

Kirol, C. P., Sutphin, A. L., Bond, L., Fuller, M .R. and Maechtle, T. L. 2015. Mitigation effectiveness for improving nest survival of greater sage-grouse influenced by energy development. – Wildlife Biology doi: 10.2981/wlb.00002

## Appendix 1

Table A1. Top and competitive ( $\Delta AIC_c \leq 2$ ) environmental models explaining sage-grouse nest survival in an energy-altered landscape in the Powder River Basin, Wyoming, 2008–2011. Model set included 1025 models. All models included the variables Year and Exposure-type. Model fit statistics are as follows: log-likelihood (LL), no. of parameters ( $k$ ), and Akaike’s information criterion adjusted for small sample sizes  $AIC_c$ . The top environmental model (model with the lowest  $AIC_c$  score) combined with the variables year and exposure-type formed our base model.

Model	$k$	Model fit statistics	
		LL	$AIC_c$
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_800, VRM_335	9	–412.646	843.323
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_800, VRM_335	9	–412.740	843.511
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_1260, VRM_335	9	–412.783	843.597

ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_1260, VRM_335	9	-412.833	843.696
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_800, VRM_564	9	-413.004	844.040
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_800, VRM_564	9	-413.085	844.201
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_1260, VRM_564	9	-413.089	844.210
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_1260, VRM_564	9	-413.132	844.294
ShrubHgtSD_1260, Sage_335, SageSD_564, TWI_800, VRM_335	9	-413.153	844.337
ShrubHgtSD_1260, Sage_564, SageSD_800, TWI_800, VRM_335	9	-413.212	844.455
ShrubHgtSD_1260, Sage_335, SageSD_564, TWI_1260, VRM_335	9	-413.213	844.457
ShrubHgtSD_1260, Sage_564, SageSD_1260, TWI_800, VRM_335	9	-413.287	844.606
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_564, VRM_335	9	-413.337	844.704
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_564, VRM_335	9	-413.347	844.724
ShrubHgtSD_1260, Sage_564, SageSD_800, TWI_1260, VRM_335	9	-413.347	844.726
ShrubHgtSD_1260, Sage_564, SageSD_1260, TWI_1260, VRM_335	9	-413.385	844.801
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_800, VRM_800	9	-413.464	844.959
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_335, VRM_335	9	-413.472	844.975
ShrubHgtSD_1260, Sage_335, SageSD_564, TWI_800, VRM_564	9	-413.478	844.986

ShrubHgtSD_1260, Sage_335, SageSD_564, TWI_1260, VRM_564	9	-413.495	845.020
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_1260, VRM_800	9	-413.499	845.029
ShrubHgtSD_1260, Sage_564, SageSD_800, TWI_800, VRM_564	9	-413.507	845.045
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_335, VRM_335	9	-413.522	845.074
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_800, VRM_800	9	-413.539	845.108
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_1260, VRM_800	9	-413.543	845.116
ShrubHgtSD_1260, Sage_564, SageSD_1260, TWI_800, VRM_564	9	-413.573	845.177
ShrubHgtSD_1260, Sage_564, SageSD_800, TWI_1260, VRM_564	9	-413.596	845.223
ShrubHgtSD_800, Sage_335, SageSD_800, TWI_800, VRM_335	9	-413.605	845.240
ShrubHgtSD_800, Sage_335, SageSD_800, TWI_1260, VRM_335	9	-413.611	845.252
ShrubHgtSD_1260, Sage_564, SageSD_1260, TWI_1260, VRM_564	9	-413.628	845.288
ShrubHgtSD_1260, Sage_564, SageSD_564, TWI_800, VRM_335	9	-413.640	845.310
ShrubHgtSD_1260, Sage_564, SageSD_564, TWI_800, VRM_335	9	-413.640	845.310
ShrubHgtSD_1260, Sage_335, SageSD_800, TWI_564, VRM_564	9	-413.642	845.315
ShrubHgtSD_1260, Sage_335, SageSD_1260, TWI_564, VRM_564	9	-413.644	845.319

