WWF-Guianas

REGIONAL SEA TURTLE CONSERVATION PROGRAM AND ACTION PLAN FOR THE GUIANAS

2003

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For bibliographic purposes this document may be cited as:
Reichart, Henri, Laurent Kelle, Luc Laurent, Hanny L. van de Lande, Rickford Archer, Reuben Charles and René Lieveld. 2003. Regional Sea Turtle Conservation Program and Action Plan for the Guianas (Karen L. Eckert and Michelet Fontaine, Editors). World Wildlife Fund – Guianas Forests and Environmental Conservation Project, Paramaribo. WWF technical report no. GFECP#10. 85 pp.

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WWF-Guianas

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This report was commissioned by World Wildlife Fund – Guianas Forests and Environmental Conservation Project (WWF Guianas) in November 1999.

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PREFACE

The need for a regional approach to sea turtle conservation has long been evident within the countries of the Guayana Shield region. The original idea for a regional strategy was proposed by the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) and WWF-France. It was stimulated by STINASU and the Biotopic Foundation, who jointly organized the first two regional symposia held in Paramaribo, Suriname in 1997 and 1998 with WWF funding. During the 1999 nesting season, WWF-Guianas initiated the first concrete step toward the development of the program by developing a Concept Paper for a Regional Sea Turtle Conservation Program. At the Third Annual Regional Sea Turtle Conservation Symposium (Mana, French Guiana, July 1999), hosted by Diren-Guyane, the Amana Nature Reserve, Kulalasi and WWF, key stakeholder groups agreed to participate in the development of this regional program.

In November 1999, WWF-Guianas commissioned the development of the *Regional Sea Turtle Conservation Strategy and Action Plan for the Guianas*. This Action Plan, prepared by a team of specialists hired by WWF-Guianas, is the output of multiple consultations with and review by key stake-holder groups, as well as discussions and recommendations from the fourth Regional Symposium in Georgetown in August 2000, during which a one-day review of the draft document took place. The Action Plan represents the first-ever regional assessment of sea turtle populations in the Guianas, the threats facing them, the institutional capacity of key national or regional organizations involved in their conservation, the needs of the affected local communities, and the issues and concerns raised by these stakeholders.

In March 2001, WWF-Guianas acquired the services of WIDECAST to assist with the scientific peer-review of the document. Under the guidance of the WIDECAST Executive Director, sea turtle specialists from the Wider Caribbean Region reviewed the document and providing invaluable comments, which were then incorporated into the document with the assistance of the Editor and senior authors. In February 2002, the final version was sent to the governmental authorities in the three Guianas and the authors for final review and approval.

WWF-Guianas looks forward to this document being instrumental in the harmonization and effective coordination of sea turtle research, management and conservation activities in the Guianas. The Action Plan will also serve as a practical tool for the development of sea turtle conservation projects and proposals for direct implementation and fundraising by local communities, national institutions, government agencies and scientific and research institutions. Finally, it will assist the donor community in proposal review and funding allocation for research, management and conservation projects benefiting the shared sea turtle populations of the Guianas.

ACKNOWLEDGEMENTS

The Director of WWF-Guianas, the authors and Editor would like to express their thanks and gratitude to all of the individuals active in sea turtle research, management and conservation in the Guianas for their inputs and contributions to the development of this program. In particular, we are grateful to the Chiefs of the coastal villages (Captain Ricardo Pane of Christiaankondre, Captain Ramses Kajoeramari of Langamankondre, and Daniel William, Chief of Yalimapo) for welcoming biologists and conservationists into their traditional territories and for their important contributions to the search for compromises between traditional resource use and conservation. We would also like to recognize the many community conservation organizations for their efforts and support, including Kulalasi, Sepanguy, Stidunal, and the Santa Rosa Conservation Club.

For information pertaining to French Guiana, the authors were assisted by friends and colleagues at DIREN, Université Paris-Sud (France), ONCFS, Kwata, CEPE/CNRS, WWF-France, and many others. Similarly, in Suriname the authors are grateful to the staff and directors of Stinasu, Nature Conservation Division, the National Zoological Collection of the University of Suriname, Biotopic, and others. Finally, in Guyana the assessment could not have been undertaken without collaboration from the Guyana Marine Turtle Conservation Society, EPA, and various organizations representing indigenous people (e.g. APA, GOIP, TAMOG). Colleagues in Trinidad and Tobago (e.g. Fisheries Division, Ministry of Agriculture, Land and Marine Resources; Nature Seekers) also contributed, as did colleagues from Venezuela and Brazil. At WWF-Guianas, Arnoud Schouten reviewed and strengthened many early drafts, and Gerold Zondervan, Patrick Williams, Hubert Geraux, Hortence Taylor, Edith McClintock, Bernard Cressens, and Angela Roemer are thanked for their guidance and assistance during the document development phases. Several professional colleagues peer–reviewed the report, including Scott A. Eckert (WIDECAST), Marc Girondot (Université Paris-Sud, France), Hedelvy J. Guada (Centro de Investigacion y Conservacion de Tortugas Marinas-CICTMAR, Venezuela), Maria Marcovaldi (Proyeto TAMAR, Brazil), John Mitchell (NOAA National Marine Fisheries Service, USA), Colum Muccio (ARCAS, Guatemala), and Peter C. H. Pritchard (Chelonian Research Institute, USA). Their comments contributed significantly to the document. Sea turtle managers, biologists and conservationists throughout the world owe a debt of gratitude to the pioneers in sea turtle conservation in the Guianas: Joop Schulz, Louis Autar, Jacques Fretey, Peter Pritchard and Daniel William. These men, who have served as friends, colleagues and mentors to so many, have laid the basis for sea turtle conservation throughout the Guianas and have inspired the new generation.

Finally, we are grateful to all professional and volunteer staff who have worked and/or who are currently working in the field throughout these many years. Without their efforts, the sustainable management and long-term conservation of the shared populations of sea turtles inhabiting the Guayana Shield Region would not be possible. And we dedicate this Action Plan to the children of the future, in the hopes that we will succeed in leaving them a planet that is rich in wild species … and therefore rich in economic and ecological potential.

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1 INTRODUCTION AND SUMMARY

1.1 ENGLISH

Sea turtles are an important natural resource shared by the countries of the Guayana Shield region, which encompasses the nations of Venezuela, Guyana, Suriname, La Guyane and Brazil. Five species nest on the region's beaches and pass through or reside in its jurisdictional waters. These are the leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), olive ridley (*Lepidochelys olivacea*), hawksbill (*Eretmochelys imbricata*), and loggerhead (*Caretta caretta*) sea turtles. This document focuses specifically on recommendations for collaborative management and conservation of sea turtle populations shared by the Guianas; namely Guyana, Suriname and La Guyane.

The Guianas have historically lacked regional tools to collaboratively manage the sea turtle resource. As a result of this, up to 1999, governments have approached sea turtle conservation largely unilaterally, as though populations were separate, national populations. This despite the fact that resource managers and policy-makers have long known that some, if not all, locally occurring aggregations are part of larger regional populations sometimes spanning the entire Wider Caribbean and/or Greater Atlantic basins. Tag returns (i.e., tags applied in one location and later recovered from a distant locale) clearly demonstrate that several species are long-distance migrants, ranging far beyond the Guayana Shield region, making accession to and compliance with pertinent international treaties a necessary component of a successful conservation strategy.

Today it is widely recognized that the scope of sea turtle conservation must be multilateral in order to be effective, requiring regional tools that emphasize a close cooperation among stakeholders within and among range states (Eckert, 1995; Eckert, 1999; Eckert and Abreu-Grobois, 2001). An integrated regional sea turtle conservation program and strategy, developed with the active participation of key stakeholder groups, including relevant government authorities, NGOs, private sectors and local communities, became imperative for the Guianas.

For a successful regional conservation program, managers must contend with issues related to two radically different but equally important critical habitats - the ocean and the nesting beach - as well as with the views of citizens, in particular local communities and the fishery sector, who may see some management decisions as counterproductive to their interests and/or traditions. In the past, the result has often been confusion. Sometimes serious conflicts have arisen between resource management agencies, local inhabitants, and other direct or indirect users or uses (such as fisheries or ecotourism).

This Regional Sea Turtle Conservation Program and Action Plan (hereafter, the Action Plan) aims at lending impetus to action at all levels: local, national, regional (tri-national) and international. It builds on previous and current conservation efforts in each of the three Guianas, including research, conservation, and management initiatives presently sponsored, funded and/or implemented by Governments, inter-national organizations, academia and research institutions, NGOs, and indigenous communities.

While realizing that most conservation and management action will continue to be undertaken at local and national levels, this Action Plan provides a framework for integrated and harmonized scientific initiatives (including research and monitoring), conservation and public awareness campaigns, and collaboration among local, national and regional entities involved in sea turtles in the Guianas. Specifically it aims to promote best practices, encourage broad public participation, enhance the working relationship between

conservation and scientific entities, strengthen the regulatory framework, and achieve measurable sea turtle conservation and management results.

The WWF / IUCN Marine Policy has identified "meeting the needs of threatened and endangered species is an important part of the ecosystem approach to marine conservation." Under this joint policy, key priority actions proposed for their conservation and recovery are to:

- Support the preparation and implementation of Action and Recovery Plans;
- Reduce exploitation by demonstrating and promoting truly sustainable use;
- Reduce exploitation by monitoring and regulating international trade; and
- Improve the understanding of, and work to mitigate the impact of threats such as commercial fisheries and pollution from toxic chemicals.

Recognizing the fact that migratory species like sea turtles often live beyond any one nation's jurisdiction and are not sufficiently protected by any one nation's laws, WWF's Strategy for the conservation of these endangered migratory species seeks, among other aspects, to secure both effective national laws and international agreements.

1.1 Goal and Objectives

Goal:

Prevent the extinction and promote the sustained survival, at healthy ecological levels, of shared populations of sea turtles in the Guianas.

Overall Objective:

Implement an integrated, comprehensive and long-term sea turtle conservation, monitoring and research program in the Guianas.

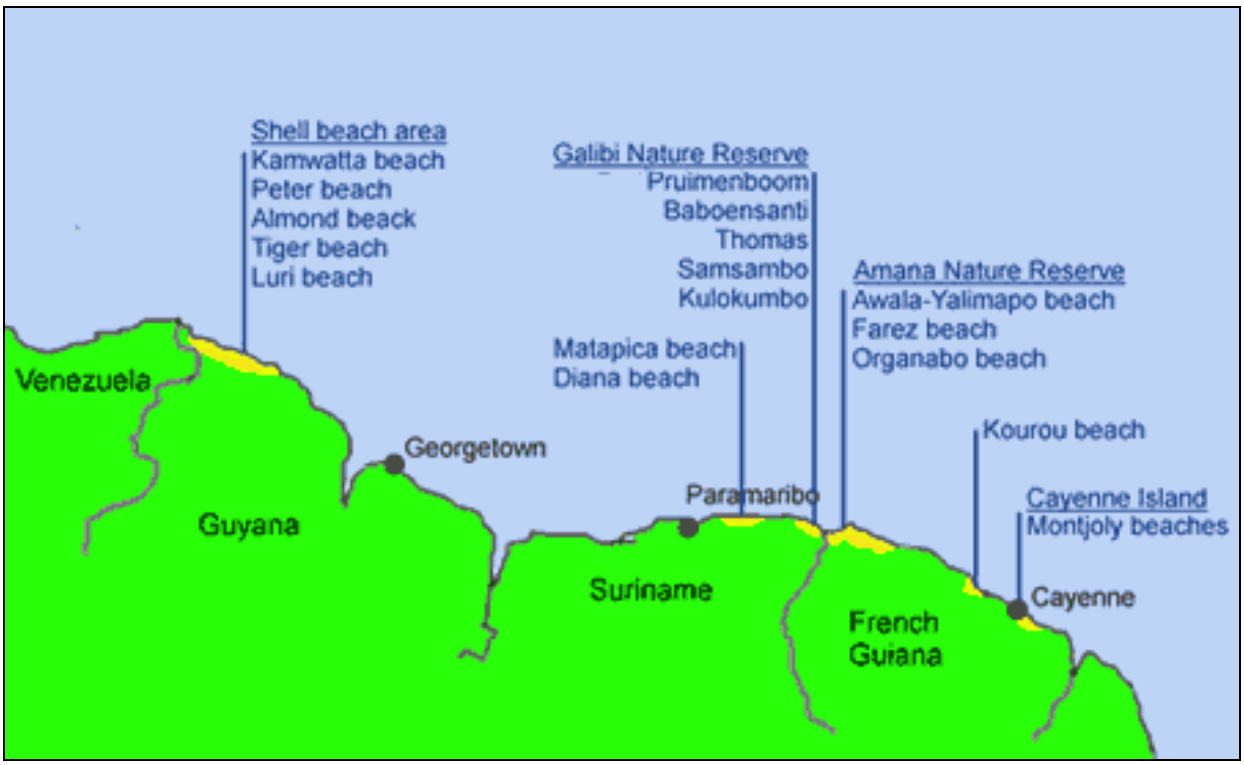
1.2 Background and Rationale

All seven extant species of sea turtles are included on the IUCN Red List of Threatened Animals (Baillie and Groombridge, 1996)[1]. The Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*) turtles are classified as **Critically Endangered,** while the loggerhead (*Caretta caretta*), green (*Chelonia mydas*) and olive ridley (*Lepidochelys olivacea*) turtles are classified as **Endangered**. The flatback turtle *(Natator depressus*), endemic to Australia, is classified as **Vulnerable**. These categories reflect the species' global status, and are based on criteria such as historical and current population levels and trends, extent of occurrence, major threats, and probability of extinction in the wild. For more details, see Baillie and Groombridge (1996) or visit www.redlist.org.

The Guianas provide important nesting and foraging habitat to five sea turtle species. As these populations transcend national boundaries, conservation results can only be achieved by long-term national and regional conservation planning, and by collaboration to establish mutual priorities, emphasize best practices, avoid redundancy and evaluate progress. At this time, only Suriname has completed a comprehensive National Sea Turtle Recovery Action Plan. Developed by the Surinam Forest Service in collaboration with WIDECAST, it was published by the UNEP Caribbean Environment

[1] For details, see Baillie and Groombridge (1996) or visit http://www.redlist.org/

Program in 1993. (Reichart and Fretey, 1993) A comprehensive national sea turtle recovery action plan for Guyana was initiated by WIDECAST-affiliated experts more than more than a decade ago, but this document remains in draft form and has not yet been published. A Sea Turtle Recovery Action Plan for La Guyane is currently being prepared by the DIREN in collaboration with all French stakeholders.



Map: Sea Turtles nesting beaches of the Guianas

Because of their wide-ranging migratory nature, sea turtles require international cooperation to ensure their survival. No systematic attempt at governmental or non-governmental levels has been made until 1999 to integrate and coordinate national conservation agendas throughout the Guianas. The reason was not ill will toward each other, nor reluctance arising from nationalistic concerns, but merely the lack of a suitable framework for cooperation and leadership to coordinate joint conservation activities. Ongoing cooperation spearheaded by WWF, among the three Guianas in recent years, and a successful series of Annual Sea Turtle Conservation Symposia of the Guianas, have shown that regional cooperation is not only feasible, but is strongly supported by stakeholders at all levels.

This Action Plan, which articulates a regional program and strategy for sea turtle conservation, is essential in order to foster sustained cooperation among scientists, NGOs, government agencies, indigenous groups and fishermen. It reflects the expressed needs, aspirations and concerns of key stakeholder groups, and it rests on the formal support and endorsement from the relevant governments. WWF Guianas will provide the initial of financial and technical assistance for its launching and coordination, but full implementation remains the responsibility of all the various stakeholder groups, including the donor community.

This Action Plan provides the framework for a comprehensive and scientifically sound regional sea turtle conservation efforts in the Guianas. Therefore, it is expected that the document will be used by many stakeholder groups for the development of their national and/or site specific program of activities, and their own fund raising efforts, and by other donors for deciding on their funding priorities in the area of sea turtle conservation.

1.3 Conservation Strategy and Action Plan

The impetus for this Action Plan is the fact that sea turtles do not respect political borders. In general they travel widely during juvenile life stages and routinely migrate, as adults, between foraging and nesting grounds that might be separated by hundreds or thousands of kilometers. Collaborative management among range states is essential to their survival. To promote collaborative action, this Action Plan is based on an assessment of sea turtle status throughout the Guianas, the threats facing them, the institutional capacity of key national or regional organizations involved in their conservation, the needs of the affected local communities, and on the issues and concerns raised by a wide diversity of stakeholders.

The key components of this Action Plan are: Monitoring and Research, Direct Conservation Activities, Capacity Building, and Conservation Support Activities defined to include harmonizing legislation and guidelines, enhancing public awareness, facilitating community participation, and promoting regional and international cooperation.

A Monitoring and Research component is essential for a sound sea turtle conservation strategy. To date, these activities have taken place primarily on the nesting beaches. Offshore habitats, in comparison, are poorly known. However, with the increase in fishery activities throughout the region, and the important interaction between fisheries and seas turtles, more attention will be given to identifying and reducing threats caused by this sector. Thus, this program component will address both terrestrial and marine issues. For detailed recommendations, see section 6.1.

To date most Direct Conservation Activities have taken place during the primary nesting season. Only in Suriname does a small, permanent field staff remain on the beaches year-around, but only for facility maintenance and to accommodate visitors. However, since recent data have shown that sea turtle nesting in the Guianas occurs throughout the entire year, it is important that the field stations remain staffed and that the nesting beaches are monitored year-around. Direct Conservation Activities (see section 6.2 for details) reflect currently available information and will be refined as additional information and data are contributed by the Monitoring and Research component.

The Capacity Building component of the Action Plan aims to ensure meaningful and sustained participation in the resource management agenda by stakeholders at all levels. The program will address the needs of both non-governmental and governmental sectors, and recommends institution-strengthening, staff training, and infrastructure improvements, among others. Most of the institutions currently involved in sea turtle conservation have financial, logistic and/ or human resource deficiencies and all may benefit from regional information and personnel exchange programs. See section 6.3 for details.

The success of the regional sea turtle conservation effort will also depend on the implementation of a number of peripheral but important Conservation Support Activities. This program component aims principally to: develop and endorse harmonized legislative and regulatory frameworks for sea turtle conservation in the Guianas; train and support law enforcement personnel/units devoted to environmental regulations; develop and implement well-targeted public awareness programs; develop and implement

environmentally-sound, community-based economic activities; and establish and maintain regional and international cooperation. See section 6.4 for details.

1.4 Expected Outputs and Achievements

- This Regional Sea Turtle Conservation Program and Action Plan is officially endorsed by the relevant authorities in Guyana, Suriname and La Guyane
- Sea turtle conservation activities in the Guianas region are designed and implemented to meet the Goal and the objectives of this Regional Sea Turtle Conservation Strategic Action Plan
- The Regional Sea Turtle Conservation Program and Action Plan is successfully used by most of the stakeholder groups for fund raising activities
- Gaps in country-level research and conservation strategies are identified and addressed
- A harmonized sea turtle research and monitoring program is developed and jointly implemented in the three Guianas
- Critical marine habitats are defined and adequately managed for the benefit of the target species
- All key sea turtle nesting sites in the Guianas are granted protection status by the relevant authorities, and comprehensive plans are developed for their management
- National and regional sea turtle databases are created, maintained, and widely accessible
- A national and regional cadre of sea turtle management and conservation specialists is identified in the three Guianas, to gradually lead the planning and implementation of sea turtle conservation in the region
- Collaboration and involvement of institutions in the Guianas in sea turtle research and monitoring, including activities promoted by international research institutions, are fostered and/ or strengthened
- Harmonized legislative and regulatory frameworks are developed and adopted by the relevant authorities
- Marine fisheries bycatch of sea turtles are significantly reduced and eventually eliminated
- Fishing gear is improved to reduce and eventually eliminate incidental catches of sea turtles, while protecting economic return
- A sea turtle information center or visitor center is developed at each important sea turtle nesting area for which public visitation is a regular occurrence
- Public awareness of sea turtle conservation issues is significantly increased
- Awareness of sea turtle conservation issues among fishermen is significantly increased
- Global awareness of sea turtle conservation issues and their importance in the Guianas is significantly increased
- Members of local communities are actively and increasingly involved in sea turtle conservation
- Local communities are guided to environmentally sound alternative economic activities, such as ecotourism development and management, to decrease pressure on sea turtles and by-products
- Basic and practical ecotourism infrastructure and facilities are promoted and/or built on the appropriate sites
- Production of local handicrafts, especially those related to marine turtle themes, is stimulated and markets successfully promoted
- Illegal take (poaching) of eggs is reduced and eventually eliminated
- Guidelines for sustainable use are formulated (within the allowances of national law)
- Procedures for assisting fishermen whose interests are violated by sea turtles are developed, financed and implemented
- Provide training and transfer skills to local communities to allow them to engage in turtle tourism, e.g. provide training in hospitality, management of lodges and guiding of tourist.

1.2 NEDERLANDS

Zeeschildpadden zijn een belangrijke natuurlijke hulpbron voor de landen in de Guayanashieldregio, te weten Venezuela, Guyana, Suriname, Frans Guiana en Brazilië. Vijf soorten nesten op de stranden en leven in de wateren van deze landen. De lederschildpad (*Dermochelys coriacea*), de groene of soepschildpad (*Chelonia mydas*), de warana (*Lepidochelys olivacea*), de karetschildpad (*Eretmochelys imbricata*), en de dikkopschildpad (*Caretta caretta*). Dit document richt zich specifiek op aanbevelingen voor gezamenlijk beheer en bescherming van de zeeschildpadpopulaties in de Guiana's, te weten Guyana, Suriname en Frans guiana.

Voorheen hadden de Guiana's geen regionale middelen om gezamenlijk beheer van de zeeschildpadden te voeren. Hierdoor hebben de verschillende overheden tot op 1999 de zeeschildpaddenbescherming benaderd als een unilaterale aangelegenheid; alsof de zeeschildpadden in nationale, gescheiden populaties leefden. Dit ondanks het feit dat managers en beleidsmakers al lange tijd weten dat de sommige, zo niet alle, lokale nestaggregaties deel uitmaken van grotere, regionale populaties, die wellicht de Caraïben of het hele Atlantische bassin omvatten. De terugvondsten van tags, die in de Guiana's zijn aangebracht en op verre locaties zijn teruggevonden, geven duidelijk aan dat sommige soorten zeer grote afstanden afleggen, ver buiten de Guianaregio. Dit betekent dat het voor een succesvolle beschermingsstrategie noodzakelijk is om deel uit te maken van ter zake doende internationale verdragen.

Het is nu alom geaccepteerd dat zeeschildpaddenbescherming in een multilateraal kader uitgevoerd moet worden om effectief te zijn. Dit vereist middelen die de samenwerking tussen betrokkenen binnen en tussen de verschillende landen versteken. (Eckert, 1995; Eckert, 1999; Eckert and Abreu-Grobois, 2001). Een geïntegreerd, regionaal zeeschildpadden-beschermingsprogramma, ontwikkeld in actieve samenwerking met belanghebbenden waaronder overheidsorganen en semi- en niet-gouvernementele organisaties, de particuliere sector en lokale gemeenschappen, is daarom een vereiste voor de Guiana's.

Voor het ontwikkelen van een succesvol regionaal programma moeten de beleidsmakers rekening houden met twee zeer verschillende, maar even belangrijke habitats: de oceaan en het neststrand en tevens met de opinies van de bevolking, in het bijzonder de vissers en de lokale gemeenschappen, die bepaalde maatregelen als belemmering kunnen zien voor hun belangen of tradities. Dit heeft in het verleden regelmatig tot verwarrende situaties geleid. Nu en dan zijn er ernstige conflicten ontstaan tussen managers, lokale groeperingen en andere belanghebbenden zoals vissers en ecotoerisme.

Dit regionale zeeschildpaddenbeschermingsprogramma en -actieplan (hierna aangeduid met Actieplan) heeft als doelstelling het geven van een impuls voor activiteiten op alle niveaus: lokaal, nationaal, regionaal (tri-nationaal) en internationaal. Het is gebaseerd op vroegere en huidige beschermingsinspanningen in alle drie de Guiana's, inclusief onderzoeks-, beschermings- en managementinitiatieven, die op dit moment door overheden, internationale organisaties, wetenschappelijke instituten, niet gouvernementele organisaties en lokale organisaties gefinancieerd of uitgevoerd worden.

Dit Actieplan creëert een kader voor geïntegreerde wetenschappelijke initiatieven (inclusief onderzoek en monitoring), beschermings-, voorlichtings- en educatieve campagnes en voor samenwerking tussen lokale, nationale en regionale entiteiten die zich met zeeschildpaddenbescherming in de Guiana's bezighouden. Hierbij wordt in beschouwing genomen dat de meeste beschermings- en beheersmaatregelen geïmplementeerd zullen blijven worden door lokale en nationale organisaties. Dit Actieplan richt zich in het bijzonder op het ontwikkelen van optimale toepassingen, het stimuleren van

brede publieke betrokkenheid, het stimuleren van de relaties tussen beschermings- en wetenschappelijke partijen, het versterken van de regelgeving, en het behalen van meetbare zeeschildpaddenbeschermings- en beheersresultaten.

De 'WWF/IUCN Marine Policy' heeft geformuleerd dat "het beschermen van bedreigde diersoorten een belangrijk aspect is van de ecosysteembenadering van de bescherming van het marine biotoop". Onder deze gemeenschappelijke aanpak kunnen de volgende prioriteiten voor bescherming worden geformuleerd:

- Het ondersteunen van de ontwikkeling en implementatie van actie- en herstelplannen;
- Het verminderen van exploitatie door het stimuleren van duurzaam gebruik;
- Het verminderen van exploitatie door monitoring en het reguleren van internationale handel, en;
- Het verbeteren van het begrip voor, en minimaliseren van, de impact van bedreigingen zoals commerciële visserij en vergiftiging door chemicaliën.

In ogenschouw nemend dat migrerende diersoorten zoals zeeschildpadden meestal onder meerdere nationale jurisdicties vallen en daardoor niet voldoende bescherming genieten door nationale wetgevingen, is het WWF's strategie om bij de bescherming van deze bedreigde migrerende diersoorten onder meer te werken aan het bewerkstelligen van effectieve nationale wetgeving én internationale afspraken.

1.1 Doelstellingen

Doelstelling

Het voorkomen van het uitsterven en het bewerkstelligen van langetermijn-overleving op duurzaam ecologisch niveau, van de zeeschildpadden van de Guiana's.

Overkoepelend streven:

Het uitvoeren van een geïntegreerd en uitgebreid lange-termijnprogramma voor onderzoek, controle en bescherming van zeeschildpadden van de Guiana's.

1.2 Achtergrond en Motief

Alle zeven levende soorten zeeschildpadden zijn opgenomen op de IUCN Rode Lijst voor beschermde diersoorten (Baillie and Groombridge, 1996)[2]. De kemp's ridley (*Lepidochelys kempii*), de karetschildpad en de lederschildpad zijn aangeduid als **Kritiek Bedreigd,** terwijl de dikkopschildpad, de groene schildpad en de warana geclassificeerd zijn als **Bedreigd**. De platrug schildpad *(Natator depressus*), die endemisch is voor Australië, is geclassificeerd als **Kwetsbaar**. Deze classificaties weerspiegelen de wereldwijde status van de soorten en is gebaseerd op criteria zoals historische en huidige populatieschattingen en trends, het verspreidingsgebied, bedreigingen en de kans op het uitsterven in het wild. Voor meer informatie, zie Baillie en Groombridge (1996) of bezoek www.redlist.org .

