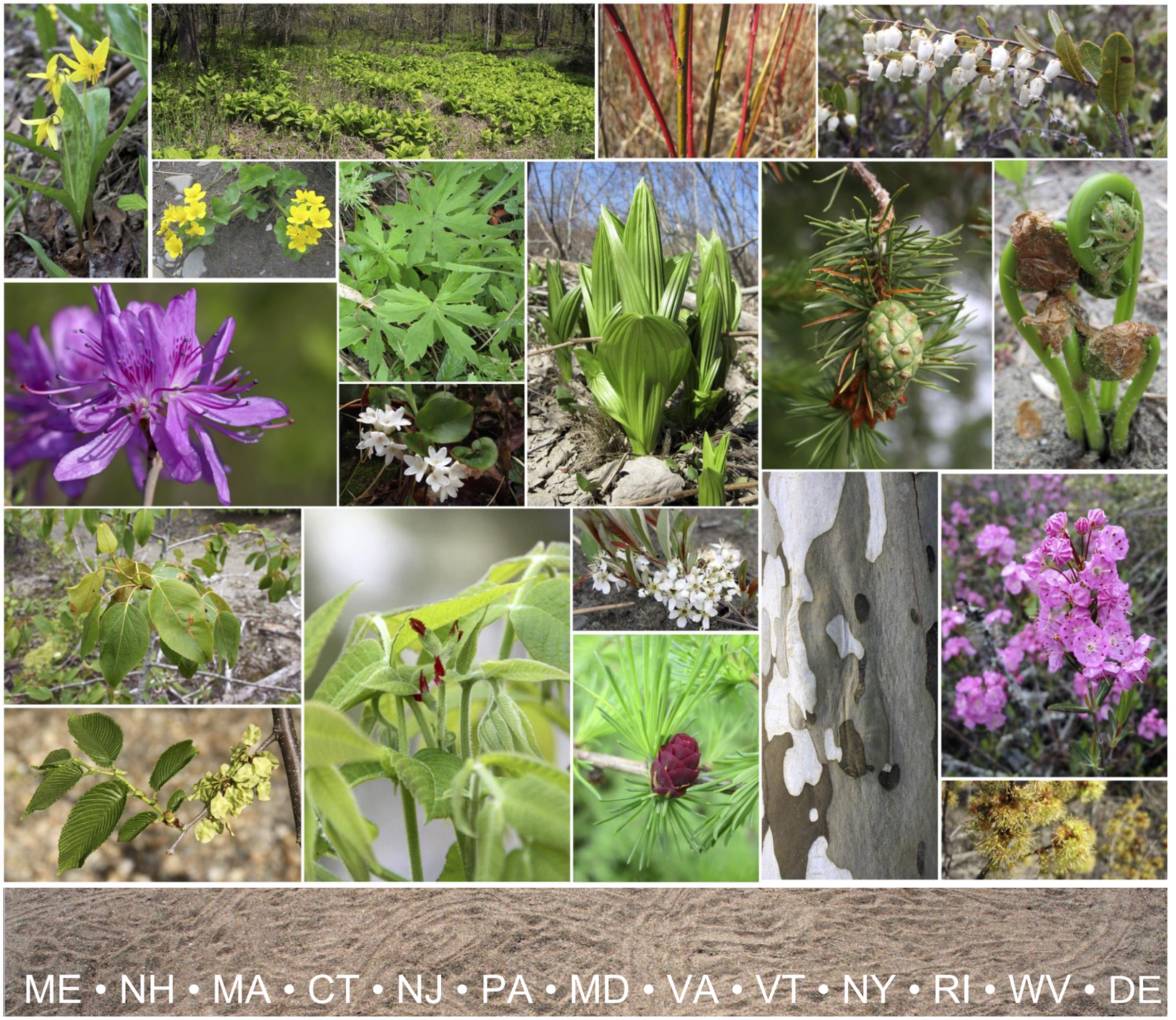


Conservation Planning for the Wood Turtle in the Northeastern United States

**Supported by a Competitive State Wildlife Grant (2014)
and Regional Conservation Needs Grants (2011, 2016, 2019)**

MASSWILDLIFE

NORTHEAST PARC PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION

ATO

Acknowledgments

Wood Turtle Working Group

Formed at Northeast PARC in Watkins Glen, NY (2009)

Funding: Competitive State Wildlife Grants; Regional Conservation Needs (RCN); states

Partners: Mike Jones (MA), Patrick Roberts (ATO), Liz Willey (AUNE/ATO), Tom Akre (SCBI), Paul Sievert (UMass), Dana Weigel Sheedy (UIdaho), Andrew Whiteley (UMT), Mike Marchand, Josh Megyesy, Melissa Doperalski (NH); Phillip deMaynadier, Derek Yorks, Derek Moore, Jonathan Mays (ME); J.D. Kleopfer (VA); Jenny Dickson, Brian Hess (CT); Kathy Gipe, Chris Urban (PA); Jake Kubel, Mike Sawyers (MA); Brian Zarate (NJ); Ed Thompson (MD); Angie Ross (NY); Glenn Johnson (SUNY); Chris Raithel and Scott Buchanan(RI); Kevin Oxenrider, Kieran O'Malley (WV); Jim Andrews (VT); Steve Parren (VT); Kiley Briggs (Orianne Society); Julie Thompson, Wende Mahaney, Laura Eaton, Colin Osborn, Tony Tur (USFWS); Ellery Ruther and Jeff Dragon (VA); Scott Angus (PA); Lori Johnson (MA); Charlie Eichelberger (PA); Jay Drasher (PA)

>140 key participants since 2012

Thanks: Dee Blanton, North Atlantic Landscape Conservation Collaborative (NALCC); AFWA

Conservation Plan for Wood Turtles *in the* Northeastern United States

Maine to West Virginia

Objective: to facilitate the persistence of functional, ecologically viable, and representative populations of Wood Turtles throughout the Northeast Region in order to protect the evolutionary potential of the species. Establish a spatially-explicit, stratified **Conservation Area Network** and **Conservation Action Plan** based on the best available population, landscape, and genetic data. Implement conservation actions at multiple scales.

1. Obtain meaningful baselines through standardized sampling
2. Empirically rank, stratify, & prioritize all known occurrences
3. Prioritize, implement, & track population-level conservation actions
4. “Do No Harm”

Northeast Wood Turtle Coordination Framework 2009–2019

Preliminary Coordination (NEPARC)

Regional Species Working Group

Ad hoc Field Trainings

Regular Coordinating Calls

Proof and Corroborate Occurrence Data

Implement Standardized Assessments Regionwide

- Pilot studies Multi-scale
- Nested design
- Repeatable
- Randomized
- Iterative analysis

Develop a Status Assessment

Develop a Conservation Plan**

Implement Site-based Plan

Reassessment and Adaptive Management

Northeast Wood Turtle Working Group


Virginia 2012


Maine 2016

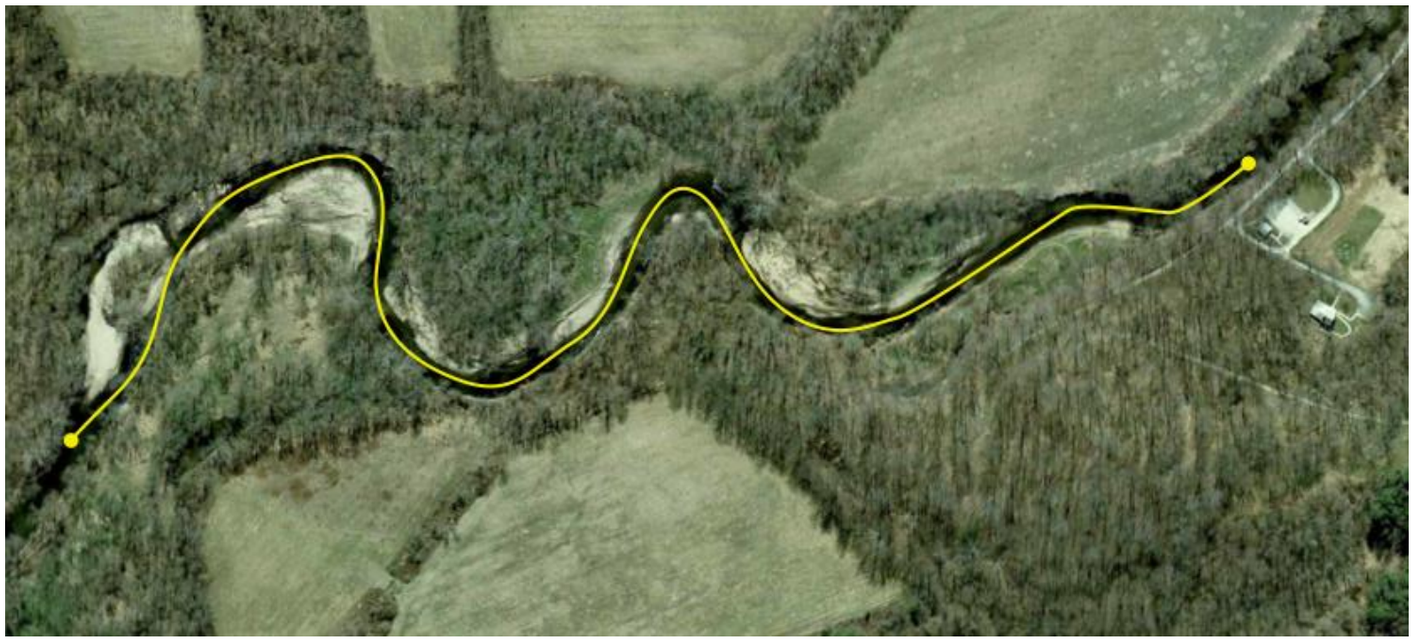

Vermont 2013


Maryland 2015

Ad hoc Regional Trainings, Surveys, Site Visits, Observer Overlap, Workshops, 2011-present

Standardized Assessments Maine to Virginia 2012–2017

One kilometer, one hour, one observer



Establish an acceptable, common method

Detect large and demographically robust populations

Detect large areas of continuous occurrence

Identify key features such as nesting beaches

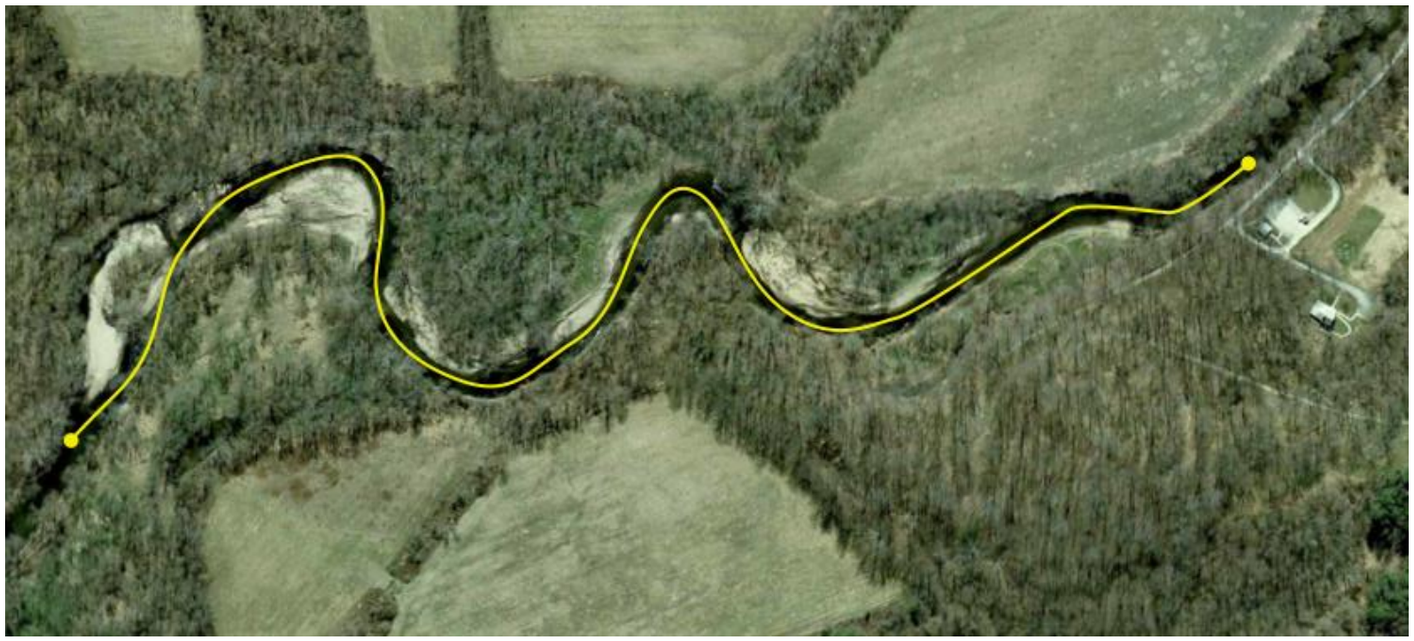
Obtain continuous abundance data for models

Establish CMR baseline at key sites

Obtain blood for genetics study (n=20 per “site")

