

CSN Network Assessment

Beth Landis
ORD Sponsored Webinar
5/1/14





Key Points

- *The following presentation provides recommendations (as of 5/1/14) for CSN network changes*
- *These recommendations are NOT FINAL and are subject to change based on discussions with Regional/State/Local agencies*
- *Sites recommended for defunding will no longer receive laboratory analysis funding, however their speciation monitors may continue to operate if other funding sources are provided*
- *The target cost savings numbers included in the presentation are contingent on current (as of 5/1/14) contract pricing and are subject to change under future contracts*
- *Further assessments may be necessary as contract costs and budgets change*

CSN Assessment Team

- Beth Landis, Joann Rice, Lew Weinstock & Tim Hanley - AQAD/AAMG
- Adam Reff, Neil Frank & Liz Naess- AQAD/AQAG
- Tesh Rao - AQAD/EIAG
- Jim Kelly - AQAD/AQMG
- Beth Palma - AQPD/GSG
- Beth Hassett-Sipple - HEID/ASG
- Alan VanArsdale - EPA Region 1
- Daniel Garver - EPA Region 4
- Rich Poirot - NACAA



Overview

- Goals of the assessment
- Network overview
- Explanation of approach & scoring
- Cost breakdown
- Recommendations
 - ❖ Defund 53 “low value” sites
 - ❖ Eliminate CSN mass measurement
 - ❖ Reduce sample frequency
 - ❖ Reduce blanks
 - ❖ Reduce icepacks in shipping
- Next steps/communication strategy



Goals of the Assessment

- Create a CSN network that is sustainable going forward
- Redistribute resources to new or high priorities from those of low-priority or low-benefit
- Extract more value from the existing network
- Fully leverage the value of other existing networks (e.g., IMPROVE)