De Guiana's bieden belangrijke nest- en leefgebieden voor populaties van vijf soorten zeeschildpadden. Omdat deze populaties grensoverschrijdend zijn kunnen er alleen beschermingsresultaten worden behaald door middel van langetermijnplanning van bescherming op nationaal en regionaal niveau, waarbij wordt

[2] Voor details, zie Baillie and Groombridge (1996) of bezoek http://www.redlist.org/

samengewerkt om gezamenlijke prioriteiten en werkwijzen te bepalen, duplicering te voorkomen en voortgang te evalueren. Op dit moment heeft alleen Suriname een Nationaal Zeeschildpadden Actieplan uitgewerkt. Dit is ontwikkeld door de dienst ‘s Lands Bosbeheer en gepubliceerd door het Caribbean Environment Program in 1993. (Reichart en Fretey, 1993) De ontwikkeling van een Nationaal Zeeschildpadden Actieplan voor Guyana is meer dan 10 jaar geleden geïnitieerd door een aan WIDECAST verbonden expert, maar dit plan is nog steeds in ontwerp en moet nog gepubliceerd worden. Een Nationaal Zeeschildpadden Actieplan voor Frans Guiana wordt op dit moment ontwikkeld door Diren, in samenwerking met alle betrokken Franse belanghebbenden.

Gezien het migratiegedrag en ruime areaal van de zeeschildpadden is het nodig om internationaal samen te werken om ze te beschermen. Tot op 1999 zijn er in de Guiana’s geen systematische stappen ondernomen om de nationale agenda’s op het gebied van zeeschildpadden bescherming op elkaar af te stemmen, te coördineren of te integreren. De reden hiervoor was het gebrek aan een kader, het was geen kwade wil of behoudendheid vanwege nationale belangen. De doorlopende samenwerking gedurende de afgelopen jaren, gestimuleerd door WWF, en de succesvolle serie van Regionale Zeeschildpadden Beschermings Symposia voor de Guiana’s hebben aangetoond dat regionale samenwerking niet alleen mogelijk is, maar ook sterk ondersteund wordt door de partners op alle niveaus.

Dit Actieplan, dat een regionaal programma en strategie beschrijft voor de bescherming van zeeschildpadden is van belang voor het stimuleren van duurzame samenwerking tussen wetenschappers, NGO’s, overheidsinstanties, lokale groeperingen en vissersgemeenschappen. Het is een weergave van de uitgesproken behoeften, ambities en zorgen van de belangrijkste belanghebbenden en het is gebaseerd op formele ondersteuning door de betrokken overheidsinstanties. WWF zal zorg dragen voor initiële financiële ondersteuning voor het lanceren en coördineren van het programma, maar de volledige uitvoering is de verantwoordelijkheid van de belanghebbenden, en de donorgemeenschap.

Het Actieplan schept een basis voor een geïntegreerde en wetenschappelijk verantwoorde regionale aanpak van zeeschildpaddenbescherming in de Guiana’s. Het is daarom de verwachting dat de belanghebbenden het document zullen gebruiken voor de ontwikkeling van hun nationale en/of specifieke activiteitenprogramma’s en hun eigen fondsenwerving. Daarnaast kunnen andere donororganisaties het document gebruiken voor het bepalen van hun eigen prioriteiten voor zeeschildpaddenbescherming in de regio.

1.3 Beschermingsstrategie en actieplan

De motor voor dit Actieplan is dat zeeschildpadden de landsgrenzen niet respecteren. In het algemeen migreren ze in hun jonge levenstadia direct ver weg en als volwassenen trekken ze op regelmatige basis tussen hun nest- en leefgebieden heen en weer, die honderden of duidenden kilometers uit elkaar kunnen liggen. Samenwerking in het beheer tussen de staten die hun leefgebied omvatten is daarom een essentieel onderdeel om overleving te garanderen. Om deze samenwerking te stimuleren is dit Actieplan gebaseerd op een inschatting van de zeeschildpaddenpopulaties van de Guiana’s, de bedreigingen, de institutionele capaciteit van nationale en regionale organisaties, die betrokken zijn bij hun bescherming de behoeften van betrokken lokale gemeenschappen en andere kwesties die onder de aandacht zijn gebracht door een grote diversiteit van betrokkenen.

De hoofdonderdelen van het Actieplan zijn: Controle en onderzoek, Directe beschermingsactiviteiten, Capaciteitsversterking en Algemeen beschermingsondersteunende activiteiten, waaronder harmonisering van de wetgeving, het stimuleren van de publieke kennis en belangstelling, het stimuleren van

betrokkenheid van lokale gemeenschappen en het stimuleren van regionale en internationale samenwerking.

Het controle- en onderzoekscomponent is essentieel voor een goedgefundeerde zeeschildpadden-beschermingsstrategie. Tot op heden vinden deze activiteiten voornamelijk plaats op de stranden, terwijl de kennis over de dieren op zee beperkt is. Gezien het feit dat de visserijactiviteiten in de regio toenemen en dat er een belangrijke interactie is tussen zeeschildpadden en deze sector, zal er meer aandacht worden gegeven aan het identificeren en beperken van de gevaren die door deze sector ontstaan. Het programma zal dus zowel land- als marine kwesties behandelen (zie paragraaf 6.1)

De meeste directe beschermingsactiviteiten worden tot op heden uitgevoerd in de periode van het nestseizoen. Alleen in Suriname is er een gereduceerde veldstaf die gedurende het gehele jaar op de stranden verblijft, voornamelijk voor het plegen van onderhoud en het accommoderen van gasten. Gezien het feit dat er gedurende het hele jaar nestactiviteiten plaatsvinden in de regio, is het van belang om veldstations zoveel mogelijk gedurende het gehele jaar te bemannen. De directe beschermingsactiviteiten (paragraaf 6.2) reflecteren de huidige kennis van zaken en zullen worden aangepast indien resultaten van controle en onderzoek aangeven dat dit gewenst is.

De capaciteitsversterkende component van het Actieplan streeft een waardevolle en duurzame input na van alle belanghebbenden in het beheer van de zeeschildpadden als natuurlijke hulpbron. Dit programmaonderdeel richt zich op de behoeftes van overheids- en niet-overheidssectoren, het adviseren in onder andere de gebieden van institutionele versterking.en infrastructurele verbetering. De meeste instituten betrokken bij zeeschildpaddenbescherming hebben financiële, logistieke en menselijke beperkingen, en kunnen er baat bij vinden door regionale uitwisseling van kennis en personen. (paragraaf 6.3).

Het succes van de regionale zeeschildpaddenbeschermingsactiviteiten zullen ook afhangen van de implementatie van een aantal perifere, maar evenzo belangrijke Algemene beschermingsondersteunende activiteiten. Dit programmacomponent richt zich in principe op: het ontwikkelen en aannemen van geharmoniseerde wetgeving en regulerende kaders voor zeeschildpaddenbescherming in de Guiana’s, het trainen en ondersteunen van wetsdienaren op onderdelen die zich op milieu- en natuurwetgeving richten, het ontwikkelen van welgerichte voorlichtings- en educatieprogramma's, het ontwikkelen van milieubewuste duurzame economische alternatieven voor lokale gemeenschappen en het ontwikkelen en onderhouden van regionale en internationale samenwerking (paragraaf 6.4)

1.4 Verwachte uitkomsten en Prestaties

- Het regionale zeeschildpaddenbeschermingsprogramma en Actieplan is officieel geaccepteerd door de relevante overheidsinstanties van Guyana, Suriname en Frans Guiana.
- De zeeschildpaddenbeschermingsactiviteiten in de Guiana’s worden zo ontworpen en uitgevoerd dat aansluiten op de doelstelling van het regionale zeeschildpaddenbeschermings-programma en Actieplan vallen.
- Het regionale zeeschildpaddenbeschermingsprogramma en Actieplan is met succes in gebruik bij de belanghebbenden bij fondsenwerving.
- Gebreken in nationale onderzoeks- en beschermingsactiviteiten zijn geïdentificeerd en worden aangepast.
- Een geharmoniseerd zeeschildpaddenonderzoeks- en controleprogramma in is samenwerking tussen de drie Guiana’s ontwikkeld en uitgevoerd.

- Kritieke marine gebieden zijn geïdentificeerd en worden adequaat beheerd voor bescherming van doelsoorten.
- Alle belangrijke legstranden van zeeschildpadden hebben een bepaalde beschermingsstatus gekregen van de betrokken autoriteiten en er zijn geïntegreerde beheersplannen ontwikkeld.
- Nationale zeeschildpadden databases zijn ontwikkeld, worden onderhouden en zijn openbaar.
- Een nationaal en regionaal kader van zeeschildpadbeschermings- en beheersspecialisten is geïdentificeerd en deze groep kan geleidelijk de leiding krijgen over nationale en regionale zeeschildpaddenbeschermingsactiviteiten.
- De betrokkenheid van, en samenwerking tussen, de instituten gerelateerd aan zeeschildpadden, onderzoek en bescherming, inclusief internationale organisaties, is gestimuleerd en versterkt.
- Geharmoniseerde wetgeving en het regulerende kader zijn geaccepteerd door de relevante autoriteiten.
- Incidentele vangst van zeeschildpadden in zeevisserij is in grote mate verminderd en wordt uiteindelijk geëlimineerd.
- De visuitrusting is zodanig verbeterd dat incidentele vangst van zeeschildpadden sterk verminderd is en uiteindelijk geëlimineerd wordt.
- Een informatie- of bezoekerscentrum is ontwikkeld voor elke belangrijke nestplaats waar intensief toerisme is.
- Publieke belangstelling voor en kennis van zeeschildpadden beschermingskwesties is sterk toegenomen
- Belangstelling voor en kennis van zeeschildpaddenbescherming onder vissers is sterk toegenomen.
- Wereldwijde belangstelling voor en kennis van zeeschildpadden beschermingsactiviteiten in de Guiana's is sterk toegenomen.
- Leden van de lokale gemeenschappen leveren een belangrijke en groeiende bijdrage aan de zeeschildpaddenbeschermingsactiviteiten.
- Om de druk op zeeschildpadden en hun bijproducten te reduceren of elimineren zijn de lokale gemeenschappen gestimuleerd om milieuvriendelijke duurzame ecologische alternatieven te ontwikkelen, waaronder ecotoerisme.
- De basisinfrastructuur voor ecotoerisme is aangelegd op de relevante lokaties.
- De productie van lokale ambachten, in het bijzonder die met een relatie tot zeeschildpadden, is gestimuleerd en succesvol op de markt gebracht.
- Het stropen van eieren is gereduceerd en uiteindelijk gestopt.
- Richtlijnen voor duurzaam gebruik zijn geformuleerd (binnen de mogelijkheden van de nationale wetgevingen).
- Procedures en financieringsmogelijkheden zijn ontwikkeld en worden geïmplementeerd voor het compenseren van vissers,voor zover die door de aanwezigheid van zeeschildpadden worden benadeeld.

1.3 FRANCAIS

Les tortues marines représentent une ressource naturelle importante, répartie sur l'ensemble des pays du plateau des Guyanes : le Venezuela, le Guyana, le Suriname, la Guyane et le Brésil. Cinq espèces nidifient sur les plages de la région et/ou se nourrissent dans ces eaux juridictionnelles. Ce sont les Tortues luth (*Dermochelys coriacea*), vertes (*Chelonia mydas*), olivâtres (*Lepidochelys olivacea*), imbriquées (*Eretmochelys imbricata*) et *caouannes (Caretta caretta*). Ce document focalise ses recommandations vers une approche régionale de la conservation des tortues marines des Guyanes ; Guyana, Surinam et Guyane.

Parce qu'ils manquaient d'outils régionaux pour gérer en commun les populations de tortues marines, les pays du plateau des Guyanes ont jusqu'à un passé récent adopté une approche unilatérale d'étude et de protection, comme s'il s'agissait de populations séparées et nationales. Et ceci en dépit du fait que les conservationnistes savent depuis longtemps que certaines, si ce n'est tous les cheptels reproducteurs font partie de plus grandes populations régionales occupant les bassins de la grande Caraïbe et/ou du Grand Atlantique. Les « recaptures » de marquage (marquage d'une tortue, puis relecture) démontrent clairement que plusieurs espèces migrent bien au-delà du plateau des Guyanes. Ceci conforte l'idée que la création et le respect de traités internationaux sont des composantes incontournables d'une stratégie de conservation efficace.

Il est reconnu que l'approche de la conservation des tortues marines doit être menée à grande échelle pour être efficace, exigeant des outils régionaux qui mettent l'accent sur une coopération plus étroite entre les organisations nationales et régionales (Eckert, 1999 – Eckert et Abreu-Grobois, 2001). Un programme et une stratégie de conservation régionaux développés grâce à l'active participation des acteurs-clé, incluant les autorités gouvernementales compétentes, les collectivités, les associations, certains secteurs privés et les communautés locales, étaient impératifs pour les Guyanes. Un programme régional de conservation efficace doit intégrer les fait que les gestionnaires ont à faire face à des problématiques liées à deux habitats critiques, radicalement différents mais d'importance équivalente – l'océan (zones côtières et pélagiques) et la plage de ponte – ainsi qu'aux points de vue des citoyens, en particulier les communautés locales et le secteur de la pêche, qui pourraient considérer certaines mesures de gestion comme contreproductives par rapport à leurs intérêts ou leurs traditions. Par le passé, la confusion a souvent résulté de telles mesures, et des conflits sont apparus entre les conservationnistes, les habitants, et les différents usagers concernés par la ressource « tortues marines ».

Ce programme régional de conservation des tortues marines (et plan d'action) vise à renforcer une dynamique à différents niveaux : local, national, régional (les trois Guyanes) et international. Il se base sur les efforts de conservation actuels dans chacune des trois Guyanes, du domaine de la recherche, de la protection, et de la gestion durable, actions soutenues dès à présent par les gouvernements, les institutions, les associations, les communautés locales, les collectivités.

Considérant que la majeure partie des interventions continueront d'être prises en charge localement et nationalement, ce plan d'action fournit un cadre pour des projets scientifiques intégrés et harmonisés (suivi scientifique ou développement de recherche), des campagnes de sensibilisation du public et pour une collaboration entre les entités locales, régionales et nationales impliquées dans les activités liées aux tortues marines dans les Guyanes. Plus spécifiquement il tend à promouvoir les meilleures pratiques, à encourager une large participation du public, à renforcer les relations de travail entre les entités impliquées et à concrétiser des résultats mesurables en matière de conservation des tortues marines.

La vision WWF/IUCN stipule que « pourvoir aux besoins des espèces menacées est un aspect important de l'approche écosystémique de la conservation de la biodiversité marine ». Cette stratégie conjointe propose des actions prioritaires pour leur conservation et leur restauration :

- Soutenir la préparation et la mise en œuvre des plans d'action et de restauration ;
- Réduire la surexploitation par la promotion d'une utilisation durable des ressources ;
- Réduire la surexploitation en surveillant et régulant le commerce international des espèces menacées ; et
- Améliorer la compréhension de l'impact des menaces telles que les pêches commerciales et la pollution venant des produits chimiques toxiques, afin de limiter ces impacts.

Considérant le fait que les espèces migratrices (comme les tortues marines) vivent au-delà de toute juridiction nationale et qu'aucune loi nationale ne peut parvenir à assurer totalement leur survie, la stratégie de WWF pour la conservation de ces espèces menacées cherche, entre autres aspects, à promouvoir à la fois des lois nationales adaptées et des accords internationaux.

> **L'objectif à long terme** du programme régional de conservation des tortues marines des Guyanes est de prévenir l'extinction, et de favoriser la restauration, des populations de tortues marines des Guyanes.
> **L'objectif spécifique** est de présenter un programme intégré et cohérent de recherche, suivi et conservation des tortues marines pour la région des Guyanes.

1.1 **Contexte** :

La totalité des sept espèces de tortues marines est inscrite sur la liste rouge IUCN des espèces menacées. La Tortue de Kemp, la Tortue imbriquée et la Tortue luth sont classées en *danger critique d'extinction*, tandis que la tortue caouanne, la verte et l'olivâtre sont classées *menacées*. La tortue à dos plat, endémique en Australie, est classée *vulnérable*. Ces catégories reflètent fidèlement le statut international de ces espèces (selon les informations disponibles), et sont basées sur des critères tels que tailles de population passées et actuelles, tendances, aire de répartition, menaces principales et probabilité d'extinction à l'état sauvage. Pour plus de détails voir Baillie et Groombridge (1996) ou visiter www.redlist.org

Les Guyanes fournissent des zones d'alimentation et de nidification à cinq espèces de tortues marines. Comme ces populations réalisent des mouvements transfrontaliers, on ne peut obtenir de réels résultats de conservation que par des planifications nationale et régionale à long terme. Une approche concertée permet d'établir des priorités mutuelles, de mettre en avant les meilleures pratiques, d'éviter les redondances et d'évaluer les progrès. A ce jour, seule une des trois Guyanes (le Surinam) a achevé un plan d'action national pour la restauration des tortues marines. Développé par le service des forêts du Surinam, en collaboration avec le Widecast, il a été publié par l'U.N.E.P. en 1993. Un plan d'action national a été initié par le Widecast pour le Guyana il y a plus de dix ans ; ce document n'est pas encore publié. En Guyane, sous la coordination de la Diren, un plan de restauration des tortues marines est en cours de finalisation.

Jusqu'à un passé récent, il n'y a eu que peu d'initiatives visant à coordonner les programmes de conservation nationaux entre les Guyanes. Ce constat n'est pas lié à un manque de volonté de coopération, ni à des aspirations nationalistes, mais plus simplement à un manque de cadre adéquat facilitant la coopération et la coordination des activités de conservation mises en place. Une coopération informelle active, telle que celle entre le Surinam et la Guyane de part et d'autre du Maroni, ainsi qu'une

série ininterrompue de colloques régionaux annuels, ont montré que la collaboration régionale n'est pas seulement réaliste, mais qu'elle est fortement encouragée par l'ensemble des acteurs.

Ce plan d'action semble ainsi important pour stimuler cette coopération entre les conservationnistes, les scientifiques, les collectivités locales, les associations, les organismes gouvernementaux, communautés locales et les pêcheurs. Il reflète les besoins, les aspirations et les préoccupations exprimés par les intervenants de la région et souhaite se baser sur un support formel et une validation de la part de chaque gouvernement. Le WWF fournit soutien technique et financier pour renforcer la coordination régionale, cependant la pleine mise en œuvre des actions locales reste du domaine des divers acteurs nationaux, et des différents bailleurs de fonds. Ce plan d'action propose un cadre pour une approche régionale de la conservation des tortues marines, sur des bases scientifiques établies. Il est souhaité qu'un tel document puisse être utilisé par divers acteurs dans leurs démarches de recherche de fonds, mais aussi par les organismes de financement souhaitant fixer leurs priorités régionales de conservation des tortues marines.

1.2 **Stratégie de conservation et plan d'action :**

Le fondement de ce plan d'action repose sur le fait que les tortues marines ne respectent pas les frontières politiques. Ces espèces, au stade juvénile, réalisent de longs trajets océaniques, et migrent ensuite, au stade adulte, entre lieux de nourrissage et de nidification, qui peuvent être séparés de centaines ou de milliers de kilomètres. Une approche commune entre les pays concernés est essentielle à la survie de ces espèces. Afin de promouvoir une telle collaboration, ce plan d'action propose une estimation du statut actuel des tortues marines dans les Guyanes, des menaces pesant sur leur survie, de la compétence des organismes nationaux ou régionaux impliqués dans leur conservation, des besoins des communautés locales concernées, ainsi que sur les préoccupations venant d'un large panel d'organismes. Les principaux axes de ce plan d'action reposent sur :

- Suivi scientifique et recherche
- Protection directe
- Renforcement des compétences,
- Activités d'appui à la conservation (harmonisation des législations, renforcement de la sensibilisation du public, implication des communautés locales, promotion des coopérations régionales et internationales)

Suivi scientifique et recherche, aspects essentiels de toute stratégie de conservation, se sont jusqu'à présent focalisés sur les plages. En comparaison, les habitats marins restent peu étudiés. Néanmoins, avec l'augmentation des activités de pêche dans la région, un effort plus important devra être porté sur l'identification et la réduction des menaces liées à ce secteur. Par conséquent, cette partie du programme devra efficacement concerner *à la fois* les problématiques terrestres et marines.

La seconde partie du plan d'action régional concerne les activités de Protection directe, qui se sont aussi focalisées, jusqu'à présent, sur les plages pendant la saison de ponte. Nous savons maintenant que les pontes surviennent dans la région presque toute l'année, il serait important de réaliser un effort permanent de protection. Ces actions directes de protection (qui se limitent pour le moment aux plages) se basent sur les connaissances actuelles, et pourront évoluer à mesure que des informations complémentaires pourront apparaître.

La partie Renforcement des compétences du plan d'action vise à promouvoir une participation réelle et durable des acteurs à tous les stades du processus régional de conservation. Cette partie doit tenter de répondre aux aspirations des organisations gouvernementales ou non gouvernementales, et inciter au

renforcement des structures, à la formation du personnel, et à l'amélioration des infrastructures. La plupart des structures impliquées à l'heure actuelle dans la conservation des tortues marines ont des difficultés financières, logistiques ou structurelles, et toutes pourraient bénéficier de programmes d'échanges d'informations et de personnel.

L'efficacité de l'effort régional de conservation des tortues marines dépendra aussi de la mise en place de certaines activités annexes mais importantes, regroupées sous l'ensemble des « activités d'appui à la conservation ». Cette partie du programme régional vise principalement à :développer et adopter des législations harmonisées, renforcer la formation des personnels de terrain, développer des programmes d'éducation à l'environnement bien ciblés, favoriser le développement durable des communautés littorales, et créer et/ou renforcer les coopérations régionales. Résultats attendus :

- Ce programme régional est officiellement validé par les autorités compétentes du Guyana, du Surinam et de Guyane
- Les activités de conservation des tortues marines des Guyanes sont préparées et mises en place en liaison avec le document régional
- le programme régional de conservation des tortues marines est utilisé par une majorité des acteurs pour leur recherche de financement
- les manques en terme de recherche et de conservation sont identifiés et résolus à l'échelle nationale
- un programme harmonisé de suivi scientifique et de recherche est développé et mis en place dans les trois Guyanes
- les habitats critiques marins sont identifiés et efficacement gérés
- tous les sites de ponte majeurs des Guyanes bénéficient d'un statut de protection national et des plans de gestion sont définis pour chacun d'eux
- des bases de données nationales et régionales sont créées, mises à jour, et totalement accessibles
- une liste des experts de gestion de ressources naturelles de la région est définie pour accompagner la mise en place du programme régional de conservation des tortues marines
- l'implication et les collaborations des organismes des Guyanes dans les activités de recherche et de suivi scientifique sont encouragés et renforcés
- un cadre légal harmonisé est développé et adopté par les autorités compétentes
- les captures accidentelles de tortues marines sont significativement réduites
- les techniques de pêche utilisées sont améliorées pour limiter les captures accidentelles et maintenir les captures ciblées
- un centre d'information sur les tortues marines existe sur chaque site de ponte ouvert au public
- la sensibilisation du public aux tortues marines est significativement améliorée
- la sensibilisation des professionnels de la pêche aux tortues marines est significativement améliorée
- des membres des communautés locales participent activement aux efforts de conservation
- les communautés locales sont soutenues dans leur initiative de développement durable tel que l'écotourisme visant à diminuer les prélèvements de tortues marines
- des infrastructures touristiques sont installées sur les sites appropriés
- la production d'artisanat local notamment lié au thème « tortues marines » est encouragée
- le braconnage des œufs est fortement réduit
- des lignes directrices du développement durable sont formulées pour chaque contexte national
- des procédures pour assister les pêcheurs subissant des dommages liés aux tortues marines sont définies
- le transfert de compétences vers les communautés locales en terme d'accueil grand public et de visites guidées est encouragé.

2 STATUS AND DISTRIBUTION OF SEA TURTLES IN THE GUIANAS

Throughout the Western Atlantic basin, centuries of the generally unregulated harvesting of sea turtles for their eggs, meat, and other body parts has taken its toll. In addition, with the increase in fisheries activities in recent decades, countless tens of thousands of sea turtles have been incidentally captured and have died in a wide variety of nets. High-density coastal development and pollution (e.g., oil spills, persistent debris, and chemical waste) further affect sea turtle populations negatively to a greater or lesser extent. As a result, IUCN classifies sea turtles as **Critically Endangered** or **Endangered** (Baillie and Groombridge, 1996) [3]and all locally occurring sea turtle species are protected by the national laws of the Guianas.

Most uses in the Guianas, whether consumptive or non-consumptive, are regulated and/or monitored in some way. Some uses which are largely unintentional and include such things as offshore drowning associated with incidental capture by fisheries, constitute a serious management concern because their effects, which may well be catastrophic (e.g., similar to what has been documented for leatherbacks in Pacific Mexico; see Sarti et al., 1996; Eckert and Sarti, 1997), are not well quantified and will not be easily controlled.

This chapter, which addresses the status and distribution of sea turtles in the Guianas, recognizes that all sea turtles nesting and/or foraging in the Guianas may belong to shared populations, as evidenced by uniquely tagged females nesting on either side of an international border, by post-nesting adults migrating between nations, and by juveniles exploiting developmental habitats extending over multiple political jurisdictions. Consequently, the "true" status and distribution of all these species can *only* be known by pooling data among the primary range states, which has not routinely been done in the past.

2.1 REGIONAL CONTEXT

In view of the widespread decline in many sea turtle populations during the 20th century, the coastal region of the Guianas has emerged as one of the most important nesting areas for sea turtles in the world. Therefore, conservation efforts carried out in the Guianas have global implications. These include ensuring the survival of one of the largest population of olive ridley sea turtles in the Western Atlantic region, and the largest (known) population of leatherback sea turtles left on Earth.

If these conservation efforts fail, the demise of breeding aggregations in the Guianas will impoverish dozens of range states which share these populations. Most post-nesting adults, for example, undertake long-distance migrations to distant foraging pastures where they spend their non-breeding years, and juvenile turtles (recruiting into the larger population from Guianas' nesting beaches) may travel widely and participate in the ecology and economy of many range states over the course of several decades. The reverse is also true; that is to say that while the Guianas hold primary responsibility for the sustainable management and conservation of in-country breeding aggregations, they cannot *alone* guarantee the survival of these ancient creatures with such complex life histories. To achieve long-term results, management and conservation activities must be undertaken in collaboration with range states outside the Guayana Shield region.

The following subsections provide a brief overview of the distribution and ecology of locally occurring sea turtle species in the Guianas, with notes on their larger regional and global importance.

[3] updated at http://www.redlist.org/

2.1.a Leatherback Sea Turtle, Dermochelys coriacea

Leatherbacks are the largest of all sea turtles. Caribbean-nesting females typically weigh 300-500 kg (660-1100 lb.). An adult male weighing a record 916 kg (2015 lb.) stranded on the coast of Wales, United Kingdom in 1988 (Morgan, 1989). Leatherbacks lack a bony shell and the smooth black skin is spotted with white; the proportion of light to dark pigment is variable. Strongly tapered, the flexible carapace is, typically measures 130-165 cm in straight-line length, and is raised into seven prominent ridges. Powerful front flippers extend nearly the length of the body. Deep cusps form tooth-like projections on the upper jaw. Stomach contents from animals killed in various parts of the world indicate that the diet is mostly cnidarians (jellyfish, siphonophores) and tunicates (salps, pyrosomas). Hatchlings are covered with tiny scales and are predominately black with mottled undersides; the flippers are margined in white. Rows of white scales appear as stripes along the length of the back.

Leatherbacks have the most extensive range of any reptile (71ºN to 47ºS; Pritchard and Trebbau, 1984) and adults exhibit broad thermal tolerances. The species is commonly reported in New England waters and northward into eastern Canada, as well as occasionally sighted in British Columbia (Canada) and northward into Alaska. In Trinity Bay, Newfoundland, an adult was observed by fishermen throughout an entire day swimming in open water amongst ice (Goff and Lien, 1988). The core body temperature in cold water has been shown to be several degrees ºC above ambient (Frair et al., 1972). This may be due to several features, including the thermal inertia of a large body mass, an insulating layer of subepidermal fat, and counter-current heat exchangers in the flippers.

