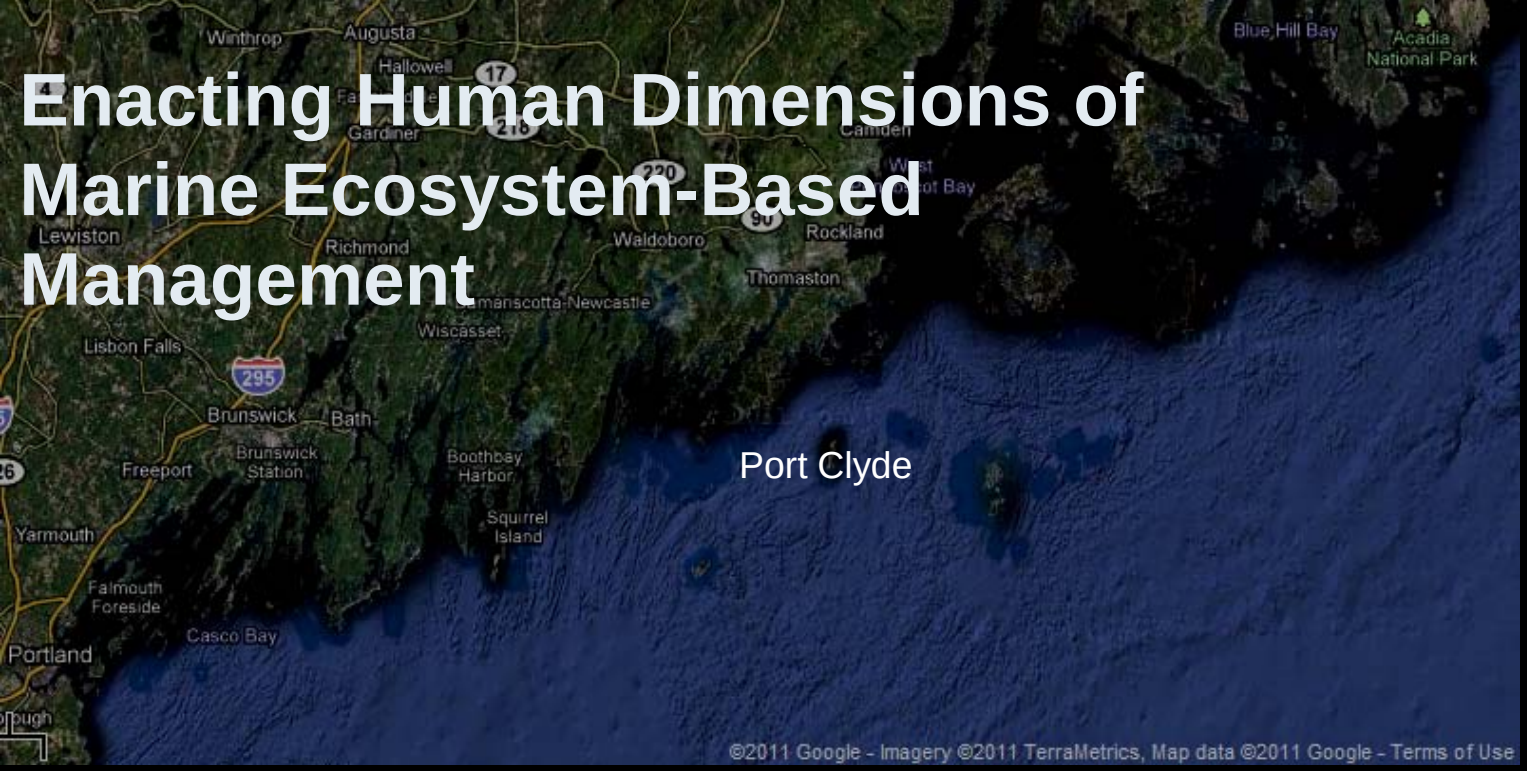
Enacting Human Dimensions of Marine Ecosystem-Based Management



Dr. Kevin St. Martin
Rutgers, University
Department of Geography

Geography and Political Ecology Foundations

- Human Geography
  - Nature/Society
  - Space and Spatial Relationality
  - Mixed Methods

- Political Ecology Approach
  - Political Economy and Environments
  - Economic and Ecological Transformations
  - Critical Analyses of Policy, Management, Capital
  - Power of Representation and Knowledge Systems

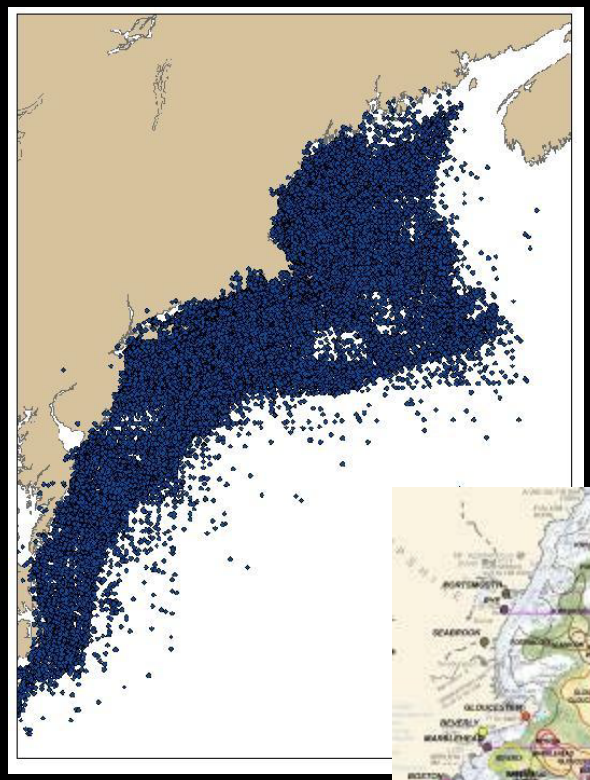
Case of the Marine Environment

- Marine Environments and Fisheries
  - Site of Transformations
  - Centrality and Power Science and Policy
  - Nature of Political Economy being Debated

- Project to Intervene in Debate
  - A “Missing Layer” of Data
  - Create an Ontology of Communities at Sea
  - Mapping Local Dependencies and Knowledges

