

The following supplement accompanies the article

Sampling nesting sea turtles: impact of survey error on trend detection

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Table S1. Summary of data source, study location and survey methodologies for the turtle populations investigated

Species	Location	Factor counted	Survey duration (seasons)	Year range	Season range (peak)	Survey frequency	Geographic position	Data reference
<i>C. caretta</i>	Kamouda, Japan	Tracks	51	1954–2004	Apr–Aug	Not stated	34° N, 135° E	(Chaloupka et al. 2008b)
	Woongarra Coast, Australia	Turtles	35	1969–2003	Oct–Mar	Daily FS	25° S, 152° E	(Limpus 2008)
	Little Cumberland Island, USA	Turtles	34	1964–1997	May–Aug	Daily FS	31° N, 81° W	(Dahlen et al. 2000)
	Heron Island, Australia	Turtles	28	1974–2002	Oct–Mar	Daily PS	23° S, 152° E	(Limpus 2008)
	Wreck Island, Australia	Turtles	26	1977–2003	Oct–Mar	Daily PS	23° S, 152° E	(Limpus 2008)
	Bald Head Island, North Carolina, USA	Clutches	24	1980–2003	May–Aug	Daily FS	33° N, 78° W	(Hawkes et al. 2005)
	Wreck Rock, Australia	Turtles	23	1980–2003	Oct–Mar	Daily PS	24° S, 152° E	(Limpus 2008)
	Zakynthos, Greece	Clutches	19	1984–2002	May–Oct	Mostly daily FS	38° N, 21° E	(Margaritoulis 2005)

Species	Location	Factor counted	Survey duration (seasons)	Year range	Season range (peak)	Survey frequency	Geographic position	Data reference
<i>C. mydas</i>	Yakushima, Japan	Tracks	19	1985–2004	Apr–Aug	Not stated	30° N, 131° E	(Chaloupka et al. 2008b)
	Dalyan Beach, Turkey	Clutches	18	1988–2005	May–Sep (Jun–Jul)	Daily FS	36° N, 28° E	(Türkozan & Yilmaz 2008)
	Bahia, Brazil	Clutches	16	1988–2003	Sep–Feb (Nov)	Daily FS	13° S, 38° W	Marcovaldi & Chaloupka (2007)
	Espirito Santo, Brazil	Clutches	16	1988–2003	Sep–Feb (Nov)	Daily FS	19° S, 40° W	Marcovaldi & Chaloupka (2007)
	Archie Carr National Wildlife Refuge, Florida, USA (21 km section)	Clutches	16	1982–1997	May–Aug (Jun–Jul)	Daily FS	28° N, 80° W	(Bagley et al. 2000)
	Archie Carr National Wildlife Refuge, Florida, USA (40.5 km section)	Clutches	15	1989–2003	May–Aug (Jun–Jul)	Daily FS	28° N, 80° W	(Weishampel et al. 2006)
	Lady Musgrave Island, Australia	Turtles	15	1988–2002	Oct–Mar (Dec)	Daily PS	24° S, 152° E	(Limpus 2008)
	Bald Head Island, North Carolina, USA	Turtles	13	1991–2003	May–Aug	Daily FS	33° N, 78° W	(Hawkes et al. 2005)
	Senri Beach, Japan	Clutches	12	1990–2001	May–Aug (Jul)	Daily FS	33° N, 135° E	(Hatase et al. 2002)
	Heron Island, Australia	Turtles	34	1974–2007	Oct–Mar (Dec– Jan)	Daily FS	23° S, 152° E	(Limpus 2007a)
	Tortuguero, Costa Rica	Clutches	33	1971–2003	Jun–Nov (Sept)	Approx. weekly PS & FS	10°N, 83° W	(Troëng & Rankin 2005)
	Sarawak Turtle Islands, Malaysia	Clutches	32	1970–2001	All year (Jun–Aug)	Not stated	2° N, 110° E	(Chan 2006)
	Tortuguero, Costa Rica	Tracks	26	1971–1996	May–Nov (Aug)	Weekly FS	10° N, 83° W	(Bjorndal et al. 1999)

Species	Location	Factor counted	Survey duration (seasons)	Year range	Season range (peak)	Survey frequency	Geographic position	Data reference
	Ogasawara, Japan	Turtles	25	1979–2003	May–Aug (Jun– July)	Not stated	27° N, 142° E	(Chaloupka et al. 2008a)
	Sabah Turtle Islands, Malaysia	Clutches	23	1977–1999	All year (Jun–Jul)	Daily FS	6° N, 118° E	(Chan 2006)
	Karachi, Pakistan	Clutches	18	1980–1997	All year (Jul–Dec)	Not stated	25° N, 67° E	(Asrar 1999)
	Terengganu, Malaysia	Clutches	17	1984–2000	All year (Jun–Jul)	Not stated	5° N, 103° E	(Chan 2006)
	Archie Carr National Wildlife Refuge, Florida, USA (21 km section)	Clutches	16	1982–1997	May–Sept (Jun–Jul)	Daily FS	28° N, 80° W	(Bagley et al. 2000)
	Archie Carr National Wildlife Refuge, Florida, USA (40.5 km section)	Clutches	15	1989–2003	May–Sept (Jun–Jul)	Daily FS	28° N, 80° W	(Weishampel et al. 2006)
	East Island, French Frigate Shoals, Hawaii, USA	Turtles	15	1980–1994	May–July	Daily PS	24° N, 166° W	(Balazs & Chaloupka 2004)
	Raine Island, Australia	Tracks	14	1991–2004	Sept–Apr (Dec–Jan)	Daily PS	12° S, 144° E	(Limpus 2007a)
	Northwest Island, Australia	Tally count of turtles	14	1989–2003	Oct–Apr (Dec–Jan)	Daily PS	23° S, 152° E	(Limpus 2007a)
	Wan-an Island, Taiwan	Turtles	14	1992–2005	June–Oct	Not stated	24° N, 120° E	(Chan et al. 2007)
<i>E. imbricata</i>	Tortuguero, Costa Rica	Turtles	30	1972–2001	Jul–Sep	Daily FS (1972-1991); Not stated (1992-2001)	10° N, 83° W	(Meylan 1999, IUCN 2002)
	Yucatán Peninsula, Mexico	Clutches	25	1977–2001	May–Sep	Variable	19° N, 91° W	(Garduño-Andrade et al. 1999, IUCN 2002)

