Supplement 2

Table S1: List of intervention options with descriptions, the relevant demographic outcome that the intervention addresses, and an indication of their impact on humans. Direct impact (D) refers to the presence of the intervention directly impacting turtles, while the indirect (I) impact refers to indirect impact on turtles (i.e., directly impacts the human behaviour or turtle environment). Threat categories are: marine debris (DEBR), altered onshore and nearshore light conditions (ON SH), modification to beaches (MOD), introduced animals (non-native animals) (INT A), sea level rise (SLR), and increasing temperature (beach and ocean) (TEMP). The vulnerability categories include: Sensitivity (S), Exposure (E) and Adaptive capacity (AC). The types of actions include: Education (EDU), On ground action (ACTION), and Policy/legislation (POL/LEG).

Intervention	Intervention description	Direct/ indirect impact	Demographic outcome	Threat category	Vulnerability category	Type of action*
Aid natural selection	Focus protection on early maturing (less than 20 years) turtles and their nests to increase population.	D	Reduce age at maturity	TEMP	S	EDU
Artificially incubate eggs offsite	Collect eggs from beach and incubate offsite.	D	Boost egg survival	TEMP	E	POL/LEG
Cool nests with electrical cooling tubes	Cool individual nests with electrical equipment to hatch both males and females.	D	Change hatchling sex ratio	TEMP	S	EDU
Cool turtle nests with shade	Cool turtle nests with shading using canopies of solid canvas or mesh.	D	Change hatchling sex ratio	TEMP	S	EDU
Disease management and treatment	Treat turtles with infections and diseases (e.g. removing tumours).	D	Increase adult survival	TEMP	S	EDU
Enhance beach depth with sand nourishment and re-profiling	Enhance beach depth (e.g. with sand nourishment) to reduce salt water flooding of nests.	I	Boost egg survival	SLR	S	EDU
Exclude 4WD activity from colony areas	Prohibit 4WD activity from nesting areas.	I	Boost egg survival	MOD	E	POL/LEG
Exclude feral animals from nesting areas	Exclude feral animals from nesting areas (e.g. fencing out pigs and foxes).	I	Boost egg survival	INT A	E	POL/LEG

Intervention	Intervention description	Direct/ indirect impact	Demographic outcome	Threat category	Vulnerability category	Type of action*
Exterminate feral animals in areas around colonies	Exterminate feral animals in/around nesting areas (e.g. shooting or poisoning).	I	Boost egg survival	INT A	E	POL/LEG
Genetic intervention	Intervene genetically so females breed earlier and more often (e.g. via gene editing).	D	Reduce age and maturity	TEMP	S	EDU
Improve condition of feeding grounds	Improve condition of feeding grounds by banning dredging.	I	Increasing nesting attempts per year	MOD	AC	ACTION
Kill predatory fish living under jetties	Harvest predatory fish living under jetties to minimise hatchlings being preyed upon.	I	Boost hatchling survival in water	MOD	E	POL/LEG
Lavage animals to remove plastics	Flush the stomachs of large flatback turtles to remove large plastics.	D	Increase adult survival	DEBR	AC	ACTION
Lights off for jetties and houses	Turn lights off on jetties and ships during hatching season (where safe to do so).	I	Boost hatchling survival in water	ON SH	E	POL/LEG
Minimise disturbance on feeding grounds	Protect feeding areas by excluding all vessel activity within the area to minimise disturbance and maintain a high density of the soft-bodied invertebrates favoured as food.	I	Boost female breeding frequency	MOD	S	EDU
Modify sand composition	Changing the density of sand to better reflect the density that is preferred by nesting turtles can create additional suitable nesting areas.	I	Improve area size suitable for nesting	MOD	AC	ACTION
Nest guarding when hatching	After the turtle hatchlings emerge from nests, threats they face on their way to the water's edge can be reduced by people guarding their path.	I	Boost hatchling survival to water	INT A	S	EDU
Reduce fishing mortality	Seasonal fishing bans in regions where adult turtles are present to prevent the occasional capture of adult turtles in fishing gear.	I	Increase adult survival	MOD	AC	ACTION