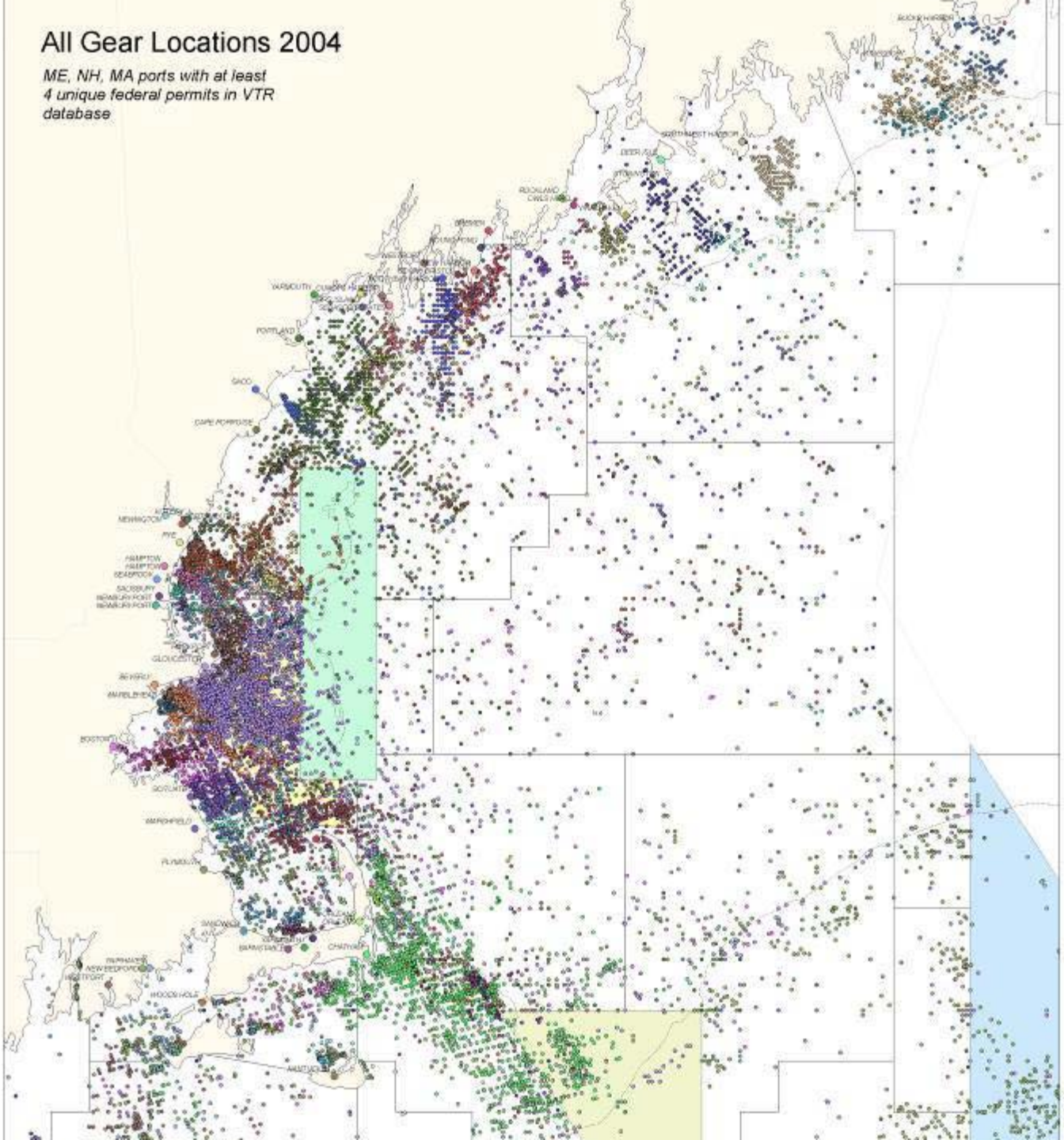
The “Atlas Project”: Mapping Community Resource Areas and LEK

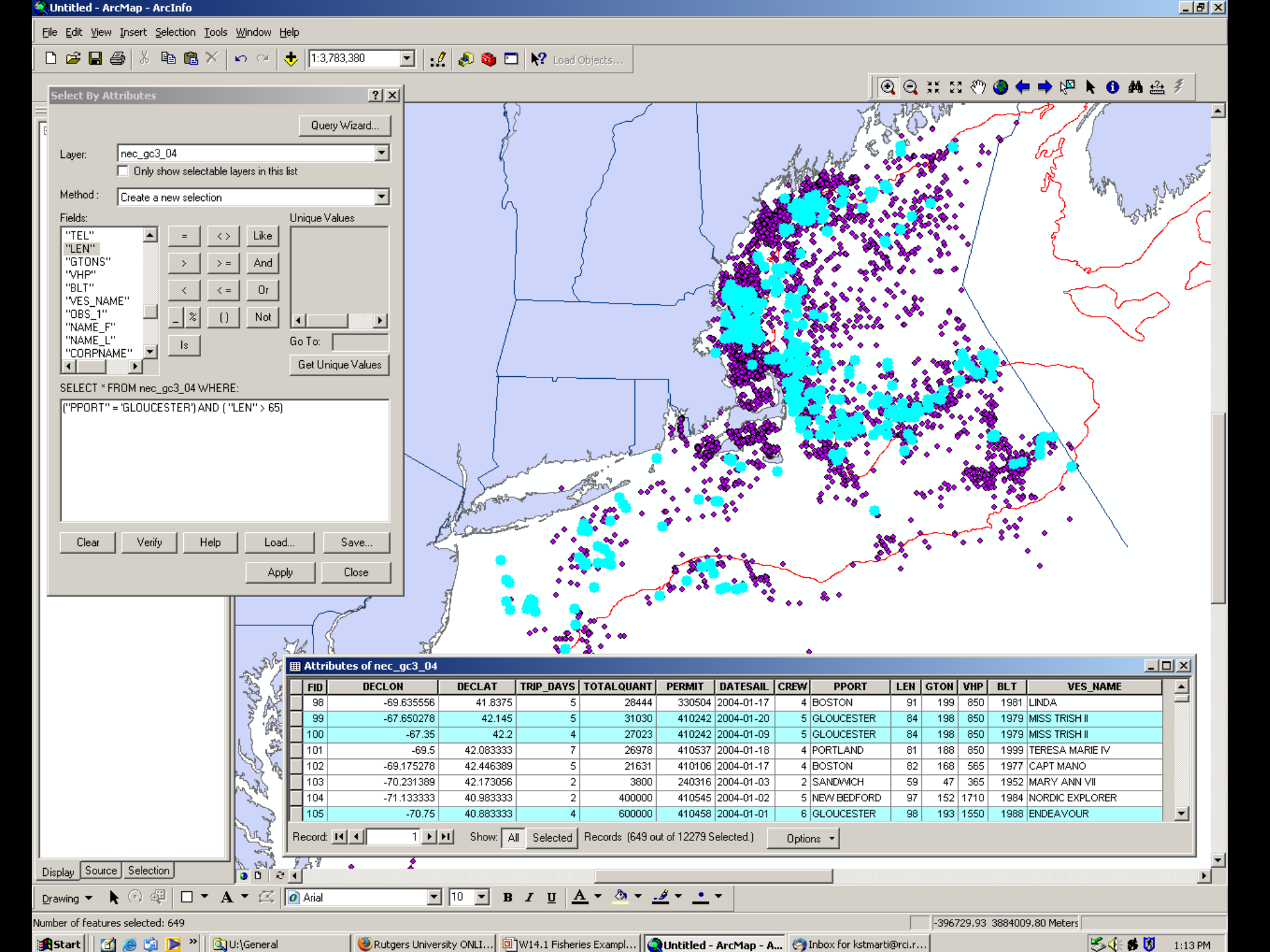
- Mixed method approach.
  - Participatory GIS.
- Began with activity data.
  - Fishing trip locations.
- Linked trip locations to ports.
  - Queried data by “community.”
  - Territories emerged.
  - Fishermen interviewed using resultant maps.