Leatherbacks are further unusual in that females engage in virtually continuous deep diving (maximum depths exceed 1000 m) in the general vicinity of the nesting ground, traversing inshore waters only to and from the beach (Eckert et al., 1986, 1989). Adults typically leave the Caribbean basin after nesting, demonstrated by long-distance tag returns (e.g., one adult female traveled 5,900 km to Ghana, West Africa, after laying eggs in Suriname; see Pritchard, 1973), patterns of barnacle colonization (Eckert and Eckert, 1988) and, more recently, satellite telemetry studies from the Guianas and Trinidad indicating that adults forage during non-breeding years in the waters of the northern and eastern Atlantic Ocean (Eckert, 1998; Ferraroli et al., In press a and b). Despite advances in determining the geographic range of adults, neither the dispersal patterns of hatchlings nor the behavior and movements of juveniles are known. Survivability, growth rate, age at maturity and longevity have not been determined.

Leatherbacks are the “flagship species” for the Guianas. Nesting occurs in all three countries and is concentrated around the Marowijne River estuary. With about 50% of the known world population nesting on its beaches (Spotila et al., 1996), the Guianas region is globally significant, thus the high importance of this species conservation in the Guianas. Significant declines in recruitment from breeding aggregations in the Guianas will have ecological implications throughout the greater Atlantic ecosystem where the animals spend the great majority of their time.

A decrease in the number of nests laid per year has been observed since the early 1990s on the main beach of La Guyane. From an estimated 50,000 nests in 1992 (Girondot and Fretey, 1996; Chevalier and Girondot, 1998), the number of recorded nests decreased at Awala-Yalimapo to about 15,000 in 1999 (Diren, in preparation). At the same time, the number of recorded nests in Suriname has increased significantly. Despite nesting activity increases on some beaches in the Guianas, take of eggs, the high mortality rate of adults reported in coastal drift gillnets (“Guyana seines”), and the ongoing (though presently much reduced) slaughter of females on the beaches in Guyana represent serious threats to the conservation of the species. Taken as a (regional) whole, the leatherback colony in the Guianas is very volatile yet may be stable at the present time, but continued careful monitoring for accurate determination

of its overall status, and targeted management intervention (such as to reduce incidental capture) is clearly essential to the survival of the colony, especially in the light of its global importance.

Leatherbacks nest nearly year-around in the Guianas, with two distinct peaks (Chevalier et al., 1999) -- a minor peak (December-January) and a major peak (April-July). With an average of 5-7 nesting activities per female during the season (measured by saturation tagging efforts elsewhere in the Caribbean region), leatherback concentrations in the Guianas waters are high, making them particularly vulnerable to fisheries activities. Individual females typically return to the region (often to the same nesting beach) for the purpose of nesting at intervals of predominately 2-3 years (Girondot and Fretey, 1996).

As noted above, leatherbacks migrate to distant foraging areas after nesting in the Guianas and stay mostly in the high seas. Their specific migrating routes and destinations are poorly known. Leatherbacks tagged in the Guianas have been observed or recaptured in widely dispersed places, such as Ghana, Morocco, France, and Nova Scotia in Canada (Schulz, 1975; Fretey and Girondot, 1996). Preliminary results of the CNRS-CEPE leatherback monitoring by satellite tracking (Balise ARGOS), initiated during the 1999 nesting season, indicate that one individual headed northeast, crossing the Atlantic to Senegal, and the other followed the Guiana Current across the Caribbean Sea toward the USA (Ferraroli et al., In press a, b). More work is needed to define "typical" pathways and destinations.

2.1.b Green Sea Turtle, Chelonia mydas

The green turtle is recognized by a round, blunt beak with serrated cutting edges, one pair of enlarged scales between the eyes, and four pairs of non-overlapping lateral shell scutes (=the plates on a turtle's shell). The shell color is light to dark brown, sometimes shaded with olive, with radiating wavy or mottled markings of darker color or with large blotches of dark brown. It is generally devoid of barnacles. The plastron (=belly plate) is whitish or light yellow. Adults can attain weights of 230 kg (500 LB.) (Pritchard et al., 1986) and generally measure 95-120 cm in straight shell length; a mean size of 100.2 cm (n=2107) is reported from the Caribbean's largest nesting colony at Tortuguero, Costa Rica (Bjorndal and Carr, 1989). The maximum reported weight of adult females nesting in Suriname is 182 kg (400 LB.) (Schulz, 1975). As is the case with all sea turtle species, adult males are distinguished by a long prehensile tail. Hatchlings are uniquely marked, being black above and white below.

Egg laying typically takes place at night, with hatchlings emerging 6-8 weeks later. Nothing is known of their initial dispersal at sea, but upon leaving the open sea existence that characterizes their earliest years, the young green turtles return to coastal waters. In the Caribbean Sea, green turtles feed primarily on the seagrass *Thalassia testudinum* (Bjorndal, 1997), commonly referred to as "turtle grass." Green turtles travel extensively during the first decades of their lives. In the years preceding reproductive maturity they may take up temporary residence in many locations before the urge to reproduce impels them to migrate to mating and nesting grounds, the latter presumed to be their natal (=birth) beach. Caribbean green turtles reach sexual maturity at an estimated 18-36 years of age (reviewed by Frazer and Ladner, 1986).

Green turtles (nesting) have been relatively well documented in Suriname, but only recently has the species been included in nest reporting and assessment in La Guyane or Guyana. In the two decades between 1969 and 1989, green turtle nesting in Suriname (all beaches combined) fluctuated in an apparently natural (and apparently stable) manner between 2,495 and 8,465 nests per annum (cf. Table 1, Reichart and Fretey, 1993). Monitoring was interrupted by civil unrest in the early 1990s, and in recent years the annual number of green turtle nests has ranged between 4,242 in 1996 and 11,581 in 1999 (Kelle et al., 2000).

In La Guyane the annual number of nests laid appears to be important, but it must be emphasized that the extent of beach coverage (and reporting) has greatly expanded over the course of the last two decades. Moreover, early investigators focused on leatherbacks, largely ignoring other nesting evidence (including both green turtles and olive ridleys) (J. Fretey, pers. comm.). In Guyana, a similar situation exists. Rising numbers of green turtles can be clearly attributed, in the authors' views, to increased beach coverage and more inclusive reporting.

With admittedly incomplete information in hand, but making every attempt to take into account both earlier publications and recent field observations, green turtles do not seem to be particularly threatened in Suriname or in La Guyane at the present time. However, ongoing slaughter on the beaches of Guyana may constitute a serious threat to the sub-population nesting in the region.

According to data collected in Suriname, green turtles nest between January and June (averaging 2-3 nesting activities per female) and they remain in the waters of the Guianas during the entire nesting season. At the end of the season, most of them head southeast to foraging grounds off the northeast coast of Brazil, with high concentrations in the waters of the State of Ceará (Schulz, 1975; Reichart and Fretey, 1993). Another group may disperse into the Caribbean Sea, and perhaps belongs to a different sub-population (P. Pritchard, pers. comm.).

In addition to gravid females, adult males are seasonally present in the Guianas and small juveniles, generally around 25-35 cm in shell length, also occur, possibly year around, "but from the narrowly restricted size range it is assumed that these individuals do not remain in the area for more than a year or so." (Pritchard, 1991). Young green turtles can be observed, year around, in the vicinity of the Devil Islands, Cayenne and Kourou

2.1.c Olive Ridley Sea Turtle, Lepidochelys olivacea

The shell of the olive ridley is broadly heart-shaped (width about 90% of the length) and mid to dark olive-green in color. The bridge and plastron are greenish white to yellow, and the legs and neck are olive above and lighter below (Carr, 1952). Hatchlings are uniformly grayish black in color. There are generally six or more vertebral and, except in rare cases, six to nine pairs of lateral scutes. Asymmetry relative to the number of lateral scutes is not uncommon. Pritchard (1969) reported straight shell lengths of 64-72 cm (n=14) for females nesting in Suriname. Adults rarely exceed 100 lb. (45 kg) (Pritchard et al., 1983). A small glandular pore is present near the rear margin of each of the four pairs of inframarginal scutes. The function of these pores is unresolved.

Olive ridleys are the least migratory of the Guianas' sea turtles. After the nesting season, most adults remain offshore. Based on tag returns, their range extends from the mouth of the Orinoco River in Venezuela to the State of Rio Grande Do Norte in Brazil (Schulz, 1975; Reichart, 1993). Little is known of the status, distribution or range of males or juveniles. Males periodically wash ashore (stranded, dead) on the beaches of Suriname (H. Reichart, pers. observ.), a mating couple was caught by a shrimp trawler in 2000 (F. Sehoe, pers. comm.), and mating has been observed offshore the Devil Islands (G. Talvy, pers. comm.). A decade ago a subadult (30-kg) was captured off Curaçao (Sybesma and Hoetjes, 1992). Reichart (1993) describes the species as an "opportunistic forager" and primarily carnivorous, foraging over the continental shelf for crustaceans, tunicates and small invertebrates.

Adults migrate between foraging and nesting grounds. Nesting is mostly nocturnal; gently inclining beaches are preferred. Nesting peaks from May-July in the Guianas, but continues through September. Gravid females nest 1-3 times per season. Nesting appears to be affected by weather conditions and

predictable inter-nesting intervals have not been documented (data collected by Hill *in* Schulz, 1975, suggest intervals of 17 and 30 days). Early studies showed that females nesting at Eilanti Beach, Suriname, laid an average of 116 eggs per nest (range 30168, n=1154; Schulz, 1975). Nearly two-thirds of females tagged while nesting at Elianti returned the following year for re-nesting, one quarter at two-year intervals, and about 8% at three-year intervals; the average interval is 1.4 years (Reichart, 1993). As is the case with other sea turtles, incubation is about 55 days (range 51-61; Schulz, 1975). Age at maturity is not known for Guianas' populations.

Prior to the mid-1990s, the only significant known nesting colony in the Western Atlantic was in Suriname, primarily at Eilanti Beach where several *arribadas* (mass nesting events) were observed during the 1960s and early 1970s (Schulz, 1975; Autar, pers. comm., Fretey, 1999). Olive ridleys nesting in Suriname have declined dramatically in recent decades, from about 3,000 nests per year in the late 1960s, to fewer than 500 nests per year in the early 1990s (Reichart and Fretey, 1993), and fewer than 200 nests per year today (Hoekert et al., 1996; Hoekert et al;, 1997, Swinkels and Van Nugteren, 1999; Hilterman et al., 2001[1], Notwithstanding indications of an eastward shift into La Guyane (due in part to the erosion and subsequent disappearance of Eilanti Beach), the primary reason for the collapse of the large colony in Suriname is believed to be high levels of incidental catch in shrimp trawls (Tambiah, 1994; Reichart and Fretey, 1993; Laurent et al., 1999).

Reichart (1989) reported diffuse nesting in northwestern Guyana and in La Guyane (Fretey, 1989), but there are no recent records of regular nesting in Guyana, even if isolated nesting still occurs. Knowledgeable observers in Guyana confirm that there were "a lot" more olive ridleys in Guyana two decades ago than there are today (P. Pritchard and R. De Freitas, pers. comm.) but, in the absence of consistent data, the magnitude of this decline cannot be quantified.

In the case of La Guyane, monitoring efforts on the eastern beaches have increased in recent years. Currently, most olive ridley nesting in the Guianas takes place in eastern La Guyane (Talvy, 2002). It is possible that declines in both Suriname and Guyana are due by a shift to new nesting sites in La Guyane. The overall number of nests recorded in Suriname and La Guyane in recently shows that these two countries still support one of the largest nesting populations of olive ridleys in the Western Atlantic region (Talvy and Vié, 1999; Godfrey, pers. comm.).

2.1.d Hawksbill Sea Turtle, Eretmochelys imbricata

Hawksbills are distinguished from other sea turtles by two pairs of prefrontal (between-the-eyes) scales, posteriorly overlapping shell plates (=carapace scutes), four pairs of lateral scutes, and a relatively narrow head and pointed jaw. The shell is typically serrated along the posterior margins and "tortoiseshell" in color and pattern (radiating streaks of brown, black and amber). Straight shell length of adult females averages 75-85 cm in the Western Atlantic (Witzell, 1983). The shells of adult females killed in Guyana during nesting ranged from 78.7 to 87.6 cm straight-line (mean=82.5 cm, n=3) (Pritchard, 1986). Clutch sizes in two nests laid on Almond Beach in 1989 were 149 and 153 eggs, respectively (Pritchard, pers. comm.). Weight is typically to 80 kg (Pritchard et al., 1983), with an historical record of a 280 pound (127 kg) individual caught at Great Sound, Grand Cayman (Carr, 1952). Hatchlings are uniform in color, usually gray or brown.

[1] These data were published by Stichting Biotopic, and were collected and processed by both Biotopic and STINASU. STINASU has been implementing sea turtle conservation activities in Suriname since the 1960s. Biotopic's work in Suriname started in 1995 as technical assistance to STINASU for the scientific research aspect of sea turtle conservation.

Hawksbills feed in coral reefs, where they appear to specialize on sponges. Ten sponge species accounted for 79.1% of the dry mass of all sponges identified in the stomachs of hawksbills from seven Caribbean countries, suggesting a degree of dietary selectivity (Meylan, 1988). During reproductive years, females leave their foraging grounds and migrate to their nesting grounds in the Guianas and elsewhere. Preferred beaches are often insular with well-developed supralittoral vegetation; isolated "pocket" beaches are commonly used, sometimes with exposed coral and rock offshore. Nesting is nocturnal. Nests are generally but not universally placed amongst woody vegetation, leaving little evidence of the visit aside from a comparatively faint asymmetrical crawl (0.7-0.8 m wide) leading to and from the ocean.

Because of their relatively low numbers in the Guianas, little is known about the distribution, abundance or trend of hawksbills, or their relationship to other sub-populations in the Wider Caribbean region. Currently this species is not a subject of extensive monitoring activities. It is a recommendation of this Action Plan that this species, which nests in very low densities in the Guianas and is considered **Critically Endangered** on a worldwide scale, be carefully evaluated and monitored on an ongoing basis. The abundance and distribution of juveniles in offshore waters, if any, is entirely unknown and should also be the subject of careful evaluation.

2.1.e Loggerhead Sea Turtle, Caretta caretta

The loggerhead is recognized by a large head (to 25 cm wide according to Pritchard et al., 1983) and thick, somewhat tapered shell with five pairs of lateral scutes. The shell is often encrusted by barnacles. The large head and strong jaws, for which the species was named, are necessary adaptations to an omnivorous diet of mollusks and hard-shelled crabs; tunicates, fishes, and plants are also eaten (Dodd, 1988). Adults attain a straight shell length of 120 cm and weigh up to 200 kg (440 LB.) (Pritchard et al., 1983). In color the dorsal surfaces are reddish-brown, lacking the variegation seen in green turtles or hawksbills; the underside is yellowish. Like hawksbills, loggerhead hatchlings are uniform in color, top and bottom. Color varies among individuals from red-brown to gray to gray-black. Frazer and Ehrhart (1985) estimated age at sexual maturity to be 12-30 years, and predicted that the upper estimate was the more realistic value.

In the Western Atlantic, loggerheads nest mainly in the USA and Brazil. They occur in the offshore waters of the Guianas, but are extremely rare on the beaches. No population data are available, but because of the potential threat of incidental capture by fishing gear in offshore waters, the species should be included in any regional and national management plan for sea turtles. As is the case with hawksbills, the abundance, distribution and behavior of individuals in nearshore and offshore waters is unknown and should be the subject of careful evaluation for management purposes.

2.2 Guyana

2.2.a Nesting Species

Leatherback, green, hawksbill, and ridley sea turtles currently nest in Guyana. There are no records of loggerheads nesting in Guyana.

- Leatherbacks are the most common sea turtle species nesting in Guyana, although they are by no means as numerous as in Suriname and La Guyane. Annual nest counts at Almond Beach (the primary nesting site at that time) varied between a low of 51 (in 1988) and a high of 247 (in 1990) between 1988 and 1994 (Pritchard and Suárez, 1996); 200 nests were laid in 1999 (R. De Freitas,

GMTCS, pers. comm.). Slaughter of nesting females has traditionally been high at Almond Beach, with nearly 50 females killed per year in the mid-1980s (Pritchard and Suárez, 1996). Harvest pressure has been eased in recent years by community involvement in conservation and entrepreneurial initiatives, including tagging, ecotourism and youth programs at important sites. The trend in this colony, which was characterized as "small" during the initial surveys of the 1960s (see Pritchard, 1971), is clearly upward. However, it is currently impossible to distinguish between natural increases and immigration from La Guyane. [Note: As of 2001, Almond Beach is no longer the primary site, having been eroded by coastal processes; the new high density areas are at Kamwatta Beach and Luri Beach, with nesting also occurring to the southeast (e.g., Tiger Beach, Gwennie Beach, Iron Punt Beach).]

- Based on 1989-1995 annual surveys of Almond Beach conducted between March and August, some 50 nests green turtle nests are laid each year (range 22-70) with a nesting peak in April (Pritchard, unpubl. data). In 1989, a small sample of six nests provided an average clutch size of 129 eggs (range 68-176 eggs). Nesting females measured in 1989 and 1990 ranged in curved carapace length from 103.5-127.6 cm (n=51; Pritchard, 1990). In 1999, 120 nests were reported by the GMTCS (R. De Freitas, pers. comm.). As is the case with leatherbacks, the slaughter of nesting females was a serious problem in the early years of data collection (e.g., 57 females are known to have been killed at Almond Beach in 1988; Pritchard and Suárez, 1996), but the killing has declined in recent years with increasing community involvement in resource management. The trend in this small population is not possible to evaluate with the data currently available, but it would be accurate to say that there is no evidence of a decline. Pritchard reported several small green turtles (~ 30 cm in carapace length) caught by trawlers, suggesting the presence of developmental habitat in the waters of Guyana. The extent to which juvenile turtles utilize the waters of Guyana is unknown.

- Hawksbills may never have been numerous, but the nesting population at Almond Beach appears to have been stable in recent years, with some 20 nests laid each year (range: 9-34 from 1988-1994, with 0 nests in 1990; Pritchard and Suárez, 1996). There were 90 nests reported in 1999 (R. De Freitas, pers. comm.). The nesting season appears to extend from April through August. One remigration interval is known to have been two years because an individual nested on Almond Beach in July 1988 and then again in July 1990 (Pritchard, 1990). Trends in this small population are impossible to discern, but some authorities contend that the persistent killing of gravid females has "caused a major reduction in the nesting population." (Pritchard and Suárez, 1996). Meat and eggs are harvested, but there appears to be no recent use of the shell. In past decades the shell was utilized locally, such as for inlay in musical instruments (e.g., banjos) (A. James, pers. comm.).

- Olive ridleys were once more common than they are today. Pritchard (1990) describes the species as "reasonably abundant" in the mid-1960s. Pritchard and Suárez (1996) contend that "the olive ridley was formerly a regular nester, with perhaps some dozens of animals per year, but it is now reduced to very low numbers." They reported 8 olive ridley nests at Almond Beach in 1988, and 0-4 nests per year from 1989-1994. No nesting was observed from 1995-1999 (R. De Freitas, pers. comm.), and "about 7 nests" were observed in 2000 (P. Pritchard, in litt. July 2001). The data suggest that slaughtering of adults at nesting beaches and an excessive harvest of eggs have taken a toll on this colony.

2.2.b Primary Nesting Sites

Although nesting may occur widely in Guyana, it is very rare east of the Essequibo. The main nesting sites are situated along North West coast, primarily between the Pomeroon and the Waini river estuaries.

Currently, sea turtles are nesting on nine distinct beaches along this coast. With the recent erosion of Almond Beach, the most frequented nesting areas are Luri Beach and Kamwatta Beach, where about 80% of all nests are now laid. Luri appears to be stable, but Kamwatta is eroding. Although these beaches are mostly uninhabited, villagers still travel there to hunt sea turtles. The meat is sold in Moruka, and originates mainly from Gwennie Beach, which is the closest beach to Moruka and the one where significant numbers of fishermen are encamped permanently (P. Pritchard, in litt. September 2001).

The precise distribution of nesting among beaches has changed significantly over the years, as coastal erosion processes have eliminated important nesting areas and subsequently created new ones. Population monitoring and conservation activities remain limited, primarily due to logistical challenges associated with the remoteness of primary nesting habitat. Before 2000, field efforts relied heavily on the efforts of Dr. Peter Pritchard (Chelonia Research Institute, Florida), who has been organizing community-based nest protection campaigns at Almond Beach since 1989. For the 2000, 2001, 2002 and 2003 nesting seasons, the WWF-GUIANAS provided a support grant to the GMTCS for the purpose of coordinating national sea turtle conservation activities. A grant from Beal Aerospace permitted continuation of these efforts during the off-season (P. Pritchard, in litt. July 2001).

2.3 SURINAME

2.3.a Nesting Species

Leatherback, green, olive ridley and hawksbill turtles nest on the beaches of Suriname. The loggerhead turtle is encountered mainly offshore, with but a single nesting record. [Note: Early records of nesting by Caretta (Schulz, 1964) were based upon misidentified *Lepidochelys*.] The Surinam sea turtle conservation program has been in place for over 30 years and, except for a forced absence from some of the nesting beaches for a couple of years due to political turmoil a decade ago, a continuous record exists of nesting on several important beaches. The main nesting season is from February through August, but nesting activities occur throughout the year.

- Leatherbacks nesting in Suriname are part of a population shared with La Guyane that nests in the region surrounding the mouth of the Marowijne River and they constitute the largest known nesting aggregation of this species in the world. Data gathered on leatherbacks in Suriname indicate that the annual numbers of nests laid have fluctuated wildly over the years (Reichart and Fretey, 1993; Swinkels and Van Nugteren, 1999; Hilterman et al., 2001), making an accurate assessment of nesting population size difficult. Notwithstanding these fluctuations, data compiled (nationwide) since 1967 indicate that the number of females selecting to nest in Suriname has increased. Whereas the number of nests laid per year numbered in the hundreds during the 1960s and early 1970s, they now number in the thousands, with 14.000 in 2000 (Hilterman et al., 2001). The nesting season peaks from April through July.

  Despite the fact that the number of nests laid in Suriname appears to be rising, the status (trend) of the population can only be evaluated in combination with data from La Guyane. In *total*, the assemblage does not appear to be declining; however, persistent beach stranding over the past decade are cause for alarm, as the actual number of breeding adults lost to commercial fishing activities is unknown. One indication of the scale of the problem in Suriname is that during a 2-day walk in 1995 along 35 km of beaches in Matapica (a survey undertaken for the purpose of counting stranding), an average of 10-12 carcasses per km were observed (H. Reichart, unpubl. data). Carcass monitoring is an essential component of any management program and should occur on an ongoing basis.

- Green turtles have been thoroughly studied in Suriname, and their dispersal to foraging grounds in Brazil is relatively well known based on tag returns (Schulz, 1975; Reichart and Fretey, 1993). In the two decades between 1969 and 1989, the number of nests laid per year fluctuated between 2,495 (in 1978) and a high of 8,465 (in 1978; as summarized by Reichart and Fretey, 1993). In recent years these fluctuations have continued, with the annual number of nests ranging between 4,242 in 1996 and 11,581 in 1999 (Mohadin, 2000). The population appears to be at least stable, and may well be increasing. Nesting peaks between February and May.

- Olive ridleys are on the decline in Suriname. It is widely accepted that Suriname had, until very recently, the most important nesting beaches in the Atlantic Ocean for this species. Some 3,000 nests per year were laid (nationwide) in the late 1960s when data collection began, including arribadas involving more than 500 individuals (Schulz, 1975). By the late 1980s the annual number of nests laid per year had dropped to significantly less than 1,000 (see Reichart and Fretey, 1993, for a complete summary) and that number further decreased to less than 200 nests per year during the 1990s (Hoekert et al., 1996; Hilterman et al., 2001). If effective measures to minimize incidental captures in shrimp trawls and other fishing gear are not instituted quickly, the Suriname rookery, which nests mainly from mid-May through July, may go extinct in the foreseeable future.

- Hawksbills nest only sporadically in Suriname. Reichart and Fretey (1993) estimated that perhaps 30 nests per year were laid in Suriname. Schulz (1975) reported an average clutch size of 146 eggs. There is no pronounced peak in the reproductive season.

- Although the presence of loggerheads in coastal waters has long been known from specimens in the collection of The Netherlands' Leiden Museum (Brongersma, 1968). Only two nestings have been documented; the first in 1969 (Schulz, 1975) and the second in 2001 on a new beach next to Samsambo Beach in Galibi (M. Hilterman, pers. observ.).

2.3.b Primary Nesting Sites

The Surinam coastline is characterized by strong erosion and accretion forces, and the sandy beaches along the Atlantic Coast shift in a westerly direction at a rate of about 1.5 km per year, with the cycle assumed to repeat itself about every 35 years (Augustinus, 1978). Virtually all sea turtle nesting activity takes place on beaches east from the Suriname River, with some species favoring one beach over another. Most of the nesting beaches are located in or near one of two nature reserves: The Wia Wia Nature Reserve and the Galibi Nature Reserve.

As a direct consequence of coastal processes, the extensive Bigisanti Beach of the 1960s, which at that time was located in the Wia Wia Nature Reserve, moved westward out of the reserve's boundaries. As it moved, the beach was subsequently called Motkreek Beach, Krofajapasi Beach, and Matapica Beach, the latter now being some 70-km west of the original Bigisanti Beach. In keeping with Augustinus' predicted beach cycle, a new beach is presently appearing at the east end of the Wia Wia Reserve, suggesting that sea turtle nesting may once again return to this protected area.

The Galibi Nature Reserve has a more stable coastline since it is located partially within the mouth of the Marowijne River. This reserve has several important nesting beaches, from south to north: Galibi Beach, Pruimeboom Beach, Babunsanti Beach, Thomas Beach, Samsambo Beach, and Kolukumbo Beach. The Samsambo Beach has emerged to the west of the other beaches in the Galibi area around 1998 and was a major nesting beach until 2001. Kolukumbo has emerged around 2000 to the west of Samsambo and is currently replacing Samsambo as a main nesting beach. Both beaches are outside of the Galibi Nature

Reserve, and have been heavily used by leatherbacks. Shifting nesting beaches located outside nature reserves are given some protection during the nesting season through annual decrees.

2.4 LA GUYANE

2.4.a Nesting Species

As is the case in Guyana and Suriname, leatherback, green, olive ridley and hawksbill turtles nest on the beaches of La Guyane, while the loggerhead is encountered only offshore. With the exception of the hawksbill, for which there are too few data, the nesting seasons are well-known: green turtles (January-May), olive ridleys (May-September), and leatherbacks almost all year long (G. Talvy, pers. comm.) and divided into two distinct nesting seasons, a minor peak (December-January) and a major peak (April-July) (D. William, pers. comm.; Chevalier et al., 1999). For more than 20 years, sea turtle monitoring has been concentrated mostly in the western section of La Guyane' s coastline.

- The leatherback turtle is by far the most common species in La Guyane. First scientific data about the leatherback are from Pritchard, in the late 60's. At this time, this species was not observed as nesting on Awala-Yalimapo beach (Daniel William, pers. Comm.), now considered as one of the most important nesting sites worldwide. The main nesting site recorded was located 40 kilometers east, on "Ilets Bâches". Since this time, leatherbacks have been efficiently monitored in all western beaches, at it has been observed that the species was mainly using the Marowijne area to nest (Fretey, J. and J. Lescure, 1979). Up to 50.000 nests a year have been recorded on Awala-Yalimapo (Girondot and Fretey, 1996; Chevalier and Girondot, 1998). More recently, the work done in the East part of La Guyane provides first comprehensive data about the nesting activity of this species, around Kourou and Cayenne Islands (Talvy and Vié, 1999). Regular exchanges of females are observed with colonies nesting in Suriname, and one case of recapture in Trinidad has been notified (Girondot et al., 2001). For 2002, the assessment of number of leatherback nests for the whole country is about 20,000 (Girondot et al., 2001).

