

# Restoration of Brook Trout across Their Native Range Using Fish Toxicants and Electrofishing: Are We Successful Ecologically and Socially?

By Matt Kulp & .....

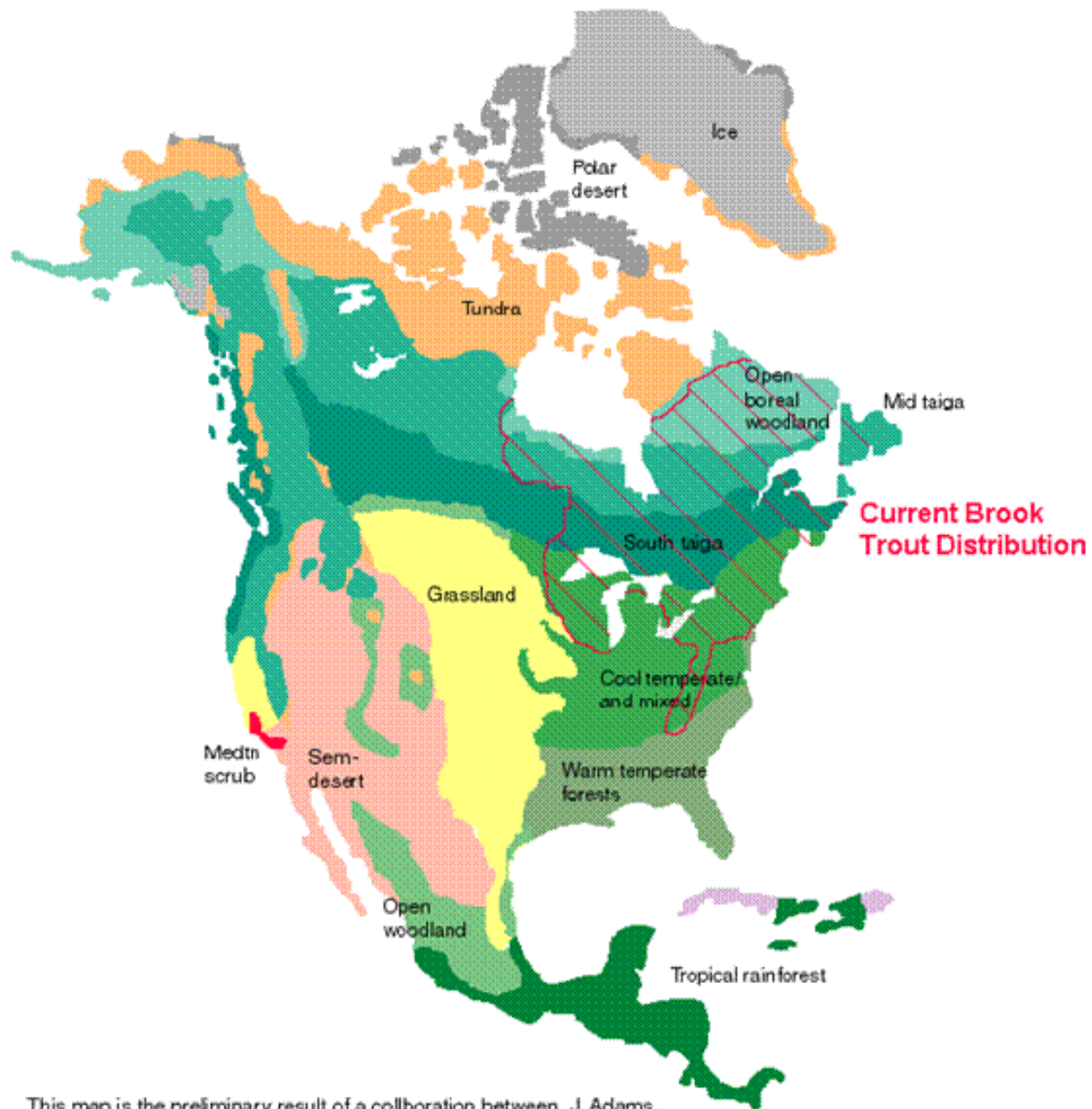
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# Special Thank-You to all the co-authors:

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This map is the preliminary result of a collaboration between J. Adams, A. Beaudoin, O. Davis, P & H. Delcourt & P. Richard.

## Background

- Only salmonid (other than Atlantic Salmon) native to eastern U.S.
- Northern populations (PA north) “reset” by last glacial advance (20k-30k years ago); southern population isolated for >2.5 my (probably since Pleistocene).



Extinct in 2015?



