APPENDIX 2

Table A2.1 Summary of scent odor deployments to deter mammalian predators at Trustom and Ninigret in southern Rhode Island in 2022 and 2023.

Parameter	Trustom 2022	Trustom 2023	Ninigret 2022	Ninigret 2023
Start Date	27 March	29 March	8 April	29 March
End Date	10 June	24 June	10 June	26 June
Number of days in a deployment season	76	87	64	89
Number of scent stations	33	33	46	46
Number of active scent stations on any given day	13	33	19	46
Number of days between moving scent station	3	3	3	3
Number of scent applications	25	29	21	29

Table A2.2 Total number of detections at scent stations by mammals at two sites (Trustom and Ninigret) in southern Rhode Island in 2022 and 2023. Six species were potential predators of Piping Plover (PIPL) nests and were included in species-specific analyses.

Common Name	Scientific Name	PIPL Predator?	Conducted Species Specific Analysis	2022 Trustom detections	2022 Ninigret detections	2023 Trustom detections	2023 Ninigret detections
Bobcat	*Lynx rufus*	No	No	1	0	8	17
Domestic Dog	*Canis lupus*	Yes	No	3	1	15	30
Eastern Coyote	*Canis latrans*	Yes	Yes	85	73	376	145
Gray Fox	*Urocyon cinereoargenteus*	Yes	No	0	0	0	1
House Mouse	*Mus musculus*	No	No	1	0	0	10
North American River Otter	*Lontra candadensis*	Yes	No	1	0	0	1
Raccoon	*Procyon lotor*	Yes	No	5	2	12	9
Red Fox	*Vulpes vulpes*	Yes	Yes (2022)	38	0	3	1
Striped Skunk	*Mephitis mephitis*	Yes	Yes (Trustom, 2023 only)	0	0	32	0
Virginia Opossum	*Didelphis virginiana*	Yes	Yes (2023)	1	1	17	51
White-tailed Deer	*Odocoileus virginianus*	No	No	13	15	21	21
Total	-	-	-	148	92	484	286

Table A2.3 Top two models assessing coyote use of different scent stations at Trustom and Ninigret, Rhode Island in 2022 and 2023. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (*w*).

Site	Year	Model	K	AIC$_c$	ΔAIC$_c$	*w*
Trustom	2022	Active Nests	2	682.81	0.00	0.34
		Null	1	683.40	0.58	0.25
Ninigret	2022	Deployments	2	598.75	0.00	0.47
		Day	2	599.43	0.68	0.34
Trustom	2023	Deployments * Scent type	8	2422.99	0.00	0.23
		Day * Scent type	8	2423.20	0.20	0.21
Ninigret	2023	Day * Scent type	8	1280.21	0.00	0.42
		Deployments * Scent type	8	1280.31	0.10	0.39

Table A2.4 Assessing coyote interaction times at two beach sites in southern Rhode Island 2022 and 2023. Each model set is separated by a horizontal line. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (*w*).

Year	Model	K	AIC$_c$	ΔAIC$_c$	*w*
2022	Scent type * Site	9	682.72	0.00	0.996
	Site * Day	5	693.99	11.27	0.004
2023	Site * Day	5	2126.92	0.00	0.99
	Site + Day	4	2146.92	19.99	4.54E-05

Table A2.5 Assessing red fox use of different scent stations at Trustom Pond National Wildlife Refuge, RI in 2022. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (w).

Model	K	AIC$_c$	ΔAIC$_c$	w
Scent type	4	409.73	0.00	0.67
Day * Scent type	8	413.59	3.85	0.10
Deployments * Scent type	8	413.61	3.88	0.10
Week * Scent type	8	414.09	4.36	0.08
Active Nests	2	415.74	6.00	0.03
Null	1	416.41	6.69	0.02
Week	2	417.77	8.04	0.01
Day	2	417.80	8.07	0.01
Deployments	2	417.82	8.08	0.01

Table A2.6 Assessing red fox interaction times at Trustom Pond National Wildlife Refuge, RI in 2022. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (w).

Model	K	AIC$_c$	ΔAIC$_c$	w
Scent type + Day	6	113.19	0.00	0.65
Scent type + Week	6	114.42	1.24	0.35
Scent type	5	134.21	21.02	1.77E-05
Day	3	140.58	27.39	7.33E-07
Null	2	156.74	43.56	2.26E-10

Table A2.7 Assessing opossum use of different scent stations at Trustom Pond and Ninigret National Wildlife Refuge, RI in 2023. Model sets are separated by a horizontal line. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC_c) and include the number of parameters (K), difference in AIC_c from the best model (ΔAIC_c), and model weight (w).