---

Table A2. Top and competitive ( $\Delta AIC_c \leq 2$ ) models incorporating anthropogenic variables and explaining sage-grouse nest survival in an energy-altered landscape in the Powder River Basin, Wyoming, 2008–2011. Model set included 1024 additive and 104 multiplicative (interaction) models. All additive and multiplicative models included the base model (Table 2). In the multiplicative models the environmental predictor used in the interaction term is shown. Model fit statistics are as follows: log-likelihood (LL), no. of parameters ( $k$ ), Akaike’s information criterion adjusted for small sample sizes  $AIC_c$ , relative  $AIC_c$  ( $\Delta AIC_c$ ), and Akaike weights ( $w_i$ ).

Type <sup>a</sup>	Model	$k$	Model fit statistics			
			LL	$AIC_c$	$\Delta AIC_c$	$w_i$
A	WaterEdge_5.0	13	−408.341	842.745	0.000	0.074
A	base model	12	−409.480	843.014	0.269	0.064
A	NearRoad_1.260, WaterEdge_5.0	14	−407.800	843.671	0.926	0.046
A	WellPad_5.0, WaterEdge_5.0	14	−407.818	843.708	0.963	0.046
A	NearPwrLine_0.800, WaterEdge_5.0	14	−407.857	843.786	1.041	0.044
A	NearPwrLine_0.800	13	−408.902	843.867	1.122	0.042
A	NearRoad_1.260, WellPad_5.0, WaterEdge_5.0	15	−406.901	843.885	1.140	0.042
A	NearRoad_1.260	13	−408.969	844.000	1.255	0.039

A	WellPad_5.0	13	-408.970	844.003	1.258	0.039
A	NearWell_0.335,WaterEdge_5.0	14	-408.007	844.085	1.340	0.038
A	NearRoad_1.260, NearWell_0.335,WaterEdge_5.0	15	-407.052	844.185	1.440	0.036
A	NearWell_0.335	13	-409.083	844.228	1.483	0.035
A	Class2RD_1.0, WaterEdge_5.0	14	-408.109	844.290	1.545	0.034
A	NearRoad_1.260, WellPad_5.0	14	-408.112	844.295	1.550	0.034
A	Class2RD_1.0	13	-409.117	844.295	1.550	0.034
A	NearRoad_1.260, NearWell_0.335	14	-408.142	844.356	1.611	0.033
A	SurfaceDistb_0.35, WaterEdge_5.0	14	-408.191	844.453	1.708	0.031
M	Sage_0.35, Class3RD_1.0, Sage_0.35*Class3RD_1.0	14	-408.195	844.462	1.717	0.031
A	PwrLine_5.0, WaterEdge_5.0	14	-408.207	844.487	1.742	0.031
A	NearPersistWater_1.260, WaterEdge_5.0	14	-408.236	844.543	1.798	0.030
A	PwrLine_5.0	13	-409.250	844.562	1.817	0.030
A	NearRoad_1.260, NearPwrLine_0.800, WaterEdge_5.0	15	-407.265	844.613	1.868	0.029
A	SurfaceDistb_0.35	13	-409.285	844.633	1.888	0.029
A	Class3RD_2.0, WaterEdge_5.0	14	-408.327	844.726	1.981	0.027

A	NearRoad_1.260, NearPwrLine_0.800	14	-408.329	844.729	1.984	0.027
M	Sage_0.35, WaterEdge_5.0, Sage_0.35*WaterEdge_5.0	14	-408.332	844.736	1.991	0.027
M	Sage_0.35, Class3RD_2.0, Sage_0.35* Class3RD_2.0	14	-408.333	844.738	1.993	0.027

---

<sup>a</sup> A = additive model, M = multiplicative model (interaction)