



CAPE COD  
COMMISSION

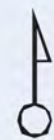
# Getting to Know Cape Cod Watersheds

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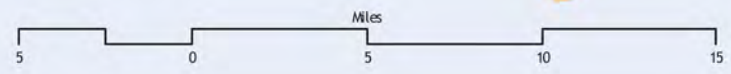
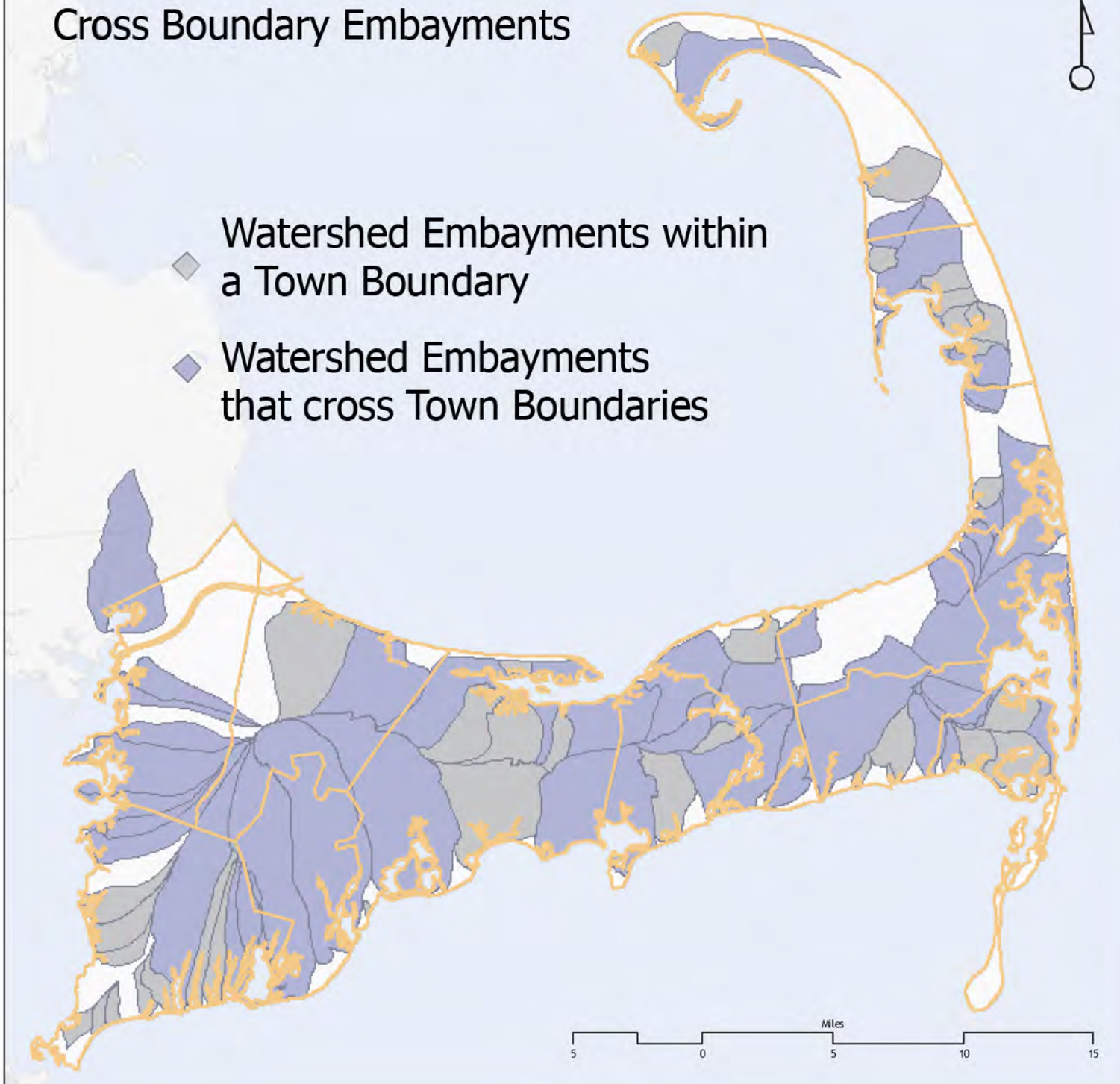
**MA Water Infrastructure Finance Commission**  
**November 10, 2010**



# Cross Boundary Embayments



- ◆ Watershed Embayments within a Town Boundary
- ◆ Watershed Embayments that cross Town Boundaries



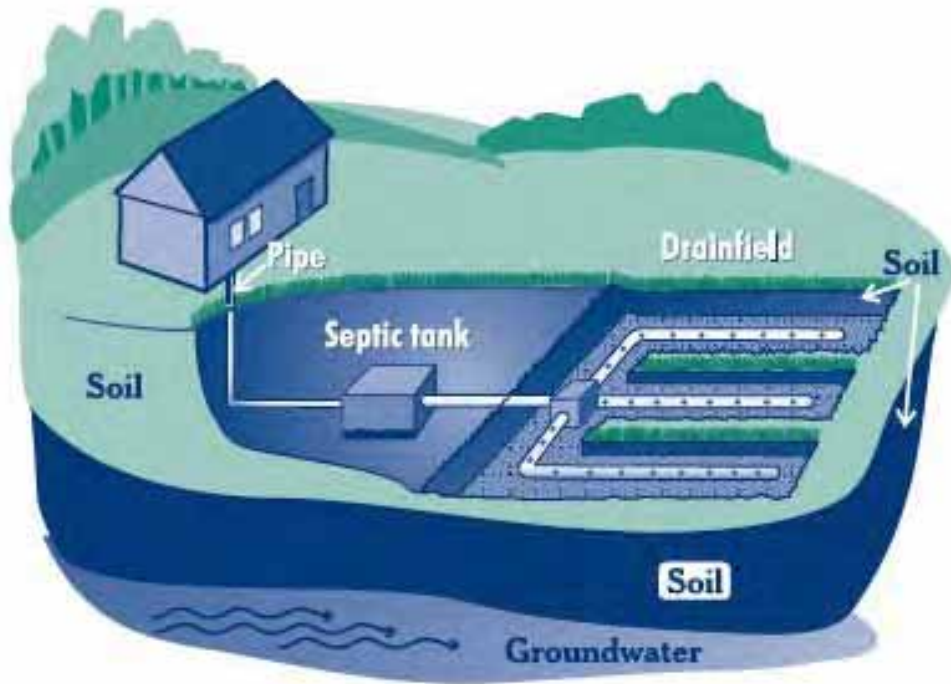
An aerial photograph showing a vast, dense forest. The majority of the forest is a vibrant blue-green color, indicating a healthy canopy. In the lower center of the image, there is a distinct, dark, irregularly shaped area that appears to be a gap in the forest or a different type of vegetation. The text "The Problem" is overlaid on the left side of the image.

# The Problem

# Septic Systems and our Watershed



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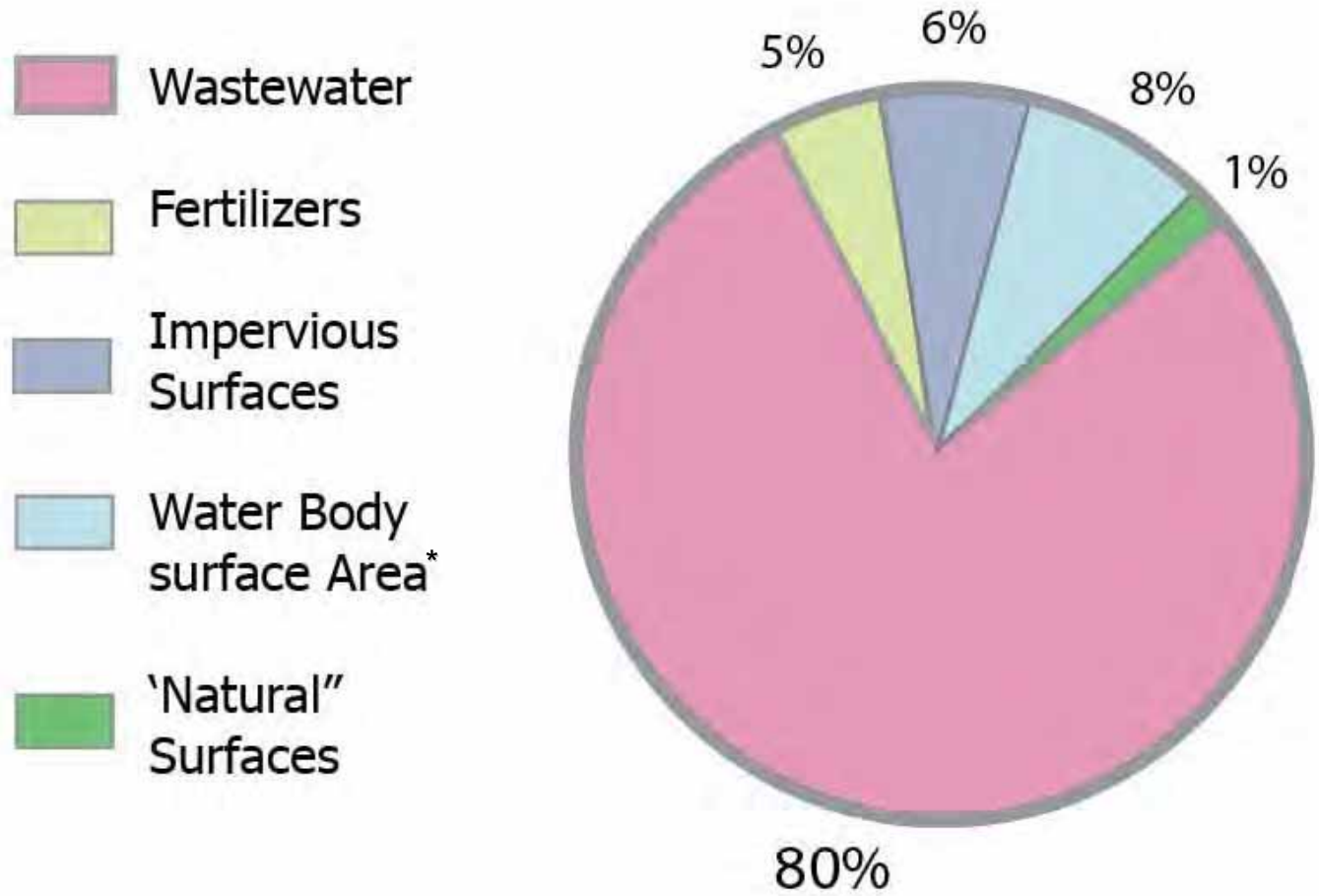


- The septic system of an average three-bedroom home loads 8.5 pounds of nitrogen into the groundwater each year.
- Approximately 85% of the over 156,000 homes on Cape Cod presently use individual Title 5 septic systems.



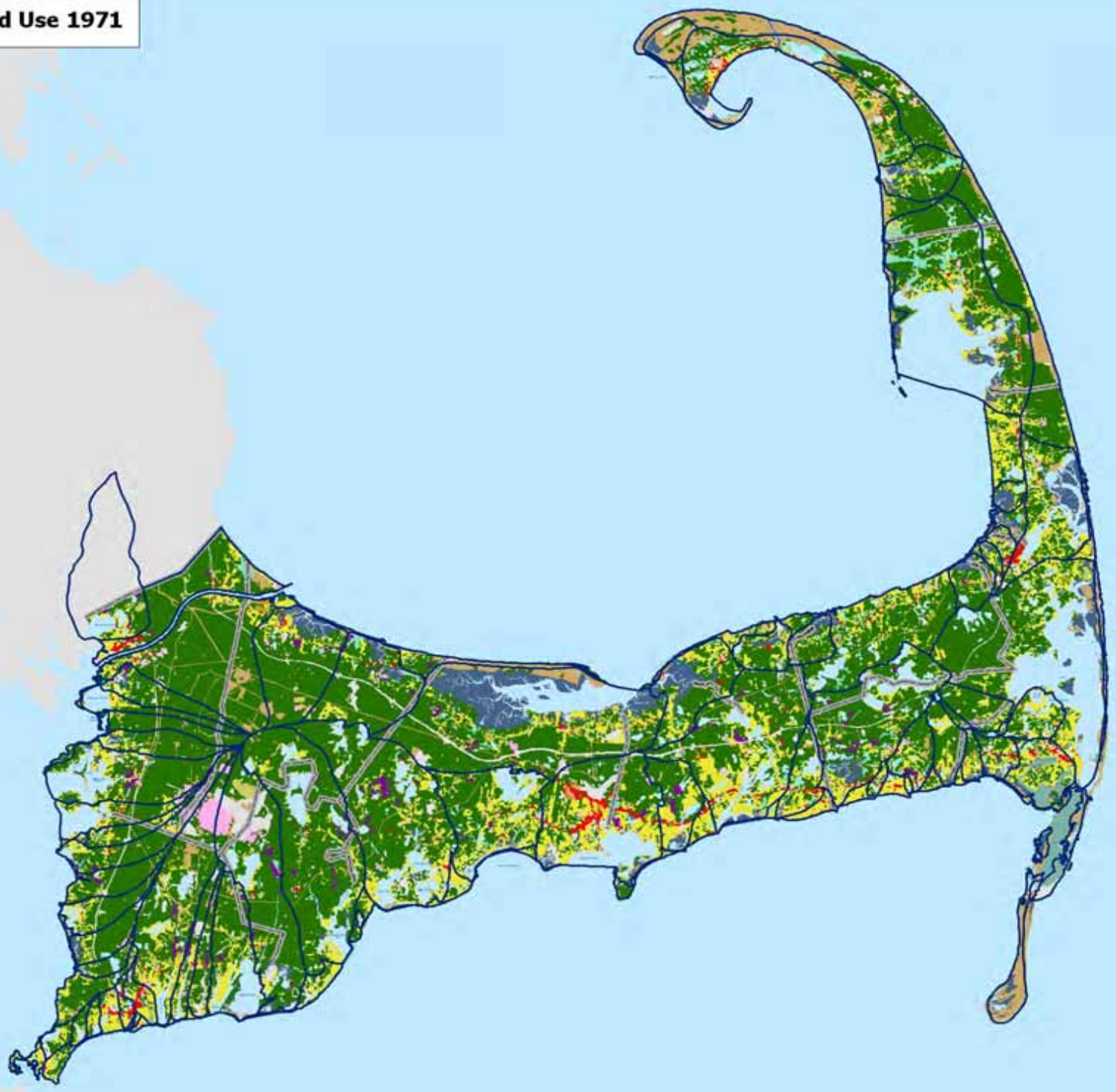
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# Sources of Nitrogen – Bass River Watershed Example