Intervention	Intervention description	Direct/ indirect impact	Demographic outcome	Threat category	Vulnerability category	Type of action*
Reduce fishing mortality with net bans in region	Impose seasonal fishing bans in areas where juvenile turtles are present.	I	Increase juvenile survival	MOD	AC	ACTION
Reduce local disturbance (beach and water)	Reduce disturbance by restricting beach and water activities within a 5 km radius of the nesting beach.	I	Increasing nesting attempts per year	MOD	E	POL/LEG
Replace existing sand with lighter coloured sand	Replace dark beach sand with light sand to lower nest temperature to hatch both males and females.	I	Change hatchling sex ratio	TEMP	S	EDU
Translocate nests to better locations on same beach	Move eggs or nests to location on the same beach where hatching success is higher.	D	Boost egg survival	SLR	E	POL/LEG
Transport hatchlings offshore (collected from nests)	Collect hatchlings directly from the nest and transport them offshore to avoid predators.	D	Boost hatchling survival to water	ON SH	S	EDU
Transport hatchlings offshore (collected from water's edge)	Collect hatchlings from the water's edge and transport them offshore to avoid predators.	D	Boost hatchling survival in water	ON SH	S	EDU

* Most interventions require more than one type of action but here we only indicate the first step action to allow for general categorisation.

Table S2: Average scores for survey questions about turtle management, threats. The average score lies between 0–10 (strongly disagree to strongly agree) by gender, for different age groups, length of residence and education level.

Variable	Gender Female	Gender Male	Gender Blank	Age under 45	Age over 45	Age Blank	Residence length less than 5 years	Residence length more than 5 years	Residence length Blank	Education up to technical training	Education university education	Education Blank	Overall average
Flatback turtles are an important part of the Port Hedland identity	9.39	8.65	9.00	9.23	9.30	8.93	9.38	9.12	9.00	9.26	9.26	8.93	9.21
The extinction of flatback turtles locally would have negative economic and/or social impacts on the region	9.23	8.18	8.45	8.77	9.32	8.46	8.80	9.21	8.45	9.17	8.82	8.46	8.95
Flatback turtles are important to me on a personal level	9.03	7.94	7.58	8.66	9.08	7.50	8.98	8.65	7.58	9.06	8.56	7.50	8.65
The local extinction of flatback turtles would negatively impact me on a personal level	8.77	8.29	6.83	8.59	8.81	7.00	8.85	8.51	6.83	8.87	8.44	7.00	8.44
believe that the government invests enough funding into flatback turtle conservation and management in the region	4.16	4.71	3.78	4.36	4.06	4.10	4.17	4.34	3.78	4.62	3.65	4.10	4.21
I am aware *there are* management measures in place to protect the local flatback turtle population	6.38	6.43	7.91	6.37	6.31	8.08	6.34	6.44	7.91	6.74	5.78	8.08	6.58
I feel engaged in the management of the flatback turtle population in the region	6.29	6.86	5.55	6.35	6.34	5.92	6.26	6.51	5.55	6.63	5.94	5.92	6.29
I would like more information on the management of flatback turtles in the region	7.70	6.93	7.00	7.58	7.42	7.38	7.79	7.33	7.00	7.68	7.25	7.38	7.49
I feel confident that the local flatback turtle population is well managed	5.88	5.21	6.82	5.74	5.65	7.08	5.66	5.85	6.82	5.87	5.45	7.08	5.89
Climate change	8.38	8.57	8.22	8.05	8.80	8.45	8.43	8.40	8.22	8.57	8.13	8.45	8.40
Beach change (e.g. erosion)	8.83	7.93	8.44	8.28	9.17	8.36	8.82	8.52	8.44	8.94	8.29	8.36	8.64
Coastal development (e.g. new structures)	8.72	8.33	7.56	8.47	9.00	7.36	8.95	8.38	7.56	9.02	8.23	7.36	8.54
Sea level rise	7.85	7.21	7.22	7.31	8.11	7.73	7.68	7.79	7.22	7.80	7.48	7.73	7.68