Species	Location	Factor counted	Survey duration (seasons)	Year range	Season range (peak)	Survey frequency	Geographic position	Data reference
<i>D. coriacea</i>	Sabah Turtle Islands, Malaysia	Clutches	21	1979–1999	All year	Not stated	6° N, 118° E	(Chan 2006)
	Yucatán Peninsula, Mexico	Tracks	20	1977–1996	May–Sep	Variable	19° N, 91° W	(Garduño-Andrade et al. 1999)
	Jumby Bay, Antigua	Turtles	18	1987–2004	Jun–Nov	Daily FS	17° N, 62° W	(Richardson et al. 2006)
	Terengganu, Malaysia	Clutches	17	1984–2000	May–Jul	Not stated	5° N, 103° E	(Chan 2006)
	Buck Island, St Croix, U.S. Virgin Islands	Clutches	17	1980–1997	Jun–Dec (Jul–Sep)	Daily PS	18° N, 65° W	(Hillis-Starr & Phillips 2000)
	Jumby Bay, Antigua	Clutches	15	1987–2001	Jun–Nov	Daily FS	17° N, 62° W	(IUCN 2002)
	Buck Island, St Croix, U.S. Virgin Islands	Clutches	15	1987–2001	Jun–Dec (Jul–Sep)	Not stated	18° N, 65° W	(IUCN 2002)
	Northern Bahia & Sergipe, Brazil	Clutches	15	1991–2005	Nov–Mar (Dec–Feb)	Daily FS	12° S, 37° W	(Marcovaldi et al. 2007)
	Yucatán Peninsula, Mexico	Turtles	12	1990–2001	May–Sep	Not stated	19° N, 91° W	(IUCN 2002)
	Melaka, Malaysia	Clutches	10	1990–1999	Feb–Sep (May–Jul)	Not stated	2° N, 102° E	(Chan 2006)
	French Guiana and Suriname	Clutches	36	1967–2002	Dec–Jan and Mar–Aug	Variable	5–6° N, 52–55° W	(Girondot et al. 2007)
	Terengganu, Malaysia	Clutches	34	1967–2001	Mar–Sep	Variable	5° N, 103° E	(Chan & Liew 1996, Chan 2006)
Tongaland, South Africa	Turtles	32	1963–1994	Oct–Feb	Daily FS	26° S, 32° E	(Hughes 1996)	

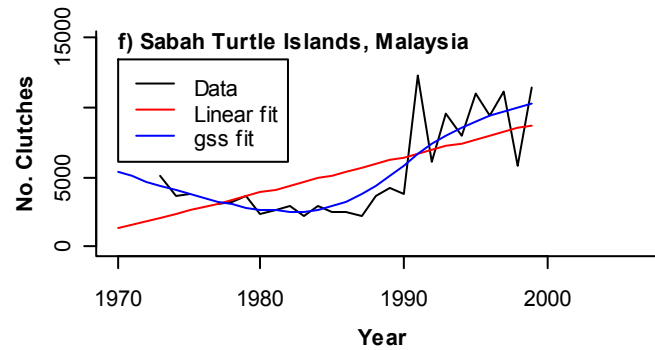
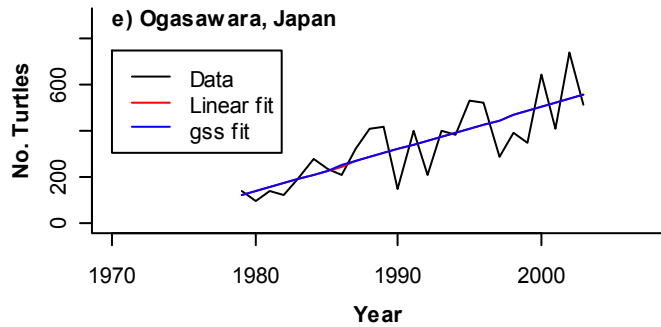
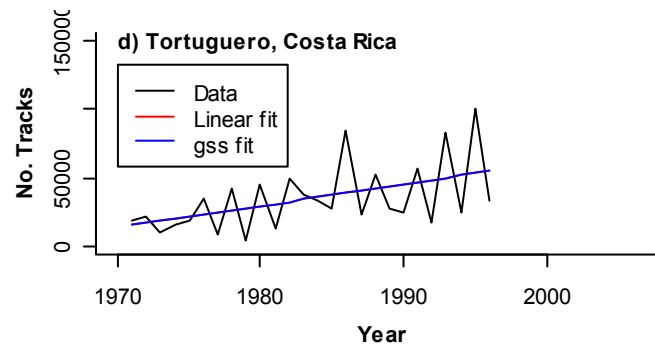
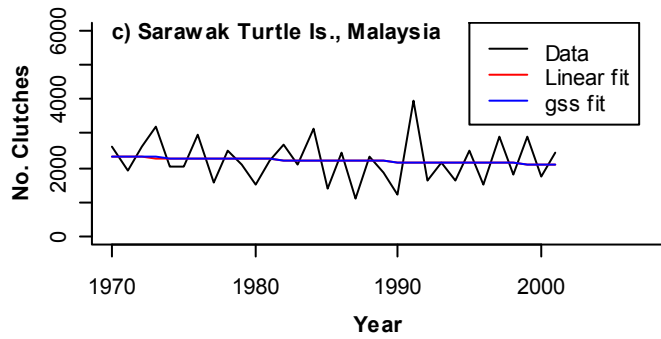
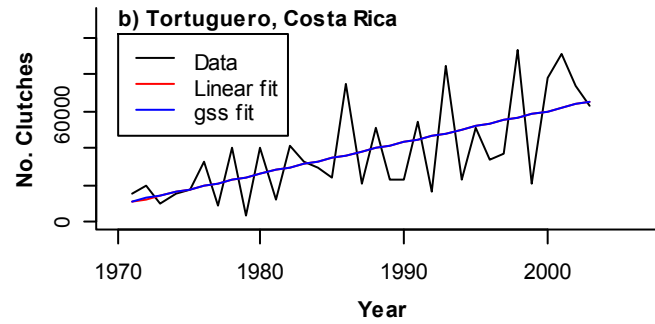
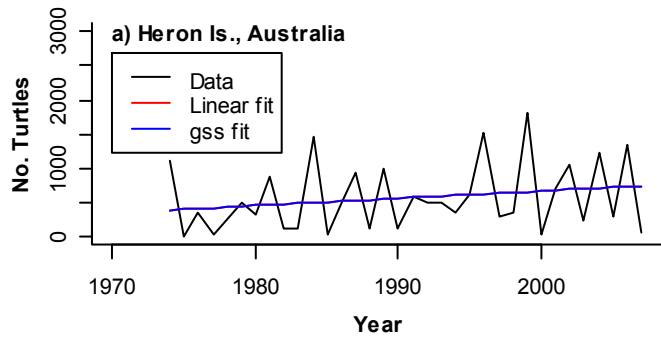
Species	Location	Factor counted	Survey duration (seasons)	Year range	Season range (peak)	Survey frequency	Geographic position	Data reference
	Sandy Point, St Croix, U.S. Virgin Islands	Turtles	21	1981–2001	Feb–Aug (May)	Nightly FS	18° N, 65° W	(Dutton et al. 2005)
	Parque Nacional Marino Las Baulas, Costa Rica	Turtles	19	1988–2006	Oct–Feb (Dec)	Nightly FS	10° N, 86° W	(Tomillo et al. 2007, Tomillo et al. 2008)
	Espirito Santo, Brazil	Clutches	16	1988–2003	Oct–Feb	Daily FS	18–20° S, 40°W	(Thome et al. 2007)
	Gandoca, Costa Rica	Clutches	15	1990–2004	Feb–Jul (Apr–May)	Nightly FS	10° N, 83° W	(Chacon-Chaverri & Eckert 2007)
	Tortuguero, Costa Rica	Clutches	13	1995–2007	Feb–Jul	Variable	10° N, 83° W	(Troëng et al. 2007, Del Aguila et al. 2008)
	Playa Grande, Costa Rica	Turtles	12	1988–1999	Oct–Feb (Dec)	Nightly FS	10° N, 86° W	(Reina et al. 2002)
	Michoacán, Mexico	Tracks	11	1984–1995	Nov–Feb	Variable PS	18° N, 103° W	(Eckert & Sarti 1997)
<i>N. depressus</i>	Woongarra Coast, Australia including Mon Repos	Turtles	35	1969–2003	Oct–Jan	Nightly FS	25° S, 152° E	(Limpus 2007b)
	Wild-Duck Island, Australia	Tracks	22	1981–2002	Oct–Jan	Nightly PS	22° S, 150° E	(Limpus 2007b)
	Curtis Island, Australia	Turtles	11	1993–2003	Oct–Jan	Nightly PS	24° S, 151° E	(Limpus 2007b; Limpus, unpubl. data)
	Peak Island, Australia	Turtles	7	1980–1986	Oct–Jan	Nightly PS	23° S, 151° E	(Parmenter & Limpus 1995)