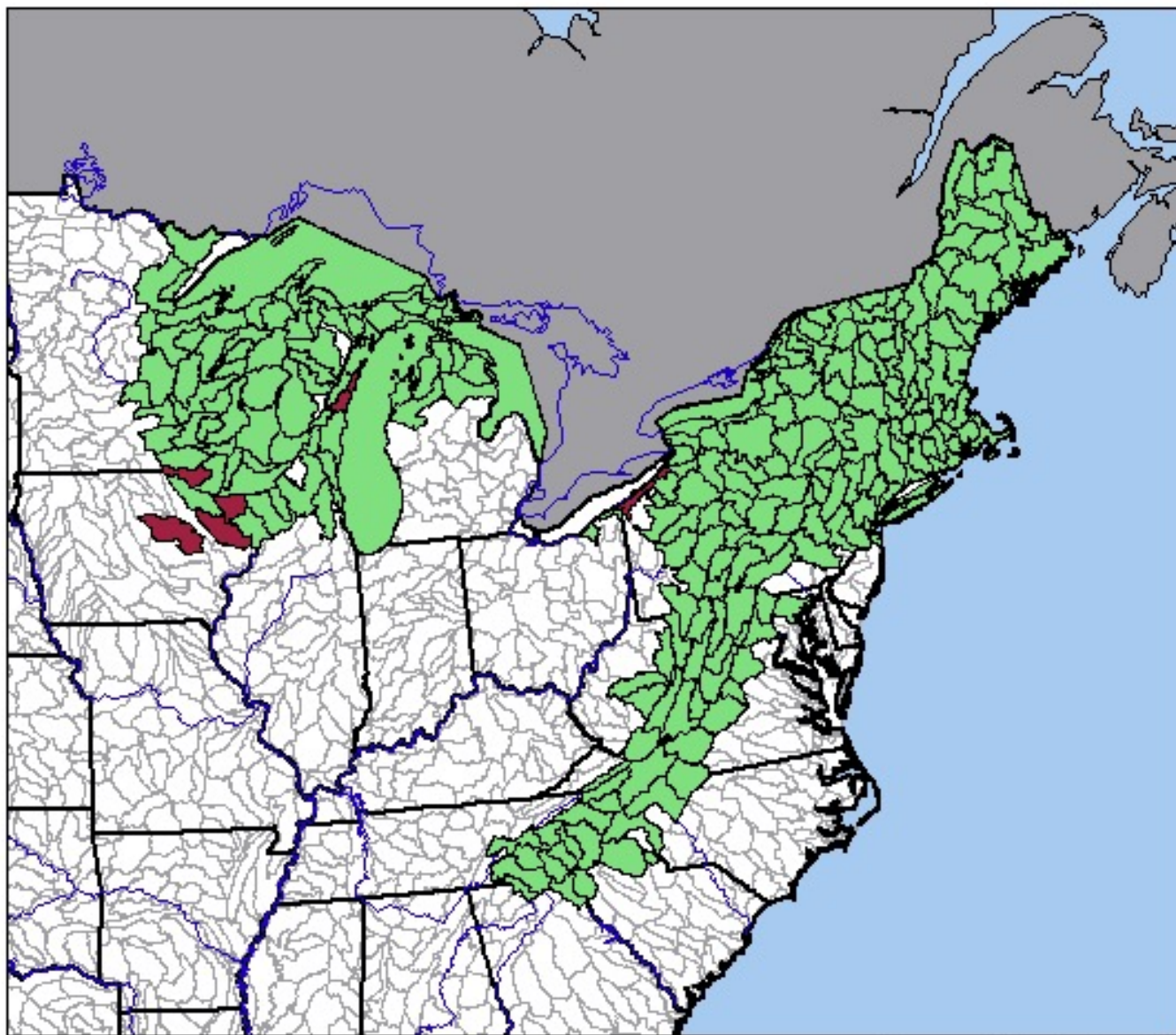
Help Save The Salters!  
Santuit Salter Brookie  
Cotuit / Mashpee, MA









## Background


- Only salmonid (other than Atlantic Salmon) native to eastern U.S.
- Northern populations (PA north) “reset” by last glacial advance (20k-30k years ago); southern population isolated for >2.5 my (probably since Pleistocene).
- Several different life history forms.
- Unique and highly differentiated microsatellite genotypes across the range suggesting multiple population groups (Kazyak *et al. In Press*).
- Remaining “Sky Island” populations highly fragmented with little to no metapopulation structure remaining.





