Species	Prop HW Vol	Avg age	Height HW	Height SW	Age-class Edge	Cover-type edge	Canopy Closure	ESG1	ESG2	ESG3	Soft wood	Hard wood
AMGO	>						<	<				
BCCH	>				>					>		
BHCO	>		>		>	<			<	>	<	
BHVI	<	>		>		>					>	<
BOCH	<	>			<				<	<	>	
BRCR	<	>		>	<	>			>	<	>	<
CHSP	<	>	<>		<	>	<	>	>	<	>	<
COYE						<		>	<	>	<	
GCKI	<	>				>			>		>	
HETH	<	<	<		<	<	>	<	>			
RCKI	<	>	<>	>	<	>	<	>	>	<	>	<
SWTH		>				>	>		>	>	>	<
WIWR	<	>				>		<			>	<
YBFL	<	>				>					>	
YBSA	>	<	>			<	>	>	<	>	<	>
YWAR												
AMRE	>	<	>		>	<	>	<	<	>		>
BAWW	>		>		>	<		<	<	>		>
CSWA	>		>		>	<			<	>		>
OVEN	>		>		>	<	>	<	<	>		>
REVI	>	<	>		>	<	>		<	>		>
VEER	>	>		>		>	<	<	<	>		

| Species	Prop HW Vol	Avg age	Height HW	Age - class Edge	Cover- type edge	Canopy Closure	Riparian ecosites	Wet soil ecosites	Shrub rich ecosites
AMGO	Hardwood					Open	Avoids		
AMRE	Hardwood	Young	Tall	High	Low	Closed	Avoids	Avoids	Uses
BAWW	Hardwood		Tall	High	Low		Avoids	Avoids	Uses
BCCH	Hardwood			High					Uses
BHCO	Hardwood		Tall	High	Low			Avoids	Uses
BHVI	Softwood	Old			High				
BOCH	Softwood	Old		Low				Avoids	Avoids
BRCR	Softwood	Old		Low	High			Uses	Avoids
CHSP	Softwood	Old		Low	High	Open	Uses	Uses	Avoids
COYE					Low		Uses	Avoids	Uses
CSWA	Hardwood		Tall	High	Low			Avoids	Uses
GCKI	Softwood	Old			High			Uses	
HETH	Softwood	Young	Short	Low	Low	Closed	Avoids	Uses	
OVEN	Hardwood		Tall	High	Low	Closed	Avoids	Avoids	Uses
RCKI	Softwood	Old		Low	High	Open	Uses	Uses	Avoids
REVI	Hardwood	Young	Tall	High	Low	Closed		Avoids	Uses
SWTH		Old			High		Uses		Uses
VEER	Hardwood	Old			High	Open	Avoids	Avoids	Uses
WIWR	Softwood	Old			High		Avoids		
YBFL	Softwood	Old			High				
YBSA	Hardwood	Young	Tall		Low	Closed	Uses	Avoids	Uses
YWAR									

Ecosite Group 1 (ESG1_2): This variable represents the mean total area of riparian ecosites (ES 5, 6, 7, 8), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where riparian ecosites are in the neighbourhood.

Response	R2[%]	F	p	
AMGO	0.9	6.8	0.00116	Avoid
BCCH	0.1	0.9914	0.62867	
BHCO	0.1	0.9195	0.60102	
BHVI	0.3	2.2	0.11143	
BOCH	0.1	1.1	0.33196	
BRCR	0.1	0.6887	0.50245	
CHSP	0.6	4.4	0.01253	ESG1
COYE	3.7	30.5	<0.00001	ESG1
GCKI	0.3	2.1	0.12073	
HETH	1.7	13.4	<0.00001	Avoid
RCKI	0.4	3.5	0.03142	ESG1
SWTH	1.7	13.6	<0.00001	ESG1
WIWR	0.5	3.6	0.02693	Avoid
YBFL	0.4	3	0.05099	
YBSA	0.6	5.1	0.00648	ESG1
YWAR	0.1	0.5938	0.55247	
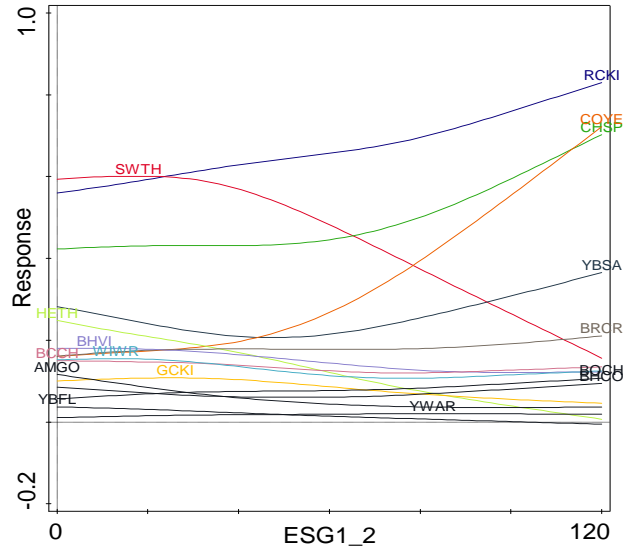
Response	R2[%]	F	p	
AMRE	0.6	4.7	0.00907	Avoid
BAWW	0.6	4.9	0.0073	Avoid
CSWA	0.3	2.4	0.08836	
OVEN	1.4	11.4	0.00001	Avoid
REVI	0.5	4	0.0193	
VEER	1.3	10.6	0.00003	Avoid
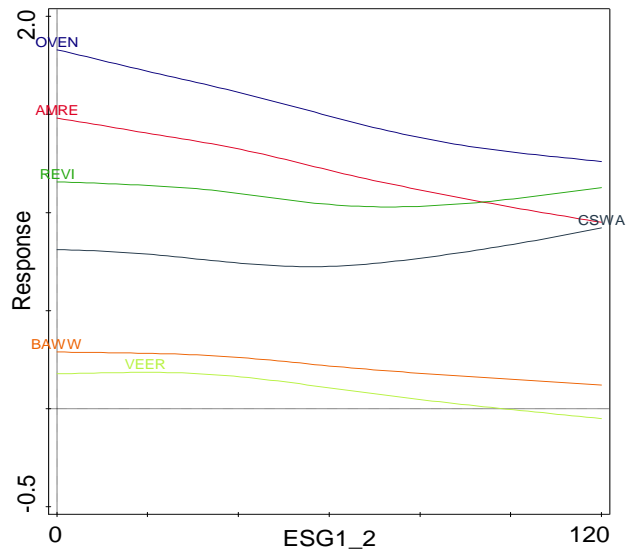
Ecosite Group 2 (ESG2_2): This variable represents the mean total area of wet soil ecosites (ES 61 - 64), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where wet ecosites are in the neighbourhood.

