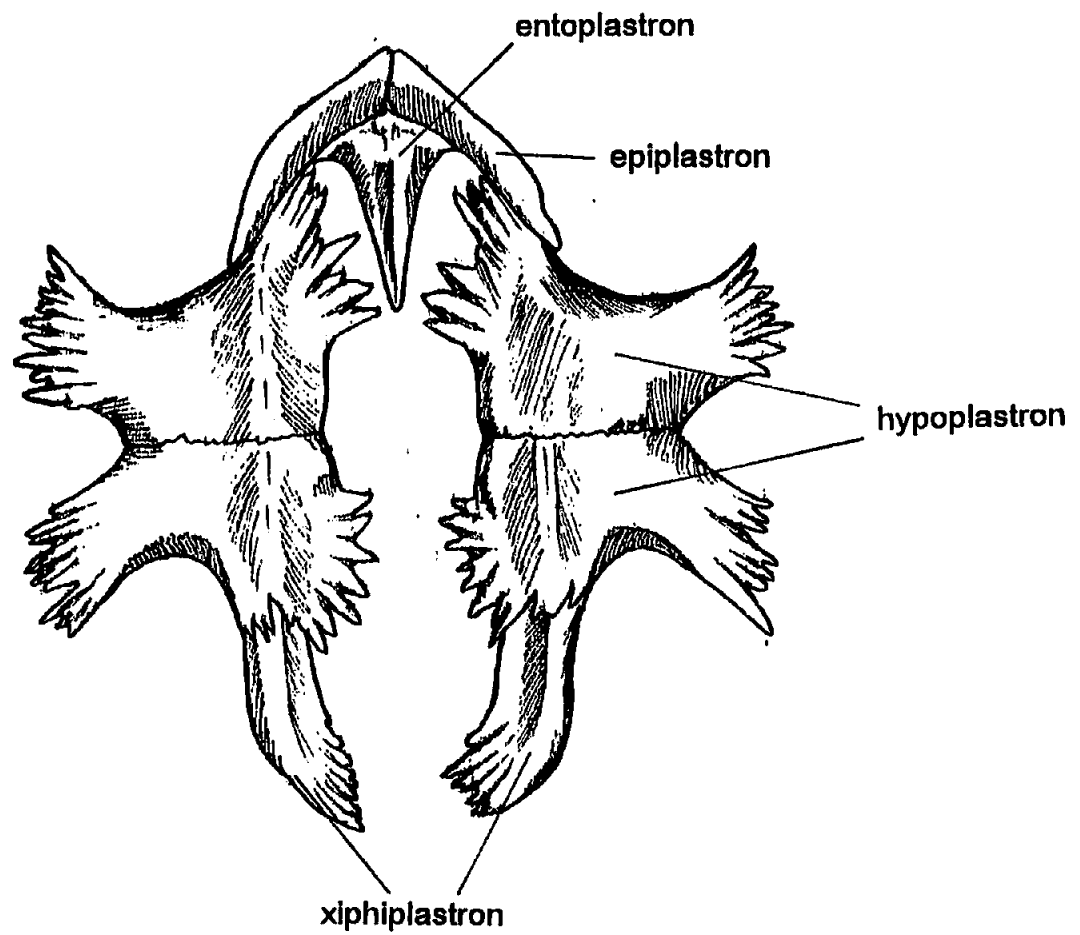


**Figure 4. Bone configuration of the Dermochelyidae carapace.**

The bones of the Leatherback turtle's shell are arranged in a mosaic pattern consisting of hundreds of small to medium sized bones. A thin dermal layer covers these bones and rib structure lies underneath. This carapacial arrangement allows the Leatherback's shell to "bend" when it dives into deep water because of an increase in bone to cartilage connection, a feature not found in any other sea turtle species.



**Figure 5.** Schematic view of a Chelonidae turtle plastron.



## **Section 1. Sea turtles of the Eastern United States and the Gulf of Mexico. Individual species accounts.**

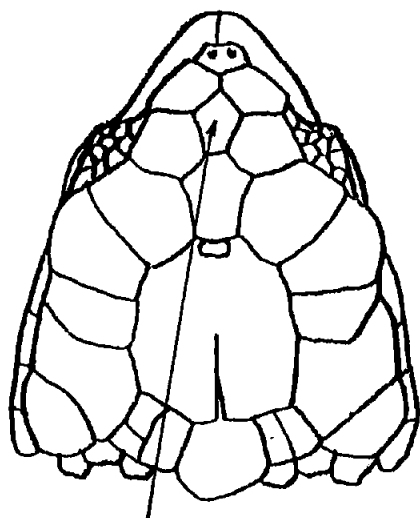
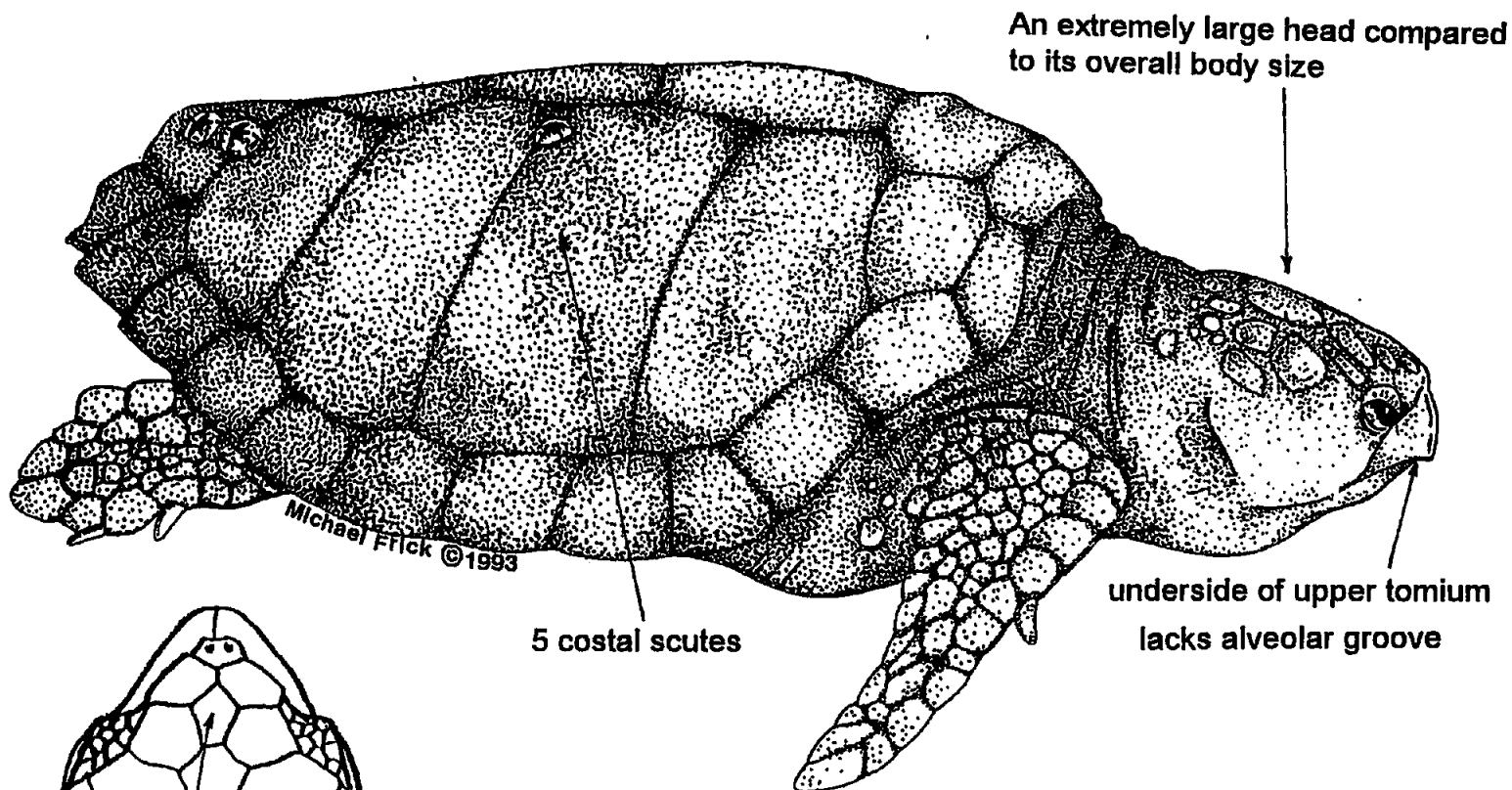
Five species of sea turtles are found off the eastern coast of the United States and into the Gulf of Mexico. The two most common turtles found nesting on the East Coast are the Loggerhead sea turtle ( *Caretta caretta* ) and the Atlantic Green turtle ( *Chelonia m. mydas* ), primarily in Florida. In the late winter and early spring ( South Carolina to Florida), the Leatherback sea turtle, ( *Dermochelys coriacea* ), can be found swimming off the coast of southern states and occasionally nesting in Florida (spring into summer). Hawksbill sea turtles ( *Eretmochelys imbricata* ) can be common in certain areas of Florida but remain as uncommon drifters in the more northern states. Ironically, probably the most endangered sea turtle the Kemp's Ridley ( *Lepidochelys kemp*i ) can be considered one of the more common strandings found in South Carolina and Georgia ( next to the Loggerhead ). Historically, as strandings go, the most common strandings found off the Eastern U.S. and into the Gulf of Mexico are Loggerheads; the next being the Kemp's Ridley, then the Green turtle, the Leatherback and then the Hawksbill. These numbers may also reflect the abundance of each species in a particular area ( obviously the more individuals of a particular species found in a given area, the greater the chance that they will be caught rather than a less prevalent species being caught ).

