

Northwest Atlantic Leatherback Nesting Trend Analyses

Northwest Atlantic Leatherback Status Working Group

An exercise facilitated by the Wider Caribbean Sea Turtle Conservation Network and Conservation Science Partners, and supported by the National Fish and Wildlife Foundation



Bryan Wallace
on behalf of the Working Group

GOALS

- **Primary Goal: determine regional trend in annual nest counts**
- Other goals: determine trends in annual nest counts at different spatial and temporal scales
- Why?
 - Apparent declines at various sites across the Wider Caribbean
 - More information about threats across the range
 - Provided up-to-date information for funders, managers, et al.

Working group members

British Virgin Islands (BVI, GB): Argel Horton and Mervin Hastings (Conservation and Fisheries Department, Government of the British Virgin Islands), Shannon Gore (Association of Reef Keepers);

Canada (CN): Mike James (Division of Fisheries and Oceans Canada);

Colombia (CO): Diego Amarocho (WWF);

Costa Rica (CR): Didiher Chacón C. (Latin American Sea Turtles: LAST), Stanley Rodriguez (Estación Las Tortugas), Sea Turtle Conservancy, Ecology Project International;

French Guiana (GF, FR): Rachel Berzins and Nicolas Paranthoen (Office National de la Chasse et de la Faune Sauvage: ONCFS), Benoît de Thoisy and Virginie Dos Reis (KWATA), Damien Chevallier and Jean-Yves Georges (Centre National de la Recherche Scientifique: CNRS-IPHC), Johan Chevalier (Réserve Naturelle de l'Amana), Laurent Kelle (WWF France);

Grenada (GD): Kate and Kester Charles (Ocean Spirits, Inc.);

Guyana (GY): Sopheia Edghill (WWF Guianas), Romeo De Freitas (Guyana Marine Turtle Conservation Society: GMTCS), Denise Fraser and Odacy Davis (Protected Areas Commission: PAC);

Guadeloupe (GP, FR): Sophie Lefevre (ONF Guadeloupe - Mission PNA) on behalf of the Réseau Tortues Marines de Guadeloupe;

Martinique (FR): Réseau Tortues Marines de Martinique;

Panamá (PA): Cristina Ordoñez, Dan Evans, David Godfrey and Roldan Valverde (Sea Turtle Conservancy);

Puerto Rico (US): Carlos E. Diez (Puerto Rico Department of Natural Resources), Luis Crespo (Amigos de las Tortugas Marinas de Maunabo: ATMAR);

St. Barthélemy (FR) and St. Martin (FR): Sophie Lefevre (ONF Guadeloupe - Mission PNA) on behalf of the Réseau Tortues Marines de Guadeloupe;

St. Kitts & Nevis (KN): Kimberly Stewart (St. Kitts Sea Turtle Monitoring Network);

Suriname (SR): Hanneke van Lavieren, Michael Hiwat (WWF Guianas);

Trinidad & Tobago (TT): Tanya Clovis (Save Our Sea Turtles-Tobago); Nevon Williams, Kyle Mitchell, and Scott Eckert (Nature Seekers); Kathryn Audroing (Turtle Village Trust) on behalf of Fishing Pond Turtle Conservation Group and Grande Riviere Nature Tour Guides Association;

United States of America (US): Simona Ceriani (Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission), Matthew Godfrey (North Carolina Wildlife Conservation Commission), Kara Dodge (Woods Hole Oceanographic Institute and New England Aquarium), Rick Scherer, Amanda Kissel, and Bryan Wallace (Conservation Science Partners), Karen Eckert (WIDECAST);

United States Virgin Islands (USVI, US): Claudia Lombard (US Fish and Wildlife Service), Kelly Stewart (The Ocean Foundation);

Venezuela (VZ): Hedelvy J. Guada (Assistant Professor, Instituto de Zoología y Ecología Tropical, Facultad de Ciencias, Universidad Central de Venezuela: IZET-UCV/ CICTMAR).