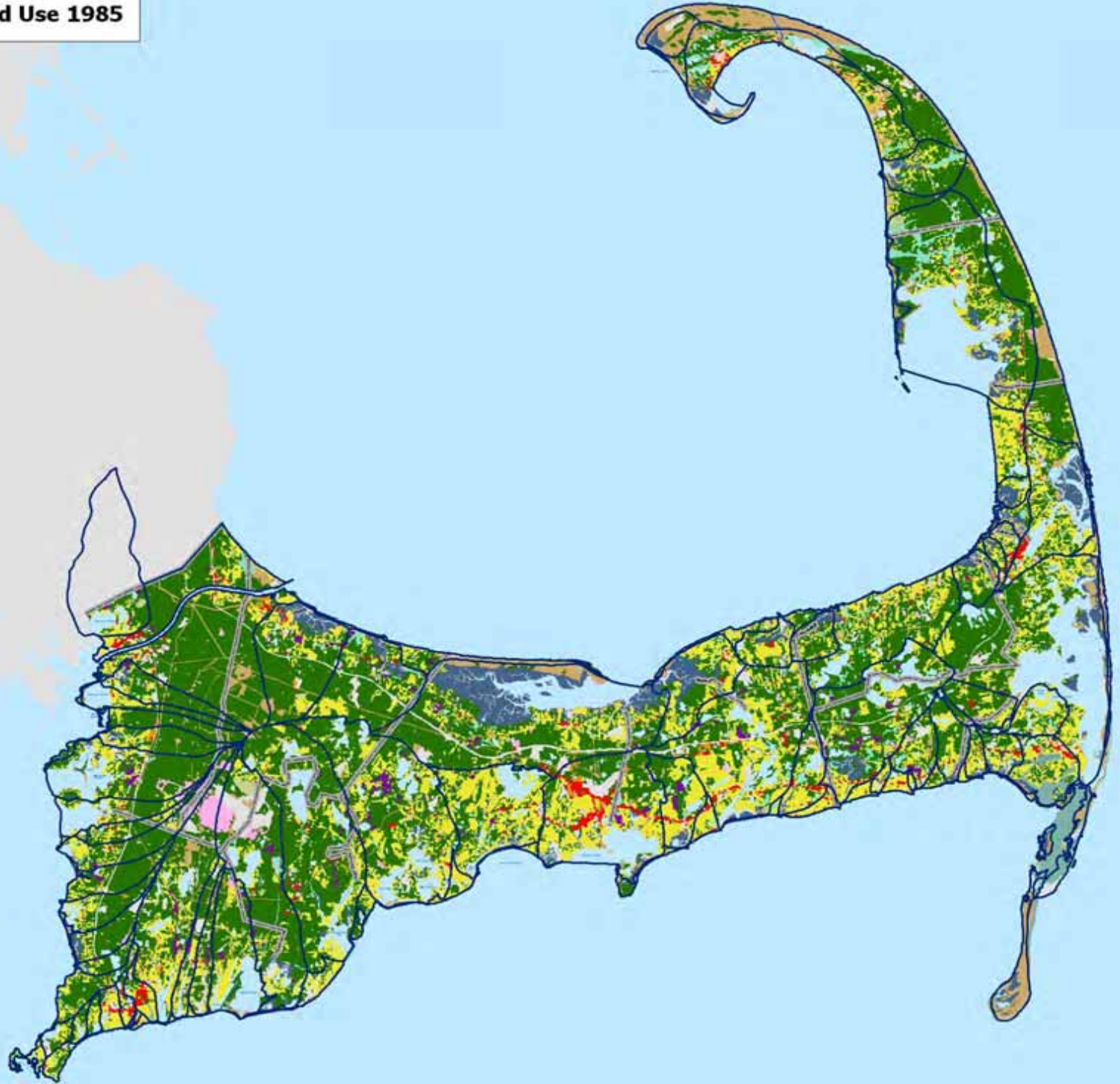


\*Including atmospheric water

MacConnell Land Use 1971



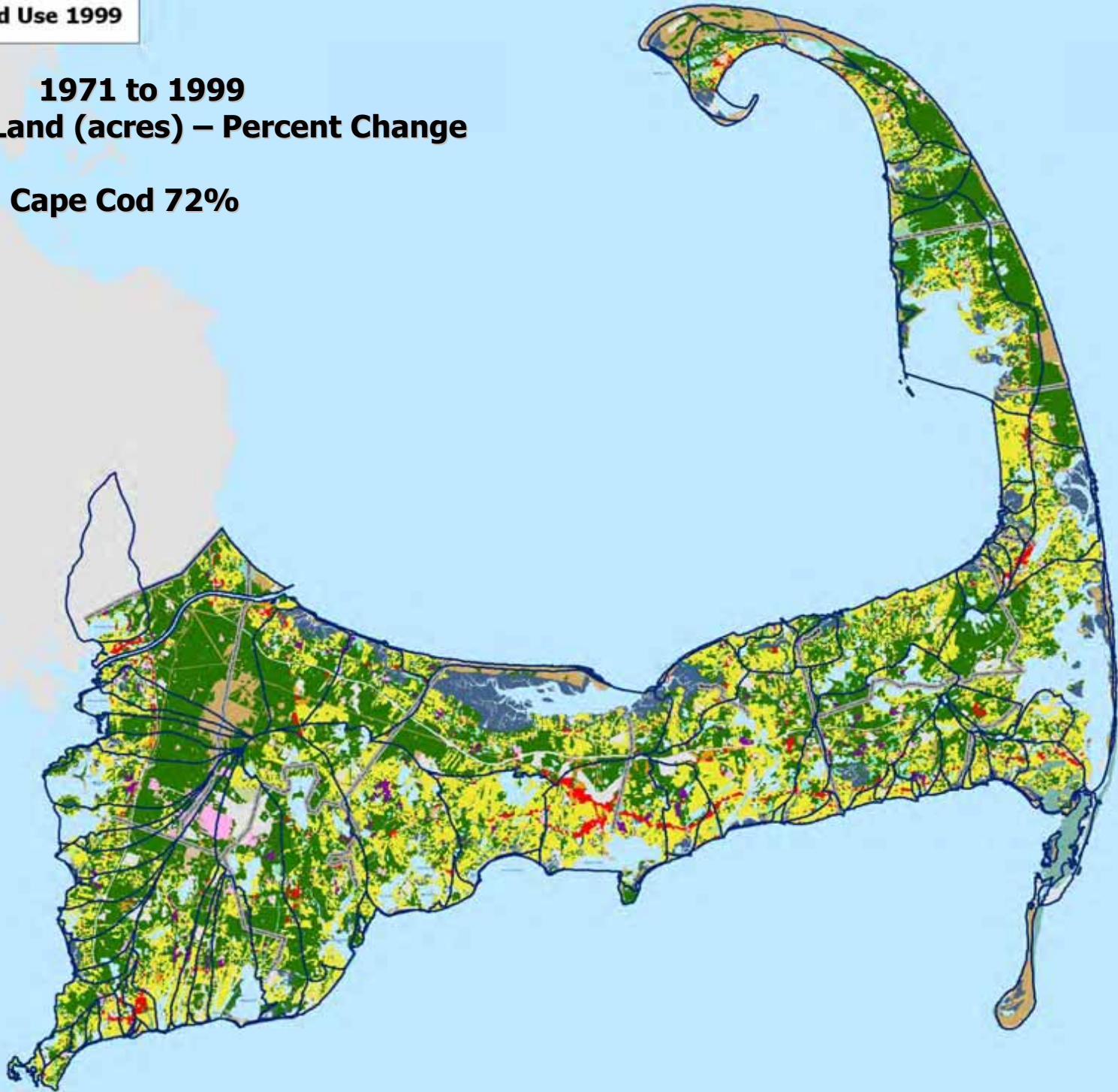
MacConnell Land Use 1985



MacConnell Land Use 1999

**1971 to 1999**  
**Developed Land (acres) – Percent Change**

**Cape Cod 72%**





# Our Sole Source Aquifer

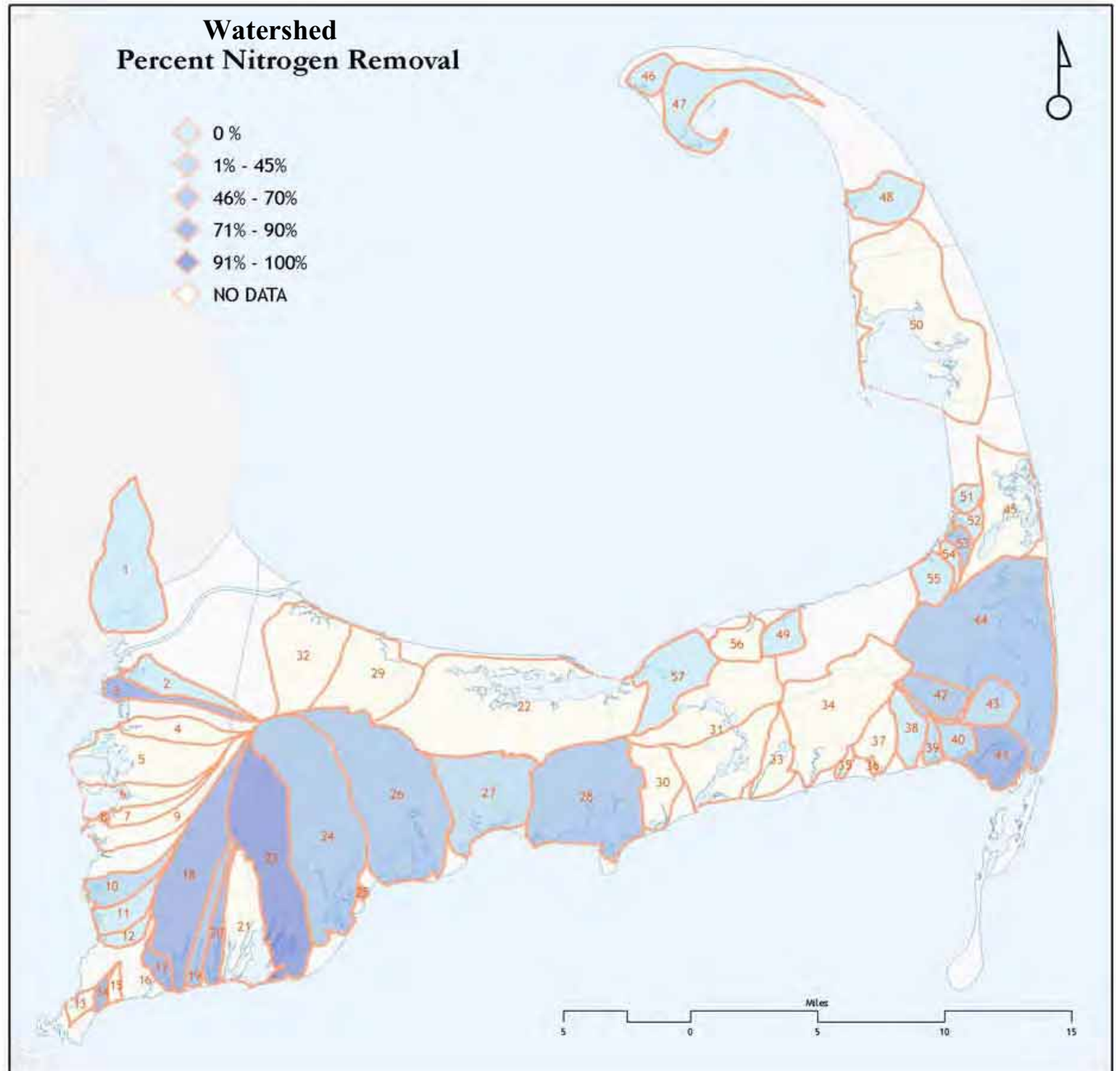


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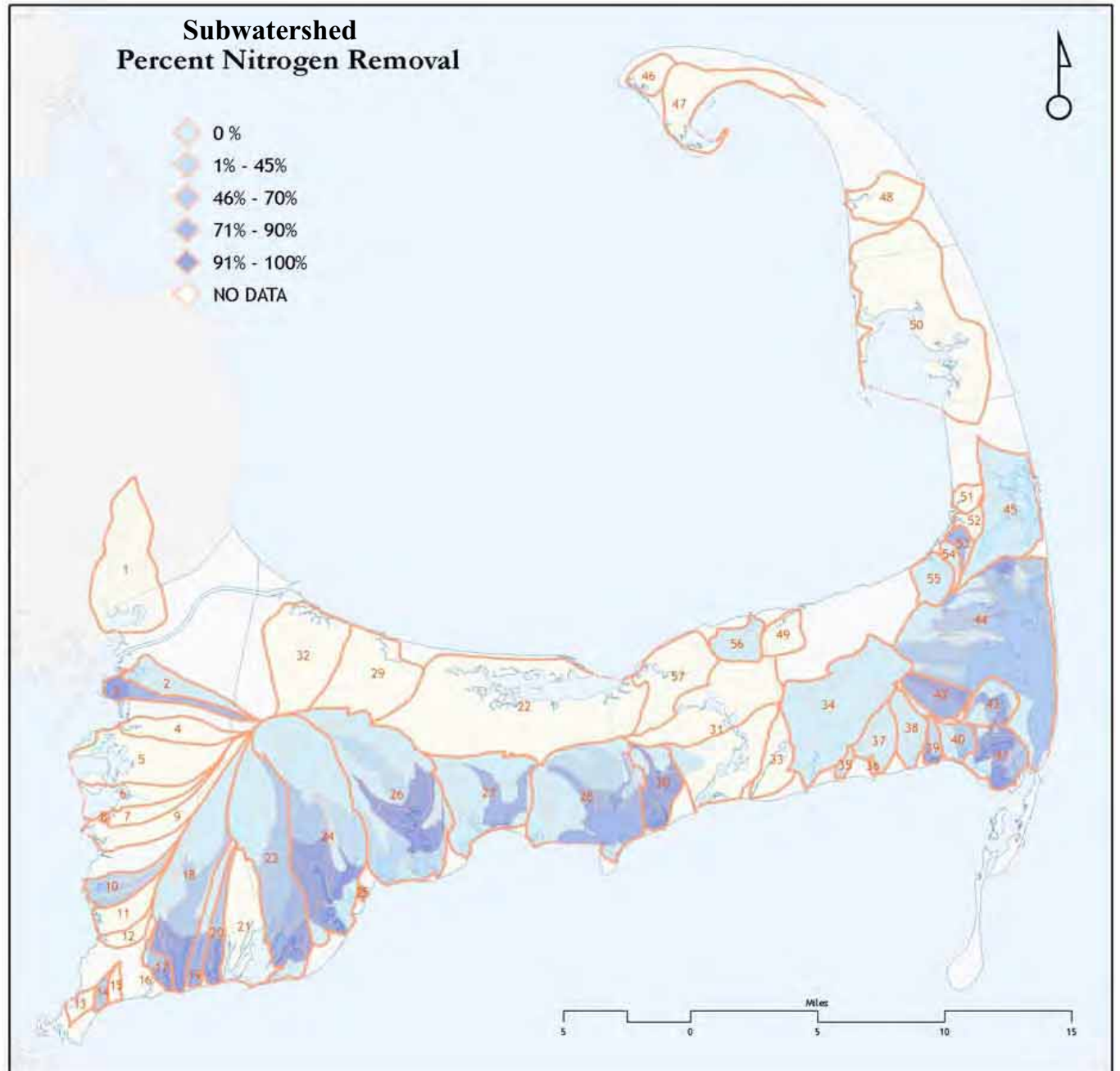