Response	R2[%]	F	p	
AMGO	0.1	1.2	0.31415	
BCCH	0.2	1.8	0.16397	
BHCO	1.4	11	0.00002	Avoid
BHVI	0.3	2.3	0.09715	
BOCH	0.8	6.6	0.00143	Avoid
BRCR	0.8	6.7	0.00133	ESG2
CHSP	2.6	21	<0.00001	ESG2
COYE	0.5	4.3	0.01379	Avoid
GCKI	1.8	14.7	<0.00001	ESG2
HETH	1	8	0.00036	ESG2
RCKI	0.8	6.4	0.00165	ESG2
SWTH	0.1	0.4353	0.64719	
WIWR	0.7	5.3	0.0051	
YBFL	0.6	4.6	0.00986	
YBSA	1.4	11.2	0.00002	Avoid
YWAR	0.1	1.1	0.34407	
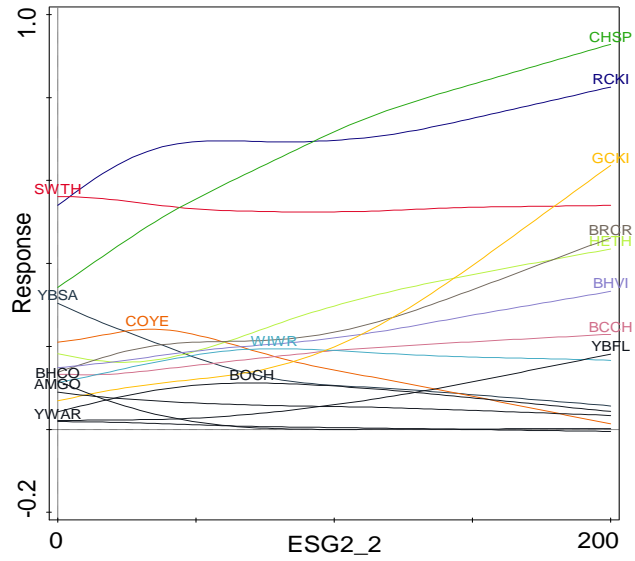
Response	R2[%]	F	p	
AMRE	10.1	88.8	<0.00001	Avoid
BAWW	1.8	14.6	<0.00001	Avoid
CSWA	1.6	12.8	<0.00001	Avoid
OVEN	3.2	26.4	<0.00001	Avoid
REVI	1.8	14.1	<0.00001	Avoid
VEER	4.7	38.8	<0.00001	Avoid
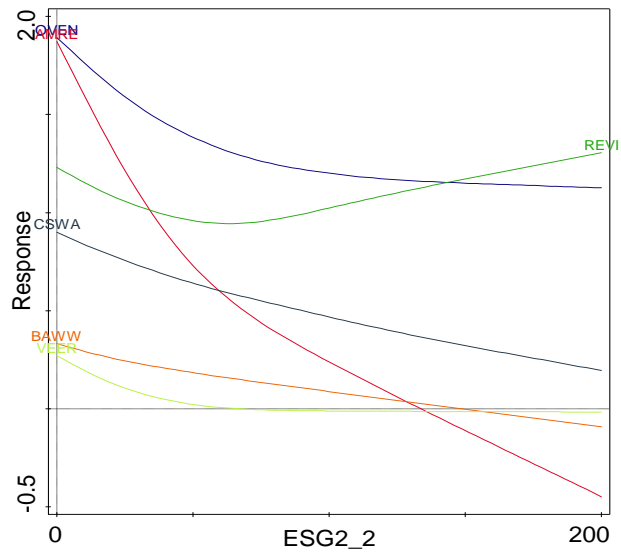
Ecosite Group 3 (ESG3_2): This variable represents the mean total area of shrub-rich ecosites (ES 21, 22, 32, 41, 51, and 52), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where shrub-rich ecosites are in the neighbourhood.

Response	R2[%]	F	p	
AMGO	0.3	2.4	0.09273	
BCCH	1.2	9.3	0.0001	ESG3
BHCO	2.7	22.3	<0.00001	ESG3
BHVI	0.3	2.5	0.07982	
BOCH	1.3	10.7	0.00003	Avoid
BRCR	0.8	6.6	0.00134	Avoid
CHSP	4.5	36.8	<0.00001	Avoid
COYE	0.4	3.3	0.03768	ESG3
GCKI	1.7	13.3	<0.00001	
HETH	0.4	2.8	0.06107	
RCKI	1.6	13	<0.00001	Avoid
SWTH	0.7	5.6	0.00386	ESG3
WIWR	0.1	1.1	0.32913	
YBFL	0.3	2.3	0.09968	
YBSA	5.6	46.7	<0.00001	ESG3
YWAR	0	0.3192	0.72676	
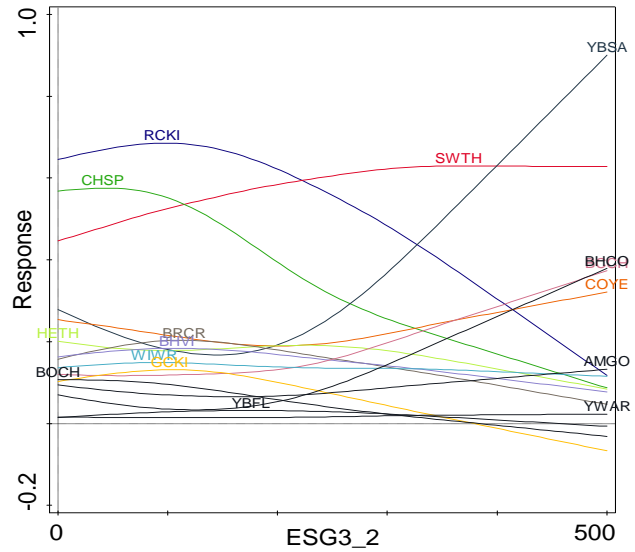
Response	R2[%]	F	p	
AMRE	13.7	125.6	<0.00001	ESG3
BAWW	7.1	60.2	<0.00001	ESG3
CSWA	3.7	30.6	<0.00001	ESG3
OVEN	8.3	71.9	<0.00001	ESG3
REVI	6.3	53.1	<0.00001	ESG3
VEER	6.2	52.3	<0.00001	ESG3
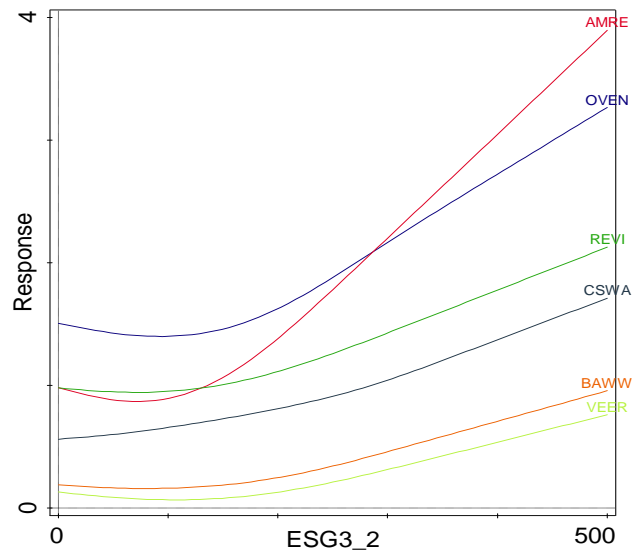
SOFTWOOD: The is an FLI variable the represent the "percentage" of softwood forest within a forest based on overstory canopy closure, and varies from 0-10. It is a stand-level variable summarized at the 0.8 ha scale. This variable was not used in the habitat models, as it is redundant with the more precise "proportion hardwood volume" variable, but it is useful in the ordination diagrams to help identify birds that prefer softwood canopy cover.