-  Administrative Boundary
-  Major Rivers
-  Hydrological Unit
-  Current Distribution
-  Extirpated/Possibly Extirpated
-  Out of Scope

*Salvelinus fontinalis*  
Brook Trout

100 0 100 Kilometers  


Map created September 2010



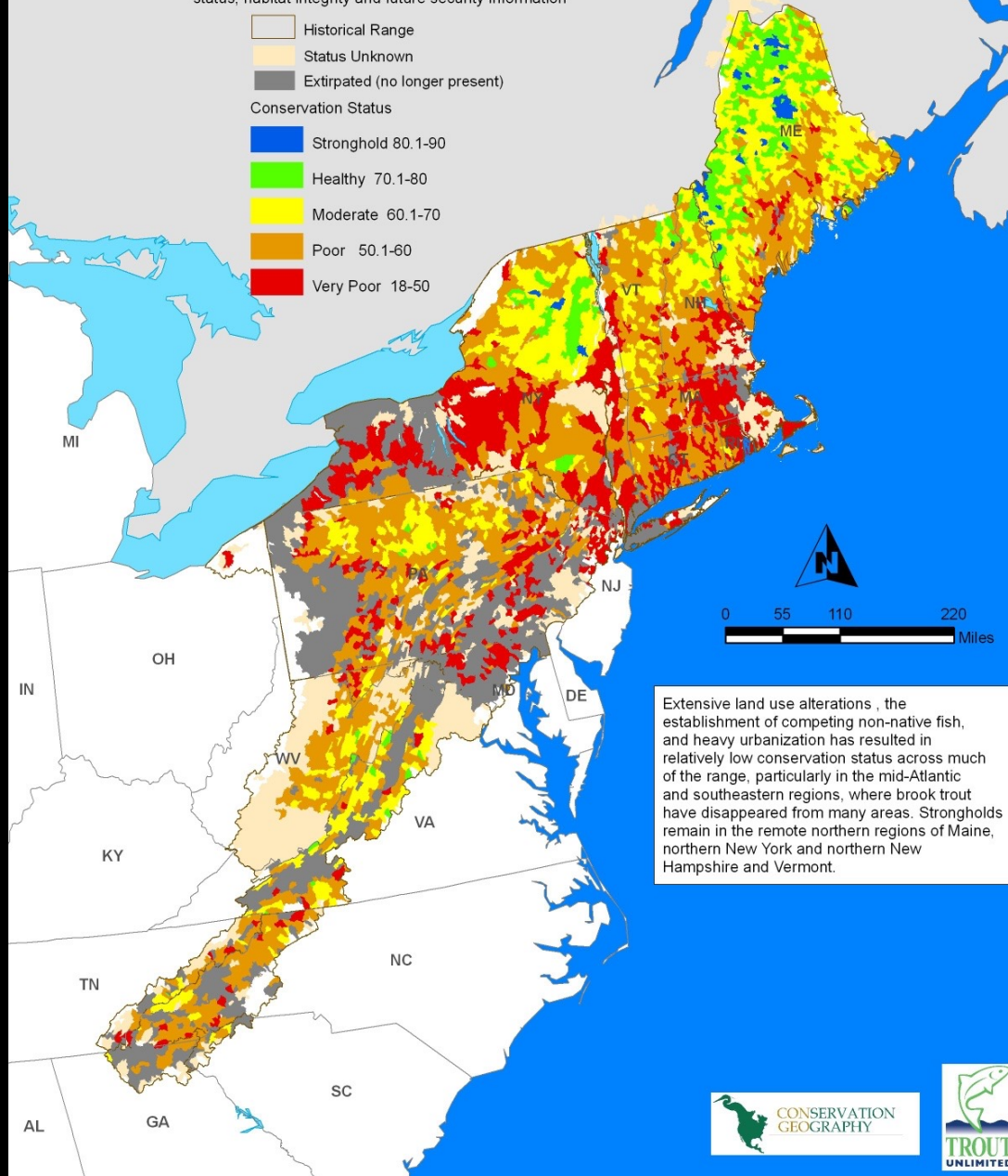
# Eastern Brook Trout Health

Conservation Status based on historical range, current population status, habitat integrity and future security information

- Historical Range
- Status Unknown
- Extirpated (no longer present)

## Conservation Status

- Stronghold 80.1-90
- Healthy 70.1-80
- Moderate 60.1-70
- Poor 50.1-60
- Very Poor 18-50



Extensive land use alterations, the establishment of competing non-native fish, and heavy urbanization has resulted in relatively low conservation status across much of the range, particularly in the mid-Atlantic and southeastern regions, where brook trout have disappeared from many areas. Strongholds remain in the remote northern regions of Maine, northern New York and northern New Hampshire and Vermont.