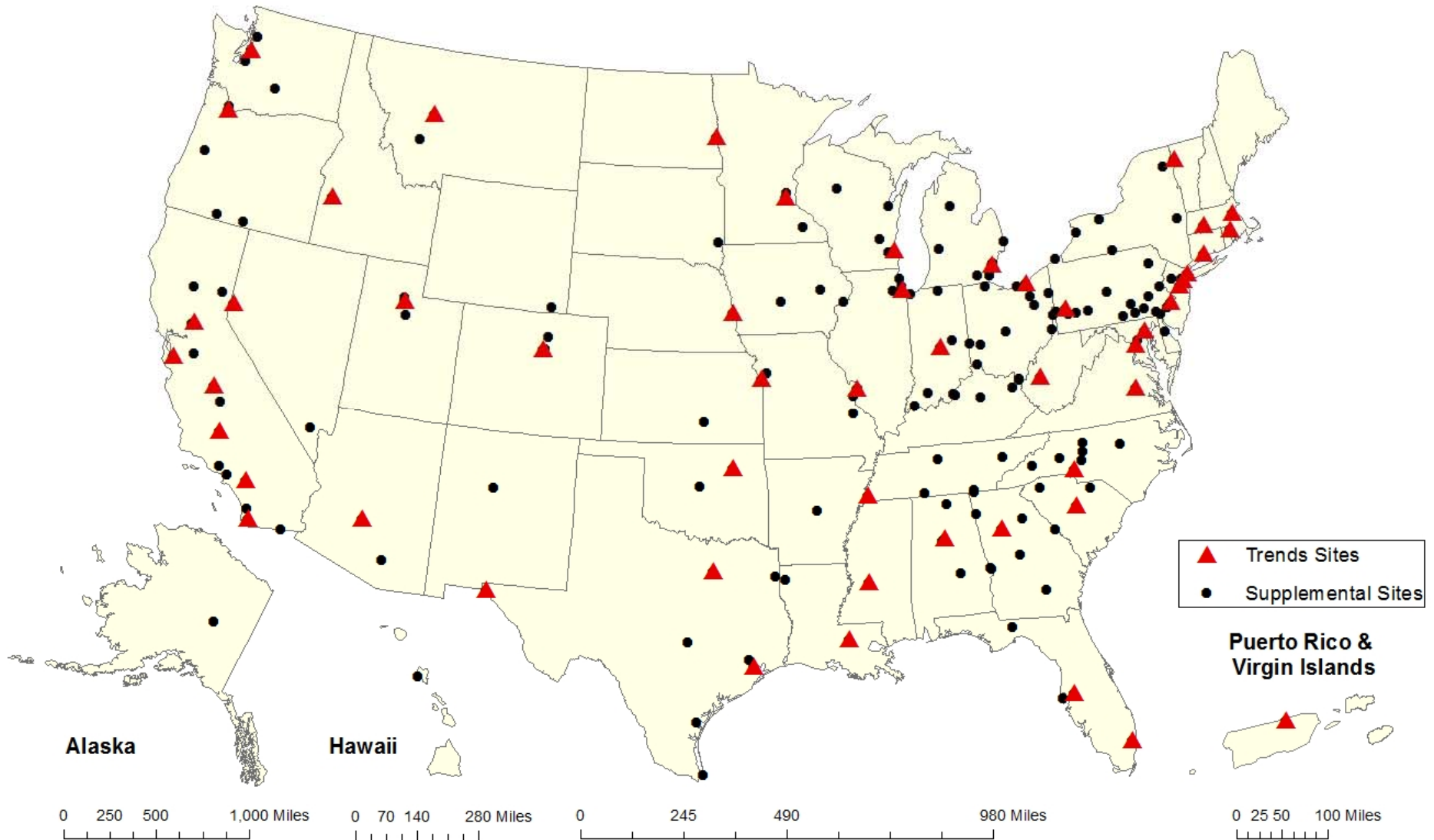




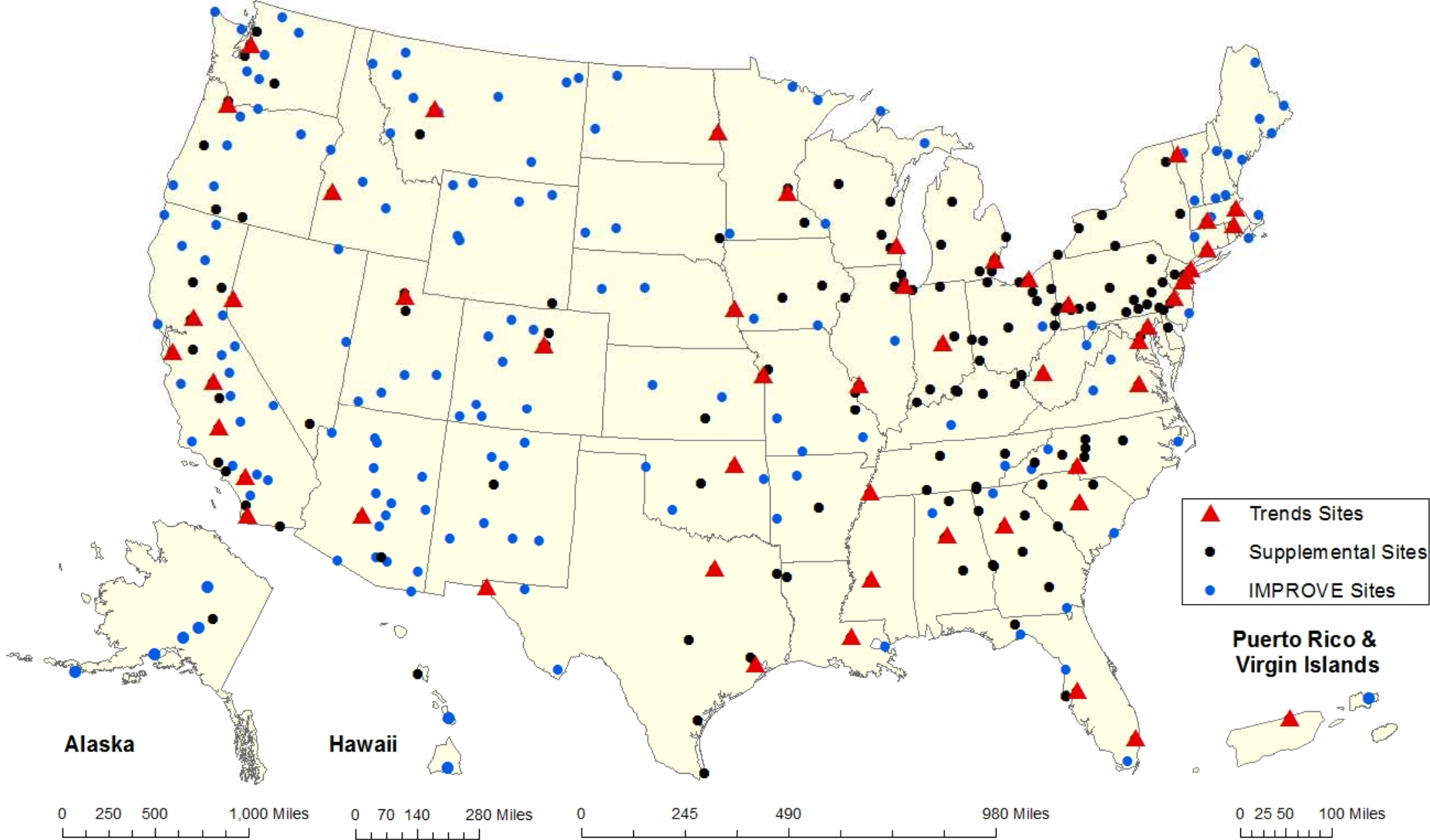
Network Overview

- 1997 PM_{2.5} NAAQS review led to the establishment of the CSN
- Initial monitoring began with 13 pilot sites in 2000
- Currently, the network consists of 189 sites:
 - ❖ 52 Speciation Trends Network (STN) sites
 - ❖ 137 supplemental sites
- Sites collect aerosol samplers of 24 hours on filters analyzed for:
 - ❖ PM_{2.5} mass
 - ❖ Trace elements
 - ❖ Major ions (sulfate, nitrate, sodium, potassium & ammonium)
 - ❖ Organic and elemental carbon (OC/EC)

Chemical Speciation Network (CSN)



CSN & IMPROVE Networks



Objectives Based Approach

- Optimize the network to support the primary objectives, which include:
 - ❖ Support of PM_{2.5} Implementation (e.g., SIPs, non attainment areas, control strategies, model development, etc.)
 - ❖ Aid in interpretation of health studies
 - ❖ Detection of trends
- We are aware and sensitive to the fact that there are many secondary objectives of our CSN sites (e.g., urban increment, regional haze, etc)



Objectives Based Approach

- Began by evaluating which of the current CSN sites meet the primary objective(s)
 - ❖ Sites at NCore
 - ❖ DV sites $> 12 \mu\text{g}/\text{m}^3$ and/or $> 35 \mu\text{g}/\text{m}^3$