Standardized Assessments Maine to Virginia 2012–2017

One kilometer, one hour, one observer



2141 standardized surveys in all NE States

467 1-km stream segments

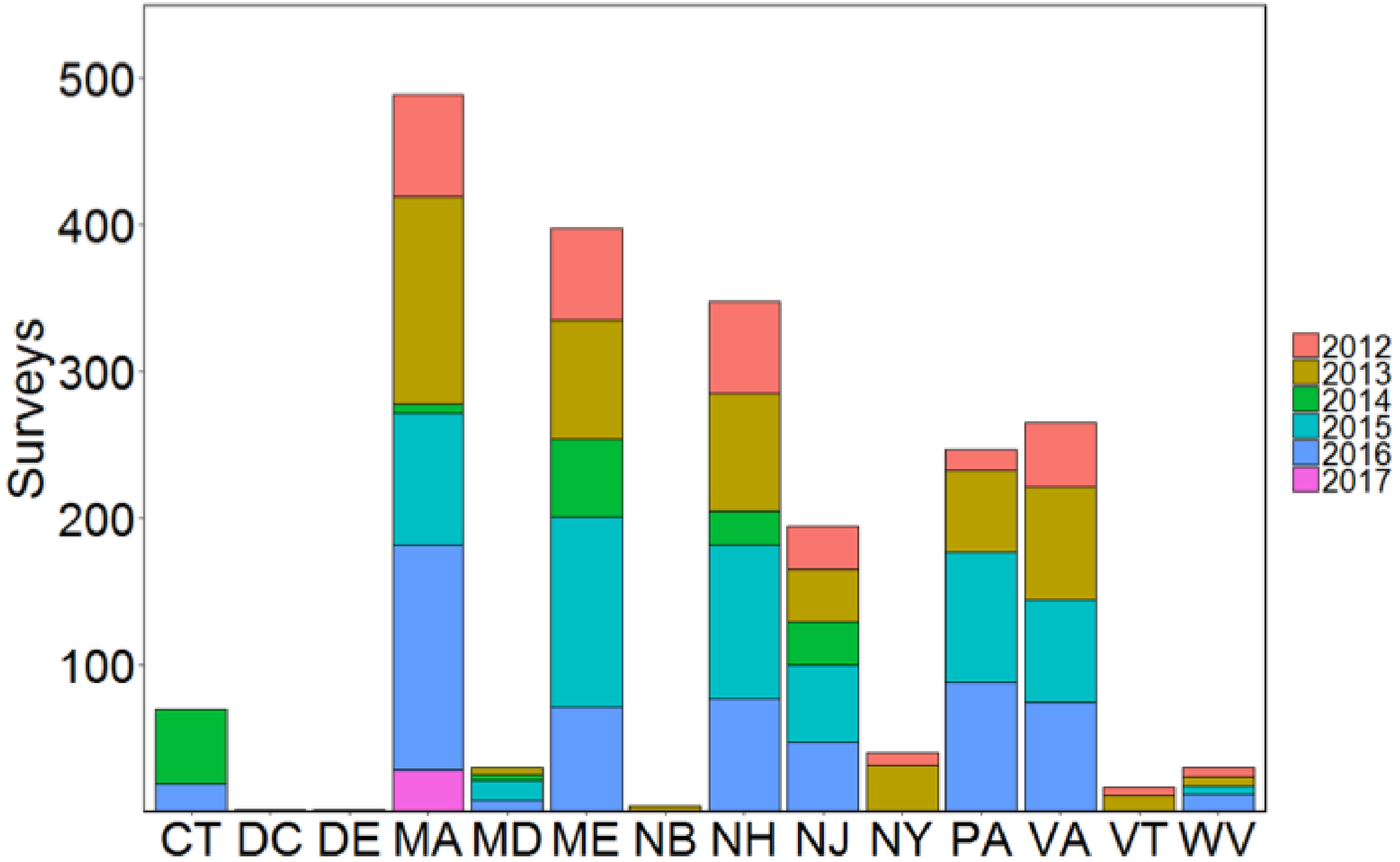
>4,600 Wood Turtle detections

>2000 Wood Turtle tissue samples

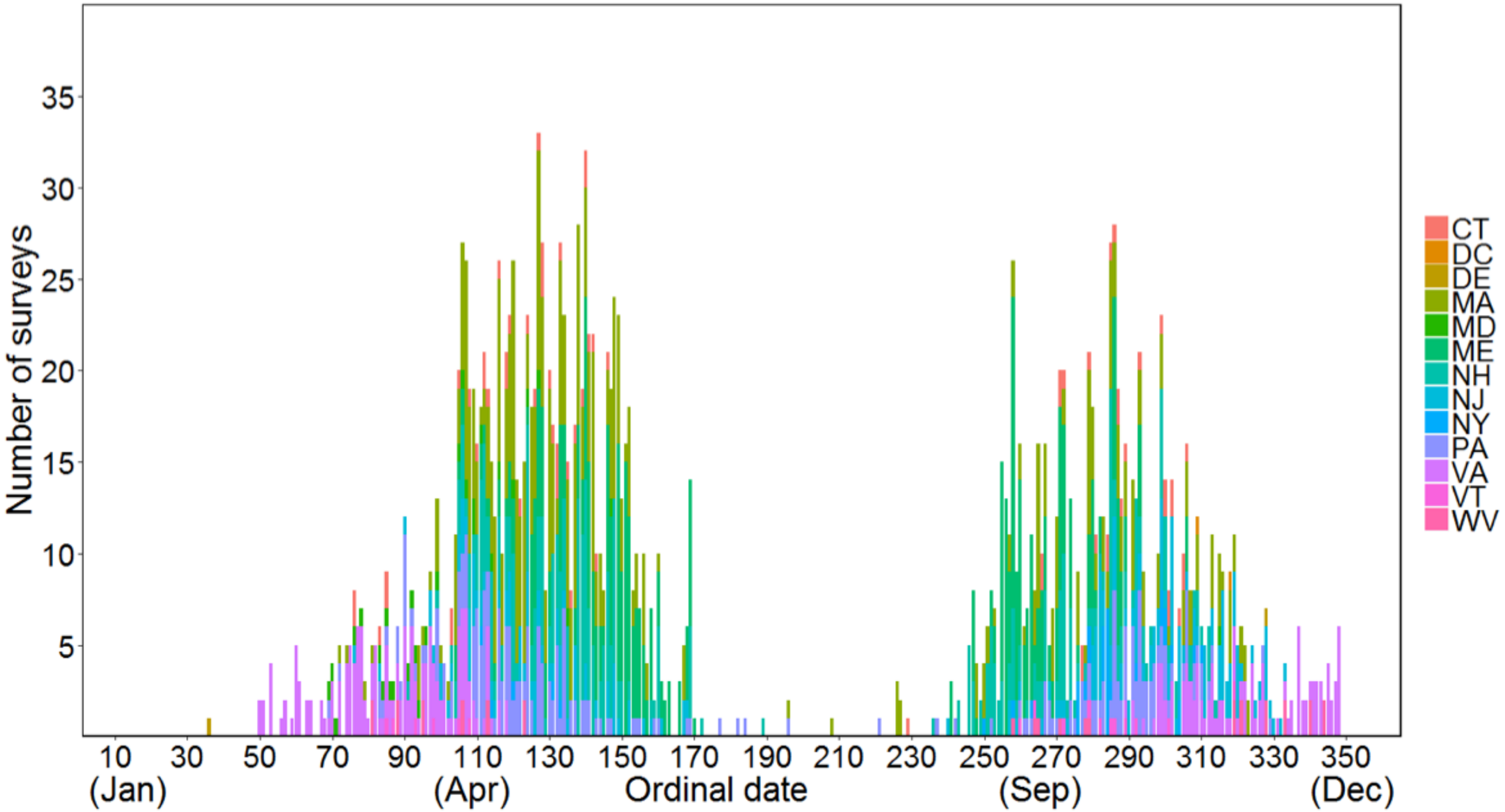
Intensively sampled states: Massachusetts (489 surveys), Maine (400), New Hampshire (347), Virginia (280), Pennsylvania (250).

Most survey segments were established in Maine (115), followed by Massachusetts (88), New Hampshire (60).

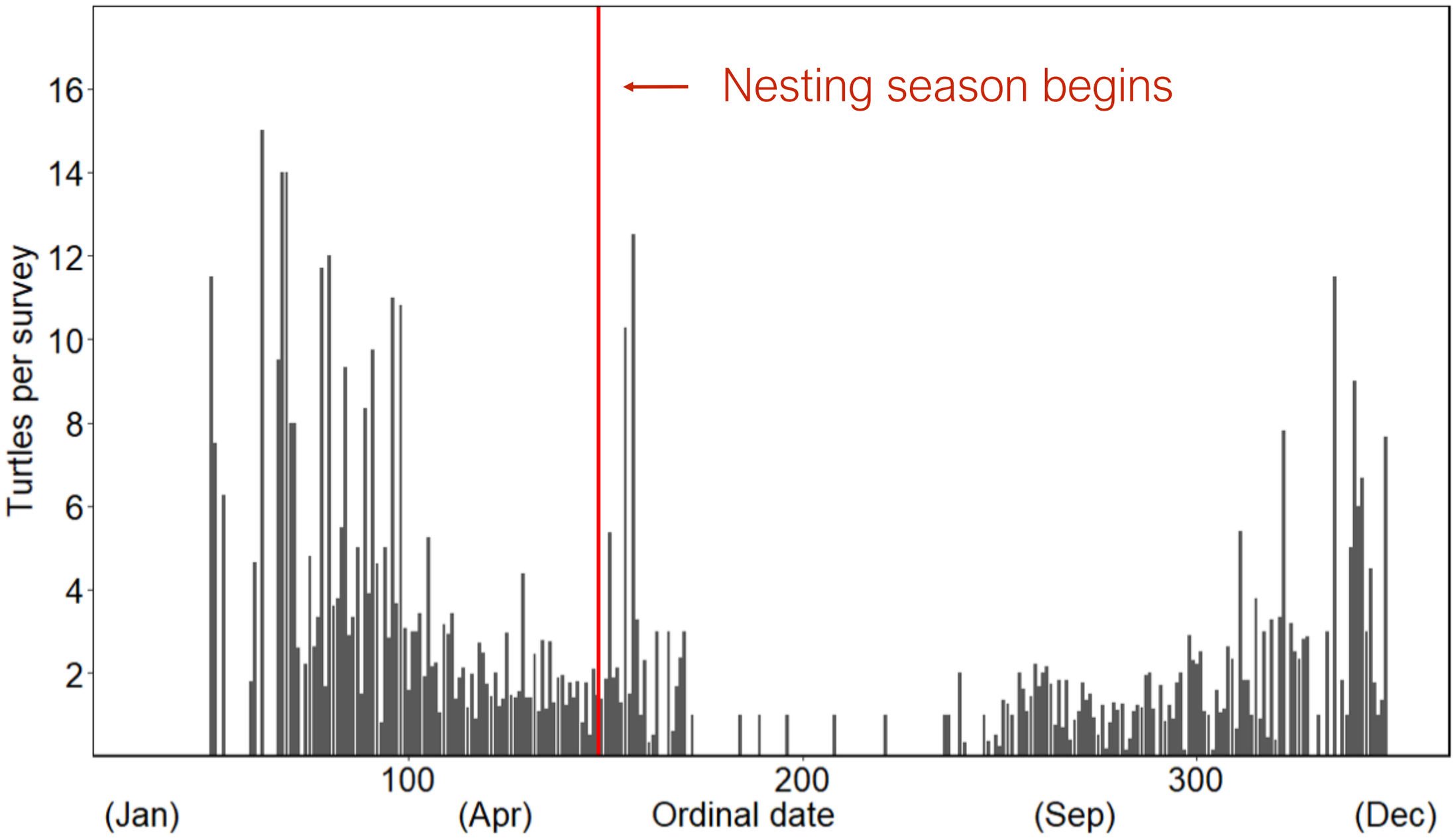
Surveys Occurred Primarily in 2012–2017



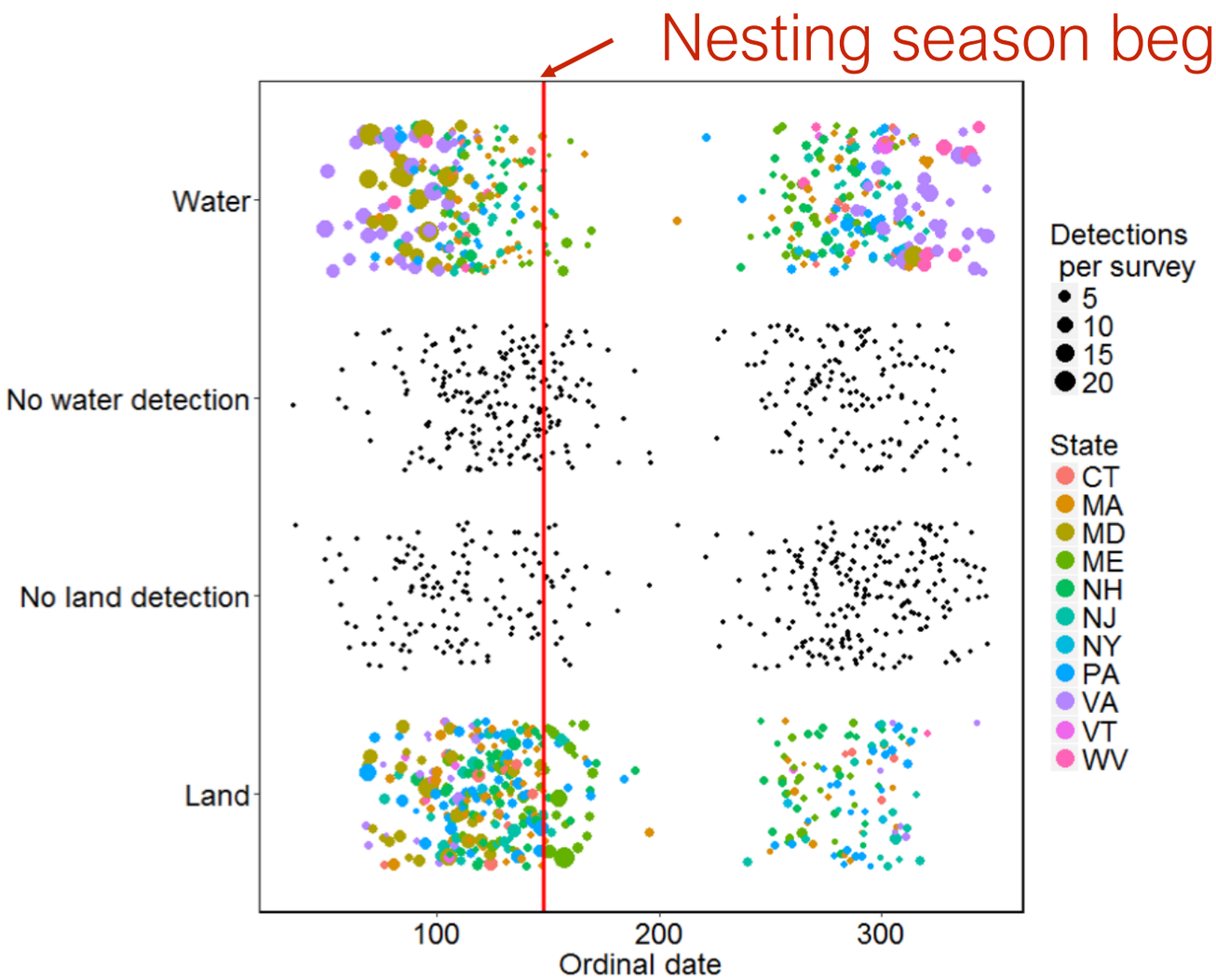
Surveys Occurred Primarily in Spring and Fall