- Replenished by Precipitation
- Six Separate Lenses
- Sole Source of Drinking Water
- Watersheds follow groundwater flow

MAP ID	Major Embayment	% TMDL
23	Waquoit Bay East	100
25	Rushy Marsh Pond	100
20	Bourmes Pond	90
17	Little Pond	86
41	Stage Harbor	85
3	Phinney's Harbor	80
18	Great Pond	79
14	Oyster Pond	77
53	Rock Harbor	69
19	Green Pond	65
42	Muddy Creek	65
24	Popponeset Bay	61
26	Three Bays	60
44	Pleasant Bay	52
28	Lewis Bay/Halls Creek	50
10	West Falmouth Harbor	43
43	Bassing Harbor/Ryders C	42
39	Taylor's Pond/Mill Creek	40
40	Sulfur Springs/Bucks Cr	35
27	Centerville River	34
1	Buttermilk Bay	0
11	Great Sippewisset Creek	0
12	Little Sippewisset Cree	0
2	Eel Pond/Back River	0
38	Red River	0
46	Hatches Harbor	0
48	Pamet River	0
51	Herring River (Eastham)	0
52	Boat Meadow River	0
54	Little Namskaket Creek	0
55	Namskaket Creek	0
57	Chase Garden Creek	0
49	Quivett Creek	0
47	Provincetown Harbor	0
13	Quissett Harbor	ND
15	Salt Pond	ND
21	Waquoit Bay West	ND
30	Parkers River	ND
31	Bass River (Upper & Low	ND
33	Swan Pond River	ND
34	Herring River	ND
35	Allen Harbor	ND
36	Wychmere Harbor	ND
37	Saquatucket Harbor	ND
4	Pocasset River	ND
45	Town Cove/Nauset Marsh	ND
5	Pocasset Harbor	ND
50	Wellfleet Harbor	ND
56	Sesuit Harbor	ND
22	Barnstable Harbor	ND
29	Scorton Harbor	ND
6	Megansett Harbor	ND
32	Sandwich Harbor	ND
7	Rands Canal	ND
8	Fiddlers Cove	ND
9	Wild Harbor	ND
16	Falmouth Harbor	ND



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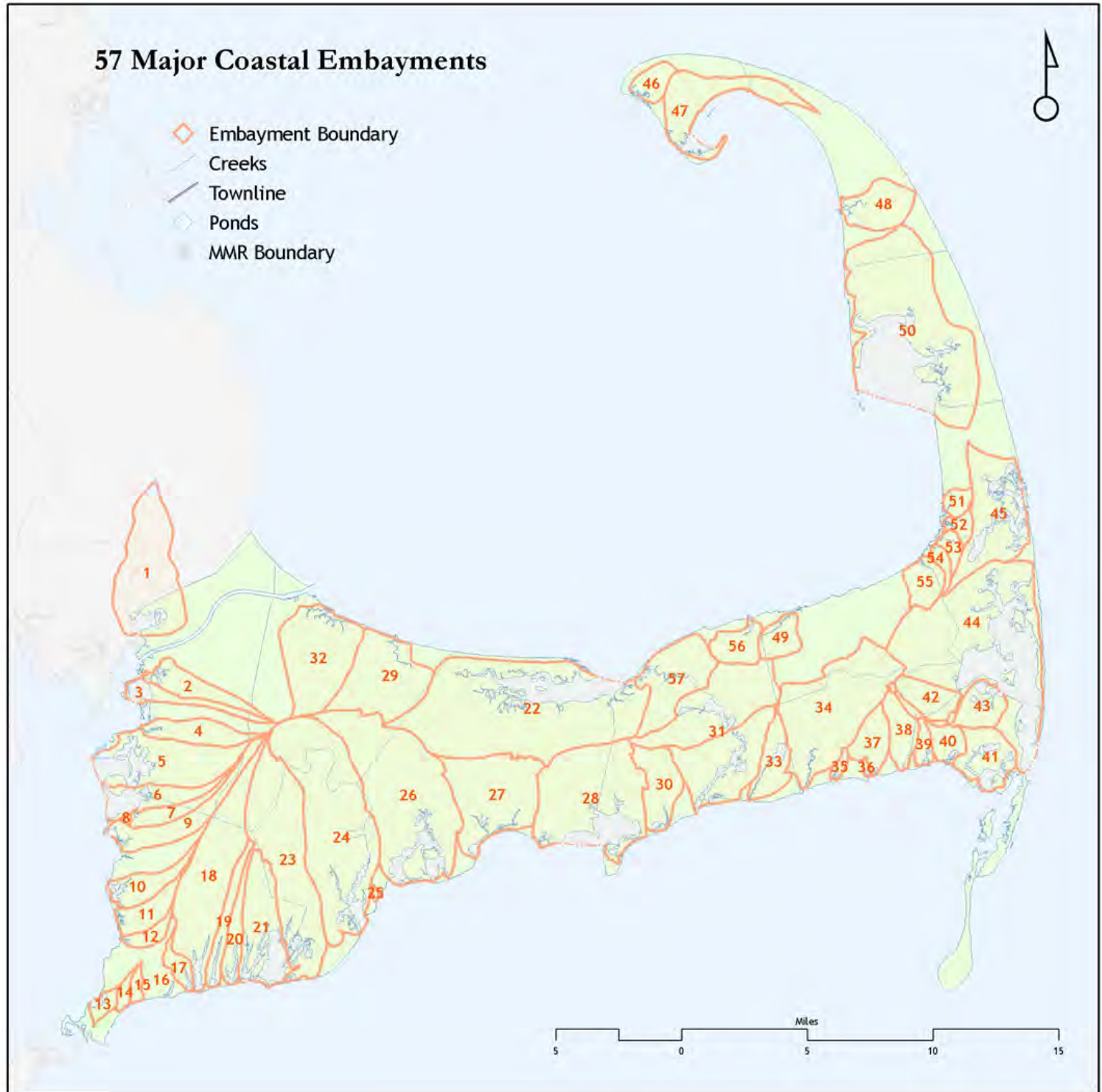


Prince Cove



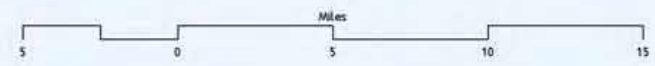
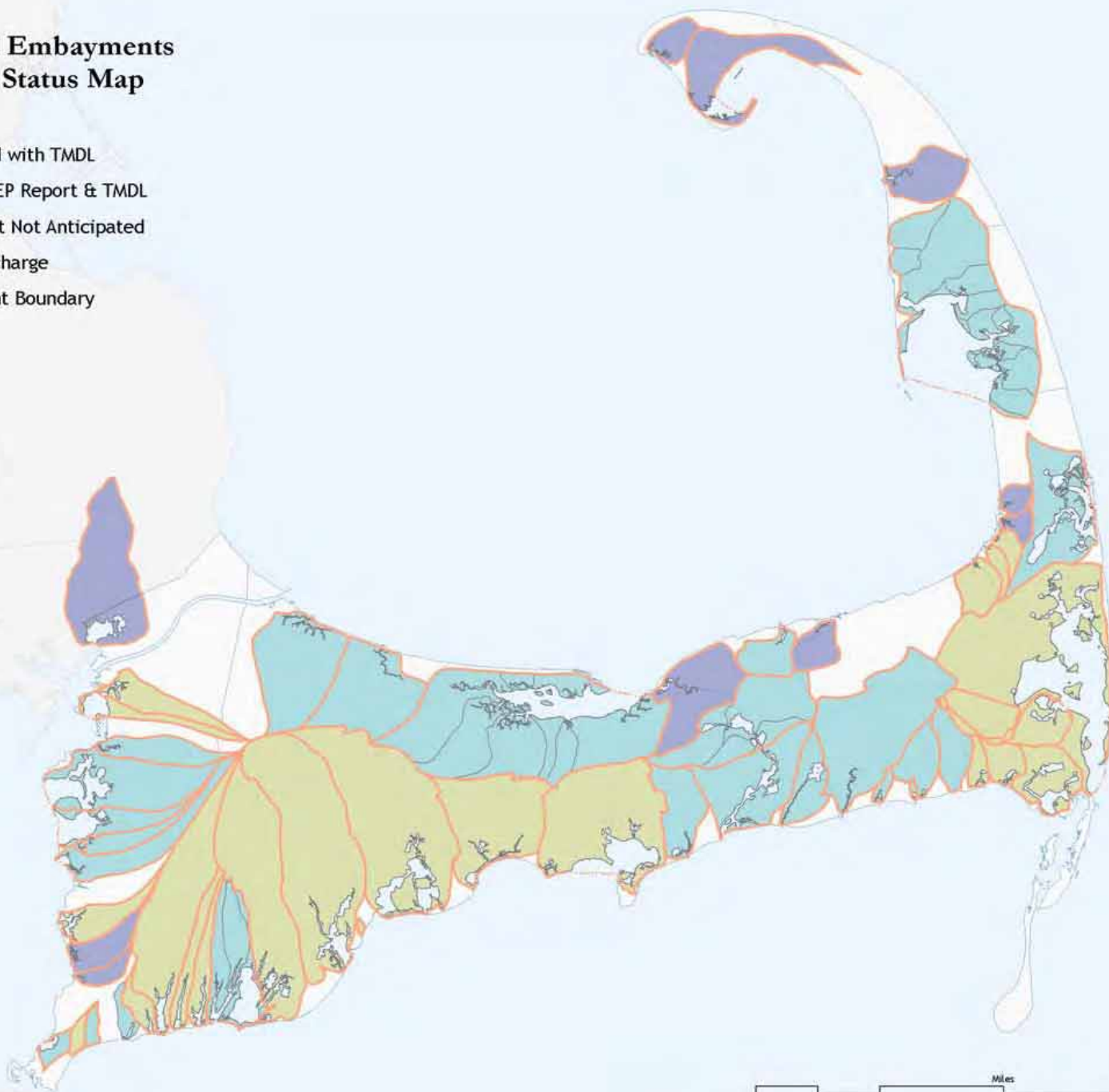
# The Solutions

MAP_ID	Major Embayment
1	Buttermilk Bay
2	Eel Pond/Back River
3	Phinney's Harbor
4	Pocasset River
5	Pocasset Harbor
6	Megansett Harbor
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57	Chase Garden Creek



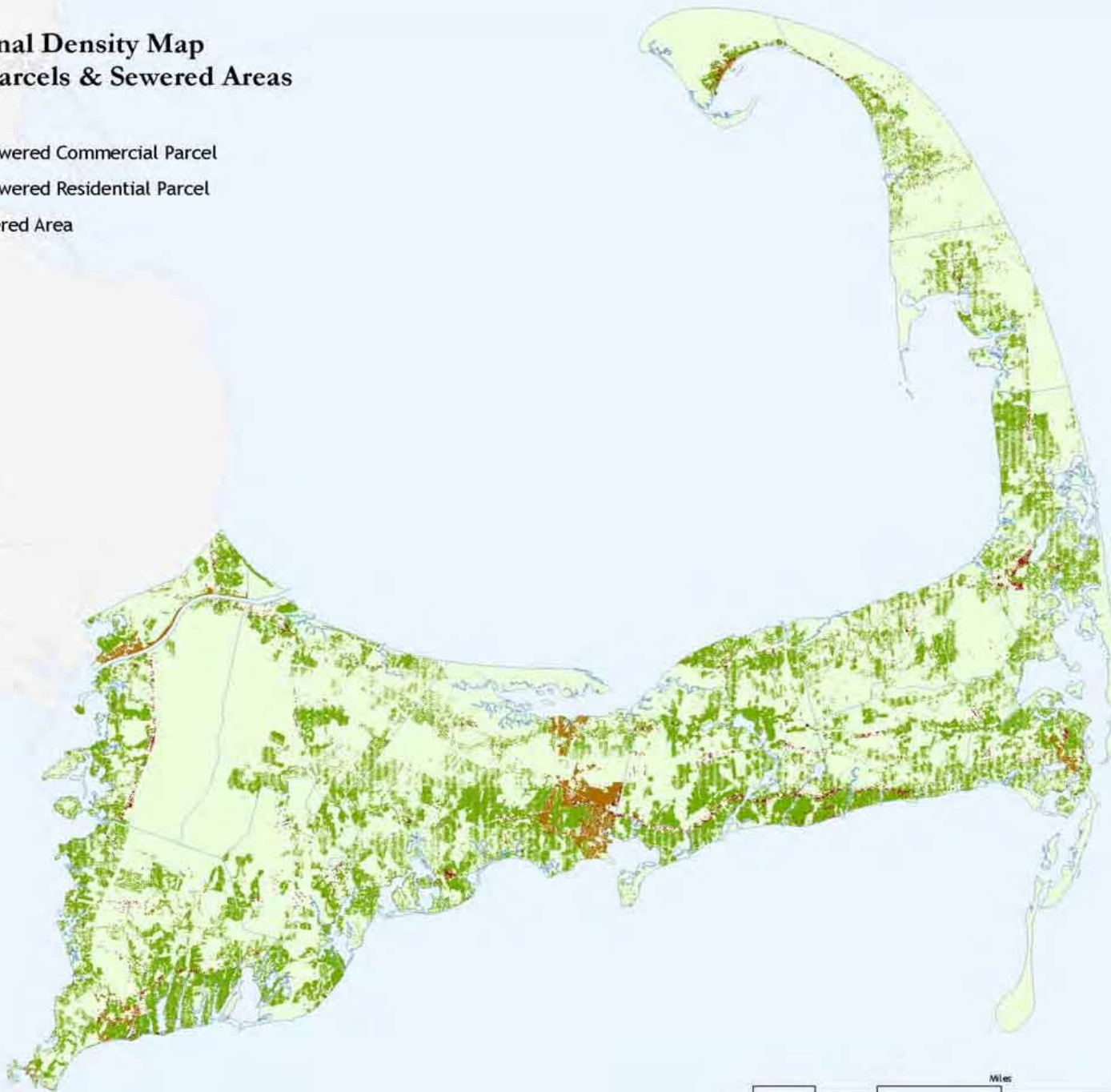
# MEP Coastal Embayments Watershed Status Map

- Completed with TMDL
- Pending MEP Report & TMDL
- MEP Report Not Anticipated
- Direct Discharge
- Embayment Boundary



# Regional Density Map Unsewered Parcels & Sewered Areas

- Unsewered Commercial Parcel
- Unsewered Residential Parcel
- ◆ Sewered Area





# Regional Density Map



**Regional Density Map  
Embayment Watersheds**

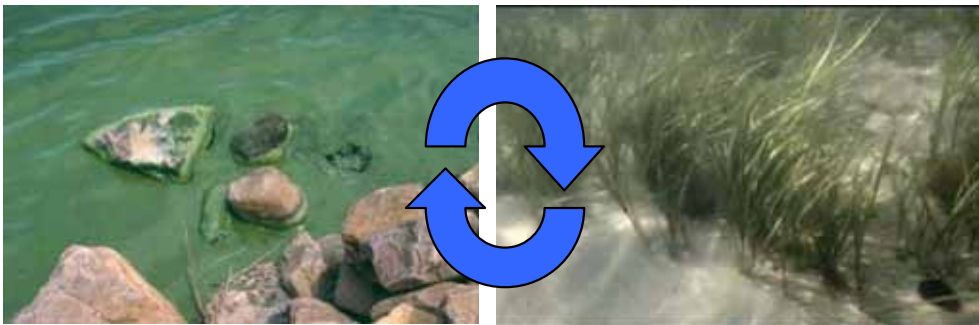


# Cape Cod Regional Wastewater Management Plan (RWMP)



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Objective Restore degraded water bodies through regional nutrient management policy promoting appropriate infrastructure and growth management mechanisms while protecting taxpayers from unnecessary costs.