 - ❖ Sites in DV counties $> 12 \mu\text{g}/\text{m}^3$ and/or $> 35 \mu\text{g}/\text{m}^3$
 - ❖ Sites currently being used in health effects research
 - ❖ STN sites
 - ❖ Sites with daily FRMs
 - ❖ Sites with continuous monitors



Scoring System

Scoring applied to begin identifying high/low priority sites:

- NCore = 5 pts
- Annual DV for site
 - $> 12 \mu\text{g}/\text{m}^3 = 5 \text{ pts}$
- 24-hr DV for site
 - $> 35 \mu\text{g}/\text{m}^3 = 5 \text{ pts}$
- STN = 4 pts
- DV for county (annual and/or 24-hr) exceeds, but site is below the standard = 3 pts
- Daily FRM = 3 pts
- Health effects city = 3 pts
- Continuous monitor(s) = 2 pts
- Collocated* with:
 - IMPROVE = 1 pt
 - NATTS = 1 pt
 - PAMS = 1 pt

*Although collocation does not meet a “primary objective”, it does meet an assessment goal of leveraging with existing networks

Breakdown of Scoring

73 “low-value” sites - more analysis necessary to determine if funding should continue

Score	# of Sites	Score	# of Sites	Score	# of Sites
0	39	8	22	16	5
1	5	9	13	17	2 (1C*)
2	1	10	5	18	1
3	28	11	6	19	2 (1C*)
4	1	12	5	20	3 (1C*)
5	7	13	9 (1C*)	21	2 (1C*)
6	6	14	1	22	1
7	4 (1C*)	15	5	23	1

174 sites supported by RTI (including 6 collocated)

