Research and Management Techniques for the Conservation of Sea Turtles

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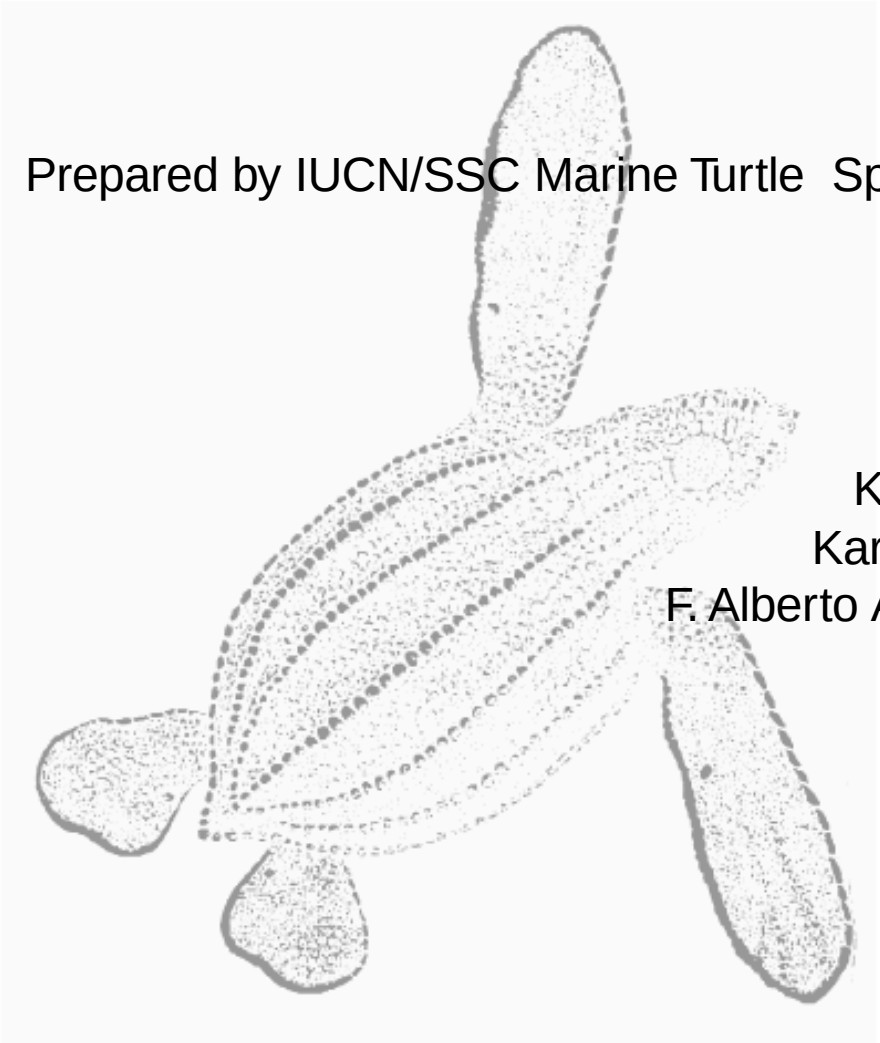

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Studies in Foraging Habitats: Capturing and Handling Turtles

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Introduction

The foraging habitats of marine turtles vary greatly in their physical and biotic attributes. Water depth; bottom type; presence/absence of tidal flow, currents and/or surge; wind velocity; and water clarity are among the factors that must be accounted for in planning in-water surveys. Despite the spectrum of conditions and circumstances with which researchers have had to deal, one general kind of equipment, the so-called "tangle net," has been used relatively effectively in many places. Technical specifications, deployment methods, soak times, net lengths, net tending methods, anchor attachment, and other considerations all have varied according to circumstance, but the basic implement is a large-mesh tangle net soaked for periods of time in the waters of the foraging habitats. The situation in which such a net works best is that of a protected but relatively open, relatively shallow bay, sound, or lagoon with little or no movement of water except that driven by the wind at the surface. We intend to adopt such a situation as an arbitrary standard—a starting point for which we can lay down the basics of net specifications, deployment styles, tending methods, etc., then follow that with comments about the modifications of these items that are warranted under different environmental conditions. It is advisable for researchers contemplating the use of net-capture and hand-capture methods to gain experience by visiting established projects where they have been used successfully.

