



Pre-Permitting Environmental / Socio-Economic Data Report Series

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# Report Series N- Terrestrial Wildlife and Habitats

## Report N-12 Wood Frog Tables 2004-2007

*Submitted to the Alaska Department of Natural Resources January 2010*

*Preliminary data. Do not cite or quote.*

The Pebble Partnership is providing environmental and socio-economic baseline data collected to inform the development of the Pebble Project to state and federal agencies, project stakeholders and the general public prior to project permitting as part of its commitment to full and open disclosure.

A comprehensive Environmental Baseline Document (EBD) will subsequently be prepared and appended to future project permit applications. The EBD will also be made publicly available when complete.

Collected for the Pebble Partnership by:



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TABLE N-12.1

Covariates Used for Occupancy and Detectability Estimation Modeling for Wood Frogs in the Mine Study Area, 2007

Model Covariate	Model Parameter Abbreviation	Covariate Type
<b>Site-specific:</b>	psi	
Hibernation habitat within 50 meters of shoreline (%)	hab	Continuous
Waterbody size (hectares)	size	Continuous
Waterbody depth (< or > 1.5 meters)	depth	Categorical
Presence of >1% emergent and/or aquatic vegetation (yes or no)	ESveg	Categorical
Beaver pond (yes or no)	beaver	Categorical
<b>Survey-specific:</b>	p	
Survey number <sup>a</sup>	svy	Categorical
Observer	obs	Categorical
Water temperature (°C)	temp	Continuous
Dissolved oxygen concentration (milligrams per liter)	DO	Continuous
Electrical conductivity (microSiemens per centimeter)	EC	Continuous

Notes:

- a. The survey number parameter was used during model-fitting to assess for differences in detectability between survey days at the same sites.

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TABLE N-12.2

Akaike's Information Criterion Rankings of Models of Detectability Parameters for Wood Frogs in the Mine Study Area, 2007

No.	Model <sup>a</sup>	AIC Score	Delta AIC	AIC Weight	Evidence Ratio <sup>b</sup>	No. of Param.	-2*LogLike
1	psi(global),p(obs)	151.89	0.00	0.1695	1.0000	9	133.89
2	psi(global),p(obs+water)	152.36	0.47	0.1340	0.7906	10	132.36
3	psi(global),p(svy+obs)	153.32	1.43	0.0829	0.4892	10	133.32
4	psi(global),p(obs+DO)	153.81	1.92	0.0649	0.3829	10	133.81
5	psi(global),p(svy+obs+water)	153.87	1.98	0.0630	0.3716	11	131.87
6	psi(global),p(obs+EC)	153.89	2.00	0.0624	0.3679	10	133.89
7	psi(global),p(obs+water+DO)	154.34	2.45	0.0498	0.2938	11	132.34
8	psi(global),p(obs+water+EC)	154.36	2.47	0.0493	0.2908	11	132.36
9	psi(global),p(svy+obs+DO)	155.10	3.21	0.0340	0.2009	11	133.10
10	psi(global),p(svy+obs+EC)	155.31	3.42	0.0307	0.1809	11	133.31
11	psi(global),p(svy+water)	155.50	3.61	0.0279	0.1645	9	137.50
12	psi(global),p(obs+EC+DO)	155.80	3.91	0.0240	0.1416	11	133.80
13	psi(global),p(svy+obs+water+EC)	155.87	3.98	0.0232	0.1367	12	131.87
14	psi(global),p(svy+obs+water+DO)	155.87	3.98	0.0232	0.1367	12	131.87
15	psi(global),p(svy+DO)	156.03	4.14	0.0214	0.1262	9	138.03
16	psi(global),p(global)	156.33	4.44	0.0184	0.1086	12	132.33
17	psi(global),p(svy+EC)	156.36	4.47	0.0181	0.1070	9	138.36
18	psi(global),p(.) <sup>c</sup>	156.65	4.76	0.0157	0.0926	7	142.65
19	psi(global),p(svy+obs+EC+DO)	157.09	5.20	0.0126	0.0743	12	133.09
20	psi(global),p(svy+water+DO)	157.37	5.48	0.0109	0.0646	10	137.37
21	psi(global),p(svy+water+EC)	157.48	5.59	0.0104	0.0611	10	137.48
22	psi(global),p(water)	157.65	5.76	0.0095	0.0561	8	141.65
23	psi(global),p(svy+global)	157.87	5.98	0.0085	0.0503	13	131.87
24	psi(global),p(svy+EC+DO)	157.94	6.05	0.0082	0.0486	10	137.94
25	psi(global),p(EC)	158.47	6.58	0.0063	0.0373	8	142.47
26	psi(global),p(DO)	158.51	6.62	0.0062	0.0365	8	142.51
27	psi(global),p(svy+water+EC+DO)	159.36	7.47	0.0040	0.0239	11	137.36
28	psi(global),p(water+EC)	159.54	7.65	0.0037	0.0218	9	141.54
29	psi(global),p(water+DO)	159.65	7.76	0.0035	0.0207	9	141.65
30	psi(global),p(EC+DO)	160.32	8.43	0.0025	0.0148	9	142.32
31	psi(global),p(water+EC+DO)	161.54	9.65	0.0014	0.008	10	141.54

Notes:

- See Table N-12.1 for definitions of model parameter abbreviations.
- The evidence ratio (AIC weight of the listed model divided by the AIC weight of the best model) represents the evidence of model support.
- p(.) is the null model of detectability, which sets the initial value of p = 1 and tests for no effect from detectability covariates.