*C=collocated

Decision Matrix - Positive Scoring

Parameter	Range	Points
Annual DV	10-10.9 $\mu\text{g}/\text{m}^3$	+1
	11-11.4 $\mu\text{g}/\text{m}^3$	+2
	$\geq 11.5 \mu\text{g}/\text{m}^3$	+3
24-hr DV	30-31 $\mu\text{g}/\text{m}^3$	+1
	32-33 $\mu\text{g}/\text{m}^3$	+2
	$\geq 34 \mu\text{g}/\text{m}^3$	+3
Population	$\geq 1\text{M}$	+1
County Emission Rank (PM _{2.5} , SO ₄ , NO ₃ , OC, EC, NH ₃ , VOCs & SO ₂ using 2011 NEI emissions)	Top 1.1-5%	+1 / pollutant
	Top 1%	+2 / pollutant
Nearest Speciation Site	>200km	+1
Statistically significant increase in trend concentration (2010-2012) for pollutants w/ >75% records above MDL & overall average precision <10% (PM _{2.5} , SO ₄ , NO ₃ , OC, EC, NH ₄ ⁺ , Fe, S, K Ca, Na ⁺ , Si, Cu, Br & Zn)	1 pollutant	+1
	2 pollutants	+2
	3 pollutants	+3
	4 pollutants	+4
Increased model bias or error if site removed (PM _{2.5} , SO ₄ , NO ₃ , total carbon & NH ₄)	n/a	+1 / pollutant

Decision Matrix - Negative Scoring

Parameter	Range	Points
Nearest CSN Site	<50 km	-1
Nearest 5 Speciation Sites	<150 km	-1
Correlation with major species at the nearest 5 speciation sites	R>0.75 for ALL major species at a site	-5 (regardless of how many sites)
	R>0.75 for PM _{2.5}	-1 / site
	R>0.75 for SO ₄	-0.2 / site
	R>0.75 for NO ₃	-0.2 / site
	R>0.75 for OC	-0.2 / site
	R>0.75 for EC	-0.2 / site
	R>0.75 for NH ₄	-0.2 / site

Breakdown of Decision Matrix Scoring

73 “Low Value” Sites

Score	# Sites	Recommendation
2 to 6	11	Fund
-3 to 1	32	Defund
-8 to -4	17	Defund
-13 to -9	10	Defund
≤ -14	3	Defund

*9 sites scored in a defund category, but are being recommended for funding due to various intangible reasons that were not captured in the decision matrix scoring system. Further modifications may be needed to address the ongoing PM_{2.5} designation process

Bottom Line Recommendation

Fund = 20 sites, Defund = 53 sites**

**While these sites will no longer receive laboratory analysis funding, their speciation monitors may continue to operate if other funding sources are provided

Lab Analysis & Shipping Cost Breakdown

- Current network cost \approx \$6.7 million
- **Goal** of 30% cut, 10% reinvestment (total savings of 20%)
 - ❖ 30% cut \approx \$2M
 - ❖ 10% reinvestment \approx \$670,000
 - ❖ 20% total savings \approx \$1.34M
- Total to spend on base network \approx **\$4.7 million**



These are current numbers for the network, and will be contingent on future contract costs

Assessment Recommendations

1. Defund Sites - of the 174 sites supported by RTI:

- ❖ 39 sites scored 0 points
- ❖ 34 sites scored 1-3 points
 - 5 NATTS (1 pt)
 - 1 continuous Sunset (2 pts)
 - 2 DV County (3 pts)
 - 4 in health effects cities of interest (3 pts)
 - 22 daily FRM (3 pts)



- ❖ Considering the decision matrix scoring as well as intangibles, propose to defund **53 of 73 “low value” sites**

While sites recommended for defunding will no longer receive laboratory analysis funding, their speciation monitors may continue to operate if other funding sources are provided

Assessment Recommendations

2. Eliminate the CSN Mass Measurement

- ❖ The CSN mass measurement was widely used when the network was established
- ❖ Now, the FRM mass measurement is widely used for model attainment, model evaluation, design values, etc.
- ❖ Currently, 119 sites* recommended for funding have an FRM, and eliminating CSN mass would provide a significant savings

*The Shreveport Airport, LA & Marysville, WA sites do not have FRMs. They will continue measuring CSN mass until such time as an FRM is established, or it is determined that an already operational FEM is sufficient



Assessment Recommendations

3. Reduce Sample Frequency

- ❖ Reduce sample frequency to 1-in-6 at sites that are not NCore or STN
 - Arnold West, MO
 - Wylam, AL



4. Reduce Blanks

- ❖ Reduce carbon field blanks (from 10% to 5%)
- ❖ Eliminate carbon backup filter blanks (currently 5%)