# Primary Threats to Brook Trout

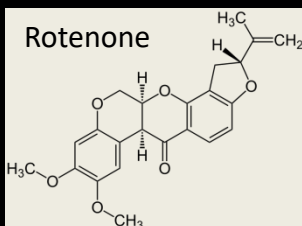
Rank	Disturbances	Number of Subwatersheds	Percent of Subwatersheds
1	Poor Land Management – Ag*	1,647	37%
2	High Water Temperature	1,629	36%
3	Sedimentation (Roads)	1,225	27%
4	≥1 Non-Native Fish Species**	1,189	26%
5	Urbanization	1,141	25%
6	Riparian Habitat	1,029	23%
7	Brown Trout	853	19%
8	Stream Fragmentation (Roads)	767	17%
9	Dam Inundation/ Fragmentation	705	16%
10	Forestry	642	14%

*Source:* Trout Unlimited. 2006. Eastern Brook Trout: Status and Threats. EBTJV

# Historical Restoration Efforts – Pre-1989



- NY among the first eastern agencies to use *rotenone* for Brook Trout restoration
  - ✓ 1952-1954: West Branch St. Regis River project included 14 lakes and 21 miles of streams
  - ✓ Also constructed four barrier dams
  - ✓ NY treated nearly 125 lakes and ponds by 1975
- USFWS used *rotenone* to remove “trash fish” in GRSM to create trophy rainbow trout fishery
- USFWS and some states used *angling, backpack electrofishing, rotenone* and *cresol* with minimal success



# Contemporary Restoration Efforts?



## EBTJV Conservation Strategy

1. Maintain the current number of intact watersheds.
2. Establish self sustaining brook trout populations in 10% of the known extirpated watersheds.
3. Change the classification of 30% of the watersheds.
4. Maintain and improve 70% of watersheds.
5. Determine status of unknown watersheds to validate the model used to predict unknown watersheds.



*Gary Verholek*

## Purpose of the Study

*To summarize the history of Brook Trout restoration in the eastern U.S. using fish toxicants, electrofishing and translocation & to assess public opinion of these projects.*