Site	Model	K	AIC_c	ΔAIC_c	w
Trustom	Null	1	211.73	0.00	0.34
	Scent type	4	213.65	1.91	0.13
Ninigret	Deployments	2	496.33	0.00	0.59
	Day	2	497.42	1.09	0.34

Table A2.8 Assessing opossum interaction times at two sites in southern Rhode Island in 2023. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC_c) and include the number of parameters (K), difference in AIC_c from the best model (ΔAIC_c), and model weight (w).

Model	K	AIC_c	ΔAIC_c	w
Scent type + Site	6	274.99	0.00	0.81
Scent type + Day	6	279.61	4.62	0.08
Scent type + Week	6	279.72	4.73	0.08
Scent type	5	281.43	6.44	0.03
Site	3	288.55	13.56	0.0009
Site + day	4	290.59	15.60	0.0003
Day	3	294.98	19.99	3.69E-05
Null	2	295.30	20.31	3.15E-05

Table A2.9 Assessing skunk use of different scent stations at Trustom Pond National Wildlife Refuge, RI in 2023. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (w).

Model	K	AIC$_c$	ΔAIC$_c$	w
Day	2	287.94	0.00	0.40
Week	2	288.31	0.37	0.33
Deployments	2	289.21	1.28	0.21
Day * Scent type	8	293.64	5.70	0.02
Week * Scent type	8	293.97	6.03	0.02
Deployments * Scent type	8	296.03	8.09	0.01
Scent type	4	346.96	59.03	6.14E-14
Null	1	356.47	68.54	5.28E-16
Active Nests	2	358.22	70.29	0.00

Table A2.10 Assessing skunk interaction times at Trustom Pond National Wildlife Refuge, RI in 2023. Candidate generalized linear models (Poisson) ranked by Akaike's Information Criterion corrected for small sample sizes (AIC$_c$) and include the number of parameters (K), difference in AIC$_c$ from the best model (ΔAIC$_c$), and model weight (w).