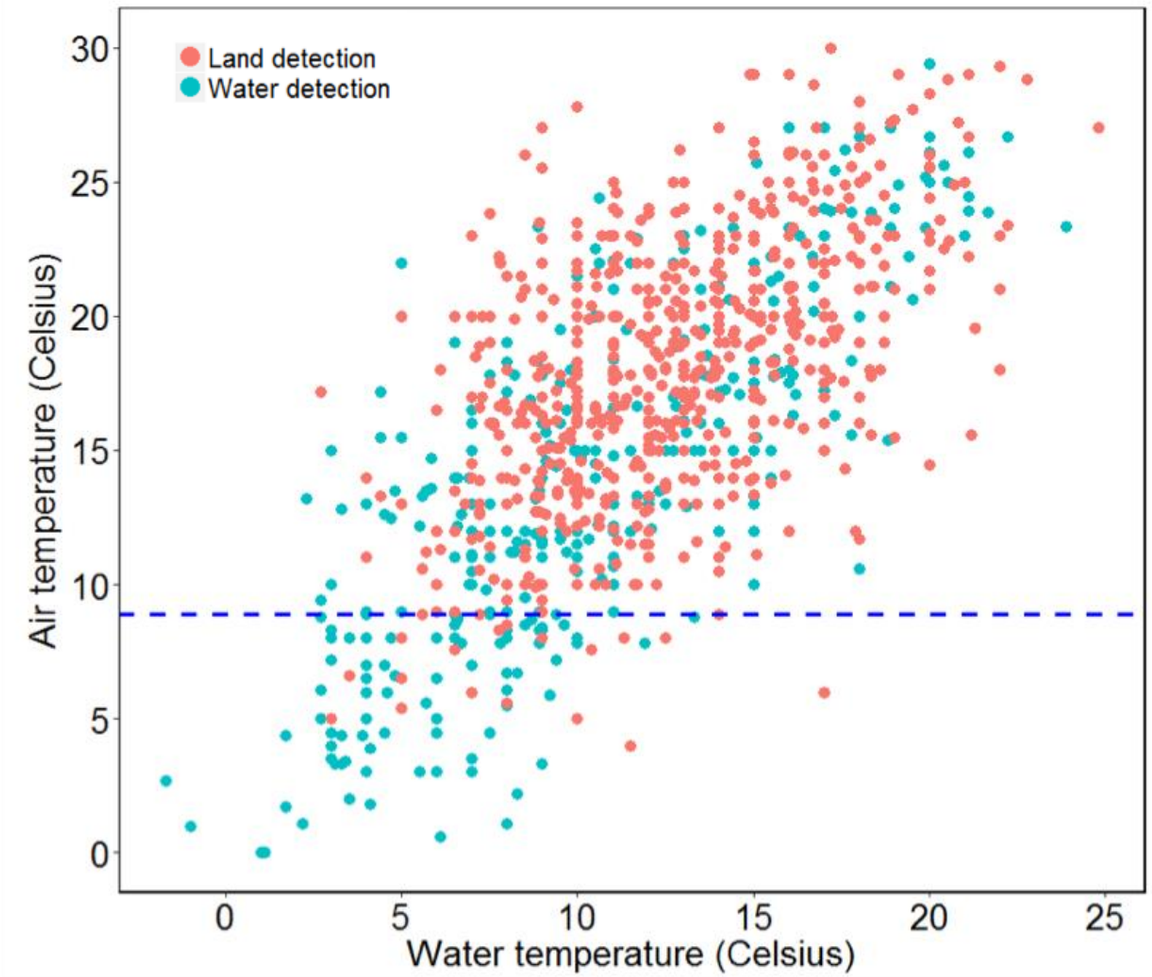
Detection Highest in Spring



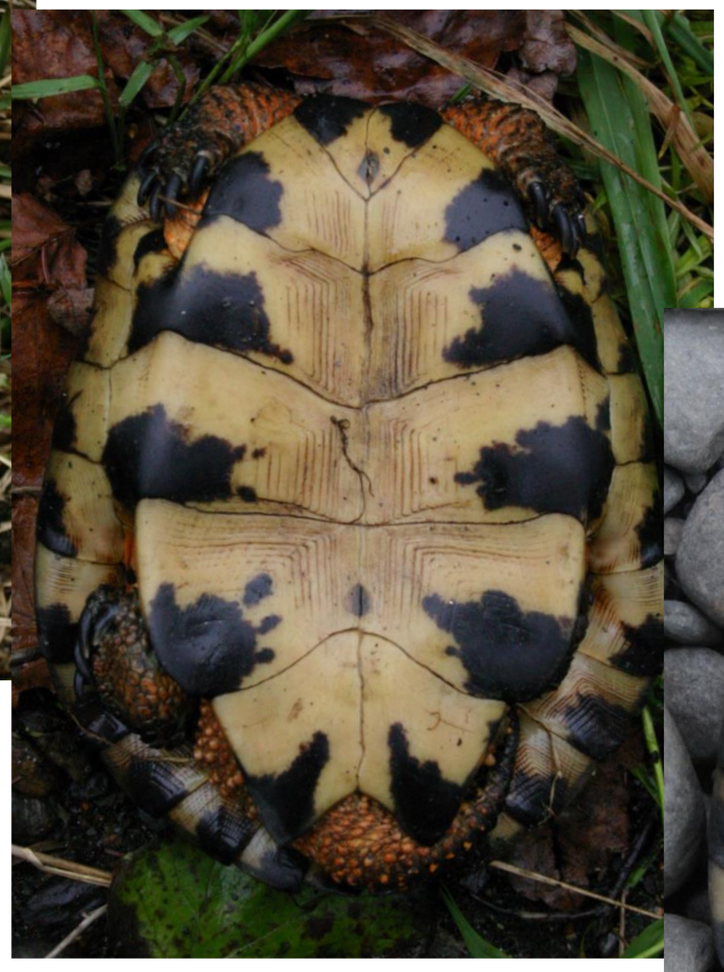
Land and Water Detections



90% of Land Detections Above 8.9˚C



2004

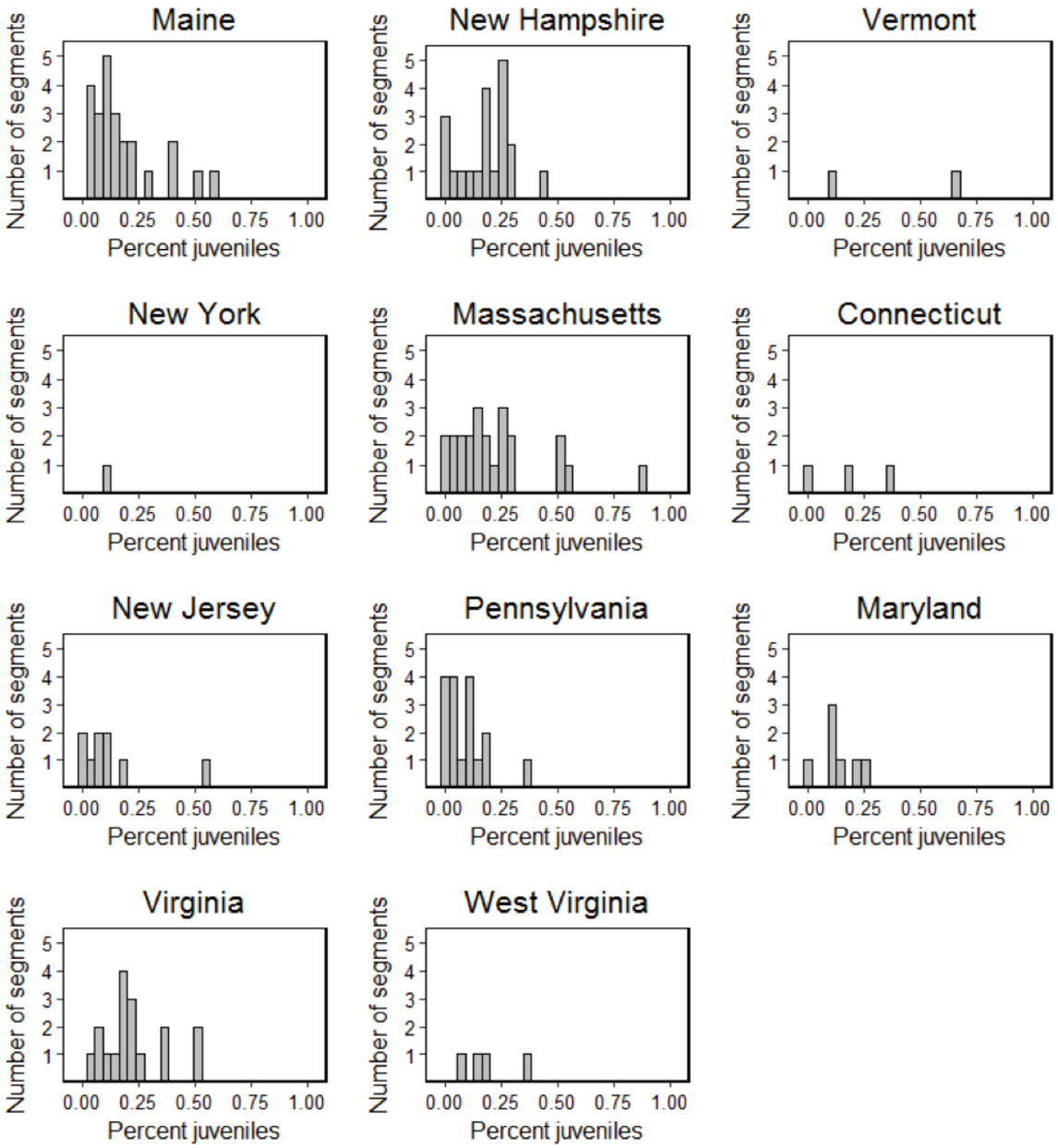


2006

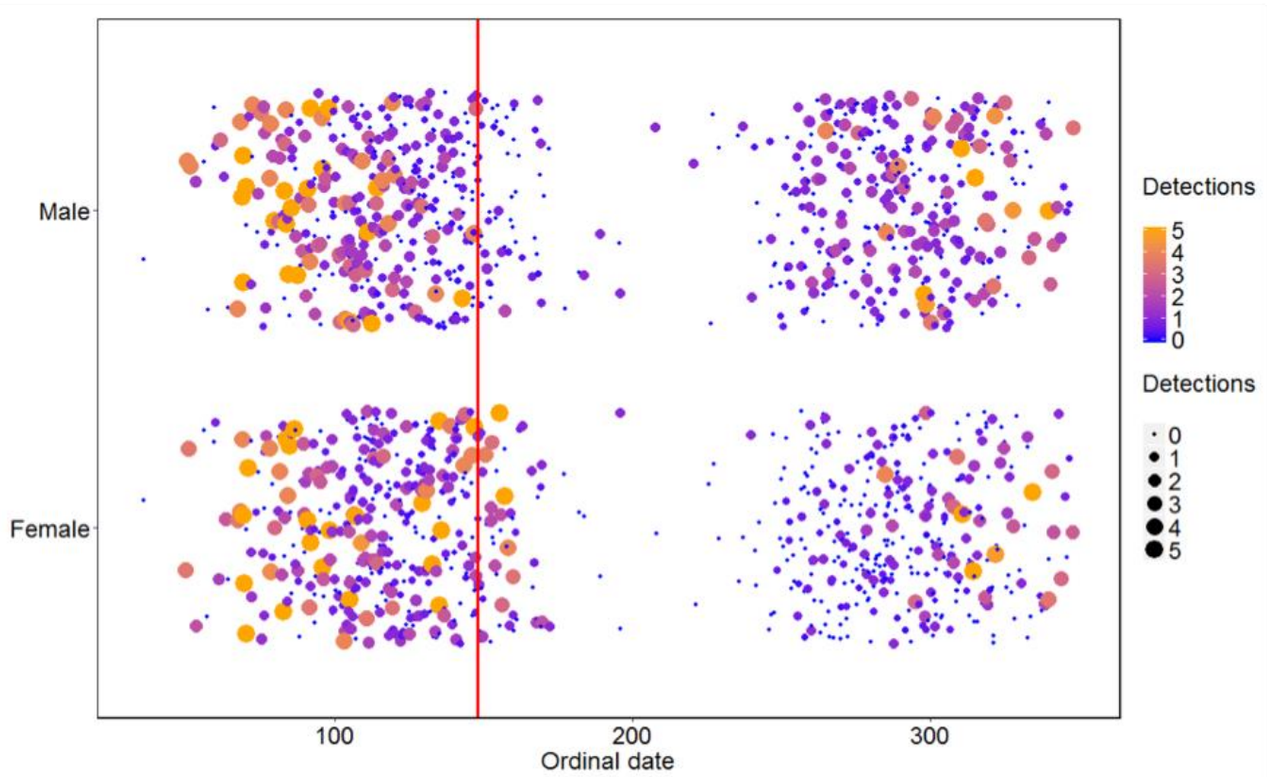
2013