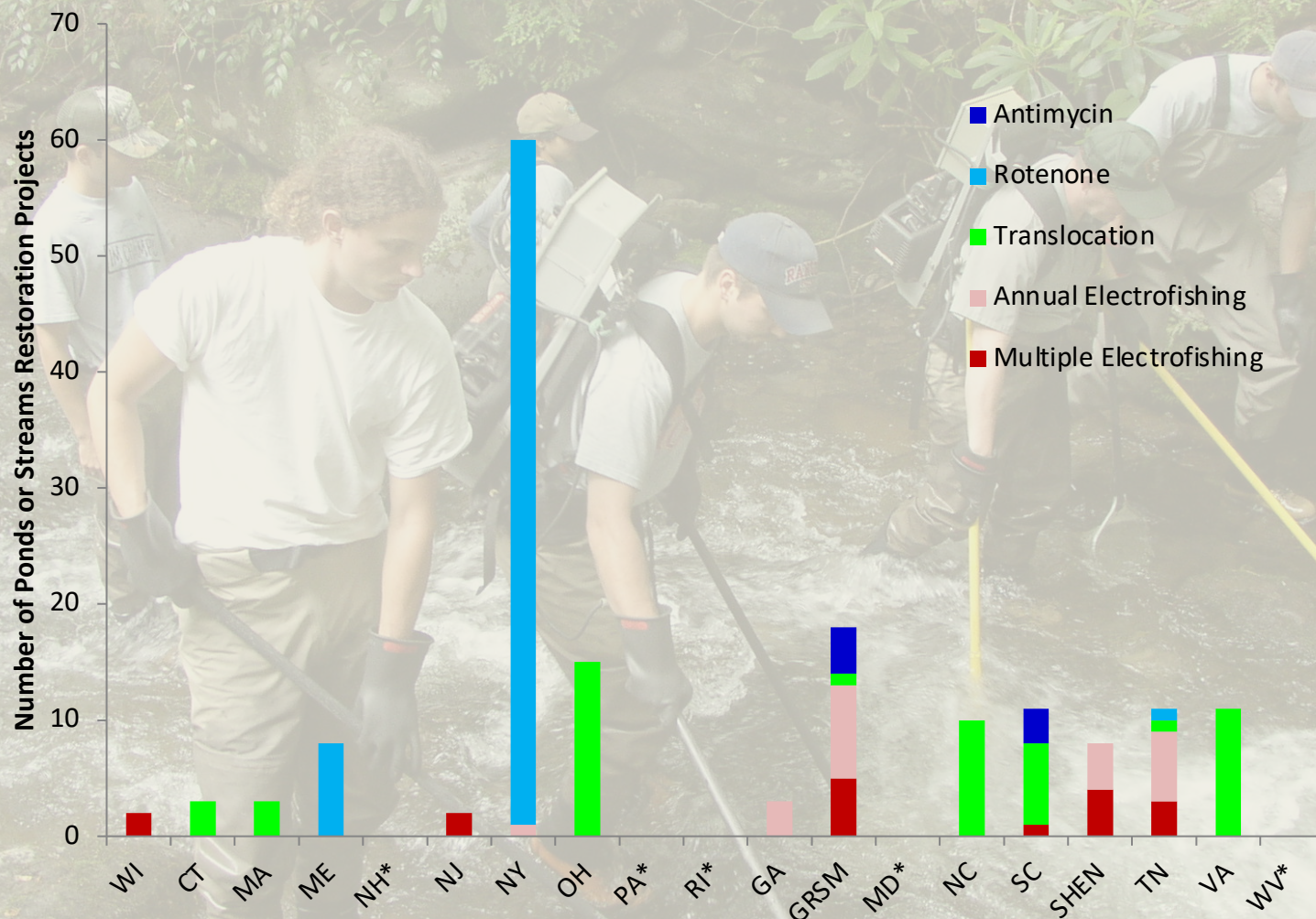


# Contemporary Restoration Efforts - 1990 to Present

Agency	N	Number (N) of Restoration Projects (% Successful)						Total
		Fish Toxicant – Antimycin	Fish Toxicant – Rotenone	Annual Removal Electrofishing	Multiple Removal Electrofishing	Translocation	No Project	
State Agency	17	3 (67%*)	68 (79%)	10 (80%)	8 (50%)	51 (73%)	5	140
National Parks	2	4 (100%)	0	12 (42%)	9 (78%)	1 (100%)	0	26
TOTAL	19	7 (86%)	68 (79%)	22 (55%)	17 (65%)	52 (73%)	5	166

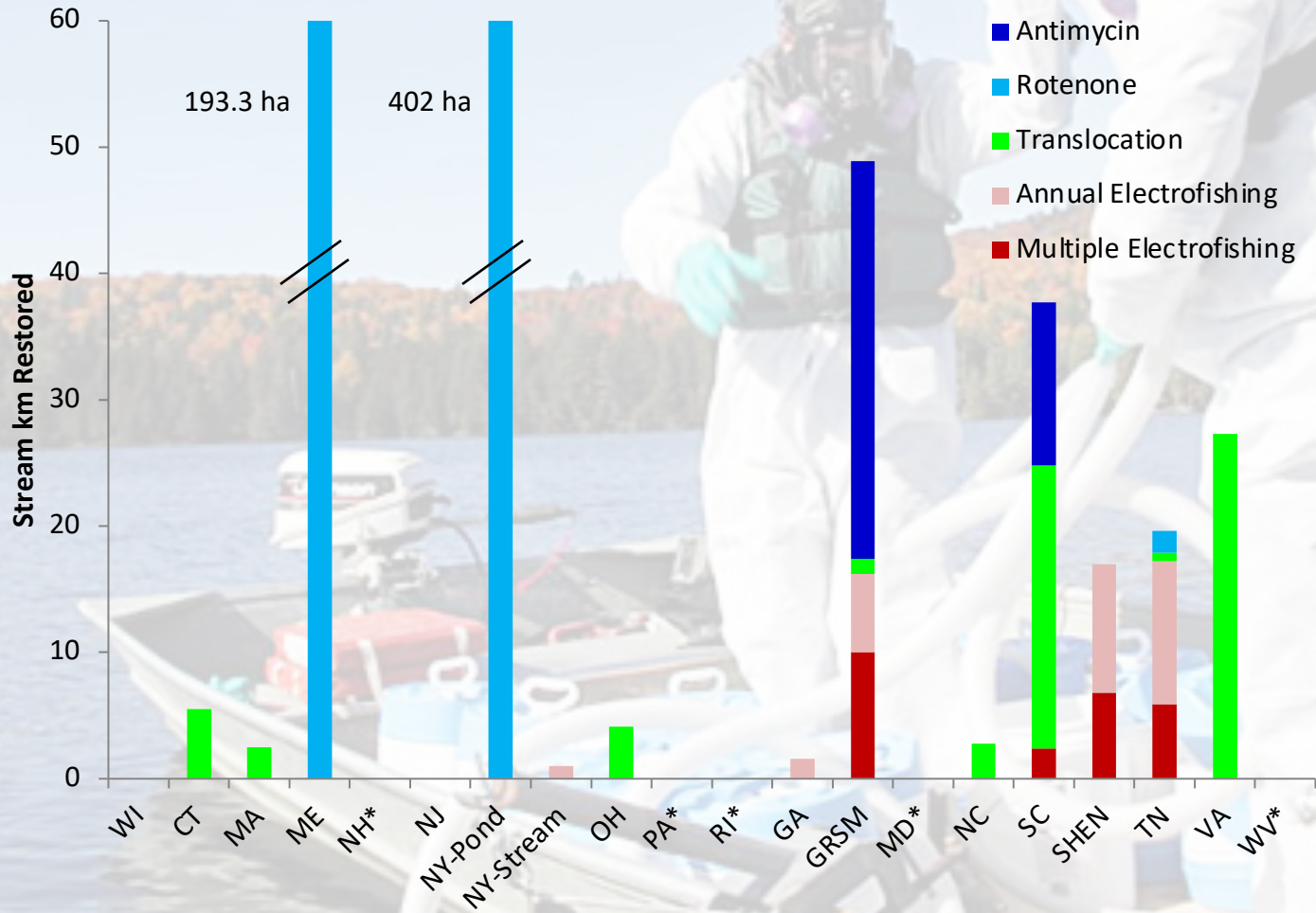
- 12 of 17 states (71%) and both NPS units (100%) have conducted restoration projects
  - ✓ NH, PA, MD, RI and WV reported no restoration projects
- Rotenone was most used technique; mostly pond projects in NY & ME (99% of projects)
  - ✓ Antimycin used in streams (6) (86% successful)\* [*bad product*]
  - ✓ Rotenone used in ponds (68) and stream (1) (79% successful)
- Translocation to fishless streams was second most used restoration technique
  - ✓ Used by 7 of 13 states (54%) and both NPS units (73-100% successful)
- Annual and multiple electrofishing removals was third most used technique
  - ✓ Used by 6 of 13 states (46%) and both NPS units
  - ✓ Multiple removal success (50-100%) generally higher than annual removal success (33-100%)