Background: the data

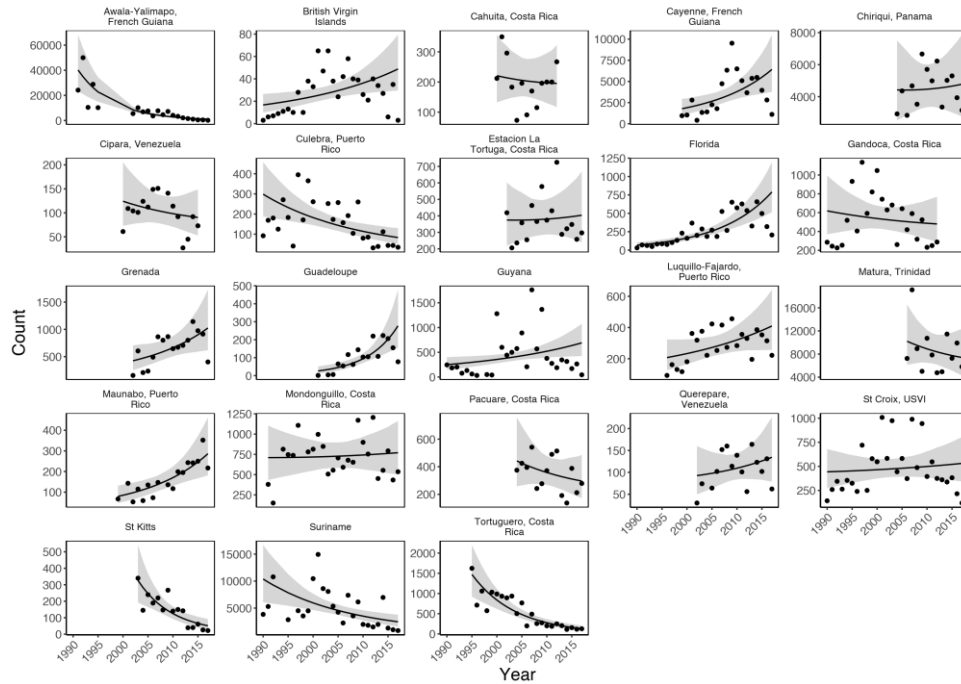
- Data request formally initiated 17 April; first dataset obtained 12 April, last dataset obtained 17 May
- Data received from 17 different countries, ~39 sites
- Those with time-series >10yr since 1990:
 - 23 sites across 14 countries and territories
 - ~450 site-years
 - >600,000 nests observed
 - People observed average 139 days/yr
 - (>80,000 people-days total)

APPROACH: 23 SITES

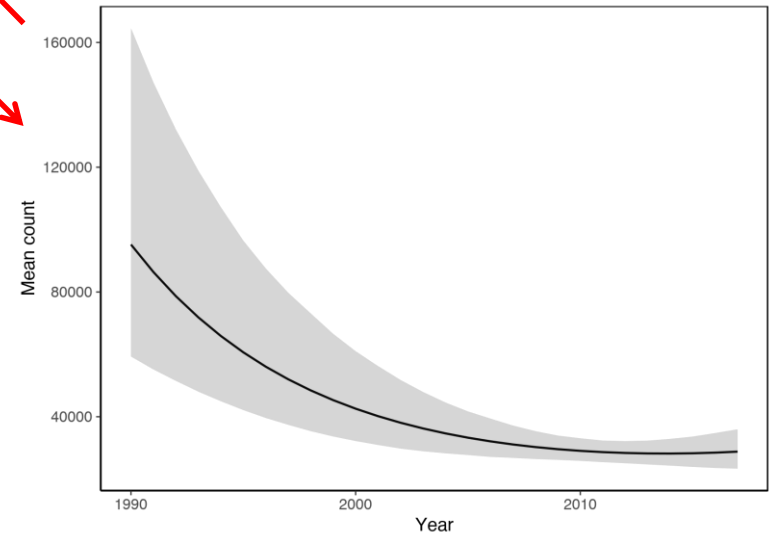
Stock	Site	1990-present (n = 23)	1998-present (n = 23)	2008-present (n = 19)
Florida	Florida, North Carolina (US)	X	X	X
N. Caribbean	St. Croix, USVI (US)	X	X	X
	Tortola, BVI (GB)	X	X	X
	Culebra, PR (US)	X	X	X
	Luquillo-Fajardo, PR (US)	X	X	X
	Maunabo, PR (US)	X	X	
	St. Kitts & Nevis	X	X	X
	Guadeloupe (FR)	X	X	X
W. Caribbean	Pacuare (CR)	X	X	X
	Mondonguillo (CR)	X	X	X
	Estacion La Tortuga (CR)	X	X	X
	Tortuguero (CR)	X	X	X
	Cahuita (CR)	X	X	
	Gandoca (CR)	X	X	
	Chiriqui (PA)	X	X	X
Guianas-Trinidad	Levera (GD)	X	X	X
	Querepare (VZ)	X	X	X
	Cipara (VZ)	X	X	
	Guyana	X	X	X
	Suriname	X	X	X
	Awala-Yalimapo, GF (FR) (including remote beaches)	X	X	X
	Cayenne, GF (FR)	X	X	X
	Matura (TT)	X	X	X