2019

Recruitment and Demography

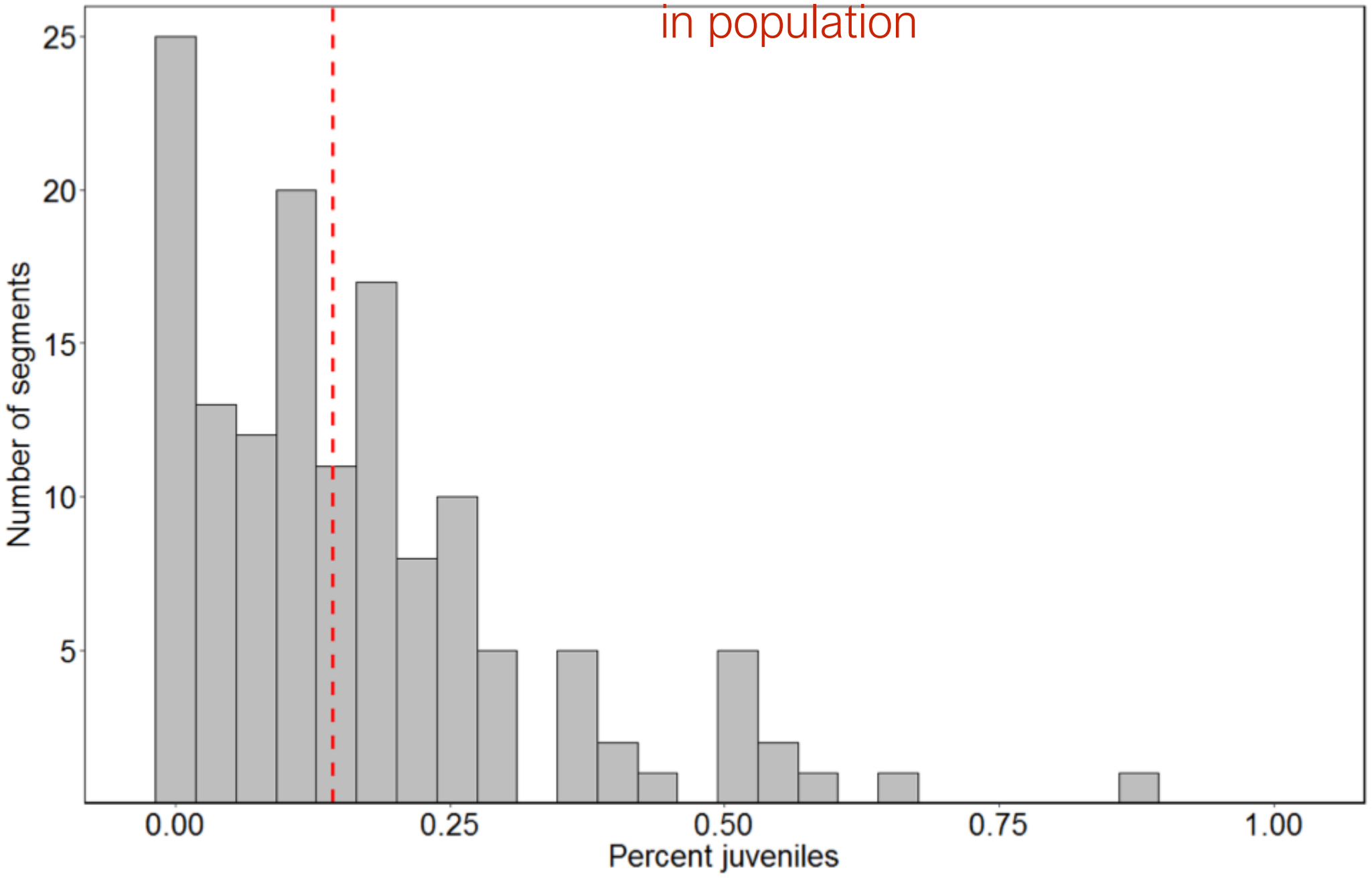


Nesting season begins



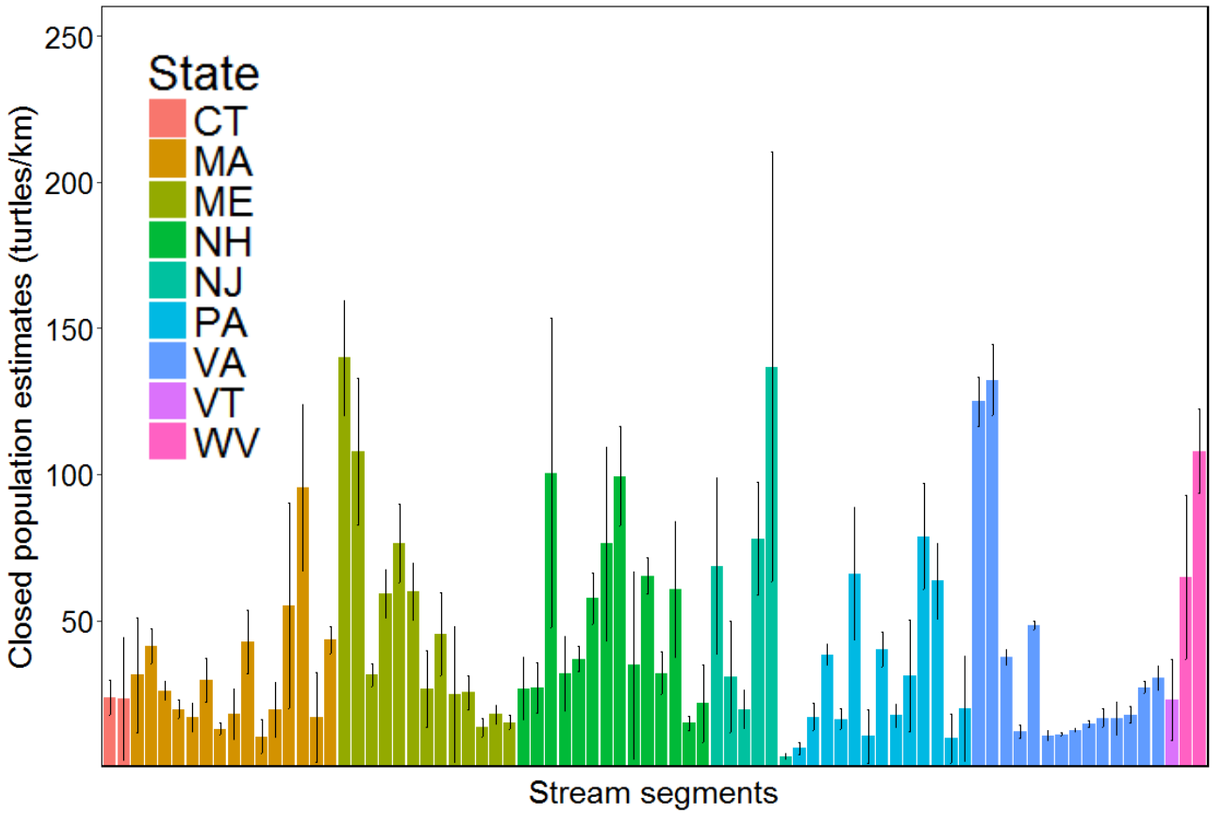
Recruitment

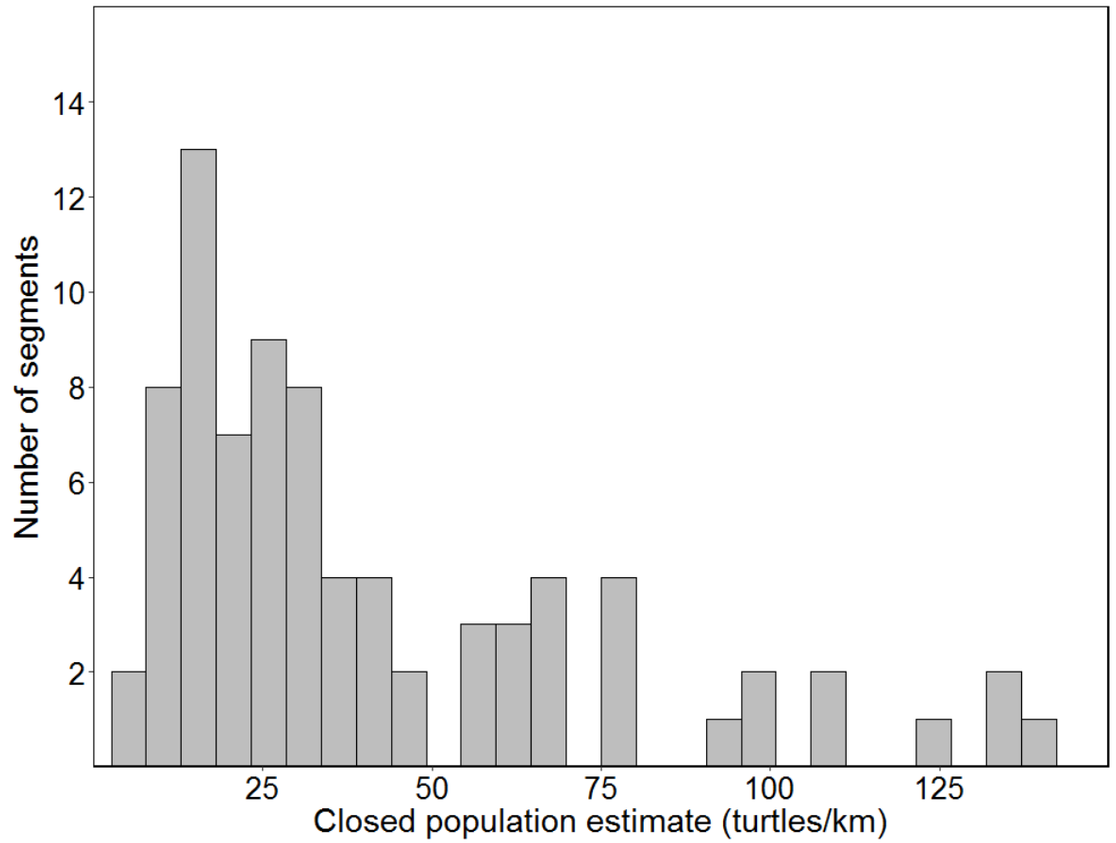
Recapture-rate corrected percentage
Reflecting average of 25% juveniles
in population