Model	K	AIC$_c$	ΔAIC$_c$	w
Scent type + Week	4	174.75	0.00	0.40
Scent type + Day	4	175.07	0.32	0.34
Scent type	3	176.01	1.25	0.21
Null	2	178.84	4.09	0.05
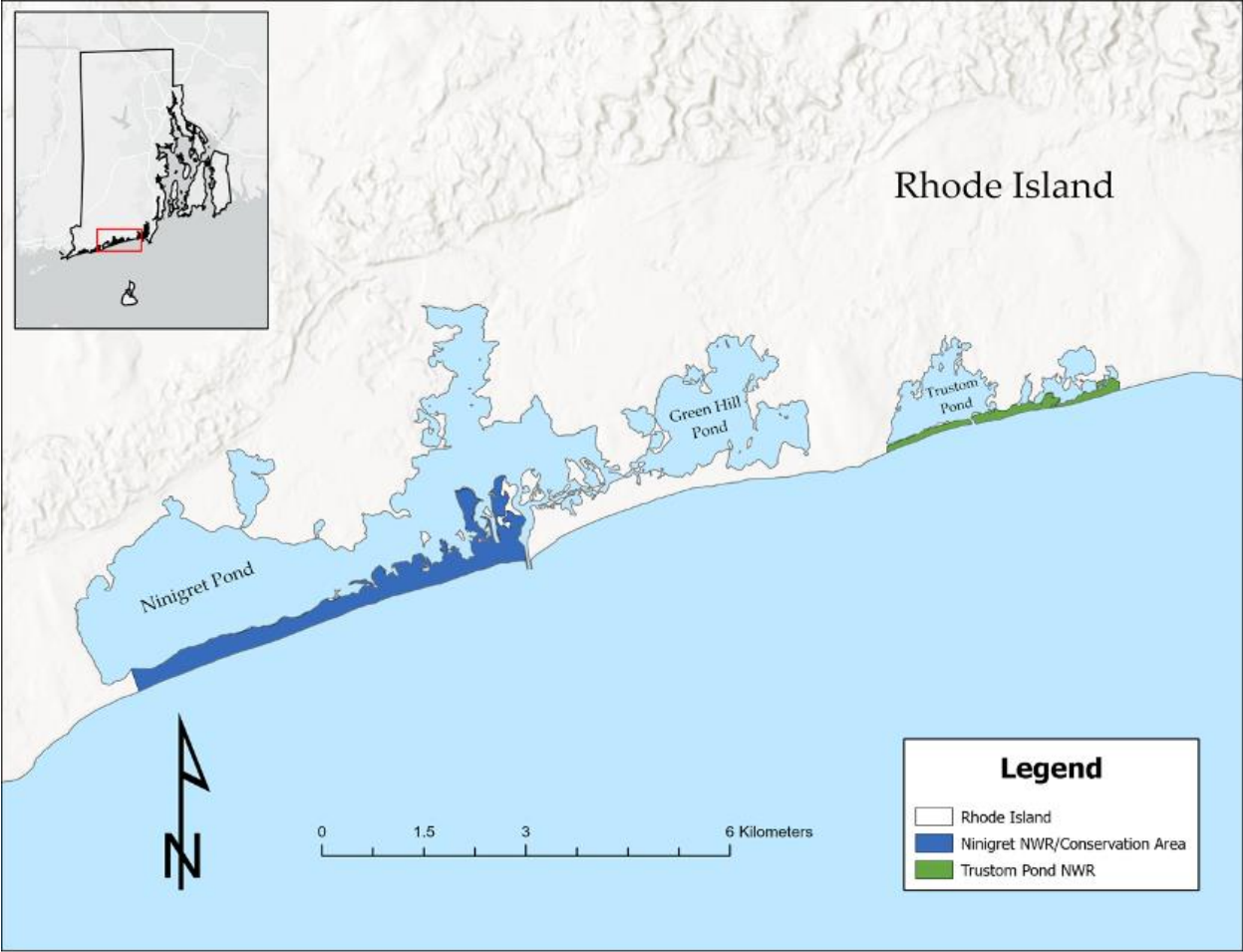
Fig. A2.1 Map of two study sites in Rhode Island, USA: Trustom Pond National Wildlife Refuge (green) and Ninigret National Wildlife Refuge/ Conservation Area (blue).