This section introduces the five species of sea turtles within our range and provides a page to page description of their common characteristics that you will encounter in the following keys in Section 2.

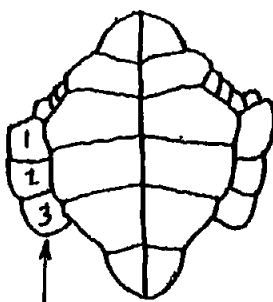
# Loggerhead Turtle

*Caretta caretta*

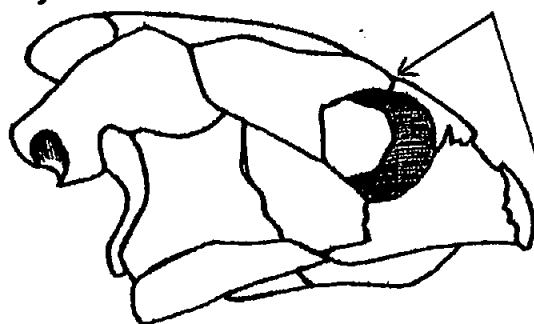
Common features of this turtle include:



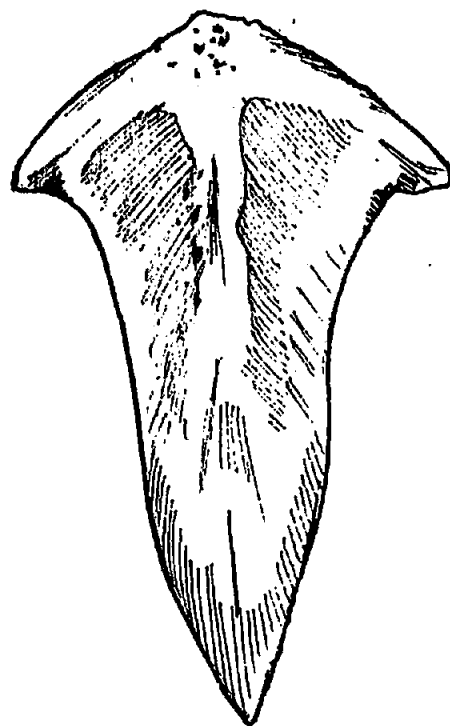
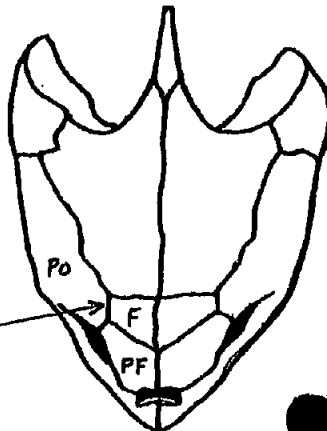
Sometimes an extra prefrontal scale is present between the eyes (numbering prefrontal scales plus one inter-prefrontal scale (5 scales total)). Some individuals may only have 4.



3 inframarginals without pores



postorbital bone touches prefrontal bone

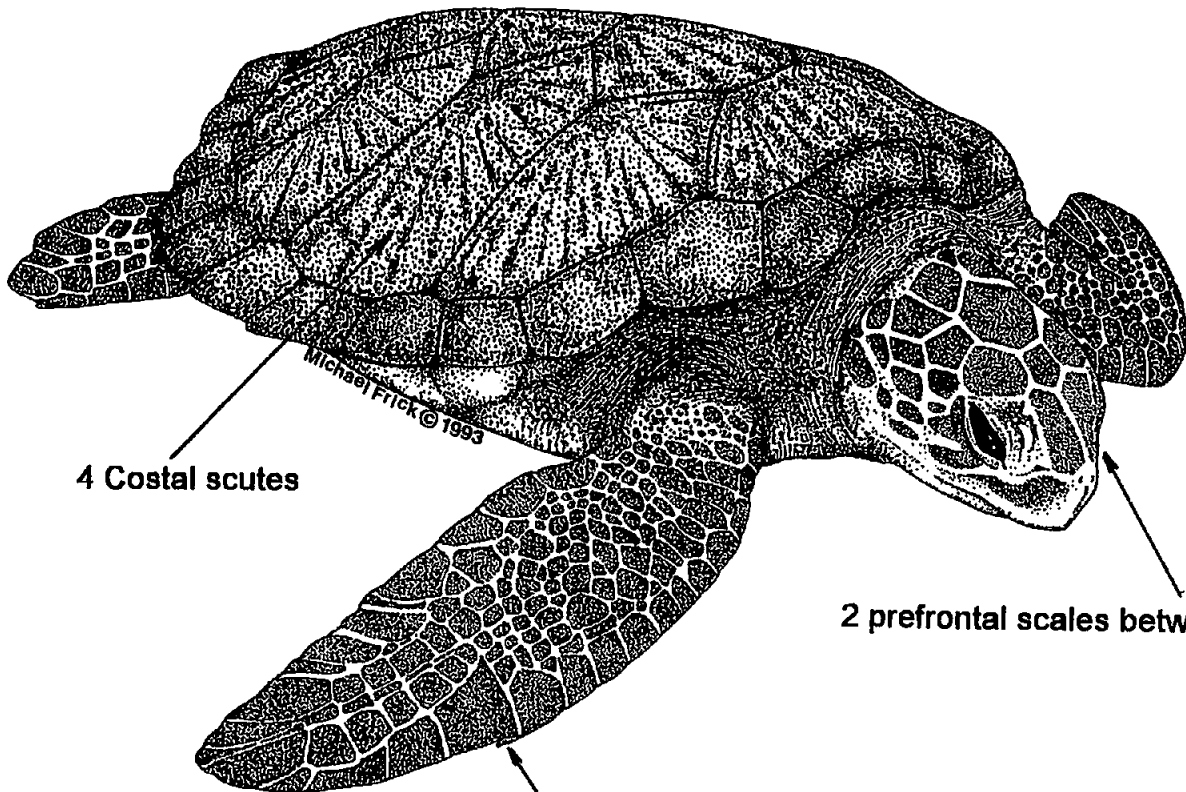


a distinct entoplastron bone

# Atlantic Green Turtle

*Chelonia m. mydas*

Common features of this turtle include:

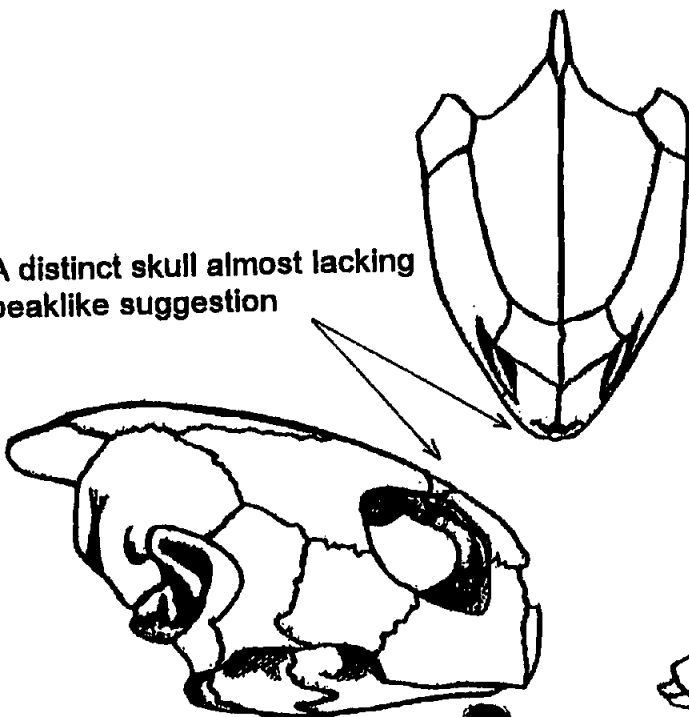


4 Costal scutes

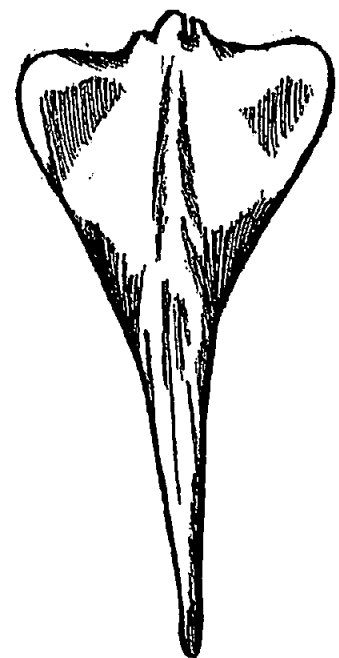
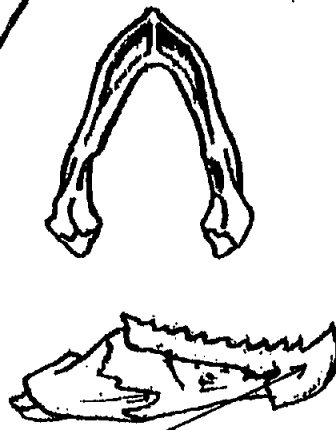
2 prefrontal scales between the eyes

One claw on each front flipper

A distinct skull almost lacking beaklike suggestion



A serrated lower tomium



a very distinct entoplastron bone

# Hawksbill Turtle

*Eretmochelys imbricata*

Common features of this turtle include:

4 prefrontal scales  
between the eyes

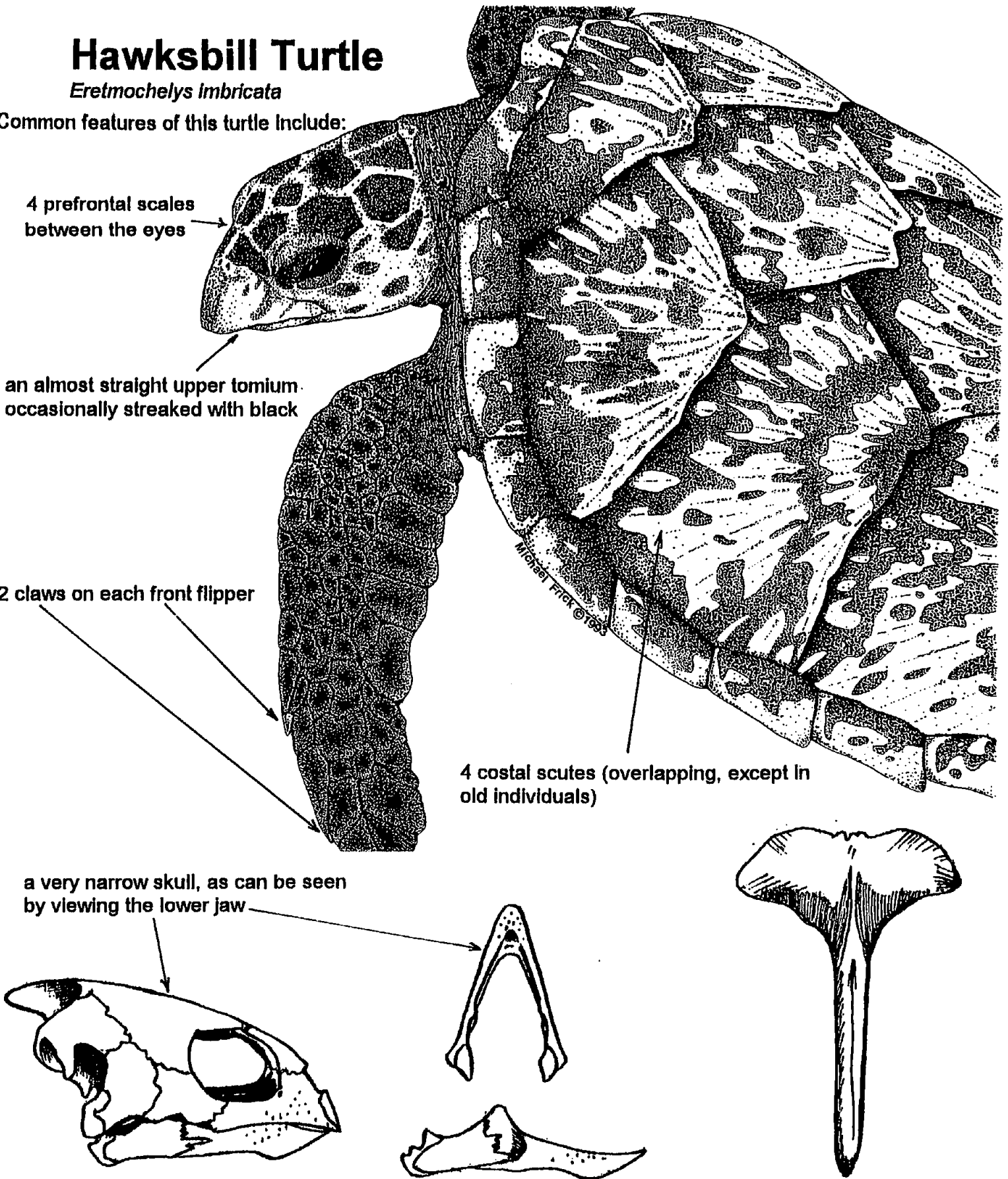
an almost straight upper  
tomium  
occasionally streaked with black

2 claws on each front flipper

4 costal scutes (overlapping, except in  
old individuals)

a very narrow skull, as can be seen  
by viewing the lower jaw

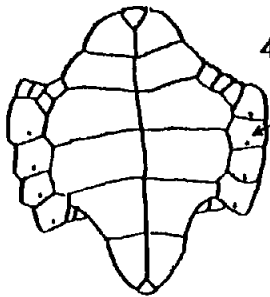
a distinct entoplastron bone



# Kemp's Ridley Turtle

*Lepidochelys kempi*

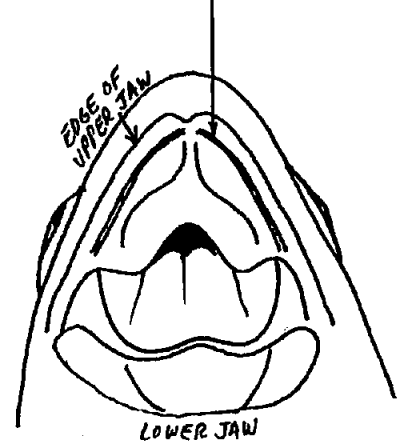
Common features of this turtle include:



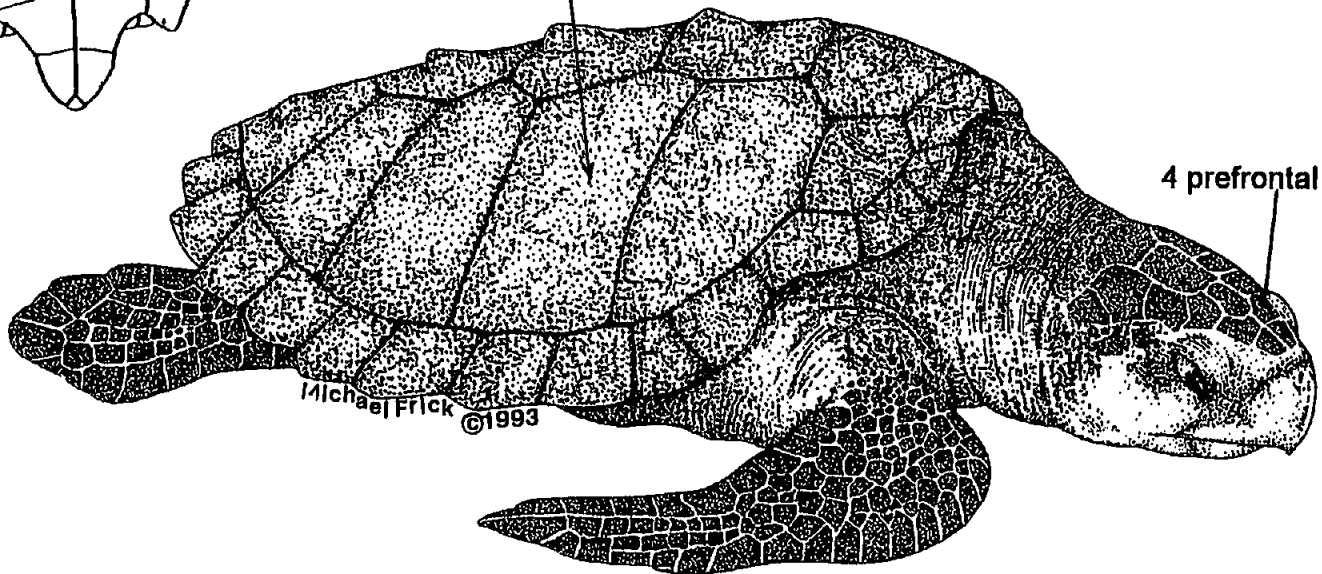
4 inframarginals with pores

5 costal scutes

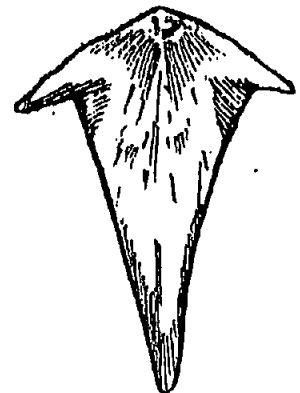
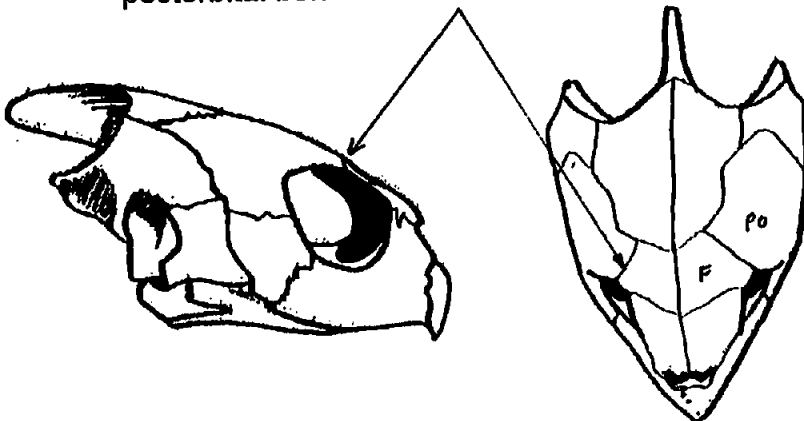
underside of upper tomium with deep alveolar groove



4 prefrontal scales



postorbital bone touches frontal bone



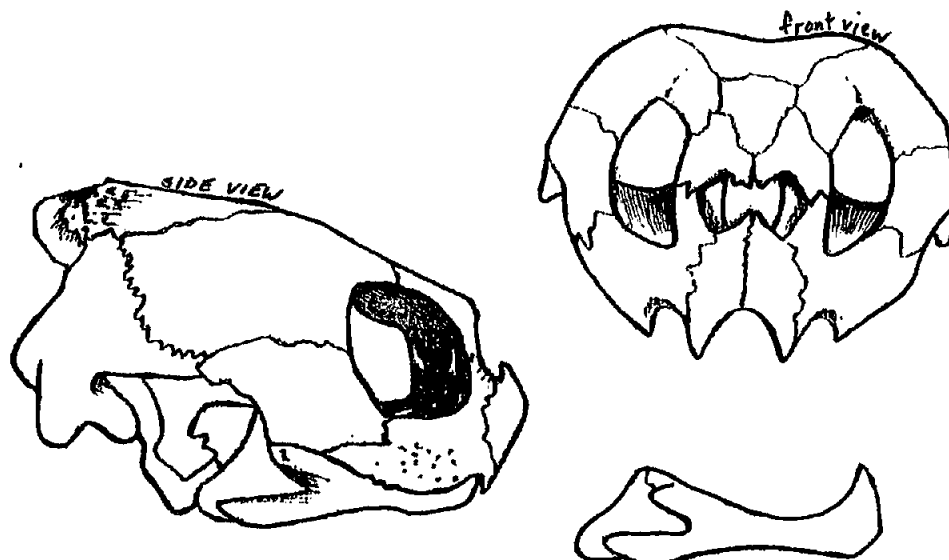
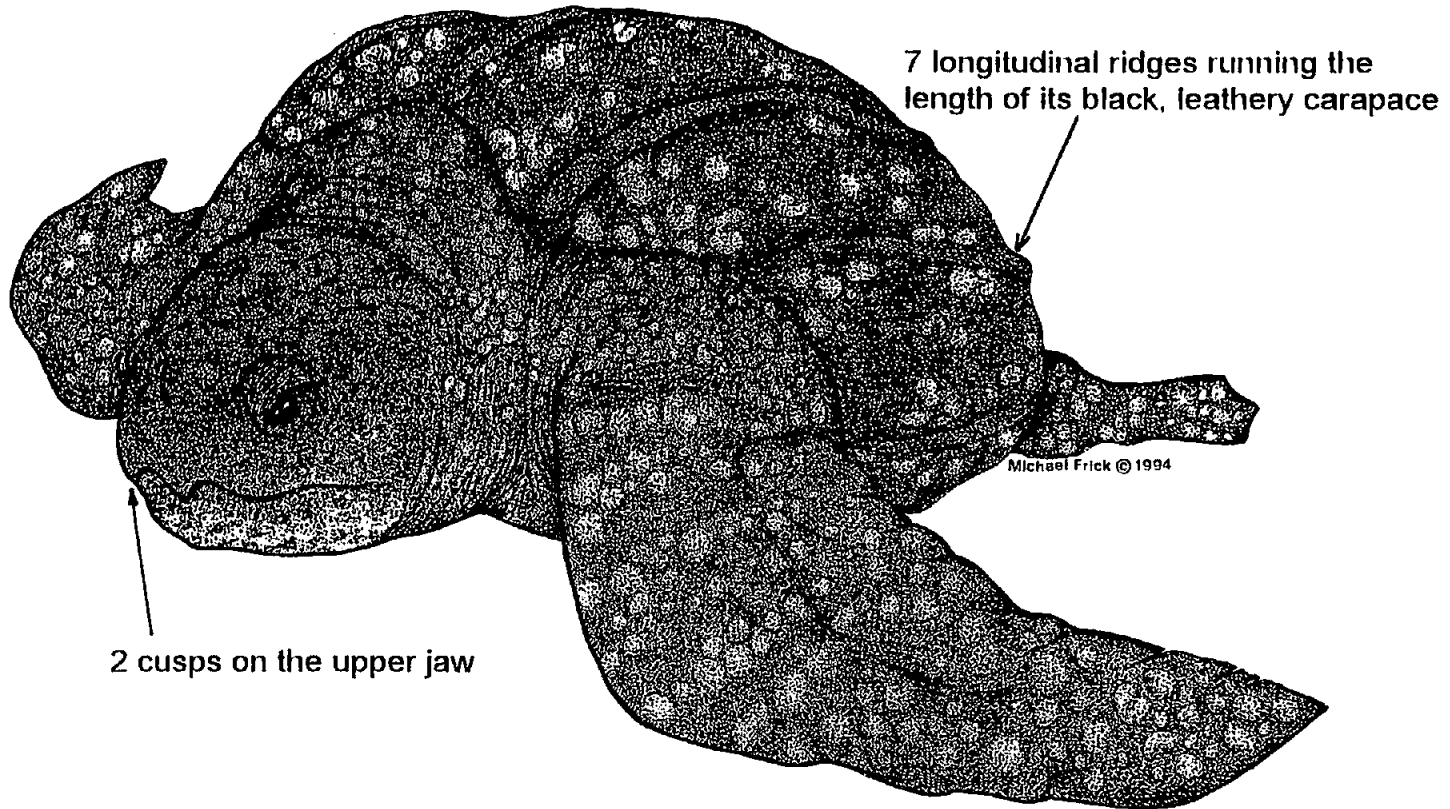
a distinct entoplastron bone