MODELING APPROACH: Hierarchical Bayesian trend analysis

Site-level data & trends



Region-level trend

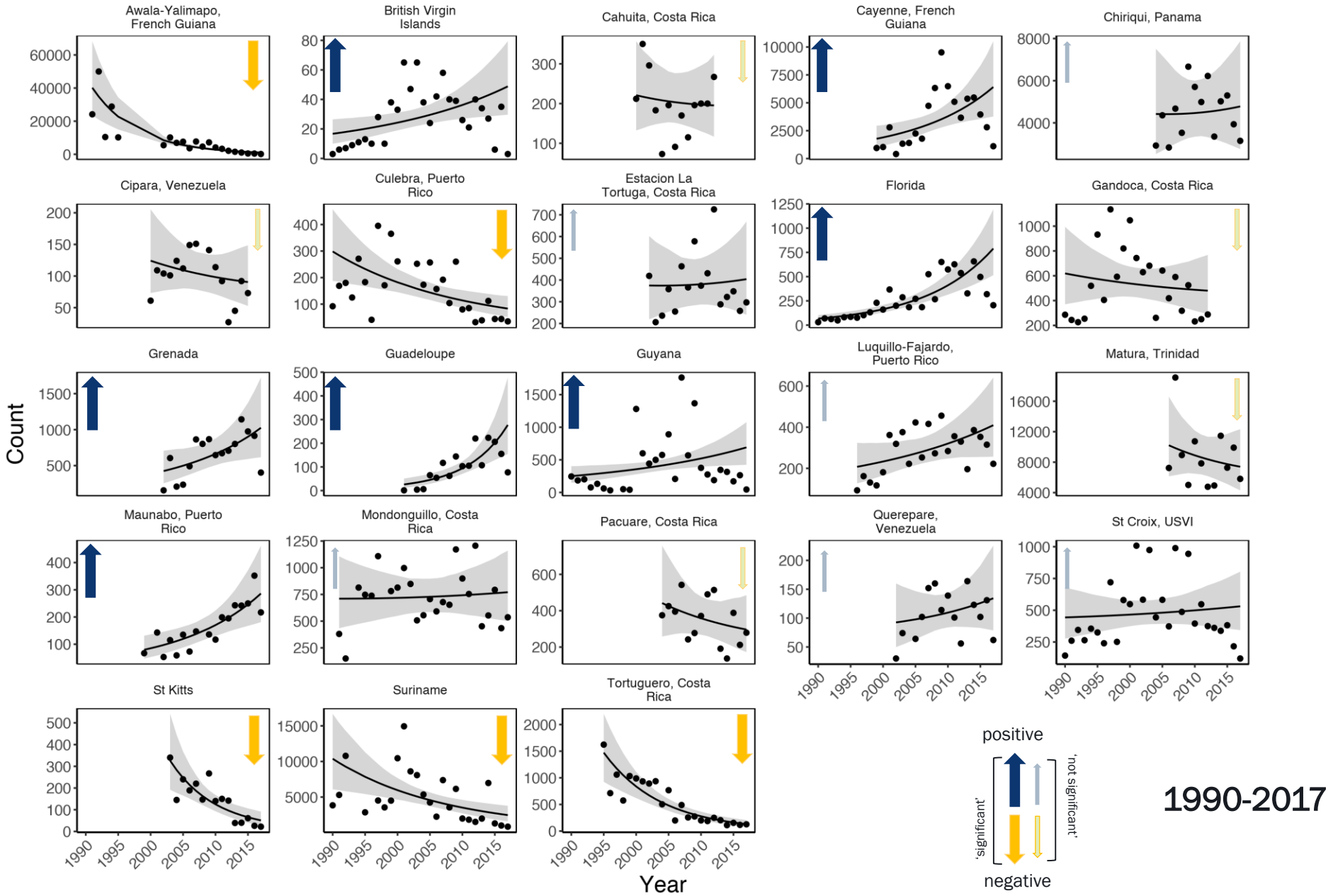


Summary of site-level trends

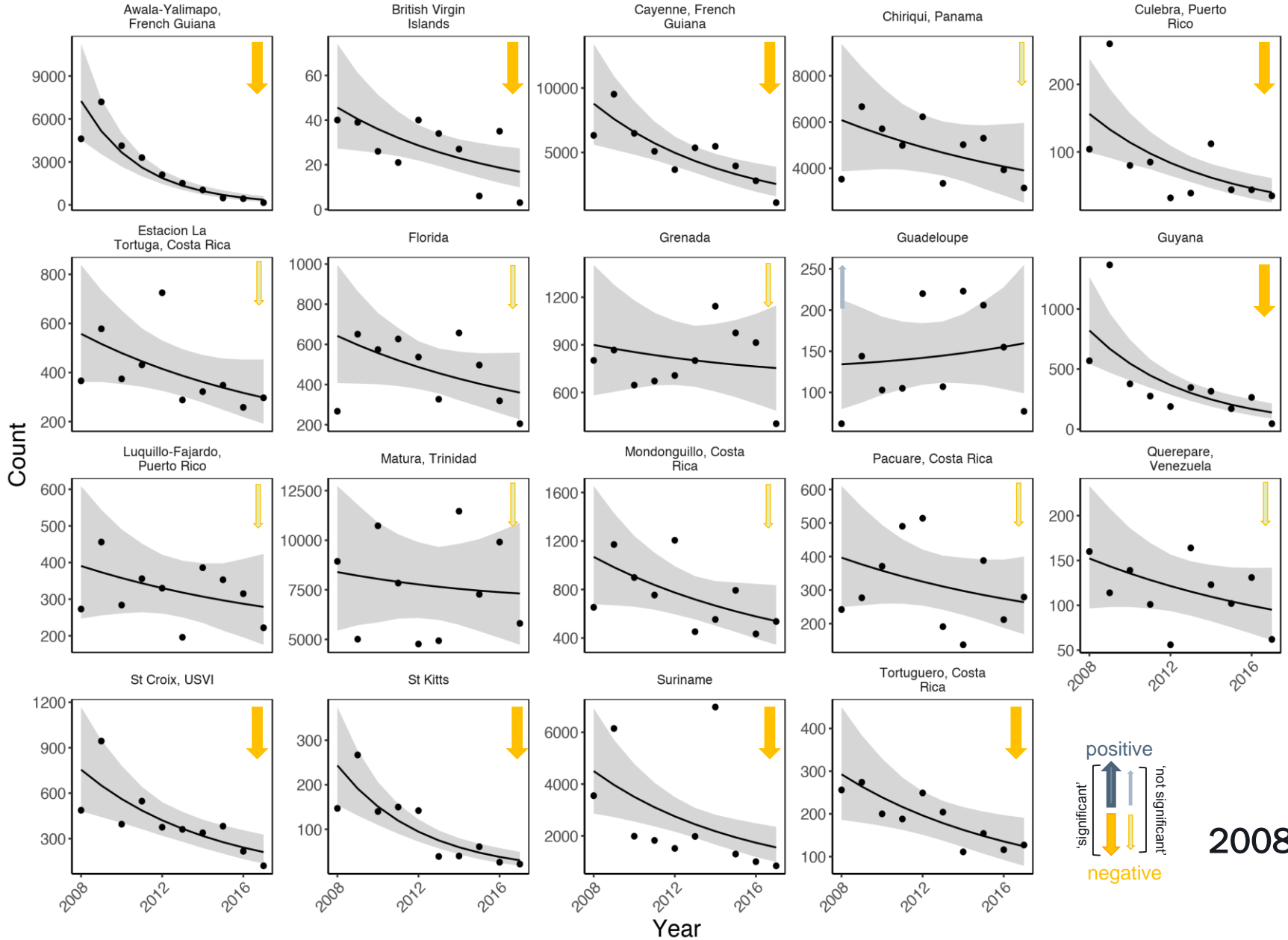
- 1990-present: Half positive, half negative
- 1998-present: more negative than positive
- 2008-present: nearly all negative

Stock	Site	1990-present (n = 23)
Florida	Florida, US	9.59 (6.53 - 12.67)
N. Caribbean	St. Croix, USVI (US)	0.68 (-2.18 - 3.68)
	Tortola, BVI (GB)	0.39 (0.06 - 0.83)
	Culebra, PR (US)	-4.61 (-7.44 - -1.76)
	Luquillo-Fajardo, PR (US)	3.32 (-0.56 - 7.46)
	Maunabo, PR (US)	7.43 (2.76 - 12.47)
	St. Kitts & Nevis	-12.43 (-18.37 - -6.26)
	Guadeloupe (FR)	16.24 (8.46 - 24.63)
W. Caribbean	Pacuare (CR)	-2.97 (-9.53 - 3.83)
	Mondonguillo (CR)	0.35 (-2.62 - 3.31)
	Estacion La, Tortuga (CR)	0.54 (-4.98 - 6.49)
	Tortuguero (CR)	-10.42 (-13.34 - -7.12)
	Cahuita (CR)	-0.97 (-7.51 - 6.04)
	Gandoca (CR)	-1.13 (-4.99 - 2.88)
	Chiriqui (PA)	0.67 (-6.39 - 7.80)
Guianas-Trinidad	Levera (GD)	6.1 (0.27 - 12.29)
	Querepare (VZ)	2.62 (-3.70 - 9.47)
	Cipara (VZ)	-2.06 (-7.75 - 3.62)
	Guyana	3.86 (0.59 - 7.28)
	Suriname	-5.14 (-7.98 - -1.96)
	Awala-Yalimapo, GF (FR) (including remote beaches)	-12.95 (-15.87 - -10.20)
	Cayenne, GF (FR)	7.44 (2.21 - 13.03)
	Matura (TT)	-2.84 (-10.02 - 4.55)