All Gear Locations 2004

ME, NH, MA ports with at least 4 unique federal permits in VTR database

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Query Wizard...
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Only show selectable layers in this list
Method: Create a new selection
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"TEL"
"LEN"
"GTONS"
"VHP"
"BLT"
"VES_NAME"
"OBS_1"
"NAME_F"
"NAME_L"
"CORPNAME"
= <> Like
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Go To:
Get Unique Values
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("PPORT" = 'GLOUCESTER') AND ("LEN" > 65)
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Apply Close
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99 -67.650278 42.145 5 31030 410242 2004-01-20 5 GLOUCESTER 84 198 850 1979 MISS TRISH II
100 -67.35 42.2 4 27023 410242 2004-01-09 5 GLOUCESTER 84 198 850 1979 MISS TRISH II
101 -69.5 42.083333 7 26978 410537 2004-01-18 4 PORTLAND 81 188 850 1999 TERESA MARIE IV
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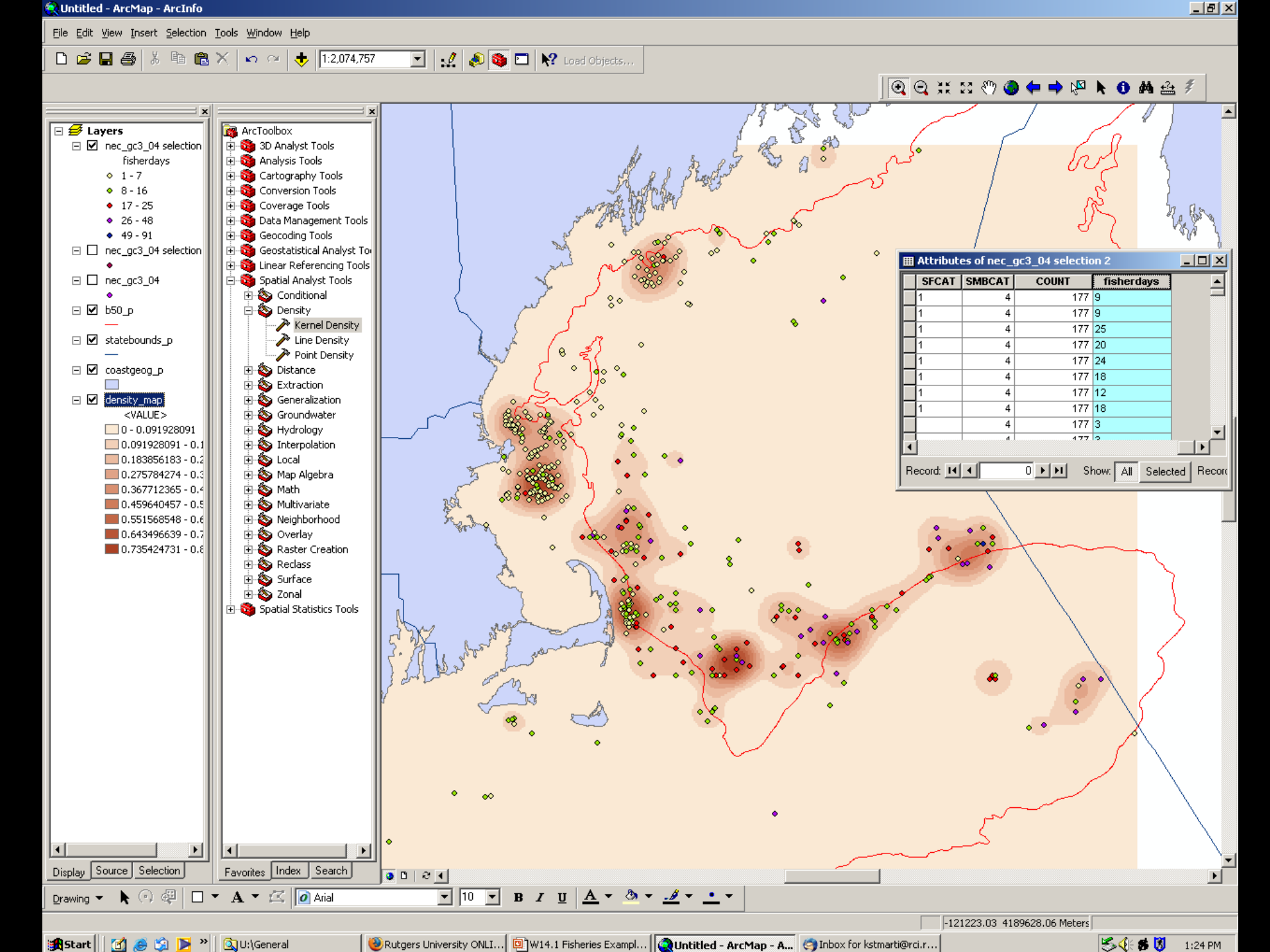
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File Edit View Insert Selection Tools Window Help
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8 - 16
17 - 25
26 - 48
49 - 91
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0.275784274 - 0.3
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0.551568548 - 0.6
0.643496639 - 0.7
0.735424731 - 0.8
Display Source Selection
ArcToolbox
3D Analyst Tools
Analysis Tools
Cartography Tools
Conversion Tools
Coverage Tools
Data Management Tools
Geocoding Tools
Geostatistical Analyst To
Linear Referencing Tools
Spatial Analyst Tools
Conditional
Density
Kernel Density
Line Density
Point Density
Distance
Extraction
Generalization
Groundwater
Hydrology
Interpolation
Local
Map Algebra
Math
Multivariate
Neighborhood
Overlay
Raster Creation
Reclass
Surface
Zonal
Spatial Statistics Tools
Favorites Index Search
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1 4 177 9
1 4 177 25
1 4 177 20
1 4 177 24
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Record: 0 Show: All Selected
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W14.1 Fisheries Exampl...
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Chart 1: Where in the Gulf of Maine do We Fish?