Some researchers capture turtles by hand and, although the precise procedures are generally locality-specific, we provide a synopsis of hand-capture techniques following the sections on net-capture.

Net Specifications

A typical net consists of webbing (mesh) hung from a braided polypropylene (0.635cm in diameter) top line that is suspended at the surface by floats. The webbing is made of 18-gauge twisted nylon twine and the mesh size is 40cm stretch (knot to knot). Such a net is said to be 20cm "on the bar," which means that each side of a mesh square is 20cm long. Some researchers use nets made of 50 lb-test monofilament line with satisfactory results, but there is more tendency to cut the skin with such a net. Other mesh sizes up to 50cm stretch can be used if there is reason to believe that turtles smaller than about 40cm straight carapace length (SCL) will not be encountered. Where there is the possibility that there will be turtles smaller than about 32cm SCL (such as some known assemblages of juvenile green turtles) a smaller mesh size (usually 30cm stretch) can be used. See the section below on net tending for a discussion of the benefits and liabilities of smaller mesh size. One method of float attachment involves fastening individual "bullet-shaped" Styrofoam floats with spring clips at approximately 10m intervals at each deployment. The bullet-shaped floats stand up and "dance" when a turtle is tangled in the net near them. Other workers prefer to have a larger number of smaller, round floats with center holes permanently arranged along the top line. Still others have used a top line that is uniformly impregnated with foam along its entire length. The latter two methods are satisfactory and may be preferred in certain situations, but they do not provide as much information to the observer as to what is happening beneath the surface as the bullet-shaped floats do. For best results the bottom line of the net should be made of No. 30 continuous lead core line.

Tangle netting is generally not undertaken in water deeper than about 4m and so most nets are not more than 4m tall (wide). It may be possible to have taller nets constructed for specific circumstances, but one should understand that such nets work best when some of the webbing is lying loosely on the bottom, not stretched out to maximum depth in the water column.

Net Deployment

Net deployment begins with the rigging of an 8-kg Danforth-type anchor. A 1.5m section of 0.8cm chain should be shackled to the ring on the anchor shaft. Another shackle should be used to tie a 15m length of 1cm nylon line to the chain. The other end of the line should be tied to one of the free ends of the top line of the net. Some readers may question anchoring the top line, but experience has shown that to be the correct manner. The net can be paid out from the uncovered bow of an outboard boat operated in reverse or from the stern of a boat specially equipped with a net platform and the engine mounted off-center on the transom. The bow (or stern) should be free of all cleats and other hardware that would interfere with the deployment, tending, and retrieval of the net. The anchor is lowered to the bottom as the boat moves away, and the entire length of anchor line is paid out. At that point it is tested to assure that the anchor has penetrated the bottom and is holding. That having been done, a float is attached to the top line at the point where the webbing begins and the net mesh begins to enter the water. Two or three workers attend the net as it is paid out, making sure that the bottom line does not get twisted over the top line and attaching floats at 10m intervals. The time at which the mesh first begins to enter the water and at which the last of the mesh is soaked should be recorded. Another anchor, rigged in the manner described above, is tied to the other free end of the top line when the last of the webbing is deployed. A worker holds onto the second anchor until the line is taut and then lowers it overboard. Net deployment should begin at the upwind end of the netting site and the boat operator should set a course that is at about a 45-degree angle to the wind. This will assure that the wind will keep the stern and propeller away from the net during subsequent net tending.