Variable	Gender Female	Gender Male	Gender Blank	Age under 45	Age over 45	Age Blank	Residence length less than 5 years	Residence length more than 5 years	Residence length Blank	Education up to technical training	Education university education	Education Blank	Overall average
Marine debris (e.g. from plastics eaten or entanglement)	9.28	8.40	9.44	9.02	9.17	9.55	9.34	8.90	9.44	9.15	9.00	9.55	9.15
Increased light (e.g. from industry, urban)	8.48	6.64	7.56	8.00	8.29	7.70	8.61	7.73	7.56	8.48	7.60	7.70	8.08
Predation from introduced animals (e.g. foxes, pigs, rats)	7.91	7.20	7.78	7.81	7.74	7.73	8.39	7.21	7.78	7.87	7.65	7.73	7.78
I support active interventions on the local flatback turtle population if that will help to ensure their protection and status into the future	8.98	7.67	8.89	8.67	8.77	9.00	8.92	8.57	8.89	8.91	8.42	9.00	8.75
I think it is important to actively intervene to protect flatback turtles now	9.16	7.93	8.78	8.95	8.86	8.90	8.97	8.88	8.78	9.06	8.68	8.90	8.91
responsible state gov	59	13	11	39	31	13	39	33	11	40	30	13	83
responsible local gov	62	15	9	41	35	10	39	38	9	44	32	10	86
responsible fed gov	41	9	6	26	23	7	24	26	6	27	22	7	56
responsible industry	54	9	4	34	28	5	34	29	4	37	25	5	67
responsible community	62	13	7	40	33	9	37	38	7	44	29	9	82
responsible self	54	9	8	34	27	10	30	33	8	38	23	10	71
responsible other	9		1	3	5	2	4	5	1	5	3	2	10
Number (N)	66	17	12	44	37	14	40	43	12	47	34	14	95

Table S3: Average acceptability for 24 different conservation interventions for flatback turtle populations in Broome and Port Hedland. The average score lies between 0–10 (completely unacceptable to totally acceptable) by gender, for different age groups, length of residence and education level.

	Gender Female	Gender Male	Gender Blank	Age under 45	Age over 45	Age Blank	Residence length less than 5 years	Residence length more than 5 years	Residence length Blank	Education up to technical training	Education university education	Education Blank	Overall average
Cool turtle nests with shading using canopies of solid canvas or mesh	6.97	6.21	6.50	7.17	6.40	6.71	6.78	6.88	6.50	6.96	6.60	6.71	6.81
Exclude feral animals from nesting areas (e.g. fencing out pigs and foxes)	8.89	7.93	8.33	8.62	9.00	7.57	9.42	8.12	8.33	8.91	8.60	7.57	8.69
Exterminate feral animals in/around nesting areas (e.g. shooting or poisoning)	6.83	6.79	7.67	6.21	7.46	8.00	7.58	6.17	7.67	6.68	6.93	8.00	6.88
Prohibit 4WD activity from nesting areas	9.46	8.57	9.50	9.02	9.74	9.00	9.43	9.19	9.50	9.38	9.30	9.00	9.32
Enhance beach depth (e.g. with sand nourishment) to reduce salt water flooding of nests	7.55	5.71	7.83	7.07	7.31	8.14	7.47	7.00	7.83	7.17	7.20	8.14	7.26
Collect eggs from beach and incubate offsite	5.86	5.08	6.50	5.95	5.35	6.75	6.03	5.46	6.50	5.30	6.27	6.75	5.79
Move eggs or nests to location on the same beach where hatching success is higher	6.41	5.08	7.33	6.62	5.62	7.29	6.75	5.68	7.33	6.09	6.30	7.29	6.27
Harvest predatory fish living under jetties to minimise hatchlings being preyed upon	5.19	3.38	4.33	5.26	4.38	4.57	5.25	4.56	4.33	4.93	4.77	4.57	4.84
Turn lights off on jetties and ships during hatching season (where safe to do so)	8.45	7.64	7.67	8.45	8.20	7.43	8.89	7.81	7.67	8.64	7.87	7.43	8.26
Collect hatchlings *from the waters edge* and transport them offshore to avoid predators	6.14	5.93	6.00	6.45	5.66	6.14	6.44	5.81	6.00	6.11	6.07	6.14	6.10
Collect hatchlings directly *from the nest* and transport them offshore to avoid predators	4.91	5.15	4.67	5.31	4.35	5.43	5.11	4.80	4.67	4.91	4.83	5.43	4.93
People guard nests during hatching season and guide hatchlings to the waters edge	7.53	6.21	7.00	7.62	6.83	7.43	7.61	7.02	7.00	7.53	6.83	7.43	7.27