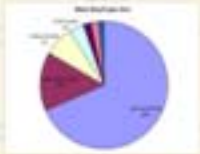
Interview ID: _____

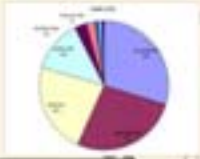
Colors represent numbers of "fisherman days" per square kilometer. Fisherman days are trip length x number of crew on board.

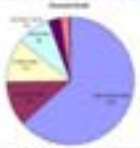
Fisherman days increase from green to pink/white
- No color = virtually no fisherman days
- Green = relatively few fisherman days
- Yellow = significant fisherman days
- Pink = many fisherman days
- White centers = most fisherman days

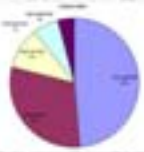
Primary zones are outlined in red (50% of all fisherman days fall within the red lines). Pie charts show percent presence by port in primary zones.

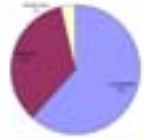
Density surface based on VTR for 8550 trips by 171 vessels.

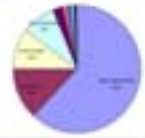


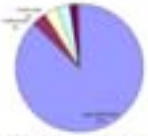










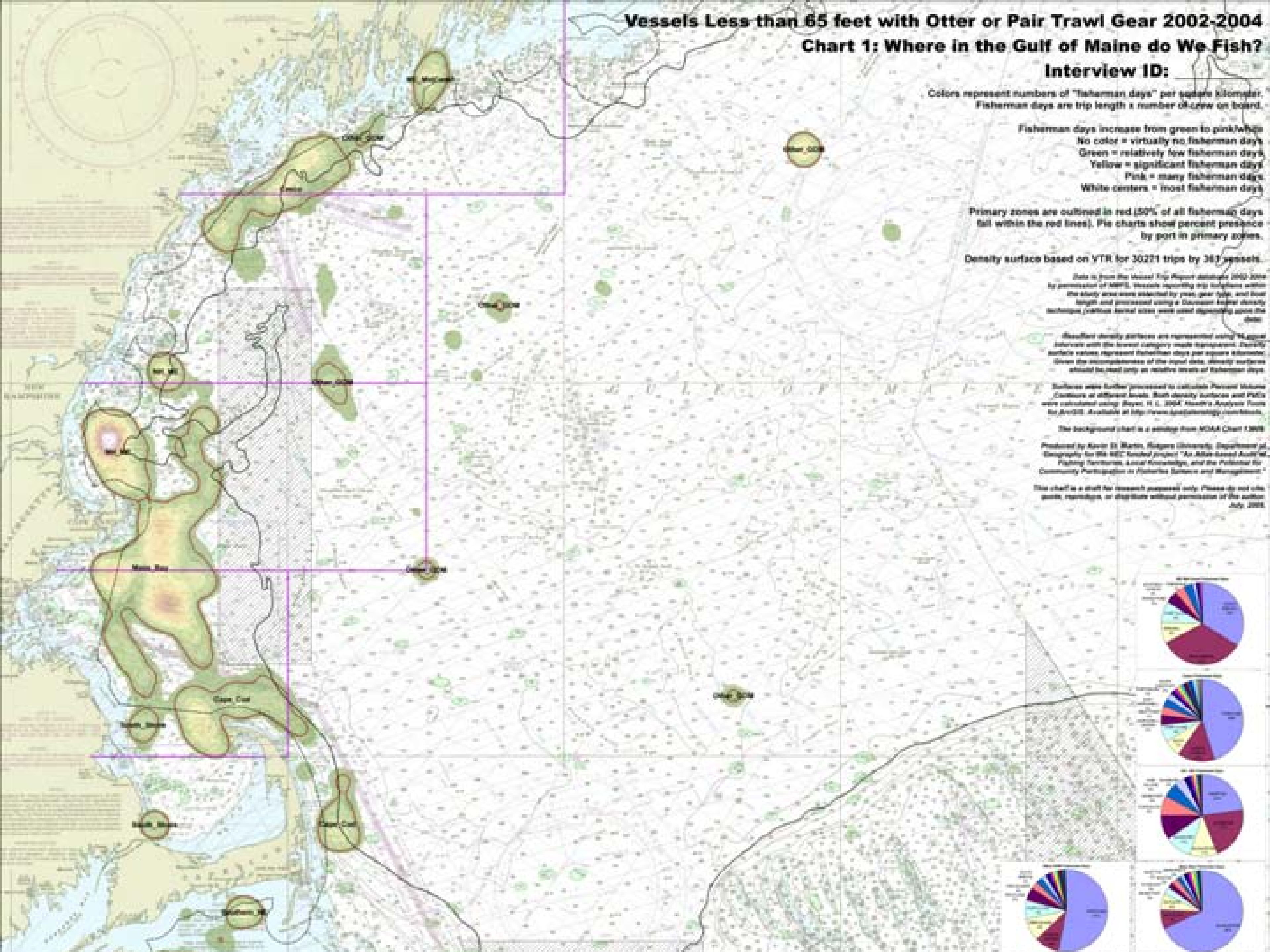


Data is from the Vessel Trip Report database 2002-2004 by permission of NMFS. Vessels reporting trip locations within the study area were selected by year, gear type, and boat length and processed using a Geokkise kernel density technique (various kernel sizes were used depending upon the data).

Resultant density surfaces are represented using 10 equal intervals with the lowest category made transparent. Density surface values represent fisherman days per square kilometer. Given the incompleteness of the input data, density surfaces should be read only as relative levels of fisherman days.

