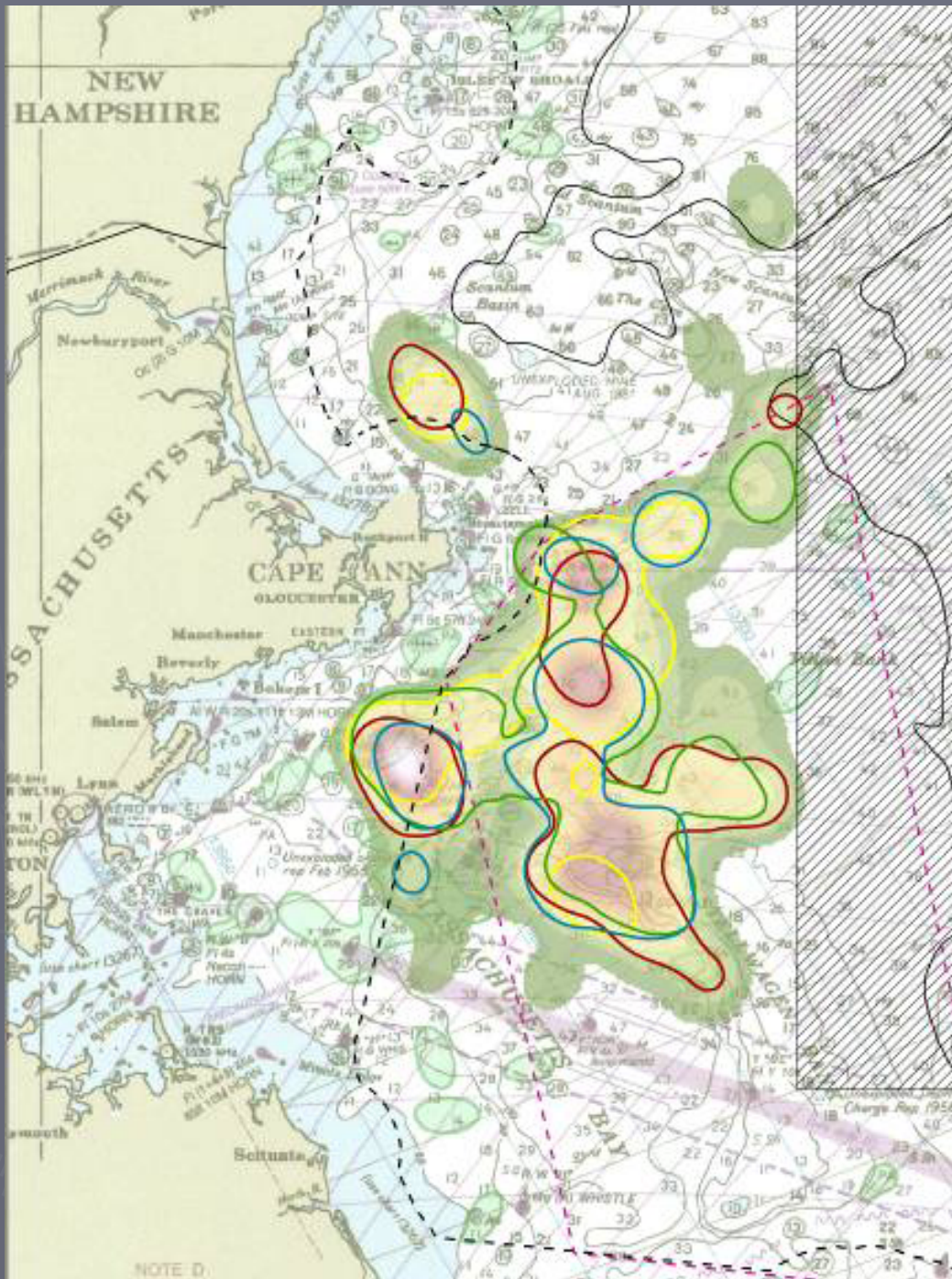


# Integrating Community Use of Fisheries into Marine Ecosystem Based Management

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# Introduction

Marine Ecosystem-Based Management should account for resource use by humans

Many MEBM efforts backend human resource use into the process, especially the mapping components

(see Arkema et al. 2006 for analysis of MEMB efforts)

# Problem

How can human use of marine resources be front ended into MEBM efforts?