- The green turtle also nests in majority on the western sites. It is of rare occurrence encountered in Kourou and Cayenne. To date, no assessment exists on the nesting population in the French department. It is assumed that these turtles adopt the same behavior as the ones nesting in Suriname, by migrating southeast after the nesting season. Nevertheless, juveniles can be encountered all year long around Kourou beach, Cayenne Island and Devil Island.

- The olive-ridley turtle has not been studied extensively in La Guyane until recently. The only known publication about this species describes nesting activity on the western beaches (Fretey, 1989). Recent studies show that important nesting activity of olive-ridleys in La Guyane take place around Kourou and Cayenne (Talvy et al., 2000). It is difficult to assess the trend in olive ridley nesting in La Guyane because data collection methods are not comparable through the years. For example, some 50 nests were reported by J. Fretey *(J. Fretey, pers. Comm.*) in 1980 for western nesting beaches and some 400-500 nests were recorded in 1990; for eastern nesting beaches (M. Girondot, pers. comm.). Talvy and Vié (1999) report 700-1,000 nests laid in 1999 in the East.

- As is the case for the other Guianas, hawksbills nest in very low numbers. Literature assessments (e.g., Talvy and Vié, 1999) estimate that fewer than 10 nests are laid each year on the eastern beaches. Even fewer nesting activities are recorded in the West.

- There is no evidence of nesting by loggerhead sea turtles in La Guyane.

2.4.b Primary Nesting Sites

The primary nesting sites in La Guyane are located at Awala-Yalimapo, along the Point-Isère / Organabo coastline, and at the urban sites of Kourou and Cayenne.

The Awala-Yalimapo Beach is characterized by its unusual stability in comparison with most of the other nesting beaches in the Guianas. This beach is sometimes considered as the most important single nesting site in the world for the leatherback sea turtle, although recent data shown an important population in Gabon. During the primary peak season (May-June), more than 200 nesting leatherbacks may be observed in a single night (Amana Nature Reserve staff, pers. comm.). This beach is also an important nesting site for the green turtles, although this species has not been monitored so far. Olive ridley turtles (on average, less than 10 nests per year) and hawksbill turtles appear to be only occasional nesters.

Beaches along the Point-Isère / Organabo coastline shift with changing shoreline processes (making consistent monitoring difficult); nevertheless, the area provides important nesting habitat and is considered the main nesting area for green turtles in the country (S. Lieutenant, pers. comm.). In 1999, for example, more than 100 nesting green turtles were recorded in a single night at what was then known as "Farez Beach" (now eroded away). Similarly (also in 1999), as many as 10 nesting olive ridleys, 20 leatherbacks and a few green turtles could be seen in a single night on "Organabo Beach"). In the 1960s, these open coast beaches received the great majority of leatherback nests, with about 300 per night during peak season (P. Pritchard, in litt. July 2001).

Finally, two "in-town" nesting sites (Kourou and Cayenne) are important to sea turtles in La Guyane. Sea turtle nesting takes place on four beaches, covering a total of about 4-km, in the vicinity of Kourou. In Cayenne, nesting sea turtles are currently using six main sites, covering a total of about 12-km. These sites are characterized by their urban location with buildings and other human structures, oftentimes only a few meters away from the nests. Two local organizations, Kwata and Sepanguy, are monitoring these sites. Their reports show the importance of these sites for olive ridleys (more than 500 nests/yr.) and leatherbacks (more than 1,000 nests/yr.) (Talvy and Vié, 1999).

3 OCEAN-BASED THREATS

3.1 NATURAL

No statistically rigorous studies of at-sea depredation on sea turtles have ever been conducted. Notwithstanding, it is logical to assume that nearly all ocean-based, natural mortality of sea turtles in the Guianas is caused by predator fishes. As soon as hatchlings enter the sea, a wide variety of fish, mainly catfish (*Arius* sp.) and small sharks, are known to prey upon them (Schulz, 1975).

An ad-hoc experiment in Suriname in the early 1980s substantiated the claim that catfish are an important predator of hatchlings in nearshore waters. Natural resource management staff (Surinam Forest Service) compared the stomach contents of catfish caught in the surf after hatchlings had entered the sea from the shore, with the stomach contents of catfish caught after hatchlings had been hand-released beyond the surf. In the second instance, "far fewer hatchlings had been consumed by the fish" (H. Reichart, unpubl. data). Statistically rigorous experiments in the future could provide quite useful insight into this predator-

prey relationship, which has also been reported in La Guyane (with catfish consuming leatherback hatchlings; see Fretey, 1981).

Laughing gulls (*Larus atricilla*) have been observed picking up hatchlings from the sea in Suriname, but Schulz (1975) concluded that, in general, "sea birds do not seem to be an important menace in the ocean off our beaches."

No studies have been undertaken to evaluate the mortality of juvenile and adult turtles at sea, but there is ample evidence (throughout the world) of their being preyed upon by predator fishes, including tiger sharks (*Galeocerdo cuvier*) and groupers (*Epinephelus itajara*) (summarized for hawksbills by Witzell, 1983 and for green turtles by Hirth, 1997). Caldwell and Caldwell (1969) reported that three killer whales (*Orcinus orcas*) taken simultaneously by a commercial fishing boat on 13 May 1968 off the leeward side of St. Vincent contained pieces of leatherback turtle in their stomachs. The extent to which marine predators contribute to natural rates of mortality for sea turtles in the Guianas is unknown.

Sea turtles may harbor a wide variety of parasites and commensals, both external and internal. For example, Hirth (1997) lists nearly 200 parasites, commensals and mutualists of green turtles. There is no evidence that these organisms contribute to the untimely death of sea turtles in the Guianas, and no specific studies have been undertaken. Fibropapilloma disease, a herpesvirus-like infection, is a debilitating disease currently afflicting several sea turtle populations (particularly green turtles) throughout the world (see Balazs and Pooley, 1991) [5]for an updated bibliography on this serious disease). No individual cases have been reported in the Guianas (Reichart and Fretey, 1993; Pritchard and Suárez, 1996).

We have no reason to believe that factors of natural mortality differ among the Guianas, and thus they are not discussed on a country-by-country basis.

3.2 MAN-INDUCED

The fisheries industry, in particular the world's fishing fleets, has experienced phenomenal growth over the past few decades. Fishing gear, including detection equipment, has improved dramatically, increasing the potential for fish stock depletion. In the Western Central Atlantic region, "there is a common belief that many [fish] stocks are being fully or over-exploited" and additional pressures are evident from coastal development, pollution, and the loss of important coastal nursery areas (FAO, 1997).

Heightened fisheries pressure (increased effort, broad use of indiscriminate fishing technologies) has also become a major factor in sea turtle mortality. Sea turtles are not target species of ocean fisheries, but they often become accidentally trapped in a wide variety of nets or are caught on the hooks of longlines (e.g., North Pacific: Wetherall et al., 1993; Australia: Poiner et al., 1990; Taiwan: Cheng and Chen, 1997; Mediterranean Sea: Gerosa and Casale, 1999; Panoe et al., 1999; Laurent et al. 2001; Western North Atlantic: NRC, 1990; NMFS, 2001).

Estimating sea turtle capture and mortality in fisheries is difficult. The incidental catch, and especially the subsequent death, of sea turtles in fishermen's nets remain clandestine for obvious reasons (as the capture of sea turtles is illegal in many areas). The most reliable way to monitor the catch is by onboard observer programs, but such programs are expensive, intrusive, and generally not welcomed by the industry.

[5] Visit http://www.turtles.org/nmfsbib.htm

The following assessment of fisheries impact on sea turtles in the Guianas, the first such assessment for the region, is based on the report of the Fisheries Impacts Assessment Team hired by the WWF-GUIANAS in support of this regional conservation program. The team's work covered Guyana, Suriname and La Guyane, as well as Trinidad and Tobago. The full assessment report is available from WWF GUIANAS under separate cover (Laurent, 1999). This section also includes a discussion of pollution as a man-induced threat to the marine environment.

3.2.a Incidental Catch in Coastal Fisheries

Coastal fisheries operate within the continental shelf in waters generally less than 200 m in depth using a great variety of fishing gear. Most of them are demersal, but some are pelagic (i.e., set at the surface). These pelagic gear types are used by small boats fishing near the coasts and targeting small pelagic fishes, or are set in shallow waters. The largest fisheries are shrimp trawling and multifilament polyethylene drift gillnetting.

Trawling for shrimp is the most important fishing activity along the coasts of the Guianas, with trawlers of several nations exploiting the resource. Circumstantial evidence suggests that trawlnet-induced mortality among sea turtles is high. In general, the trawlers are "Florida type", steel-hulled boats, varying from 15-25 m in length. The most common method of fishing is with double outrigger otter trawlnets plus a stern "try" net. In Guyana, though, all shrimp trawlers use four smaller outrigger otter trawlnets (twin trawling). Almost all trawlers operate on the continental shelf, and are thus coastal fisheries. Those fishing for the various *Penaeus* sp. do so at depths of 18-90 m, with a haul time of 4-6 hours at night and 3-4 hours during the day. Those fishing for sea bob shrimp (*Xiphopenaeus kroyeri*) trawl at depths of 10-20 m, with a haul time of 2-4 hours.

Information regarding turtles (including those tagged on the nesting beaches) being subsequently captured in shrimp trawls has been available for Guyana for many years (e.g., Pritchard, 1973, 1991), but the first efforts to quantify the problem were published by Tambiah (1994). Furthermore, logbook data from La Guyane (Moguedet et al., 1994) and observer data from Venezuela (Marcano and Alio, 2000), clearly indicate that both leatherback and olive ridley turtles interact with shrimp trawl fisheries along the coasts of the Guiana-Brazil shelf (Laurent et al., 1999) [n.b. both Pritchard and Tambiah document the catch of juvenile green turtles, as well]. Because leatherback and olive ridley turtles occur in high densities in these waters for nesting and feeding, catch rates[6] in shrimp trawl nets (especially of olive ridleys) are likely to be substantial (Chevalier et al., 1998). As a result, the total catch may reach thousands of incidental captures per year, since about 548 shrimp trawlers operate in the region all year round.

The use of Turtle Excluder Devices (TEDs) contributes significantly to reducing direct mortality in shrimp trawls. Throughout the Guianas, except in La Guyane, the use of TEDs is mandatory according to national law. However, the escape opening of the TEDs currently being used is too small to allow leatherbacks and the larger cheloniids to escape from trawl nets. Thus, great numbers of leatherbacks and the larger cheloniids may drown each year in shrimp trawl fisheries operating on the Guiana-Brazil Shelf, even with the use of TEDs. To accommodate the release of larger turtles, TEDs with sufficiently large openings must be utilized (for details, see section 7.2.b.1).

Gillnets are either multifilament nets, made of twine (woven cotton, nylon or polyethylene) or monofilament nets, made of transparent nylon locally called "transpearing". Gillnets are used in different ways. They may be set and anchored at the bottom. They may also be held at the bottom while drifting

[6] number of turtle caught per unit fishing effort

freely with the tides. Thus, the lead line touching the bottom and the length of float line are adjusted according to the depth and the desired slackness, strength of current, etc. In other cases, they are set as traditional surface drift gillnets with the headline floating at the surface and the webbing hanging vertically in the water. The are three primary types of gillnets, as follows:

- Type 1 is a multifilament polyethylene drift gillnet, called a "Guyana seine", primarily used in Guyana and Suriname to target nectobenthic fishes such as gray snapper (*Cynoscion acoupa)*, sea trout (*Cynoscion virescens),* gillbacker (*Arius parkieri)*, and sharks. Nets range in length from 2-4 km with a height varying from 5-8 m; stretched mesh sizes vary from 17 to 20 cm. The fishing boats are known as "Guyana-type" and are wooden with a length of about 15-m.

- Type 2 is a multifilament braided nylon gillnet with a stretched mesh size of about 10 cm and a length that varies from 300-1,000 m. It is either anchored at the bottom or is allowed to drift in shallow waters in contact with the bottom. In La Guyane, these nets are called "follettes".

- Type 3 is a multifilament braided nylon gillnet (green net) of about 1000 m in length. It is mostly used in Trinidad and Tobago to target Carite (*Scomberomorus brasiliensis)*. In shallow waters, it is also used to catch demersal species. The monofilament flyingfish gillnet is also used in Trinidad and Tobago to target flyingfish (*Hirundichthys affinis)*.

A total of 728 "Guyana-type" boats operate year round along the coasts of the Guiana-Brazil Continental Shelf using multifilament polyethylene drift gillnets. Their impact on sea turtles is estimated to be very significant due to the high concentration of sea turtles in these coastal waters. Many authors, have already stressed the need for this assessment (Pritchard, 1991; Reichart and Fretey, 1993; Tambiah, 1994). Reichart and Fretey (1993) characterized incidental catch from various fishing activities as "the largest unaddressed problem in turtle conservation in the region." A study by the ONCFS and Diren-Guyane confirms the level of impacts of fisheries on sea turtles, especially the Leatherback (Chevalier, 2001).

3.2.a.1 Guyana

A survey conducted a decade ago among fishermen and coastal villagers in Guyana indicated that about 1,300 leatherback, green and olive ridley turtles were caught and killed in shrimp trawls in 1991 (Tambiah, 1994). Since installing TEDs in these trawls, sea turtle mortality in coastal fisheries might logically be assumed to have declined, but there are no data available to support this (or any other) conclusion. Currently, 106 shrimp trawlers operate in Guyana's waters.

The Maritime Boundaries Order (under the Maritime Boundaries Act) requires that all fishing vessels use Turtle Excluder Devices (TEDs) as of 1 May 1994 Guyana (Guyana Review, 17 June 1994). At the present time, however, there is no formal mechanism at the level of government of industry to enforce the use of TEDs, to evaluate their effectiveness under local fishing conditions, or to assess the efficacy of the TED program in general (e.g., legislation, fleet use, record-keeping, effect on sea turtle mortality).

Currently, 368 vessels use the multifilament polyethylene drift gillnet, locally called a "Guyana seine", while the multifilament braided nylon bottom set gillnet is used by an estimated 442 boats. In addition, about 38 fishing boats known as "handliners" and measuring up to 18 m, target snappers and groupers with hooked lines at depths ranging between 120 m at the edge of the Continental Shelf. Traps ("pots") are also used to target snappers.

3.2.a.2 Suriname

Schulz (1975) first published concern over "the drowning of young turtles in the nets of fishermen and of shrimp trawlers, operating in growing numbers on the Guiana shelf." He further noted that, "The large number of adults thus caught is illustrated by the recoveries made off the Guiana coast, which are all from shrimp trawlers." His records showed that tag recoveries from post-nesting green and olive ridley turtles (departing from the nesting beaches of Suriname) came from as far away as Isla de Margarita (Venezuela) to the state of Alagoas in Brazil.

The first attempt to quantify sea turtle bycatch in offshore fisheries included a survey of fishermen and coastal villagers in Suriname, and reported that about 3,200 leatherback, green and olive ridley turtles were caught and killed in shrimp trawls in 1991 (Tambiah, 1994). This number may or may not have significantly decreased with the use of the TEDs. There are apparently no data with which to assess the efficacy of TED use at the present time. About 130 shrimp trawlers currently operate in Suriname. Patrol boats help to ensure TED use, which is part of a fisheries agreement with the USA. Some vessels have recently been apprehended for illegal fishing practices.

About 360 registered wooden "Guyana-type" boats use the multifilament polyethylene drift gillnets in Suriname. The actual number is probably higher, as many boats registered in Guyana fish illegally in the coastal waters of Suriname. In Suriname, about 50 vessels use the same type of bottom set gillnet used in Guyana. There currently is a no-fishing zone in front of the Galibi nature reserve which extends until 15 km to the West. Law enforcement in this zone is done during the marine turtle nesting season by the Fisheries Service and other government services active at sea in the area.

3.2.a.3 La Guyane

The shrimp trawler fleet in La Guyane consists of about 60 vessels. None uses TEDs. Incidental catch of sea turtles in these trawls consists mainly of olive ridleys, and is estimated at about 1,000 turtles per year, with a direct mortality rate of about 16.6% (Moguedet et al., 1994). No data are available on rates of incidental catch or mortality of leatherbacks and greens in shrimp trawls.

Sea turtle mortality, caused by the multifilament polyethylene drift gillnets that are probably used by "Guyana boats" from Suriname, is reported to be significant in La Guyane (Chevalier, 2001). In May 1999, eight dead sea turtles were found entangled in a single piece of multifilament polyethylene drift gillnet (Kawana project staff, pers. comm.). A similar case has been recorded in 2001 where 12 leatherbacks were caught on a single drifnet (Kelle, L., pers. obser.) The full extent of multifilament polyethylene drift gillnet-induced mortality of sea turtles is not known.

Gill nets set in the mouth of the Marowijne River during the nesting season also cause significant levels of entrapment (incidental capture) and subsequent death to leatherbacks in particular, as the estuary zone is a high-density sea turtle nesting ground. (Lochon, 1999; Chevalier et al., 2000; Debas et al, 2000). A recent work focused on the Marowijne estuary has provided data on such impact (Chevalier et al., 2001). Currently, there are no specific regulations governing sea turtle entrapment in La Guyane (although it is illegal to kill a sea turtle or to capture it intentionally for the purpose of killing it).

In La Guyane, around 44 boats use multifilament braided nylon bottom set gillnets, called "folettes". About 27 handliners also operate out of La Guyane.

3.2.a.4 Extra regional

Pritchard (1984) reported that a significant number of adult olive ridleys tagged in Suriname in the late 1960s and early 1970s were subsequently caught in trawls in Trinidad and western Venezuela. There have been few subsequent data, partly because of collapsing olive ridley stocks and partly because of an increasing reluctance on the part of shrimpers to provide information (P. Pritchard, in litt. July 2001). Currently 28 trawlers are registered in Trinidad and Tobago. The number of trawl-caught sea turtles is unknown. The use of TEDs has been mandatory under national law since 1994.

Leatherback mortality caused by multifilament braided nylon (green net) and monofilament gillnets is high in Trinidad, especially along the northeast coast of the country. Based on interviews conducted in fishing communities between 1992 and 1998, Eckert and Lien (1999) estimate that more than a 1,000 egg-bearing leatherbacks are captured each year (including, presumably, multiple captures of the same individual) offshore the nesting beaches in Trinidad; all indications are that mortality rates are high (50%-95%, depending on the area).

Eckert and Lien (1999) concluded that "incidental capture is the largest single source of mortality to leatherbacks in Trinidad and Tobago, killing more turtles than all other factors combined" and they offer a number of recommendations for mitigating the threat. The number of boats involved in the gillnet fishery was estimated at 393 in 1991 (Fabres and Kuruvilla, 1992); more current information is not available.

Tobago has a fishing fleet of 39 boats, and monofilament flying fish gillnet fisheries operate only from November to June. The number of handliners is around 60 (Fabres and Kuruvilla, 1992), with most of them under the Venezuelan flag.

In the period of 1991-1993, an observer program was implemented on the shrimp trawl fleet of Venezuela. The following incidental captures were recorded: 6 leatherbacks, 16 greens, 11 hawksbills and 15 loggerheads (Marcano et al., 2000). There are 66 shrimp trawlers on the Atlantic coasts of the Venezuela.

No data are currently available on either gillnet fisheries or handliner fisheries.

In 1999, about 115 industrial fishing boats were recorded in the states of Amapá and Pará (Aragão, J. A. N. et. al. In press).

3.2.b Incidental Catch in High-Seas Fisheries

In this context, high-seas fisheries refer to oceanic pelagic fishing beyond the Continental Shelf targeting migratory species such as scombrids, Swordfish (*Xiphias gladius)*, and billfish (*Istiophoridae)*.

Rich fishing grounds are located off the coast of the Guianas. Commercial boats of several nations besides those from the Guianas exploit the area year around and, depending on the target species, use a variety of gear, much of which may entrap sea turtles.

Based on information obtained from available fisheries statistics and incidental catch monitoring programs initiated by other governments, three types of high-seas fisheries are known to cause sea turtle incidental catch in the Western Atlantic Ocean:

- Drifting longlines (pelagic long lines with baited hooks attached along the entire length)
- Driftnets (gillnets left to drift with the ocean currents)
- Purse seines (floating nets where the ends are pulled together to encircle schools of fish)

None of the three Guianas uses these high-seas fishing gear types. In contrast, Venezuela uses all three and Brazil (see ICCAT, 1998) and Trinidad and Tobago use only drifting longlines. Drifting longline fisheries are well known to interact with leatherback populations. Catch rate[7] and direct mortality[8] of leatherbacks in Atlantic fisheries are generally low (Witzell, 1999), but delayed mortality[9] remains unknown.

Compared to driftnet fisheries in the Pacific, in which large numbers of leatherbacks are captured incidentally (e.g., Frazier and Montero, 1990; Eckert and Sarti, 1997), fishing impact of Atlantic driftnet fisheries appears to be minor. In the Venezuelan fishing industry, however, numerous artisanal boats, targeting billfish, are fishing with driftnets. The incidental capture of sea turtles, in particular leatherbacks, may be significant, but bycatch data are poorly recorded in Venezuela. Incidental catch and mortality of leatherbacks is reported from the Eastern Atlantic in the French and English albacore tuna driftnet fisheries (Goujon et al., 1993) and some proportion of these turtles are surely drawn from the Guianas, based on what we know about the geographic range of leatherbacks in the Greater Atlantic ecosystem.

Purse seine fisheries activity is low and poorly monitored in the Atlantic. Stretta et al. (1993) indicated that all leatherbacks caught by this type of fisheries gear in the Atlantic are released alive. Thus, it seems that sea turtle mortality may be negligible in these fisheries.

There are no data on high-seas fisheries incidental catch of olive ridleys. In the Eastern Tropical Pacific olive ridleys occur hundreds of kilometers offshore, but in the Atlantic they are typically continental shelf species and thus would not be expected to interact with high-seas fisheries.

In general, the fishing effort of high-seas fisheries in the Guianas region is not intense, but the incidental catch of sea turtles in Venezuelan longline and driftnet fisheries needs to be evaluated as a matter of priority.

3.2.b.1 Guyana

Venezuelan longline swordfishing vessels operate off the coasts of Guyana and may cause incidental sea turtle capture and mortality. A specific regional agreement is needed to address the potential problems caused by foreign vessels inflicting mortality on species protected under the laws of Guyana.

3.2.b.2 Suriname

Venezuelan longline swordfishing vessels operate off the coasts of Suriname and may cause incidental sea turtle capture and mortality. One case of leatherback turtle with a similar kind of hook than the one used is Venezuelan longline swordfish fishing vessels on the mouth has been recently observed in

[7] number of captures per unit fishing effort

[8] direct mortality means the immediate death in the fishing gear due to drowning or severe trauma

[9] delayed mortality means the subsequent death of individuals released in a weak or comatose condition, injured or with a hook in digestive tract

Suriname (L. Kelle, pers. Obser.). A specific regional agreement is needed to address the potential problems caused by foreign vessels inflicting mortality on species protected under the laws of Suriname.

3.2.b..3 La Guyane

Venezuelan longline swordfishing vessels operate off the coasts of La Guyane and may cause incidental sea turtle capture and mortality. A specific regional agreement is needed to address the potential problems caused by foreign vessels inflicting mortality on species protected under the laws of La Guyane.

3.2.b.4 Extra regional

Venezuelan longline swordfishing vessels operate off the coasts of Trinidad and Tobago and may cause incidental sea turtle capture and mortality. Conversely, Trinidadian longline tuna fishing boats fish off the Guianas up to 40° W, and may also interact with sea turtles. Specific regional agreements should be negotiated to address the potential problems caused by foreign vessels inflicting mortality on species protected under the laws of a maritime country.

In contrast to the Guianas, Venezuela supports a commercial fleet of about 294 boats using drifting longlines and driftnets and a fleet of 34 boats using purse seines, operating mainly in the Pacific Ocean (Weidner and Arocha., 1999). No data are available on sea turtle incidental catch and mortality in Venezuelan high-seas fisheries.

Brazil has drifting longline fisheries, with a fleet of about 73 boats (ICCAT, 1998), but has neither driftnet nor purse seine fisheries. Some information is available regarding sea turtle incidental catch in Brazilian longline fisheries (Barata et al., 1998), but in general the situation is poorly documented (Weidner and Arocha, 1999).

3.2.c Pollution

Ships passing through the waters of the Guianas routinely dump garbage and other waste products overboard, often in violation of international agreements. Much of this debris winds up on the nesting beaches, but much of it also remains floating in the ocean, presenting a hazard to marine life – including sea turtles. Another source of pollution is the discharge from the main rivers in the Guianas. Nearby industries and public utilities installations, unencumbered by or in spite of regulations, discharge their waste products directly into river systems. These products then gradually find their way to the ocean.

Based on data from other regions of the world, and some available data from the Guianas, we can assume that the major pollutants *potentially* threatening sea turtles in the region include:

- Pieces of floating and abandoned driftnets may ensnare turtles and can cause drowning
- Plastic sheets and bags may be ingested for food, causing suffocation or intestinal blockage
- Abandoned or lost fishing lines with baited hooks still attached may cause mortality when turtles consume the bait and become hooked

None of these problems have been thoroughly assessed, nor have mitigation actions been defined or undertaken. In some cases anecdotal data are available, such as from Suriname where dead leatherbacks have been observed to have bag-like plastic material extruding from their mouth (H. Reichart, pers. observ.). General information, particularly concerning persistent marine debris, is available in the

literature (e.g., Balazs, 1984; Witzell and Teas, 1994; Faris and Hart, 1995) and might serve as a starting point for evaluating and documenting the problem in the Guianas. The extent to which chemical contaminants affect sea turtles in the Guianas is unknown; Pugh and Becker (2001) provide a useful annotated bibliography on this subject.

4. LAND-BASED THREATS

4.1 NATURAL

The slow, westward-directed Guiana Current (a continuation of the South Equatorial Current) carries a large volume of mud (presumably of Andean origin and transported to the Atlantic Ocean by the Amazon River) to the Guianas. Much of that mud settles on and near the coasts of the Guianas. The combined effects of sea current and wave action results in erosion on the east-side of mud banks, as well as adjoining beaches, and accretion on the west side. This causes an apparent movement of beaches in a westerly direction at a rate of 1-2 km per year, with the result that the location and the shape of the nesting beaches continually change. This accretion and erosion cycle has been extensively studied in Suriname and is estimated to take about 35 years (Augustinus, 1978)

4.1.a Regional Context

Natural, land-based threats to sea turtles are virtually the same in all three Guianas, with beach erosion being the most important mortality factor for the eggs. Erosion probably destroys more eggs than all other mortality factors combined, but the effects are not seen at all locations as high-risk areas shift from year to year. One option is to relocate "doomed" eggs to safer sites, with an aim to increase reproductive success. Nest relocation is discouraged by some as potentially detrimental to the population because altered thermal regimes may bias hatchling sex ratios (Girodont et al., 1998). However saving a substantial number of otherwise doomed eggs using standard relocation protocols (e.g., Boulon, 1999; Mortimer, 1999) has been done successfully for more than two decades at long-term research sites elsewhere in the Caribbean region, resulting, for example, in a near tripling of the nesting population in the U.S. Virgin Islands (R. Boulon, pers. comm. *in* Eckert, 2001).

We assume that threats from other natural factors, such as depredation, are within acceptable limits in the Guianas, and that no specific action needs to be taken. Field personnel should, nevertheless, monitor and record predator-induced mortality to establish a reference database. In comparison with sea turtle nesting sites in other parts of the world, the coastal biome of the Guianas remains well preserved, and the current environmental conditions have probably existed for centuries. Therefore, natural mortality factors probably play no substantive role in the observed decrease in numbers of nesting females, such as has clearly occurred in the case of the olive ridley.