Surfaces were further processed to calculate Percent Volume Contours at different levels. Both density surfaces and PVCs were calculated using: Beyer, H. L. 2004. Hawth's Analysis Tools for ArcGIS. Available at http://www.spatialecology.com/htools.

The background chart is a window from NOAA Chart 13003.


Vessels Less than 65 feet with Otter or Pair Trawl Gear 2002-2004
Chart 1: Where in the Gulf of Maine do We Fish?
Interview ID: ________
Colors represent numbers of "fisherman days" per square kilometer.
Fisherman days are trip length x number of crew on board.
Fisherman days increase from green to pink/white
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Pink = many fisherman days
White centers = most fisherman days
Primary zones are outlined in red (50% of all fisherman days fall within the red lines). Pie charts show percent presence by port in primary zones.
Density surface based on VTR for 30271 trips by 367 vessels.
Mass_Bay
Cape_Cod
G U L F O F M A I N E

Vessels Less than 65 feet with Otter or Pair Trawl Gear 2002-2004

Chart 2: Who Fishes in Which Locations?

Interview ID: ______

Primary zones (or "Home Ranges") are outlined for each port with 4 or more vessels submitting VTRs in 2004. 50% of all fisherman days for the period 2002-2004 fall within the outlined zones for each port.

Home range zones are colored coded and match the color of the port symbol for each of the ports represented.

Large or multiple "home range" zones indicate a wide ranging fleet for a given port while small or few home range zones suggests a fleet with limited travelling. Home range shows the distribution of fisherman days across space; it does not directly show quantity of fisherman days.

Base density surface based on VTR for 30271 trips by 361 vessels.

Data is from the Vessel Trip Report database 2002-2004 by permission of NMFS. Vessels reporting trip locations within the study area were selected by year, gear type, and boat length and processed using a Gaussian kernel density technique (various kernel sizes were used depending upon the data).

Resultant density surfaces are represented using 10 equal intervals with the lowest category made transparent. Density surface values represent fisherman days per square kilometer. Given the incompleteness of the input data, density surfaces should be read only for relative levels of fisherman days.

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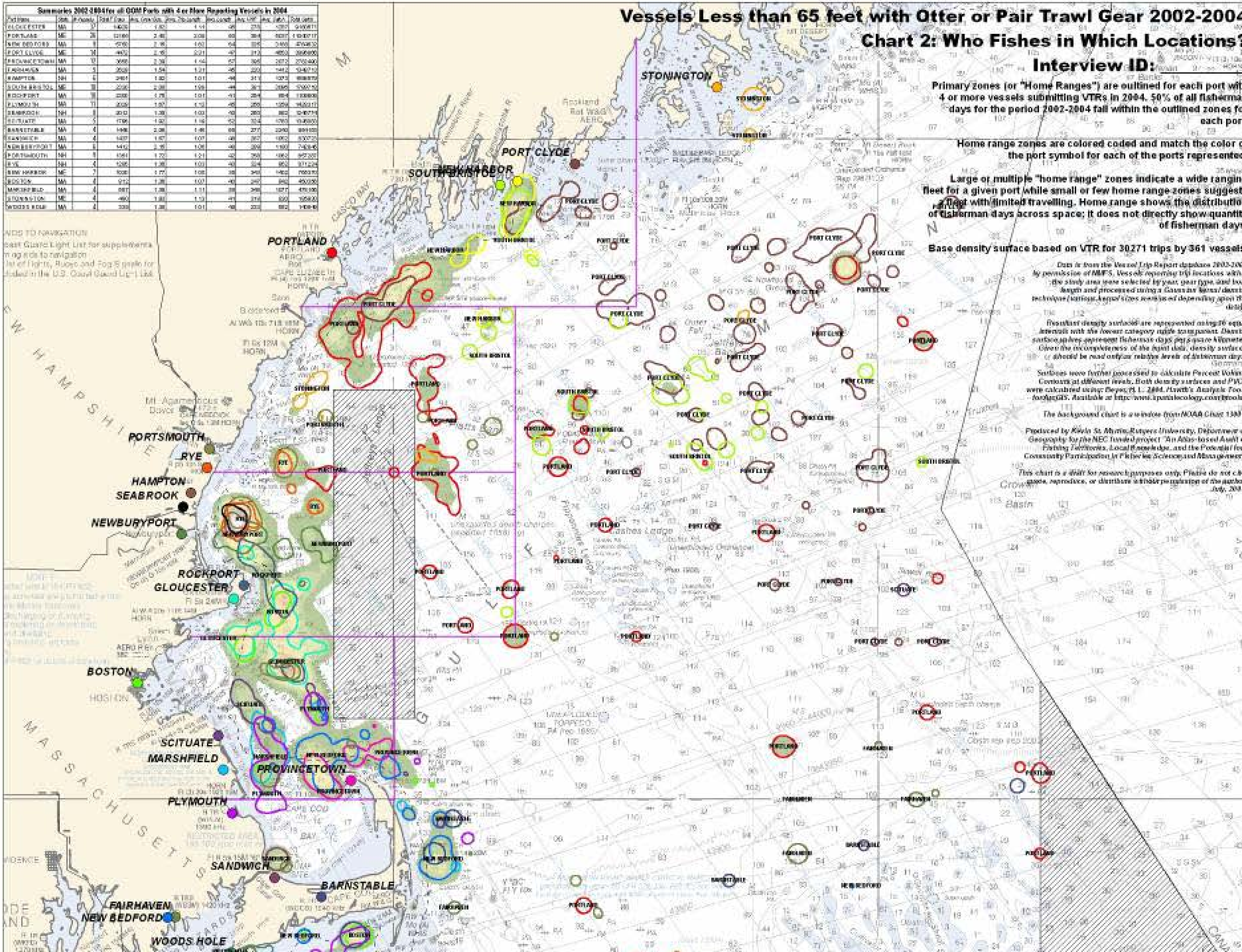
The background chart is a window from NOAA Chart 13009.