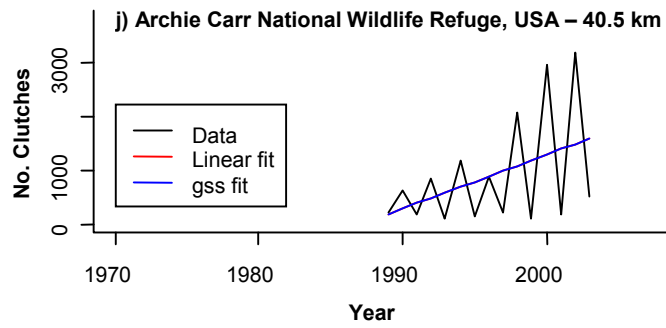
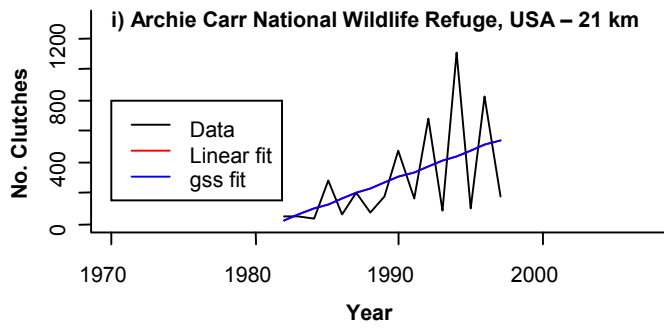
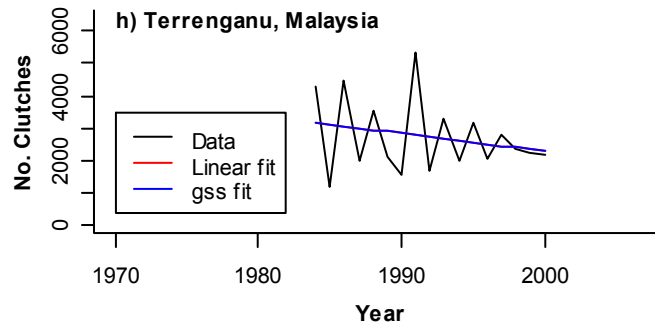
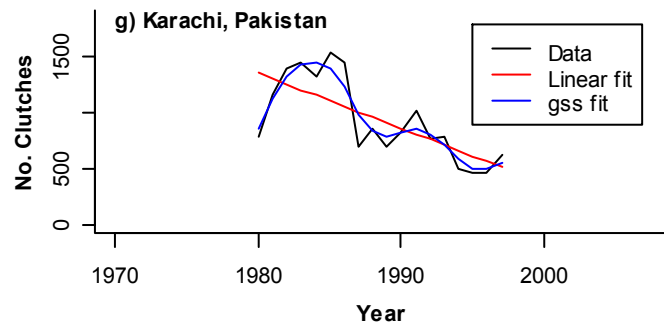
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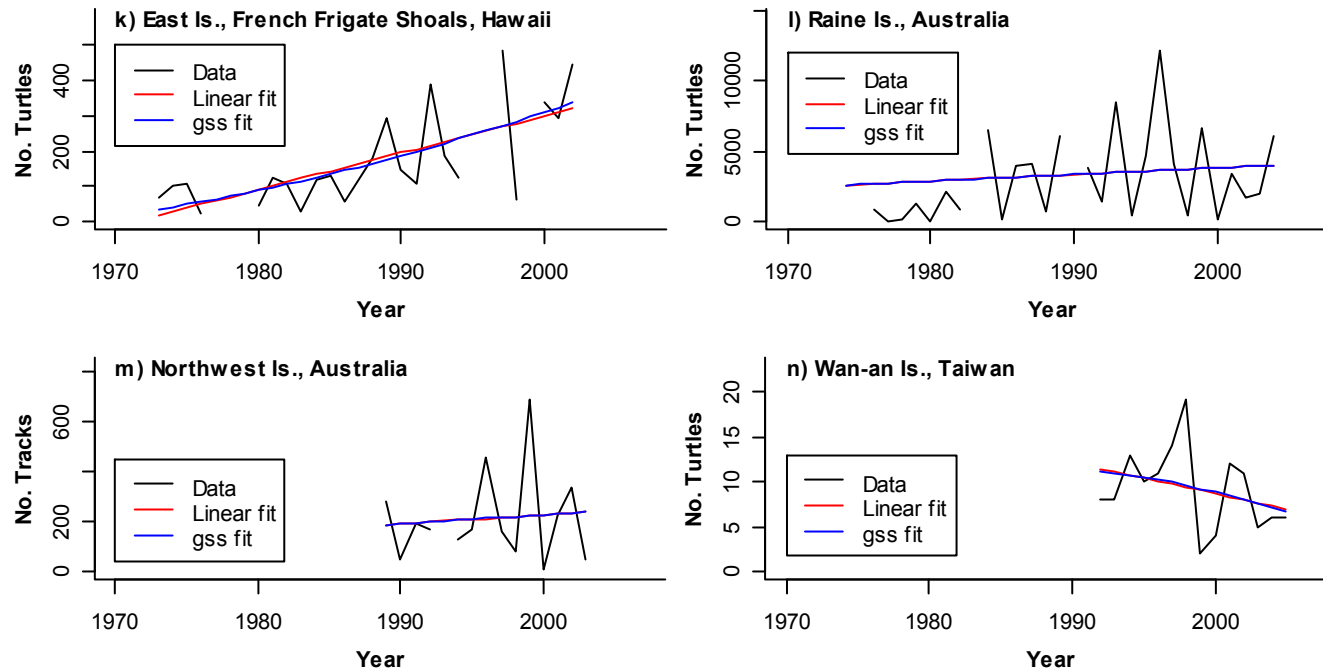
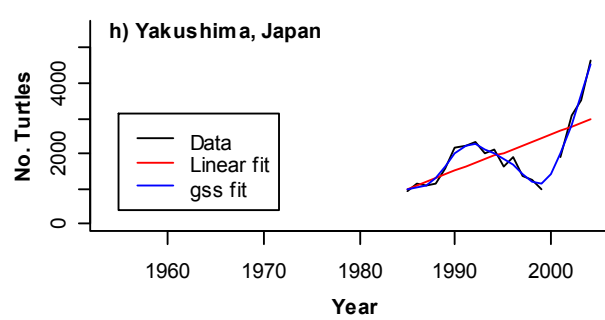
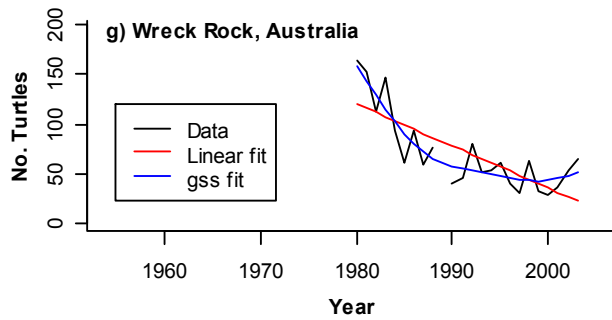
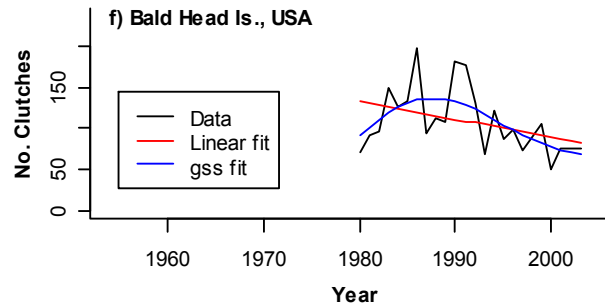