RESULTS: Site-level trends

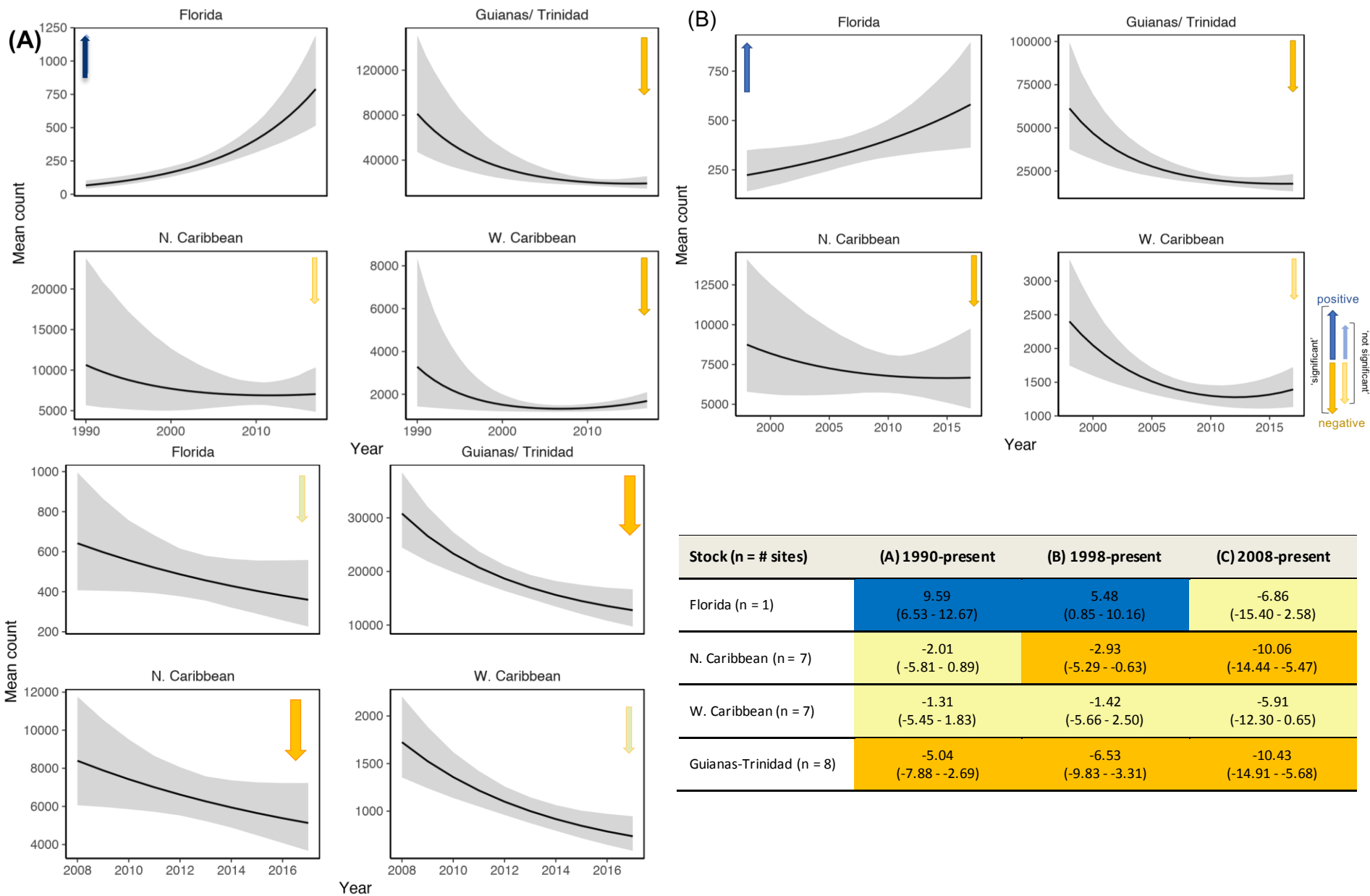


RESULTS: Site-level trends