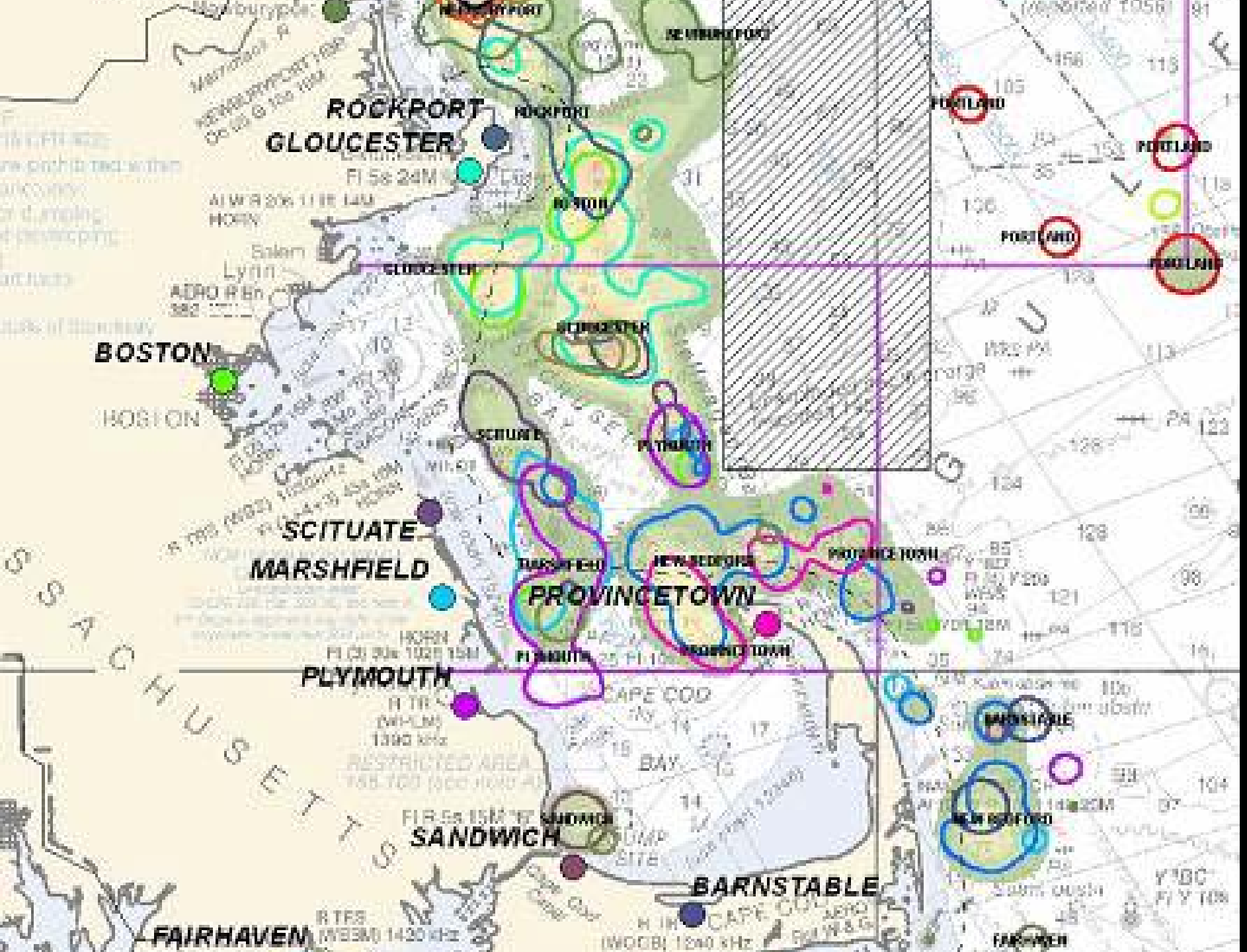
Produced by Kevin St. Martin, Rutgers University, Department of Geography for the NEC funded project "An Atlas-based Audit of Fishing Territories, Local Knowledge, and the Potential for Community Participation in Fisheries Science and Management."

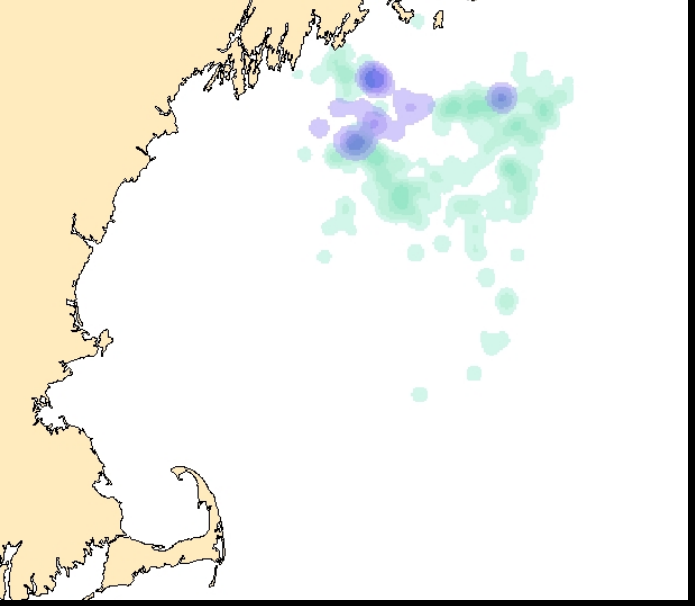
This chart is a draft for research purposes only. Please do not cite, quote, reproduce, or distribute without permission of the author. July, 2005.

Summaries 2002-2004 for all GOM Ports with 4 or More Reporting Vessels in 2004

Port Name	State	# Vessels	Total Days	Avg. Crew Size	Avg. Trip Length	Avg. Length	Avg. HP	Avg. Catch	Total Lbs
GLOUCESTER	MA	37	14626	1.82	1.14	46	275	1267	[illegible]
PORTLAND	ME	26	12160	2.48	2.08	60	364	[illegible]	[illegible]
NEW BEDFORD	MA	9	5268	2.16	1.60	64	335	3466	[illegible]
PORT CLYDE	ME	14	4452	2.16	2.21	40	213	4653	[illegible]
PROVINCETOWN	MA	12	3668	2.38	1.14	57	305	2072	[illegible]
FAIRHAVEN	MA	5	2628	1.54	1.21	45	222	1412	[illegible]
HAMPTON	NH	6	2461	1.82	1.01	44	311	1073	[illegible]
SOUTH BRISTOL	ME	10	2296	2.08	1.08	44	267	2085	[illegible]
ROCKPORT	MA	16	2280	1.76	1.01	41	254	864	[illegible]
PLYMOUTH	MA	11	2036	1.87	1.13	45	285	1259	[illegible]
SEABROOK	NH	8	2012	1.38	1.03	40	285	862	[illegible]
SCITUATE	MA	5	1798	1.82	1.16	52	324	1763	[illegible]
BARNSTABLE	MA	4	1448	2.28	1.46	66	277	2290	[illegible]
SANDWICH	MA	4	1437	1.67	1.07	46	265	1062	[illegible]
NEWBURYPORT	MA	5	1412	2.15	1.06	46	299	1160	[illegible]
PORTSMOUTH	NH	5	1361	1.72	1.21	42	256	1062	[illegible]
RYE	NH	4	1265	1.38	1.03	40	324	862	[illegible]
NEW HARBOR	ME	7	1036	1.77	1.08	38	348	1462	[illegible]
BOSTON	MA	4	912	1.38	1.07	40	247	862	[illegible]
MARSHFIELD	MA	4	667	1.38	1.11	38	348	1077	[illegible]
STONINGTON	ME	4	460	1.83	1.13	41	314	600	[illegible]
WOODS HOLE	MA	4	338	1.38	1.01	48	233	662	[illegible]