## Goal

### Policy Integrating:

- Environment
- Affordability
- Infrastructure
- Growth Management



# Strategies and Measures

## STRATEGY & MEASURES

POLICY

<b>ENVIRONMENT</b>	<b>Strategy: Science Based Nutrient Management Program</b> <b>Measure: Complete CWMP's</b>
<b>AFFORDABILITY</b>	<b>Strategy: Maximize SRF and other funds</b> <b>Measure: Towns obtain SRF &amp; 0% SRF loans</b>
<b>INFRASTRUCTURE</b>	<b>Strategy: Limit infrastructure to limit cost &amp; unintended growth</b> <b>Measure: MOA's for shared systems</b>
<b>GROWTH MANAGEMENT</b>	<b>Strategy: Limit development where Title 5 would have limited or prohibited it.</b> <b>Measure: Towns adopt flow neutral regulations.</b>



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## Other Purposes of the RWMP

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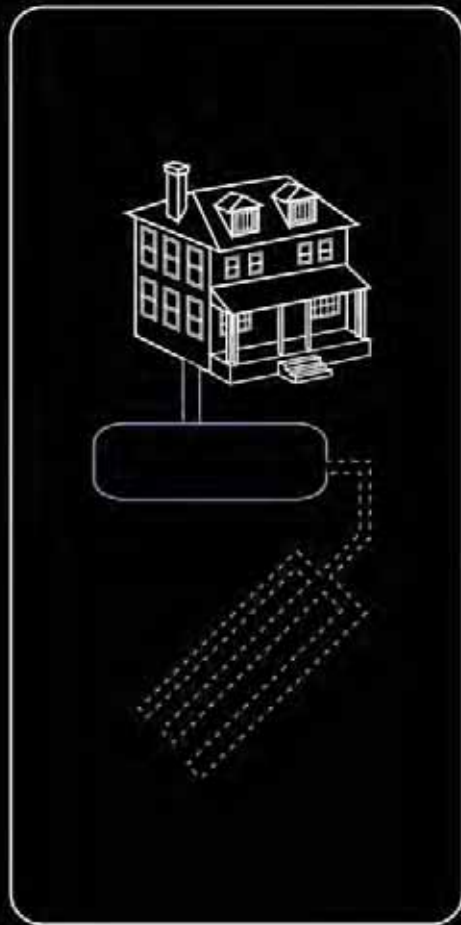


- **Zero % State Revolving Fund (SRF) Construction Loans for identified 'Flow-Neutral' Communities**
- **Inform CCC DRI review of CWMPs and development of Technical Bulletin**

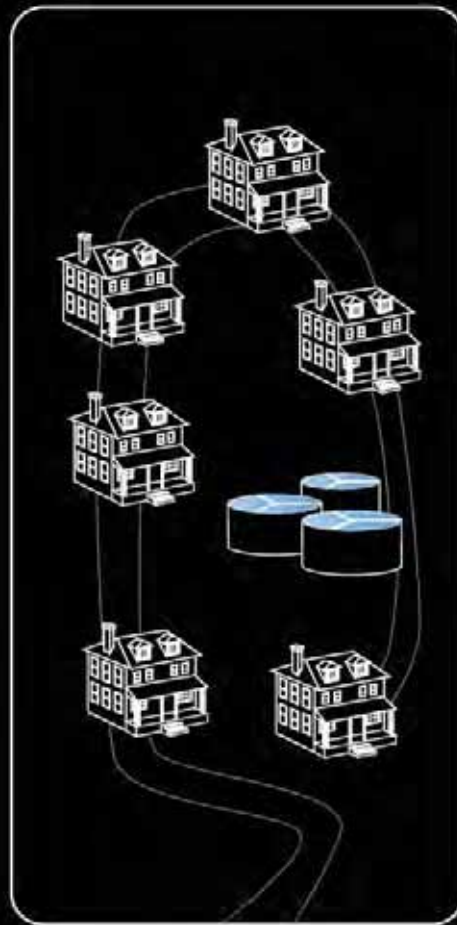


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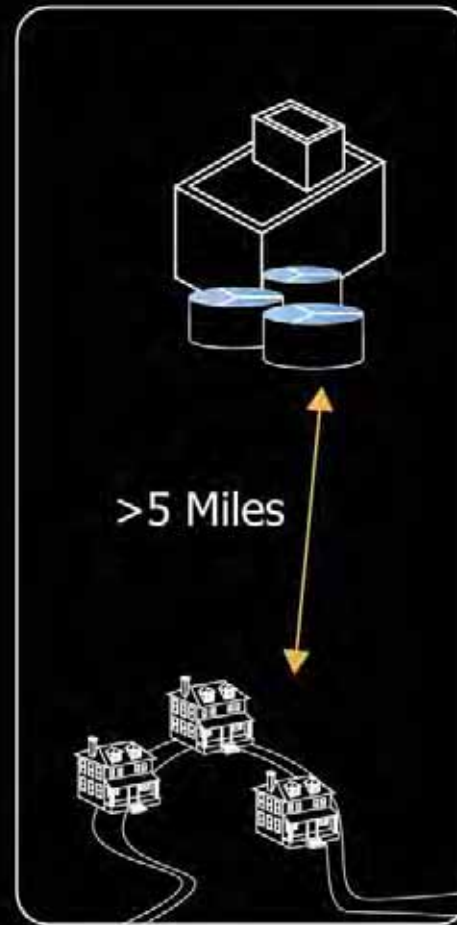
# A Mix of Systems is Appropriate



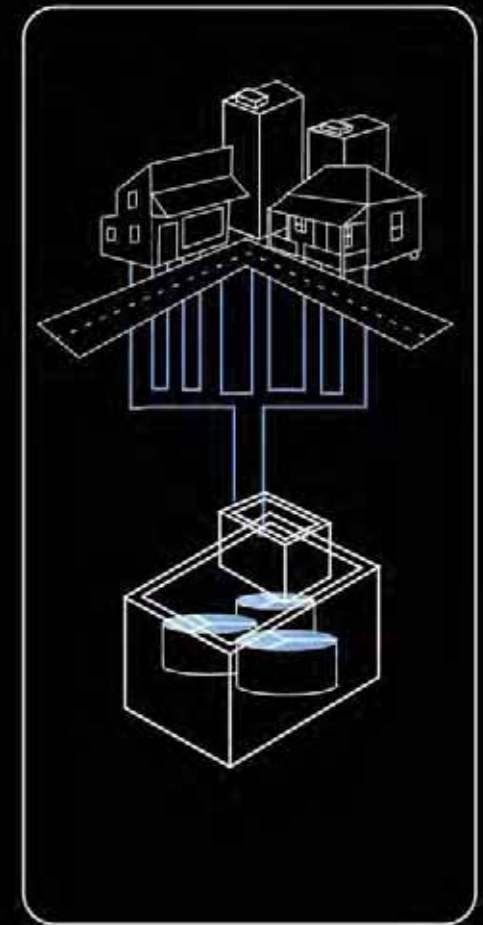
**TITLE 5 / IA**



**CLUSTER**



**SATELLITE**



**CENTRALIZED**

# Region-wide Cost Estimates for Wastewater Treatment



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- If we sewer the entire Cape today:  
**\$8 billion**
- Estimates of 25% sewer:  
**\$3 billion**
- Buildout conditions:  
**\$2-4 billion**

# GIS Demographics Slides

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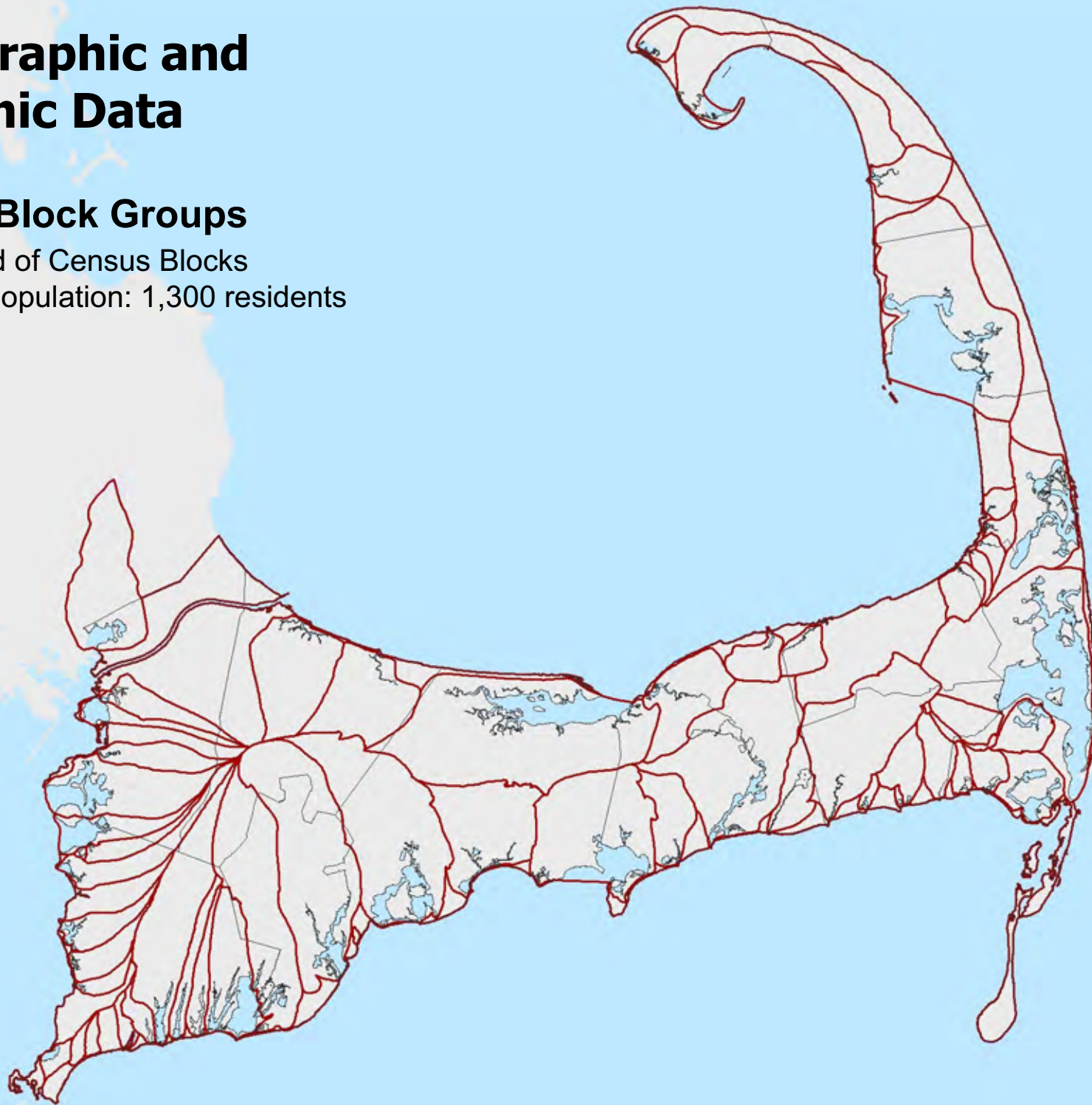
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# Demographic and Economic Data

## Census Block Groups

- Comprised of Census Blocks
- Average Population: 1,300 residents



**Population Density**

Population per Sq. Mile

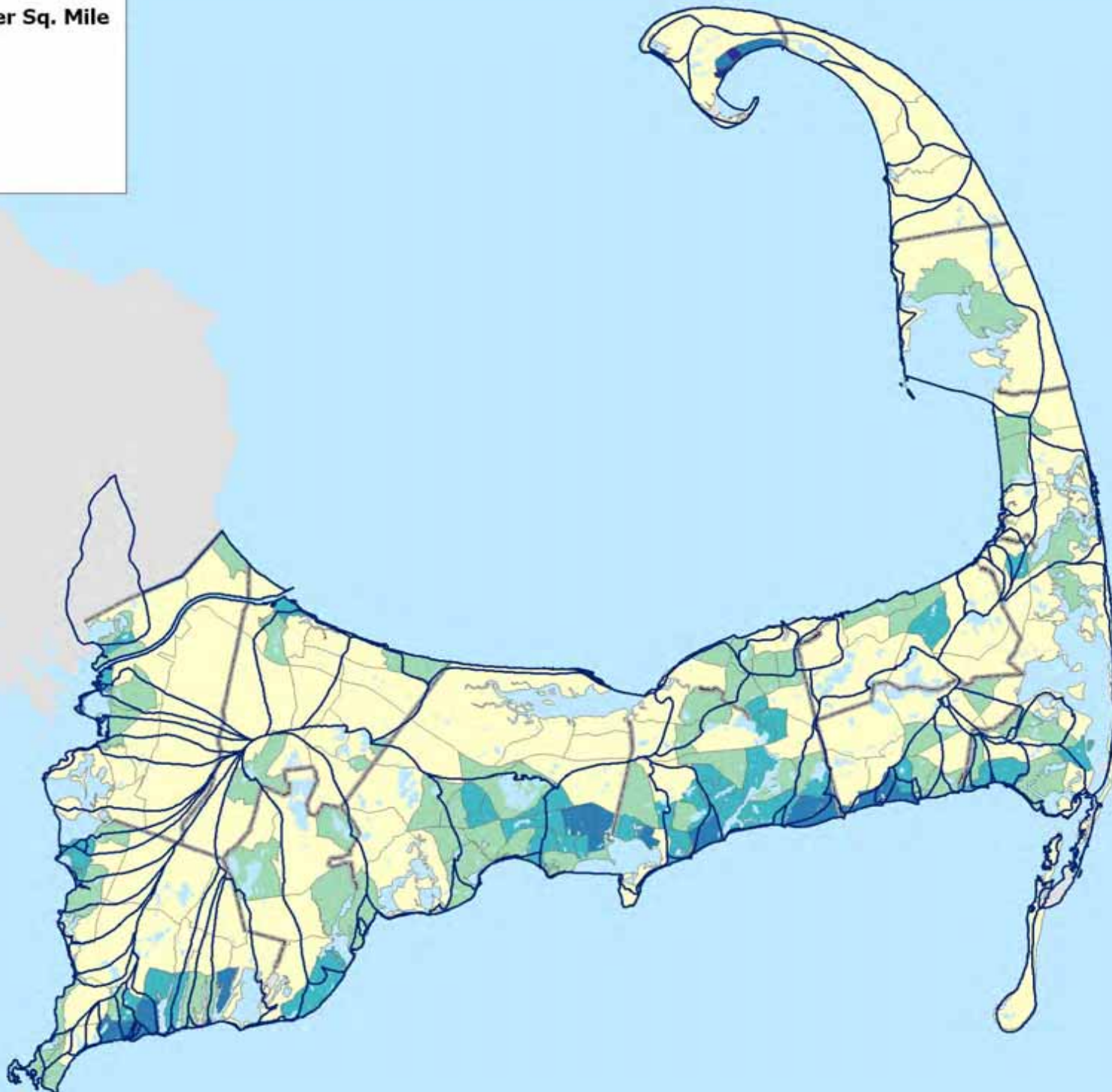
- 42 - 678
- 679 - 1,283
- 1,284 - 2,180
- 2,181 - 3,844
- 3,845 - 5,911



