

Session VI

Working Group Results and Recommendations

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Determining Population Distribution and Status

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Goal 1: To achieve sound management of the sea turtle resource by determining the distribution of sea turtle populations

Objective 1: Locate all sea turtle nesting sites:

Identify all breeding units (also known as “stocks” or “populations”) for each species and record geographic coordinates for nesting sites, past and present. Register causes of population collapse if known.

Characterize nesting habitats by:

- Physical characteristics
- Human use and degree of human presence
- Major habitat type (according to the ecology of each species)

Determine nesting intensity at all nesting sites so that it becomes possible to:

- Classify nesting sites as Primary, Secondary, or Tertiary [High, Medium, Low], according to nest density
- Classify nesting sites according to human accessibility to sites
- Select “Index Beaches.” Criteria for selection of Index Beaches may vary. One favored method is to select Primary beaches with adequate accessibility that will allow or has allowed long term monitoring.

Objective 2: Locate all marine turtle foraging sites

Locate major feeding sites for each species, recording geographic coordinates for each site.

Identify source populations contributing to each foraging assemblage

Determine marine turtle abundance at feeding sites for each species/population

Classify sites as Primary, Secondary, or Tertiary for each species, based on the size of the foraging aggregation with respect to the known total

abundance of the species in the nation and region

Characterize feeding habitats by:

- Food type and abundance
- Quality of the environment
- Level of threats
- Size (e.g., square meters, hectares)
- Identify formerly utilized feeding sites for each species, if information is available.

Identify level of human impact

Objective 3: Locate marine turtle migratory routes

Using remote sensing techniques (e.g., satellite tracking) to evaluate whether marine turtles utilize specific oceanic corridors during juvenile or adult (e.g. pre- or post-nesting) life stages

Identify species/populations that utilize specific routes or corridors

Assess any threats (e.g., commercial fishing, shipping) affecting these routes

Objective 4: Locate mating sites

Locate major mating sites for each marine turtle species

Identify source populations at each mating site

Determine seasonality and abundance at mating sites for each species/population

Classify sites as Primary, Secondary, or Tertiary for each species

Characterize mating sites by:

- Quality
- Level of threats
- Size (e.g., square meters, hectares)

Identify historically utilized mating sites for each species

Identify level of human impact

Objective 5: Locate developmental habitats

Locate major developmental sites/habitats for marine turtles

Identify source populations at each developmental site

Determine seasonality and abundance at feeding sites for each species/population

Classify sites as Primary, Secondary, or Tertiary for each species

Characterize developmental habitats by:

- Food type and abundance
- Quality
- Level of threats
- Size (e.g., square meters, hectares)

Identify historically utilized developmental sites for each species, if possible

Identify level of human impact

Goal 2: To achieve sound management of the marine turtle resource by determining the current status of marine turtle populations

Objective 1: Determine the current status of all populations with a procedure that is congruent with the biological characteristics of the species, and which includes measures of trends in both nesting and foraging habitats

Determine demographic trends for each population using statistically robust procedures over biologically relevant time frames (typically 5-10 year time-series; see "Monitoring Population Trends" Working Group recommendations, this volume)

Take regional and global species-specific trends into consideration

Consider the amount of variability in the demographic trends of the various populations

Using statistically robust procedures, determine population trends as a function of changes in:

- Number of nests/year at Index Beaches, standardized for monitoring effort
- Number of turtles at foraging sites, standardized for monitoring effort

Quality and size of nesting and foraging habitats

Register the magnitude and persistence of known threats; identify gaps in knowledge

Deduce changes in abundance from historical records (changes in relative abundance can be inferred from some historical records, such as national fisheries or trade statistics)

Realize that an accurate assessment of a population trend must consider trend measurements from the full area of the population's distribution (i.e., complete range). If variation in trends is observable within the region, the more common or prevalent trend can be used as a measure for the overall (regional-level) trend

Derive population "status" (as distinct from a "trend," which can be evaluated over a shorter time frame) from trend measurements (whether observed, estimated or inferred) taken from the population's full range for a period of at least 2 generations. Thus "status" becomes a biologically meaningful classification congruent with criteria used internationally (i.e., IUCN)

Chairman's comments: The Working Group voiced an interest in measuring and achieving the "recovery" of marine turtle populations. Unfortunately, there was insufficient time to explore this interest. The Group also noted the difficulty in defining "recovery" in terms and parameters that would be meaningful to resource managers.

Monitoring Population Trends

Rhema Kerr Bjorkland, Working Group Chair
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Goal 1: To achieve sound management of the marine turtle resource by monitoring population trends, and incorporating that information into decision-making

The Group laid a foundation for their discussion by defining “trend” as “a change in abundance over time,” and then agreed that trends could be deduced from three primary sources: nesting beaches, foraging grounds, and markets. The Group agreed to limit its recommendations to monitoring nesting beaches and foraging grounds, but noted that useful information could be obtained from market data as long as Catch Per Unit Effort (CPUE) was quantified (i.e., if fewer and fewer and/or smaller and smaller turtles are landed *with the same effort*, then a decline in the fished population could be inferred).

