



FIVE: foraging and behavioural plasticity

Task group planning:

Task group 5	Foraging and behavioural plasticity
Task group leader	Bryan Wallace
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Task group members (email in parentheses afterwards please)	Lucy Hawkes (lhawkes@wwfca.org) Clive McMahon Nadia Bood Cathi Campbell Steve Cornelius Michael Coyne (mcoyne@seaturtle.org) Eduardo Cuevas Milani Chaloupka Carlos Drews Scott Eckert (seckert@widecast.org) Marah Hardt (mhardt@blueocean.org) Alfonso Lombana Neca Marcovaldi Nicholas Mrosovsky David Owens Robert van Dam (rpvandam@yahoo.com) Matthew Witt
Task group aims	<ol style="list-style-type: none">i) To understand the characteristics of hawksbill habitat selection, of hawksbill foraging habitat, and the regional role of key foraging sitesii) To understand the varying quality of prey in identified foraging habitats and how prey might be affected by climate changeiii) To understand the dietary breadth and plasticity of foraging in hawksbills
Task group missions	<ol style="list-style-type: none">I. To help identify, to the finest resolution possible, existing turtle foraging sites across the Caribbean, toward finalising the atlas of foraging sites currently being produced by the WIDECAST network

2. To conduct a meta-analysis of in-water surveys and satellite tracking to characterise turtle foraging habitat by forage composition (a correlative study)
3. To catalogue the current state of reef health as pertinent to hawksbill prey resources
4. To model the change in home range with climate change in terms of loss of suitable habitat
5. To quantify the effect of increased temperatures on turtle physiology and fitness
6. To investigate dietary breadth / foraging plasticity using stable isotope studies, with appropriate standardised protocols for sample collection
7. To investigate the effect of surface currents on existing foraging habitat quality
8. To investigate the dispersal of hatchlings by surface currents, with implications for duration and location of the oceanic phase under climate change scenarios
9. To assess the quality of epipelagic forage
10. To catalogue the genetic structure of foraging stocks in collaboration with task group 2

Potential partner / data source	Location (Please complete)	Contact (please complete)
1	Cross Caribbean	WIDECAST
2	Cross Caribbean (global)	SWOT (The State of the World's Sea Turtles)
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I. Introduction

I.1 Group outputs

- 1) Summary of existing information on hawksbill foraging areas in the Caribbean.
 - a. completion of WIDECAST foraging site atlas
 - b. synthesis of published literature (known foraging sites; age/size classes of turtles present, their growth rates; habitat characteristics, e.g. prey types present; other relevant information to qualitatively characterize quality of foraging grounds)
 - c. incorporate information on effects of climate change on coral reef habitat, as well as information on sponge-coral reef community dynamics (w/ implications for future climate change scenarios)
- 2) Map of known hawksbill nesting sites, distributions, foraging sites, and bottom types to assess putative foraging sites relative to hawksbill stocks
 - a. obtain data layer for bottom type (especially distribution of reef habitat)
 - b. construct data layer for nesting sites (WIDECAST, SWOT)
 - c. construct data layer for distributions, including foraging sites (see output 1)
- 3) Biophysical model of hawksbill physiology with respect to water temperatures from literature-derived assumptions and new empirical data
 - a. literature review of hawksbill physiology (or similar topics for related species)

- b. construct heuristic biophysical model to estimate physiological effects (e.g. metabolic rates, digestion, growth) of water temperature changes
 - c. laboratory measurements of growth rates, digestion, and metabolic rates under different water temperature regimes
 - d. empirical body temperature measurements of free-swimming hawksbills w/ concomitant water temperature measurements to record preferred water temps and resulting body temps to test model
- 4) Determine dietary breadth using stable isotope analyses and diet compositions
- a. review of hawksbill dietary composition (Anne Meylan's work) to create hypothetical baseline for isotope analyses and future dietary studies
 - b. samples of putative prey types as well as hawksbill tissues for stable isotope analyses

1.2 Special requirements

None at this time.