Source: ESRI's Business Analyst 2009 Estimates

**Housing Units per Sq. Mile**

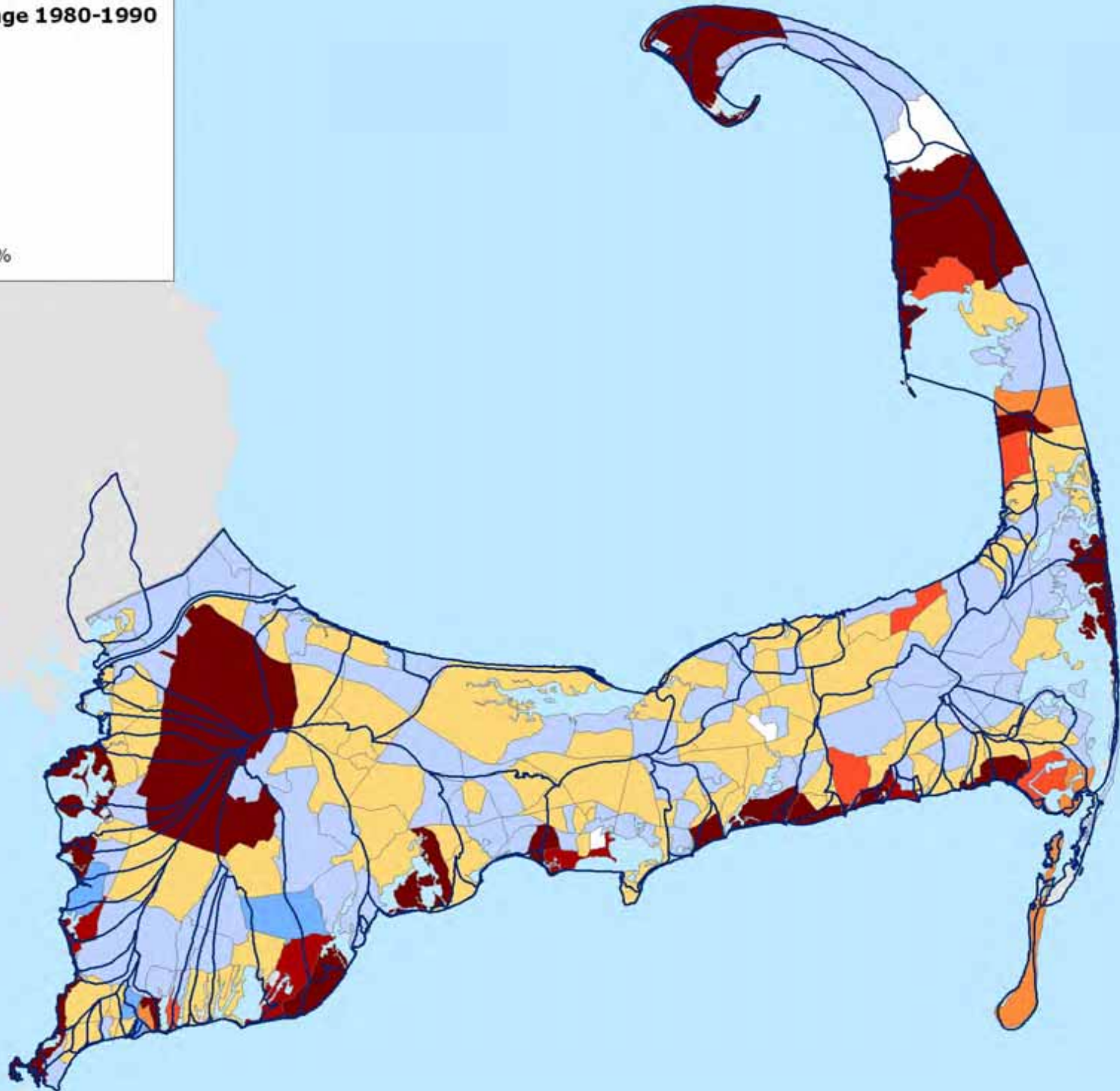
- 20 - 442
- 443 - 857
- 858 - 1,447
- 1,448 - 2,652
- 2,653 - 5,978



Source: ESRI's Business Analyst 2009 Estimates

**Population Change 1980-1990**

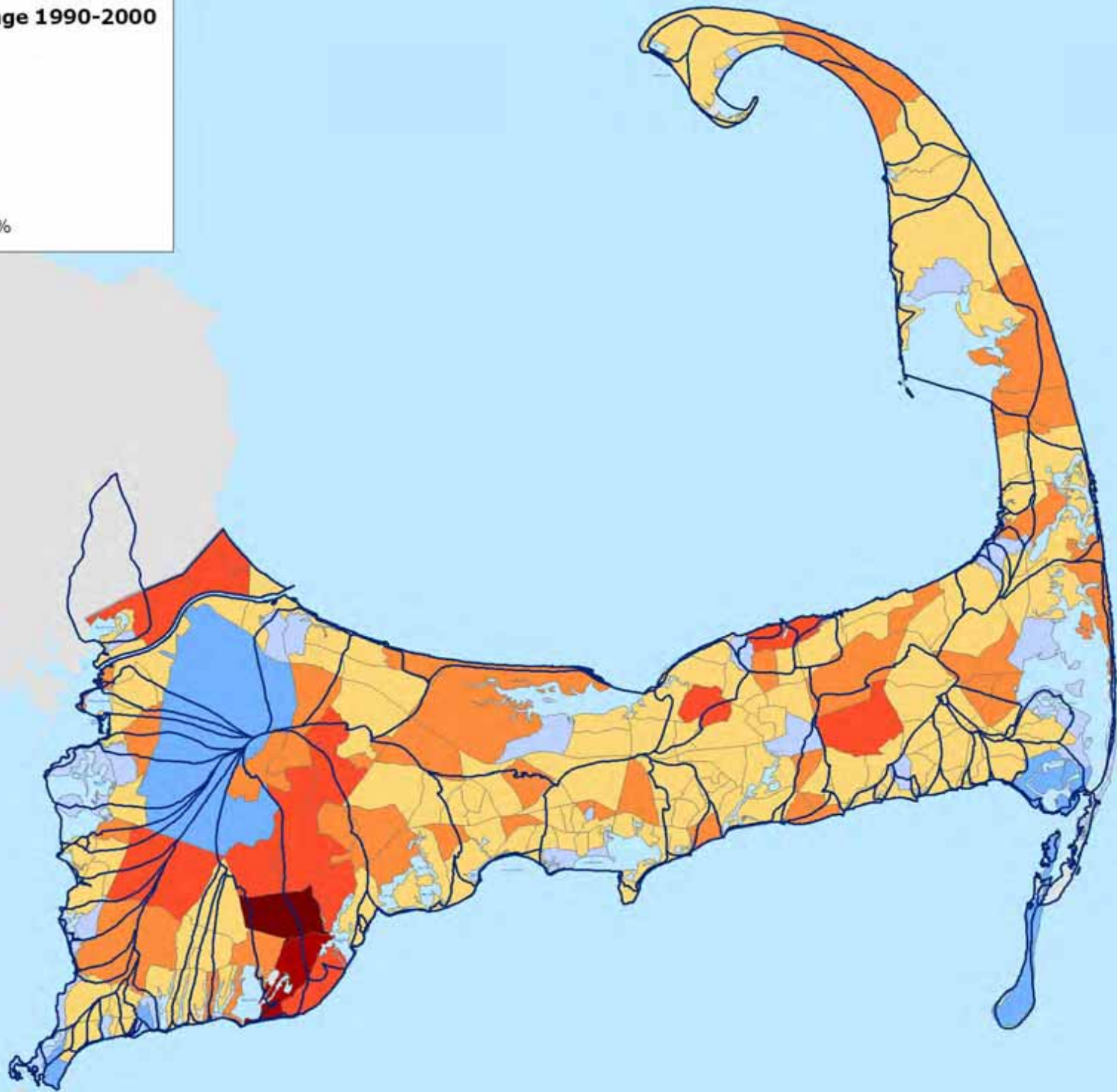
- 30% to -15.1%
- 15% to -0.1%
- No Change
- 0.1% to 25%
- 25.1% to 50%
- 50.1% to 75%
- 75.1% to 100%
- Greater than 100%



Source: ESRI's Business Analyst 2009 Estimates and Missouri Census Data Center

**Population Change 1990-2000**

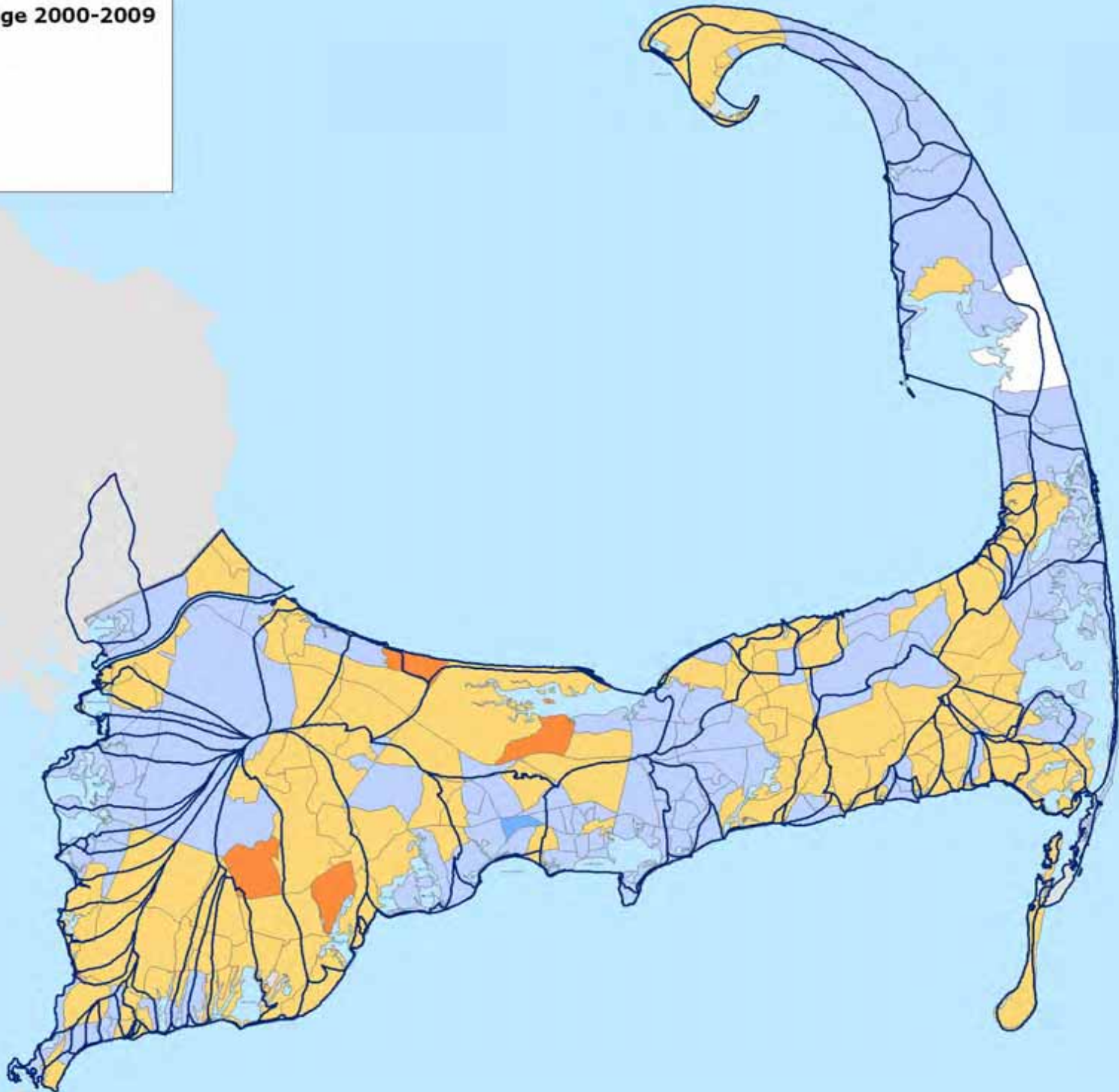
- 30% to -15.1%
- 15% to -0.1%
- 0.1% to 25%
- 25.1% to 50%
- 50.1% to 75%
- 75.1% to 100%
- Greater than 100%