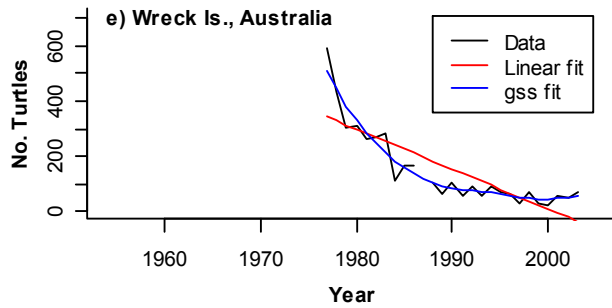
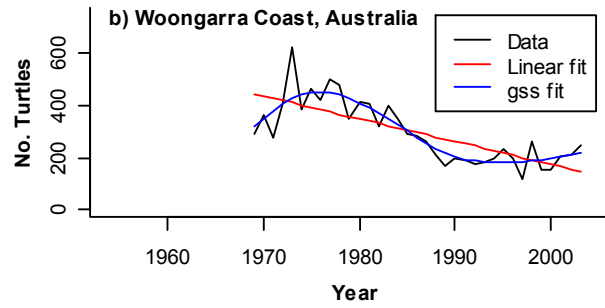
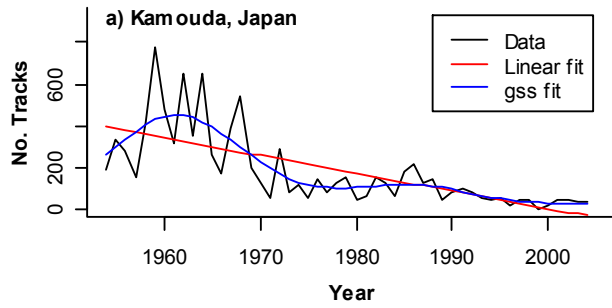
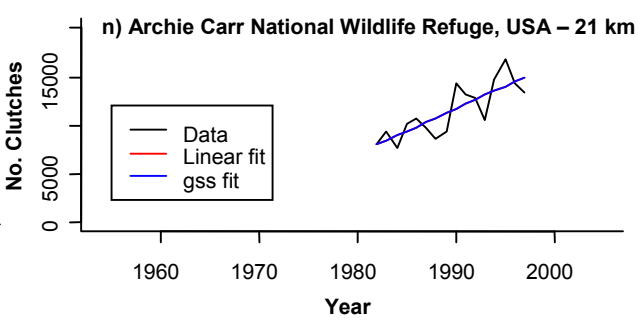
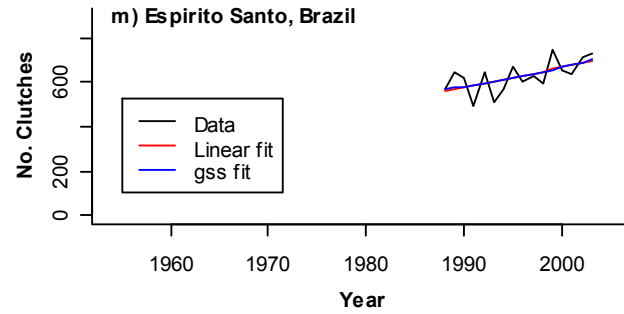
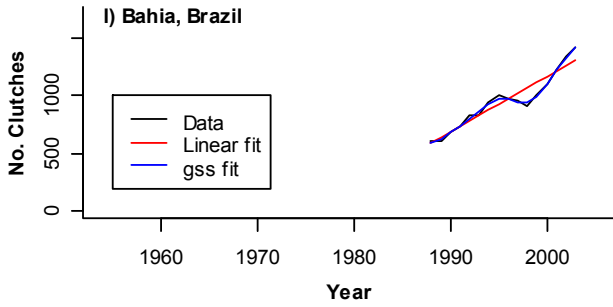
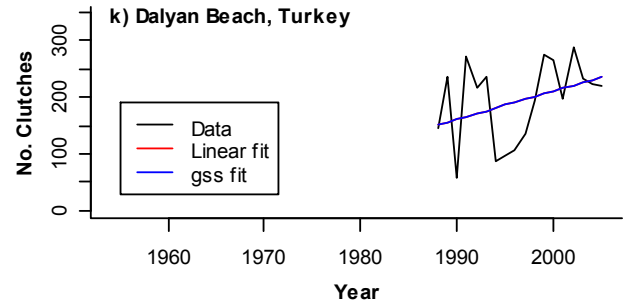
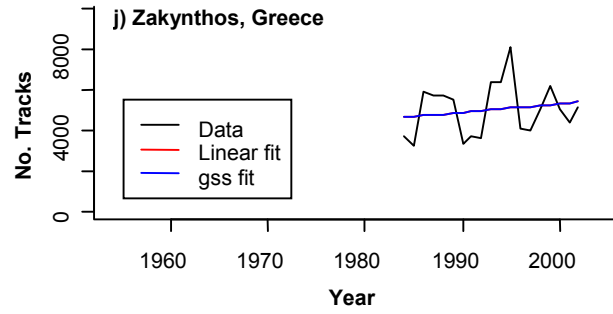
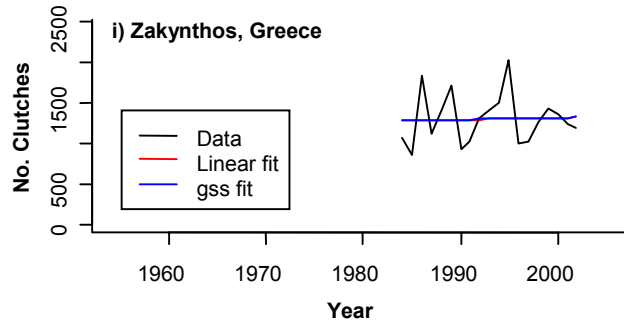