Response	R2[%]	F	p	
AMGO	0.2	1.9	0.1557	
BCCH	0	0.3685	0.69185	
BHCO	0.7	5.3	0.00494	Swd
BHVI	2.7	21.9	<0.00001	Swd
BOCH	1.4	10.9	0.00002	Swd
BRCR	2.3	18.8	<0.00001	Swd
CHSP	2.4	19.5	<0.00001	Swd
COYE	0.6	4.5	0.01076	Hwd
GCKI	2.8	22.9	<0.00001	Swd
HETH	0.2	1.8	0.16784	
RCKI	5.3	44.4	<0.00001	Swd
SWTH	1.8	14.4	<0.00001	Swd
WIWR	1.6	13	<0.00001	Swd
YBFL	0.6	5.1	0.00605	Swd
YBSA	2	16.1	<0.00001	Hwd
YWAR	0.2	1.3	0.26305	
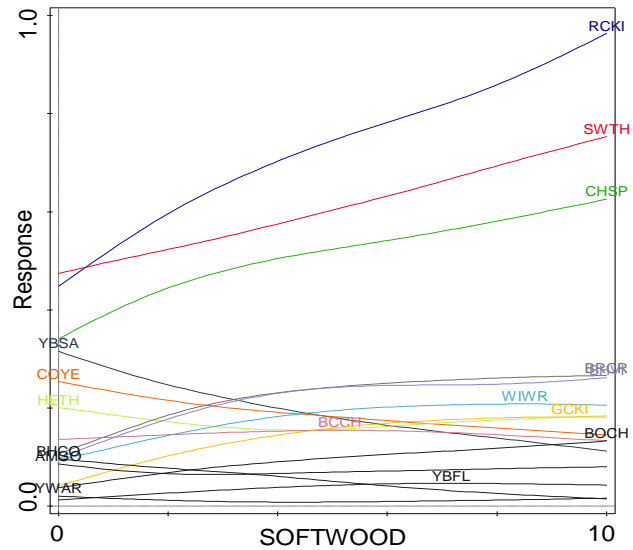
| Response	R2[%]	F	p	
OVEN	1.9	15.1	<0.00001	**Hwd**
AMRE	8.3	71.9	<0.00001	Hwd
BAWW	2.6	21.4	<0.00001	Hwd
CSWA	2.4	19	<0.00001	Hwd
REVI	6.7	56.7	<0.00001	Hwd
VEER	1.8	14.5	<0.00001	Hwd
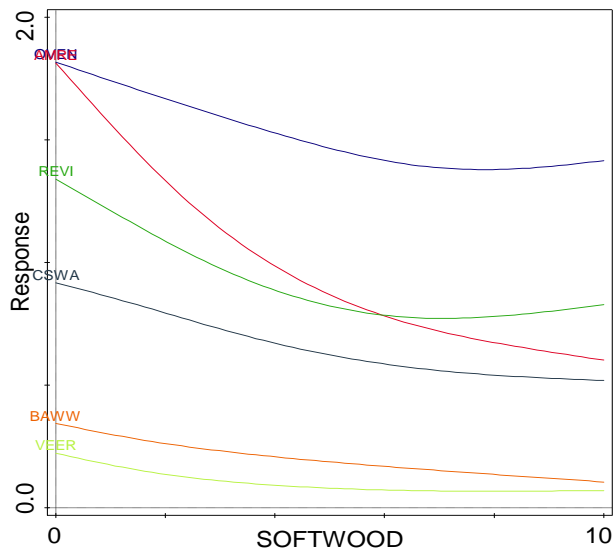
HARDWOOD: The is an FLI variable the represent the "percentage" of hardwood forest within a forest based on overstory canopy closure, and varies from 0-10. It is a stand-level variable summarized at the 0.8 ha scale. This variable was not used in the habitat models, as it is redundant with the more precise "proportion hardwood volume" variable, but it is useful in the ordination diagrams to help identify birds that prefer hardwood canopy cover.

Response	R2[%]	F	p	
AMGO	0.4	3.2	0.0401	
BCCH	0	0.366	0.69383	
BHCO	0.2	1.3	0.26064	
BHVI	2.1	16.8	<0.00001	Swd
BOCH	1.2	9.6	0.00007	
BRCR	1.4	11.5	0.00001	Swd
CHSP	1.8	14.1	<0.00001	Swd
COYE	0.2	1.9	0.15294	
GCKI	1.9	15	<0.00001	
HETH	0.2	1.8	0.17194	
RCKI	3.9	32.1	<0.00001	Swd
SWTH	0.8	6.4	0.00177	Swd
WIWR	1.5	12	<0.00001	Swd
YBFL	0.5	3.7	0.02527	
YBSA	0.9	7.3	0.0007	Hwd
YWAR	0.2	1.2	0.28717	
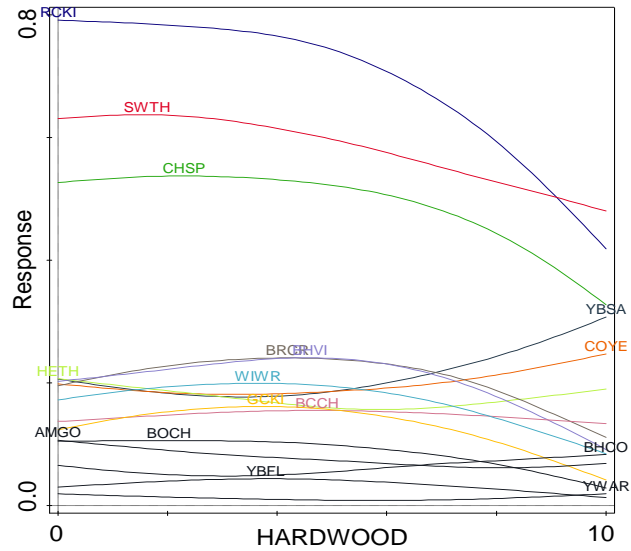
GAM fitted for 6 response variables:

| Response	R2[%]	F	p	
AMRE	8.6	74.4	<0.00001	Hwd
BAWW	1.9	15.1	<0.00001	Hwd
CSWA	2.5	20.3	<0.00001	Hwd
OVEN	2.2	17.7	<0.00001	Hwd
REVI	6.7	56.7	<0.00001	Hwd
VEER	0.9	6.9	0.00099	Hwd
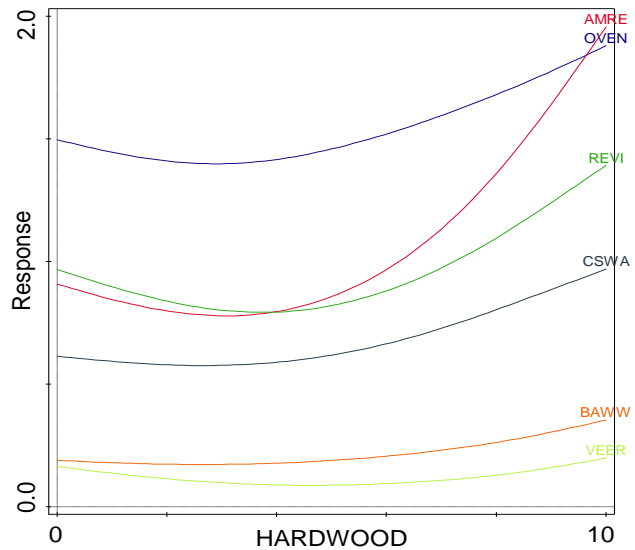
PHW_1: This is the proportion of hardwood based on hardwood and softwood volume estimates from Patchworks. Measured at the 50 ha scale. A positive reponse indicates that the bird prefers sites dominated by hardwood forest, whereas a negative reponse indicates the opposite, and prefers softwood forest.

Response	R2[%]	F	p	
AMGO	0.9	7.4	0.00061	Hwd
BCCH	1	8	0.00036	Hwd
BHCO	2.2	18.1	<0.00001	Hwd
BHVI	2.7	21.9	<0.00001	Swd
BOCH	1.9	15.6	<0.00001	Swd
BRCR	2.4	19.8	<0.00001	Swd
CHSP	6.6	55.5	<0.00001	Swd
COYE	0.3	2.6	0.07736	
GCKI	3.3	27.3	<0.00001	Swd
HETH	0.6	4.5	0.01102	Swd
RCKI	4.1	33.5	<0.00001	Swd
SWTH	0.3	2.1	0.11873	
WIWR	1.9	15.2	<0.00001	Swd
YBFL	1.2	9.5	0.00008	Swd
YBSA	3.8	31	<0.00001	Hwd
YWAR	0	0.2849	0.7522	
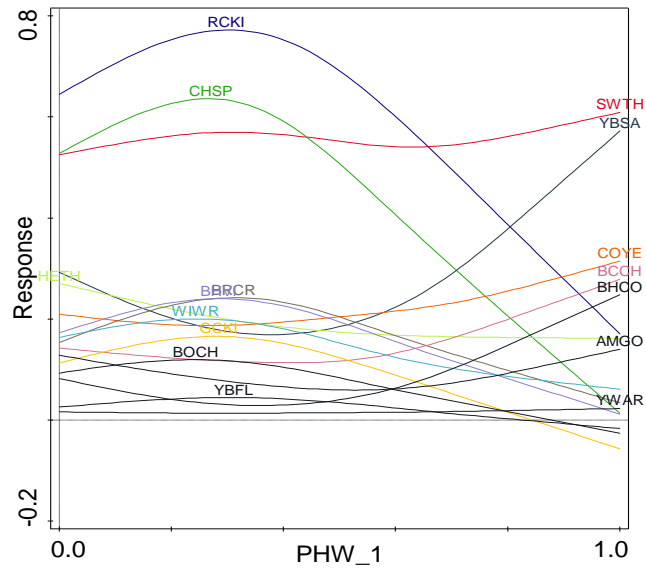
Response	R2[%]	F	p	
AMRE	21.8	219.5	<0.0000	Hwd
BAWW	9.2	80	<0.0000	Hwd
CSWA	4.3	35.4	<0.0000	Hwd
OVEN	6.3	52.9	<0.0000	Hwd
REVI	10.7	94.4	<0.0000	Hwd
VEER	10.2	89.9	<0.0000	Hwd
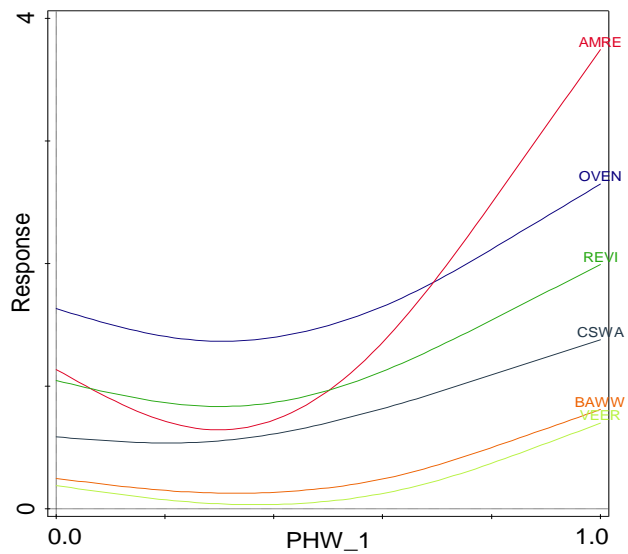
AGEDEN_3: Contrast-weighted density of edge between young and old age class forest. Edge between young forest (< 20 years) and old forest(> 60 years) was given a higher weight than edge with the intermediate immature forest. This is a lanscapce-level variable measured at the 5000 ha scale. A negative response to this variable indicates the that the bird prefers a more contiguous forest with a homogenous age-class, whereas a positive response indicates the bird prefers a mix of young and old forest.