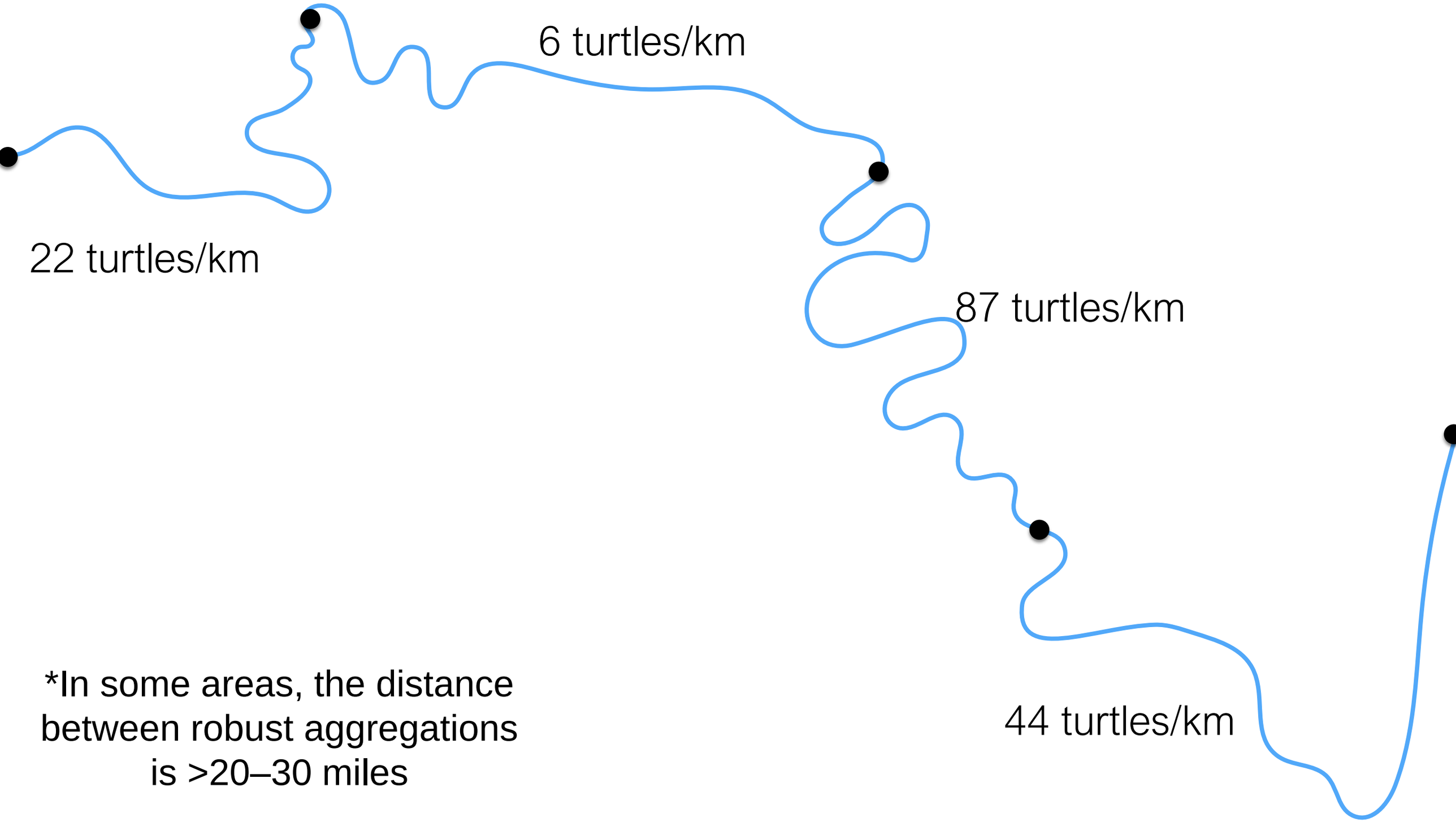
Population Density

Most Survey Segments Comprise Occurrences of <50 Turtles





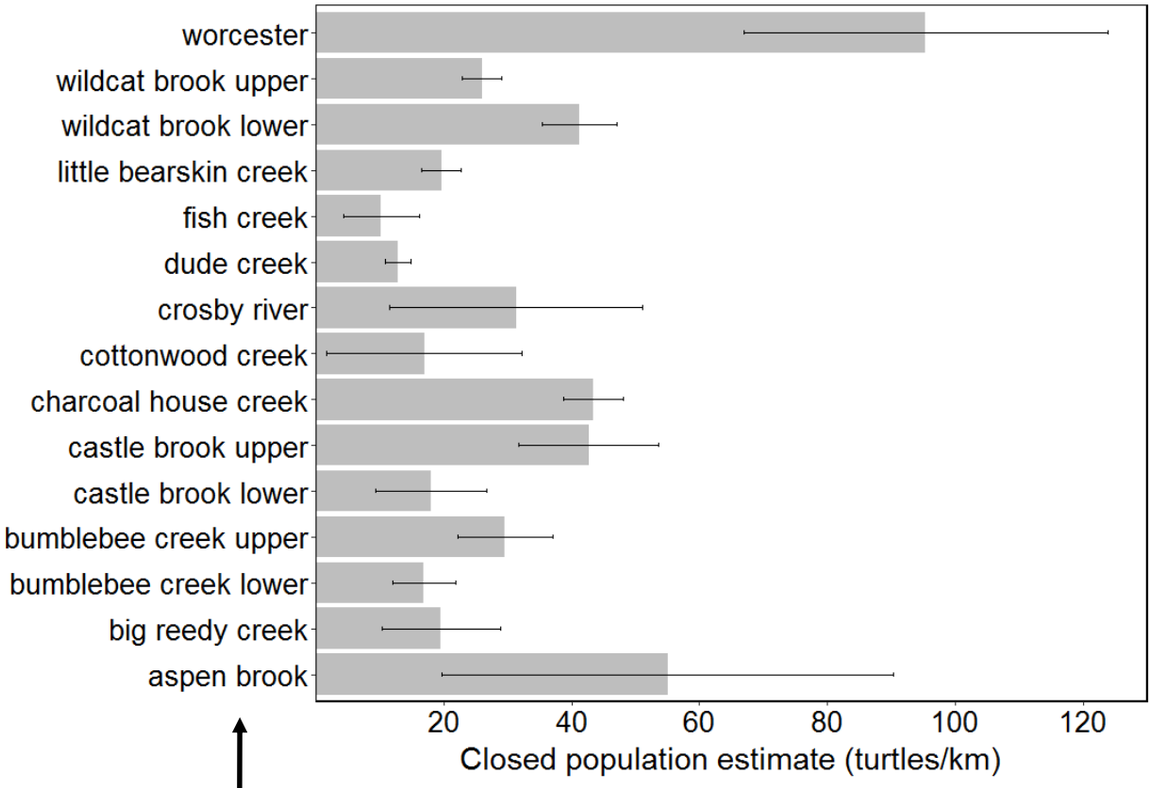
Wood Turtle Population Density is Highly Variable Within Defined Sites, from 0 to >100 turtles/km



*In some areas, the distance between robust aggregations is >20–30 miles

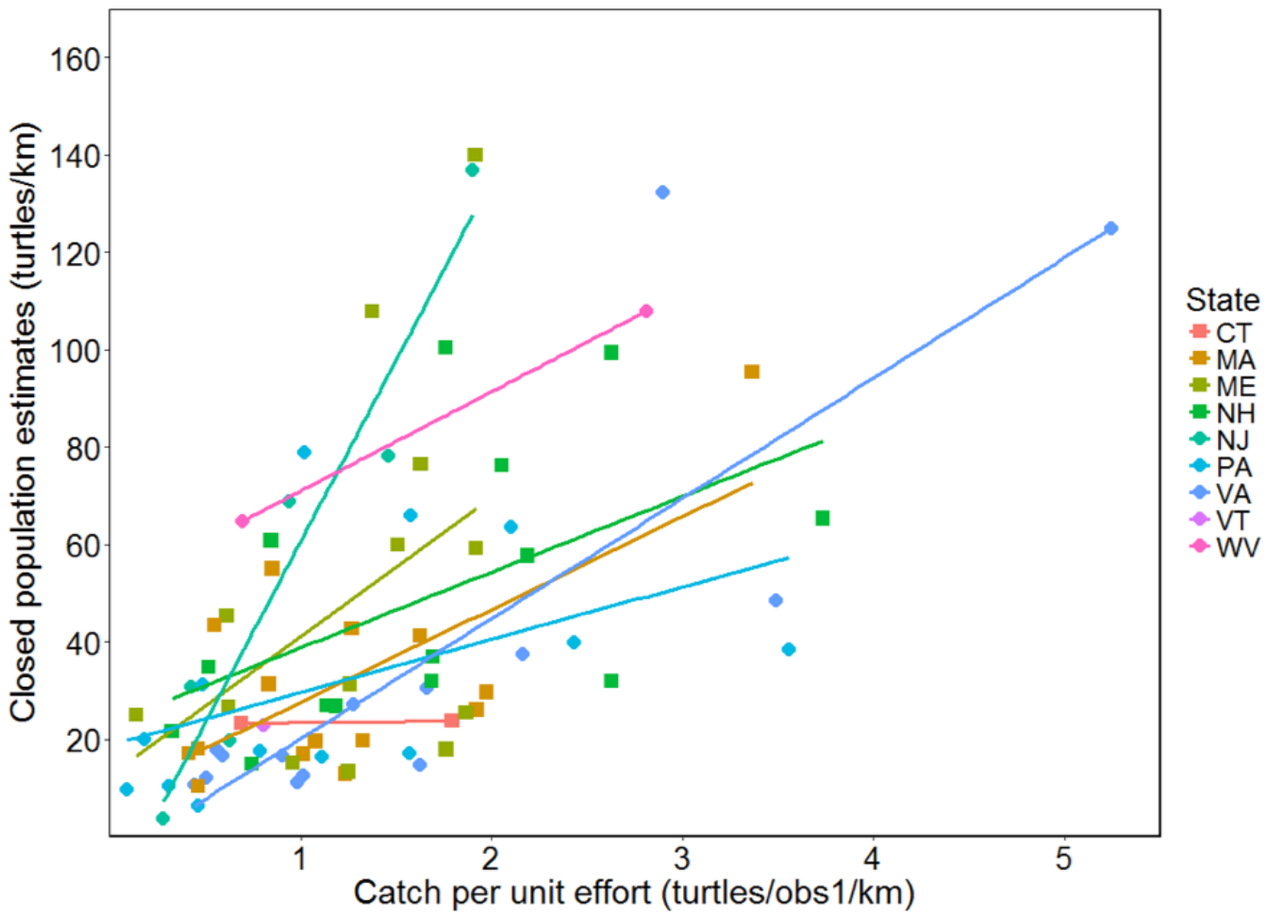
Jones and Willey 2015

Wood Turtle Population Density is Highly Variable Among Defined Sites, from 0 to >100 turtles/km



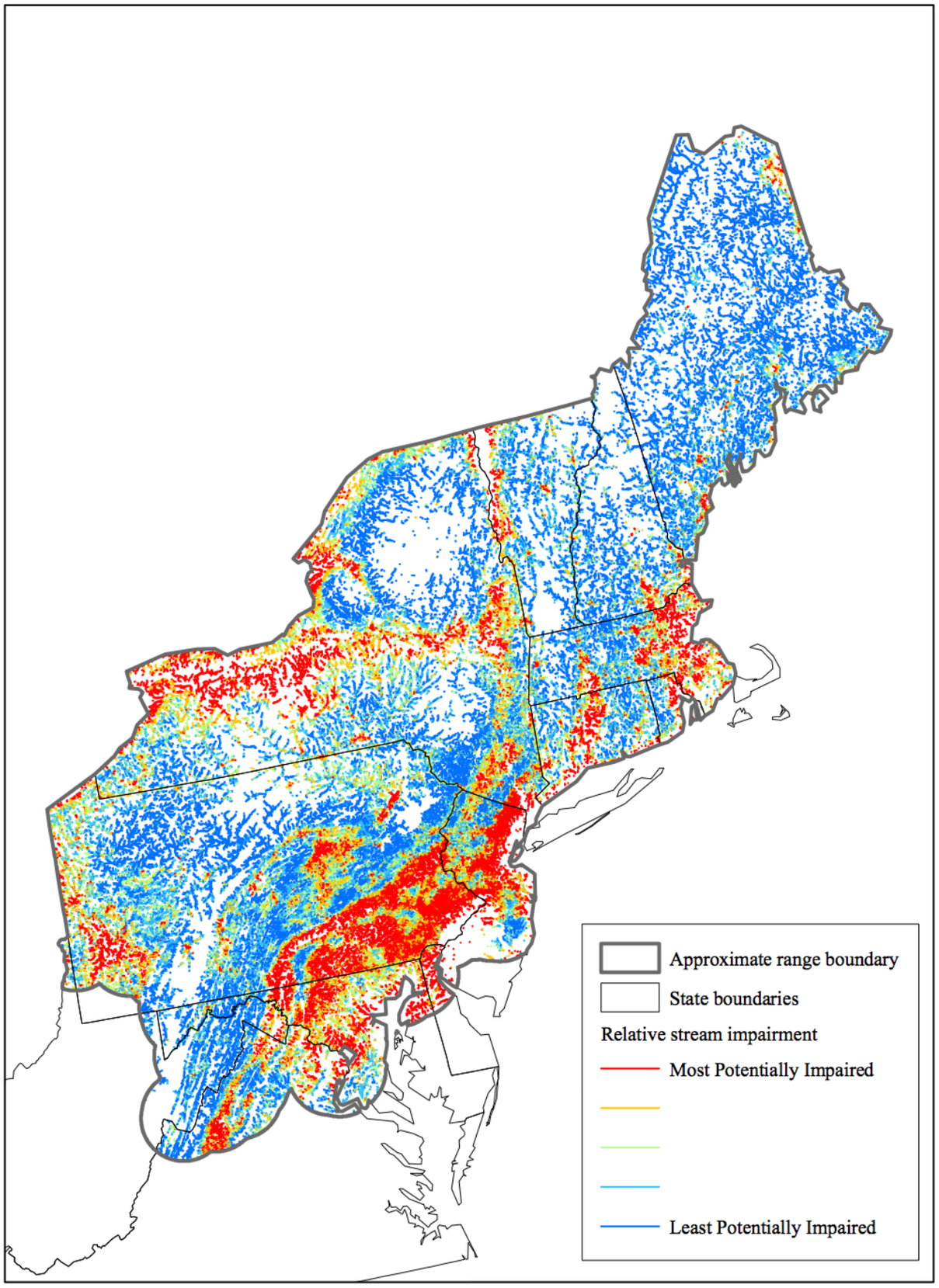
Pseudonyms

CPUE is Correlated with CMR Estimates



Wood Turtle Status Assessent

Modeling Suboptimal Habitat to Assess Regional Status



State	Total stream habitat (km)	km of potentially impaired habitat	% of habitat that is potenitally impaired	km with optimal landscape condition	% of habitat with optimal landscape condition
Maine	18211	3790	21%	6087	33%
New Hampshire	4627	1666	36%	1540	33%
Vermont	2987	1318	44%	746	25%
Massachusetts	6172	4395	71%	569	9%
Rhode Island	650	423	65%	23	4%
Connecticut	3541	2363	67%	189	5%
New York	21470	13162	61%	3127	15%
New Jersey	8233	6945	84%	244	3%
Pennsylvania	46258	30178	65%	7890	17%
Delaware	437	437	100%	0	0%
Maryland	5739	4814	84%	461	8%
Virginia	6025	3876	64%	1118	19%
West Virginia	3182	979	31%	1395	44%
Total	127532	74344	58%	23389	18%