Source: ESRI's Business Analyst 2009 Estimates

**Population Change 2000-2009**

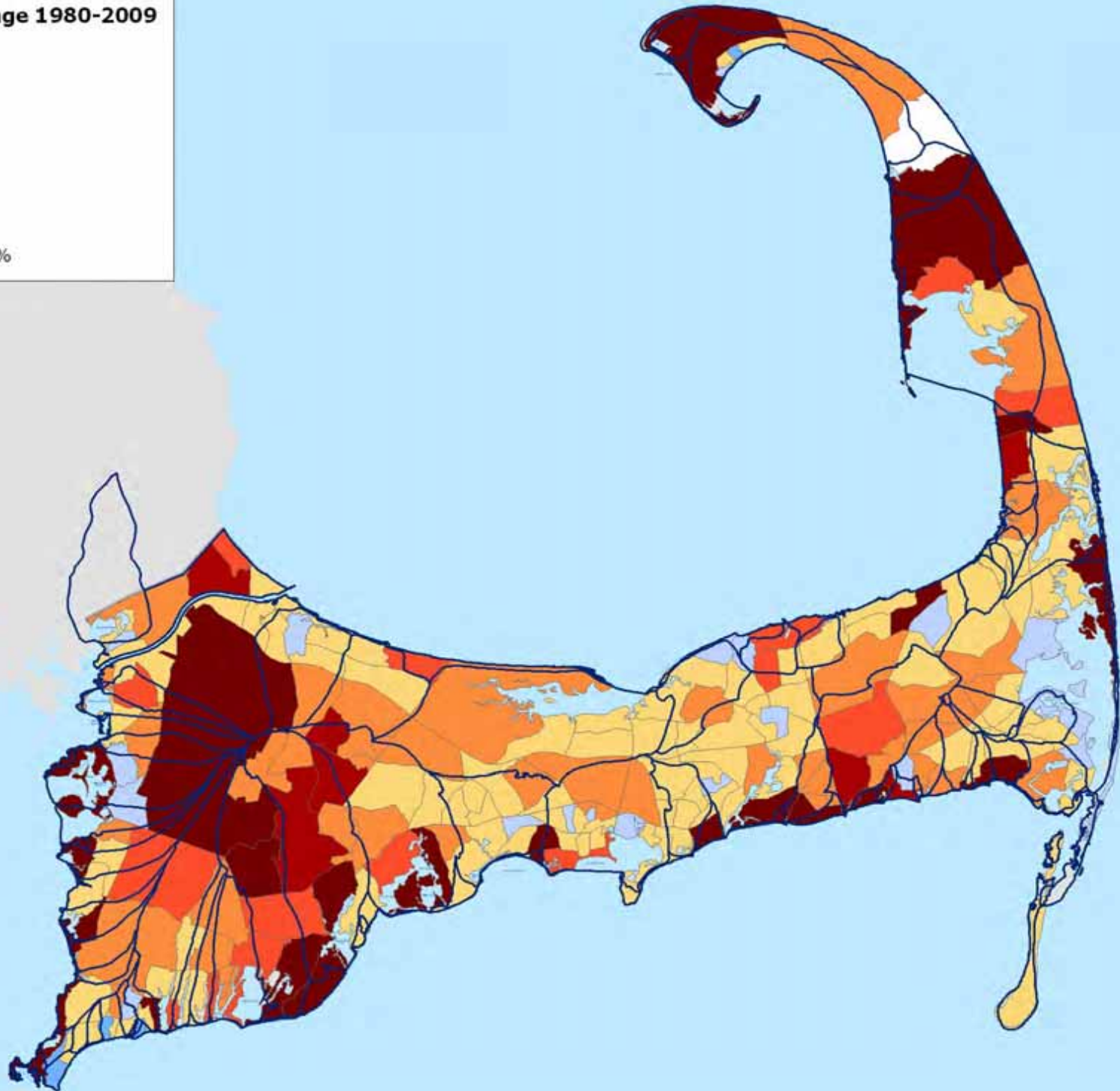
- 30% to -15.1%
- 15% to -0.1%
- No Change
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Source: ESRI's Business Analyst 2009 Estimates

**Population Change 1980-2009**

- 30% to -15.1%
- 15% to -0.1%
- No Change
- 0.1% to 25%
- 25.1% to 50 %
- 50.1% to 75%
- 75.1% to 100%
- Greater than 100%



Source: ESRI's Business Analyst 2009 Estimates and Missouri Census Data Center

### Cape Wide Share of Seasonal Homes (Census 2000)

- Below Average
- Seasonal Home Average (27.2%)
- Above Average

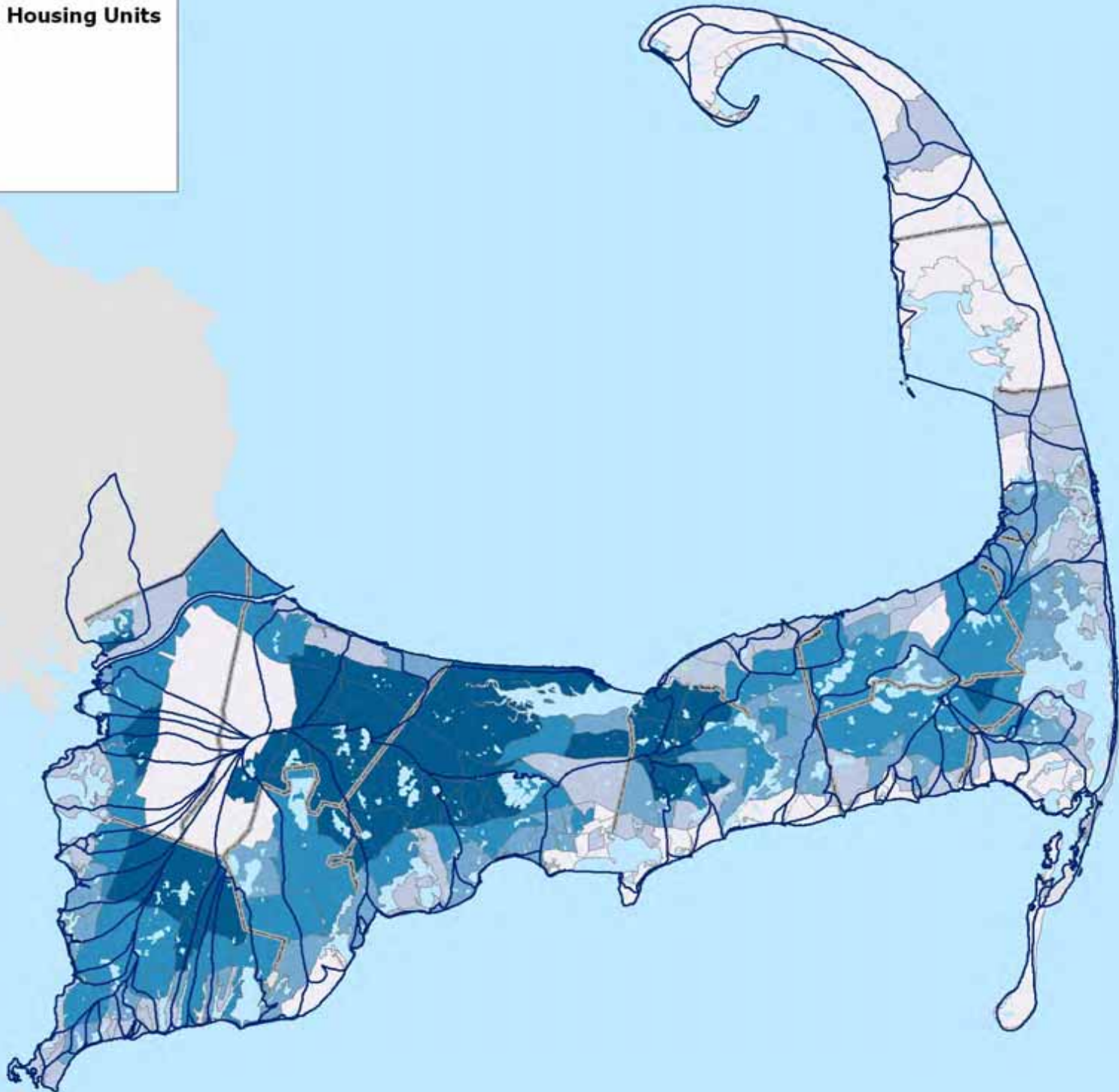


Source: 2000 U.S. Census Bureau



**Owner Occupied Housing Units**

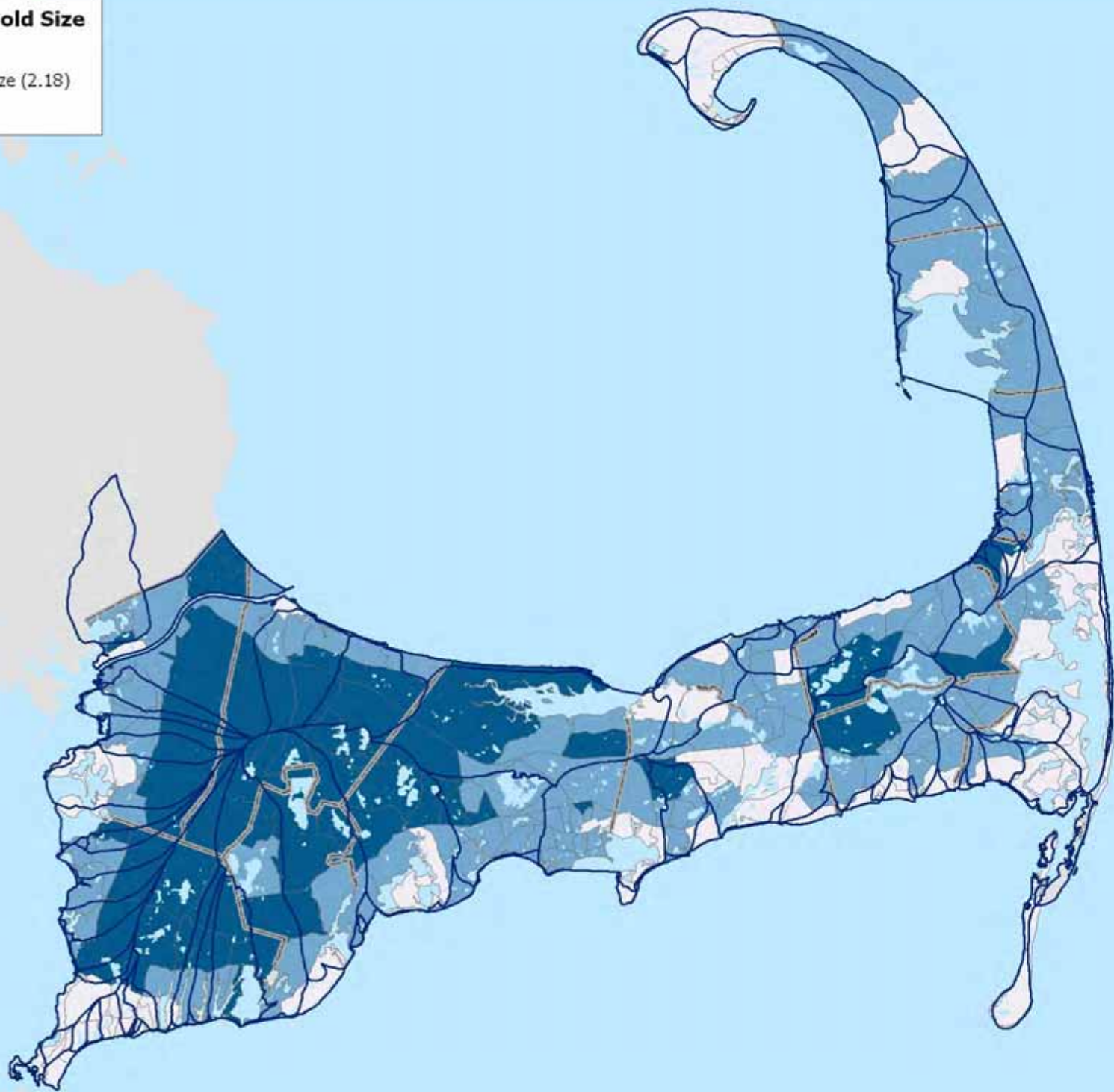
- 1% - 28%
- 29% - 42%
- 43% - 56%
- 57% - 71%
- 72% - 88%



Source: ESRI's Business Analyst 2009 Estimates

**Average Household Size**

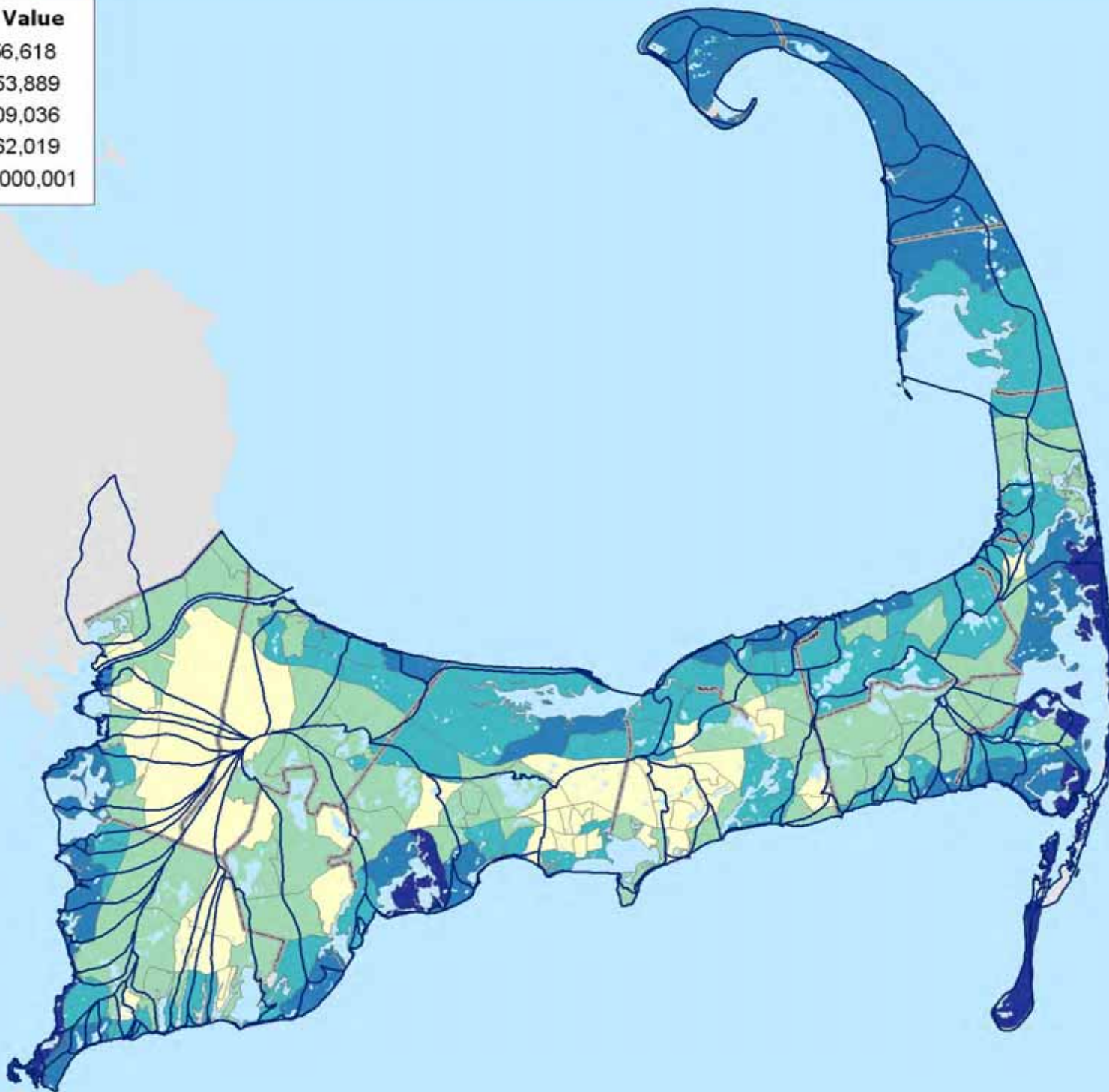
- Below Average
- Average Family Size (2.18)
- Above Average



