

## 5-YEAR RESEARCH PLAN

*My long-term goal is to understand how environments influence population, species, and ecosystem stability by shaping individual variation in internal states (e.g., energy needs and infections). Within my first five years, I will make progress toward this goal by understanding: (1) how short-term energy needs shape individual habitat selection, collective animal movements, and group composition, and (2) the relationship between internal state variation and the susceptibility of populations to disease and parasite infections. Within this time, I expect to graduate at least three MSc and one PhD student who will collect and use data from the tall-grass prairie elk project. Our applied contributions will include (1) an “epigenetic clock” to detect diseases and parasites non-invasively in cervids, and (2) providing basic information about the structure and movements of the southeast Manitoba elk population.*

	Year 1 2025–2026	Year 2 2026–2027	Year 3 2027–2028	Year 4 2028–2029	Year 5 2029–2030
<b>Theme 1:</b> Influence of short-term energy needs on habitat selection, collective movements, and group composition	<b>Actions:</b> <ul style="list-style-type: none"><li>• Apply for NSERC DG and other local, external funding</li><li>• Advertise student positions</li><li>• Build and nurture existing collaborations to grow prairie cervid network</li></ul> <b>Existing relationships:</b> <ul style="list-style-type: none"><li>• Nature Conservancy of Canada (MB region)</li><li>• Manitoba Fish &amp; Wildlife</li><li>• Travis Seaborn (North Dakota State University)</li><li>• North Dakota Fish &amp; Game</li><li>• Minnesota Department of Natural Resources</li></ul> <b>New and future relationships:</b> <ul style="list-style-type: none"><li>• Manitoba Hydro</li><li>• Manitoba Métis Federation</li><li>• Standing Rock Sioux Tribe</li><li>• Western Canadian and US elk researchers</li></ul>	Recruit: 1 PhD, 1–2 MSc	Recruit: 1–2 BSc	Recruit: 1 PhD, 1 MSc	Recruit: 1–2 BSc
		<b>Possible projects:</b> <ul style="list-style-type: none"><li>• Modelling cortisol-habitat selection relationships</li><li>• Genetic group compositions and risky habitat selection</li></ul>		<ul style="list-style-type: none"><li>• Developing state-space models for continuous internal states</li><li>• Population variation in internal states and space use patterns</li></ul>	
		<b>Potential funding sources:</b> Fish and Wildlife Enhancement Fund, NSERC RTI, NSERC Alliance International, Research Manitoba New Investigator Operating Grant			
<b>Theme 2:</b> Relationship between internal state variation and population susceptibility to infections			Recruit: 1 PhD/Postdoc		Recruit: 1 PhD, 1 MSc
			<b>Possible projects:</b> <ul style="list-style-type: none"><li>• Developing epigenetic clocks to test whether sick animals age faster than healthy animals</li></ul>		<ul style="list-style-type: none"><li>• Relationships between internal state and infection</li><li>• Internal state variation and disease portfolio effects</li></ul>
			<b>Potential funding sources:</b> Alberta Innovates, Minnesota Centre for Prion Research, MB Sustainable Canadian Agricultural Partnership		