Context: Generating a network of marine reserves in maritime NE US and Canada

# Background

Conservation Law Foundation and World Wildlife Fund – Canada (2006) proposed Maritime NE US and Canada reserve network

- Marxan based reserved selection process
- Biological and physical characteristics
- People not incorporated into process

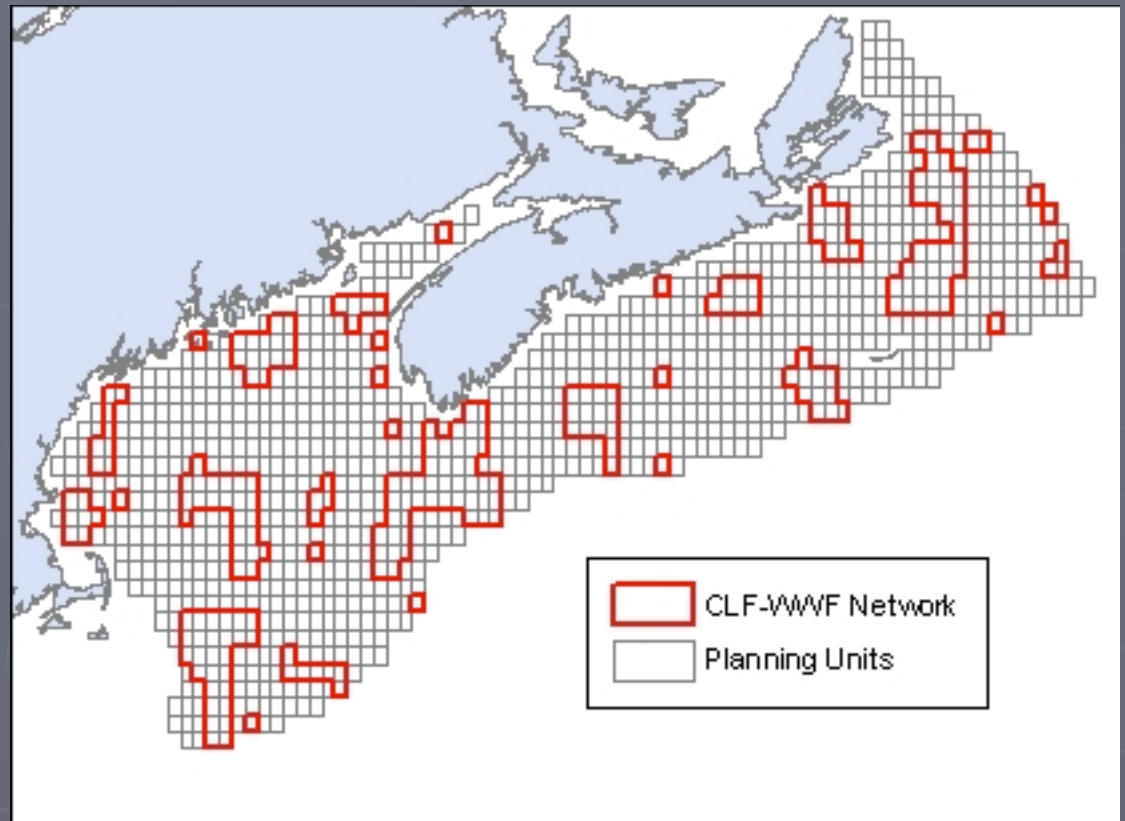
# Proposed Reserve Network

10 minute square  
planning units

Marxan selects network  
with lowest score

$$\text{Score} = \underbrace{\sum_{i=1}^n \text{cost}_i}_A + \underbrace{\text{BLM} \times \sum_{i=1}^n \text{boundary}_i}_B + \underbrace{\sum_{i=1}^n \text{CFPF}_i \times \text{penalty}_i}_C$$

All planning units had  
cost of 1 in CLF-WWF  
proposal



# Incorporating Resource Use

Previous work (St. Martin 2008) developed a process to create spatial data layers of fishing effort (based on fisherman days) in the Gulf of Maine and George's Bank – separate layers for different gear types

Could this data be incorporated into CLF/WWF-CA's reserve planning process by altering cost of planning units?