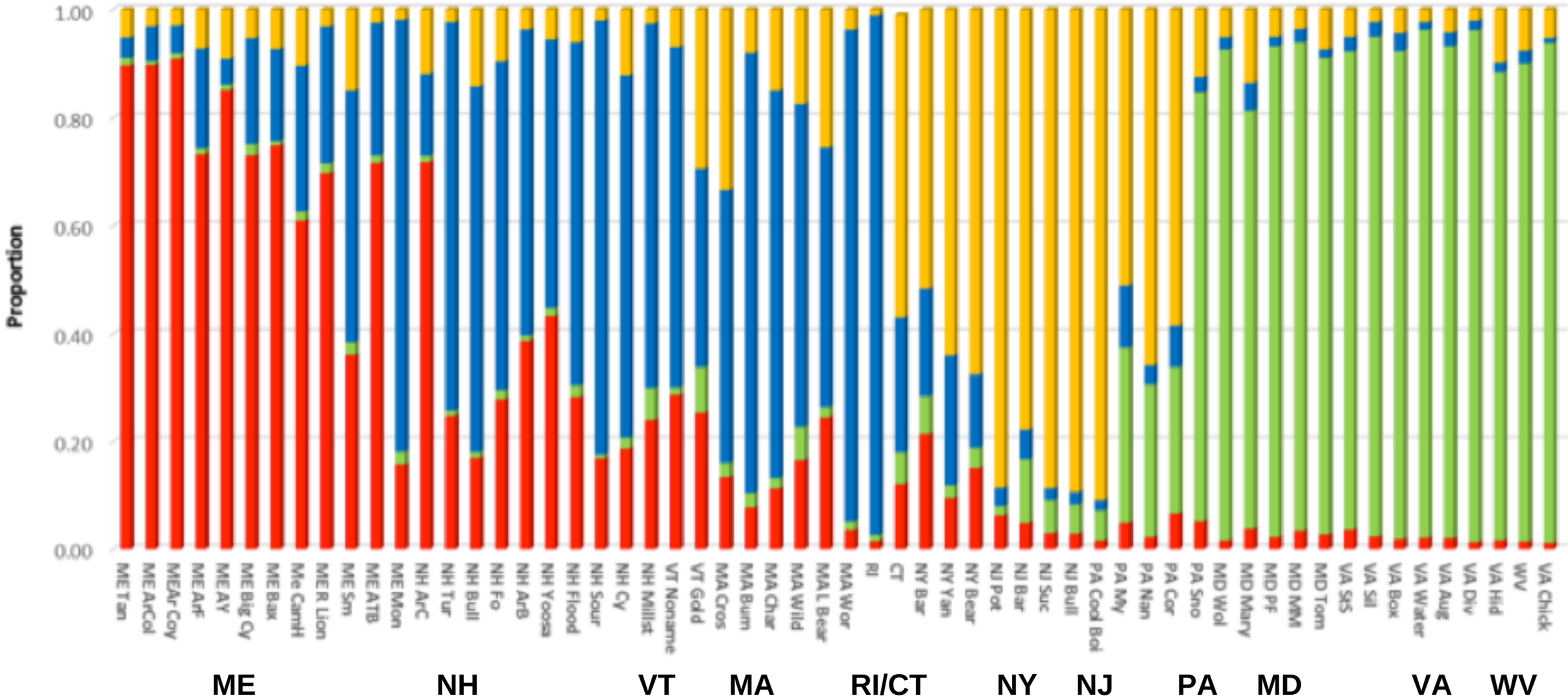
≤50% Stream Segments “Suboptimal”

50 to 75% Stream Segments “Suboptimal”

>75% Stream Segments “Suboptimal"

Conservation Genetics

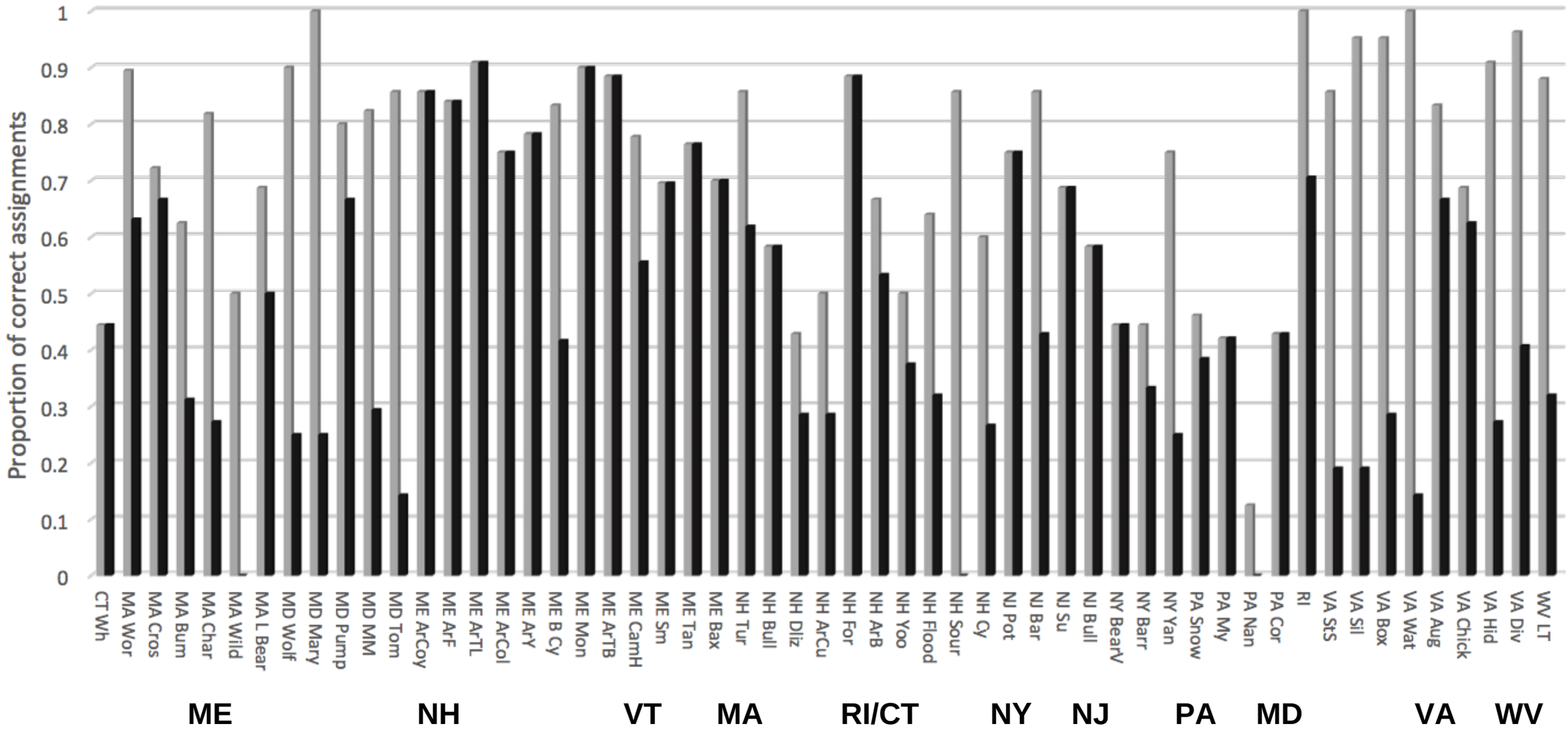
STRUCTURE k=4



Sheedy and Whiteley (2018)

Conservation Genetics

Genetic Assignment - Proportion Correct Assignment by Site



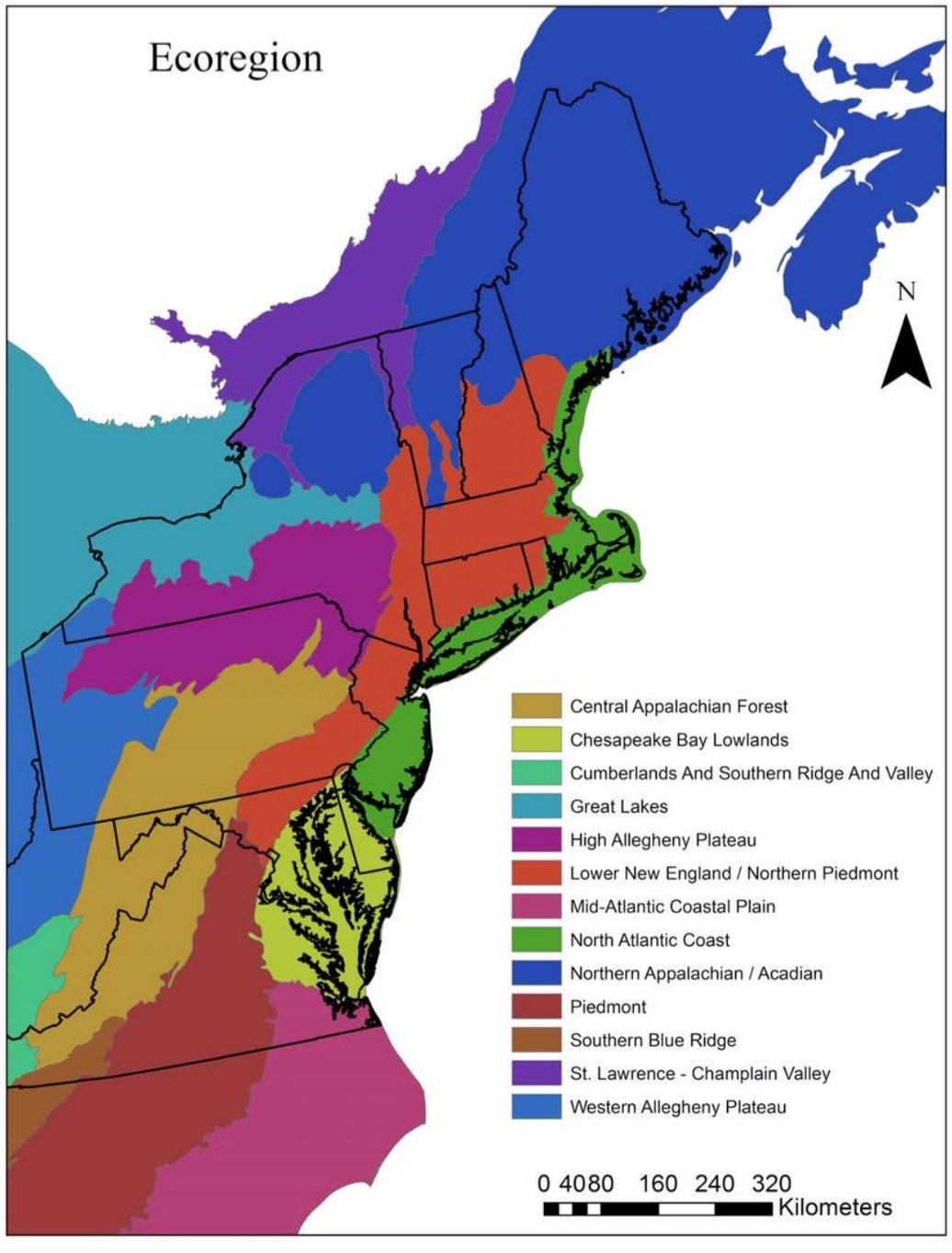
Proportion correct assignment to site where sample was collected

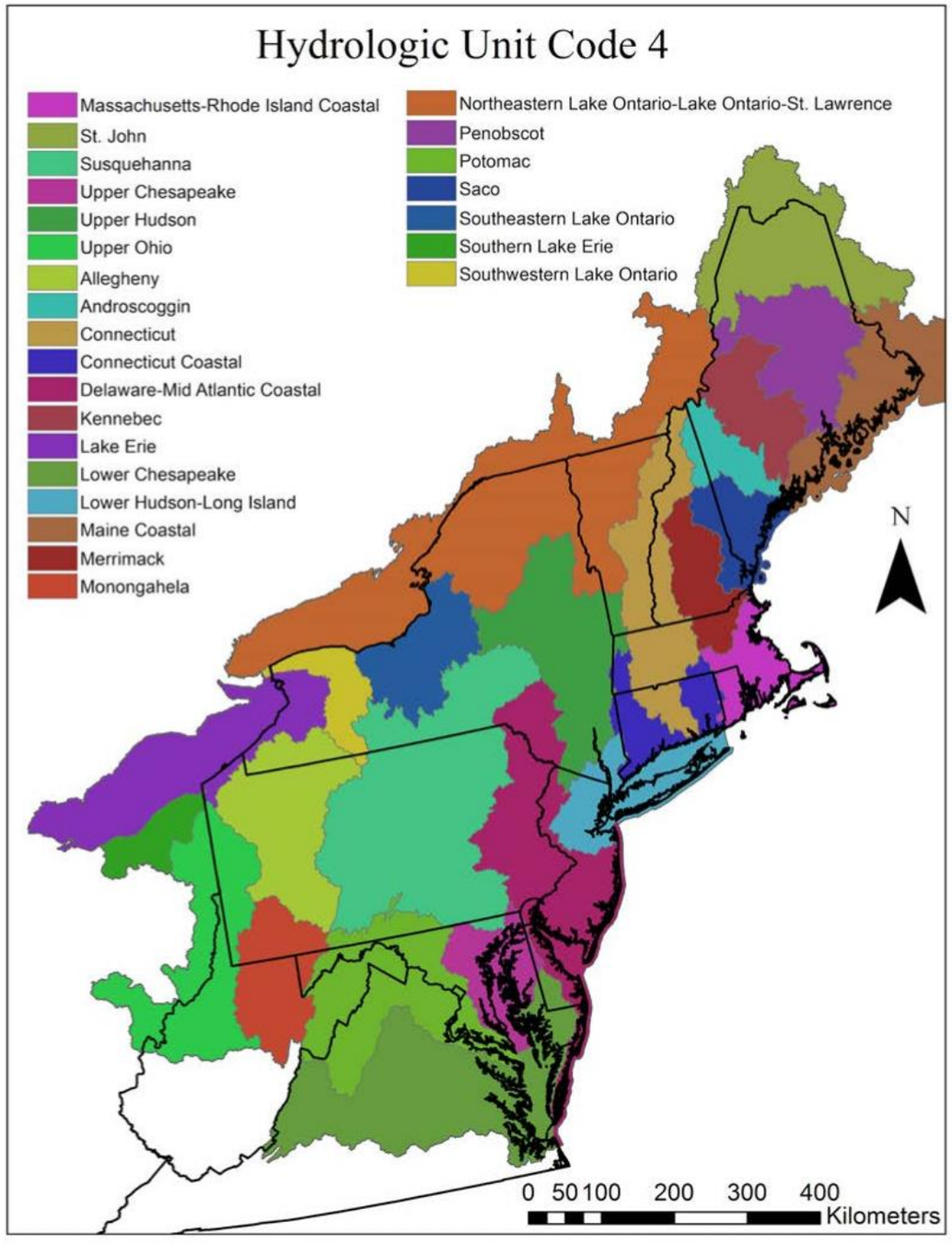
Proportion correct assignment to any site where no significant allele frequencies were detected

Sheedy and Whiteley (2018)

Empirically-Driven Conservation Plan

Objective: Facilitate the persistence of functional, ecologically viable, and representative populations of Wood Turtles throughout the Northeast Region, protecting the evolutionary potential of the species. Establish a spatially-explicit, stratified **Conservation Area Network** and **Conservation Action Plan** based on the best available population, landscape, and genetic data.