The balance of the Group’s time was spent discussing monitoring trends in nesting populations and foraging assemblages. The Group recognized that:

- For practical purposes the management unit at the national level should be the assemblage of turtles occurring in a nation’s waters and/or on its beaches, but, due to the migratory nature of marine turtles, local trends may be the result of adequate or inadequate management practices on the part of several range state nations.

- Nesting beaches and foraging grounds should be monitored independently. A statistically significant trend at an Index Beach relates to that segment of the adult population utilizing the monitored habitat but may not, for example, relate to mixed-stock foraging assemblages offshore.

- Information-sharing should be a priority. A mechanism to collate and link information pertinent to a particular population would be very useful and would require long-term collaboration

between Nation A (where gravid females nest), Nations B, C, and D (where adults forage during off-breeding years), and Nations E, F, G, and H (where the juveniles spend their developmental years).

Objective 1: Monitor trends on nesting beaches

Select Index Beaches for intensive monitoring, realizing that monitoring every nesting beach is neither possible nor necessary. Index Beaches should:

- include beaches with the highest nest density, if possible
- encompass a majority of known nesting for each species of management concern
- be predictably accessible by researchers

Collect baseline data by measuring:

- Absolute Abundance — determine absolute abundance by counting every animal, year after year, by making use of saturation tagging protocols; or
- Indices of Abundance - determine an index of abundance by making use of statistically viable sampling protocols (e.g., estimating the annual number of nesting females by counting nests or crawls; inferring national trends by monitoring selected Index Beaches)

Collect baseline data for a minimum of 3 multiples of the average remigration interval (ARI) or at least 5 years, whichever is longer. Based on published remigration intervals determined from long-term tagging programs in the Caribbean basin, the following minimum monitoring intervals were recommended:

- *Lepidochelys*: 5 yr, based ARI of 1.5 yr (Rancho Nuevo, México)
- *Eretmochelys*: 8 yr, based on ARI of 2.7 yr

(Jumby Bay, Antigua)

- *Caretta*: 8 yr, based on ARI of 2.5 yr (Georgia, USA)
- *Dermochelys*: 8 yr, based on ARI 2.5 yr (St. Croix, USVI)
- *Chelonia*: 10 yr, based on ARI of 3.2 yr (Tortuguero, Costa Rica)

Continue monitoring until a *statistically significant* change in abundance is detected or until population stability is demonstrated; for small populations this may be *considerably longer* (for purely mathematical reasons) than the minimum intervals defined above

Recognize that trends are not predictive, rather they simply define with a selected degree of mathematical precision that there has been a “change in abundance over time” and that its direction is negative or positive

Objective 2: Monitor trends in foraging grounds

Sample seasonally during the first year to determine when and where the turtles are present and accessible for long-term monitoring

Select Index Foraging Grounds for intensive monitoring, realizing that monitoring every foraging area is neither possible nor necessary. Index sites should:

- include areas where turtles are found in the highest density (to maximize encounters and facilitate statistical analysis)
- encompass a majority of known foraging turtles for each species of management concern

- be predictably accessible by researchers

Develop a census protocol consistent both in its methodology (e.g., study site, net size and type, capture technique, transect(s), reporting) and timing (e.g., time of day, seasonality, repetition)

Collect baseline data for a minimum period of 5 years, relying on standard protocols (e.g., CPUE, capture-mark-recapture, transect) associated with tracking Indices of Abundance; assume that measuring Absolute Abundance is impossible

Continue monitoring until a *statistically significant* change in abundance is detected (or until population stability is demonstrated with statistical precision); for small sample sizes this may be *considerably longer* than 5 years ... a “trend” has to be both measurable and statistically significant

Recognize that trends are not predictive, they simply define with a selected degree of mathematical precision that there has been a “change in abundance over time” and that its direction is negative or positive

Chairman’s comments: The Working Group voiced interest in evaluating the extent to which intensive monitoring at 1-5 Index Beaches (or Index Foraging Grounds) - with the exact number of monitored sites depending on the size of the country and the geographic distribution of critical habitat - could sufficiently address management questions at the national level, thereby saving duplicative monitoring effort. There was insufficient time to discuss this topic. A literature search for relevant information was suggested.