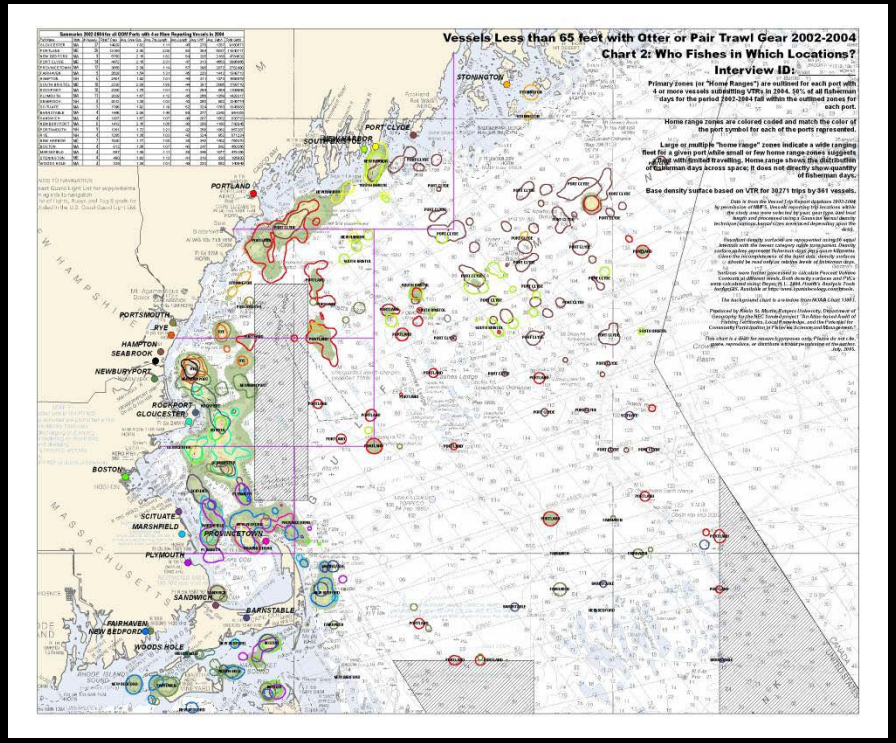



ROCKPORT
GLOUCESTER
BOSTON
SCITUATE
MARSHFIELD
PROVINCETOWN
PLYMOUTH
SANDWICH
BARNSTABLE
FAIRHAVEN
MASSACHUSETTS
BAY
CAPE COD



Community Maps

- Foundation for query/analysis.
- Aggregate and link to data at other scales.
- Engage community members.
- Visualize community resource interactions.