	Gender Female	Gender Male	Gender Blank	Age under 45	Age over 45	Age Blank	Residence length less than 5 years	Residence length more than 5 years	Residence length Blank	Education up to technical training	Education university education	Education Blank	Overall average
Cool individual nests with electrical equipment to hatch both males and females	6.02	4.29	5.67	6.32	4.86	6.29	6.06	5.40	5.67	6.09	4.93	6.29	5.70
Replace dark beach sand with light sand to lower nest temperature to hatch both males and females	5.90	4.36	5.67	5.79	5.30	6.14	6.25	5.05	5.67	5.98	4.93	6.14	5.62
Protect areas where female flatback turtles feed (e.g. from fishing and dredging)	8.57	8.43	8.67	8.62	8.41	8.86	9.17	8.00	8.67	8.57	8.45	8.86	8.55
Use excavation equipment to improve the density of the sand (i.e. for nesting purposes)	5.92	5.23	6.00	5.90	5.53	6.57	6.57	5.13	6.00	6.02	5.31	6.57	5.81
Impose seasonal fishing bans in areas where adult turtles are present	8.26	8.07	7.67	8.10	8.33	8.00	8.50	7.98	7.67	8.46	7.79	8.00	8.18
Flush the stomachs of large flatback turtles to remove large plastics	7.14	6.62	8.00	7.31	6.67	8.00	7.11	7.00	8.00	7.37	6.48	8.00	7.12
Treat turtles with infections and diseases (e.g. removing tumours)	8.38	7.57	8.67	8.12	8.26	9.00	8.43	8.05	8.67	8.53	7.62	9.00	8.26
Improve condition of feeding grounds (away from Port Hedland/Broome) by banning dredging	8.56	8.50	8.50	8.57	8.47	8.71	8.61	8.49	8.50	8.68	8.28	8.71	8.54
Reduce disturbance by restricting beach and water activities within a 5 km radius of the nesting beach	7.76	7.57	7.00	7.17	8.35	7.43	7.83	7.63	7.00	7.94	7.31	7.43	7.67
Impose seasonal fishing bans in areas where juvenile turtles are present	7.68	8.00	7.83	7.43	8.06	8.14	7.92	7.59	7.83	7.79	7.59	8.14	7.75
Aid natural selection by focussing protection on early maturing (less than 20 years) turtles and their nests to increase population	7.14	6.21	7.17	6.88	7.00	7.57	7.08	6.88	7.17	7.19	6.52	7.57	6.99
Intervene genetically so females breed earlier and more often (e.g. via gene editing)	3.76	3.50	2.83	3.69	3.58	3.71	3.67	3.76	2.83	3.75	3.48	3.71	3.65
Number (N)	66	17	12	44	37	14	40	43	12	47	34	14	95