Promoting Public Awareness and Participation

*Crispin d’Auvergne, Working Group Chair
Ministry of Finance and Planning
St. Lucia*

Goal 1: To achieve sound management of the marine turtle resource by obtaining stakeholder participation through a process of awareness building, education and changes in behaviour

In order to reach the goal, the Group recognized the need to:

Understand the relationship between awareness, education and participation

Understand the objectives of awareness and participation

Work within existing national legal, institutional and socio-economic contexts

Objective 1: Develop, strengthen, and utilize mechanisms for public participation

Clearly identify target and stakeholder groups, and stakes

Determine the socio-economic importance or value of the resource to the various stakeholders, including communities and nations

Identify economic alternatives (options) in a collaborative manner; such alternatives might include activities totally divorced from the resource, as well as those involving non-consumptive or

more sustainable consumptive use of the resource

Develop comprehensive medium- and long-term marine turtle public awareness programmes focused on the respective stakeholder groups

Coordinate and harmonize policies and activities of the relevant sectors, including Governmental and non-governmental

Incorporate marine turtle (and general marine) education into the school curriculum

Identify, strengthen, establish, and maintain mechanisms for the exchange of experiences, information and collaboration (including the Internet and field visits) using various sectors of society

Determine ways in which programme success can be measured and evaluated

Identify funding sources and develop funding strategies consistent with specific program objectives

Chairman’s comments: Nelson Andrade noted that UNEP has established a WebSite for the exchange of information on Caribbean Marine Protected Areas. This site, known as CAMPAM Corner (www.cep.unep.org), could serve as a means of exchanging information.

Reducing Threats at Nesting Beaches

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Goal 1: To achieve sound management of the marine turtle resource by improving nesting and hatch success, and maximizing the number of hatchlings that successfully reach the sea

In order to reach the goal, the Group recognized the need to:

Identify threats through assessments, research, and the exchange of information

Consider threats not only to nesting beaches (habitat), but also to nests (eggs), hatchlings, and nesting females

Identify, characterize, and rank threats, giving priority management attention to those with the greatest potential to negatively affect the status of local breeding assemblages

Objective 1: Eliminate illegal poaching of eggs and nesting females

Improve the effectiveness of law enforcement

Promote and facilitate community involvement

Design and implement public education campaigns

Work with stakeholders to develop and encourage economic alternatives

Establish protected units/areas

Objective 2: Control beach sand mining

Assess the extent of beach sand mining and monitor mining activity

Establish areas where no beach sand mining is allowed

Require and enforce permits for mining activities (work with local government)

Strengthen (or adopt) relevant laws and improve the effectiveness of law enforcement

Identify alternative sand sites/sources

Design and implement public education campaigns

Emphasize inter-agency coordination

Objective 3: Minimize egg depredation using the least manipulative strategy

Evaluate the effectiveness of nest cages and/or nest screens, using standard techniques

Evaluate the effectiveness of nest relocation, both *in situ* and hatchery, using standard techniques

Consider predator control, taking care to consider the broader ecological consequences of predator removal

Objective 4: Eliminate (or reduce to non-threatening levels) artificial beach lighting

Using standard techniques, shade or redirect beachfront lights that cannot be turned-off during peak nesting and hatching seasons

Consider beachfront lighting issues during permit and approval stages for new construction at known nesting beaches

Adopt local lighting ordinances obligating landowners to ensure that lighting associated with built structures at known nesting beaches does not interfere with nesting or hatching activity

Design and implement public education campaigns

Organize hatchling rescues (with immediate release) as a temporary measure, while implementing the above actions

Objective 5: Prohibit beach stabilization structures (e.g., seawalls, groynes)

Strengthen (or adopt) relevant laws and improve the effectiveness of law enforcement

Design and implement public education campaigns

Consider alternatives to hard-engineering stabilization options

Objective 6: Manage human activities during the nesting season

Design and implement public education campaigns

Strengthen (or adopt) relevant legislation
Ensure that nesting turtles have access to suitable habitat by removing beach “stuff” (tables, chairs, temporary structures, recreational equipment, etc.) at night during peak nesting and hatching seasons

Develop and implement a beach zonation system to ensure that primary nesting habitat is protected to the maximum extent possible in areas of high human use, especially during peak nesting and hatching seasons

Consider organized and guided public “turtle watches,” using standard guidelines concerning the number of people per group, restrictions on lighting, and training for guides

Emphasize the collection or other management of waste generated at beach sites

Strictly regulate the use of vehicles on nesting beaches during peak nesting and hatching seasons

Objective 7: Control (manage) beach rebuilding and renourishment activities

Strengthen (or adopt) relevant legislation and improve the effectiveness of law enforcement

Design and implement public education campaigns
Enact restrictions on rebuilding and renourishment activity during nesting season

- ensure enforcement of restrictions
- ensure sand compatibility (sand characteristics) and other relevant technical requirements

Objective 8: Reduce beach debris

Undertake regular beach clean-ups

Utilize volunteers, NGO partners, and/or government agency programs

Eliminate or reduce the source of the debris problem

Design and implement public education campaigns on proper waste disposal, including the health and ecological consequences of litter

Promote inter-agency collaboration and cooperation

Encourage the media to become involved

Objective 9: Regulate coastal construction of buildings and infrastructure

Establish protected units/areas

Promote inter-agency coordination

Implement building setbacks (minimum distance requirements between buildings and the high water mark)

Strengthen (or adopt) legislation to preserve dunes and protect natural beach vegetation that serves to stabilize the beach

Review current legislation to ensure adequacy (types of structures permitted, size/density, zoning, timing, disposal of construction waste, etc.)