The length of net to be soaked varies with conditions and the experience of the researcher. It is not wise to soak more than 100-150m of net in any new situation. With experience it should be possible to gradually increase the length of net soaked to as much as 450m in a protected, shallow bay, or lagoon. Ordinarily that would be the maximum that could be tended effectively by a crew of four to five people in one boat. In most other situations, soaking half as much net, or less, is prudent.

Tending the Net

In the sort of situation that we have adopted as our standard (shallow, protected bay or lagoon) the net can be checked by hand over hand elevation of the top line from the bow of a boat. The level of intensity of net tending varies with mesh size and with the minimum size of turtles in the population. Turtles larger than about 40cm SCL have the bulk and strength to rise to the surface to breath even when well entangled. Smaller turtles, especially those smaller than 35cm, can get both anterior flippers thoroughly enmeshed and have difficulty reaching the surface. The net should be tended continuously in any new situation, and it is a good idea to keep the net in view at all times. Where experience has shown that there are no turtles under about 40cm SCL and where 50cm stretch mesh is used, attention to the net can be somewhat less assiduous. However, in those situations where turtles in the 30-35cm size range (or smaller) are a possibility and a mesh size of 40cm (stretch) or smaller is used, the net should be tended continuously. Heightened awareness and more intensive tending are warranted whenever 30cm mesh is used and where smaller turtles are likely to be captured.

Departures from the Standard

Netting Over Near-Shore Oceanic Reefs

The problems here involve the movement of water (the surge and flow of tidal change and sea state), poor water clarity, and the tendency for the net to become caught on the jagged surfaces of reef structures. These factors preclude checking the net from the bow of a boat and require that free divers snorkel the top line continuously. The use of SCUBA gear is not advisable because divers are constantly caught up in the net by their regulators, octopuses, buckles, and snaps. The crew must be sufficiently large that there can be two snorkelers in the water for every turtle that is captured (one to handle the turtle, one to pull snagged mesh off the bottom). A crew of six, in one boat, should not set more than about 200m of net (half of that or less in new situations) and nets should not be deployed when visibility does not exceed the depth of the net.

Cuts and Channels

Turtles of several species are often concentrated in cuts and channels that interrupt large areas of grass flats, oyster reefs, and other shallow water habitats. These cuts or tidal channels are characterized by strong currents associated with the ebb and flood of the tide onto and from the inshore flats. Tangle nets are difficult to set in such situations, but they can be fished by drifting or anchoring a relatively short length of net (30-40m drift net; 50m set net). In the former method the net is tied between two boats riding the current from one end of the cut to the other. Two free divers are required to disentangle turtles and bring them to the boat.

The latter technique ("set net") requires that the net be anchored across the cut or channel. The net should be deployed during the slack tide period to facilitate positioning it perpendicular to the current. Care should be taken not to allow the webbing to "knot up" while paying it out of the boat. The anchors must be set firmly in the bottom and bridles at each end of the net pulled tight with the anchor warps (lines). Strong tidal currents can pull the anchors loose, causing the net to drag downdrift and/or become fouled on the bottom. This is especially true in areas of limestone bottoms and oyster reefs.

If the channel is wider than the net or is a poorly defined depression or slough, netting efficacy can be enhanced by anchoring a second net 3 to 5m downdrift from the first net. It should block that part of the channel not covered by the first net and overlap the end of the first net by a few meters. Turtles using these channels sometimes avoid or escape from the first net they encounter, only to become entangled in the second.

Other departures from the standard set described above that are relevant to cuts and channels, involve mesh size and depth (width) of the net. The larger mesh size (50cm stretched) may be preferable because it avoids, to some degree, the incidental capture of large numbers of fishes, especially sharks and rays, that are commonly found in these habitats. Also, if more meshes (about 20) are hung in between the float line and lead line, the surplus or slack webbing tends to entangle small turtles when they contact the net as they surface to breathe. Another modification to the standard net involves use of a larger anchor, a Northill type weighing at least 15kg, and attached to bridles at each end of the net. The bridles (3-4m lines attached to the ends of the top and bottom lines that come together at a single anchor line) should be rigged so that the bottom leg to the lead line is one meter longer than the upper leg attached to the float line.