Source: ESRI's Business Analyst 2009 Estimates

**Median Housing Value**

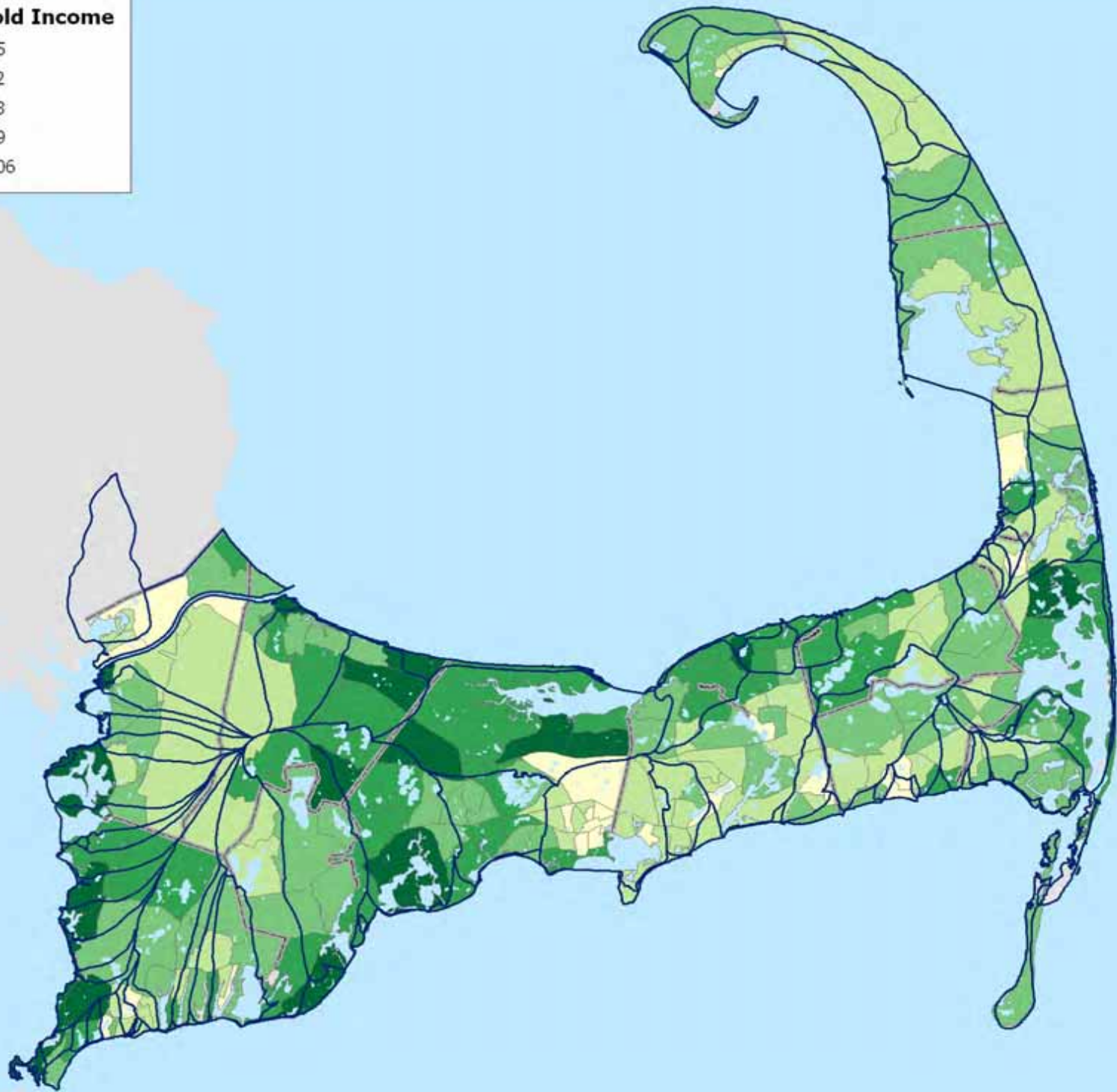
- Less than \$256,618
- \$256,618 - \$353,889
- \$353,889 - \$509,036
- \$509,036 - \$762,019
- \$762,019 - \$1,000,001



Source: ESRI's Business Analyst 2009 Estimates

**Median Household Income**

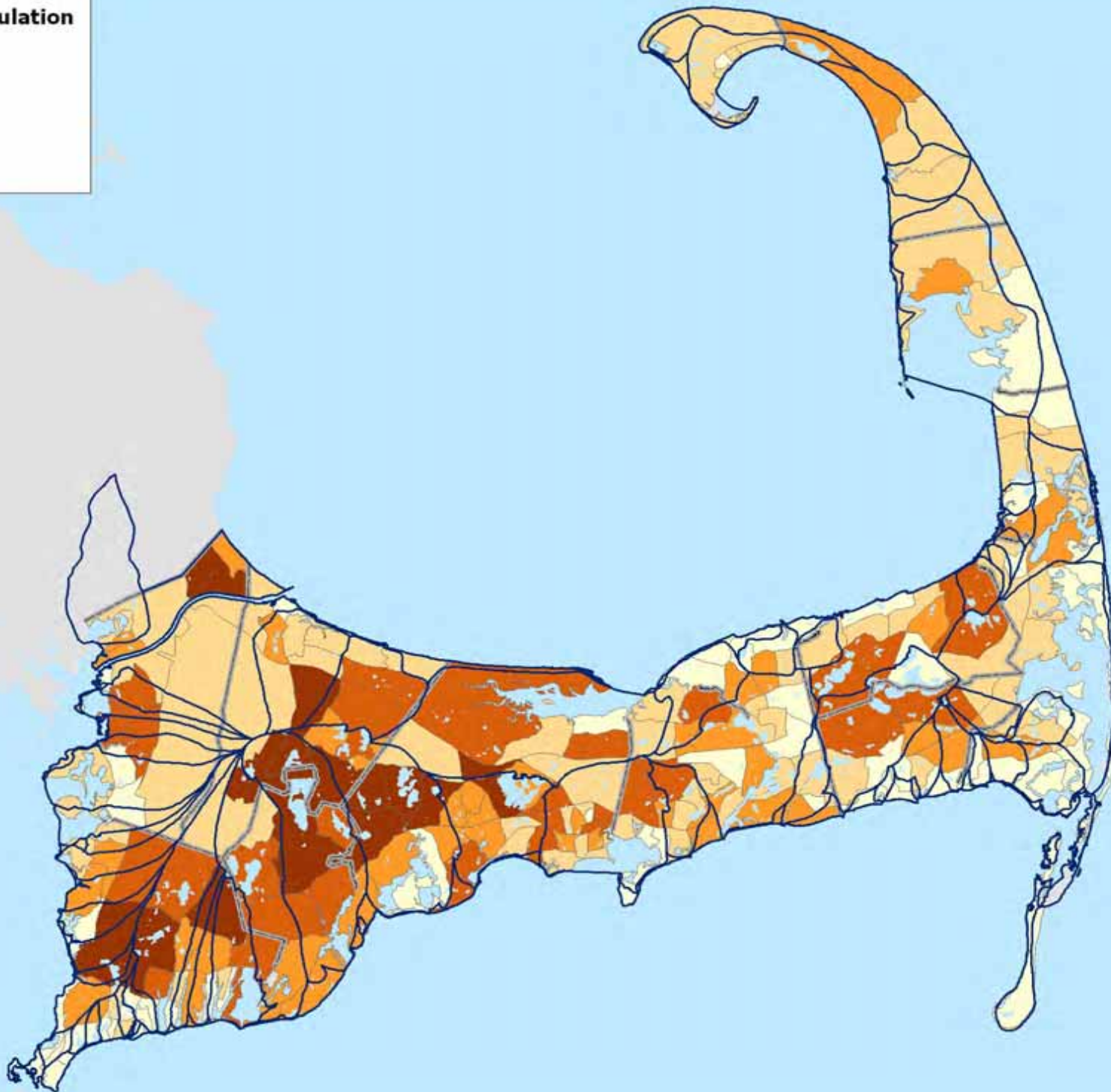
- \$24,520 - \$42,625
- \$42,625 - \$58,322
- \$58,322 - \$73,143
- \$73,143 - \$89,819
- \$89,819 - \$115,906



Source: ESRI's Business Analyst 2009 Estimates

**Labor Force Population**

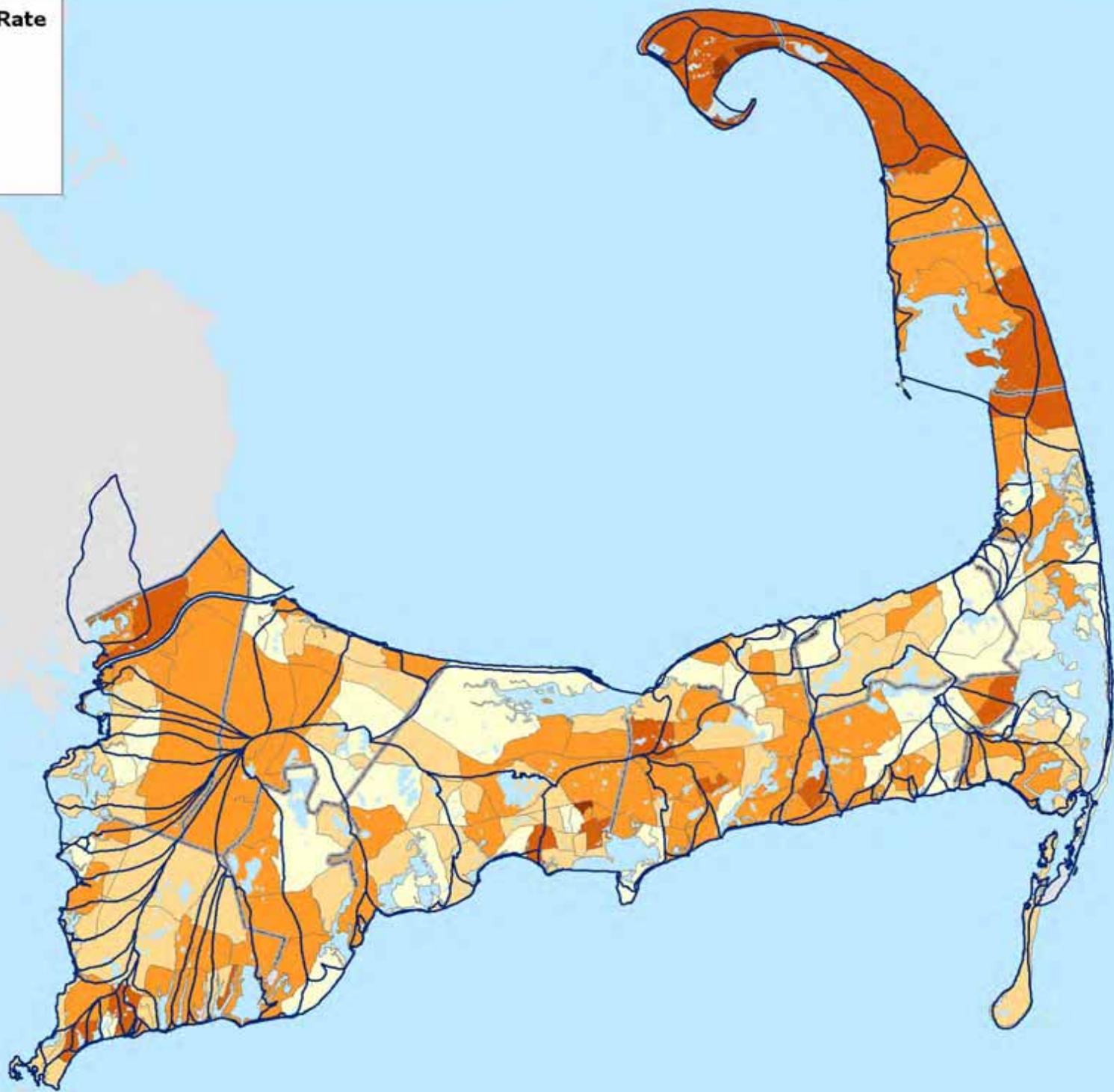
- 144 - 423
- 424 - 625
- 626 - 933
- 934 - 1,453
- 1,454 - 3,359



Source: ESRI's Business Analyst 2009 Estimates

**Unemployment Rate**

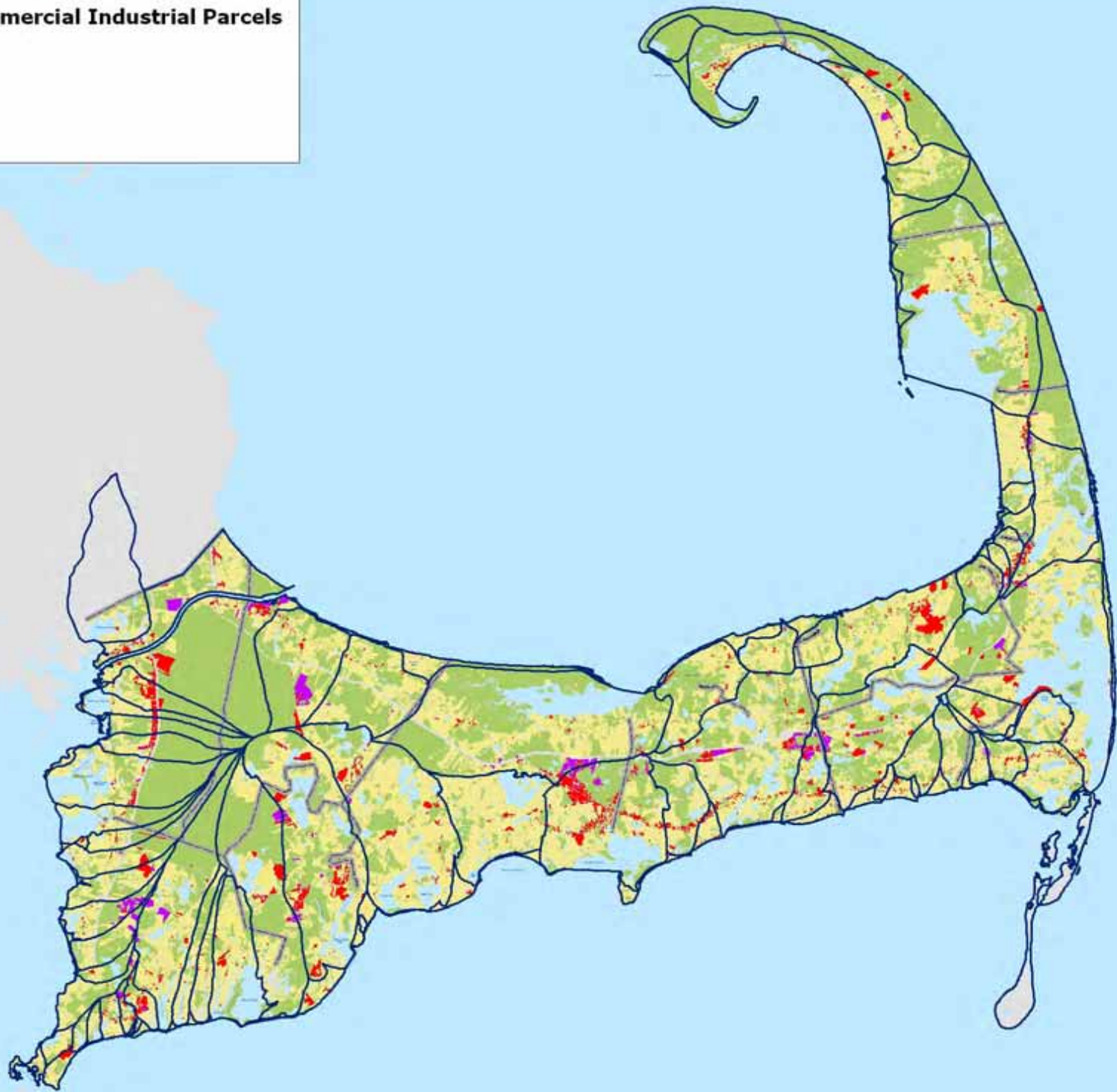
- 0% - 4%
- 5% - 6%
- 7% - 10%
- 11% - 15%
- 16% - 27%