To summarize, the main natural threats facing sea turtles in the region are:

- *adult stage:* entanglement in the prop roots of mangroves, entrapment in mud flats, disorientation into inland swamps after nesting, and depredation by jaguars,
- *egg stage:* beach erosion, predators (e.g., mole crickets, ghost crabs, and other invertebrates; mammals; birds), sub-optimal physicochemical development conditions (e.g., nest flooding)

- *hatchling stage:* entanglement in the prop roots of mangroves; entrapment in driftwood; stranding and dehydration on mud flats; depredation such as by raccoons, birds and crabs; disorientation into inland swamps after emergence.

4.1.b Guyana

In Guyana, the beach erosion cycle takes place throughout the 90 miles of coastline between the mouths of the Pomeroon and Waini rivers. This coastline consists of stretches of mangrove forests and mudflats that alternate with shell beaches. Although the coast is classified as a "low-energy coast" (Augustinus, 1978), strong wave action at the nesting beaches causes considerable loss of beach material. In this environment, the most important environmental threat to sea turtles is erosion of nests causing the loss of untold numbers of eggs.

Another factor is the mangroves lining the coastline between the nesting beaches. Nesting sea turtles regularly (that is, incidents are reported every year) become entangled in prop roots, are unable to extract themselves, and eventually die from exposure. Although the loss of eggs and adult sea turtles to these environmental factors may be significant, no accurate data exist to quantify these threats.

Non-human depredation of adult turtles has not been quantified. Nesting females are occasionally taken by jaguars (*Panthera onca*) and while this is a more significant threat in some countries than in others, it is presumably consistent with historical patterns of natural depredation. Eggs and hatchlings are exposed to a host of predators, such as crab-eating raccoons (*Procyon cancrivorous*), black vultures, (*Coragyps atratus*), ghost crabs (*Ocypode quadrata*), and mole crickets (*Gryllotalpa* sp.; *Scapteriscus* sp.) (summarized by Reichart and Fretey, 1993).

On the whole, natural mortality factors can be largely mitigated by having adequate beach personnel available to relocate the doomed eggs to safer locations, discourage predators, and regularly patrol mangrove areas to dislodge live, trapped turtles.

4.1.c Suriname

In Suriname, sea turtle nesting takes place only on the beaches between the Suriname River and the Marowijne River, the latter being the border-river between Suriname and La Guyane. The phenomenon of coastal erosion and accretion is probably even more intense in Suriname than in Guyana. The nesting beaches at the mouth of the Marowijne River are fairly stable, showing only minor shifting over the past century. The beaches along the Atlantic coast, however, are subject to drastic changes. Coastal land tongues, called spits, form at the mouths of some of the tidal creeks, moving in a westerly direction at a rate of 1-2 km per year, paralleling the mainland coast.

The most important environmental threat to sea turtles nesting on beaches and spits along the Atlantic Coast of Suriname is erosion of nests, causing the loss of untold numbers of eggs. The mangroves lining the coastline between the nesting beaches represent another threat, as nesting females at times become entangled in the prop roots. Very often they are unable to extract themselves, and eventually die from exposure if not set free. Although loss of eggs and adult sea turtles to these environmental factors is widely believed to be substantial, no accurate data exist to quantify these threats. Much of this mortality may be avoided by increasing the number of beach patrollers able to relocating doomed eggs to safer locations and patrolling mangrove areas to dislodge live, trapped turtles.

Non-human depredation of sea turtles on the nesting sites is similar to that in Guyana (for example, depredation by jaguars is documented by Autar, 1994), but levels of mortality have never been adequately quantified. Levels of mortality may be consistent with historical patterns, but with an increase in human activities (e.g., agricultural plots, fishermen's camps) in the area, the presence of jaguars has become more evident; in the future, rates of depredation on sea turtles or their young may exceed tolerable levels.

As is the case elsewhere in the region, eggs and hatchlings are exposed to a host of predators, such as crab-eating raccoons, black vultures, ghost crabs, mole crickets, and feral as well as domesticated dogs (Schulz, 1975, as well as current observations by field personnel).

4.1.d La Guyane

Three types of beaches have nesting sea turtles in La Guyane: the relatively "stable" beach of Awala-Yalimapo, the "west coast" nesting beaches between Organabo and Pointe Isère, (with high coastal dynamic) and the "in-town" (urban) nesting beaches at Kourou and Cayenne.

Because of the high concentration of nests on a small beach (4,5 km long), some nests laid early in the season at Awala-Yalimapo are destroyed by females coming to nest later in the season, but the effect appears to be marginal (Girondot et al., 2002). As in the other Guianas, ghost crabs and mole crickets prey upon the eggs, providing an additional source of mortality.

The relative stability of the Awala-Yalimapo Beach, and the very large numbers of eggs laid there, may have resulted in some predators specializing on sea turtles, especially during the hatchling life stage. At night, during peak hatchling emergence, black-crowned night herons (*Nycticorax nycticorax*) (Fretey, J. and J. Lescure, 1981) and great-horned owls (*Bubo virginianus*) (L. Kelle, pers. observ.) prey on hatchlings, and catfish (Ariidea *spp.*) wait for them to enter the sea. Depredation by fish seems to be the most important natural threat to hatchlings at night. Large concentrations of black vultures are also observed during the nesting season. Adults (nesting females) face few natural threats on the beach at Awala-Yalimapo, and no deaths have been recorded in recent memory.

On the "west coast" nesting beaches, the main threats to adult sea turtles are depredation and entrapment in driftwood snags (Fretey, 1981). The main natural predator appears to be the jaguar, and during the nesting season one (sometimes more) is on the beach almost every day night in Organabo.

Field trips made to the west-coast nesting beaches showed significant erosion. Nests located at the easternmost ends of these beaches are doomed, i.e. destroyed before they have hatched. The main threats to hatchlings on these beaches appear to be the natural predators (black vultures and raccoons), and the risk of getting snagged in the many large pieces of driftwood being deposited on the beach by the tides.

The same natural threats (as on the West Coast) have been recorded for the "in-town" sites except that they are less prone to erosion.

4.2 MAN-INDUCED

In historical times, the nesting beaches of the Guianas were remote and isolated. The only man-induced threats to the sea turtles came from small indigenous tribes living in isolated communities nearby. There was a subsistence harvest with, presumably, no significant effect on the sea turtle populations. As the Guianas became more inhabited, and the natural resources became more exploited, man-induced threats

became an important factor in the population dynamics of these species. While the natural land-based threats appear to be quite similar among the Guianas, and there are no data to suggest that they exceed ecologically acceptable limits, the situation is different for man-induced threats. Their impacts on sea turtles vary with the socio-cultural and economic environment of each country.

4.2.a Regional Context

Terrestrial, man-induced threats to the survival of sea turtles are different in each of the Guianas. The species are confronted with a number of country-specific negative factors, each of which will have to be addressed at the national level. This Regional Conservation Action Plan reflects those differences in terms of mitigation measures. The main human-induced threats in the region to sea turtles are:

- *adult stage:* poaching (Guyana), dogs on nesting beaches (Guyana, Suriname, La Guyane), artificial beachfront lighting (La Guyane), disturbance by tourists (Suriname, La Guyane)
- *egg stage:* depredation by humans (poaching) and dogs (Guyana, Suriname, La Guyane), trampling of nests by tourists (La Guyane)
- *hatchling stage:* dogs on nesting beaches (Guyana, Suriname, La Guyane), artificial beachfront lighting (La Guyane), trampling by tourists (La Guyane)

4.2.b Guyana

Human depredation on sea turtles has taken a heavy toll in Guyana. While the harvest has been significantly reduced in recent years, due to beach patrols and other conservation initiatives, it is still the worst land-based threat to sea turtle survival. Pritchard (1986) concluded that some nests, perhaps as many as 50%, escaped human exploitation, but 80% of all nesting attempts resulted in the slaughter of the nesting female by Amerindians living in the vicinity of nesting grounds. During “crab season” (June-August), entire families periodically spent a few days on the beaches. During these stays, any sea turtle seen coming ashore to nest was likely to be killed for meat.

Today the odds of a adult female surviving the nesting season have improved significantly, but as nesting shifts to new beaches where base camps have not been constructed and communities are unfamiliar with conservation options, nesting females continue to be killed on an opportunistic basis. Eggs, meat, and other parts of the turtle, such as viscera, throat tissue and unlaid eggs, are offered for sale in local markets, such as in Maruka. At the present time the meat arriving in Maruka appears to originate from nearby Gwennie Beach.

While the killing of nesting females and the theft of eggs persists as a serious problem, the *most* serious threat to sea turtle survival in Guyana at the present time is unquestionably “the massive amount of incidental mortality of leatherbacks that has occurred during the last few seasons.” (P. Pritchard, in litt. September 2001). The affected animals wash ashore dead, many of them mutilated but most not butchered out for meat, and it seems inescapable that they are caught at sea and killed by fishermen to prevent further damage to their nets.

4.2.c Suriname

Virtually no turtles are slaughtered for meat or other products in Suriname, and uncontrolled human depredation of sea turtles consists only of the poaching of eggs.

Until 2001, there was a short open season (the month of April) for legally collecting sea turtles eggs by the public, but this was allowed only on specific low-production beaches, outside of the main nesting areas of marine turtles. Permits used to be given for a larger legal harvest to STINASU, whereby the eggs collected are sold to the public to raise funds for sea turtle conservation. This has been discontinued. The only collection of turtle eggs outside this open season which Suriname law allows is by native, tribal inhabitants who collect eggs for their own consumption.

The legal harvest was under adequate control; however, poaching continues in some closed or protected areas during the entire nesting season. Egg poaching has been on the increase over the past few years (precise data are unavailable but informed observers estimate thousands, if not tens of thousands, of eggs are involved), probably as the result of a worsening economic situation in Suriname. The legal harvest of eggs was stopped (since 2000) at the request of the local Amerindian communities, however, poaching continues because the level of personnel to adequately patrol the long isolated beaches is not sufficient. There are plans to have volunteers assist with the monitoring and patrolling.

Domestic or feral dogs are an indirect human depredation factor. Dogs from villagers, dogs lost by hunters, and dogs purposely abandoned are a known threat to sea turtle conservation in Suriname. Dogs not only dig up nests to get to the eggs, but they also harass turtles coming ashore to nest to the point where the female will leave the area without laying her eggs, or in some instances drop the eggs on her way back to the sea.

4.2.d La Guyane

In La Guyane, collecting, selling or using sea turtles eggs is prohibited. Egg poaching still occurs on many of the nesting beaches, especially in the west, where the high density of leatherback and green turtle nesting sites attracts poachers. On the beaches around Kourou and Cayenne, egg poaching occurs at lesser rates. Egg poaching at the latter seems to be more the work of opportunist collectors than that of organized teams. No quantitative data are currently available documenting the number of eggs or nests poached each year in La Guyane.

The presence of dogs on the beaches of Awala-Yalimapo and Cayenne also represents a significant threat to both turtle eggs and hatchlings. On the beaches in Cayenne, more than 50 adult olive ridleys have been killed by domestic dogs in 2002. (Barrioz and Szpigel, Pers. Comm.).

While it cannot be considered a direct threat to the survival of sea turtles, human disturbance of sea turtles seems to be a matter of concern at most nesting sites in La Guyane. Good road access makes the sites of Awala-Yalimapo, Kourou, and Cayenne prime recreational areas, with significantly high rates of visitation during national holidays. Many of these holidays are during the sea turtle nesting season. Unfortunately, many visitors still show little or no concern for the nests or the emerging hatchlings despite the on-going environmental awareness.

In Awala-Yalimapo, some of these holidays may bring more than 300 people in a single night on the nesting beach then many of these visitors would walk around without a guide, even when dozens of sea turtles are coming ashore to nest. Similar scenes take place on the beaches in Cayenne from March to August, although most of the visitors limit their stay to daylight hours. Olive ridley nests are especially vulnerable to these types of human interference because they are relatively shallow (Talvy and Vié, 1999).

As these beaches have become more popular as recreation areas, local town councils have initiated beach-cleaning activities. The upper part of the beaches is cleaned, and these activities may also have negative impacts on the development of the eggs in the nests laid on these beaches.

Finally, artificial beachfront lighting is a potential threat in Awala-Yalimapo, Kourou, and Cayenne. It is noteworthy that in Awala-Yalimapo, at least, lights from the village have now been reduced and only a relatively few hatchlings stray inland. Once in a while, an adult sea turtle (in most instances a leatherback) is disoriented by the lights. Similarly, high intensity camera flashes are a source of disturbance during the more crowded days.

5 INSTITUTIONS ENGAGED IN SEA TURTLE CONSERVATION

This chapter and the next one are excerpts from the "Assessment of Sea Turtle Related Institutions and Communities", conducted by the support team of Institution / Community Development Specialists (full report is available from WWF-Guianas, under separate cover).

5.1 NATIONAL ORGANIZATIONS AND/OR AGENCIES

5.1.a Regional Context

Due primarily to socio-cultural and economic differences among the Guianas, local involvement in sea turtle conservation varies.

In Guyana, sea turtle conservation efforts depended, until recently, almost totally on non-governmental efforts made by Dr. Peter Pritchard, who has successfully reduced poaching pressure by organizing nest site protection patrols by the Arawak stakeholders at Almond Beach for over 13 years. In late 1999, community- and national-level stakeholders, led by Dr. Pritchard, launched the Guyana Marine Turtle Conservation Society (GMTCS) with the support of WWF-Guiana.

Suriname has for a long time been the pioneer in sea turtle conservation efforts for the region, and several local organizations are involved in sea turtle activities. Conservation efforts began in the 1960s by Dr. Johan Schulz, Head of the Nature Conservation Division (NB) of the Surinam Forest Service (LBB). To facilitate fundraising and reduce bureaucracy, Schulz set up the Foundation for Nature Preservation in Suriname (STINASU). Research, education, and tourist activities associated with sea turtles were placed under the supervision of STINASU, which has a full mandate from the Government. The legal aspects of sea turtle management (e.g., legislation, game wardens, and treaties) remained with the Nature Conservation Division. Today these efforts represent a truly collaborative relationship between Government, NGOs and community participants.

In La Guyane, Jacques Fretey coordinated the first sea turtle research and conservation program at Yalimapo from 1977-1996. A recent wave of interest in sea turtle conservation has led to a significant increase in the number of stakeholders participating in local and national initiatives. Once limited to a few pioneers, now up to ten organizations play a role in sea turtle conservation efforts.

At the regional level, the WWF-GUIANAS has recently assumed a role in coordinating and funding sea turtle conservation efforts. Since 1998, it has provided technical and financial support for sea turtle conservation in Suriname and La Guyane. Similar support has been provided to Guyana since the 2000

nesting season. In collaboration with the Wider Caribbean Sea Turtle Conservation Network (WIDE-CAST), the WWF-GUIANAS provided impetus for this regional conservation strategy and action plan.

5.1.b Guyana

The Guyana Environmental Protection Agency (EPA) is the government agency primarily responsible for the conservation of biodiversity. Through its Natural Resources / Biodiversity Unit, the EPA has a mandate for wildlife management. As such, it is also responsible for sea turtle management; however, to date, this recently established agency has not been directly involved in sea turtle conservation activities.

Until the creation of the Guyana Marine Turtle Conservation Society (GMTCS) in late 1999, no institution directly targeted sea turtle management or conservation in Guyana. For many years, Dr. Peter Pritchard and a group of local Amerindians from Santa Rosa were the only ones involved in sea turtle research and/or conservation work on the nesting beaches of Guyana. The GMTCS has currently a leading role in sea turtle conservation work in Guyana.

The Fisheries Department, in cooperation with the U.S. National Marine Fisheries Service, has spearheaded the TED program in Guyana. The Maritime Boundaries Order (under the Maritime Boundaries Act) requires that all fishing vessels use Turtle Excluder Devices (TEDs) starting on 1 May 1994 in Guyana (Guyana Review, 17 June 1994). More recently, actions by the Coast Guard have supplemented the beach protection efforts of the GMTCS (P. Pritchard, in litt. July 2001).

There are several indigenous NGOs, but their concerns are primarily land rights, economic improvement, and cultural preservation. None of them is currently involved with sea turtle research or conservation, with the exception of the Santa Rosa Conservation Club, created by the GMTCS and comprised of young people in the Santa Rosa / Kumaka area.

Conservation International Guyana (CI) is primarily involved in education and awareness activities, it has recently been involved in sea turtle education at Almond Beach, and has lobbied for protected status for this beach. It also supports the Santa Rosa Conservation Club (see above).

5.1.c Suriname

Established in 1963, the Nature Conservation Division or Natuur Beheer *(NB)*, a department of the Surinam Forest Service (LBB), is the government agency responsible for the implementation of all legislation pertaining to nature conservation. Specifically, NB is responsible for the control and the implementation of the Nature Preservation Law and the Game Law. It has the legal responsibility for the protection of sea turtles on the nesting beaches. Its mandate includes maintaining (i) natural life supporting resources, ecological processes, natural equilibria and productivity; (ii) biological diversity; and (iii) sustainable use of wild flora and fauna, and ecosystems.

The Foundation for Nature Preservation (STINASU) is a semi-Government foundation established in 1969. Its overall mandate is to (i) develop the existing nature reserves for their statutory recreational, educational, and economic purposes, and (ii) foster the protection and sound use of areas not yet protected or insufficiently protected. STINASU's responsibilities also include the coordination of scientific research, education, and tourism activities in all nature reserves. Over the past twenty years, STINASU's sea turtle conservation efforts have included monitoring, patrolling and protection of nesting sites.

As both NB and STINASU have the legal mandate to develop nature reserves, a Memorandum of Understanding (MOU) was developed and signed to strengthen their co-operation and avoid duplication of efforts. Among other aspects, under this MOU, STINASU is responsible for all aspects of management, research and education with reference to sea turtles in Suriname.

The Fisheries Division of the Ministry of Agriculture, Livestock, and Fisheries (LVV), has jurisdiction over sea turtles at sea, outside the confines of the terrestrial nature reserves, It has undertaken its first sea turtle related activities in the season 2002 with support of WWF-GUIANAS.

The Anton de Kom University of Suriname (UvS) has occasionally been involved in marine turtle research. In 1999 the National Zoological Collection Suriname (NZSS), part of UvS, has undertaken research on nesting ecology at Matapica. In 2000 the CELOS, also part of UvS, has undertaken similar research at Galibi, and in 2001 it has done a pilot study on the impact of shrimp trawling on marine turtles.

The Foundation for Sustainable Nature Management of Alusiaka (STIDUNAL**)**, founded in 1997, is a foundation of the local Amerindian villages located just south of the Galibi Nature Reserve. It promotes tourism in the area, identifies and develops local economic initiatives, and promotes protection of sea turtles. It works in collaboration with STINASU, Stichting Biotopic, and NB.

Stichting Biotopic is a Dutch foundation that has an agreement with STINASU to conduct sea turtle research on the nesting beaches in Suriname. Its activities in the Guianas are largely funded by WWF.

The Oceanic Society is a US organization promoting ecotourism in Suriname through hands-on support for sea turtle researchers (volunteers participate in local conservation projects on a seasonal basis). It has recently co-funded the construction of a tourist lodge in the Galibi Nature Reserve.

5.1.d La Guyane

In La Guyane, a number of local, national, and international organizations, contribute to sea turtle conservation efforts and they can be described as follows.

Diren Guyane is the local branch of the French Ministry of Environment, working under the authority of the Préfet and the Région-Guyane. In charge of the implementation of global policies defined by the Ministry, Diren-Guyane has been mandated to develop actions of monitoring and protection for all environmental issues. As sea turtle conservation represents a high priority for this French Overseas Department, Diren-Guyane is in charge of the development of the "Sea Turtle recovery plan for La Guyane", in collaboration with all the stakeholders. Diren-Guyane coordinates all sea turtle activities, defines priorities, and collaborate with other state institutions (Marine Nationale, Douanes, Affaires Maritimes, Gendarmerie Maritime, Sécurité Civile, representing the "State Action at Sea" services) to improve and adapt the conservation effort. Diren-Guyane also represents a major funding agency in Guyane, by providing support to all stakeholders working in the French Department. This organization also supports international exchanges, by organizing regional meetings.

ONCFS (Office National de la Chasse et de la Faune Sauvage) has been working in La Guyane since 1993. It is an institution of the French Ministry of Environment. Since 1998, ONCFS rangers realize patrols on isolated nesting sites to control eggs and adult sea turtle poaching. To do so, ONCFS (with support from Diren-Guyane) welcomes extra-staff especially coming from Mainland France or from other

overseas territories. This action has shown to be efficient, with a clear decrease of poaching activity. ONCFS has also developed a by-catch monitoring in the Marowijne estuary to better understand the level of interactions between fishing activity and sea turtles. Activities of counting and tagging are also realized during the nesting season, in collaboration with the Amana Nature Reserve.

The Amana Nature Reserve was created in 1998 for the sustainable management of the western nesting beaches. Managed by the village councils of Mana and Awala ("SIVU de l'Amana"), it is currently staffed by five rangers and one manager, who share the responsibility of site policing, monitoring and protection. The Amana Nature Reserve coordinates all sea turtle activities in the west part of La Guyane. Main activities include beach patrolling, awareness, public management. The Amana Nature Reserve welcomes, during the nesting season, teams from various organizations working within the territory of the reserve.

ESE (Laboratoire d'Ecologie, Systématique et Evolution) at Université Paris-Sud Orsay et CNRS is in charge of data processing for the sea turtle tagging program. Currently it is the repository for 15 years of data, and is one of the more important sea turtle database systems. Led by M. Girondot, a team of researcher develops guidelines for scientific activities to be implemented in La Guyane. Major issues include sea turtle tagging/recapture, database management, sea turtle population dynamic, predation assessment, nest ecology. This laboratory has already delivered more than 30 scientific publications on sea turtles.

CEPE, based in Strasbourg, is supporting the sea turtle research and conservation program by satellite tracking since 1999. Currently, this pilot program focuses on leatherbacks. CEPE has acquired significant experience and has achieved international recognition in using tracking techniques for decades in Antarctica. First results from this work are of highest importance to better understand movements at sea of leatherback turtles within a single nesting season, and among nesting seasons.

Kulalasi is an Amerindian organization based in Awala-Yalimapo. It is now primarily involved in the protection of the western nesting beaches. During the leatherback nesting season, it contracts about 10 local people to participate in the Kawana project (a field program initiated by J. Fretey,). Daily patrols are made with students on the Awala-Yalimapo nesting site, allowing an intensive leatherback tagging effort. Kulalasi assists with weekly counts, in collaboration with other teams, and play a major role in the monitoring of remote nesting sites. It has also developed environmental awareness, with particular attention to cultural aspects.

Kwata, based in Cayenne, has, since 1998, implemented sea turtle monitoring and awareness activities around Cayenne and Kourou. Daily patrols are conducted on Cayenne islands during all the nesting season (march – august), thanks to an important team of volunteers. Thus, active protection, counting and tagging are quite intensive on those nesting sites. Awareness activities have been enforced thanks to the implementation of a natural hatchery on Montjoly beach, the most popular beach of the country.

Sépanguy, an association based in Kourou, has been involved since 1999, in sea turtle monitoring program on Kourou beaches, in close collaboration with Kwata. The main activities are the patrols at night during the nesting peak, and awareness.

WWF-France has been funding and undertaking conservation activities in the area since 1977. With the influx of new institutions in 1999, WWF-France has gradually refocused its activities to the protection of nesting females during the leatherback nesting season ("Kawana project"), in collaboration with Kulalasi

and the Amana Nature Reserve staff. Implementation of camps on isolated beached has been developed since 2002 with Kulalasi. Special attention has been recently given to tourist management on crowded sites. More attention is being paid on offshore issues, and a collaboration with shrimp trawlers has been recently set up to assess sea turtle bycatch.

5.2 LOCAL COMMUNITIES ENGAGED IN SEA TURTLE CONSERVATION

5.2.a Regional context

At the regional level, Amerindian communities located along the coastline (Arawak or Carib tribes) are directly concerned with sea turtle conservation. There is a clear duality in their relationship with these animals. On the one hand, sea turtles are still used as a protein source (in Guyana mostly for meat and stopped only recently, and in the two other Guianas for the eggs). On the other hand, more and more community members are concerned about the decline of these natural resources and have become involved in ecotourism linked to marine turtles. In each of the Guianas, community members are getting increasingly interested and involved in sea turtle conservation efforts. This involvement is unfortunately difficult because of a bad economic situation and limited access to training, information and other conservation tools.

5.2.b Guyana

There are currently no community-based organizations involved in sea turtle conservation, apart from the Santa Rose Conservation Club. However, several organized Amerindian groups have the potential to participate in sea turtle conservation. With the support of WWF, UNDP, the Guyana Marine Turtle Conservation Society, plans are underway to assist local Amerindian groups in organizing sea turtle conservation-related activities. Strengthening the capacity of community-based groups to participate meaningfully in conservation is strongly supported by this regional action plan.

5.2.c Suriname

The primary communities near the sea turtle nesting areas are the two Amerindian villages of Christiaankondre and Langamankondre, just south of the Galibi Nature Reserve. Both communities have a long history of involvement with sea turtles. In general, members of these two communities do not eat sea turtle meat, nor do they consume many turtle eggs. The latter are sold as a cash crop, mainly to members of the Paramaribo community. A Government permit to harvest a predetermined number of leatherback and green turtle eggs may be issued to STINASU on an annual basis, which in its turn can sub-contract STIDUNAL for the harvesting.

The two Galibi communities have several NGOs, although only one, STIDUNAL, is directly involved in sea turtle conservation. Another, UMARI, strives to develop and solicit funding for various projects that directly benefit the inhabitants. Except for trying to attract tourism to the nesting beaches, UMARI has no connection with sea turtles.

Other Galibi village foundations are Worian Uwaponaka, Masuwana and EPIH, all geared toward women's interests. Worian Uwaponaka has established a local handicraft shop to sell products the women have made and manages the Galibi visitors centre.

5.2.d La Guyane

Members of the Awala-Yalimapo community occasionally eat leatherback eggs, especially at the beginning of the nesting season, but this custom is gradually disappearing in the new generations. No data exist on the level of egg poaching for other species. There are strong links between the Surinamese and French Amerindian communities living in this area, and many families have relatives on both sides of the Marowijne River.

As with the Galibi communities, the villagers living around the Marowijne River estuary in La Guyane are closely associated with sea turtle conservation efforts. The Chiefs of the two villages (Awala and Yalimapo) are board members of the Kulalasi Association, which contract nearby inhabitants to work on sea turtle protection during nesting seasons.

The Chief of Yalimapo *M. Daniel William* is a pioneer in sea turtle conservation in the area. He is the only person who has been involved in the sea turtle conservation program since it started in La Guyane, i.e. since 1977.

Currently the Kulalasi Association is only active during the leatherback nesting season, and would like to develop all year long activities linked to environmental preservation. The association is working in collaboration with indigenous organizations from Galibi.

6 REGIONAL SEA TURTLE CONSERVATION STRATEGY

The need for a regional approach to sea turtle conservation has long been evident for the countries in the Guayana Shield region. The original idea for a regional strategy was proposed by WIDECAST and WWF-France. It was stimulated by STINASU and Biotopic foundation who jointly organized the first two regional symposia held in Paramaribo, Suriname in 1997 (van Tienen and Verkade, 1998) and 1998 (Swinkels and van Nuchteren, 1999). In November 1998, the WWF Guianas Forests and Environmental Conservation Project (GFECP) initiated the first concrete step toward the development of the program by commissioning the preparation of a Concept Paper for a Regional Sea Turtle Conservation Program. At the Third Annual Regional Sea Turtle Conservation Symposium (Mana, La Guyane, July 1999), hosted by Diren-Guyane, Amana Nature Reserve, Kulalasi and WWF (Kelle et al., 2000), key stakeholder groups agreed to participate in the development of this regional program.