Figure S1: Time-series of annual nesting abundances and linear and non-linear (gss= generalised smoothing spline) temporal trends for 12 green turtle populations. Nesting populations were from: a) Heron Island, Australia; b and d) Tortuguero, Costa Rica; c) Sarawak Turtle Islands, Malaysia; e) Ogasawara, Japan; f) Sabah Turtle Islands, Malaysia; g) Karachi, Pakistan; h) Terengganu, Malaysia; i and j) Archie Carr National Wildlife Refuge, USA; k) French Frigate Shoals, Hawaii; l) Raine Island, Australia; m) Northwest Island, Australia; and n) Wan-an Island, Taiwan. For panels where the linear fit is not shown, the gss fit and linear fit are identical.





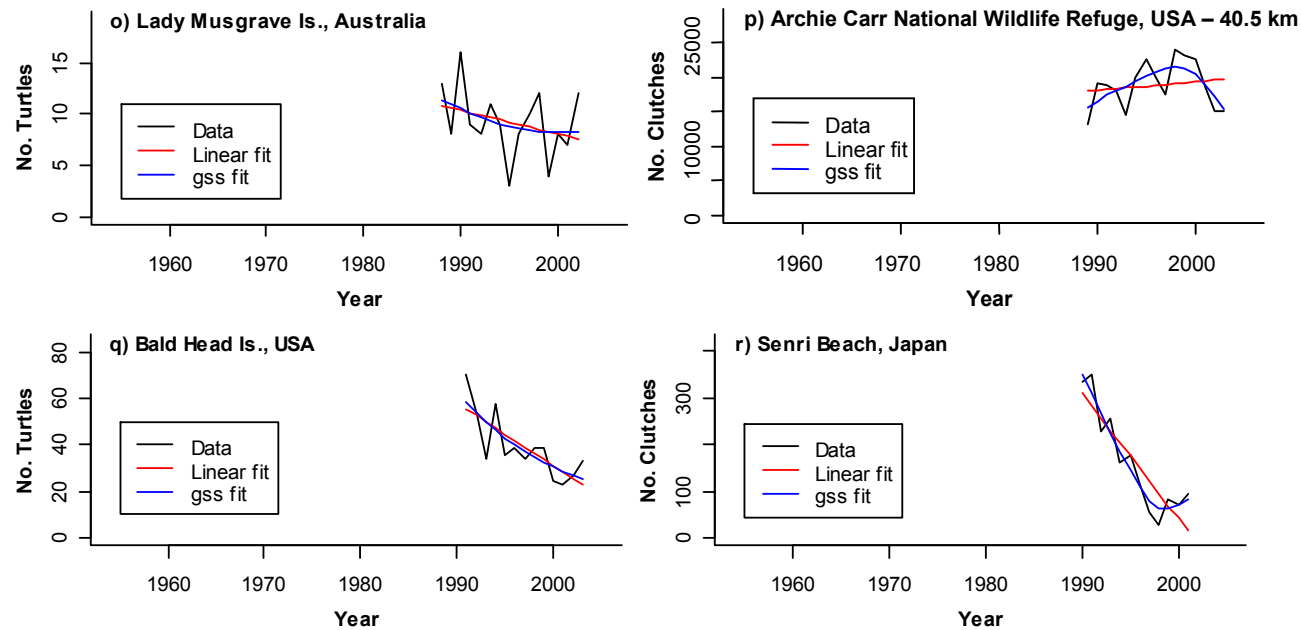
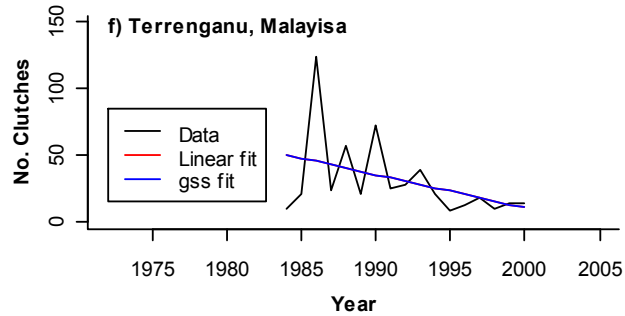
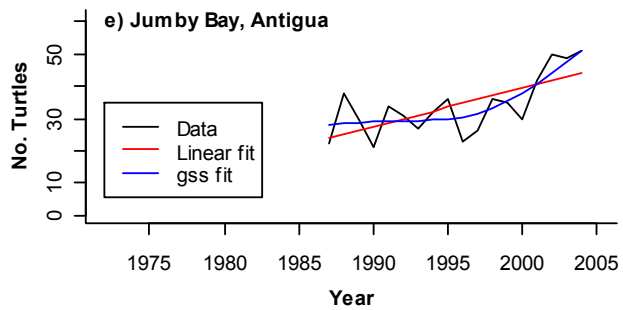
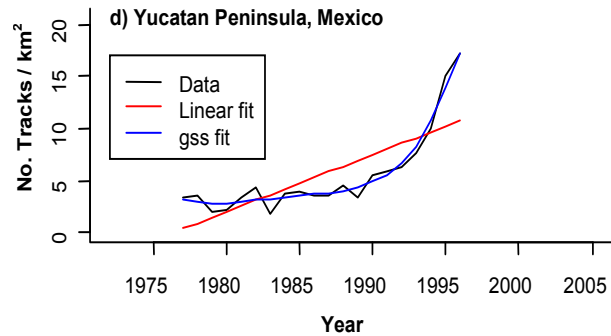
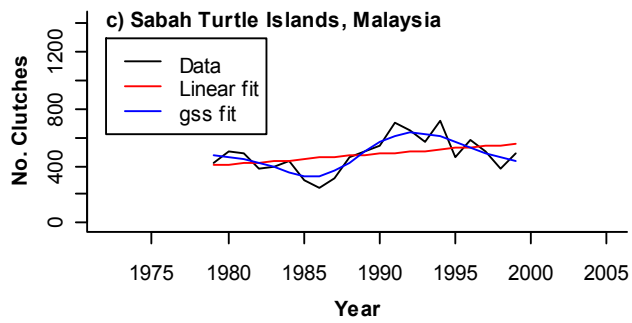
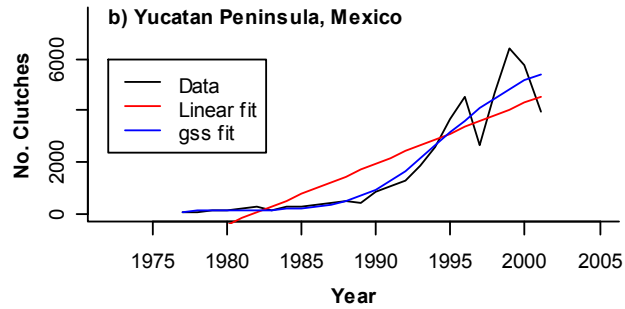
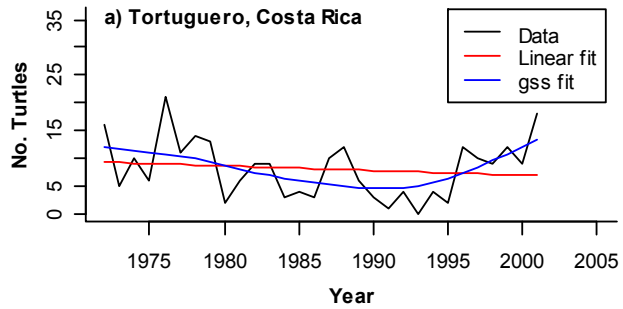