Source: ESRI's Business Analyst 2009 Estimates

**Residential Commercial Industrial Parcels**

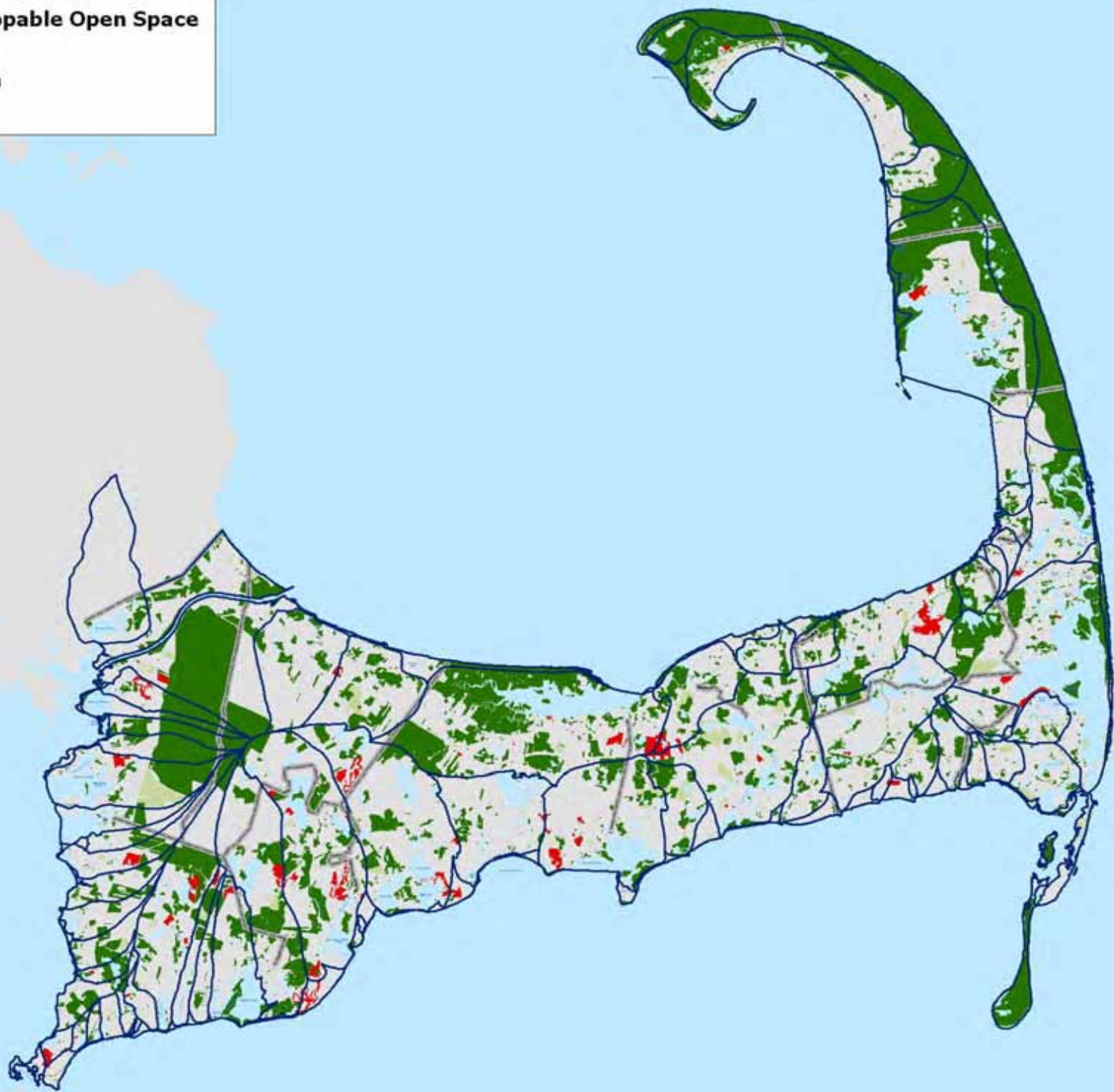
- All Other
- Residential
- Commercial
- Industrial



Source: Cape Cod Commission

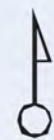
### Potential Developable Open Space

- Legally Protected
- Limited Protection
- Unprotected

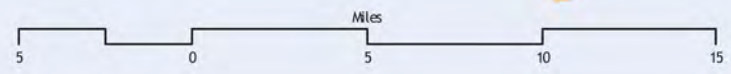
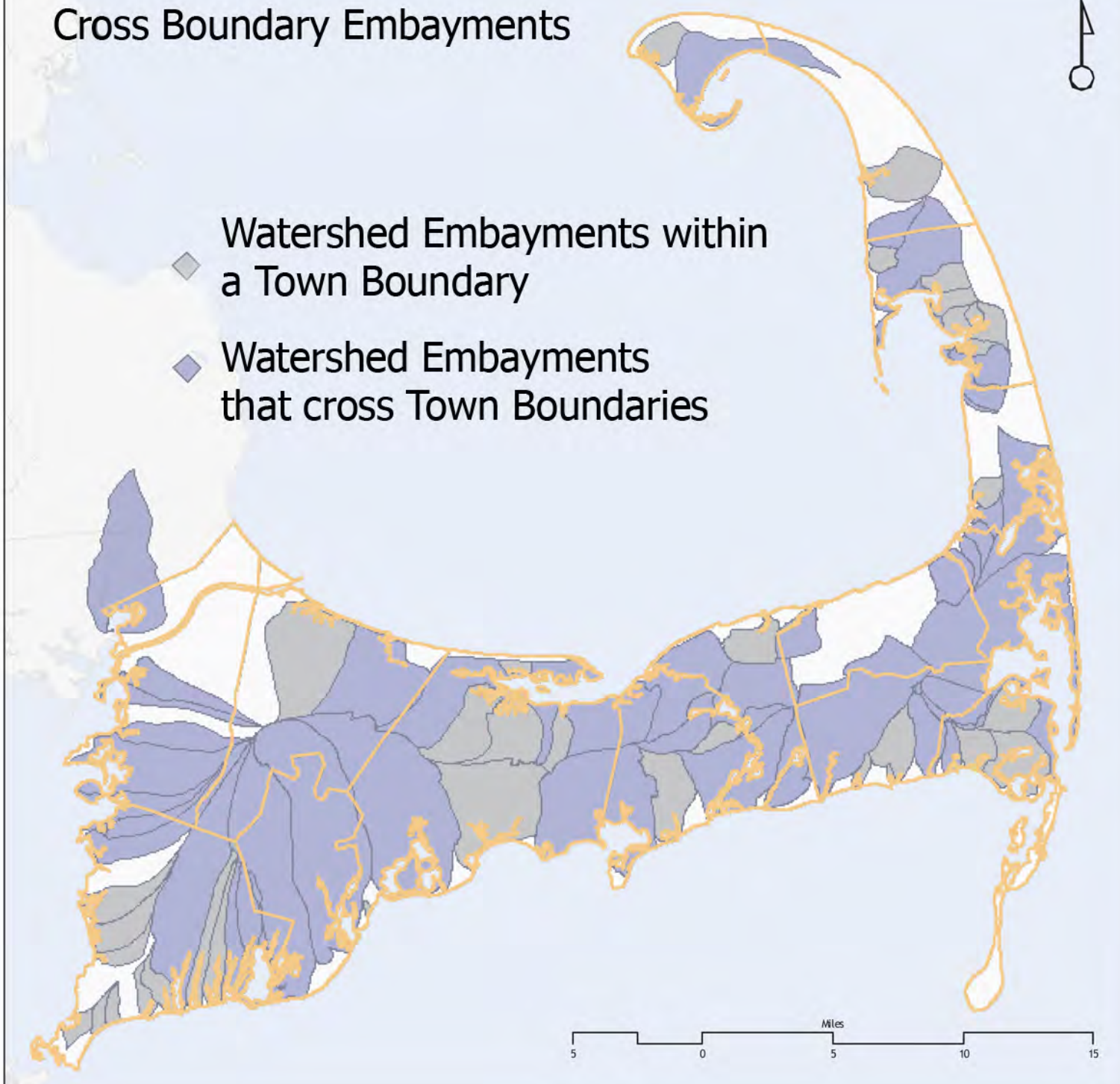




# Cross Boundary Embayments



- ◆ Watershed Embayments within a Town Boundary
- ◆ Watershed Embayments that cross Town Boundaries



GETTING TO KNOW  
**Your Watershed**  
CAPE COD COMMISSION

Tour Calendar   My Watershed   Documents   Stakeholders   Announcements

**2010 Watershed Tour**

September 2010

October 2010

ON CAPE COD we live, work, and play on our drinking water supply. It is stored beneath our feet, in the form of a sole source aquifer. All drinking water comes from our groundwater supply. The rain cycle replenishes that supply every year.

*The Wastewater Problem*

More than 156,000 homes now exist on Cape Cod. About 85 percent of them use individual septic systems (known as Title 5 systems in

[Access the Blog](#)  
*An opportunity to comment and provide feedback...*

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**Sign up for updates and stay informed:**

**[www.capecodcommission.org/watertour](http://www.capecodcommission.org/watertour)  
or email: [watershed@capecodcommission.org](mailto:watershed@capecodcommission.org)**



SEE TO KNOW YOUR WATERSHED

Edit Page  
Promote with an Ad  
Suggest to Friends  
<http://www.capecodcommission.org/watertour/home.htm>

Insights See All  
0 Monthly Active Users  
0 Daily New Likes  
0 Daily Post Views  
0 Daily Post Feedback  
Insights are visible to page admins only.

2 People Like This See All  
Brock Bill  
Cape Cod Watershed Tour

Photos 1 of 3 albums See All  
Threebays Created on Tuesday  
Fan photos are not enabled. Edit Settings.

### Cape Cod Watershed Tour

Get Started Wall Info Photos Discussions Events

What's on your mind?  
Attach: [Icons] Share

Cape Cod Watershed Tour + Others Just Cape Cod Watershed Tour Just Others Settings

Cape Cod Watershed Tour <http://www.youtube.com/watch?v=jPSJohWIRsUB&feature=related>



Cape Cod Regional Wastewater Management Plan  
[www.youtube.com](http://www.youtube.com)  
Cape Cod Regional Wastewater Management Plan, May 13, 2010 Paul Hledzwicki, Executive Director, Cape Cod Commission.

2 hours ago Comment Like Share Promote Flag



Threebays 83 new photos  
Yesterday at 11:00am Comment Like Share

Cape Cod Watershed Tour  
<http://www.capecodcommission.org/watertour/Watershedtourbrochure.pdf>  
[www.capecodcommission.org](http://www.capecodcommission.org)  
October 1st 11:18am Comment Like Share Promote Flag

Cape Cod Watershed Tour  
WAQUOIT BAY FORUM  
Tuesday, November 30, 2010 at 7:00pm  
Mashpee Public Library, Mashpee  
October 1st at 9:56am Comment Like Share RSVP to this event

Create an Ad

FREE Foreclosure List  
[homerunrealestate.com](http://homerunrealestate.com)



Updated list of foreclosures in FL for FREE! Browse listings, fill out a contact form and have a Realtor help you or call 1-800-967-7074

The SPARKS lab



How hi-tech is heat insulation nowadays? Like, can a snowman visit the scorching desert in one piece? Find out at The SPARKS lab.  
Like

CaesarStone US



"Like" the original quartz surface, CaesarStone Quartz Surfaces, & get the latest news, trends, kitchen design ideas, & more.  
Like

The Firm Of DiSabatino  
[sharpcpa.com](http://sharpcpa.com)

Chat (0)



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# Become a fan and stay informed:

# Cape Cod Watershed Tour



# Status of Local Wastewater Planning *Summer 2010*

	Barnstable	Bourne	Brewster	Chatham	Dennis	Eastham	Falmouth	Harwich	Mashpee	Orleans	Provincetown	Sandwich	Truro	Wellfleet	Yarmouth
<b>Comprehensive Wastewater Management Plan (CWMP) (start date)</b>	Jul-09	Jun-09	Jul-09	Jun-09	Jun-09	Jul-09	2007*	Jun-09	Jun-09	Jun-09	Jun-09	N	N	Jul-09	Jun-09
Joint MEPA/DRI	N	N	N	Y	N	N	Y	N	Y	Y	Y			N	Y
Needs Assessment		Apr-07	Nov-10		Sep-05	Mar-09	Dec-07	underway	Nov-07	Jan-07		underway		underway	Jul-05
Technology Assessment	Sep-10						Dec-07		Feb-08	Oct-07					
Alternatives Screening								underway	Jan-08						
Alternative Selection Preferred Plan									May-08						
Draft EIR/DRI									Apr-09						Oct-10
Final EIR/DRI				Oct-09						Mar-01					

<b>Wastewater Facility Plan (start date)</b>	Jun-09	Tied to Wareham	N	Jun-09	N	N	Jun-09	N	N	Tri town (septage only)	Jun-09	Serves MMR	N	N	Septage only
Facility Plan Upgrade (start date)	Jun-09			N			Jun-09				Jun-09				
Joint MEPA/DRI	Y			Y			Y				Y				
Needs Assessment															
Technology Assessment															
Alternatives Screening															
Alternative Selection Preferred Plan															
Draft EIR/DRI															
Final EIR/DRI	Sep-07			Oct-09			May-01				Mar-01				