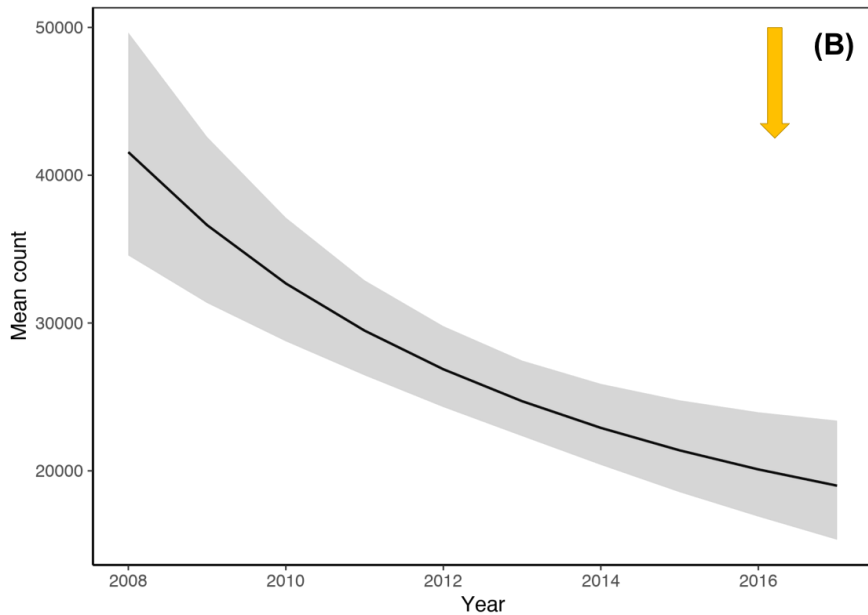
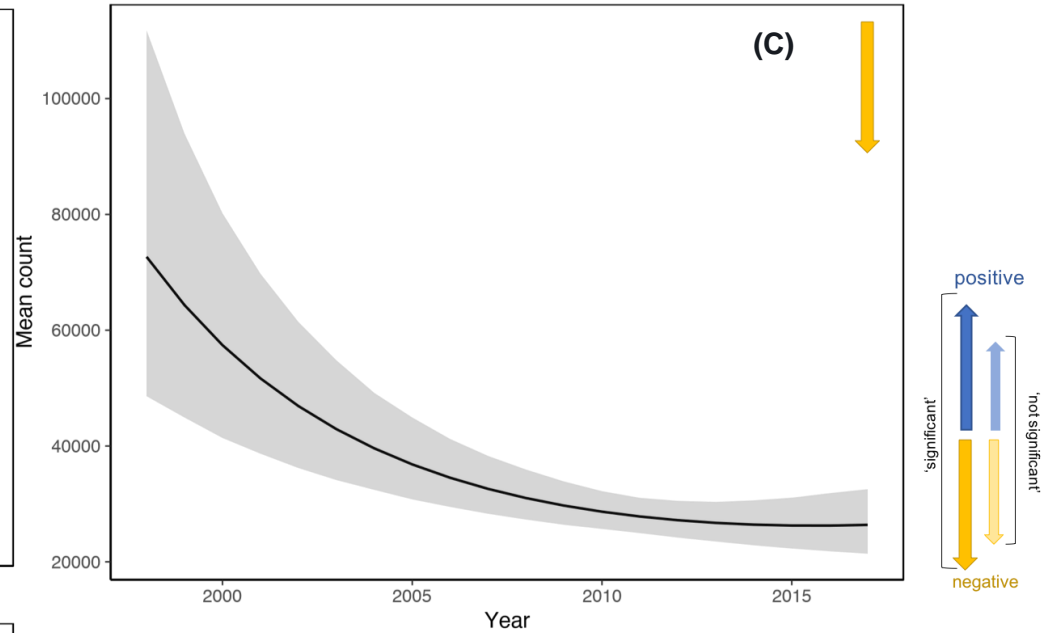
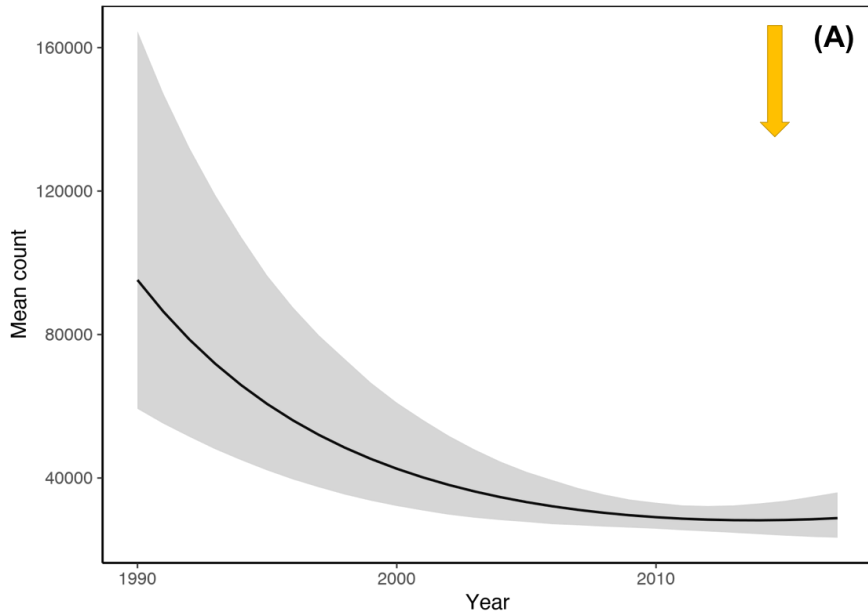