Figure S2. Time-series of annual nesting abundances and linear and non-linear (gss= generalised smoothing spline) trends for 15 loggerhead turtle populations. Nesting populations were from: a) Kamouda, Japan; b) Woongarra Coast, Australia; c) Little Cumberland Island, USA; d) Heron Island, Australia; e) Wreck Island, Australia; f and q) Bald Head Island, USA; g) Wreck Rock, Australia; h) Yakushima, Japan; i and j) Zakynthos, Greece; k) Dalyan Beach, Turkey; l) Bahia, Brazil; m) Espirito Santo, Brazil; n and p) Archie Carr National Wildlife Refuge, USA; o) Lady Musgrave Island, Australia; and r) Senri Beach, Japan. For panels where the linear fit is not shown, the gss fit and linear fit are identical.



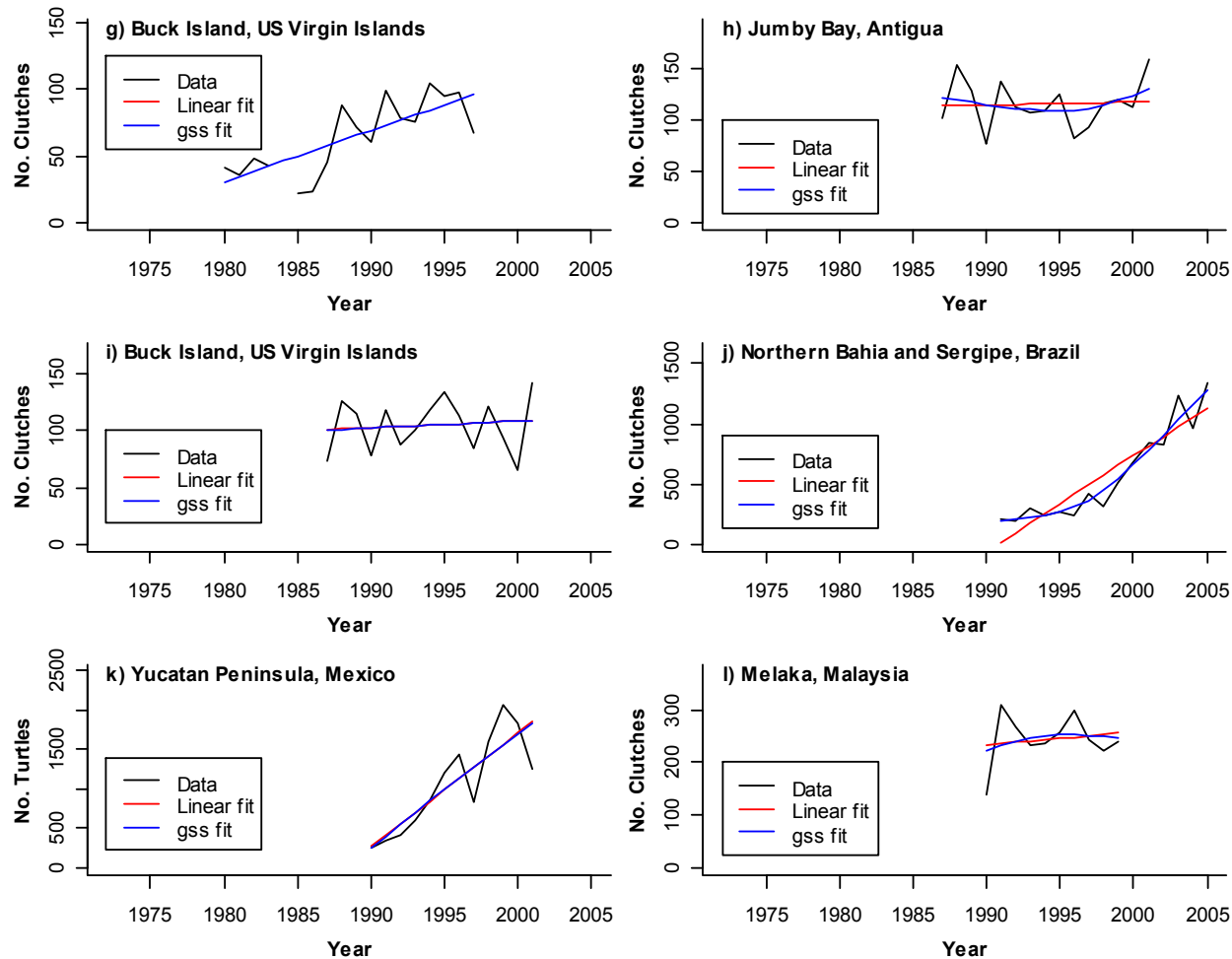