The Concept Paper resulted in a Conservation Strategy and Action Plan. This document is a synthesis of the work of a team of specialists hired by the GFECP, consultations with key stakeholder groups, and discussion and recommendations made during the fourth regional symposium in Georgetown, hosted by GMTCS in 2000, where a one-day review of the draft document took place. These symposia were also attended by representatives from the wider region, including Brazil, Venezuela, Trinidad and Tobago, and observers from Mexico, a country where leatherback aggregations have plummeted in recent years. It is based on an assessment of sea turtle status in the Guianas, the threats facing them, the institutional capacity of key national or regional organizations involved in their conservation, the needs of the affected local communities, and on the issues and concerns raised by these stakeholders. Finally the Action Plan was peer reviewed by WIDECAST experts.

The Goal and Objective of this Sea Turtle Conservation Program are:

Goal:

Prevent the extinction and promote the sustained survival, at healthy ecological levels, of shared populations of sea turtles in the Guianas.

Overall Objective:

Implement an integrated, comprehensive and long-term sea turtle research, monitoring and conservation program in the Guianas.

Specific Objectives:

1. Develop, adopt and implement an integrated regional conservation strategy to manage and sustain (and restore when necessary) viable populations of the sea turtle species nesting on the beaches of the Guianas.

2. Enhance the capacity of local organizations, as well as national and regional institutions, to support effective and technically sound sea turtle research, monitoring, ecotourism, and conservation activities.

3. Increase awareness and sensitivity to the ecological importance of sea turtles in order to stimulate the people and the Governments of the Guianas to take appropriate actions to reduce stress on the environment, protect sea turtle species as necessary, and require sustainable use practices.

4. Assist indigenous and local communities that rely upon sea turtles or sea turtle products in developing guidelines for sustainable use and in developing and undertaking alternative environmentally sound economic activities to support their welfare, thereby decreasing pressure on fragile or threatened species and ecosystems.

5. Develop, adopt and implement effective environmental laws and law enforcement strategies throughout the region.

This program rests on four pillars, each of which will be discussed in turn:

- Monitoring and Research
- Direct Conservation Activities
- Capacity Building
- Conservation Support Activities

6.1 MONITORING AND RESEARCH

Coordination of monitoring and research activities is essential for a sound sea turtle conservation strategy. To date, these activities have taken place primarily on the nesting beaches. Offshore habitats, in comparison, are poorly known. However, with the increase in fishery activities throughout the region, more attention will be given to identifying and reducing threats caused by this sector, as suggested by Reichart and Fretey (1993) Thus, this program component will address both terrestrial and marine issues, and aims to:

- Harmonize monitoring and research strategies and protocols for the selected variables, and justify their importance for conservation (n.b. "harmonized", in the context of this Action Plan, is intended to describe strategies that are in agreement or in accord with one another)
- Define performance indicators for successful research and monitoring efforts
- Monitor species populations, using standardized data entries for parameters, such as trends in population size, nesting cycles, hatching success, growth rates, survivorship and mortality
- Identify geographic distribution, migration routes, and critical habitats for each species
- Develop a strategy for integrating local communities into research and monitoring initiatives
- Develop a strategy for involving national universities in sea turtle conservation; for example, by promoting student internship programs and fostering linkages with research institutions outside the Guianas region
- Develop a strategy for the implementation of collaborative research and monitoring agreements between national universities and those outside the Guianas region
- Recommend specific conservation actions and mid-course adjustments to these actions, as appropriate

The Monitoring and Research activities will emphasize best practices and focus on:

- Identifying and filling gaps in existing local, national and regional strategies and programs
- Implementing standardized and statistically viable assessments of the size and trends of major nesting colonies and, ideally, foraging assemblages
- Developing regional standards for data collection, analysis, and reporting
- Developing and maintaining standardized database(s) suitable and appropriate for the evaluation of conservation efforts at national and regional levels
- Surveying and mapping the various beaches, using a Global Positioning System (GPS) for accurate location and demarcation of management sectors
- Determining population identification and origin(s)

6.2 DIRECT CONSERVATION ACTIVITIES

To date, most regional sea turtle conservation activities take place only during the main nesting season. Only in Suriname does a small, permanent field staff remain on the beaches all year around, but then only for maintenance of facilities and to accommodate visitors. Recent data have shown that sea turtle nesting in the Guianas occurs throughout the entire year. Thus, it is important that field stations remain staffed, and that nesting beaches are monitored year around. Daily patrols will take place during the height of the season, while patrol schedules may be spaced further apart when nesting frequency is low.

The direct conservation activities on the beaches and off the coasts of the Guianas reflect currently available information and data and will be refined as additional information and data are produced by the Monitoring and Research component. The Direct Conservation Activities component aims to:

- Identify, quantify and mitigate threats to sea turtles nesting and/or foraging in the Guianas
- Reverse observed trends in declining populations and facilitate the recovery of these populations
- Promote and foster adoption of harmonized methods of conservation, based on internationally accepted and locally appropriate practices (see Eckert et al., 1999)
- Define performance indicators for successful conservation efforts
- Develop a strategy for effectively integrating local communities into direct conservation activities
- Encourage applied research strategies that address basic conservation needs

Direct Conservation Activities will emphasize best practices and focus on:

- Identifying and filling gaps in existing local, national and regional strategies and programs
- Protecting nesting turtles, eggs/nests, and hatchlings
- Protecting key nesting and foraging sites, especially those selected for long-term population monitoring and research
- Implementing regulations to create closed and/or restricted fishing areas around the nesting sites
- Implementing fisheries regulations pertaining to sea turtles that promote stable or increasing populations
- Eliminating the illegal take of eggs and turtles
- Managing visitors (e.g., turtle watchers)

6.3 CAPACITY BUILDING

Currently there exists no local, national or regional governmental institution exclusively specializing in sea turtle conservation in the Guianas. Moreover, most of the institutions currently involved in sea turtle conservation have financial, logistic and/or human resource deficiencies and all would benefit from regional information and personnel exchange programs. The strategy in this area is to:

- Establish and implement comprehensive plans to build local, national and regional capacity for increasing involvement in sea turtle conservation
- Foster the establishment of government agencies with unambiguous regulatory responsibilities for sea turtle management and conservation, where they are lacking
- Develop local, national, and regional cadre for sea turtle conservation
- Develop a strategy for enhancing research and conservation capacity within local communities
- Foster the involvement of the national universities and other academic institutions in capacity building for sea turtle conservation
- Strengthen national institutions in order to increase their involvement (and eventually leadership) in sea turtle conservation throughout the region
- Promote appropriate structures and mechanisms for the enforcement of legislation, guidelines and regulations pertaining to all aspects of sea turtle conservation
- Foster cooperative exchanges (local, national, regional, and international), including training courses, in the area of sea turtle conservation
- Procedures for assisting fishermen whose interests are violated by sea turtles are developed, financed and implemented
- Provide training and transfer skills to local communities to allow them to engage in turtle tourism, e.g. provide training in hospitality, management of lodges and guiding of tourist.

Activities associated with this program component will include:

- Identifying local, national and regional institutions involved in sea turtle conservation and identifying gaps in existing strategies and programs
- A thorough assessment of the human resources and infrastructure needs for effective sea turtle conservation at the different levels
- Strengthening, as necessary, relevant Units of the Department of Fisheries with an aim to reducing incidental catch in fishing gear

- Development and implementation of short-term training workshops, study tours, etc. for various levels of cadre involved in sea turtle conservation activities, including local community members
- On-the-job training of nationals involved in sea turtle conservation activities
- Establishment of national, regional, and international exchange programs for all levels of field personnel involved in sea turtle conservation activities
- Promotion of hands-on participation of the universities and other educational institutes in sea turtle research and management programs
- Training of targeted institutions in fundraising to support sea turtle conservation programs
- Establishing and maintaining linkages among local, national, and regional and Wider Caribbean institutions and organizations involved in sea turtle conservation

6.4 CONSERVATION SUPPORT ACTIVITIES

The success of this sea turtle conservation effort depends on the implementation of a number of peripheral but important support activities. This program component aims to:

- Develop and endorse harmonized legislative and regulatory frameworks for sea turtle conservation in the Guianas
- Train and support law enforcement personnel/units devoted to environmental regulations
- Develop and implement well-targeted public awareness programs
- Develop and implement environmentally-sound, community-based economic activities
- Establish and maintain regional and international cooperation

6.4.a Harmonized Legislation, Regulations and Guidelines

Each of the three Guianas already has specific legislation, regulations, guidelines and policies concerning the protection of sea turtles. There are, however, significant differences among them. Even within a nation, laws, regulations, guidelines and policies are oftentimes not complementary. For a comprehensive regional approach to sea turtle conservation, harmonization of legislative differences is necessary, within the limits of each country's specificity. The following strategy is recommended:

- Review of legislation, regulations, guidelines, and policies pertaining to sea turtle conservation within each of the three Guianas, and an assessment of the applicability (and adherence to best practices) of these various policies and regulations
- Development of harmonized frameworks for legislation, regulations, guidelines, and policies pertaining to sea turtle conservation
- Technical assistance and scientific support to the relevant government authorities for the drafting, endorsement and adoption of appropriate laws, regulations, guidelines, and policies based on the harmonized frameworks
- Review of the relevant international and regional treaties, conventions and/or agreements signed by the relevant authorities in the three Guianas, and assessment of compliance
- Assistance to relevant government authorities to facilitate ratification of global and regional conventions, as appropriate
- Training of law enforcement personnel/units devoted to environmental regulations

6.4.b Public Awareness, Information and Education

Many people in the region, including public officials, are not aware of the ecological importance of sea turtles, nor of their precarious global status. They are lulled into complacency because of the relative abundance of nesting sea turtles in the Guianas, and often question regulatory measures advocated by researchers, or imposed by natural resource management agencies. Exacerbating the problem is a lack of understanding of the intrinsic, economic value of (live) sea turtles, resulting in sea turtle conservation usually being given low priority by Government decision-makers. Well-targeted awareness, information and education programs to key sectors of the population are essential to the success of this sea turtle conservation effort.

In addition to the general public of the Guianas (including school children), the Awareness and Education Program will specifically target Amerindian communities (including school children), directly affected by sea turtle related activities; the fisheries sector, including fishermen and shrimp trawlers; decision-makers, government authorities, and legislators; and visitors to the nesting beaches ('turtle watchers').

Recommendations put forward by a Working Group on "Promoting Public Awareness and Participation" convened at a regional (Wider Caribbean) sea turtle meeting in 1999 could provide guidance to the Guianas program (see Eckert and Abreu-Grobois, 2001). Crispin d'Auvergne (Working Group Chair) summarized the discussion by articulating a shared goal ("To achieve sound management of the sea turtle resource by obtaining stakeholder participation through a process of awareness building, education and changes in behavior"), and noted that the Group recognized the need to (i) understand the relationship between awareness, education and participation, (ii) understand the objectives of awareness and participation, and (iii) work within existing national legal, institutional and socio-economic contexts. The following specific recommendations were made:

- Clearly identify target and stakeholder groups, and stakes
- Determine the socio-economic importance or value of the resource to 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 sea turtle public awareness programs focused on the respective stakeholder groups
- Coordinate and harmonize policies and activities of the relevant sectors, including Governmental and non-governmental
- Incorporate sea 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 program success can be measured and evaluated
- Identify funding sources and develop funding strategies consistent with specific program objectives

Activities associated with this program component in the Guianas should include:

- An assessment of educational materials currently available

- An assessment of current awareness levels among target groups and decision-makers in order to identify gaps in their knowledge.
- Development and implementation of a comprehensive "sea turtle awareness" campaign
- Development, production and distribution of a series of pamphlets, brochures, posters, technical papers, quizzes and arts competitions, targeting specific groups
- Production of a series of television and radio talk shows on sea turtle conservation Promote environmental awareness via local radio stations and communicate via national press releases on turtle-related activities, facilitate media coverage of turtles activities by national and international TV, magazines and papers.
- Organization of information workshops, consultations, tours, video and/or slide presentations for the various groups
- Development and dissemination of a sea turtle conservation kit for school children, and of related curriculum-oriented materials, and organization of teachers' workshops.
- Development/ maintenance of a website and newsletter on sea turtle conservation in the Guianas
- Development / maintenance of an information clearing house on sea turtle conservation
- Development of a strategy to network with other prominent sources of sea turtle information in the Wider Caribbean Region (e.g., WIDECAST, Central American Sea Turtle Network, UNEP Caribbean Environment Program)
- Create local fora for social-professional interaction between researchers / conservationists present at beaches and (adult) villagers of nearby communities
- Establish local Wildlife Rangers Clubs and facilitate rangers' activities at beaches and schools

6.4.c Local Community Support Activities

Effective management of nesting sites depends significantly on the active collaboration and involvement of coastal inhabitants, if they are present. Sea turtles have been part of the socio-cultural, and even religious traditions of many of these communities. Furthermore, many communities are commercially involved in sea turtle poaching or killing, as well as egg collection. This program element seeks to promote environmentally sound income generation activities as alternatives, within the context of socio-cultural traditions and religious beliefs. It rests on the fact that these communities are as important as other stakeholders in the planning, decision-making and implementation phases of any successful regional conservation program. We recommend that local community support activities aim to:

- Ensure that local communities are considered, and consider themselves, as important stakeholders and key beneficiaries of the sea turtle conservation program
- Promote the involvement of the local communities, where applicable, in all program phases (planning through implementation)
- Establish a positive rapport between the technical team, field workers, and members of the local community
- Assist community members in developing alternative, culturally appropriate, and conservation-oriented economic activities
- Incorporate community members into implementation teams, as appropriate

Activities associated with this program component should include:

- An assessment of the socio-cultural, religious, and commercial importance of sea turtles in the various communities throughout the Guianas

- An assessment of alternate, culturally appropriate, and conservation-oriented economic activities in selected communities
- Provision of the necessary assistance to launch pilot conservation-oriented economic activities in selected communities
- Training of trainers in the target communities to support, manage and replicate pilot economic activities, based on best practices
- Provision of basic facilities, where appropriate, to support and manage turtle watching activities
- Training of selected community members to meaningfully participate in and contribute to the various components of the regional sea turtle conservation program

6.4.d Regional and International Cooperation

Sea turtles are highly migratory, and no single country can succeed unilaterally in ensuring the survival of the sea turtle resource. Regional cooperation and exchange are imperative for conservation and recovery of sea turtle populations. The strategy is to:

- Foster the execution of an agreement for regional cooperation (within the Guianas) for collaborative sea turtle conservation and management
- Establish a regional coordination structure (Regional Sea Turtle Conservation Steering Committee) for sea turtle management and conservation in the Guianas, and an advisory Scientific Committee
- Foster an appropriate level of cooperation and collaboration (including data exchange structures) with neighboring range states, including Brazil, Venezuela, and Trinidad and Tobago
- Facilitate adoption of harmonized management, conservation, and research procedures consistent with international standards
- Provide a forum for exchange of information, data, and lessons learned in sea turtle conservation
- Develop national and regional standardized databases on sea turtle conservation, and identify focal point institutions to manage the database(s)
- Develop a strategy to inform and involve local communities in the execution of regional conservation agreements
- Encourage governments to join and adhere to relevant international conventions and agreements
- Promote regional collaboration to implement international treaties and conventions relevant to sea turtle conservation
- Promote participation in the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) as a means of interacting with colleagues throughout the larger region, keeping abreast of best practices, and sharing the success of the tri-national Guianas program

7 REGIONAL SEA TURTLE CONSERVATION ACTION PLAN

7.1 MONITORING AND RESEARCH

The key criteria for success in the Monitoring and Research Program will be the extent to which program objectives (see section 1.3.a) are translated into direct field conservation action(s).

7.1.a Regional Context

To ensure the long term survival and enhancement of sea turtle populations in the Guianas, a dual (i.e., land and sea) but fully integrated research and management approach will be taken. Through long- and short-term technical assistance, the criteria and procedures for the research and monitoring activities will be refined or developed for nesting beaches and ocean zones. A regional-level Scientific Committee, serving in an advisory capacity to the Regional Sea Turtle Conservation Steering Committee, will be established to validate them.

The following areas are seen as priorities for research and monitoring at the regional level:

- Assessment of population size and trend
  * Yearly identification of nesting sites
  * Quantification of nesting activity and observed mortality
  * Population dynamics
- Population identification (genetic analysis)
- Identification of critical habitats and main threats
  * Incidental capture study
  * Satellite tracking

7.1.a.1 Assessment of population size and trend

Yearly identification of nesting sites: Throughout the Guianas, and particularly in Suriname, nesting beaches shift in a westerly direction as the result of erosion and accretion forces. On each beach, and in each country, a permanent geographic marker will be erected to indicate the base line from which the location and confines of each nesting beach can be established. These measurements, using Global Positioning System (GPS) equipment, will be done annually to maintain accuracy.

Criteria for success

- Methods and procedures are standardized for the three Guianas
- Methods and procedures are validated by the regional Scientific Committee
- Location and (geographic) size of all nesting sites are known and made available to field workers, regulatory agencies, and other relevant partners at the beginning and end of each nesting season

Quantification of nesting activity and observed mortality: At each nesting site, nesting activity per species will be monitored on an annual basis using harmonized regional methods. Causes of mortality will be documented or estimated, as appropriate.

Criteria for success

- Methods and procedures are standardized for the three Guianas
- Methods and procedures are validated by the regional Scientific Committee
- Results are entered into the database on a regular basis during the season and published in the scientific literature on (ideally) at least a biannual basis

Population dynamics: Standardized tag/recapture methods (adapted, as necessary, from existing models) will be used to estimate the size of rookeries through the long-term monitoring of nesting females. The program will seek both to endorse and support (and standardize as needed) ongoing tagging initiatives, as well as implement new tagging programs where such information can provide essential information to benefit sea turtle management and conservation. These data will also be used to assess adult survival and recruitment rates, among other things. Increased rates of recruitment (i.e., increasing numbers of first-time nesters, based on an estimated number or ratio of untagged turtles arriving at the rookery after intense tagging has been ongoing for a statistically appropriate period of time) provide one benchmark for evaluating the success of management and conservation actions. See also section 7.1.b.1.

Criteria for success

- Methods and procedures are standardized for the three Guianas
- Methods and procedures are validated by the regional Scientific Committee
- A database on population dynamics is created, regularly updated, and accessible to all interested stakeholder groups
- A tag/recapture model suitable for the regional database is developed, validated and adopted

7.1.a.2 Population identification

Genetics are increasingly used to study population structure. These studies allow for the definition of each population of sea turtles according to their genotype, thereby facilitating an assessment of the relationship(s) between the turtles nesting on the beaches of the Guianas and those nesting (as well as foraging) at other sites in the greater Atlantic region.

Criteria of success

- Methods and procedures are standardized for the three Guianas
- Methods and procedures are validated by the regional Scientific Committee
- Results clearly indicate the structure of each population, and data are entered regularly in the database
- A database on population genetics is created, regularly updated, and accessible to all interested stakeholder groups.

7.1.a.3 Identification of critical habitats and main threats

To fill gaps in crucial knowledge, an ocean-based research and monitoring program will be implemented to estimate catch and direct mortality rates of sea turtles within the framework of a stratified random sampling test using, among other s, onboard observers as data collectors. This program component will be a model for other Caribbean states to follow in their attempts to assess the management challenges posed by incidental, fisheries-based mortality of sea turtles.

Incidental catch study: As demonstrated by population modeling studies, variation in survivorship in adult and sub-adult life stages can dramatically affect the potential for population recovery. The main ocean-based threat to these life stages is incidental capture, and subsequent death, in fishermen's nets. The results of this aspect of the Research and Monitoring Program, which will make every attempt to assess rates of incidental capture as well as rates of acute and delayed mortality, are designed to assist in locating important offshore sea turtles habitats, as well as in refining conservation efforts directed at offshore threats to sea turtle population stability.

Criteria of success

- Precise list (qualitative and quantitative) of type of fishing boats is available and is periodically updated for each country
- Incidental catch and mortality rates are described and quantified per species, season and type of fishing activity, on the basis of a harmonized statistical sampling design
- Incidental catch data are entered into the database on a regular basis, at least annually, and are available in a timely fashion to all interested stakeholders

Satellite tracking: Satellite tracking studies have already given some excellent information on intra- and inter-nesting locations and movements of studied individuals. This work should be expanded throughout the Guianas, as the cumulative results will be essential in establishing sea turtle conservation areas (e.g., no-fishing or restricted fishing zones), marine reserves, and fisheries awareness programs.

Criteria of success

- Data highlight sea turtle offshore movements and critical habitats
- Sea turtle range and distribution patterns are defined
- Information and data are regularly entered into the database and readily available to all interested stakeholder groups

7.1.b National Level

Regional objectives and criteria for success, as defined above, establish the broad parameters of a successful conservation program. However, implementation of the program will fall largely to in-country stakeholders and program participants. The sections that follow provide a more detailed overview of country-based requirements.

As the coastlines of the Guianas are very dynamic, it is essential to monitor the morphology of key beaches regularly, not just during the nesting season. However, the highest priority is to monitor the number of nesting females and to protect them, their nests and their young in order to aid in the long-term survival and enhancement of regionally significant sea turtle populations. The relocation of doomed nests to safer locations, when necessary, will be done under strict supervision and using the best available techniques.

Except when otherwise specified, the following research and monitoring activities will be implemented in all three Guianas, though at different levels of emphasis.

7.1.b.1 Assessment of population size and trend

Recommendations put forward by a Working Group on “Monitoring Population Trends” convened at a regional (Wider Caribbean) sea turtle meeting in 1999 could provide guidance to the Guianas program in this aspect (see Eckert and Abreu-Grobois, 2001). Rhema Kerr (Working Group Chair) summarized the discussion by articulating a shared goal (“To achieve sound management of the sea turtle resource by monitoring population trends, and incorporating that information into decision-making”), and noted the consensus of the group that population trends be assessed based on regular population monitoring “for a minimum of 3 multiples of the average remigration interval or at least 5 years, whichever is longer.” This Action Plan recommends that the necessary indices of abundance be determined in the Guianas on an ongoing basis and that they be made available for the purpose of defining trends in shared populations. Related recommendations follow below.

Yearly identification of nesting sites: Measurement and record of annual changes in size and location of nesting beaches, including conducting at least two aerial surveys during the nesting season each year using regionally established procedures, and including the following:

- Use of GPS equipment to establish the coordinates of nesting beaches
- Aerial survey flights (twice per year) to inspect beaches for nesting activities, fishermen's camps, and other relevant observations
- Development of a standardized log book to enter data from aerial surveys
- Establishment of ground truth patrols concurrent with the survey flights to verify aerial data

Quantification of nesting activity and observed mortality: On major nesting beaches, we recommend -

- Compilation of historical data on sea turtle conservation activities
- Ongoing monitoring of nesting activity and rates of mortality
- Improvement of facilities for beach access and patrols (Guyana: construction of camp facilities)
- Conducting of daily nest counts on all beaches during peak nesting seasons
- Documenting observed sea turtle mortality according to a regionally harmonized system

On more isolated beaches, we recommend staffing field camps during the height of the nesting seasons to monitor daily nesting activities. During off-peak seasons, monitoring should take place at least on a weekly basis, as resources permit. Data from the aerial surveys should be used to complement ground-based monitoring activities.

Population dynamics: Design and implement a tag/recapture program, including specific models for data analysis, for nesting green, leatherback, and olive ridley sea turtles; and specifically:

- Design field projects with an emphasis on meeting a specific suite of objectives, developing a statistically valid experimental design, and defining expected outputs for population assessment at national and regional levels (cf. Congdon and Dunham, 1999)
- Design of protocols for tagging, data collection, data processing, statistical analysis, and reporting

7.1.b.2 Population identification

Facilitate genetic studies to establish population structure and regional kinship for each species by:

- Collection and preservation of tissue samples from various life stages for target species
- Transfer of samples to appropriate research centers
- Compilation and analysis of the data, as appropriate
- Ensuring the timely dissemination of results

7.1.b.3 Identification of critical habitats and main threats

Incidental capture study: To meet the objectives of the regional program in this aspect, each nation will facilitate or undertake:

- An initial assessment and ongoing monitoring of bycatch due to gillnets
- An initial assessment and ongoing monitoring of bycatch due to shrimp trawls

- Identification of “hot spots”; that is, areas where bycatch rates are highest
- Genetic evaluation of leatherback turtles incidentally captured in the waters of Trinidad and Tobago, Brazil, and Venezuela in order to identify and record extra-territorial sources of mortality of the leatherback nesting populations of the Guianas

Satellite tracking: To meet the objectives of the regional program in this aspect, each nation will facilitate or undertake:

- Tracking of leatherbacks and olive ridleys during their nesting seasons to define critical marine (inter-nesting) habitat
- Tracking of leatherbacks and olive ridleys departing from their nesting grounds in order to identify migration routes and foraging areas in use during non-breeding years

7.2 DIRECT CONSERVATION ACTIVITIES

The planned direct conservation activities on the beaches and off the coasts of the Guianas reflect available information and data, as well as the carefully considered goals and objectives of this collaborative regional program. Direct activities will be refined as additional information and data are produced by the monitoring and research component, but at the present time this program component aims to:

- Reduce threats to sea turtles nesting and/or foraging in the Guianas
- Halt any observed population declines, and facilitate the recovery of depleted or declining populations
- Promote and foster the adoption of harmonized methods of conservation, based on internationally accepted practices
- Facilitate the direct participation of local communities in conservation initiatives

To this end, direct activities will focus on the:

- Protection of nesting beaches, as well as protection of nesting females, eggs, and hatchlings
- Management of visitors (turtle watchers), including the development and implementation of tour and tour guiding guidelines and the development and implementation of a visitor impact monitoring system
- Delimitation of closed and/or restricted fishing areas adjacent to nesting beaches, based on an assessment (including mapping) of areas and time periods where fisheries activities significantly affect sea turtle populations, an assessment of the level of protection necessary for different sites, and development of site plans for those that warrant protection
- Reduction of fisheries bycatch, based on promoting the use of TEDs, cultivating a good working relationship with the fisheries sector, involving this sector in the development of new rules or regulations (if needed), and providing assistance in the implementation of relevant regulations

7.2.a Land-Based Protection Activities

7.2.a.1 Regional context

Nesting sites are critical habitats for sea turtles during three life stages: reproductive females, eggs, and hatchlings. Protection of these habitats is essential in the Guianas. National management plans, based on a regionally harmonized framework of procedures, will be developed.

a) Protection of nesting females

As much as possible, procedures will be established to patrol the beaches every night during peak nesting seasons. This is the most effective way to protect adult females from poachers. During low-intensity nesting activity periods, patrols will be reduced, but to not less than two per week, as resources permit. Patrolling will be done on an irregular schedule to keep poachers off-guard.

Efforts will be made to significantly reduce mortality caused by stranding in mangrove areas, where this is known to occur, by patrolling and dislodging of trapped (live) sea turtles. This will be enhanced by regular clean-up activities and campaigns aiming at clearing the beaches of hazards, such as discarded plastic, pieces of rope and nets, or potentially dangerous driftwood snags (n.b. the removal of driftwood snags will always be evaluated with care, as systematic removal of these objects can seriously destabilize nesting habitat).

Beach lighting can cause disorientation in adults, as well as in hatchlings (there is a wealth of literature on this subject; Witherington and Martin, 2000, summarize mitigation options). The problem is minimal in Guyana and Suriname, but efforts will be made to mitigate it in La Guyane, where in many places human structures are located very close to nesting sites and the use of lights is not regulated. Efforts will also be made to ensure that artificial beachfront lighting does not become a hazard to nesting rookeries in Guyana or Suriname.

b) Protection of eggs

Sea turtle eggs in the region are exposed to two main threats: poaching and beach erosion. Concurrently with an education program, beach patrols will be used to reduce egg poaching.

Erosion of beaches, and nests laid below the high tide line, are serious conservation problems in the Guianas. If no remedial action is undertaken, hundreds of thousands of eggs will be destroyed every year through natural forces. Saving those thousands of eggs could be an important tool in the sea turtle conservation efforts. Wherever appropriate, small-scale egg relocation experiments will continue in order to evaluate their effect on population levels.