2008-2017

RESULTS: Stock-level trends weighted by site-level abundance



RESULTS: Regional trends weighted by site-level abundance



Regional Trend (n = # sites)	(A) 1990-present (n = 23)	(B) 1998-present (n = 22)	(C) 2008-present (n = 18)
REGIONAL	-4.21 (-6.66 - -2.23)	-5.37 (-8.09 - -2.61)	-9.32 (-12.9 - -5.57)

Working Group Report Conclusions

- **Weighted trends progressively negative from long-term to short-term timeframes**
- **Recent trends negative at all scales: site, stock, regional**
- **Not incorporated/estimated**
 - Overall abundance
 - Annual survivorship
 - Environmental effects
 - Remigration intervals

Working Group Report Conclusions

- **Potential drivers**

- **Anthropogenic impacts**

- Fisheries bycatch close to nesting beaches
 - Fisheries bycatch in foraging areas

- **Habitat loss**

- Beach erosion without creation of new beaches

- **Life history and demographic factors**

- Increasing remigration intervals
 - Long-term cycles and variation in recruitment, breeding periodicity

Working Group Report Conclusions and Questions

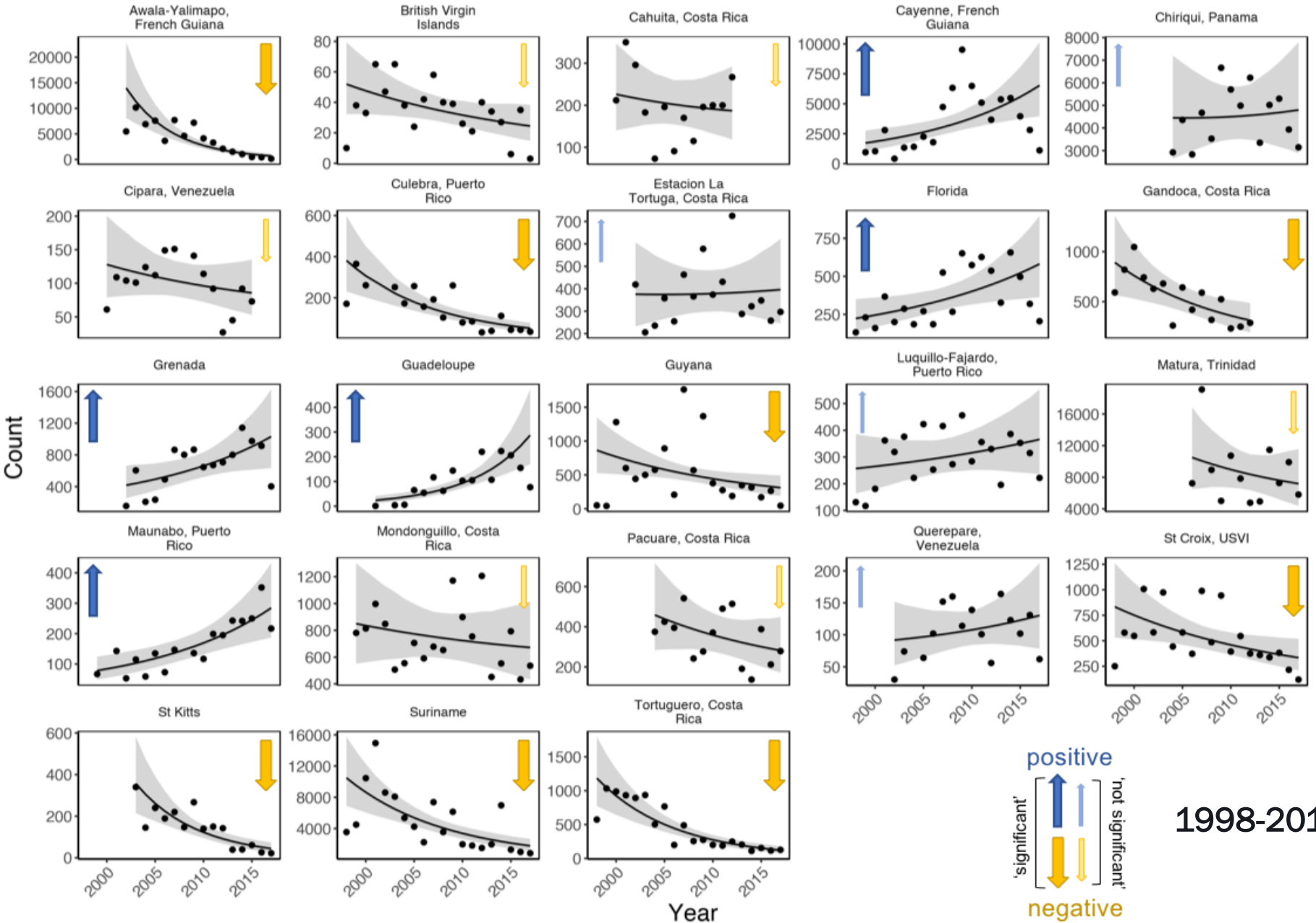
- Which trends are most informative?
- Which trends are most relevant for management?
- What is driving recent declines?
- Are short-term trends ‘real’?
 - See NWA loggerheads example
- How long do we need to monitor sea turtle populations to ‘know’ what the trend is?
- Are sea turtle populations inherently cyclical across multiple generations?



Thanks to you!

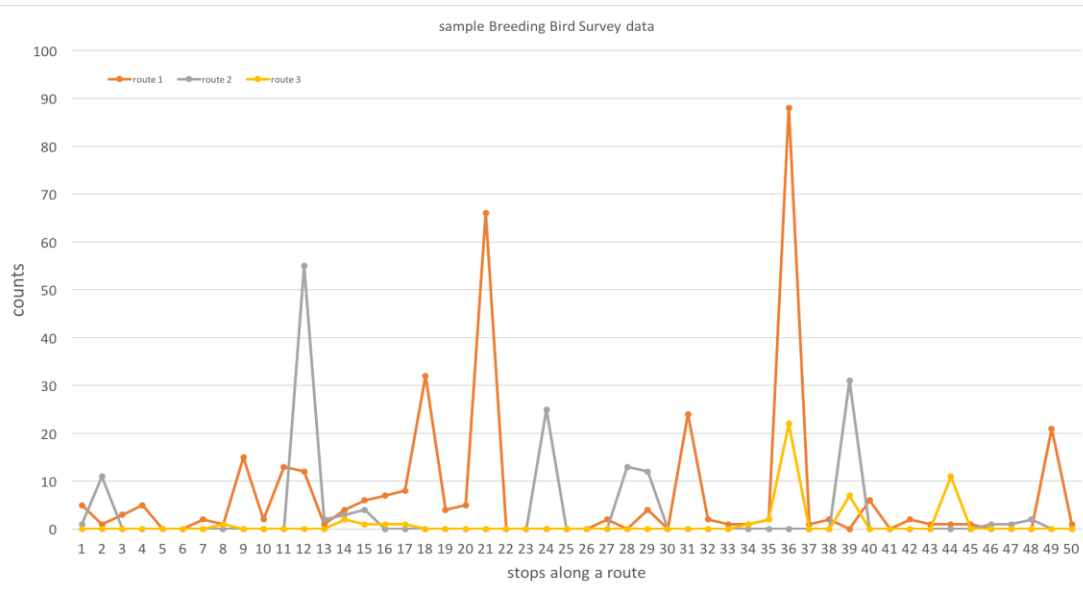
Appendices

RESULTS: Site-level trends



MODELING APPROACH: Hierarchical Bayesian trend analysis

North American Breeding Bird Survey



Multiple years of data per route



Model to estimate trends over time:

- by stratum (site)
- by region