5. Reduce Icepacks in Shipping

- ❖ Reduce the number of icepacks included in sample shipments (from 8 to 6 during cooler months)

Next Steps

- Communicate draft defund list, CSN mass elimination & timing
 - ✓ EPA OAQPS management - 3/26/14
 - ✓ EPA OAR management = 3/31/14
 - ✓ EPA Regions - 4/8/14
 - ✓ AAPCA - 4/23/14
 - ✓ NACAA - 4/24/14
 - ❖ ORD Sponsored Webinar - 5/1/14
 - ❖ HEI Conference - 5/5/14
 - ❖ NAAMC* Conference - 8/11/14
- Discuss and determine reinvestment options for network improvements
- Incorporate feedback and adjust recommendations
- Eliminate CSN mass in July, 2014
- Incorporate other network changes by early 2015
- Determine if further assessments necessary once laboratory analysis contract awarded and new pricing determined



Questions/Comments/Feedback

Please contact your appropriate EPA Regional Contact*

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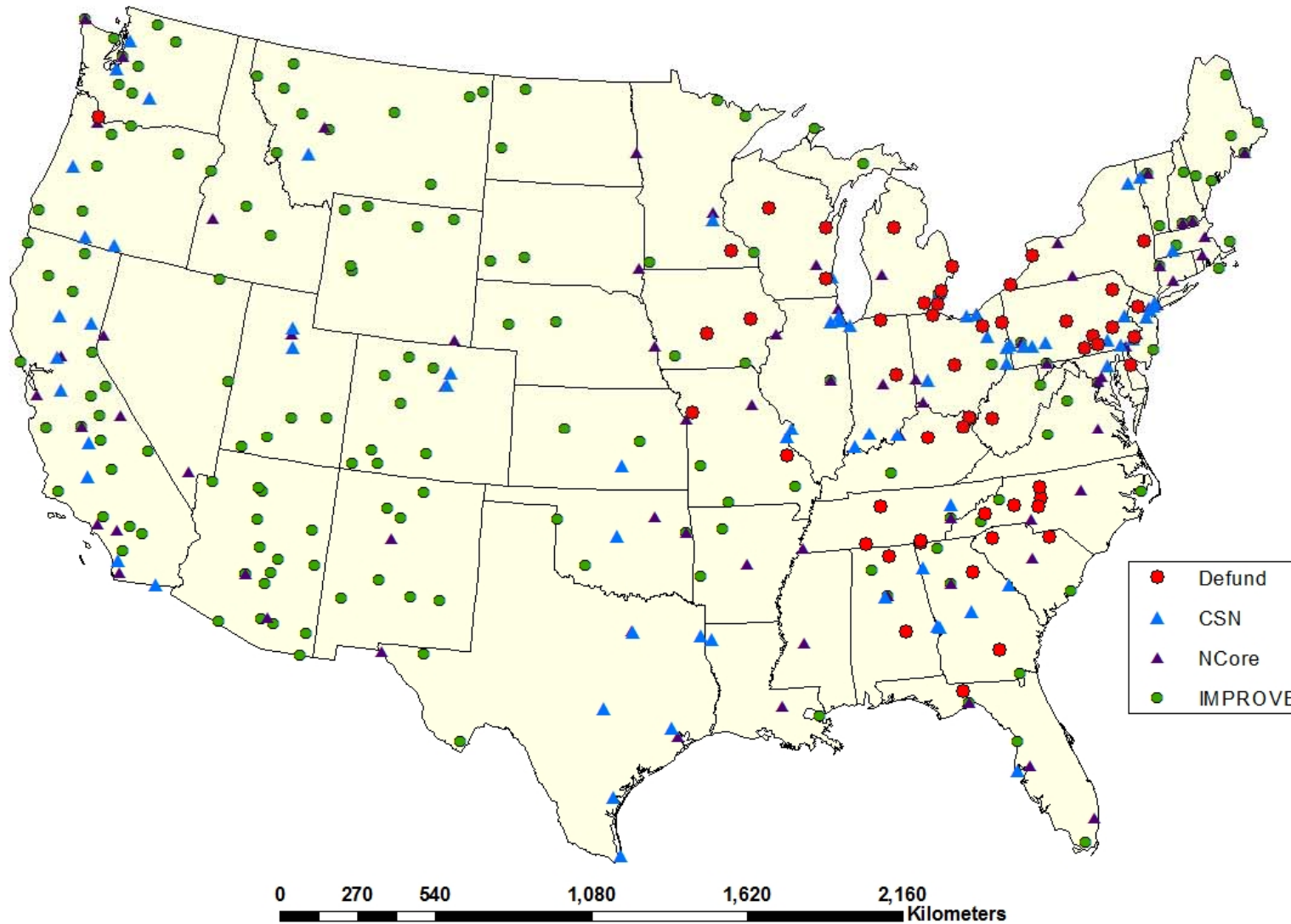
*Unsure of your EPA Region? See <http://www2.epa.gov/aboutepa/visiting-regional-office>