Response	R2[%]	F	p	
AMGO	0.1	0.7139	0.51014	
BCCH	0.6	4.7	0.00887	High
BHCO	0.8	6.1	0.0023	High
BHVI	0.2	1.6	0.20832	
BOCH	1	7.7	0.00047	Low
BRCR	0.4	3	0.04873	Low
CHSP	0.9	7.4	0.00066	Low
COYE	0.3	2.2	0.10832	
GCKI	0.1	0.7712	0.53743	
HETH	0.9	7.2	0.00077	Low
RCKI	0.5	4.1	0.01724	Low
SWTH	0.2	1.2	0.29143	
WIWR	0.1	0.4675	0.62659	
YBFL	0.1	0.5042	0.60402	
YBSA	0.3	2.1	0.12465	
YWAR	0.1	0.6357	0.52967	
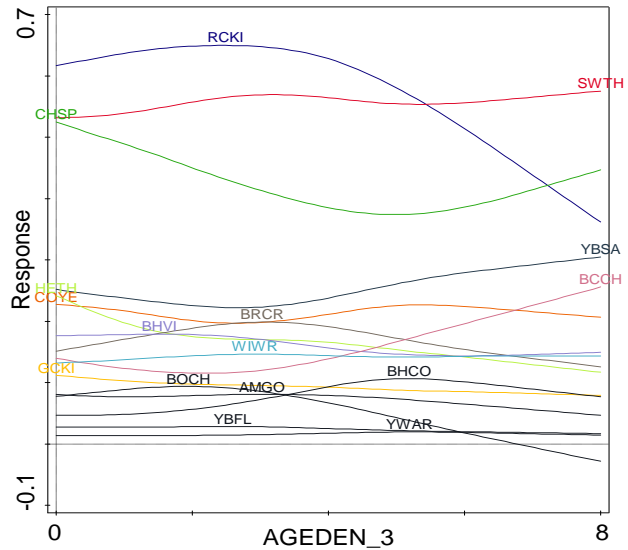
d Generalized Additive Models:

Predictors

Distribution

Link function

for 6 response variables:

| Response	R2[%]	F	p	
AMRE	3.1	24.9	<0.00001	High
BAWW	2.3	18.3	<0.00001	High
CSWA	1.4	11.6	0.00001	High
OVEN	2.6	20.7	<0.00001	High
REVI	1.3	10.3	0.00004	High
VEER	2.5	20.2	<0.00001	High
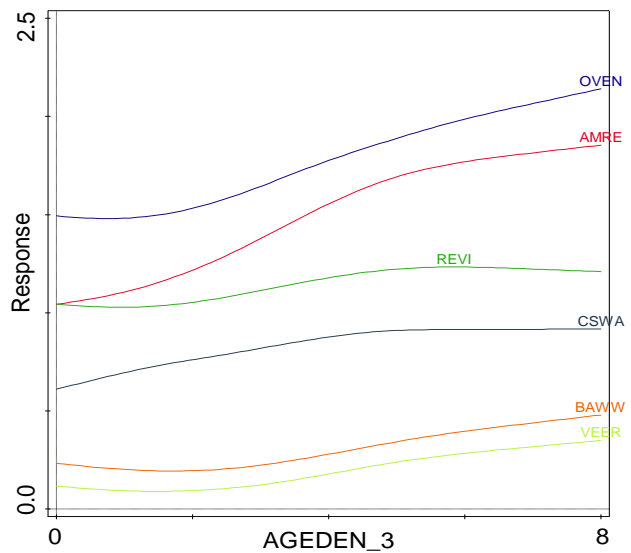
CTEDEN_3: Contrast weighted density of edge (m/ha) between softwood, mixedwood, and hardwood forest.   Edge between hardwood (>70% hardwood volume) and softwood (<30% hardwood volume) was given a higher weight than edge with mixedwood (intermediate volume). This is a landscape-level variable measured at the 5000 ha scale. A negative response indicates that the bird prefers a more homogenous forest with respect to cover-type, where as a positive response indicates the bird prefers a mix of forest cover-types.