Ports, Basins, and Other Partial Enclosures

Marine turtles of several species sometimes use deep, man-made basins as foraging habitats. Such basins are usually far too deep to allow the use of tangle nets throughout most of their extent, but some have shallow shelves around their perimeters where nets can be deployed in much the same manner as in bays and lagoons. In this case the net is deployed parallel to the shore at a distance of 5-10m and long-handled dip nets can be used to augment the capture of turtles that come up into the shallows to feed. The net is checked by hand-over-hand top line elevation from the bow of a boat that slips quietly through the narrow zone between the net and shore. Attempts can be made to dip turtles seen in shallow water near the shoreline. When that fails, the turtles move toward the deep water and are often caught in the tangle net deployed near the edge of the shelf. Admonitions relative to net length and attention to the net are essentially the same as for the standard situation (bays, lagoons, etc.).

Marshes and Tidal Creeks

Along some low-energy shorelines characterized by salt marshes and tidal creeks marine turtles (mostly green turtles in this case) are known to move into the creeks on the rising tide. With experience and local knowledge it is possible to deploy a relatively short length of tangle net across the mouth of these creeks and capture turtles as the tide falls. The method is similar to the "set net" procedure described above under "cuts and channels." As in the case of netting over oceanic reefs, it is advisable for any researcher contemplating surveys of such habitats to gain experience by visiting and participating with a seasoned practitioner.

"Striking" the Net

In areas where surface and bottom conditions permit and where numbers of turtles can be seen at the surface, an anchored barrier net can be drawn in a circle around small groups of turtles. Once turtles are enclosed by the net, free divers enter the water to catch them by hand and bring them to the boat. This is usually done a number of times in rapid succession and is referred to as "striking."

Hand-Capture

Specific procedures by which researchers hand-capture marine turtles are as varied and sundry as the places and circumstances where this method is used. Our attempt here is to provide a succinct, ordered, but necessarily subjective approach to the subject. Most hand-capture techniques fall into one of three arbitrary categories: those in which boats are directly involved in the pursuit and capture; those in which barrier nets of some kind are used; and those involving the use, primarily, of SCUBA and/or snorkeling gear. This method generally requires clear water with good visibility.

Diving with Active Watercraft Pursuit

In some cases this involves pursuing the animal until it begins to tire and then diving on it from the bow or gunwale of a boat. In other cases the turtle is simply followed at relatively slow speed until it stops or slows down or quiescent turtles on the bottom are searched for; then (in either case) the dive is made. The diver enters the water hands first, aiming just slightly in front of the turtle. Momentum carries the diver beneath the surface where, if fortune prevails, he/she grasps the turtle by the nuchal and posterior marginal scutes and guides it to the surface. In the case of small turtles stationary on the bottom, the diver usually pins the animal against the sand to make the initial capture, then grasps both shoulders prior to making the ascent.

Diving to Tend a Barrier Net

In places where turtles occupy small coves between prominences of land or shallows, it is possible to capture them by deploying nets across the mouths of the coves. Turtles that move seaward encounter the net and usually dive to the bottom where they can be procured by free divers.

Free Diving and Use of SCUBA

Turtles sleeping or resting quietly on the bottom can, in some instances, be approached stealthily and captured directly by a free diver or one employing SCUBA. Usually, however, two divers are required; one to approach the animal from the front and distract it while the other diver approaches from above and behind, makes a quick, final descent, and grasps the turtle at the insertion of the anterior flipper (small turtles) or by the nuchal and posterior marginal scutes (turtles greater than about 45cm). A modification of this method used at night involves shining a bright diver's light on the bottom in front of the turtle, distracting or disorienting it to the extent that another diver can move in from above and behind and grasp it.