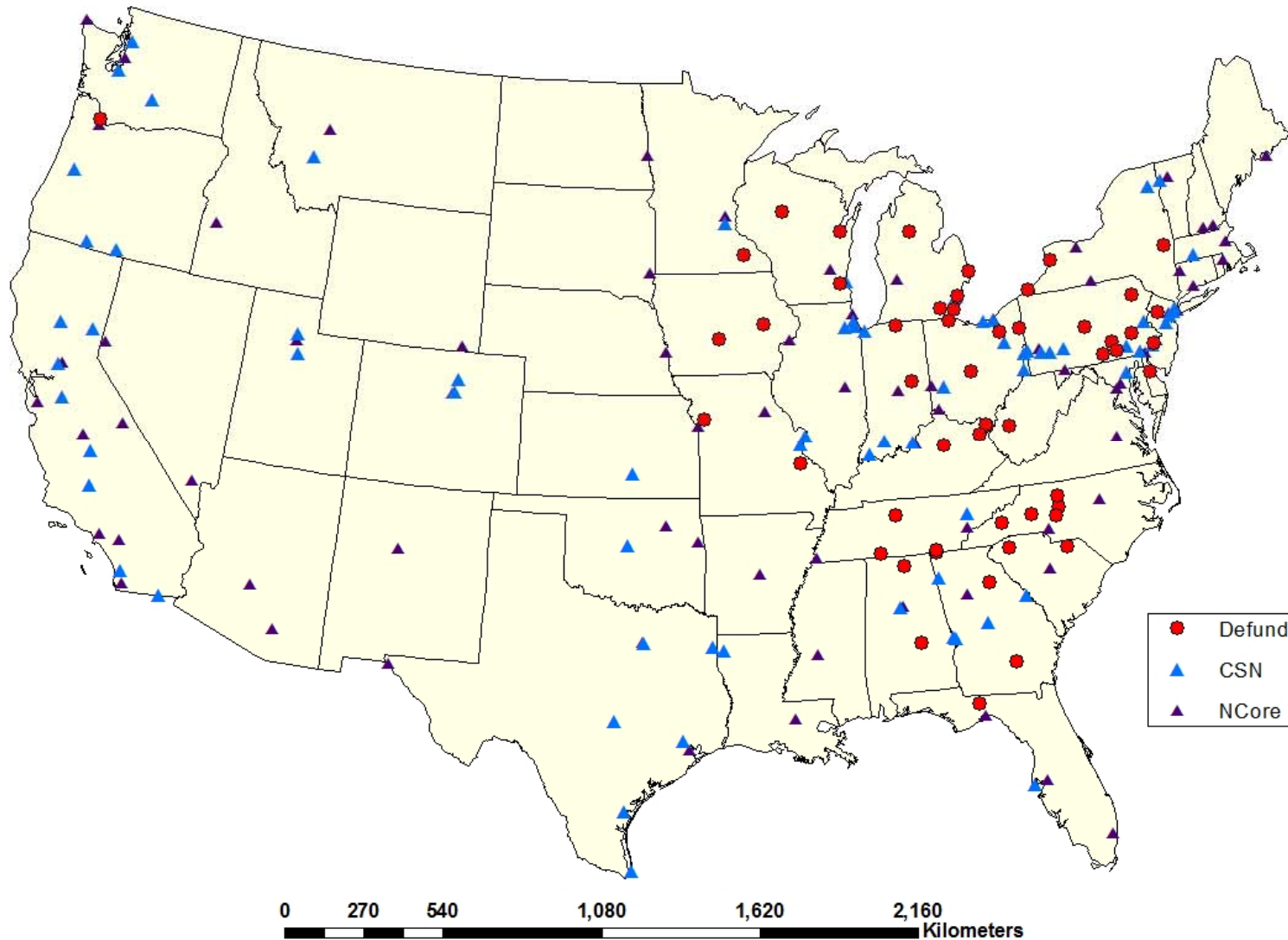
Appendices

- Map of Speciation Sites (including 53 recommended for defunding)
- Map of CSN Sites (including 53 recommended for defunding)
- Map of Speciation Sites (excluding 53 recommended for defunding)
- Map of 53 CSN Sites Suggested for Defunding