# Leatherback Turtle

*Dermochelys coriacea*

Common features of this turtle include:



a diagram showing a common Leatherback skull  
\*note the 2 cusps and the angular lower jaw

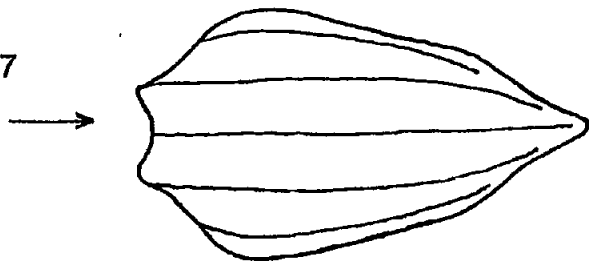
**Section 2. Keys to stranded turtles according to condition, ( format adapted from Shoop and Ruckdeschel's format, 1990).**

**Part 1. A key to the keys, note condition to begin.**

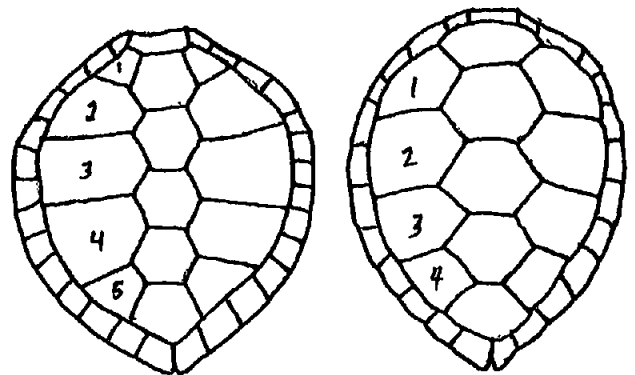
- 1. Turtle alive or fresh, completely intact animal .....see key #1.**
- 2. Fresh carcass missing flippers only .....see key # 1.**
- 3. Fresh carcass missing head only .....see key # 2.**
- 4. Carcass missing head and limbs.....see key # 3.**
- 5. Head only.....see key # 4.**
- 6. Skull only.....see key # 5.**
- 7. Plastral bones present , entire skeleton present except head.....see key # 6.**

**Key #1.** Turtle alive or fresh, completely intact animal. **AND** Fresh carcass missing flippers only.

- A. Carapace somewhat smooth and black with 7 longitudinal ridges running the entire length of the shell.....**Leatherback Turtle**  
*Dermochelys coriacea.*



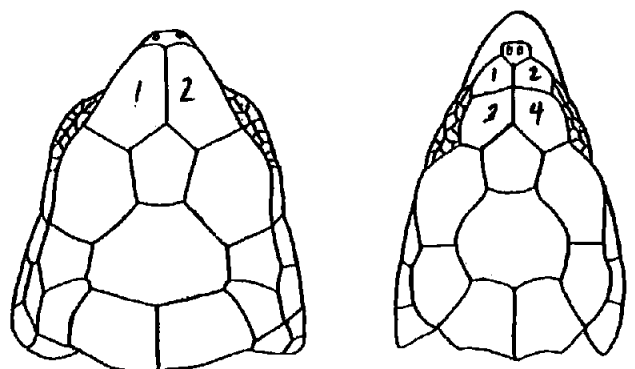
- A. Carapace hard and bony with scutes, *not* black with longitudinal ridges.....see B.



- B. Costal scutes number to 4.....see C.

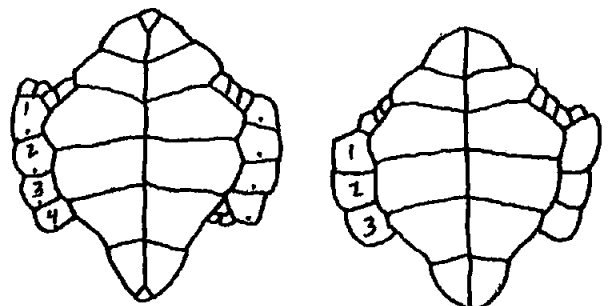
- B. Costal scutes number to 5.....see D.

- C. Two prefrontal scales between the eyes.....  
.....**Green Turtle.**  
*Chelonia m. mydas.*



- C. Four prefrontal scales between the eyes.....  
.....**Hawksbill Turtle.**  
*Eretmochelys imbricata.*

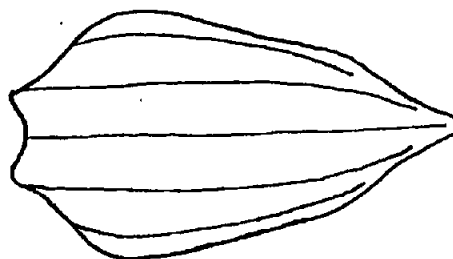
- D. Three inframarginals without pores.....  
.....**Loggerhead Turtle.**  
*Caretta caretta.*



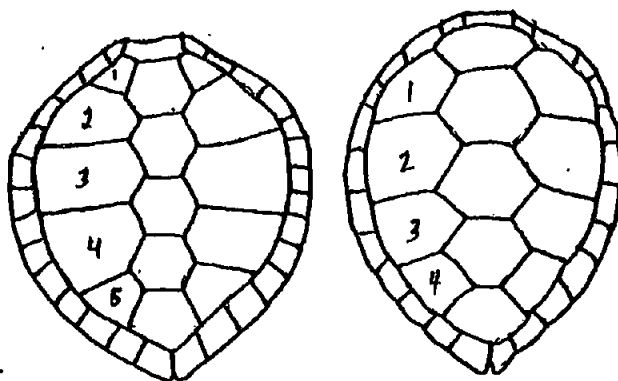
- D. Four inframarginals with pores.....  
.....**Kemp's Ridley Turtle.**  
*Lepidochelys kempii*

**Key # 2. Fresh carcass missing head only.**

- A. Carapace somewhat smooth and black with 7 longitudinal ridges running the entire length of the shell.....**Leatherback Turtle**  
*Dermochelys coriacea*



- A. Carapace hard and bony with scutes, *not* black with longitudinal ridges.....see B.