Response	R2[%]	F	p	
AMGO	0.5	4.3	0.01427	
BCCH	0.5	3.6	0.02665	
BHCO	2	15.8	<0.00001	No Edge
BHVI	0.8	6.4	0.00171	Edge
BOCH	1	8	0.00036	
BRCR	1.7	13.3	<0.00001	Edge
CHSP	1.7	14.1	<0.00001	Edge
COYE	0.7	5.8	0.00302	No Edge
GCKI	1.4	11.2	0.00001	Edge
HETH	0.5	4	0.01865	No Edge
RCKI	0.5	3.8	0.02204	Edge
SWTH	0.2	1.5	0.2188	Edge
WIWR	1.8	14.1	<0.00001	Edge
YBFL	1.6	13.2	<0.00001	Edge
YBSA	3.8	31.6	<0.00001	No Edge
YWAR	0.2	1.7	0.18674	
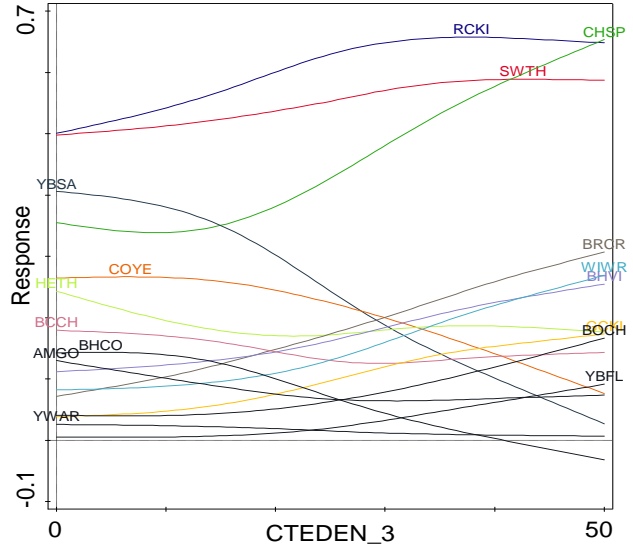
Response	R2[%]	F	p	
AMRE	11.7	104.2	<0.00001	No edge
BAWW	5.6	46.7	<0.00001	No edge
CSWA	1.4	11.2	0.00002	No edge
OVEN	8.3	71.1	<0.00001	No edge
REVI	3.9	32.3	<0.00001	No edge
VEER	8.1	69.5	<0.00001	No edge
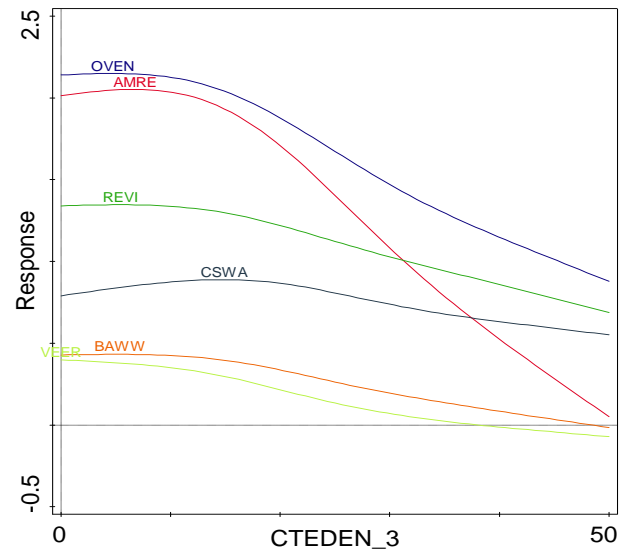
Canopy closure (CC): This FLI variable represents "percent" closure of the canopy on a scale 0-10, and is measured at the stand-level (0.8 ha). A positive response indiates the bird prefers more closed forest with few openings, whereas a negative response indicates the bird prefers to have some openings in the forest canopy.
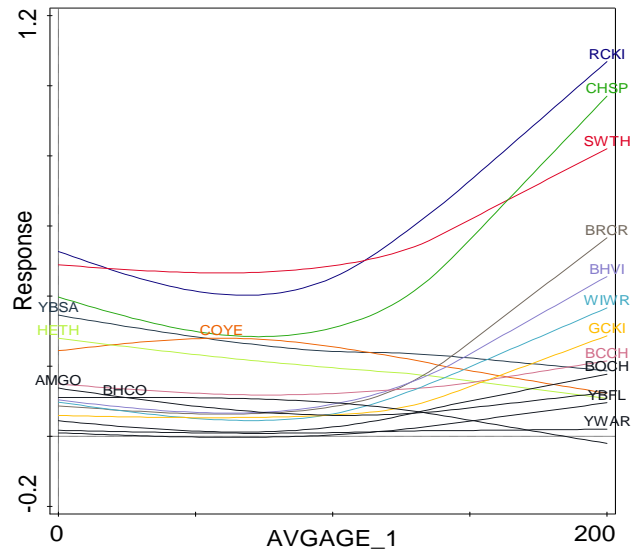
Response	R2[%]	F	p	
AMGO	1.1	9.1	0.00012	Open
BCCH	0.1	0.7605	0.53238	
BHCO	0.2	1.8	0.16673	
BHVI	0.3	2.6	0.07576	
BOCH	0.3	2.4	0.0926	
BRCR	0.4	3.2	0.04098	
CHSP	0.4	2.9	0.05524	
COYE	0.5	3.7	0.02581	
GCKI	0.1	1	0.35052	
HETH	0.3	2.2	0.11002	
RCKI	1	7.8	0.00042	Open
SWTH	0.1	0.663	0.51547	
WIWR	0.6	4.4	0.01224	Open
YBFL	0.1	0.7838	0.54313	
YBSA	0.7	5.3	0.00484	Closed
YWAR	0	0.2574	0.77314	

| Response	R2[%]	F	p	
AMRE	1.6	12.7	<0.00001	Closed
BAWW	0.4	3.5	0.03012	
CSWA	0.2	1.4	0.23513	
OVEN	4.3	35.1	<0.00001	Closed
REVI	1.1	9.1	0.00012	Closed
VEER	1.4	11.2	0.00002	
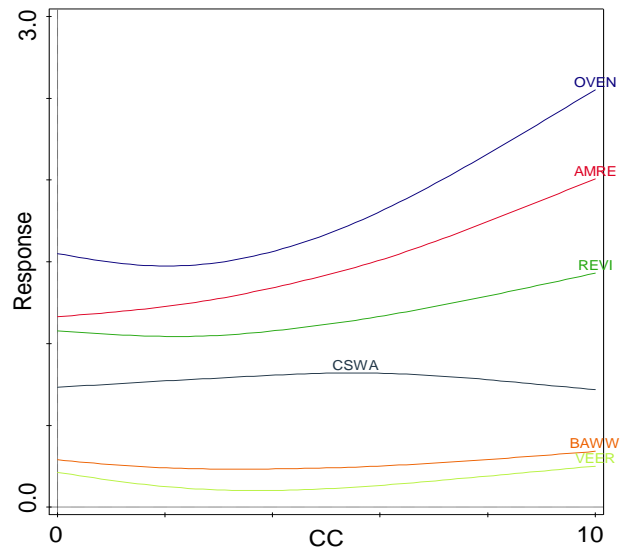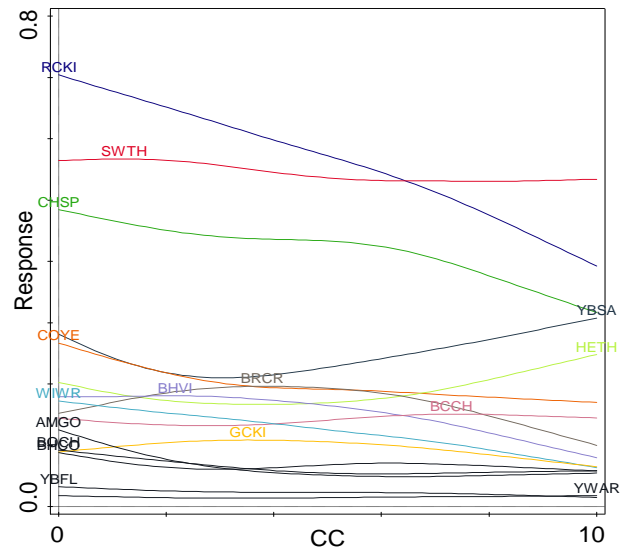
AVGAGE_1: This variable represents the average age of combined managed and unmanaged forest. It is a local-scale variable measured at the 50 ha scale. The variable represents time since last stand-replacing disturbance, so a positive response indicates that the bird prefers older stands that may have more complex internal stand structure, number snags, amount of downed woody debris, and number of stand openings.

Response	R2[%]	F	p	
AMGO	0.6	4.6	0.0098	Old
BCCH	0.1	0.7799	0.5413	
BHCO	0.3	2.6	0.0775	
BHVI	1.6	12.7	<0.00001	Old
BOCH	0.7	6	0.0026	Old
BRCR	2.7	22.1	<0.00001	Old
CHSP	1.8	14.6	<0.00001	Old
COYE	0.2	1.7	0.1881	
GCKI	1	8.2	0.0003	Old
HETH	0.6	4.6	0.01	Young
RCKI	1.4	11.2	2E-05	Old
SWTH	0.5	3.9	0.0207	Old
WIWR	1.5	12.3	<0.00001	Old
YBFL	0.7	5.4	0.0048	Old
YBSA	0.5	3.8	0.0236	Young
YWAR	0.1	0.4261	0.6532	

| Response	R2[%]	F	p	
AMRE	1.8	14.7	<0.0000	Young
BAWW	s2	0.4	3.4	
CSWA	0.3	2.1	0.122	
OVEN	0.3	2.4	0.088	
REVI	0.9	7.1	8E-04	Young
VEER	s2	1.6	12.7	
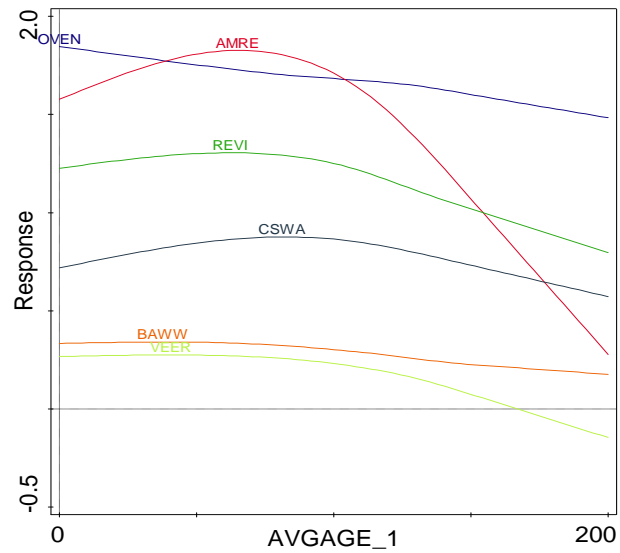
0.03405
<0.00001

HT_HW_1: This is the height (m) of hardwood trees, as projected by Patchworks models. The variable is local-scale, measured at 50 ha. The response to this variable cam be interpreted as a combination of whether the bird prefers hardwood versus softwood forest, and then within that whether it prefers low, mid-size, or tall trees. Alternatively, the bird may avoid such forest conditons.