Wood Turtle Conservation Area Network (CAN)

Focal Core Area and Focal Basin Selection

Site Mapping

Potentially suitable stream habitat with up to 5000 m of meandering stream between documented occurrences, buffered to 300 m.

Wood Turtle Conservation Area Network (CAN)

Focal Core Area and Focal Basin Selection

Site Mapping

Potentially suitable stream habitat with up to 5000 m of meandering stream between documented occurrences, buffered to 300 m.

Ecological Assessment

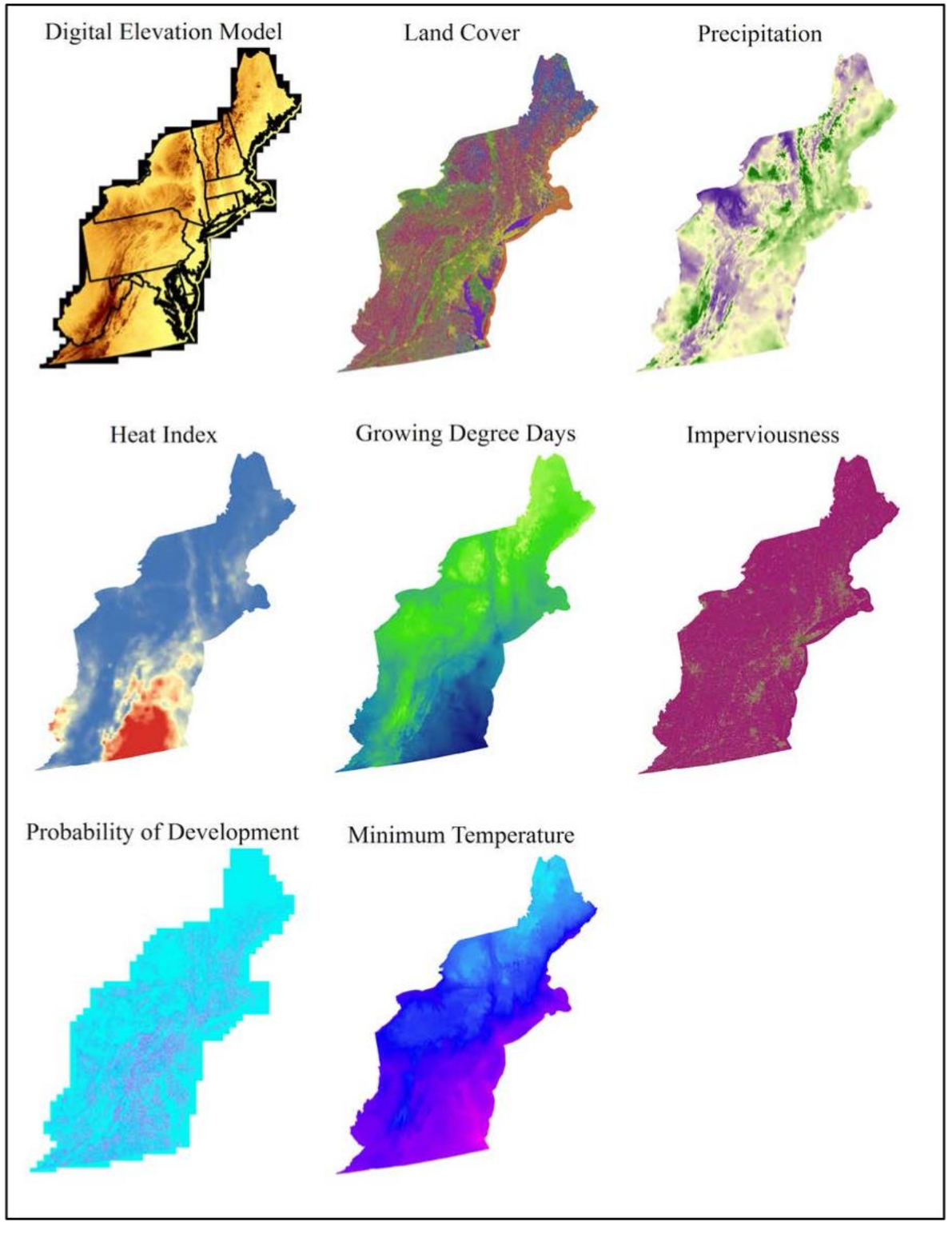
Vulnerability to Development

Vulnerability to Climate Change

Genetic Diversity

Genetic Uniqueness

NALCC



Wood Turtle Conservation Area Network (CAN)

Focal Core Area and Focal Basin Selection

Site Ranking
weighted by experts

- **Total Size of Site (300 m)**
- **Habitat Quality (300 m, 5500 m)**
- **Landscape Integrity (300 m, 5500 m)**
- **Wood Turtle Abundance (300 m)**
- **Wood Turtle Distribution (HUC12)**

=

Site Rank
Expert-weighted sum

Ecological Assessment

- **Vulnerability to Development**
- **Vulnerability to Climate Change**
- **Genetic Diversity**
- **Genetic Uniqueness**

Wood Turtle Conservation Area Network (CAN)

Focal Core Area and Focal Basin Selection

Site Ranking
weighted by experts

Total Size of Site (300 m)

Habitat Quality (300 m, 5500 m)

Landscape Integrity (300 m, 5500 m)

Wood Turtle Abundance (300 m)

Wood Turtle Distribution (HUC12)

=

Site Rank
Expert-weighted sum

Focal Core Area Selection

Top-Ranked Sites Northeast Region
(N=15)

Genetically Diverse Sites
(AR, He, PA) (N=11)

Top-Ranked Site per State
(N=1 per state)

Genetically Unique Sites
by Cluster (N=5)

Top Ranked Site per Ecoregion
(N=1 per region)

Top-Ranked Site per HUC4
(N=1 per region)

Wood Turtle Conservation Area Network (CAN)

Focal Core Area and Focal Basin Selection

Focal Core Area Selection

Top-Ranked Sites Northeast Region
(N=15)

Genetically Diverse Sites
(AR, He, PA) (N=11)

Top-Ranked Site per State
(N=1 per state)

Genetically Unique Sites
by Cluster (N=5)

Top Ranked Site per Ecoregion
(N=1 per region)

Top-Ranked Site per HUC4
(N=1 per region)

Management Opportunities

Agricultural Restoration Opportunity

Large sites with high CAN ranks, high ag. cover, and low road density

Riparian Restoration

Large sites with high CAN ranks, identified riparian opportunities

Federal Lands

Potentially viable sites encompassing / adjoining NWR, USFWS, NPS

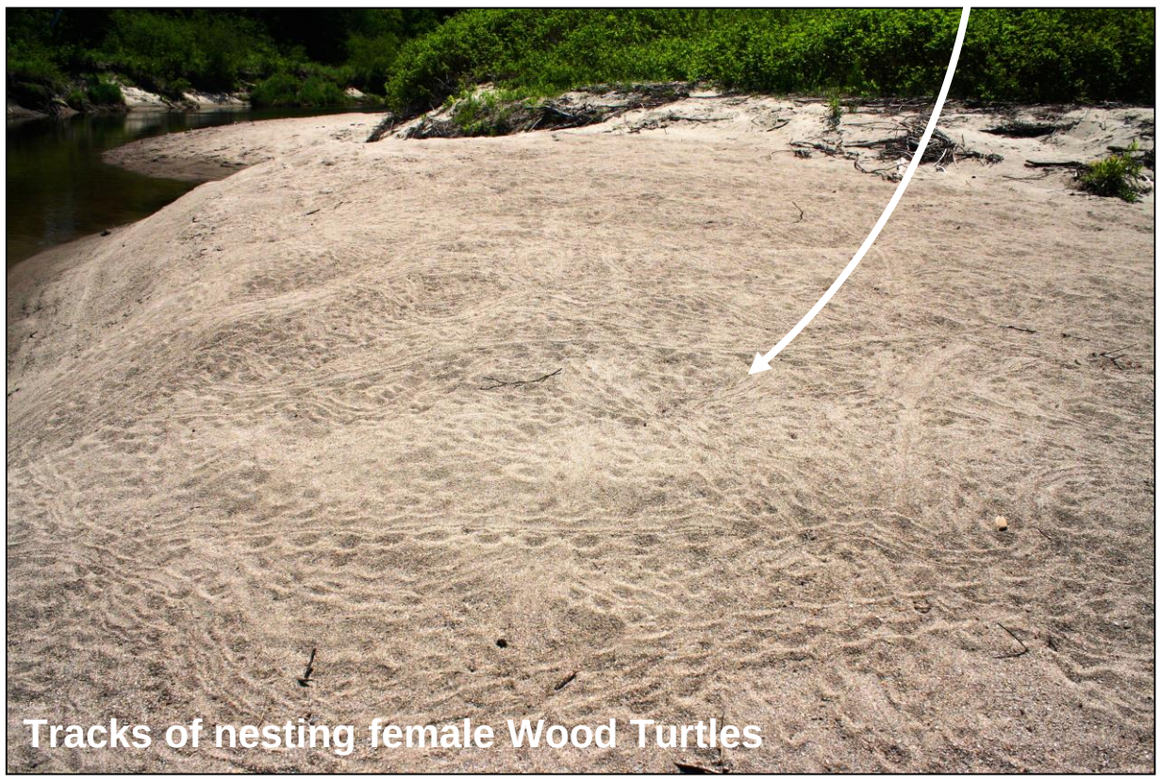
International Coordination

Potentially viable sites adjoining Canada

Wood Turtle Conservation Area Network (CAN)

Spatial Tiers for Priority Sites

Conservation Action Plan & RCN



Tracks of nesting female Wood Turtles

Conservation Area Network
Site-Level Planning & Implementation

Finalize Site Boundaries
Using regional mapping guidelines (Appendix X)

Designate Site Leader

Identify Key Wood Turtle Features
High-density segments, hibernacula, nesting areas, and high-use areas

Parcel Analysis

— Site Action Plan Development —

Site-specific Threat Assessment

- Habitat Loss/ Fragmentation
- Collection
- Nest Predation
- Agriculture
- Invasive Plants

Site-specific Conservation Objectives

Land Protection

Management

- Promote BMPs
- Nesting area creation
- Riparian restoration
- Invasive management
- Seasonal road access restrictions
- Road-side management
- Early-successional habitat creation

Monitoring

- More surveys
- More survey segments
- Nest area monitoring
- Telemetry
- Habitat monitoring

Targeted Outreach

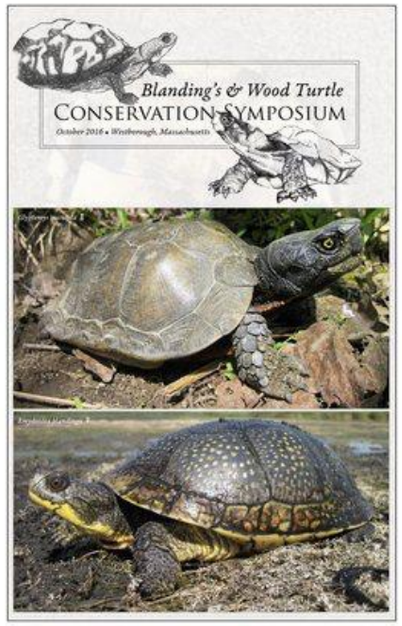
- Key landowners
- State agencies
- Conservation NGOs
- Federal agencies

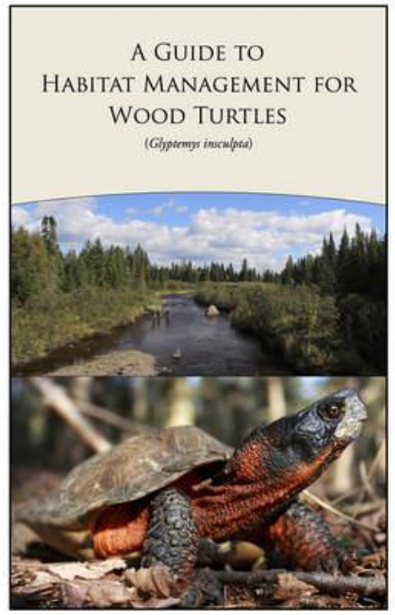
Plan Approval
State Wildlife Agency & Wood Turtle Council

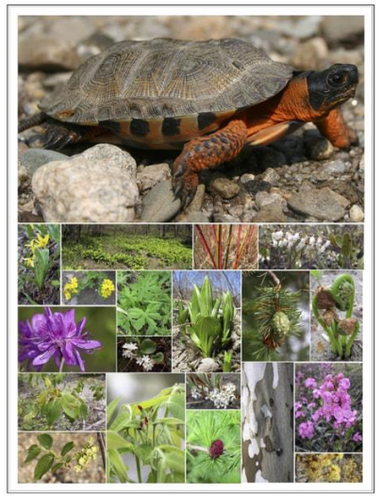
Implementation

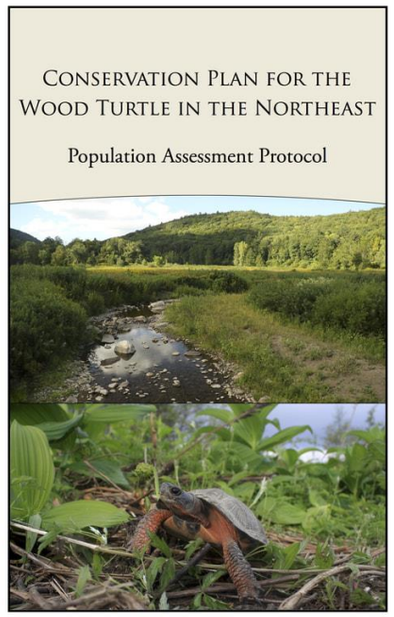
Annual Progress Reports
Provided to Wood Turtle Council