# Effort as Cost

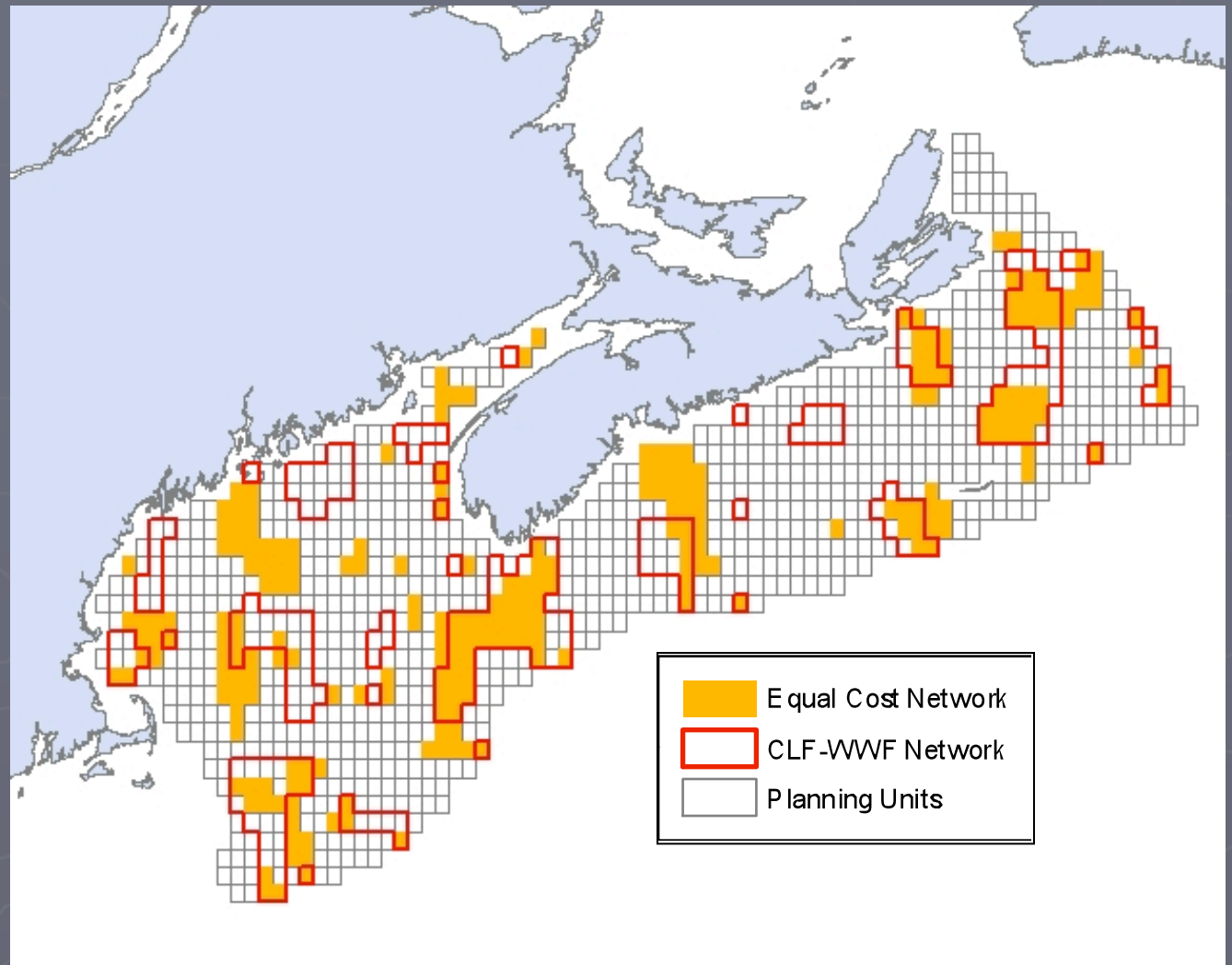
Two implementations:

Any planning unit containing part of 50% effort area for any gear type given cost of 3, otherwise 1

Number of 50% effort areas in each planning unit tallied, increased by 1 and used as cost