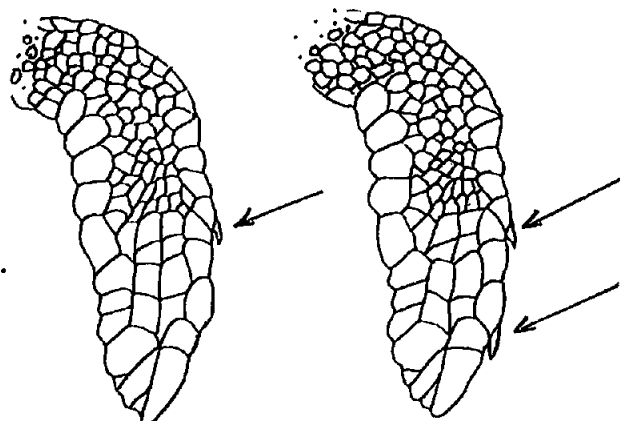


- B. Costal scutes number to 4.....see C.

- B. Costal scutes number to 5.....see D.

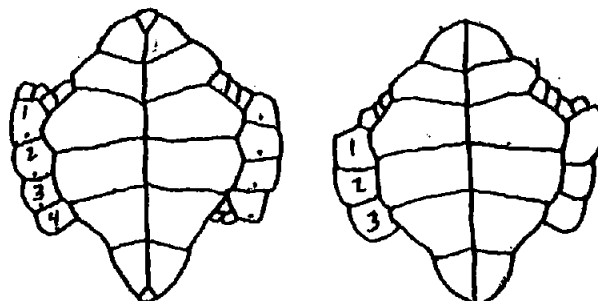
- C. One claw on each front flipper.....**Green Turtle.**  
.....*Chelonia m. mydas*

- C. Two claws on each front flipper.....**Hawksbill Turtle.**  
*Eretmochelys imbricata*



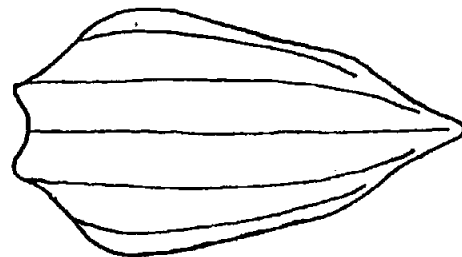
- D. Three inframarginals without pores.....  
.....**Loggerhead Turtle.**  
*Caretta caretta*

- D. Four inframarginals with pores.....  
.....**Kemp's Ridley Turtle.**  
*Lepidochelys kempi.*



**Key # 3. Carcass missing head and all limbs.**

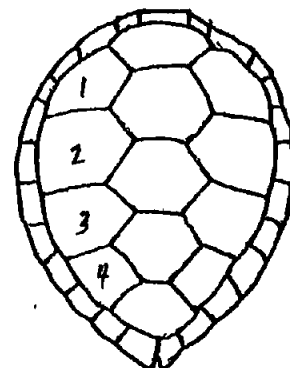
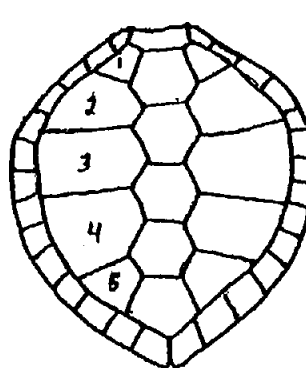
- A. Carapace somewhat smooth and black with 7 longitudinal ridges running the entire length of the shell.....**Leatherback Turtle**  
*Dermochelys coriacea*



- A. Carapace hard and bony with scutes, *not* black with longitudinal ridges.....see B.

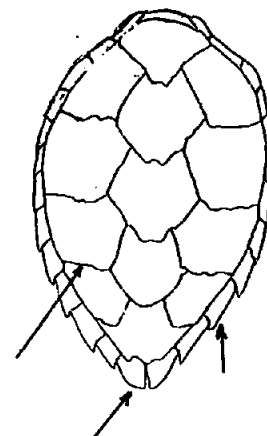
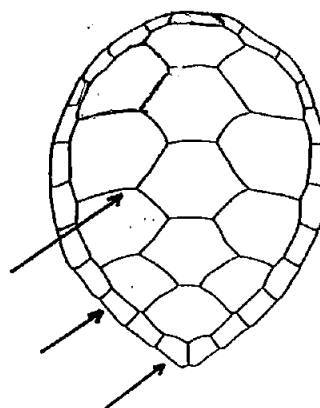
- B. Costal scutes number to 4.....see C.

- B. Costal scutes number to 5.....see D.



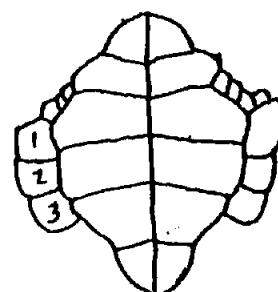
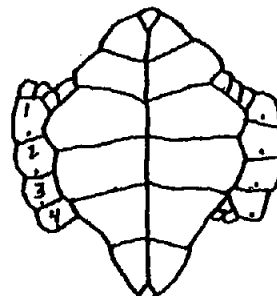
- C. Scutes laying side by side, not overlapping. Pygal and marginal scutes follow carapace curve.....  
**Green Turtle**  
*.....Chelonia m. mydas*

- C. Scutes overlapping (except in old individuals). Pygal and marginal scutes toward the rear of the shell appear "spikey", don't necessarily follow carapace curve on shell margin.....**Hawksbill Turtle**  
*Eretmochelys imbricata*



- D. Three inframarginals without pores.....  
**Loggerhead Turtle.**  
*Caretta caretta*

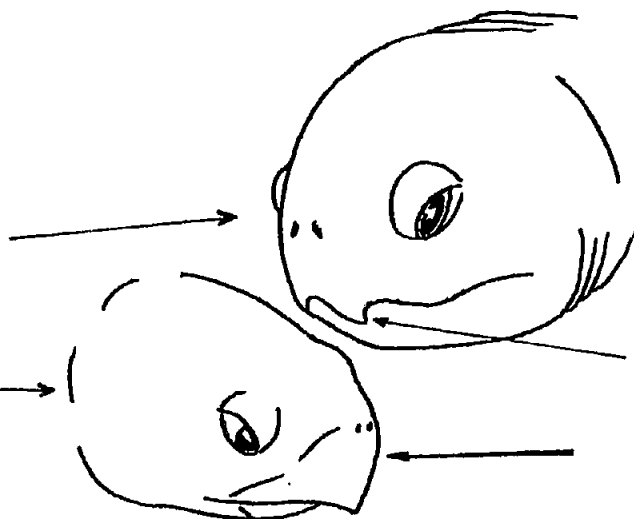
- D. Four inframarginals with pores.....  
**Kemp's Ridley Turtle.**  
*Lepidochelys kempi.*



**Key # 4. Head only.**

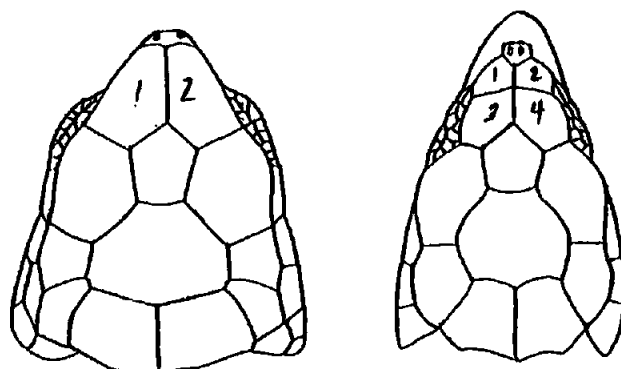
- A. Cusps present on either side of upper jaw.....**Leatherback Turtle.**  
*Dermochelys coriacea*