1.3 Management and technical constraints

Availability of information; collection of new data; sampling of habitat, prey, turtles, etc.

2. Project estimates

2.1 Previous known work

WIDECASST is currently compiling its hawksbill foraging ground atlas; several published papers and ongoing in-water studies exist.

2.2 Cost, effort and time estimates

This task group will require some time for collation of existing literature into databases for all potential outputs. For 1) support for WIDECASST's ongoing effort is necessary. For 2) generation of maps dependent upon acquiring existing data layers and constructing new data layers. For 3) proper laboratory setup necessary for water temperature-physiology experiments, as well as data logging instrumentation for recording of dive parameters and body temperatures. For 4) collection of prey and turtle samples, as well as support for mass spectrometry analyses necessary.

2.3 Are you aware of any ongoing funding for this work?

Not aware of any funding, apart from WIDECASST has already for its current work.

2.4 Project resources required

See above.

3. Risk assessment

3.1 Project risks, probability and impact

- 1) no risks, probability and impact very high.
- 2) no risks, probability and impact very high.
- 3) risks relatively high due to handling, husbandry (for lab experiments), and manipulation (via instrumentation) of animals. Probability contingent upon acquisition of resources (money and persons). Impact high.
- 4) risks relatively low, including only those incurred during relatively non-invasive tissue sampling of turtles. Probability contingent upon acquisition of resources (money and persons) and samples. Impact high.

3.2 Risk mitigation

3) Consultation with experienced researchers and execution of laboratory and fieldwork done in accordance with advice and under supervision of experienced researchers. All work under appropriate animal care and use protocols. Several task group members have experience in instrument attachment methodologies.

4) Consultation with experienced researchers and execution of laboratory and fieldwork done in accordance with advice and under supervision of experienced researchers. All work under appropriate animal care and use protocols. Several task group members have experience with tissue sampling; Wallace has experience with stable isotope methodology.

4. Project schedule

4.1 A framework of activities and tasks for this task group are shown on the next page.

4.2 Project task dependencies

4.3 Timeline for project outputs

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Activities	Project Outputs	Indicator	Baseline Value	Predicted Value Project Output
Collate and review all existing deployments of satellite transmitters on hawksbill turtles in the Caribbean	Searchable Excel database			Allows for progress towards state of knowledge to be addressed
Collate and review all existing in-water surveys for hawksbill turtles in the Caribbean	Searchable Excel database			
Catalogue reef health for the Caribbean	GIS layers with sampled reef sites for health	COMPLETED (Reefs at risk project)	COMPLETED (Reefs at risk project)	
Extract from 1 and 2 foraging location environmental parameters and habitat types	Data layers and GIS products; interactive, searchable web-based product			
Overlay nesting sites, distributions, foraging sites on habitat types	Data layers and GIS products; interactive, searchable web-based product			
Collate and review all existing information on hawksbill physiology with respect to thermoregulation, growth rates, metabolic rates	Biophysical model of temperature-dependent physiology responses of hawksbills to water temperature variation			
Stable isotope study of juvenile and adult hawksbills in the Caribbean.	Published study of variety in isotopic variation as compared with other published studies			
Hatchling dispersal models for surface current effects	Published study of hatchling movements	UNDER WAY (Coyne and Blumenthal)	UNDER WAY (Coyne and Blumenthal)	
Model loss of suitable foraging habitat under climate scenarios using results of activity 3 and working with task group 8	Published study of potential habitat loss			

5. Group structure

5.1 Roles in the task group: who is responsible for what?*

5.2 How will you coordinate this group?

5.3 Mechanisms for reporting and communication (how will group members report to you and how often can you communicate this back to the initiative (as coordinated by Lucy))*

6. Monitoring

6.1 How do you propose to monitor progress?

6.2 Can you propose some indicators of progress (milestones for achievements of the various missions)?

7. Appendix

Supplementary information here

Other important information you feel needs to be communicated*93

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