# Contemporary Restoration Efforts – Number of Projects



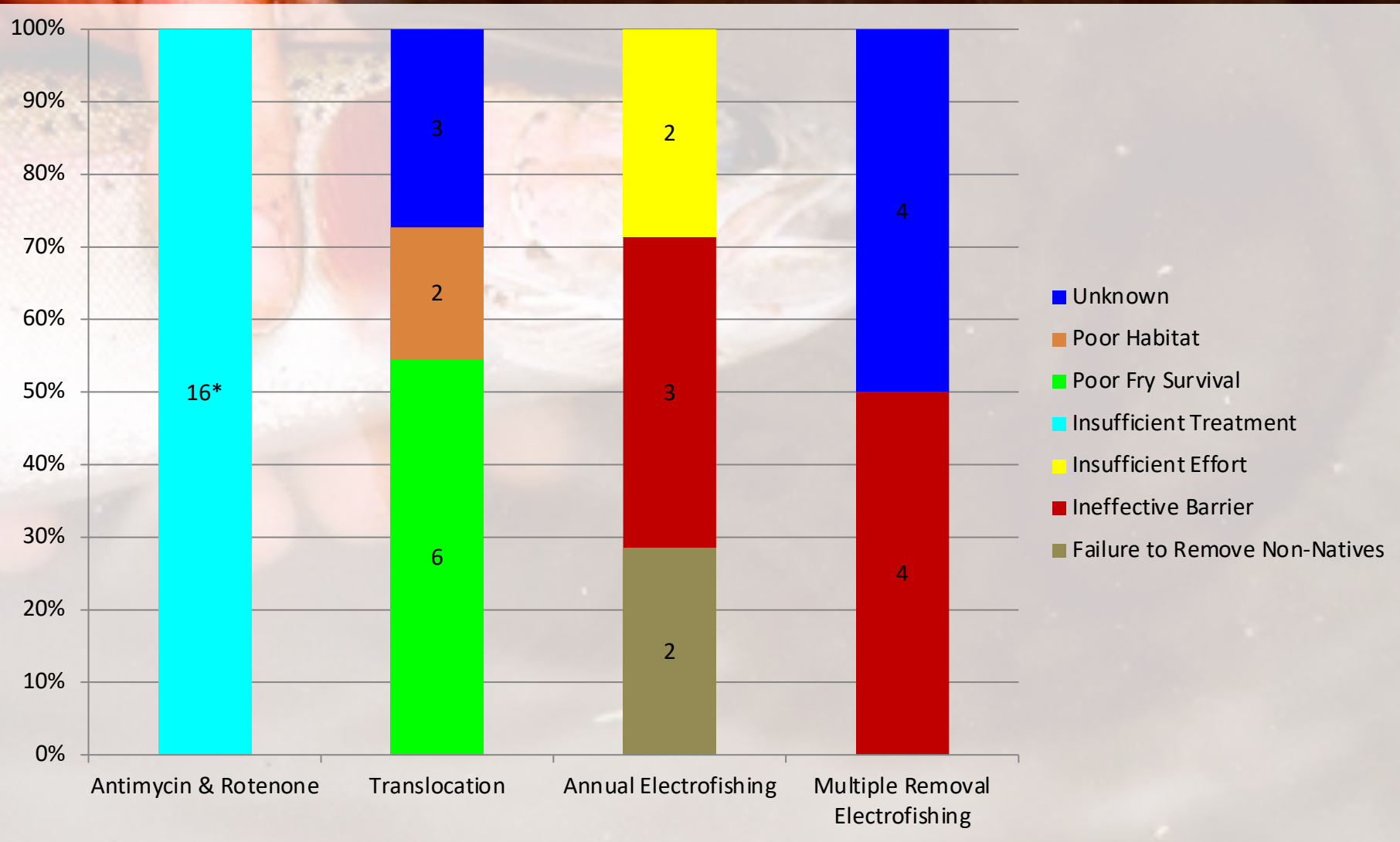
\* No restoration projects initiated

# Contemporary Restoration Efforts – Stream Km Restored



\* No restoration projects initiated

# Contemporary Restoration Efforts – *Why Did They Fail?*



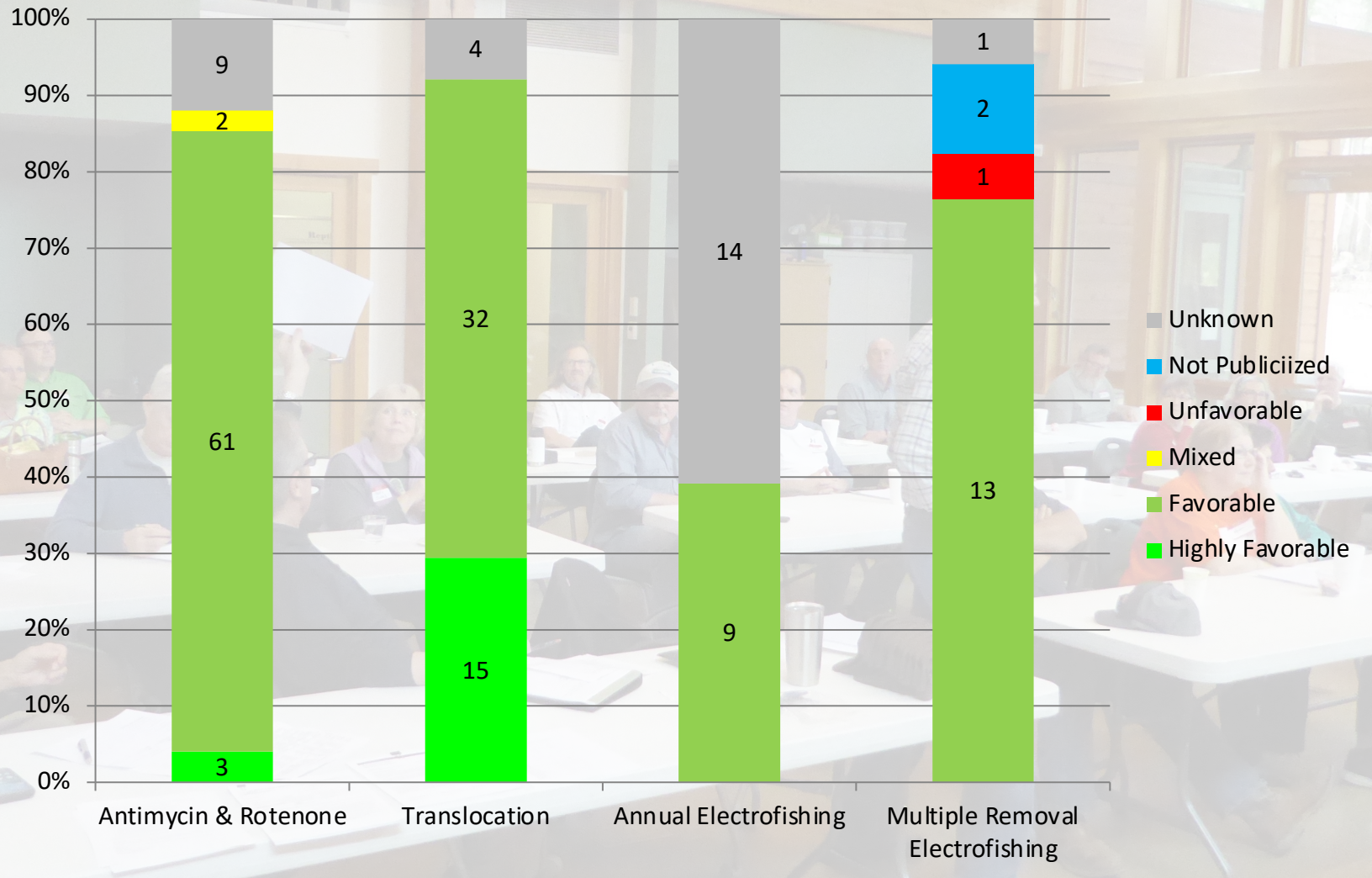


# Contemporary Restoration Efforts – *What's the cost?*



AUG 19 2005

# Public Perception – Is the public on board?



# Public Perception – *What is the public concerned about?*

## *Sams Creek, GRSM (2001)*

- 41 Responses to EA (33 in favor; 8 opposed)
- 2 Petitions opposed (42-187 signatures)
  - ✓ Did not oppose use of antimycin – *opposed replacing “perfectly fine rainbow trout population” with brook trout population (similar in state agencies)*
- 6 State/Federal Agencies in favor; 13 NGO’s in favor (2 opposed)
- Public opinion very favorable after completed

## *Lynn Camp Prong, GRSM (2008)*

- Most public opinion favorable, however...
- Lower 3.6 km of 10.2 km treatment area was sabotaged (2010)
- Assailants used horses and coolers to transport adult hatchery and wild rainbow 4.0 km upstream to trail crossing
- Assailants were frustrated with U.S. Govt. over historical removals from family lands and through they would *“stick it to the man”*
- Led to extensive public meeting campaign, with emphasis on preserving natural *“heritage”* of Smokies
  - ✓ Public was generally mad the project was sabotaged
- Lower 4.8 km was re-treated in 2011; has remained intact since

# Public Perception – *What is the public concerned about?*

## *NY DNR (2001)*

- Mixed bag of responses
- *Positive* perception of eradicating invasive species in favor of natives
- *Negative* perception regarding state agency “poisoning” fish