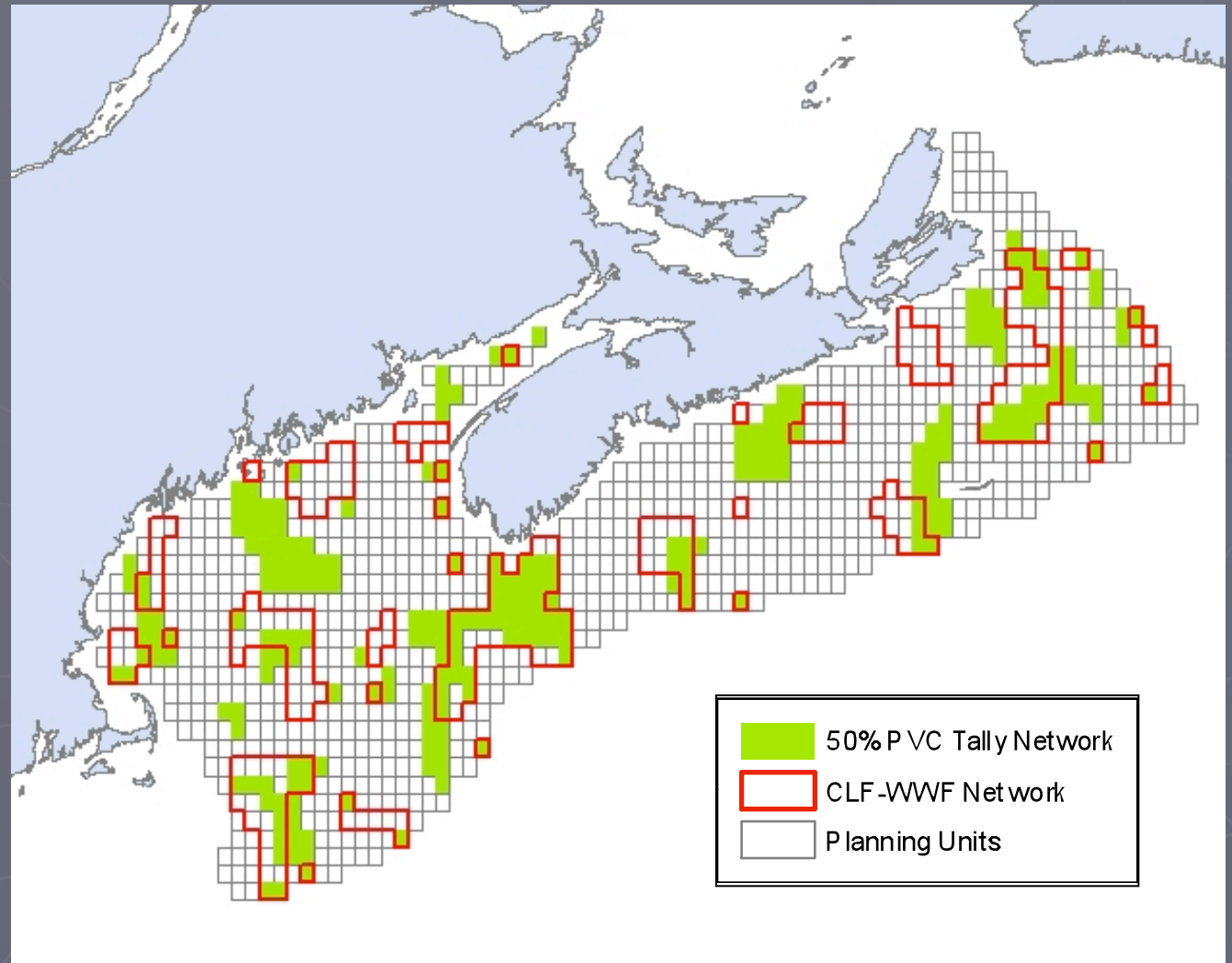
# Results

## Equal Cost Network Results



# Results

## 50% Effort Tally Network Results



# Quantifying Impact

The resultant preserve networks were used to determine the loss of fishing days, based on 2004 vessel trip reports, grouped by gear type and primary port.

# Community Impacts

## Average Percent Fishing Days Lost

### Reserve Network Alternative

Gear Type	CLF/WWF	Equal Cost	Tally
Trawl/Seine	17.8%	9.0%	7.7%
Dredge	3.5%	3.6%	3.5%
Gill Net	19.0%	4.4%	5.5%
Pots/Traps	9.4%	3.8%	5.9%

# Community Impact

Port Summary	Trawl/Seine	Dredge	Gill Net	Pots/ Traps
Number of ports	24	11	13	41
Ports impacted in CLF/WWF Proposal	100.0%	63.6%	92.3%	63.4%
Ports benefiting from Equal Cost Alternative	83.3%	9.1%	84.6%	43.9%
Ports benefiting from Tally Alternative	79.2%	18.2%	69.2%	41.5%
Ports benefiting from both alternatives	83.3%	9.1%	76.9%	36.6%
Ports fairing worse under Equal Cost Alternative	12.5%	18.2%	7.7%	22.0%
Ports fairing worse under Tally Alternative	12.5%	18.2%	15.4%	31.7%
Ports fairing worse under both alternatives	8.3%	18.2%	7.7%	17.1%
Ports neither better or worse	0.0%	27.3%	0.0%	4.9%

# Discussion

Most communities see benefit from integrating effort as cost layer

Those that don't have fishing grounds that conflict with unique conservation resource – limitation of approach

Expandable to anywhere geolocatable data for fishing effort is available

# Conclusions

- ▶ Successful approach
- ▶ Limited by Marxan's structure
- ▶ Data source useful for other methods
- ▶ Potential for public participatory approach

# Acknowledgements/References

Funding provided by the David and Louise Packer Foundation through the Duke University Marine Ecosystem-Based Management Tool Innovation Fund

## References

Arkema, K., S.C. Abramson and B.M. Dewsbury. 2006. "*Marine ecosystem-based management: from characterization to implementation*" *Frontiers in Ecology and the Environment* 4(10): 525-532.

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