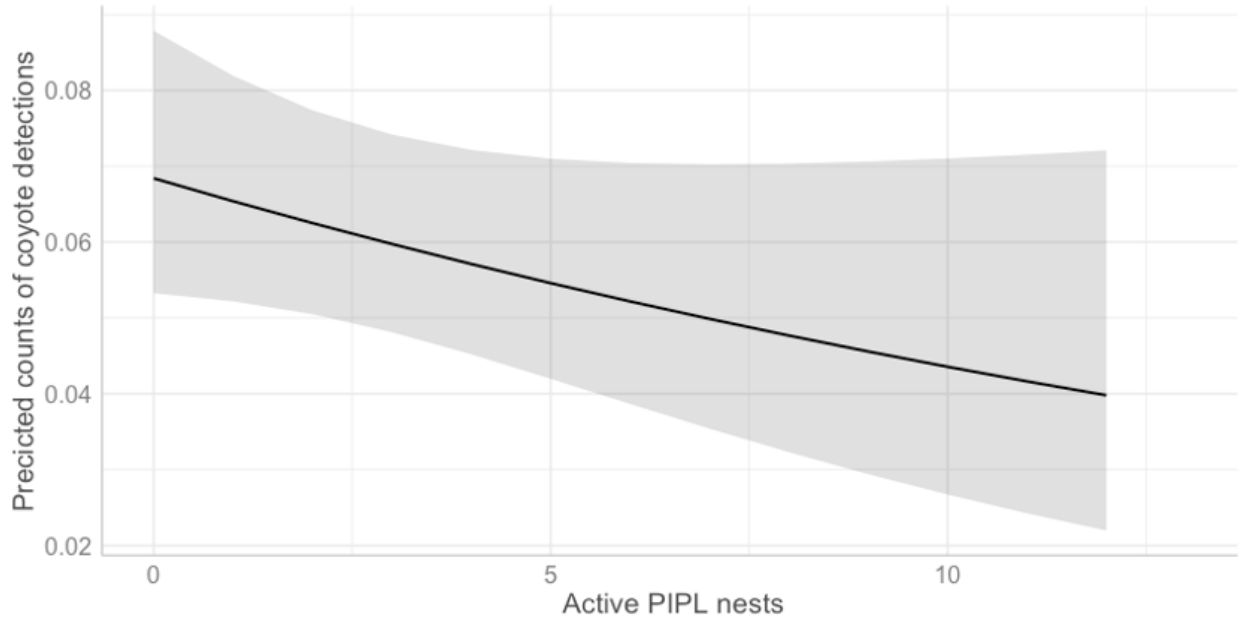
Fig. A2.2 Predicted counts of coyote detections considering active Piping Plover (PIPL) nests at Trustom, Rhode Island in 2022. The shaded area indicates a 95% confidence interval with a negative-sloped prediction line (black line). Graph shows the most supported model, active nests (Table 3).
