Ohio Department of Transportation Research Project Fact Sheet

Eastern Massasauga Rattlesnake: Ohio Population Survey and Survey Technique Development

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The Problem

Eastern Massasaugas (*Sistrurus catenatus*) endangered in Ohio and federally threatened. Current approved survey methods involve corrugated tin surveys supplemented by visual encounter surveys. While effective, these traditional methods have low detection rates and require intensive field effort which can complicate environmental reviews of project impacts to the species. The **Adapted-Hunt Drift Fence Technique (AHDriFT)** presents an opportunity to potentially increase survey efficiency and effectiveness but has not yet been tested for detecting massasaugas.

Can AHDriFT detect massasaugas?

Research Approach

We deployed AHDriFT arrays in 66 fields across seven Ohio counties with known massasauga populations in between 2019 and 2022 to survey for massasaugas. We tested and modified the AHDriFT design, compared our detection rates to prior and concurrent traditional surveys, and evaluated how to optimize array deployment for Massasauga detection.

Findings

Our AHDriFT arrays recorded **351 massasauga detections across 51 fields** in six of seven Ohio counties surveyed, including a single detection at a remnant population where traditional surveys have failed to detect the snakes in recent years. AHDriFT arrays had higher detection rates than both visual and tin surveys under all circumstances. Although traditional surveys were slightly less expensive to conduct over a single year, AHDriFT arrays were considerably more cost effective across multiple years and had more consistent detection rates. Linear arrays made of aluminum flashing were the most cost effective and practical to deploy. AHDriFT arrays yield the highest detection rates when deployed from July to October in dense vegetation away from mature trees.

AHDriFT was effective at detecting massasaugas across all surveys

Recommendations

To detect massasaugas, deploy a minimum of two arrays per field (adding one array per additional 10 ha) for at least 12 weeks, preferably 16, and activate cameras in April or June. Place arrays far from trees, in dense vegetation, and ideally between lowland hibernacula and upland areas. Service arrays once per month to switch out batteries and ensure cameras are functioning.

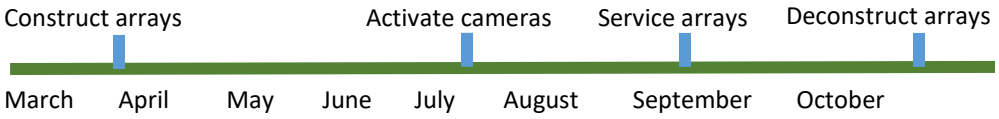

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Table 1. Comparison of catch-per-person-hour of AHDriFT and traditional survey methods from prior surveys in the same fields and from the literature. Traditional methods include visual encounter surveys (VES) and artificial cover surveys (ACO). Effort includes time spent in the field after method deployment, and image processing time.

Method	Proportion of surveys with detections	Effort per survey (person-hours)	Snakes per person-hour	Detection probability	Reference
AHDriFT	14.6%	0.38	0.48	0.00–0.40	This study
VES	20.2%	0.65	0.11	0.18	This study – prior surveys
	20.4%	2.13	0.16	0.08	Shaffer et al. 2019
	44.2%	2.00	0.22	0.40	Crawford et al. 2020
	NA	4.07	0.41	NA	Bartman et al. 2016
	NA	NA	0.41	NA	Dreslik et al. 2011
ACO	45.7%	0.65	0.28	0.45	This study – prior surveys
	NA	NA	0.58	NA	Bartman et al. 2016

Table 2. Comparison of catch-per-unit-effort (CPUE; person-hours) of concurrent AHDriFT and tin surveys in two wet meadow fields in Wyandot county, Ohio. Field A is a dense Massasauga population adjacent to a major overwintering area. Effort includes time spent in the field after method deployment (*represents more field visits than strictly necessary), and image processing time specifically for Massasauga.

Metric	Tin field A	Arrays field A	Tin field C	Arrays field C
Total captures	19	91	15	32
Density (units / ha)	1.5	0.22	2.0	0.13
Effort hours (field visits)	13 (20)	10 (6*)	20 (20)	15 (6*)
Estimated CPUE	1.5	9.1	0.8	2.1

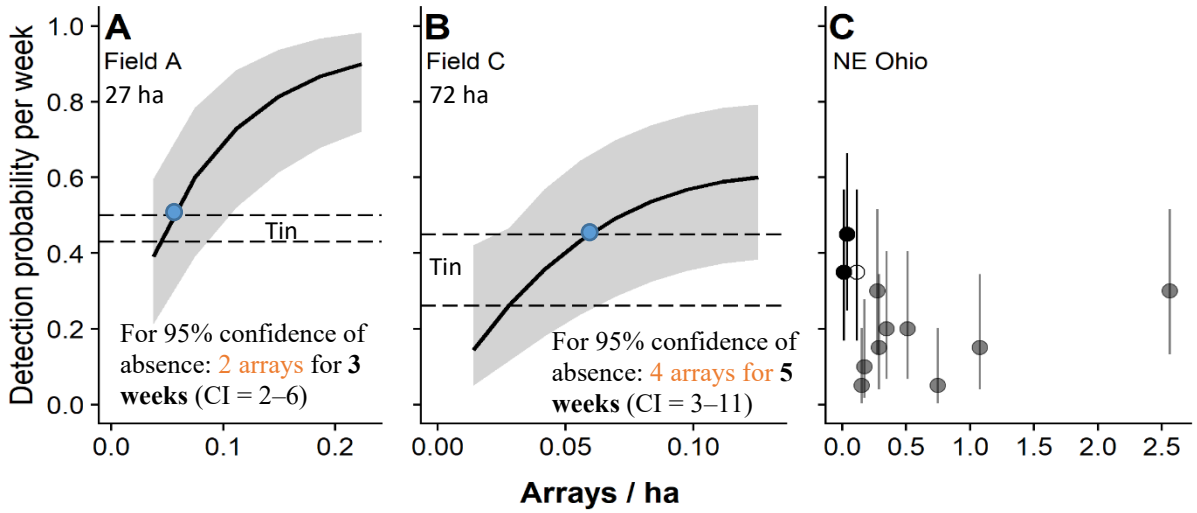

Figure 1. (A-B) Weekly detection rate accumulation curves of AHDriFT array density compared to concurrent tin surveys. Dashed lines represent the tin detection rates within the protocol tin density range. Surveys were in two wet meadow fields in Wyandot county, Ohio. Field A is a relatively high-density Massasauga population. (C) Weekly detection by a single array placed in high density (black), average (white) and sparse (grey) Massasauga populations.

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