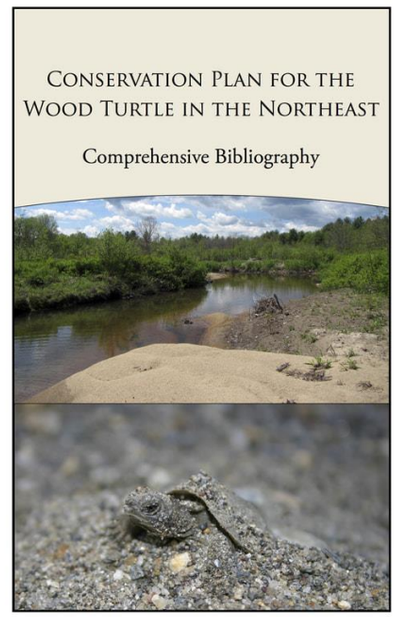
Regional Reassessment

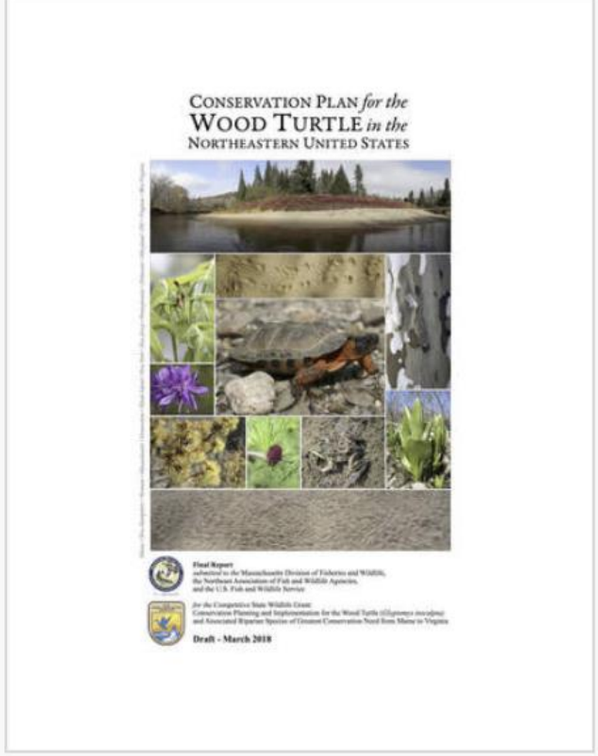












Supported by State Wildlife Grants through the Competitive SWG and Regional Conservation Needs (RCN) Programs.

.PDF .DOC

Conservation Plan *for the* Wood Turtle *in the* Northeastern United States

Conservation Plan for the Wood Turtle in the Northeastern United States represents the cumulative product of a multi-year, proactive effort among Northeastern State Wildlife Agencies, and their partners, to articulate a strategic action plan to protect regionally significant populations of Wood Turtles in the northeastern United States. The **fundamental objective** of this Plan is to protect the **evolutionary potential** of the Wood Turtle by ensuring the persistence of **functional**, **ecologically viable**, and **regionally significant** populations throughout the Northeast Region. To accomplish this objective, and to effectively triage conservation efforts, we developed a spatially-explicit, stratified Wood Turtle Conservation Area Network based on the best available population, landscape, and genetic data. Ultimately–in order to achieve meaningful conservation of this unusual and iconic species--it will be necessary to **stabilize and reverse population declines** within this Conservation Area Network and elsewhere throughout the species range.

Recommended citation: Northeast Wood Turtle Working Group. 2017. Conservation Plan for the Wood Turtle in the Northeastern United States. Technical Report Prepared for the U.S. Fish and Wildlife Service, Massachusetts Division of Fisheries and Wildlife, and Northeast Association of Fish and Wildlife Agencies.

Competitive State Wildlife Grant II

Job 1: Priority Management Actions

Conduct habitat and nesting area management, technical assistance to key landowners, public access restrictions, surveillance of key nesting beaches and hibernacula.

Job 2. Population Assessment

Conduct surveys in data-deficient areas of the Northeastern States and use telemetry and remote GPS to document key features and movement patterns within Focal Core Areas.

Job 3: Conservation Genetics

This effort will encompass a new study using genomic techniques. All confiscated turtles will be genotyped and compared to a regional sample of more than 2,000 turtles. If assigned to a known locality, Wood Turtles would be returned to that jurisdictional state. Some funds may also be allocated to the captive care and study of confiscated Wood Turtles and to greater cooperation with AZA facilities.

Job 4. Inter-Regional Coordination

We will expand the regional partnership and improve the compatibility of regional efforts in three ways: (1) incorporate genetic samples from these regions into the existing analysis; (2) implement Northeastern survey protocols in the Midwest and Canada and the Midwest protocols in the Northeast Region; (3) expand the Conservation Area Network (CAN) design implemented in the Northeast Regional Conservation Plan to sites in Canada and the Midwest. Host Wood Turtle Symposium.

Job 5. Update the Conservation Plan

The Conservation Plan will be expanded and updated based on new survey information, genetics results, and expert surveys. we will pursue publication of appropriate results from RCN and CSWG.

Michael Jones
Massachusetts Natural Heritage Program

Patrick Roberts
University of Massachusetts

Lisabeth Willey
American Turtle Observatory
Antioch University New England

Tom Akre
Smithsonian Conservation Biology Institute

Paul Sievert
University of Massachusetts

Dana Weigel Sheedy
University of Idaho

Andrew Whiteley
University of Montana

ME • NH • MA • CT • NJ • PA • MD • VA • VT • NY • RI • WV • DE

Conservation Plan for the Wood Turtle in the Northeastern United States

Mike Jones: mtjones@bio.umass.edu
Liz Willey: lwwilley@antioch.edu

Fluvial Specialists
Riparian Generalists

Robust populations occur where key habitat features are juxtaposed

woody instream structure

instream overwintering areas

nesting beach

herbaceous foraging areas

nesting beach

upland forest

Habitat Requirements

Fluvial specialists tolerant of a wide range of floodplain conditions

In many areas Wood Turtles are most abundant in non-impounded, low gradient (>0 to <1%) streams with numerous nesting and early successional habitats in an unfragmented forested landscape

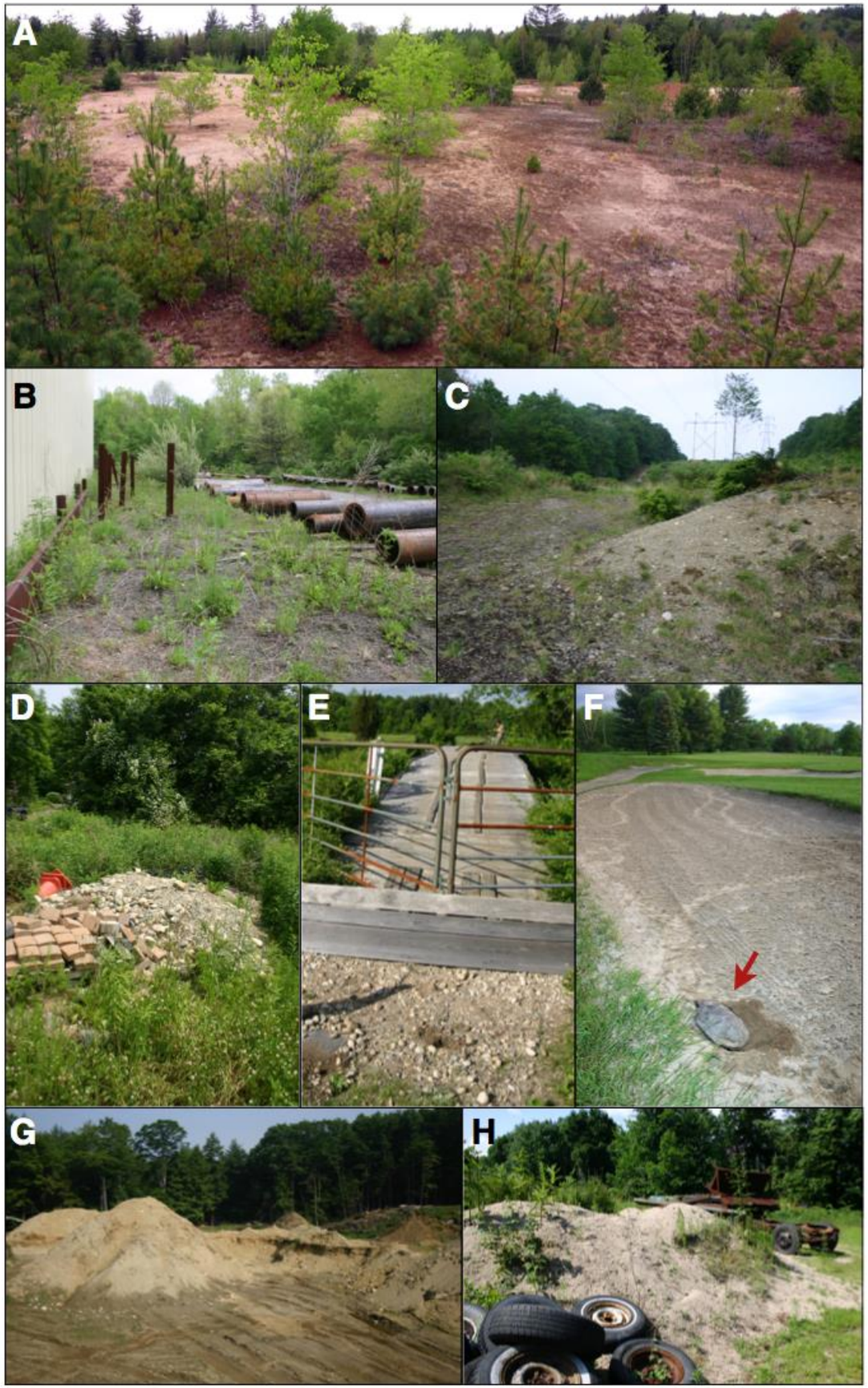
Stream-Generated Features

Natural nesting areas - beaches, overwash, islands

Natural stream-generated features for foraging and thermoregulation

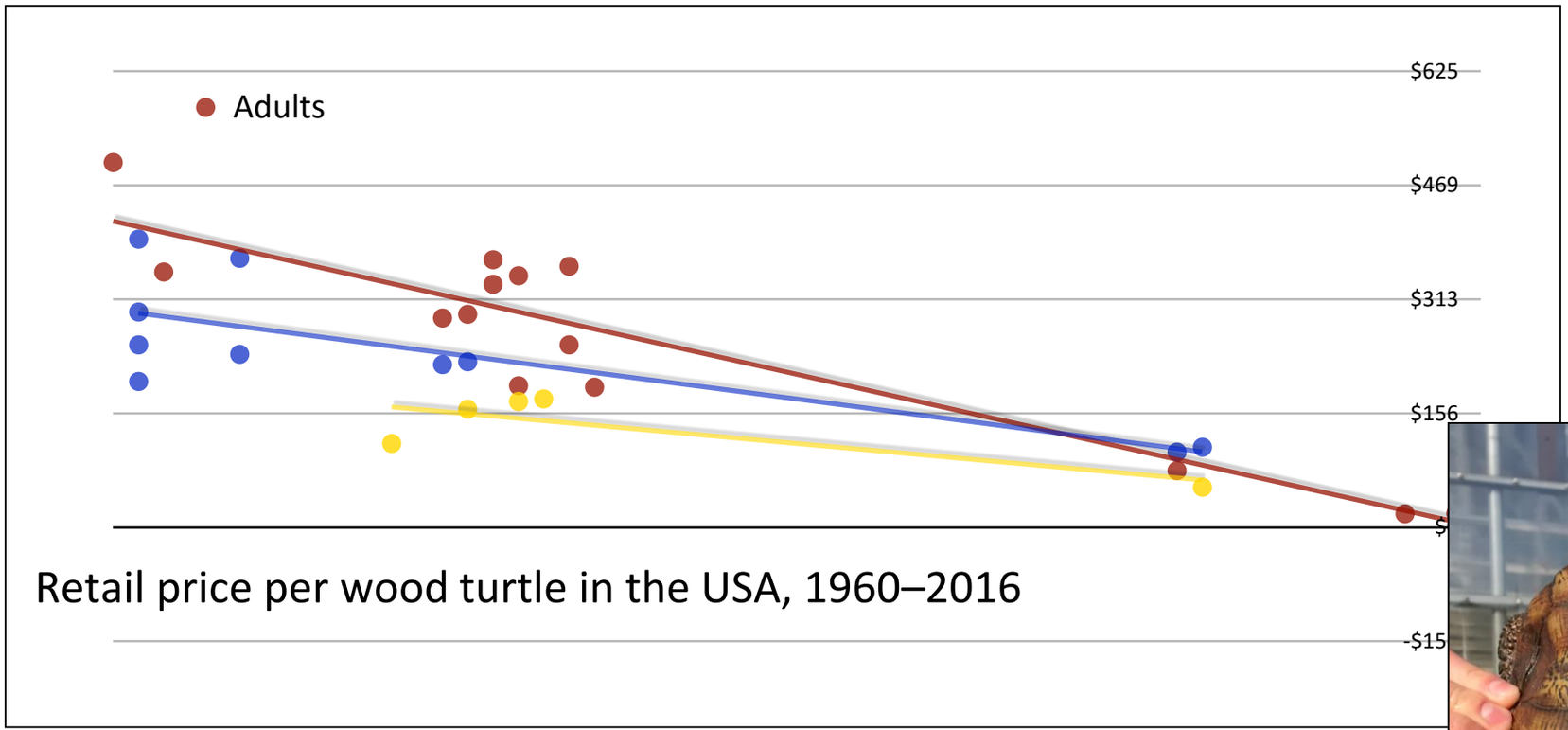
Natural Riparian Features Replaced by Ecological Traps

Anthropogenic nesting areas - gravel pits, shale quarries, power lines



Anthropogenic features for foraging and thermoregulation

Illegal Harvest; Impunity; Lack of Federal LE Tools



Retail price per wood turtle in the USA, 1960–2016

The risk of illegal collection impedes efficient communication.
Several confiscations >50 adults: a large occurrence in the Northeast.