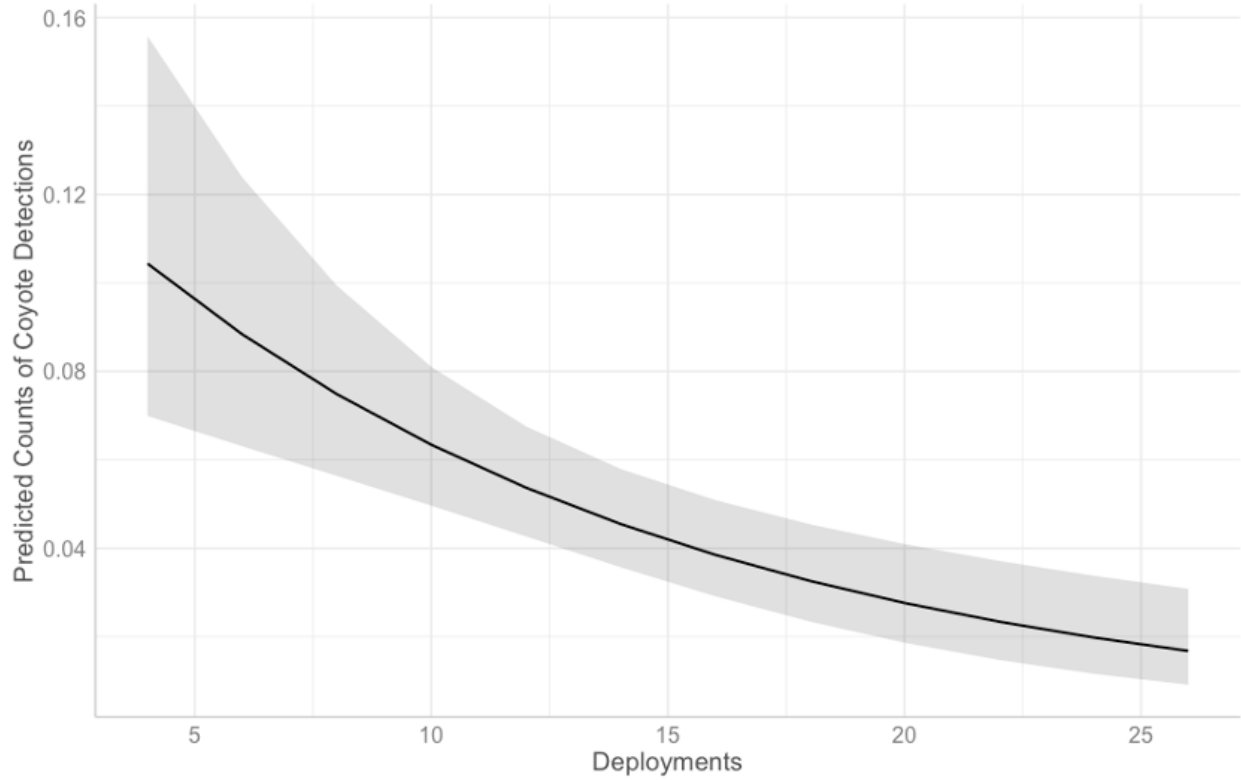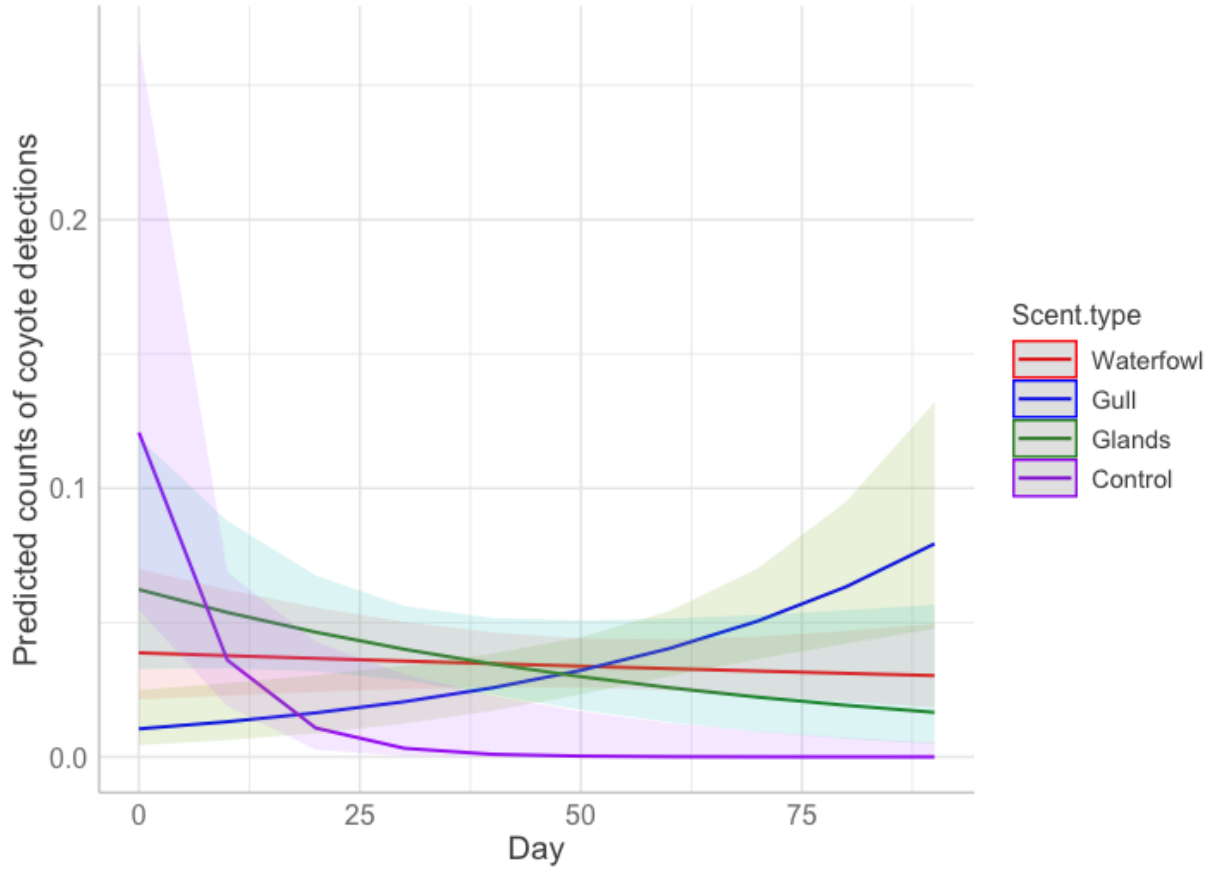
Fig. A2.3 Predicted counts of coyote detections at Ninigret, Rhode Island in 2022. Deployment periods are in 3-day intervals. The shaded area indicates a 95% confidence interval with a negative-sloped prediction line (black line). This graph displays the most supported model, deployments (Table 3).