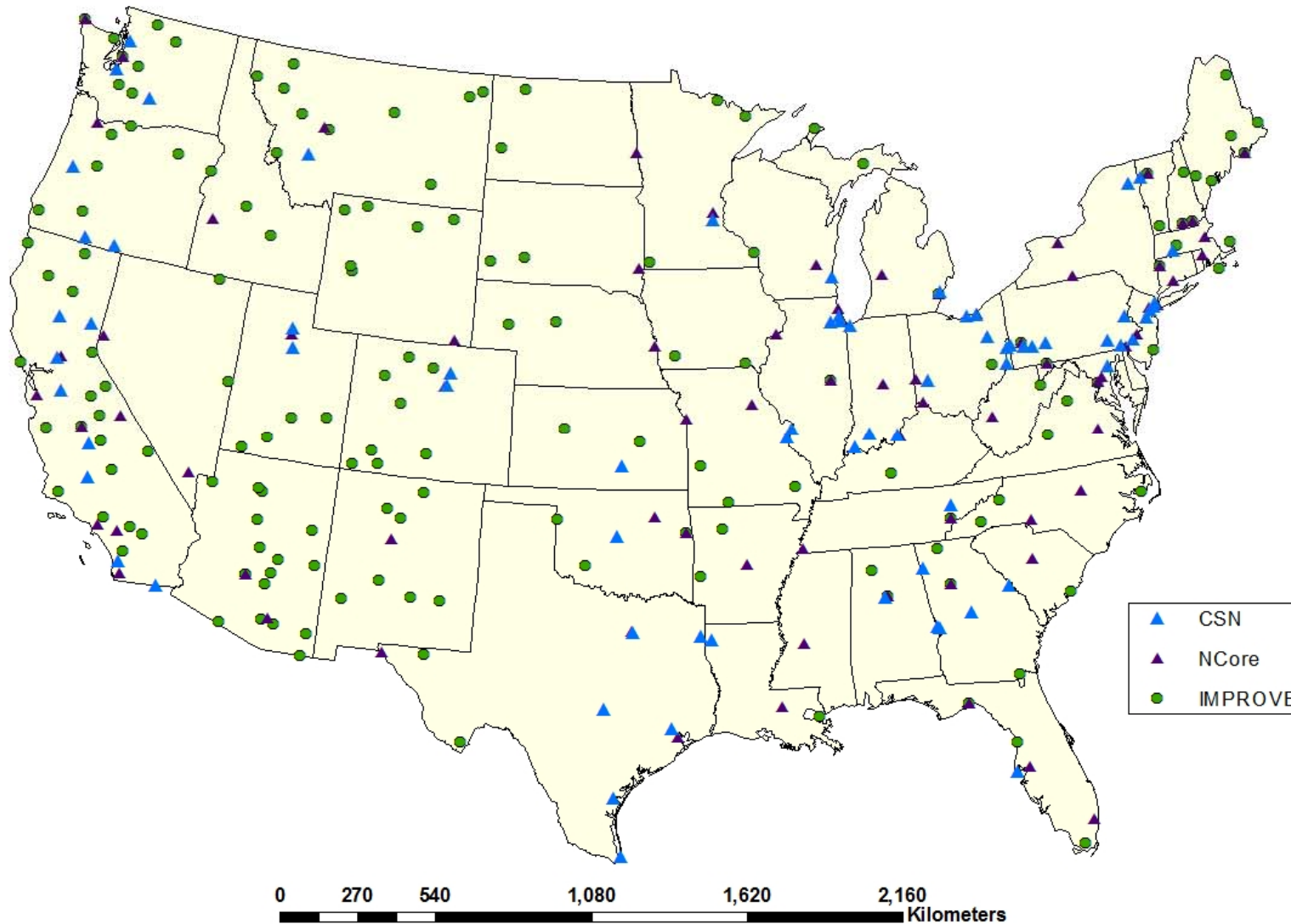
Map of Speciation Sites



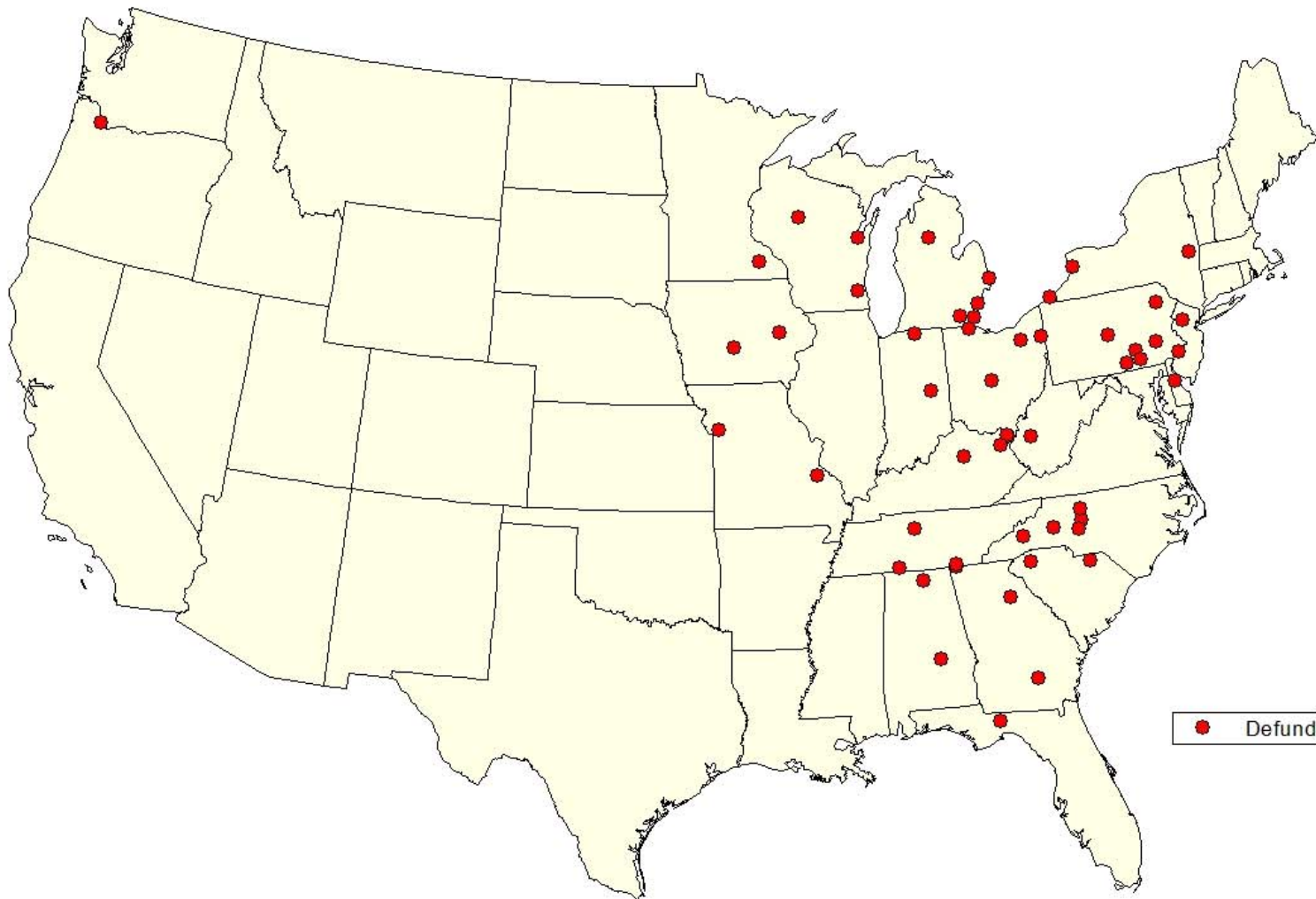
Map of CSN Sites



Map of Speciation Sites



Map of 53 CSN Sites Suggested for Defunding



0 270 540 1,080 1,620 2,160 Kilometers