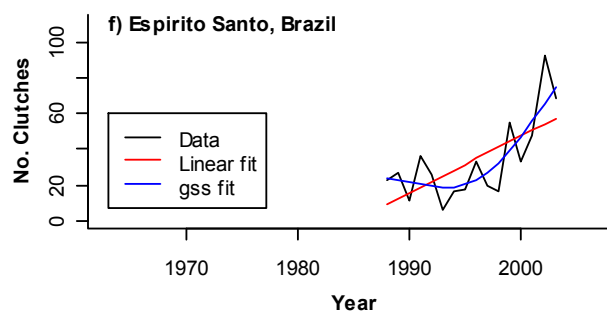
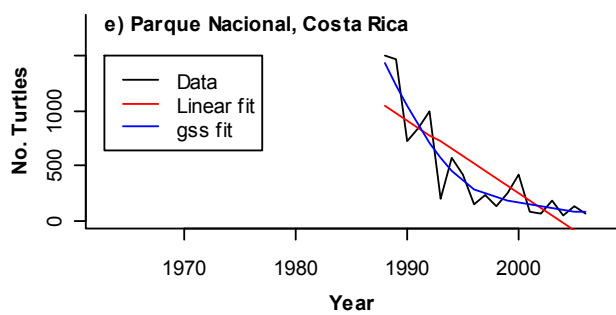
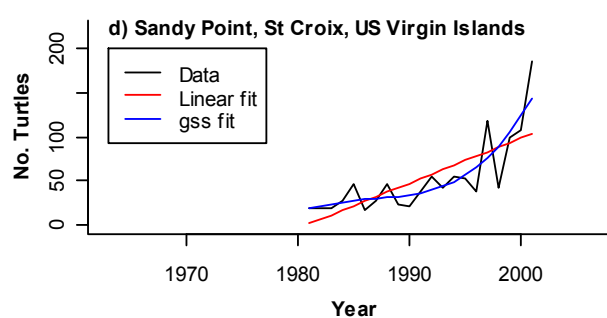
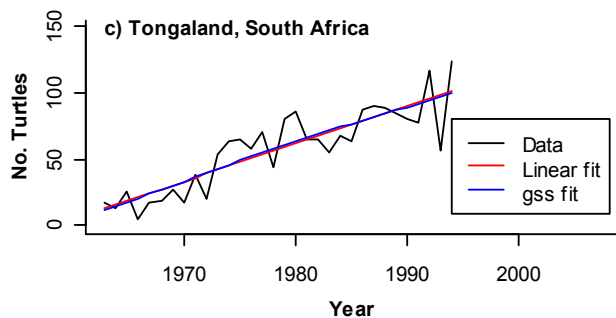
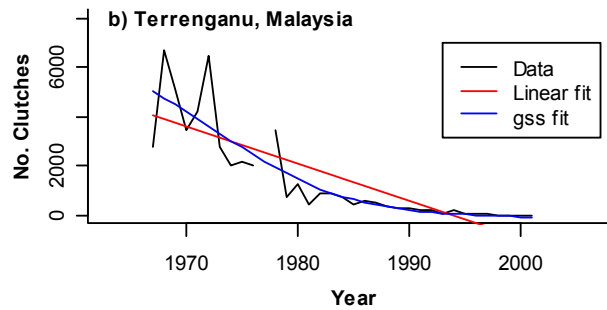
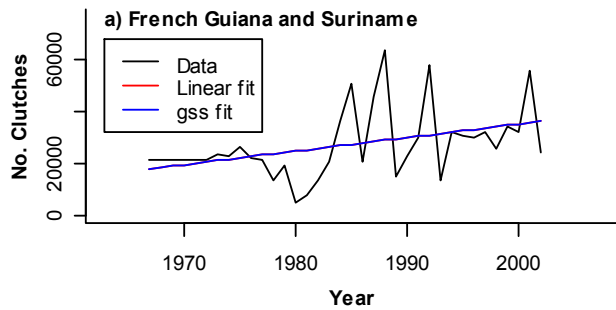


Figure S3. Time-series of annual nesting abundances and linear and non-linear (gss= generalised smoothing spline) trends for eight hawksbill turtle populations. Nesting populations were from: a) Tortuguero, Costa Rica; b, d and k) Yucatán Peninsula, Mexico; c) Sabah Turtle Islands, Malaysia; e and h) Jumby Bay, Antigua; f) Terengganu, Malaysia; g and i) Buck Island, U.S. Virgin Islands; j) northern Bahia and Sergipe, Brazil; and l) Melaka, Malaysia. For panels where the linear fit is not shown, the gss fit and linear fit are identical.