- A. Upper jaw without cusps.....**see B.**

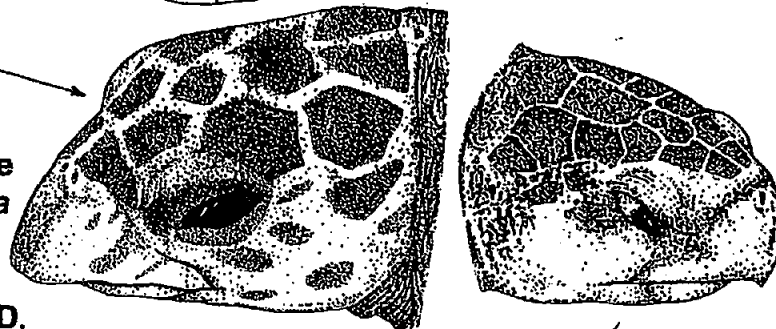


- B. Two prefrontal scales between the eyes, serrated lower tomium.....**Green Turtle.**  
*Chelonia m. mydas*

- B. Four or more prefrontal scales between the eyes, lower tomium *not* serrated.  
.....**see C.**

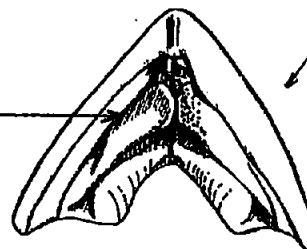


- C. Head narrow when viewed from above. Upper tomium somewhat straight with no curve (hook). Tomia yellowish frequently streaked with black.....  
.....**Hawksbill Turtle**  
*Eretmochelys imbricata*



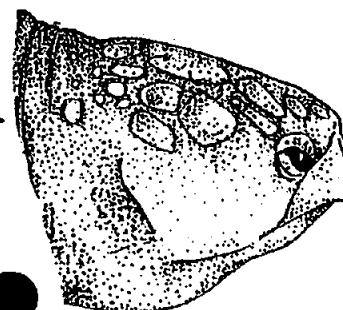
- C. Curved (hooked) upper tomium. Tomia yellowish or whitish. Head broad.....**see D.**

- D. Upper tomia severely hooked. Underside of upper tomia contains deep alveolar groove.....**Kemp's Ridley Turtle.**  
*Lepidochelys kempi*



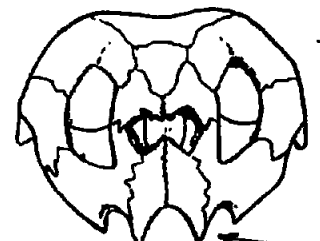
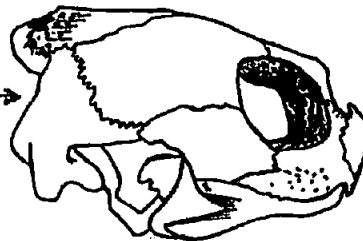
Underside view of *L. kempi* upper tomium.

- D. Upper tomium gently curved. No alveolar groove on underside of upper tomium.  
.....**Loggerhead Turtle**  
*Caretta caretta*

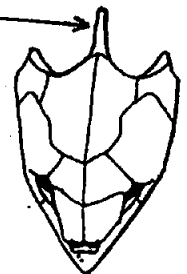
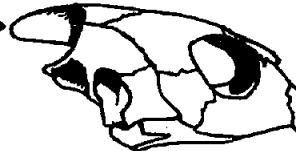


## Key # 5. Skull only

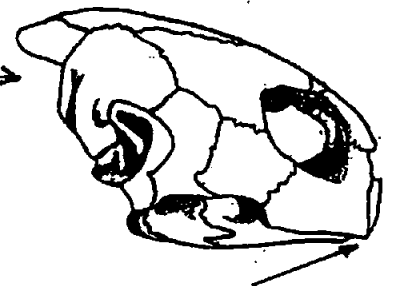
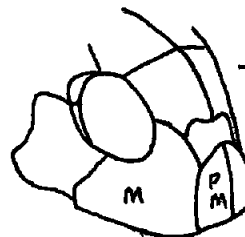
- A. Upper jaw with cusps. Supraoccipital bone not visible when viewed from above.....Leatherback Turtle.  
*Dermochelys coriacea*



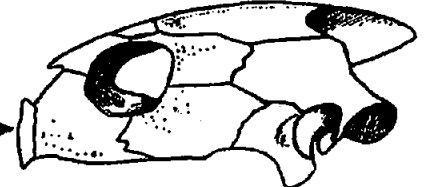
- A. Upper jaw without cusps. Supraoccipital bone visible when viewed from above.  
....See B.



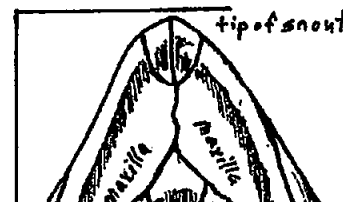
- B. Suture between premaxillae bones nearly vertical all the way up to the nasal aperture. OR premaxillae themselves are nearly vertical.  
.....Green Turtle.  
*Chelonia m. mydas*



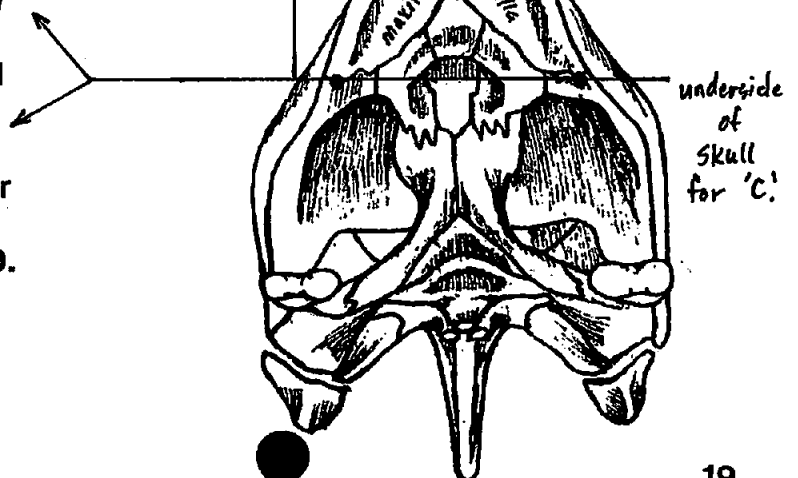
- B. Suture between premaxillae bones slopes backwards to the nasal aperture. OR premaxillae themselves are sloped upwards to nasal aperture forming a distinct "beak".....see C.



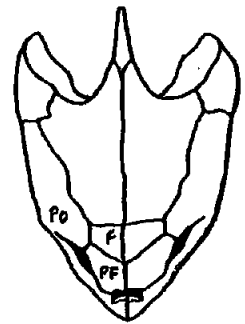
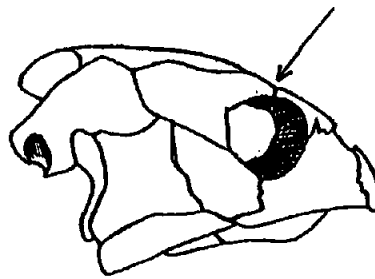
- C. Skull appears to be narrow when viewed from above. Distance between the posterior tips of the maxillae is *less than or equal to* the distance from the posterior tip of the maxilla to the tip of the snout.....Hawksbill Turtle.  
*Eretmochelys imbricata*



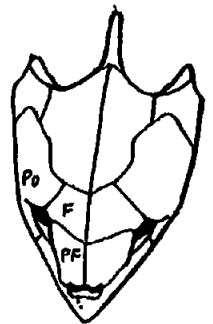
- C. Skull appears to be broad when viewed from above. Distance between the posterior tips of the maxillae is *greater than* the distance between the posterior tip of the maxilla to the tip of the snout.  
.....see D.