Over the years, relocation of “doomed” nests to higher locations on the same beach has been a major sea turtle management activity in Suriname and the decision to relocate eggs to safer sites has been left to the discretion of individual site managers, based on local circumstances and knowledge of erosion patterns. In cases where a trade-off between total clutch loss and generally lower hatch success (which is minimal when relocation is done properly) seems prudent, relocation efforts will follow standard techniques (see Boulon, 1999; Mortimer, 1999).

c) Protection of hatchlings

After emergence, hatchlings are faced with a wide range of threats on their way to the sea, including depredation, entrapment or entanglement in litter and debris, harassment by human onlookers, and disorientation by artificial lighting. Measures will be taken to reduce these threats as much as possible. The presence of research or conservation personnel can effectively reduce the potential for depredation, entanglement, harassment or disorientation. Educational campaigns will emphasize how local communities, tour guides, and others can assist in raising the survival prospects of hatchlings. Educational campaigns will also emphasize best practices with regard to beachfront lighting and other

man-induced threats. It may also be useful to regularly clear primary nesting zones of beach obstacles, such as large pieces of driftwood, plastic debris, netting, and ropes that may contribute to hatchling mortality.

d) Management of visitors (turtle watchers)

In Guyana and Suriname, virtually all sea turtle nesting beaches are in remote and largely unpopulated areas. This makes it easier to regulate or monitor the flow of visitors in comparison to the French Department of La Guyane. Furthermore, in all three Guianas, people can visit most beaches whenever they wish. With the exception of nature reserves, there are no laws or regulation prohibiting access. In Suriname, a few nesting beaches in non-reserve areas enjoy some measure of protection through annual decrees, but these are primarily intended to protect nests from poachers; the decrees do not restrict people's access to the beaches. In La Guyane, however, most of the nesting beaches are near populated areas, making management of visitors more challenging.

The distinction must be made between two types of visitors: local people and tourists. The former use the beaches and surrounding areas for traditional purposes, such as fishing, hunting, and gathering of subsistence materials. They may consider access to the beaches as an inherent right, and control of their activities by an outside management authority is neither practical nor desirable.

Local people must continue to have an unencumbered right to use the beaches and surrounding areas for their traditional lifestyles, and they must be closely involved in any management action intended to safeguard turtle populations by restricting the harvesting of sea turtles or their products. A balance must be achieved whereby the survival of both the sea turtles and the indigenous culture is assured. In cases where members of local communities will be participating in sea turtle population monitoring initiatives, relevant training will be provided to community leaders.

This program component is primarily intended to curb abuses perpetrated by the visiting public, including excessive use of lights, noise, and inappropriate contact with egg-bearing females (e.g., riding turtles back to the sea) and their young. Appropriate guidelines will be developed for turtle watchers, and, ideally, trained local guides will be available to all visitors. Guides will be trained in etiquette, basic sea turtle ecology, conservation and, if relevant, data collection, record keeping, and reporting.

In key locations on nesting beaches, display boards will be erected. These displays will contain information on regulations, local sea turtle issues, and a code of conduct for watching sea turtles. Although mostly for the benefit of non-guided tourists, these displays will give useful information to all visitors.

In the sections that follow, specific information is provided in the context of each country.

7.2.a.2 Guyana

Poaching of sea turtle eggs and adults, on land as well as at sea, was widespread in Guyana until very recently. In combination they still represent a greater threat to sea turtles in Guyana than does beach erosion, with egg poaching being perhaps more prevalent now than the killing of gravid females. Typically the eggs are consumed within the beachfront settlements, rather than offered for sale (P.

Pritchard, in litt. January 2002). Frequent beach patrols by qualified field personnel at key nesting sites play a significant role in reducing poaching, and these efforts should be supported on an ongoing basis.

The beaches in the Northwest District, located in the most remote area of the coast, are currently the focal point of nesting activities in Guyana. Successful conservation measures are dependent on a close partnership with local communities at all phases of project planning and implementation.

In light of the regional context presented in section 7.2.a.1, the following are particularly relevant to Guyana:

a) Protection of nesting females

- Construction of suitable field stations and base camps on the beaches to support the program
- Conducting of daily anti-poaching patrols during peak seasons and weekly patrols during off-seasons
- Removal of potentially hazardous debris from nesting beaches (e.g., ropes, nets, plastic, glass, large driftwood snags deposited on the beach surface)
- Minimizing negative effects of artificial beachfront lighting (n.b. beachfront lighting is minimal in Guyana at the present time, but with tourism increasing and new developments appearing along the coast, standard management procedures to address problems caused by shoreline lighting will be in place)
- Control and monitoring of human access to important nesting beaches during nesting seasons
- Ecologically balanced and prudent predator control , if necessary

b) *Protection of eggs*

- Camouflaging of nests and tracks
- Placement of predator-proof (but hatchling permeable) cages around/over vulnerable nests
- Reduction or prevention of beach compaction (e.g. by motorized vehicles, people) in nesting zones
- Relocation of doomed nests to safer locations, where appropriate

c) *Protection of hatchlings*

- Placement of predator proof (but hatchling permeable) cages around/over vulnerable nests
- Removal of life-threatening beach obstacles to facilitate movement of hatchlings to the sea
- Ecologically balanced and prudent predator control, if necessary
- Minimize negative effects of artificial beachfront lighting (n.b. beachfront lighting is minimal in Guyana at the present time, but with tourism increasing and new developments appearing along the coast, standard management procedures to address problems caused by shoreline lighting should be in place)

d) *Management of visitors (turtle watchers)*

- Development and implementation of tour and tour guiding guidelines
- Development and implementation of a visitor impact monitoring system
- Development of tourism information center(s)

- Development and installation of information and instruction signs in nesting areas
- Development and distribution of brochures on the etiquette of 'turtle watching'
- Development and enactment of regulations governing public access to important sea turtle nesting areas

7.2.a.3 Suriname

In the late 1960s, Suriname implemented its first sea turtle conservation program. During a pioneering five-year initiative, every sea turtle coming ashore was tagged and all nesting beaches were fully monitored year-around (Schulz, 1975). This impressive work ended in 1973. Today Suriname has the advantage of a long history of successful sea turtle management, including collaboration with communities and other stakeholders, protected habitats, sustainable harvest programs, and strong legislation. Notwithstanding, regionally important breeding aggregations continue to decline and there is much that still needs to be done to ensure the survival of these ancient creatures.

The poaching of adult turtles is virtually non-existent, but beach erosion and egg poaching are serious land-based threats in Suriname. Control activities are severely impeded by lack of transport, but field facilities (field stations, base camps, lodging, etc.), many of which have been recently built or renovated with GFECP support, are of very good quality.

a) Protection of nesting females

- Deployment of daily anti-poaching patrols during peak seasons and weekly patrols during off-seasons
- Removing potentially hazardous debris from nesting beaches (e.g., ropes, nets, plastic, glass, large driftwood snags deposited on the beach surface)
- Minimizing negative effects of artificial beachfront lighting (n.b. beachfront lighting is minimal in Suriname at the present time, but with tourism increasing and new developments appearing along the coast, standard management procedures to address problems caused by shoreline lighting should be in place)
- Controlling and monitoring of human access to important nesting beaches during nesting seasons
- Undertaking ecologically balanced and prudent predator control, if necessary

b) *Protection of eggs*

- Camouflaging nests and tracks
- Placing predator-proof (but hatchling permeable) cages around/over vulnerable nests
- Relocating doomed nests to safer locations, where appropriate
- Monitoring and controlling, if necessary, unsupervised dogs on nesting beaches

c) Protection of hatchlings

- Placement of predator proof (but hatchling permeable) cages around/over vulnerable nests
- Removal of life-threatening beach obstacles to facilitate movement of hatchlings to the sea
- Ecologically balanced and prudent predator control, if necessary
- Minimizing negative effects of artificial beachfront lighting (n.b. beachfront lighting is minimal in Suriname at the present time, but with tourism increasing and new developments appearing

along the coast, standard management procedures to address problems caused by shoreline lighting should be in place)
- Monitoring and control, if necessary, of unsupervised dogs on nesting beaches

d) Management of visitors (turtle watchers)

- Development and implementation of tour and tour guiding guidelines
- Development and implementation of a visitor impact monitoring system
- Development of tourism information center(s)
- Development and installation of information and instruction signs in nesting areas
- Development and distribution of brochures on the proper "etiquette" of 'turtle watching'
- Development and enactment of regulations governing public access to important nesting areas

7.2.a.4 La Guyane

Nowadays, the increased number of institutions involved in sea turtle conservation in La Guyane allows a large number of activities to be implemented. Thanks to these efforts, adult sea turtle poaching has become exceptional on the beaches. Disturbance by tourists is a major concern, and egg poaching, tough in decline, still continues in the Western section of the Department.

a) Protection of nesting females

At Awala-Yalimapo, the priority is to conduct anti-poaching patrols daily during peak seasons; minimize the effects of artificial beachfront lighting; and monitor (and control, as necessary) human access to important beaches during nesting seasons. At the isolated beaches, the priority is to establish base camps for anti-poaching patrols; conduct daily patrols during peak seasons; and rescue or redirect disoriented females that stray into coastal swamps. At urban ("in-town") nesting sites, the priority is to conduct daily patrols during peak seasons; regulate net fisheries activities which ensnare gravid females offshore; and monitor (and control, as necessary) unsupervised dogs on nesting beaches

b) Protection of eggs

At Awala-Yalimapo and isolated beaches, the priority is to conduct daily patrols during peak seasons. At urban ("in-town") nesting sites, the priority is to conduct daily beach patrols during peak seasons; camouflage vulnerable nests; and monitor (and control, as necessary) unsupervised dogs on nesting beaches.

c) Protection of hatchlings

At Awala-Yalimapo, the priority is to conduct morning beach patrols during peak seasons; monitor (and control, as necessary) unsupervised dogs on nesting beaches; reduce depredation as necessary and appropriate; and minimize the effects of artificial beachfront lighting. At the isolated beaches, the priority is to conduct early morning patrols to free trapped hatchlings and redirect (toward the sea) disoriented hatchlings that have strayed towards coastal swamps. At the urban ("in-town") nesting sites, the priority is to minimize the effects of artificial beachfront lighting.

d) Management of visitors (turtle watchers)

This is mainly of concern at Awala-Yalimapo, where the priority, as proposed by this Action Plan, is to develop and implement tour and tour guiding guidelines; develop and implement a visitor impact monitoring system; develop and distribute brochures on the proper "etiquette" of 'turtle watching'; and reinforce beach patrols during holidays. Such guidelines will also be useful at smaller rookeries where visitation is less common and, at least in the case of some urban sites, guests would also need to be accompanied by representatives of local NGOs who could enforce a certain level of appropriate conduct during any turtle watching.

7.2.b Ocean-Based Protection Activities

7.2.b.1 Regional context

Population modeling, notably survival elasticity analyses[7], clearly demonstrates that the decline of a sea turtle population in which adult and large immature stages sustain fishery-related mortality is only reversible by reducing this mortality. Although no monitoring program has been developed for Guianas' sea turtle populations to reliably estimate catch and mortality in fisheries, it is clear from local investigations (e.g., Tambiah, 1994), stranding patterns, and anecdotal information that high levels of fishery-induced mortality occur throughout the Guianas.

Coastal fisheries on the Guianas-Brazil Continental Shelf, particularly shrimp trawling and multifilament polyethylene drift gillnet fisheries, are indubitably the most damaging to local sea turtle populations, due to the high intensity of the fishing effort in areas where large concentrations of adult sea turtles occur. Reduction of incidental catch and mortality in shrimp trawls and multifilament polyethylene drift gillnets must be a primary goal of any conservation strategy seeking to ensure the long-term survival of Guianas' sea turtles. Thus this program will devote major conservation efforts to these threats.

For shrimp trawling fisheries, a priority action will be to foster the improvement of Turtle Excluder Devices (TEDs) by enlarging the escape opening to promote the release of leatherbacks, in particular, as well as adult cheloniids and other large objects. Such modification(s) will also promote TED adoption in La Guyane. Other operational and management measures will be explored in relation to shrimp stock management, including time and area closures. Several options for promoting the release of larger turtles have been designed and certified (federally approved) for U.S. shrimp trawl fisheries.

One option is to ensure that the two forward cuts of the escape opening are made not less than 20 inches (51 cm) long when stretched from the points of the cut immediately forward of the TED frame. The resultant length of the leading edge of the escape opening cut must be no less than 71 inches (180 cm) when stretched. A webbing flap may be used with this escape hole, but the resultant opening with a webbing flap must have a minimum width of 71 inches when stretched (180 cm) and the circumference of the exit opening must be 142 inches (361 cm) when stretched (Appendix III: Figures 1a-c).

If a "double cover flap TED opening" is preferred, the two forward cuts of the escape opening must not be less than 20 inches (51 cm) long when stretched from the points of the cut immediately forward of the TED frame. The resultant length of the leading edge of the escape opening cut must be no less than 56 inches (142 cm) when stretched (Appendix: III: Figure 2).

[7] survival elasticities quantify the relative changes in population growth rate resulting from relative changes in survival rates

To date, only a few operational mitigation measures are known for the multifilament polyethylene drift gillnet fishery. The situation is more complicated for this fishery because (i) interactions between sea turtle and this fishery are poorly known; (ii) the fishery, being artisanal, is distributed among numerous ports and many independent operators; and (iii) many of these fishermen consume sea turtles onboard. Thus, the appropriate conservation measures and their socio-economic impacts must be identified and assessed during the implementation phase of the regional conservation program.

The multifilament nylon and monofilament gillnet fisheries operating in the jurisdictional waters of Trinidad and Tobago (and other range states) also have a significant negative impact on sea turtles, including, in all likelihood, sea turtles from Guianas' nesting aggregations. The use of molecular markers will facilitate an assessment of the leatherback stock composition in extra-territorial fisheries.

High-seas fisheries are responsible for leatherback mortality in both the western and eastern Atlantic Ocean (NMFS, 2001), and they also should be more fully surveyed by the appropriate authorities in order to assess their impact on sea turtle populations seasonally nesting and/or foraging in the waters of the Guianas. Fatal interactions between pelagic longlining are also documented for seabirds (e.g., Brothers et al., 1999) and marine mammals (e.g., Northridge, 1984, 1991).

The multifilament nylon and monofilament gillnet fisheries operating in the jurisdictional waters of Trinidad and Tobago (and other range states) also have a significant negative impact on sea turtles, including, in all likelihood, sea turtles from Guianas' nesting aggregations. The use of molecular markers will facilitate an assessment of the leatherback stock composition in extra-territorial fisheries.

With this in mind, specific activities in all target areas (Guyana, Suriname, La Guyane, Trinidad and Tobago, Venezuela and Brazil) will include:

- Shrimp trawl fishery
  - Assistance in the design and implementation of a program providing incentives for fishery-wide use of a modified TED (specifically, an enlargement of the standard escape opening) to allow leatherback and large cheloniid turtles to escape from the trawl.
  - Assistance in evaluating national legislation and enforcement protocols to ensure government's competence to promote compliance.

- Delimitation of closed and/or restricted fishing areas near the nesting sites
  - Identification and mapping of areas and time periods where coastal fisheries activities significantly affect sea turtle populations
  - Assessment of the level of protection necessary for "hot spots" were interactions are highest
  - Designation and promotion of new protected areas (including the possibility of U.S. "National Seashore" status or its equivalent), or seasonal area closures
  - Development of site plans (area-specific management plans) for areas that warrant protection

7.2.b.2 Guyana and Suriname

Specifically in Guyana and Suriname, the program will focus on the multifilament polyethylene drift gillnet fishery. Priority actions will include:

- Development and/or improvement of the relationship between this fishery and other stakeholders

- Assessment of the level of sea turtle consumption by fishermen, and the development and promotion of appropriate conservation measures
- Design and implementation of a comprehensive sampling survey to estimate:
  - catch rates and their variations in space and time
  - total catch per season in distinct fishing areas along the coast
  - direct sea turtle mortality rates
  - total sea turtle mortality (direct and delayed) in the fishery
- Development of appropriate conservation measures (e.g., time and area closures, reduction of fishing effort), based on the results of the sampling survey
- Designation and implementation of monitoring protocols to assess, on an annual basis, rates of incidental catch and their relationship to trends in nesting activity
- Facilitate the development of a program to support fishermen whose nets – despite the use of approved conservation measures - have been damaged or destroyed by sea turtles

In the Galibi Nature Reserve, Wia Wia Nature Reserve, Matapica region, and Coppenamemonding Nature Reserve (Suriname), the program will emphasize physical delimitation and designation of "fishing restricted areas" to promote more effective law enforcement

7.2.b.3 La Guyane

In La Guyane the program will focus on trawling and gillnet fisheries, with particular attention to the Marowijne estuary where some type of protected area status may enable more effective management of the effects of both artisanal activities and foreign fishing vessels. Specifically, we recommend:

❖ Shrimp trawl fishery
- Assistance in the design and implementation of a program providing incentives for fishery-wide use of a modified TED (specifically, an enlargement of the standard escape opening) to allow leatherback and large-sized cheloniid turtles to escape from the trawls
- An assessment of the feasibility of establishing "fishing restricted seasons" as conservation measures to enhance the survival of sea turtles

❖ Gillnet fisheries
- Reduction in license granting to foreign vessels targeting sharks with gillnets in the waters of La Guyane

❖ Marowijne estuary
- Promotion of stricter control of fishing activities by foreign vessels
- Development of management plans for artisanal fisheries
- Assessment of the feasibility of establishing marine protected area

7.2.b.4 Trinidad and Tobago

Gillnet fisheries:

- Work in collaboration with the relevant authorities in Trinidad and Tobago to estimate rates of incidental capture and mortality for sea turtles (especially leatherbacks) ensnared by the flying fish gillnet fishery

- Work in collaboration with the relevant authorities in Trinidad and Tobago to assess the composition (stock origin) of the sea turtles (especially leatherbacks) captured as bycatch in Trinidad's gillnet fishery, using genetic techniques

7.2.b.5 Venezuela

High-seas fisheries:

- Work in collaboration with the relevant authorities in Venezuela to assess rates of sea turtle (and especially leatherback) incidental catch and mortality in the billfish gillnet fishery
- Work in collaboration with the relevant authorities in Venezuela to assess rates of sea turtle (and especially leatherback) incidental catch and mortality in the longline fishery
- Work in collaboration with the relevant authorities in Venezuela to assess the composition (stock origin) of sea turtles (and especially leatherbacks) captured as bycatch in Venezuela's billfish and longline fisheries, using genetic techniques

7.3 CAPACITY BUILDING

All three Guianas suffer from insufficient financial, logistical and human resources that can be devoted to sea turtle conservation. All three will benefit from regional information and personnel exchanges at all levels. Therefore, the Capacity Building component of the program aims at:

- Establishing, developing, and implementing comprehensive plans to build local, national, and/or regional capacity for increasing involvement in sea turtle conservation
- Fostering the establishment of government agencies with unambiguous responsibilities for sea turtle conservation, insofar as these are lacking
- Fostering the establishment of government agencies, enforcement units, and community partnerships with unambiguous responsibilities for the enforcement of environmental legislation, including sea turtle regulations
- Developing a local, national, and regional cadre for sea turtle conservation
- Fostering involvement of national universities in sea turtle conservation
- Establishing and maintaining linkages among local, national, regional, and international institutions involved in sea turtle management, conservation and public awareness

7.3.a Regional Context

Until the WWF Guianas Program, there was almost no cooperation among nations, institutions and individuals involved in sea turtle conservation in the Guianas region. Too often cooperation was marginal even at the national level. The success of national and regional sea turtle conservation efforts rests, among other aspects, on strong sea turtle institutions and well-structured national and regional cooperation.

Planned activities in Capacity Building at the regional level include:

- Thorough assessment of human resources and infrastructure needs for effective sea turtle conservation at the different levels
- Development and implementation of short-term training workshops and study tours for various levels of personnel (in and out of government) involved in sea turtle conservation

- On-the-job training and mentoring of nationals involved in sea turtle conservation
- Organization of national, regional, and international study tours for local community members
- Establishment of national, regional and international exchange programs for all levels of field personnel involved in sea turtle conservation
- Promotion of hands-on participation by national universities and other educational institutions in sea turtle research and management programs
- Training of targeted institutions in fund raising to support the sea turtle conservation program
- Establishment and maintenance of national and regional sea turtle management and conservation databases

7.3.b Guyana

Program priorities in Guyana include:

- Development and empowerment of an agency specialized in sea turtle conservation and management
- Development of academically trained cadre to lead this agency and its sea turtle conservation activities
- Development and empowerment of law enforcement agencies, units or specially trained personnel specialized in sea turtle conservation regulations, including related protected areas and other habitat-related restrictions and requirements.
- Reinforcement of collaboration and partnership among local communities, government agencies, and NGOs (local, national, regional and international)
- Hiring of qualified field personnel for management, research, conservation and law enforcement activities
- Organization of training workshops for all level of sea turtle conservation personnel
- Establishment of formal and strategic partnerships with sea turtle conservation organizations in Suriname and La Guyane
- Development of information, data, and personnel exchange programs with Suriname and La Guyane

7.3.c Suriname

Program priorities in Suriname include:

- Establishment of a national-level coordination structure for sea turtle conservation and management
- Strengthening and formalizing of relationships among STINASU, STIDUNAL, Nature Conservation Division, Fisheries Department, local communities, and ADEK University
- Development of academically trained personnel for sea turtle conservation activities. Financial support to maintain this cadre and give it the tools to function as such within their national institutes
- Reinforcement of collaboration and partnership among local communities, government agencies, and NGOs (local, national, regional and international)
- Hiring of qualified field personnel for management, research, conservation and law enforcement activities
- Organization of training workshops for all levels of sea turtle conservation personnel

- Establishment of formal and strategic partnerships with sea turtle conservation organizations in Guyana and La Guyane
- Development of information, data, and personnel exchange programs with Guyana and La Guyane

7.3.d La Guyane

Program priorities for La Guyane include:

- Strengthening and formalizing of relationships among the various institutions and agencies involved in sea turtle conservation in La Guyane, under the coordination of Diren
- Development of academically trained personnel to
- Reinforcement of collaboration and partnership among local communities, government agencies, and NGOs (local, national, regional and international)
- Hiring of qualified field personnel for management, research, conservation and law enforcement activities
- Organization of training workshops for all levels of sea turtle conservation personnel
- Establishment of formal and strategic partnership with sea turtle conservation organizations in Guyana and Suriname
- Development of information, data, and personnel exchange programs with Guyana and Suriname

7.4 CONSERVATION SUPPORT ACTIVITIES

7.4.a Harmonized Legislative and Regulatory Framework

The planned activities include:

- Review of legislation, regulations, guidelines, and policies pertaining to sea turtle conservation in each of the three Guianas
- Review of the relevant international and regional treaties, conventions, and/or agreements signed by the relevant authorities in the three Guianas, and assessment of compliance
- Development of harmonized frameworks (both within and among the nations of the region) for legislation, regulations, guidelines, and policies pertaining to sea turtle conservation
- Provision of technical assistance to relevant government authorities for drafting appropriate laws, regulations, guidelines, and policies based on the harmonized frameworks
- Provision of technical support to the relevant government authorities for the endorsement and adoption of the target laws, regulations, guidelines and policies
- Development and adoption of harmonized management plans for sea turtle nesting sites and foraging grounds
- Establishment of protection status for the more important sea turtle nesting beaches, foraging grounds, inter-nesting habitats, and, to the extent practicable, migratory corridors

7.4.b Public Awareness, Education, and Information

To be successful, biodiversity conservation, including that related to sea turtles, must have the support of the public. This can only be accomplished through education and a realization of benefits (cultural, economic, and ecological) derived from ensuring sustainable sea turtle populations. Awareness and education campaigns will be directed at the general public, but will be focused on inhabitants of coastal

communities (including children), fishermen, tourism and recreation sector, and public officials, such as legislators and decision makers. An environmental education program will seek to increase understanding and awareness of the main issues related to sea turtle conservation in the Guianas, with a view to promoting (and even facilitating) individual and collective conservation actions by the various target groups.

Activities planned under this program component include:

- Development and launching of a sea turtle awareness campaign well-focused on each of the target groups
- Compilation of environmental awareness materials pertaining to sea turtle conservation
- Provision of technical assistance for the development and/or adaptation of sea turtle conservation awareness materials
- Development of a sea turtle conservation awareness library (printed, digital, audio visual) for general use by sea turtle conservation practitioners
- Launching of an interactive sea turtle web site
- Presentation of lectures, slide shows, radio and TV programs, to the various target groups
- Production and distribution of sea turtle conservation brochures, pamphlets, posters, leaflets, press releases, technical briefs, and scientific papers.

7.4.b.1 Information Clearinghouse and Exchange

Sea turtle conservation cannot take place in a vacuum. Practitioners must have easy access to the latest technical and scientific information, at all levels: local, national, regional and international. A regional sea turtle information clearinghouse and exchange will be established. It will serve as a depository for briefs, technical papers, scientific reports, legislation, management plans, and other relevant documents pertaining to sea turtle conservation in the Guianas. It will also facilitate access to the regional database and to other sea turtle conservation documents generated in other parts of the world.

The information clearinghouse will be linked to the program web site (i.e., a sea turtle within the WWF Guianas web site). This will also facilitate the publication and distribution of a newsletter, a monthly synopsis program highlights, and other information pertinent to the sea turtle conservation program, including data and documents pertaining to the sea turtle conservation and management program at local, national and regional levels.

Facilitate access to this clearing house and access by the national experts to main academic centers in either the USA or Europe. This means access i) to libraries and other information storage facilities, ii) to expertise, e.g. other scientists and, iii) to training programs and courses. Provide also funds for the purchase of books and periodical which are needed in the various countries, at the national institutes, so that the national experts can stay informed about recent developments in turtle biology, nature management and conservation.

7.4.c Local Community Support Activities

The first priority of local people living near the nesting beaches is meeting their daily basic needs. Many of these communities have traditionally considered sea turtle products and byproducts as commodities. The turtle conservation program will work with these communities to gradually and significantly decrease their dependence on sea turtle products, especially in cases where this dependence cannot be shown to be

ecologically sustainable. Concurrently, the program will work collaboratively with community leaders to foster and facilitate the development of sea turtle related economic activities to ensure the interest and involvement of local communities in sea turtle management and conservation.

The following subsections provide recommendations for activities to be carried out in support of this program component.

7.4.c.1 Regional Context

- Technical assistance in the development of community-based nature tourism (this will vary with each target site management)
- Training of designated members of local communities to become tour guides or to participate in the initiative in related ways
- Assistance in the development of visitor's center(s) in selected villages near nesting beaches
- Development of guidelines and standards for sea turtle watching, tour guiding, and related interpretive efforts
- Facilitating access for economic development agencies specialized in local community issues
- Technical assistance to ensure the environmental soundness of economic initiatives

7.4.c.2 Guyana

- Assist local communities in acquiring help in the development and implementation of environmentally sound economic initiatives, such as aquaculture
- Assist local communities in the development of appropriate lodging facilities near primary nesting sites (e.g., Kamwatta Beach)

7.4.c.3 Suriname

- Assist communities in acquiring in-village training for making handicrafts featuring local materials and ethnic designs;

- Assist local communities in acquiring help, including start-up funding, to develop and implement environmentally sound economic initiatives.

- 7.4.c.4 La Guyane

- Assist communities in the development and implementation of environmentally sound economic initiatives, such as bee keeping, farming and/or fruit cultivation (e.g., pineapples, cashews, mangoes)

7.4.d Regional and International Cooperation

Development of this program is guided by the WWF EcoRegion-Based Conservation Approach Regional cooperation is the key to this program's success, as it will help to more effectively address the broader social, cultural, and economic factors as well as the policy issues related to sea turtle conservation. During planning and development review stages, this program will rely heavily on the participation of key stakeholder groups in the Guianas.