Fig. A2.4 Seasonal variation in predicted counts of coyote detections interacting with different scent types at Ninigret, Rhode Island in 2023. Scent types included gull (blue line), uropygial glands (blue line), waterfowl (red line), and control (purple line). This represents the most supported model, day * scent type (Table 3).
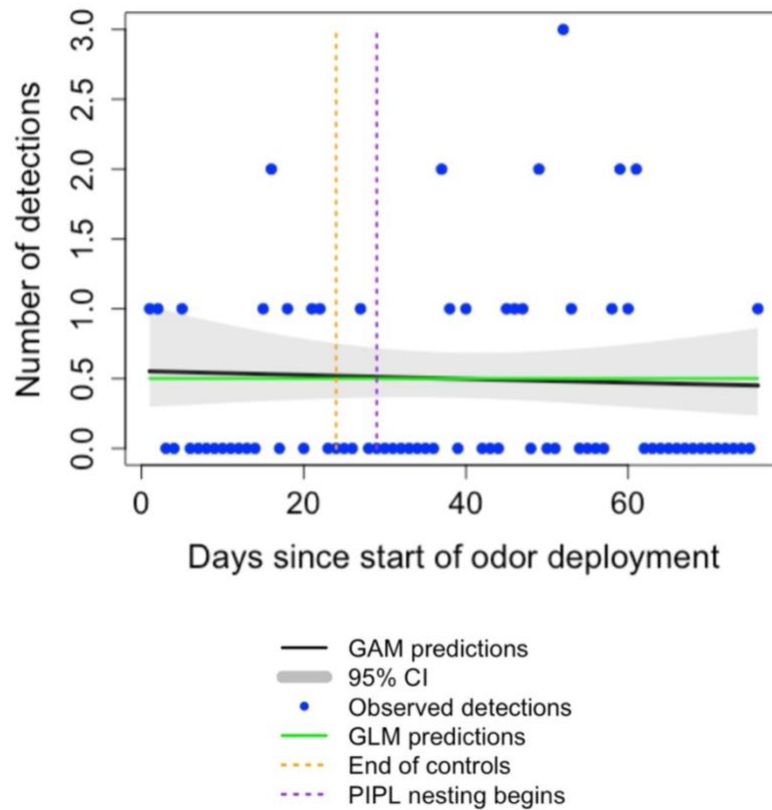
Fig. A2.5 Daily variation in red fox detections (blue points) at control points and scent stations at Trustom, Rhode Island from 27 March (day 0) to 10 June (day 76) in 2022. Graph shows the most supported generalized linear model, GLM (green line), which is the null model (Table 11), and a 95% confidence interval (gray shaded region) which is derived from a generalized additive model, GAM (solid black line). Vertical dotted lines represent the end of the control deployments (orange), and the start of the piping plover nesting season (purple).