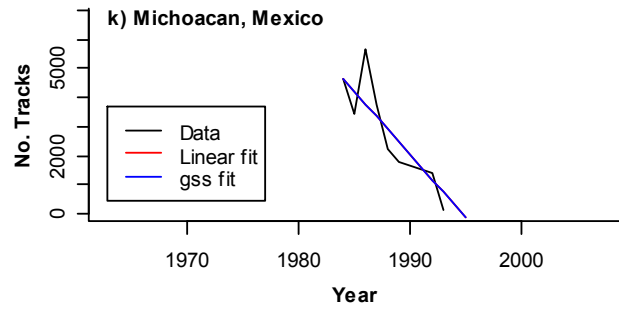
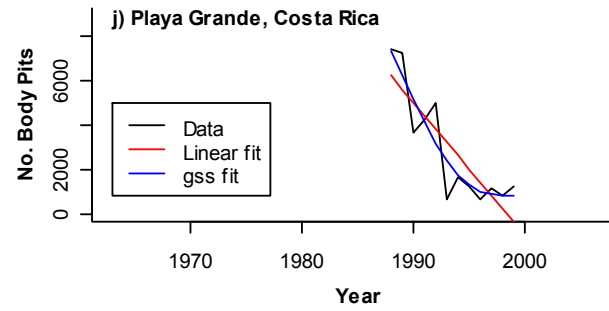
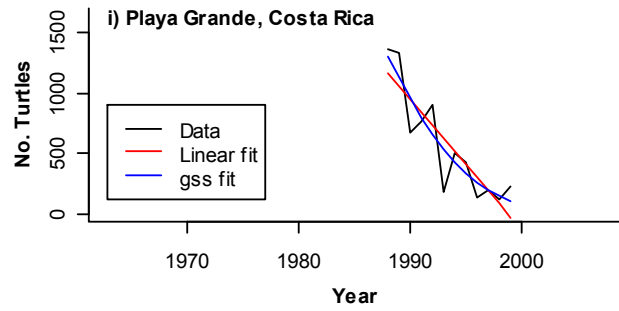
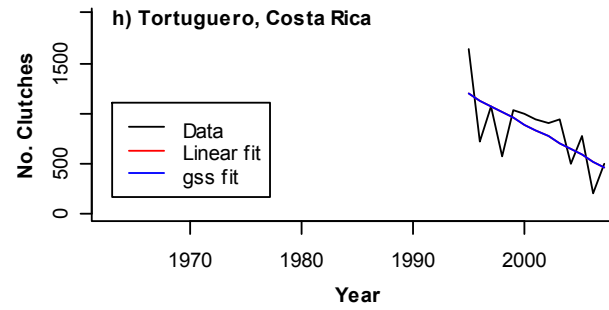
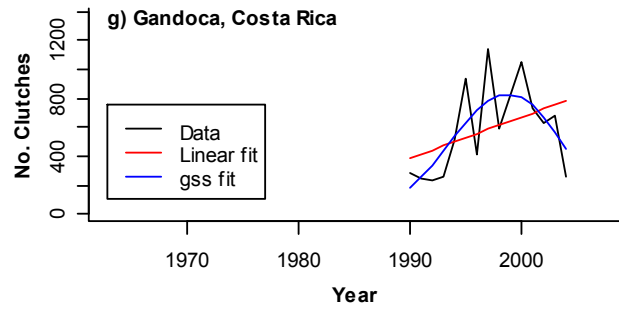
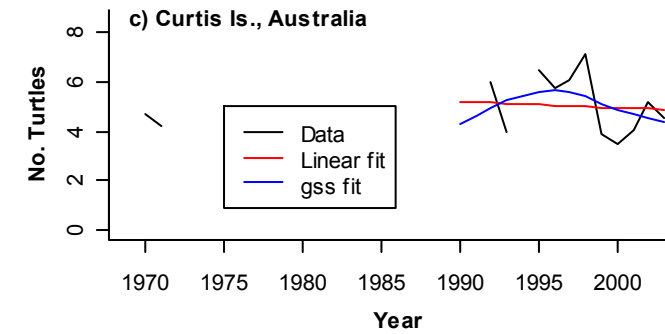
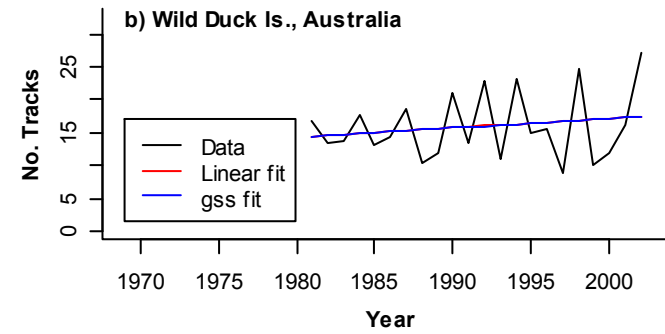
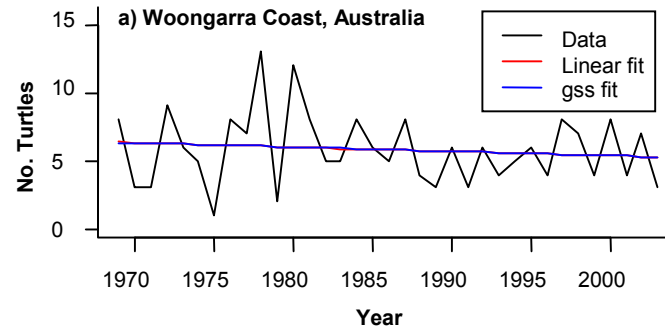


Figure S4. Time-series of annual nesting abundances and linear and non-linear (gss= generalised smoothing spline) trends for 10 leatherback turtle populations. Nesting populations were from: a) French Guiana and Suriname; b) Terengganu, Malaysia; c) Tongaland, South Africa; d) Sandy Point, U.S. Virgin Islands; e) Parque Nacional, Costa Rica; f) Espirito Santo, Brazil; g) Gandoca, Costa Rica; h) Tortuguero, Costa Rica; i and j) Playa Grande, Costa Rica; and k) Michoacan, Mexico. For panels where the linear fit is not shown, the gss fit and linear fit are identical.



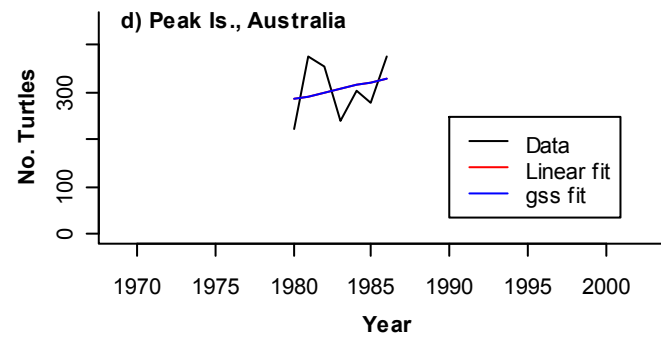


Figure S5. Time-series of annual nesting abundances and linear and non-linear (gss= generalised smoothing spline) trends for four flatback turtle populations. Nesting populations were from: a) Woongarra Coast, Australia; b) Wild Duck Island, Australia; c) Curtis Island, Australia; and d) Peak Island, Australia. For panels where the linear fit is not shown, the gss fit and linear fit are identical.