Response	R2[%]	F	p	
AMGO	0.7	5.4	0.00481	Avoid
BCCH	0.4	2.9	0.0552	Avoid
BHCO	1	7.7	0.00047	Tall
BHVI	1.5	12.3	<0.00001	Avoid
BOCH	1	8.3	0.00027	Avoid
BRCR	1.1	8.8	0.00016	Avoid
CHSP	4.3	35.2	<0.00001	Avoid
COYE	0.1	0.61	0.54341	
GCKI	1.7	13.4	<0.00001	Avoid
HETH	1.6	12.7	<0.00001	Avoid
RCKI	1.8	14.6	<0.00001	Avoid
SWTH	0.3	2.6	0.07497	
WIWR	1.2	9.4	0.00009	Avoid
YBFL	0.8	6.1	0.00221	Avoid
YBSA	1.3	10.3	0.00004	Tall
YWAR	0	0.2325	0.79243	
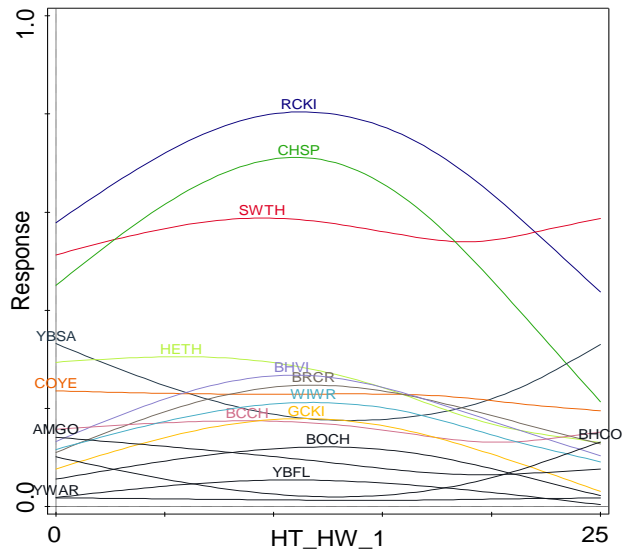
| Response	R2[%]	F	p	
AMRE	10.2	89.6	<0.00001	Tall
BAWW	2.1	17.2	<0.00001	Tall
CSWA	2.2	18.1	<0.00001	Tall
OVEN	3	24.1	<0.00001	Tall
REVI	2.6	21.4	<0.00001	Tall
VEER	4.5	37.4	<0.00001	Tall
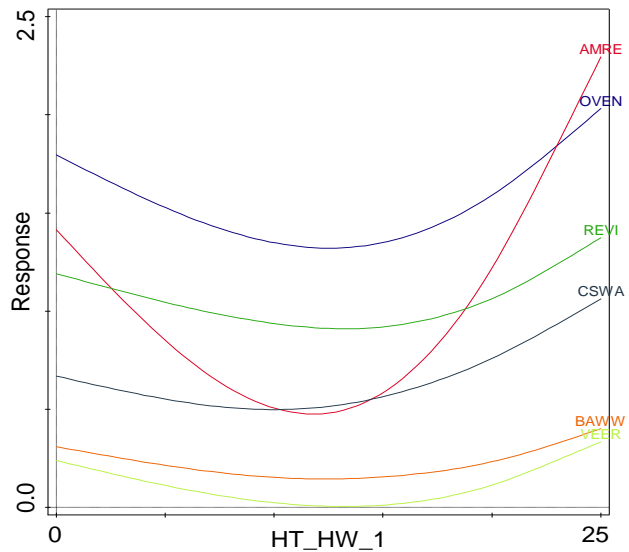
HT_SW_1: This is the height (m) of softwood trees, as projected by Patchworks models. The variable is local-scale, measured at 50 ha. The response to this variable cam be interpreted as a combination of whether the bird prefers hardwood versus softwood forest, and then within that whether it prefers low, mid-size, or tall trees. Alternatively, the bird may avoid such forest conditons.

Response	R2[%]	F	p	
AMGO	0.7	5.2	0.00467	Avoid
BCCH	0.9	6.5	0.00121	Avoid
BHCO	0.3	2.5	0.0791	
BHVI	0.4	2.7	0.06378	Tall
BOCH	0.2	1.6	0.19596	
BRCR	0.6	4.2	0.013	Tall
CHSP	0.1	0.585	0.56728	
COYE	0.6	4.7	0.00807	Avoid
GCKI	0.2	1.7	0.17388	
HETH	0.9	7.1	0.00068	Avoid
RCKI	0.5	4.1	0.01538	Tall
SWTH	0.2	1.6	0.21098	
WIWR	0.2	1.2	0.31401	
YBFL	0.1	0.7587	0.52426	
YBSA	0.8	5.7	0.00275	Avoid
YWAR	0	0.2747	0.77303	
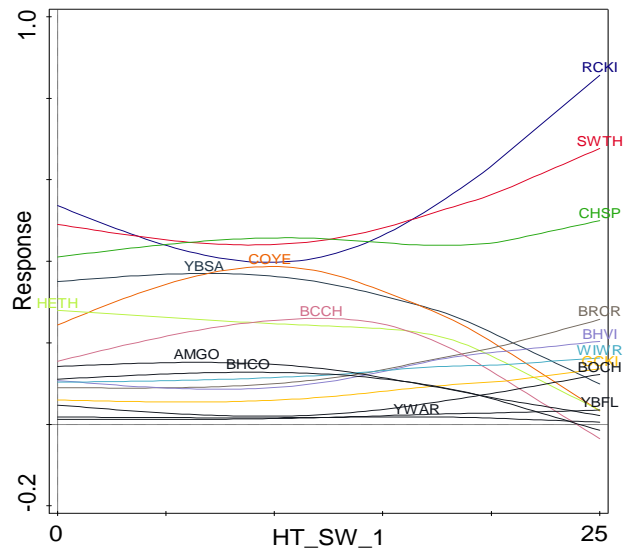
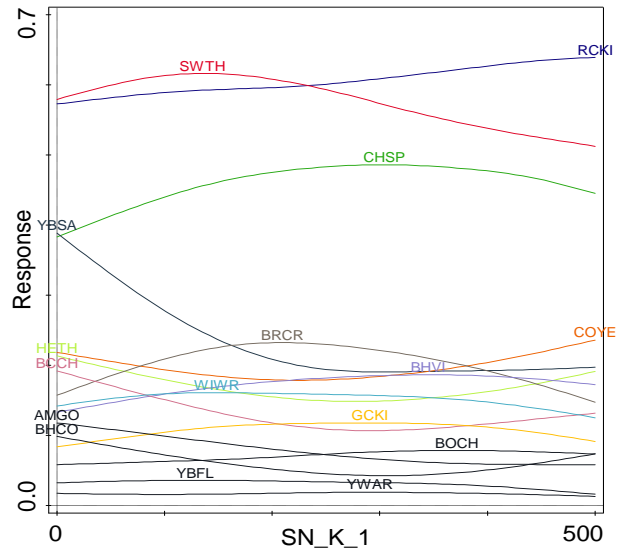| Response	R2[%]	F	p	
AMRE	0.8	6.2	0.00159	Avoid
BAWW	1.5	11	0.00001	Avoid
CSWA	0.2	1.7	0.17952	
OVEN	0.7	5.1	0.00507	Avoid
REVI	2.9	22.2	<0.00001	Avoid
VEER	2	15.2	<0.00001	Avoid
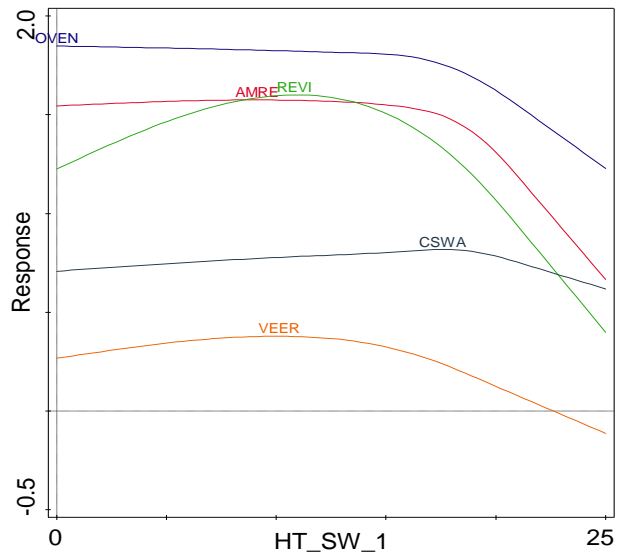
SN_K_1: The bird relationship with snags was initially modelled using an interpolated surface based on LP field data collections. This relationship was then extended to the Patchworks HEC curves to allow for scenario analysis. Snags represent the number of snags per ha, and has modeled at the local (50-ha) scale.