Improve the effectiveness of law enforcement and monitoring for violations

Design and implement public education campaigns

Objective 10: Control chemical/sewage/oil contamination

Strengthen (or adopt) and enforce specific legislation (domestic and international) for point and non-point source pollution (e.g., pesticide/herbicide management; oil use, disposal, exploration, and transport; upland runoff)

Design and implement public education campaigns

Improve the effectiveness of law enforcement

Emphasize adequate (and accessible) sewage treatment

Enact and publicize emergency response plans

Require clean-up/compensation by the responsible (polluting) party

Prohibit activities that are likely to result in contamination from occurring in or near sensitive areas, including known marine turtle nesting beaches

Objective 11: Reduce, to the extent possible, the negative effects of natural disasters/phenomena

Establish protocols for relocating unquestionably “doomed” clutches, such as eggs laid in well documented high-risk erosion zones

Adopt emergency plans for post-disaster responses to devastating episodic events

Recognize that some “natural” phenomena result directly or indirectly from improper water/land management practices

Adopt relevant legislation or other controls to minimize the damage

Chairman's comments: The Working Group voiced concern regarding threats in nearshore marine habitats adjacent to nesting beaches; these might include fishing activities (trawls, nets, seines), recreational activities (boating, jet skis),

sources of pollution, and other disturbances. There was insufficient time to explore this concern. The Working Group recommended that actions to be taken within countries (as well as regionally) should be prioritized, and that priority ranking should take "feasibility" into consideration.

Reducing Threats on Foraging Grounds and Inter-Nesting Habitats

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Goal 1: To achieve sound management of the marine turtle resource by maintaining, improving or restoring foraging and inter-nesting habitats

Objective 1: Map past and present quantitative and qualitative status and extent of foraging habitats

Objective 2: Identify, characterize and rank (as to their impact on local populations) present and potential threats to each foraging area

Objective 3: Develop and incorporate marine turtle habitat management plans as part of national Integrated Coastal Zone Management (ICZM) plans

Objective 4: Promote regional cooperation in managing critical habitats

Actions to be taken:

- Implement relevant portions of ICZMs

Goal 2: To achieve sound management of the marine turtle resource by minimizing threats to marine turtles on foraging grounds and inter-nesting habitats

Objective 1: Identify and rank present and potential threats to marine turtles on foraging grounds

Objective 2: Design and implement management plans to mitigate priority threats

Actions to be taken:

- Assemble and review existing information, nationally and regionally
- Identify information gaps and initiate efforts to acquire the necessary data
- Develop criteria to rank threats on foraging grounds and inter-nesting habitats
- Design and implement monitoring protocols to evaluate the result(s) of management actions

Chairman's comments:

The Group agreed to the following general recommendations:

Review legislation and law enforcement for adequacy and gaps

Incorporate useful program elements from the recommendations of Working Group IV (“Reducing Threats at Nesting Beaches”), since many coastal zone threats affect both sandy beaches and nearshore foraging grounds

The Group recognized the importance of reducing threats along migratory routes. There was insufficient time to discuss recommendations in this regard, but the Group felt the topic should be tackled separately and should include concern about the incidental capture of marine turtles in national waters and on the high seas.

Strengthening the Regulatory Framework

Jeffrey Sybesma, Working Group Chair
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Goal 1: To achieve sound management of the marine turtle resource by strengthening the regulatory framework at all levels

Objective 1: Strengthen the regional (international) regulatory framework

Stimulate and promote, on a practical level, cooperation among nations

Harmonize national regulatory frameworks for the protection and management of the natural environment, in particular marine turtles

Ensure that national obligations under international treaties and agreements are met on a timely and ongoing basis

Objective 2: Strengthen the national regulatory framework

Review existing legislation and regulations, identify gaps

Strengthen the national legislative framework by using the best available scientific knowledge and taking into consideration: stakeholders, enforcement capacity, public education, international and regional obligations, financial mechanisms, and existing laws pertaining to the conservation and management of marine turtles

Objective 3: Ensure public participation in the regulatory process

Design and implement public education campaigns

Ensure continuous education to all sectors and stakeholders, relative to the provisions and obligations of environmental legislation