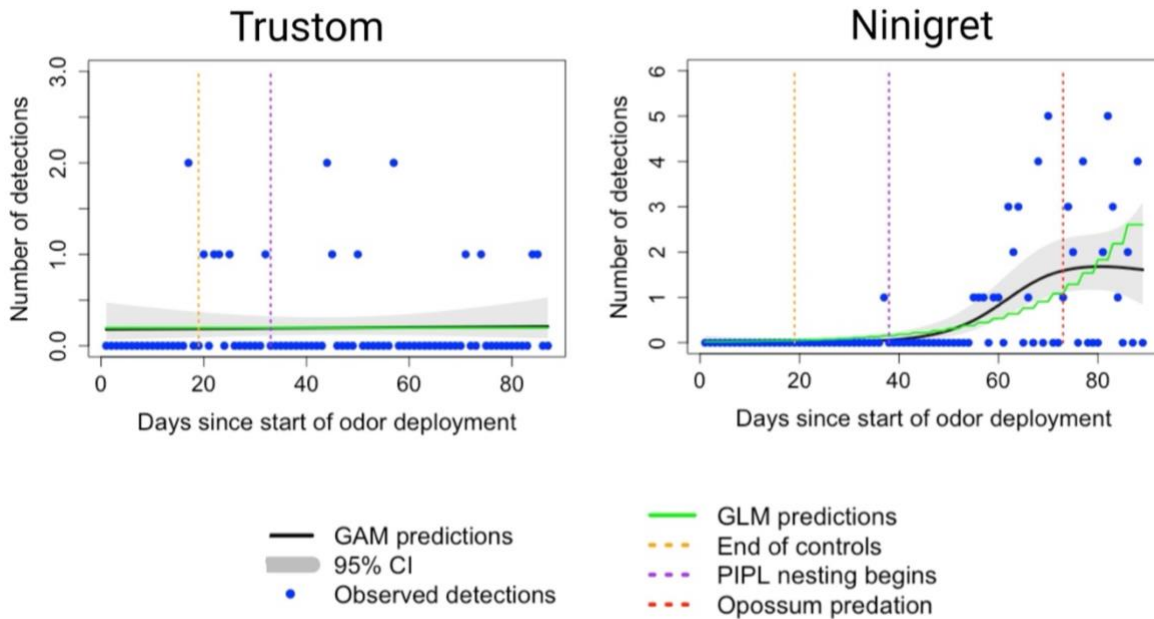
Fig. A2.6 Site-level daily variation in opossum detections (blue points) at scent stations at Trustom and Ninigret, Rhode Island from 27 March (day 0) to 10 June (day 76) in 2022 and 29 March (day 0) to 24 June (day 87) in 2023. Plotted are mean predictions from the generalized linear model (GLM; green dotted line) and mean predictions (solid black line) along with 95% confidence intervals (gray shaded region) from a generalized additive model (GAM). Vertical dotted lines represent the end of the control deployments (orange), the start of the piping plover nesting season (purple), and documented predation of a piping plover nest by an opossum (red).
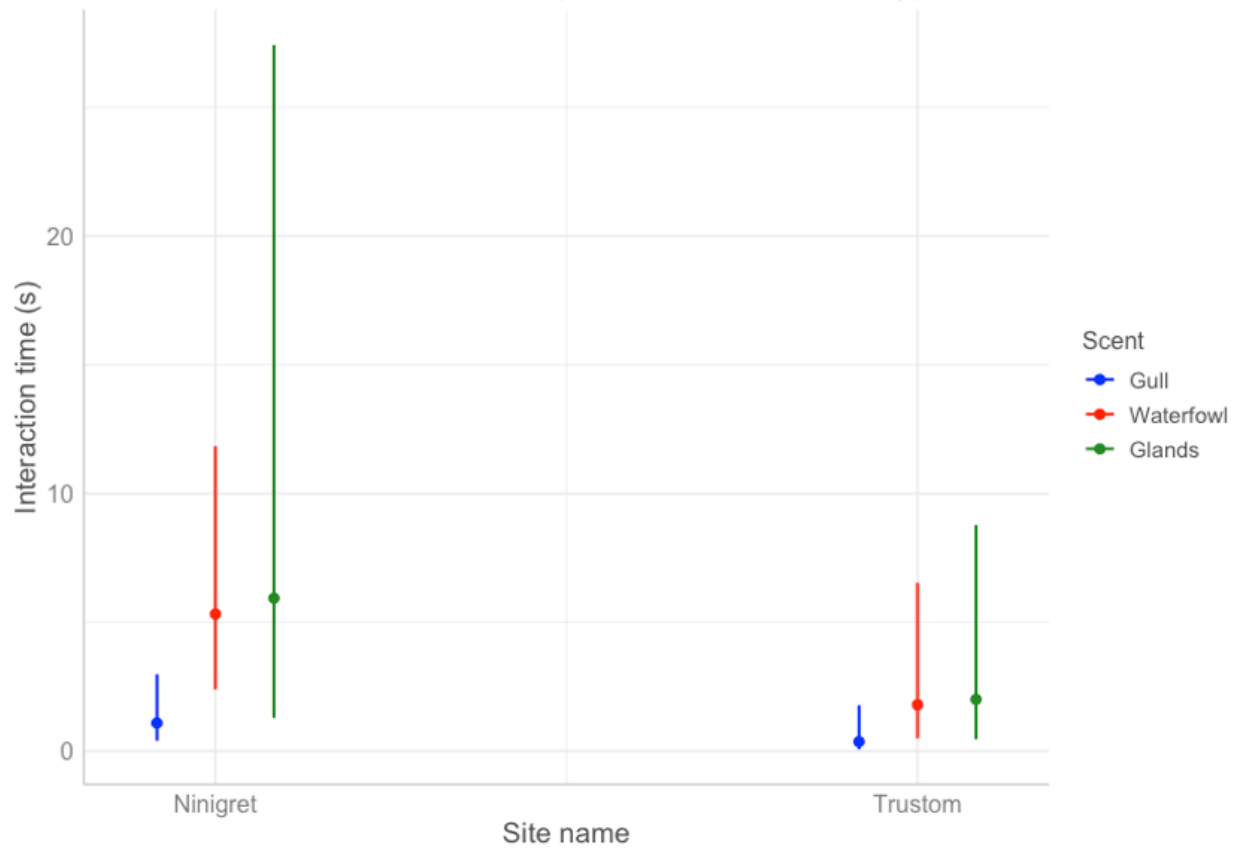
Fig. A2.7 Predicted interaction time (seconds) that an opossum spent at a scent station for four scent types at site Ninigret (left panel) and Trustom (right panel) in 2023. Scents are gull (blue), waterfowl (red), and uropygial glands (green).