Summary of fitted Generalized Additive Models:

SN_K_1

Response	R2[%]	F	p	
AMGO	0.7	5.2	0.00546	<
BCCH	0.7	5.3	0.00512	<
BHCO	0.4	3.2	0.04297	
BHVI	0.3	2.1	0.1214	
BOCH	0.1	0.7559	0.53024	
BRCR	0.9	7.3	0.00073	<>
CHSP	0.4	3.2	0.03933	
COYE	0.2	1.9	0.15532	
GCKI	0.3	2.1	0.12099	
HETH	0.4	2.9	0.05366	
RCKI	0.1	1.1	0.33927	
SWTH	0.4	3.4	0.03524	
WIWR	0.3	2.1	0.12129	
YBFL	0.3	2.7	0.07005	
YBSA	2.8	22.7	<0.00001	<
YWAR	0.1	0.6157	0.54043	

Summary of fitted Generalized Additive Models:

Response	R2[%]	F	p	
AMRE	1.9	15.6	<0.00001	<
BAWW	2.9	23.3	<0.00001	<
CSWA	0.3	2.2	0.10803	
OVEN	1	7.6	0.0005	<
REVI	1.1	8.5	0.00022	<
VEER	1.1	8.6	0.00019	<
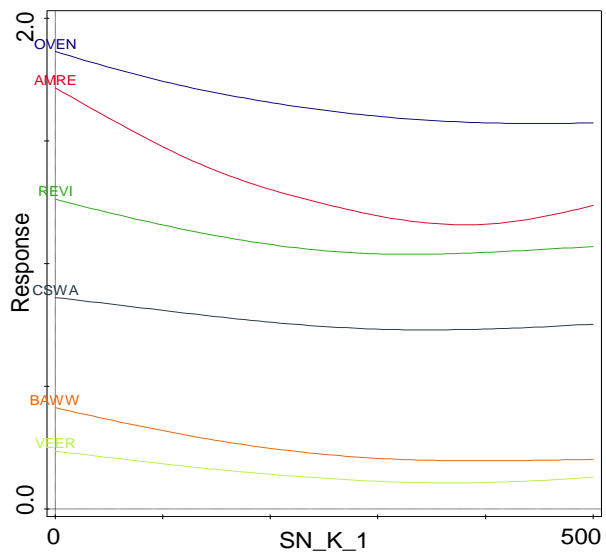
Summary of responses to scenarios and habitat model variables

Habitat analysis work in support of the 2019 FMP

R. Rempel Nov 11th, 2019

379 Black Bay Rd, Thunder Bay, Ontario, P7A 1P4
Phone: 807-629-5501
www.ferit.ca
northernbio@gmail.com

Interpretation of response to scenarios:

The No Harvest response was estimated as positive, neutral, or negative based on the change in habitat quality over the 40-year modeling period, as estimated using change over time reported in the "Baseline Scenario – 4 time periods All Birds. Pdf". If the amount of medium or high-quality habitat (Prob of occupancy > 50%) increased over time, or low-quality habitat decreased, then this was interpreted as a positive response. In contrast, if amount of low-quality habitat increased, then this was interpreted as a negative response. Note that the No Harvest scenario also excludes natural disturbance, so the forest is simply aging over time without any new regeneration.

The response to the Baseline and Moose Emphasis scenarios was estimated by comparing relative amounts of high- and low-quality habitat at year 40 with the No Harvest scenario, as reported in "Comparison of Birds under No Harvest versus Baseline and MEA – Year 40 for all Birds.pdf". If the amount of medium and high-quality habitat (prob of occupancy > 50%) was lower relative to No Harvest scenario, then this was interpreted as a negative response, and vice versa with the low-quality habitat.

Bird Spp #	American Ornithologist Union Code	Bird Common Name	*No Harvest* estimated response (positive, negative, or neutral)	BASELINE Estimated Response (positive, negative, or neutral)	MOOSE EMPHASIS Estimated Response (positive, negative, or neutral)
1	AMGO	American Goldfinch	*positive*	negative	negative
2	*AMRE	American Redstart	*neutral*	neutral	neutral
3	BAWW	Black and White Warbler	*negative*	Slightly positive	Slightly positive
4	BCCH	Black-Capped Chickadee	*Slightly positive*	neutral	Slightly positive
5	BHCO	Brown-Headed Cowbird	*neutral*	positive	positive
6	BHVI	Blue-Headed Vireo	*positive*	negative	negative
7	BOCH	Boreal Chickadee	*positive*	negative	negative
8	BRCR	Brown Creeper	*positive*	negative	negative
9	CHSP	Chipping Sparrow	*positive*	negative	negative

Bird Spp #	American Ornithologist Union Code	Bird Common Name	No Harvest estimated response (positive, negative, or neutral)	BASELINE Estimated Response (positive, negative, or neutral)	MOOSE EMPHASIS Estimated Response (positive, negative, or neutral)
10	**COYE	Common Yellowthroat	Slightly positive	neutral	neutral
11	CSWA	Chestnut-Sided Warbler	negative	positive	positive
12	GCKI	Golden-Crowned Kinglet	positive	negative	negative
13	HETH	Hermit Thrush	Slightly negative	positive	positive
14	OVEN	Oven bird	neutral	slightly positive	slightly positive
15	RCKI	Ruby-crowned Kinglet	positive	Slightly negative	Slightly negative
16	REVI	Red-Eyed Vireo	Slightly positive	neutral	neutral
17	SWTH	Swainson's Thrush	positive	negative	negative
18	***VEER	Veery	negative	positive	positive
19	WIWR	Winter Wren	positive	negative	negative
20	YBFL	Yellow-bellied Flycatcher	neutral	neutral	Neutral
21	YBSA	Yellow-Bellied Sapsucker	positive	slightly negative	slightly negative
22	YWAR	Yellow Warbler	positive	Slightly negative	Slightly negative

Interpretation of response to habitat model variables:

The response to habitat variables was estimated using GAM (Generalized Additive Model) response curves (GAM response curve.pdf). Only significant relationships (p<0.05) were interpreted. For each variable 2 sets of curves were created: one set comprised 16 bird species and the other 6 species. These were separated because the set of 6 species generally had the strongest relationships, so they tended to dominate the graphs if all species were graphed together. Within each set of curves, species higher in the graph tended to have the stronger relationship.
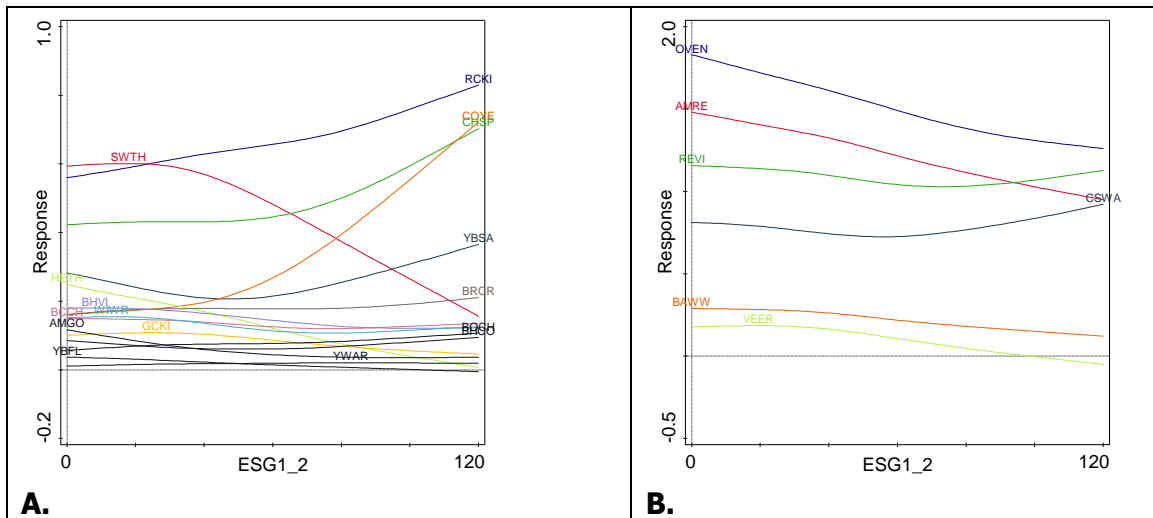

Figure 1. **Example of Generalized Additive Model response curves for use of riparian ecosites (ESG1) by A) 16 bird species, and B) 6 bird species.**

Table 1. Interpretation of response to significant bird habitat model variables.

	Prop HWD Vol	Avg Stand age	Height HWD	Age-class Edge	Cover-type edge	Canopy Closure	Riparian ecosites	Wet soil ecosites	Shrub rich ecosites
Variable Name	PHW_1	AVGAGE_1	HT_HW_1	AGEDEN_3	CTEDEN_3	CC	ESG1_2	ESG2_2	ESG3_2
***SCALE**	50 ha	50 ha	50 ha	5000 ha	5000 ha	0.8 ha	500 ha	500 ha	500 ha
Bird Species									
AMGO	Hardwood					Open	Avoids		
AMRE	Hardwood	Young	Tall	High	Low	Closed	Avoids	Avoids	Uses
BAWW	Hardwood		Tall	High	Low		Avoids	Avoids	Uses
BCCH	Hardwood			High					Uses
BHCO	Hardwood		Tall	High	Low			Avoids	Uses
BHVI	Softwood	Old			High				
BOCH	Softwood	Old		Low				Avoids	Avoids
BRCR	Softwood	Old		Low	High			Uses	Avoids
CHSP	Softwood	Old		Low	High	Open	Uses	Uses	Avoids
COYE					Low		Uses	Avoids	Uses
CSWA	Hardwood		Tall	High	Low			Avoids	Uses
GCKI	Softwood	Old			High			Uses	
HETH	Softwood	Young	Short	Low	Low	Closed	Avoids	Uses	
OVEN	Hardwood		Tall	High	Low	Closed	Avoids	Avoids	Uses
RCKI	Softwood	Old		Low	High	Open	Uses	Uses	Avoids
REVI	Hardwood	Young	Tall	High	Low	Closed		Avoids	Uses
SWTH		Old			High		Uses		Uses
VEER	Hardwood	Old			High	Open	Avoids	Avoids	Uses
WIWR	Softwood	Old			High		Avoids		
YBFL	Softwood	Old			High				
YBSA	Hardwood	Young	Tall		Low	Closed	Uses	Avoids	Uses
YWAR									

*Scales:
  stand-level (0.8 ha)
  local-scale (50 ha)
  Meso-scale (500 ha)
  Landscape-level (5000 ha)

Variable descriptions and interpretations:

Riparian ecosites (ESG1_2): This variable represents the mean total area of riparian ecosites (ES 5, 6, 7, 8), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where riparian ecosites are in the neighbourhood.

Wet soil ecosites (ESG2_2): This variable represents the mean total area of wet soil ecosites (ES 61 - 64), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where wet ecosites are in the neighbourhood.

Shrub rich ecosites (ESG3_2): This variable represents the mean total area of shrub-rich ecosites (ES 21, 22, 32, 41, 51, and 52), and is summarized at the meso-scale (500 ha). A positive response indicates the bird prefers to use breeding sites where shrub-rich ecosites are in the neighbourhood.

Softwood overstory (SOFTWOOD): The is an FLI variable the represent the "percentage" of softwood forest within a forest based on overstory canopy closure and varies from 0-10. It is a stand-level variable summarized at the 0.8 ha scale. This variable was not used in the habitat models, as it is redundant with the more precise "proportion hardwood volume" variable, but it is useful in the ordination diagrams to help identify birds that prefer softwood canopy cover.

Hardwood overstory (HARDWOOD): The is an FLI variable the represent the "percentage" of hardwood forest within a forest based on overstory canopy closure and varies from 0-10. It is a stand-level variable summarized at the 0.8 ha scale. This variable was not used in the habitat models, as it is redundant with the more precise "proportion hardwood volume" variable, but it is useful in the ordination diagrams to help identify birds that prefer hardwood canopy cover.

Proportion hardwood volume (PHW_1): This is the proportion of hardwood based on hardwood and softwood volume estimates from Patchworks. Measured at the 50-ha scale. A positive response indicates that the bird prefers sites dominated by hardwood forest, whereas a negative response indicates the opposite, and prefers softwood forest.

Age-class edge (AGEDEN_3): Contrast-weighted density of edge between young and old age class forest. Edge between young forest (< 20 years) and old forest (> 60 years) was given a higher weight than edge with the intermediate immature forest. This is a landscape-level variable measured at the 5000-ha scale. A negative response to this variable indicates the that the bird prefers a more contiguous forest with a homogenous age-class, whereas a positive response indicates the bird prefers a mix of young and old forest.

Cover-type edge (CTEDEN_3): Contrast weighted density of edge (m/ha) between softwood, mixedwood, and hardwood forest.   Edge between hardwood (>70% hardwood volume) and softwood (<30% hardwood volume) was given a higher weight than edge with mixedwood (intermediate volume). This is a landscape-level variable measured at the 5000-ha scale. A negative response indicates that the bird prefers a more homogenous forest with respect to cover-type, where as a positive response indicates the bird prefers a mix of forest cover-types.

Stand age (AVGAGE_1): This variable represents the average age of combined managed and unmanaged forest. It is a local-scale variable measured at the 50-ha scale. The variable

represents time since last stand-replacing disturbance, so a positive response indicates that the bird prefers older stands that may have more complex internal stand structure, number snags, amount of downed woody debris, and number of stand openings.

Canopy closure (CC): This FLI variable represents "percent" closure of the canopy on a scale 0-10 and is measured at the <u>stand-level (0.8 ha).</u> A positive response indicates the bird prefers more closed forest with few openings, whereas a negative response indicates the bird prefers to have some openings in the forest canopy.

Height hardwood trees (HT_HW_1): This is the height (m) of hardwood trees, as projected by Patchworks models. The variable is <u>local-scale, measured at 50 ha</u>. The response to this variable cam be interpreted as a combination of whether the bird prefers hardwood versus softwood forest, and then within that whether it prefers low, mid-size, or tall trees. Alternatively, the bird may avoid such forest conditions.

Height softwood trees (HT_SW_1): This is the height (m) of softwood trees, as projected by Patchworks models. The variable is <u>local-scale, measured at 50 ha</u>. The response to this variable cam be interpreted as a combination of whether the bird prefers hardwood versus softwood forest, and then within that whether it prefers low, mid-size, or tall trees. Alternatively, the bird may avoid such forest conditions.