## *TN Wildlife Resources Agency (TWRA), GA DNR, VA Dept. of Game and Inland Fisheries (VDGIF); CT Dept. of Energy & Enviro. Protection; NJ Div. of Fish & Wildlife; WI DNR (WI DNR)*

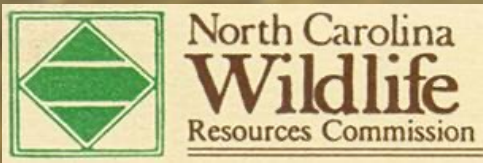
- Favorable; No negative reactions to either technique
- Little to no public notification (i.e. “Flying Under the Radar”)
- 20% of WI anglers were unaware of BKT restoration efforts; 48% heard of it but knew nothing about it, 33% were familiar
  - Of 33% of WI BKT anglers familiar with program, 79% were satisfied (9% dis)

## *NC Wildlife Resources Agency (NCWRC)*

- Brook trout restoration “of high importance to trout anglers” in statewide surveys (Responsive Management 2007)
  - ✓ NCWRC survey indicated “importance of restoration” > “performance”

# Summary

- Southern (71%) and northern (66%) states both conducted restoration projects
  - ✓ Northern states restored 595 ha of ponds/lakes and 5 km of streams
  - ✓ Southern states restored 135 km of streams
- Rotenone was used in most projects (68), translocation (51), annual electrofishing (22) and multiple removal electrofishing (17)
  - ✓ 99% of rotenone project in NY & ME
- Leading cause of project failure changed with technique:
  - ✓ Antimycin/rotenone: *Insufficient treatment*
  - ✓ Translocation: *Poor fry survival*
  - ✓ Annual electrofishing removals: *Ineffective barrier*
  - ✓ Multiple electrofishing removals: *Ineffective barrier/Unknown*
- Public perception Favorable to Highly Favorable in most projects
  - ✓ Most restoration projects viewed favorably *if the public is aware*
  - ✓ Many agencies provide little/no public awareness of restoration projects
  - ✓ WE ARE OUR OWN WORST ENEMIES!
- Variety of effective techniques available to managers
  - ✓ Funding sources available for restoration projects (i.e. EBTJV, NFWF, TU EAS, DOI SCC)
  - ✓ Projects meet 3 of 5 EBTJV Conservation Strategies, State Fish Plans (i.e. typically score high)



# Thank You