D. Postorbital bone touches the prefrontal bone.....Loggerhead Turtle.  
*Caretta caretta*

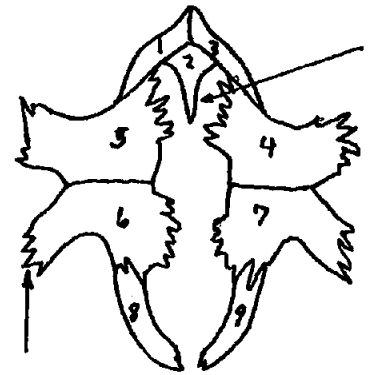
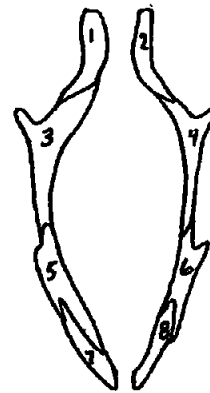


D. Postorbital bone touches the frontal bone and does not touch the prefrontal bone....Kemp's Ridley Turtle.  
*Lepidochelys kempi*



**Key # 6.** Plastral bones present, entire skeleton present except head.

A. Eight plastron bones total. All eight form an oval-like matrix. No entoplastron bone....Leatherback Turtle  
*Dermochelys coriacea*

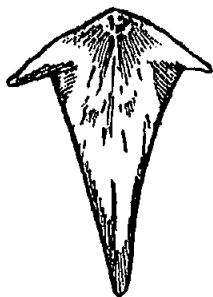


A. Nine plastron bones total. The largest of the plastron bones have "spikey" projections off each side. Entoplastron bone present.....remove entoplastron bone and compare to the chart below.

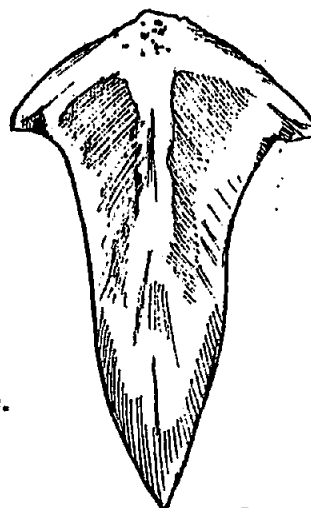
Entoplastron bones of four Cheloniidae turtles:



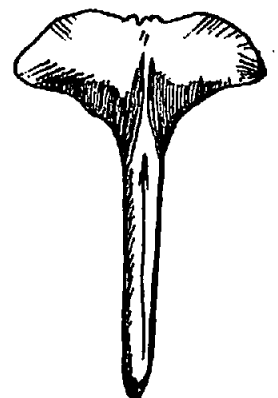
.....Green Turtle.  
*Chelonia m. mydas.*



.....Kemp's Ridley Turtle.  
*Lepidochelys kempi*



.....Loggerhead Turtle.  
*Caretta caretta.*



.....Hawksbill Turtle.  
*Eretmochelys imbricata.*



## **Second printing text addition - Sea turtle limb identification.**

This page has been added to the second printing of this manual by suggestion of Georgia naturalist Dana Ross. Dana was contracted to work as a biologist on dredges in the Gulf of Mexico. During his 'tour of duty' Dana and his colleagues were assigned to identify turtles that were captured by dredges. This particular manual was being used on dredges to back up turtle identification. One instance where only a turtle flipper was brought up by the dredge led the ship biologists to page through this manual. To their dismay, a key on turtle flippers had not been included. The reason for this being because a single flipper cannot be used to document a sea turtle stranding. A flipper catalogued as a stranding could actually be from the same turtle catalogued two or three days earlier by another individual. This would show, in data, as two separate strandings when in all actuality it should be classified as only one.

I do recognize the importance for turtle limb identification in instances as previously described with dredge work. Any part to a marine turtle carcass should be reported to your respective stranding coordinator. However, it should be remembered that limbs should not be classified as a single stranding.

### **Sea turtle limb characteristics:**

**Hawksbill Turtle** (*Eretmochelys imbricata*)- 2 claws on each flipper (fore and hind); flipper color is black to dark brown with lighter yellow to grayish-white pigment outlining each scale.

**Loggerhead Turtle** (*Caretta caretta*)- 2 claws on each flipper (fore and hind); flipper color is yellow to yellowish-orange. The scales on the flipper are darker chestnut brown in the center and fade to yellow towards the scale's margins. Some individuals may contain more yellow pigment and others more brown.

**Kemp's Ridley Turtle** (*Lepidochelys kempi*)- 1 claw on each fore flipper and 2 claws on each hind flipper; flipper color is light. Young individuals may be darker than adults. Generally flipper color is gray to greenish-gray. These are very 'ghostly' colored turtles.

**Green Turtle** (*Chelonia mydas*)- 1 claw on each flipper (fore and hind); flipper color is very bold and clean in most individuals. Dark chestnut brown scales lay atop cream to white colored skin.

**Leatherback Turtle** (*Dermochelys coriacea*)- No claws on each flipper (fore and hind); flipper black in color with occasional, white speckling. Scaleless flipper.

As you can see most sea turtles have the same number of claws on each flipper. This makes it very confusing if the flippers are discolored due to decomposition. Single flipper identification is a weak area unless there is good color to the flipper. This chart should only be consulted when only a single flipper is available. Otherwise, use the previous keys for turtle identification.

### **Section 3. Glossary of terms found in the manual.**

**Alveolar groove-** The ridges and inner grooves of the mandibles where the horny beak or tomium is implanted. A very useful characteristic in distinguishing Kemp's Ridleys from Loggerheads, see key #4 and the Kemp's Ridley species account.

**Carapace-** The upper shell of a turtle covered by horny scutes or soft skin.

**Cusp-** Sharp projection found on the upper and lower jaw of the Leatherback turtle. See Key #4 and Leatherback species account.

**Entoplastron bone-** Median bone in the Cheloniidae plastron. Useful in determining Cheloniidae species. See Figure 5 and Key # 6.

**Frontal bone-** see Fig.1. Useful in determining Loggerheads from Kemp's Ridleys. See Key # 5 and Kemp's Ridley species account.

**Inframarginal pore-** A single small hole through each inframarginal scute (see Fig.2), serving as the outlet for excretions; function unknown. Useful in distinguishing Kemp's Ridleys from Loggerheads, see Kemp's Ridley species account and Keys 1,2, and 3.

**Plastron-** Lower turtle shell covered by horny scutes or soft skin.

**Prefrontal scales-** The scales found between the eyes of a turtle. Usually 2 or 4 are present, sometimes Loggerheads may have 5 (an interprefrontal scale). Useful in distinguishing turtle genera, see individual species accounts and Keys 1 and 5.

**Scutes-** Horny shields covering the carapace and plastron. See Figure 2.

**Tomium-** The horny beak that covers the surface of the upper and lower jaws. Useful in identifying Green turtles since their lower tomium is serrated to cut through sea grasses. See species account for Green turtle and Key #4.

## Sources used for this compilation:

- Dodd, C, Kenneth, Jr. 1988. Synopsis of the biological data on the Loggerhead sea turtle (*Caretta caretta*) (Linnaeus 1758). U.S. Fish and Wildlife Service, Biol. Rep. 88 (14). 110pp.
- Marquez, R. 1984. Kemp's Ridley turtle. Rosential School of Marine and Atmospheric Sciences overview of biology. In: Bacon, P., F. Berry, K. Bjorndal, H. Hirth, L. Ogren, and M. Weber (editors). Proceedings of the Western Atlantic Turtle Symposium, 17-22 July 1983, Rosential School of Marine and Atmospheric Sciences, University of Miami, Miami, Florida.
- Marquez, R. 1990. FAO Species Catalogue, Sea Turtles of the World. No. 125. Vol. 11. Rome, FAO. 81pp.
- Shoop, R. and Ruckdeschel, C. 1990. A Key to Strandings. Unpublished. Presented at the 10<sup>th</sup> Annual Sea Turtle Symposium, Hilton Head Island, South Carolina. 6pp.
- Teas, Wendy. Semi-Annual Reports of the Sea Turtle Salvage and Stranding Network: Atlantic and Gulf Coasts of the U.S., NOAA. Miami Laboratory. Compiled data from 1990-1995.
- Savannah Science Museum herpetology collection, *Caretta* Research Project and USFWS Savannah Coastal Refuges data 1972-1996.