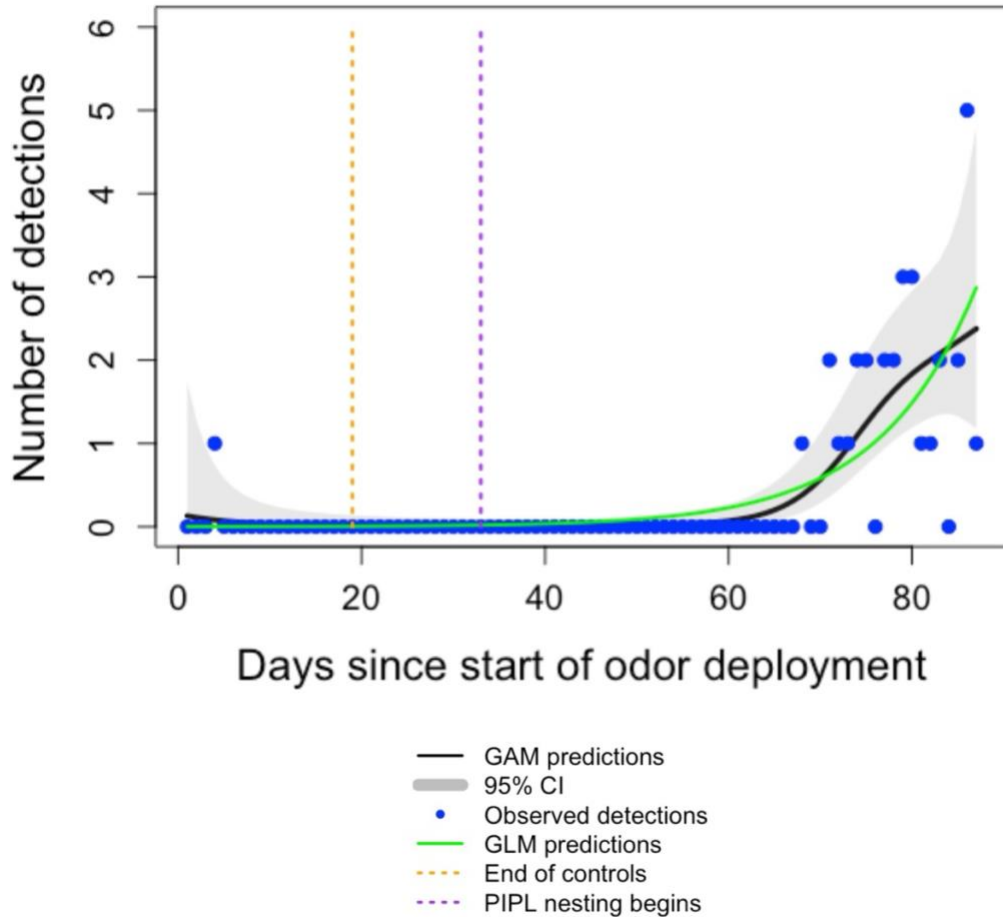
Fig. A2.8 Daily variation in skunk detections (blue points) at control points and scent stations at Trustom, Rhode Island from 29 March (day 0) to 24 June (day 87) in 2023. Graph shows the most supported generalized linear model, GLM (green line), which is the null model (Table 23), and a 95% confidence interval (gray shaded region) which is derived from a generalized additive model, GAM (solid black line). Vertical dotted lines represent the end of the control deployments (orange), and the start of the piping plover nesting season (purple).
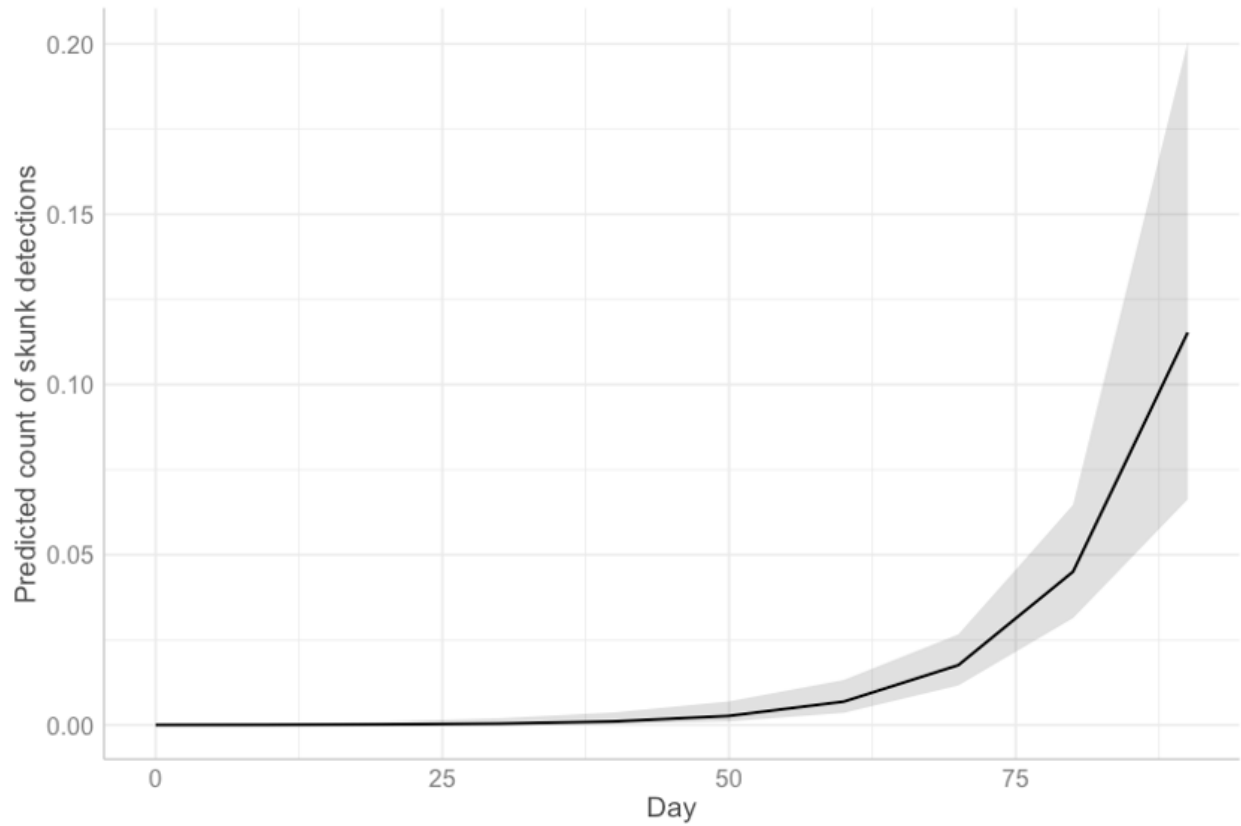
Fig. A2.9 Predicted counts of skunk detections at Trustom, Rhode Island in 2023. The gray-shaded area indicates a 95% confidence interval with a prediction line (black line). This graph displays the second most supported model, Day (Table 10).