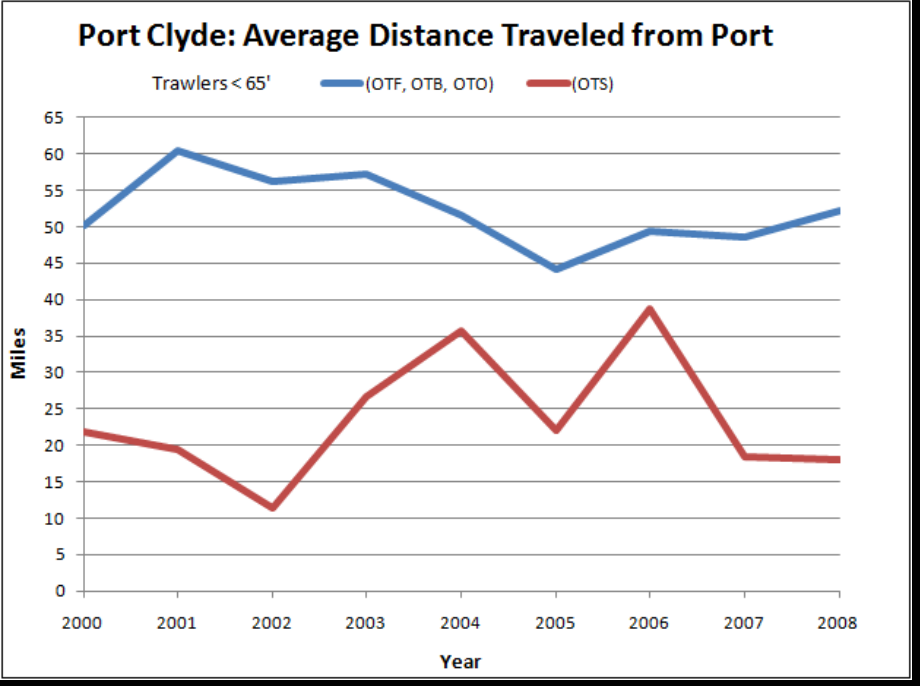


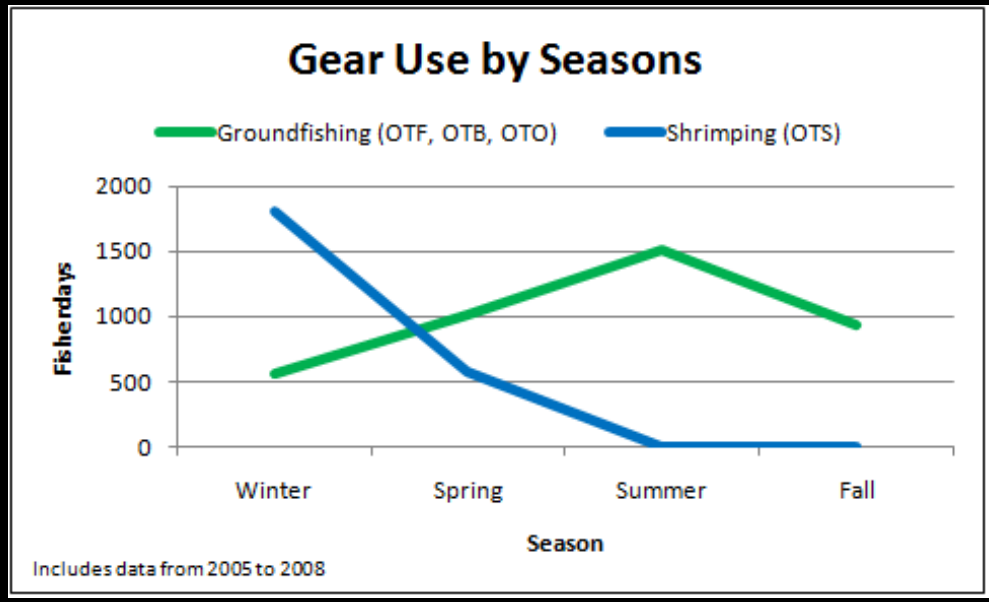
Port Clyde: Community Concerns

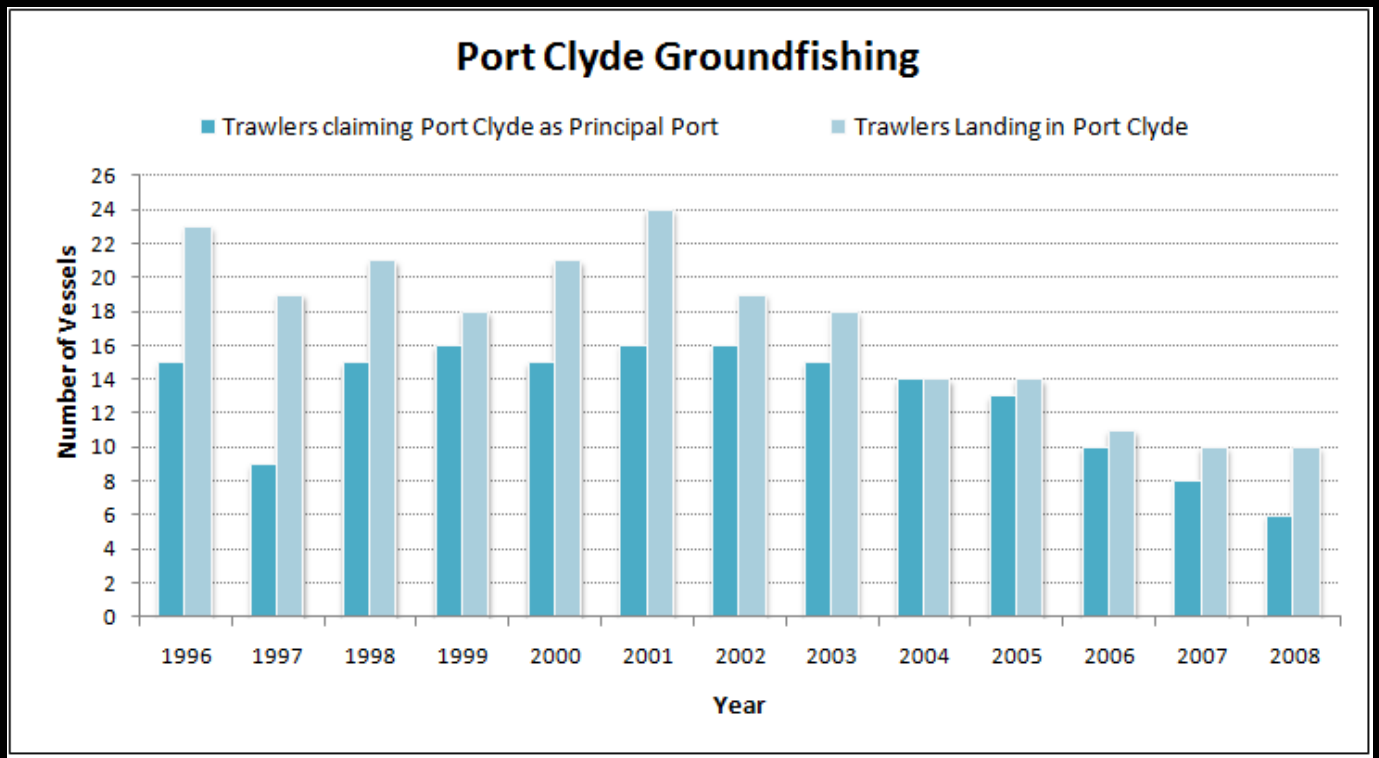
- *It's a small community cut right on the shore where I would say 80% of the people that live there rely on fishing in one way or another to survive.*

- *There were more boats (in) Port Clyde and its surrounding area. Tenant's Harbor, there was a bunch of boats going out of there. Spruce Head. You know, all up and down the coast there were boats ground fishing.*

- *(Y)ou don't have the time to go look. You have to pretty much pray that you land right where the fish are becausethe clock's ticking. It's changed fishing patterns.*


Port Clyde: Average Distance Traveled from Port
Trawlers < 65'
(OTF, OTB, OTO)
(OTS)
Miles
65
60
55
50
45
40
35
30
25
20
15
10
5
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year


Gear Use by Seasons
Groundfishing (OTF, OTB, OTO)
Shrimping (OTS)
Fisherdays
2000
1500
1000
500
0
Winter
Spring
Summer
Fall
Season
Includes data from 2005 to 2008


Port Clyde Groundfishing
Trawlers claiming Port Clyde as Principal Port
Trawlers Landing in Port Clyde
Number of Vessels
26
24
22
20
18
16
14
12
10
8
6
4
2
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
Year

Enacting Community?

"[The Atlas Project] was designed to encourage fishermen to start thinking about the areas they used in the ocean to pursue their living as "theirs." The goal was to see if there was, in fact, a sense of community that extended out from the shore…

"With the recent interviews… still fresh in our memory… [we] decided to organize and offer some suggestions about what we thought would work in "our" area of the ocean… "

"Essentially, we had created a plan to catch fewer fish… This plan… exemplified the sense of conservation and community that the Rutgers University study had discovered..."

Community Support Fisheries (CSF)

- Innovation in Port Clyde, Maine
  - An alternative model (based on CSA).
  - Forming a cooperative.
  - Community involvement.

Conclusion

- Enacting Communities
  - Producing data about and with “communities.”
  - Producing “communities” through research practice.
  - Participatory Action Research (PAR)