Successful implementation of this program component depends significantly on collaboration among all the relevant government institutions and agencies, NGOs, researchers, technical and field staff, local communities, and other stakeholders across political boundaries. That collaboration also includes networking with range states, including Venezuela, Trinidad and Tobago, and Brazil. Moreover, the entire scope of conserving sea turtle populations nesting on the beaches of the Guianas relies on high-level government commitments to support these efforts, both nationally and regionally. This includes effective implementation of regional and international treaties, many of which have already been ratified by one or more of the three governments (see Annex I). Finally, it relies as well on significant support from the international donor community and the private sector at national and regional levels.

Activities under this component include:

- Official endorsement of this program by relevant government authorities
- Formal assessment of the feasibility of a Sea Turtle Conservation Cooperation Agreement among the three Guianas
- Assessment of the feasibility of Venezuela, Trinidad and Tobago, and Brazil acknowledging and supporting that Agreement
- Drafting of the Guianas Sea Turtle Conservation Cooperation Agreement
- Organization of a Guianas Sea Turtle Conservation Summit Conference, culminating with the signing of the Cooperation Agreement
- Establishment of a Regional Sea Turtle Conservation Steering Committee to oversee implementation of the Agreement, and to facilitate program coordination
- Development and operation of a Regional Sea Turtle Conservation Network to include Guyana, Suriname, La Guyane, Venezuela, Trinidad and Tobago, and Brazil (*Note*: the Central American Sea Turtle Network, a subregional alliance in partnership with the Wider Caribbean Sea Turtle Conservation Network, would be a useful model)
- Development and utilization of a regional strategy and approach for fund raising
- High level government collaboration for the development of harmonized frameworks for legislation, regulations, guidelines, and policies for sea turtle conservation and law enforcement
- Endorsement at the highest relevant government levels of the harmonized frameworks for legislation, regulations, guidelines, and policies for sea turtle conservation and law enforcement
- Lobbying for governmental compliance with relevant international treaties and conventions to which one or more of the Guianas are Party, including CITES, the Protocol to the Cartagena Convention concerning Specially Protected Areas and Wildlife (SPAW Protocol), and the Inter-American Convention for the Protection and Conservation of Sea Turtles (see Annex I)

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APPENDIX I - LIST OF ABBREVIATIONS AND ACRONYMS

ADEK	Anton de Kom University of Suriname
APCEP	Action Plan for the Caribbean Environment Programme
Bioinsight	Name of a consultancy firm from France
Biotopic	Name of an NGO from the Netherlands
CBD	Convention on Biological Diversity
CEPE	Centre d'Ecologie et Physiologie Energétiques [Strasbourg, France]
CELOS	Centre for Agricultural research [Suriname]
CI	Conservation International
CITES	Convention on International Trade in Endangered Species
CMS	Convention for the Protection of Migratory Species of Wild Animals
CNRS	Centre National de la Recherche Scientifique [Paris]
DIREN	Direction Régionale de l'Environnement de Guyane
EPA	Environmental Protection Agency [Guyana]
EPIH	Cultural Organization in Suriname
ESE	Laboratoire d'Ecologie, Systématique et Evolution [Orsay, France]
FAO	Food and Agricultural Organization [United Nations]
GFECP	Guianas Forests and Environmental Conservation Project
GMTCS	Guyana Marine Turtle Conservation Society
GPS	Global Positioning System
ICCAT	International Commission for the Conservation of the Atlantic Tunas
IMO	International Maritime Organization
INSERM	Institut National de la Santé et de la Recherche Médicale [Paris]
IUCN	World Conservation Union
Kulalasi	Community-based organization in Yalimapo, La Guyane
Kwata	NGO in La Guyane
LBB	Forest Service of Suriname
LVV	Ministry of Agriculture, Livestock and Fisheries [Suriname]
Masuwana	Community-based organization in Suriname
MOU	Memorandum of Understanding
NB	Nature Conservation Division [of LBB, Suriname]
NGO	Non-Governmental Organization
NMFS	National Marine Fisheries Service [USA]
NRC	National Research Council [USA]
NZCS	National Zoological Collection of Suriname
Oceanic Society	NGO in the USA, with projects in Suriname
ONCFS	Office national de la Chasse et de la Faune Sauvage [La Guyane]
Santa Rosa Conservation Club	Community-based organization in Guyana
Sépanguy	NGO in La Guyane
SPAW	Specially Protected Areas and Wildlife
STIDUNAL	Foundation for Sustainable Nature Management of Alusiaka, Suriname
STINASU	Foundation for Nature Preservation in Suriname
UvS	Anton de Kom University of Suriname
TED	Turtle Excluder Device
UMARI	Community-based organization in Galibi, Suriname
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
WIDECAST	Wider Caribbean Sea Turtle Conservation Network
WMA	Wildlife Management Authority [Guyana]
Worian Uwaponaka	Community-based organization in Galibi, Suriname
WWF	World Wide Fund for Nature, World Wildlife Fund

APPENDIX II - SEA TURTLE CONSERVATION INSTRUMENTS

There are a number of global and regional treaties and other agreements that could support harmonized sea turtle management and conservation in the Guianas. The most noteworthy are annotated below. Not all of the Guianas are signatory to all of them, but efforts will be made to urge them to do so.

GLOBAL TREATIES

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA (CITES)

The 1973 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was established to protect species from over-exploitation (due to commercial trade pressures) by means of an import/ export permit system. The Convention regulates international commerce in animals and plants whether dead or alive, and any recognizable parts or derivatives thereof. Appendix I lists endangered species (including all species of sea turtle) "threatened with extinction that are or may be affected by trade." Appendix II lists species that may become endangered unless trade is regulated. Appendix III lists species that any Party may wish to regulate, and that require international cooperation for trade control. Appendix IV contains model permits.

Permits are required for species listed in appendices I and II stating that specimens were acquired legally and that import will not be detrimental to the survival of the species. Trade in Appendix I specimens "must be subject to particularly strict regulation in order not to endanger further their survival and must only be authorized in exceptional circumstances."

With 145 Parties (Hykle, 1999), CITES is one of the most widely supported wildlife treaties of all time. CITES does not regulate or control any aspect of the domestic harvest and usage of species, including sea turtles; such regulations must be promulgated by national governments. Although designed to cover a wide range of wildlife (and floral) species, it is perhaps the most important global instrument to protect sea turtles from the potentially detrimental effects of international trade. For more information, see IUCN (1996) and Wijnstekers (1990), or visit www.cites.org.

Guyana became a signatory nation in 1977, France in 1978, and Suriname in 1980.

CONVENTION ON BIOLOGICAL DIVERSITY (CBD)

The Convention on Biological Diversity (CBD) came into force in 1993. Its objective is "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources…" for present and future generations. It binds nations to, among other things, (i) develop national strategies, plans or programs for the conservation and sustainable use of biological diversity; (ii) identify and monitor the status of the components of biological diversity; (iii) develop and manage protected areas and other areas of importance for biodiversity; and (iv) integrate *in situ* and *ex situ* methods of conservation.

The Convention also addresses sustainable use, incentives, research and training, public education and awareness, impact assessment and mitigation, access to genetic resources, technology transfer, information exchange, technical and scientific cooperation, biotechnology, and other principles relevant to the convention's objective. Furthermore, it established a funding mechanism, the Global Environment

Fund (GEF), to encourage developed nations to assist developing nations with their plans, programs and projects. For more information, visit www.biodiv.org.

Guyana and France ratified the Convention in 1994 and Suriname in 1996.

INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS (MARPOL TREATY)

The 1973 International Convention for the Prevention of Pollution from Ships, known as the Marpol Treaty, is an important treaty for the conservation of marine habitat. Its objective is "to preserve the marine environment by achieving the complete elimination of international pollution by oil and other harmful substances" (UNEP, 1989). The Convention has five Annexes that provide detailed technical specifications for ship construction and equipment to prevent major pollution of the marine environment in case of accidents. The Convention also provides norms and technical requirements to minimize operational discharges. The five Annexes are for oil, chemicals in bulk, packaged chemicals, liquid sewage, and garbage. Regarding Annex V (garbage), the nations of the Caribbean have submitted to the International Maritime Organization (IMO) a proposal for the Caribbean Region to be declared a "Special Area." This proposal has been accepted, but will only come into force when the relevant nations have put in place the necessary facilities to receive and process garbage on shore.

Guyana, France and Suriname are Parties to Annex V of the Marpol Treaty.

U. N. CONVENTION ON THE LAW OF THE SEA (UNCLOS)

The United Nations Convention on the Law of the Sea (UNCLOS) is considered one of the most comprehensive instruments of international law. This Convention provides the basic framework for all aspects of ocean sovereignty, jurisdiction, use, Signatory State rights and obligations. Its 320 articles and 9 annexes are a guide for behavior by Signatory States in the world's oceans, defining maritime boundaries, laying down rules for delineating sea boundaries, assigning legal rights, duties and responsibilities and providing machinery for the settlement of disputes.

The Convention was initiated at the Third Conference on the Law of the Sea in 1973. It was opened for signature in 1982 and entered into force in 1994. There are 130 Parties, including Guyana, France and Suriname. Environmental provisions aim at establishing rules for environmental standards and there are enforcement provisions relevant to pollution in the marine environment. There is provision for an Annex on highly migratory species, and thus there is the possibility that sea turtles could receive some protection under this Convention. For more information, visit www.un.org/Depts/los.

CONVENTION FOR THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals, commonly referred to as the Convention on Migratory Species (CMS, or Bonn Convention) came into force in 1983. The treaty recognizes that "wild animals in their innumerable forms are an irreplaceable part of the earth's natural system which must be conserved for the good of mankind" and that "conservation and effective management of migratory species of wild animals require the concerted action of all States within the national jurisdictional boundaries of which such species spend any part of their life cycle." It incorporates two Appendices of migratory species that would benefit significantly from concerted conservation measures.

Endangered species, listed in Appendix I, are accorded full protection. This includes all sea turtles, with the exception of the endemic Australian flatback (*Natator*). Range States of Appendix I species are to endeavor to conserve their habitat, to counteract factors impeding their migration, and to control other factors that might endanger them. Moreover, Range States are obliged to prohibit the taking of these species, with few exceptions. The definition of "taking" includes hunting, fishing, capturing, harassing and deliberate killing. Appendix II lists migratory species with a conservation status that requires, or would benefit from, international cooperative agreements that provide for species and habitat conservation measures, research and monitoring, training, and information exchange. Where appropriate, a species may be listed in both appendices (Hykle, 1992).

Currently the Bonn Convention lacks broad support in the Caribbean basin, but if ratified by enough nations in the region, it could be an effective tool in the conservation of migratory species, including sea turtles. In the Guianas region, only France is a Party. For more information, visit www.wcmc.org.uk/cms.

REGIONAL TREATIES

CARTAGENA CONVENTION AND SPAW PROTOCOL

Arguably the most important regional treaty with regard to the protection of sea turtles and their habitats in the Wider Caribbean Region is the United Nations Environment Program (UNEP) Regional Seas Convention, "Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region" (Cartagena Convention). The following paragraphs are excerpted from Eckert (1991).

The Convention is coupled with an Action Plan, known as the Action Plan for the Caribbean Environment Program (APCEP). The First Intergovernmental Meeting on APCEP was convened by UNEP in cooperation with the Economic Commission for Latin America in Montego Bay, Jamaica, in April 1981. The representatives of Governments from 22 States in the Region adopted APCEP at this meeting and established the Caribbean Trust Fund to support common costs and activities associated with the implementation of the Action Plan.

In March 1983, a Conference of Plenipotentiaries met in Cartagena, Colombia to negotiate the Cartagena Convention and ultimately adopted both the Convention and a Protocol Concerning Cooperation in Combating Oil Spills in the Wider Caribbean Region. The Convention describes the responsibilities of Contracting Parties to "prevent, reduce and control" pollution from a variety of sources (i.e., pollution from ships, from at-sea dumping of waste, from land-based sources, from seabed activities, and from airborne sources). Article 10 is of special interest in that it addresses the responsibilities of Contracting Parties to "individually or jointly, take all appropriate measures to protect and preserve rare or fragile ecosystems, as well as the habitat of depleted, threatened or endangered species, in the Convention area."

In January 1990, a Protocol Concerning Specially Protected Areas and Wildlife (SPAW) to the Cartagena Convention was adopted by a Conference of Plenipotentiaries, providing a mechanism whereby species of wild fauna and flora could be protected on a regional scale. The landmark Protocol grants explicit protection to species listed in three categories, or annexes.

Annex I includes species of flora to be exempt from all forms of destruction or disturbance. Annex II ensures total protection and recovery to listed species of fauna, with minor exceptions. Specifically, Annex II listing prohibits (a) the taking, possession or killing (including, to the extent possible, the

incidental taking, possession or killing) or commercial trade in such species, their eggs, parts or products, and (b) to the extent possible, the disturbance of such species, particularly during periods of breeding, incubation, estivation or migration, as well as other periods of biological stress. Annex III denotes species in need of "protection and recovery", but subject to a regulated harvest.

On 11 June 1991, Plenipotentiaries again met in Kingston, Jamaica, to formally adopt the Annexes. The Conference voted unanimously to include all six species of sea turtle inhabiting the Wider Caribbean (i.e., *Caretta caretta*, *Chelonia mydas*, *Eretmochelys imbricata*, *Dermochelys coriacea*, *Lepidochelys kempii*, *L. olivacea*) in Annex II. The unanimous vote on this issue is a clear statement on the part of Caribbean Governments that the protection of regionally depleted species, including sea turtles, is a priority.

France is a Party to the Cartagena Convention and a signatory to the SPAW Protocol. Neither Suriname nor Guyana has joined these uniquely important regional instruments. For more information, visit www.cep.unep.org.

CONVENTION ON NATURE PROTECTION AND WILDLIFE PRESERVATION IN THE WESTERN HEMISPHERE

The Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, often referred to as the Western Hemisphere Convention, was opened for signature at the Pan American Union on 12 October 1940 and entered into force on 1 May 1942. Currently there are 22 Parties in the Wider Caribbean region (Hykle, 1999).

Its stated objective is to preserve all species and genera of Native American fauna and flora from extinction, and also preserve areas of wild and human value. Provisions include the establishment of National Parks and Reserves (article 2), and strict wilderness areas to remain inviolate (article 4). Species listed in the Annexes are considered to be of "special urgency and importance" (article 8). Article 9 provides for trade controls on behalf of protected fauna and flora (and parts thereof). Five species of sea turtle are listed (Dodd, 1978).

Suriname is a Party, but Guyana and France are not.

INTER-AMERICAN CONVENTION FOR THE PROTECTION AND CONSERVATION OF SEA TURTLES

The Inter-American Convention for the Protection and Conservation of Sea Turtles is the only international treaty dedicated exclusively to sea turtles, setting standards for the conservation of these endangered animals and their habitats. The objective of this Convention is "to promote the protection, conservation and recovery of sea turtle populations and of the habitats on which they depend, based on the best available scientific evidence, taking into account the environmental, socioeconomic and cultural characteristics of the Parties." Parties are obligated to take appropriate and necessary measures, in accordance with international law and on the basis of the best available scientific evidence, for the protection, conservation and recovery of sea turtle populations and their habitats. The convention came into force in 2001.

Neither Guyana, Suriname nor La Guyane (France) are Party to this treaty, but range states Venezuela and Brazil ratified in 1996 and 1997, respectively. For more information, visit www.seaturtle.org/iac.

APPENDIX III – TURTLE EXCLUDER DEVICE

Figure 1a. To accommodate the release of larger turtles, the two forward cuts of the escape opening for the Turtle Excluder Device (TED) must not be less than 20 inches (51 cm) long from the points of the cut immediately forward of the TED frame. The resultant length of the leading edge of the escape opening cut must be no less than 71 inches (180 cm), as seen in the diagram below. A webbing flap may be used with this escape hole, but the resultant opening with a webbing flap must have a minimum width of 71 inches (180 cm) and the circumference of the exit opening must be 142 inches (361 cm) when stretched (see Figure 1b). The completed apparatus is illustrated in Figure 1c. *Source*: Proposed Rules: U.S. Federal Register, 2 October 2001, 66(191):50148-50159.

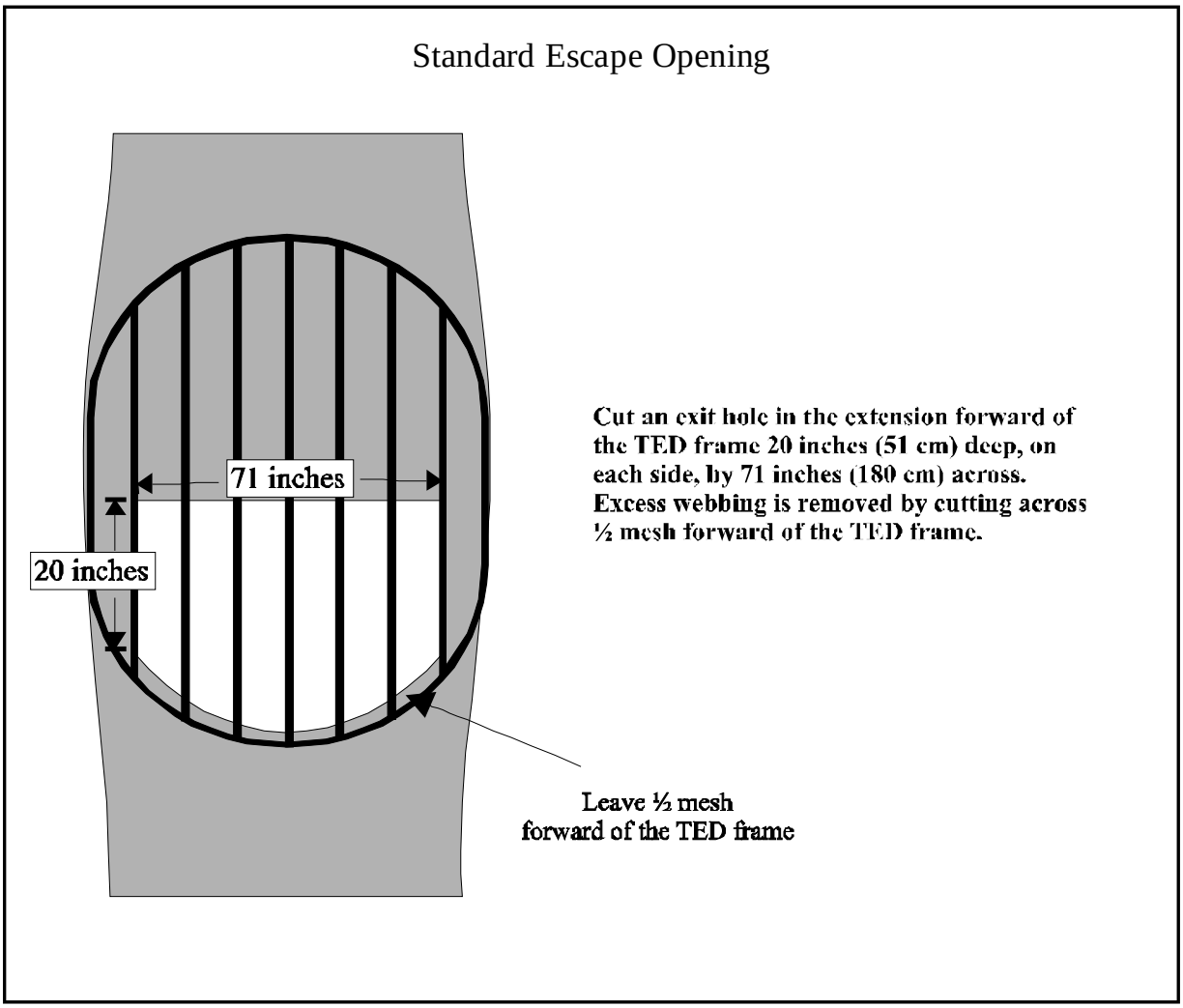

Figure 1b. *Source*: Proposed Rules: U.S. Federal Register, 2 October 2001, 66(191):50148-50159.

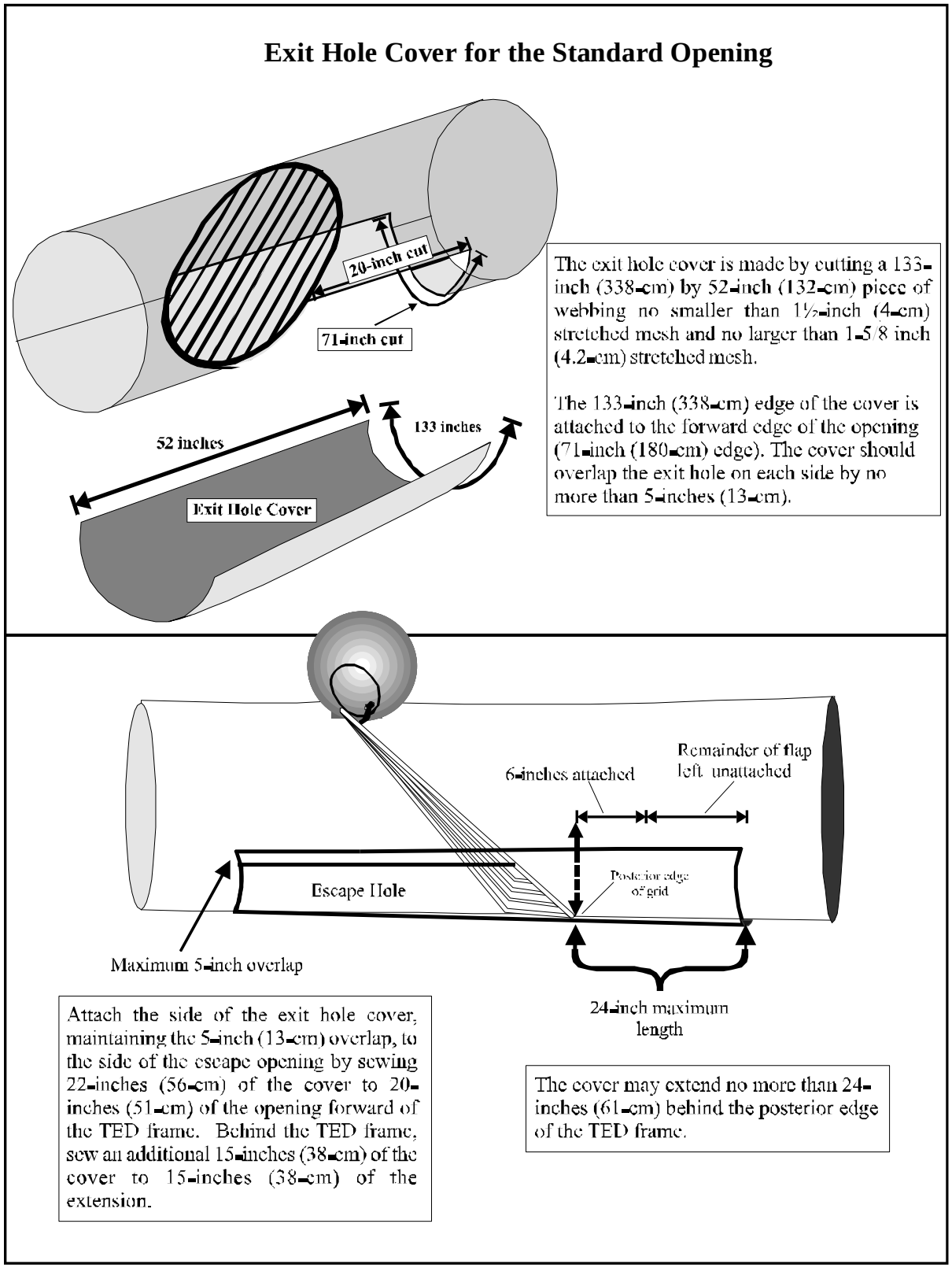

Figure 1c. *Source*: Proposed Rules: U.S. Federal Register, 2 October 2001, 66(191):50148-50159.

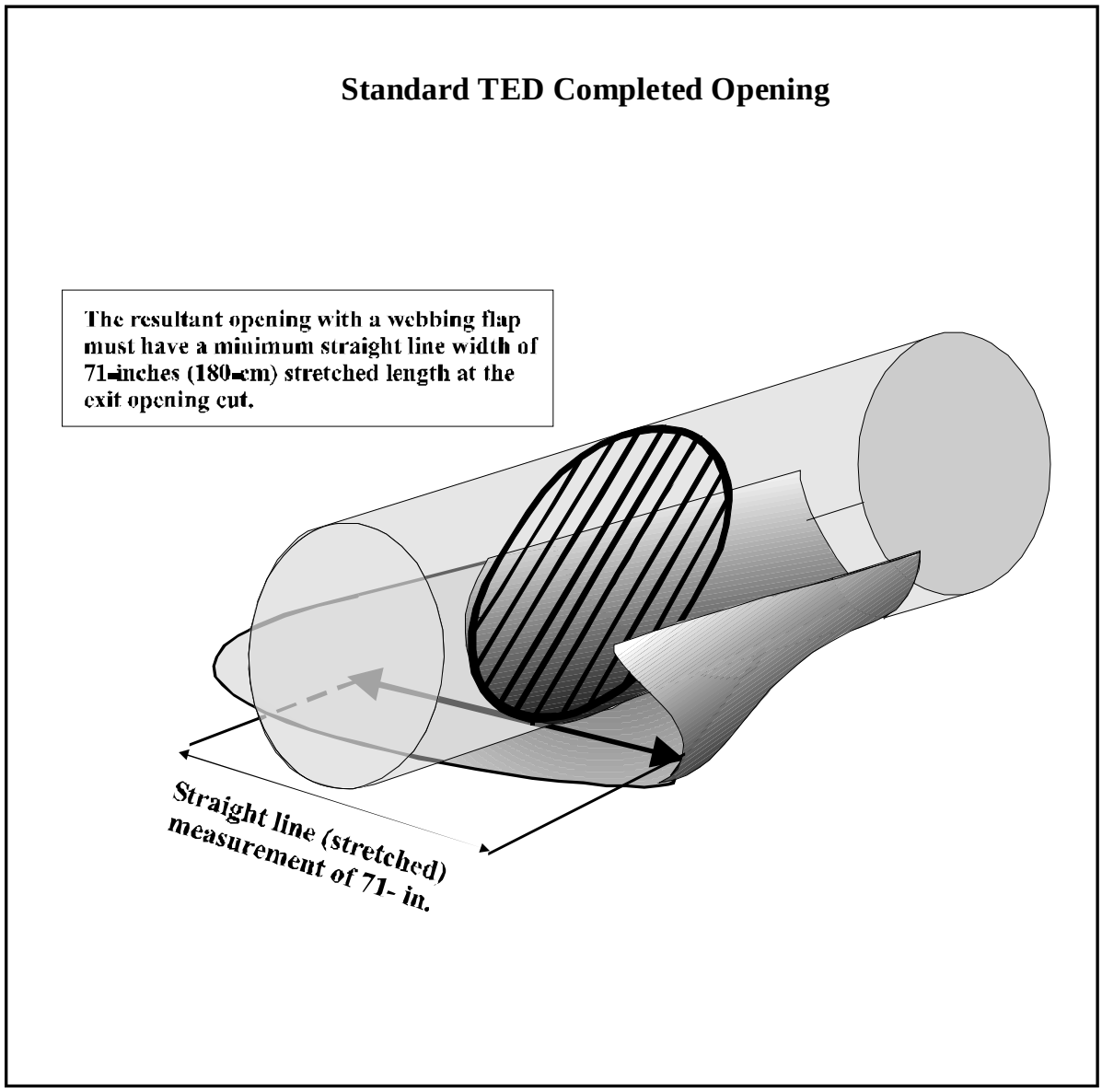

Figure 2. If a double cover flap TED opening is used, the two forward cuts of the escape opening must not be less than 20 inches (51 cm) long from the points of the cut immediately forward of the TED frame. The resultant length of the leading edge of the escape opening cut must be no less than 56 inches (142 cm). *Source*: Rules and Regulations: U.S. Federal Register, 14 May 2001, 66(93):24287-24290.