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TABLE N-12.3

Akaike's Information Criterion Rankings of Models for Wood Frog Occupancy Parameters in the Mine Study Area, 2007

No.	Model <sup>a</sup>	AIC Score	Delta AIC	AIC Weight	Evidence Ratio <sup>b</sup>	No. of Param.	-2*LogLike
1	psi(hab+depth),p(obs)	146.98	0.00	0.1315	1.0000	6	134.98
2	psi(depth),p(obs)	147.57	0.59	0.0979	0.7445	5	137.57
3	psi(depth+ESveg),p(obs)	147.92	0.94	0.0822	0.6250	6	135.92
4	psi(hab+size),p(obs)	148.23	1.25	0.0704	0.5353	6	136.23
5	psi(hab+depth+ESveg),p(obs)	148.24	1.26	0.0701	0.5326	7	134.24
6	psi(hab+size+depth),p(obs)	148.79	1.81	0.0532	0.4045	7	134.79
7	psi(hab+depth+beaver),p(obs)	148.98	2.00	0.0484	0.3679	7	134.98
8	psi(depth+beaver),p(obs)	149.30	2.32	0.0412	0.3135	6	137.30
9	psi(size+depth),p(obs)	149.55	2.57	0.0364	0.2767	6	137.55
10	psi(depth+ESveg+beaver),p(obs)	149.86	2.88	0.0312	0.2369	7	135.86
11	psi(size+depth+ESveg),p(obs)	149.92	2.94	0.0302	0.2299	7	135.92
12	psi(hab+size+depth+ESveg),p(obs)	149.93	2.95	0.0301	0.2288	8	133.93
13	psi(hab+size+ESveg),p(obs)	150.02	3.04	0.0288	0.2187	7	136.02
14	psi(hab+depth+ESveg+beaver),p(obs)	150.21	3.23	0.0262	0.1989	8	134.21
15	psi(hab+size+beaver),p(obs)	150.23	3.25	0.0259	0.1969	7	136.23
16	psi(hab),p(obs)	150.24	3.26	0.0258	0.1959	5	140.24
17	psi(.),p(obs) <sup>c</sup>	150.46	3.48	0.0231	0.1755	4	142.46
18	psi(hab+size+depth+beaver),p(obs)	150.79	3.81	0.0196	0.1488	8	134.79
19	psi(size+depth+beaver),p(obs)	151.30	4.32	0.0152	0.1153	7	137.30
20	psi(size),p(obs)	151.69	4.71	0.0125	0.0949	5	141.69
21	psi(ESveg),p(obs)	151.70	4.72	0.0124	0.0944	5	141.70
22	psi(size+depth+ESveg+beaver),p(obs)	151.86	4.88	0.0115	0.0872	8	135.86
23	psi(global),p(obs)	151.89	4.91	0.0113	0.0859	9	133.89
24	psi(hab+size+ESveg+beaver),p(obs)	152.02	5.04	0.0106	0.0805	8	136.02
25	psi(hab+ESveg),p(obs)	152.06	5.08	0.0104	0.0789	6	140.06
26	psi(beaver),p(obs)	152.08	5.10	0.0103	0.0781	5	142.08
27	psi(hab+beaver),p(obs)	152.20	5.22	0.0097	0.0735	6	140.20
28	psi(size+ESveg),p(obs)	152.33	5.35	0.0091	0.0689	6	140.33
29	psi(size+beaver),p(obs)	153.12	6.14	0.0061	0.0464	6	141.12
30	psi(ESveg+beaver),p(obs)	153.49	6.51	0.0051	0.0386	6	141.49
31	psi(hab+ESveg+beaver),p(obs)	154.05	7.07	0.0038	0.0292	7	140.05

## Notes:

- See Table N-12.1 for definitions of model parameter abbreviations.
- The evidence ratio (AIC weight of the listed model divided by the AIC weight of the best model) represents the evidence of model support.
- psi(.) is the null model of occupancy, which sets the initial value of psi = 1 and tests for no effect from occupancy covariates.

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TABLE N-12.4

Parameter Estimates, Conditional Parameter Standard Errors, Back-transformed Odds Ratios, and Odds Ratio Confidence Intervals for Site-specific Covariates Influencing Wood Frog Occupancy in the Mine Study Area, 2007

Model Covariate	Parameter Estimate ( $\beta_i$ )	Standard Error of $\beta_i$	Odds Ratio ( $e^{\beta_i}$ )	Confidence Interval of Odds Ratio
<b>Site-specific:</b>				
Hibernation habitat within 50 meters of shoreline (%)	0.56	0.655	1.76	0.47–6.51
Waterbody size (hectares)	0.10	0.213	1.10	0.71–1.68
Waterbody depth (< or > 1.5 meters)	2.32	2.411	10.12	0.08–1258.76
Presence of >1% emergent and/or aquatic vegetation (yes or no)	1.06	1.471	2.88	0.15–54.65
Beaver pond (yes or no)	0.14	1.017	1.14	0.14–8.75

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