Cape Cod Basin

20-Year Renewal Permit Meeting

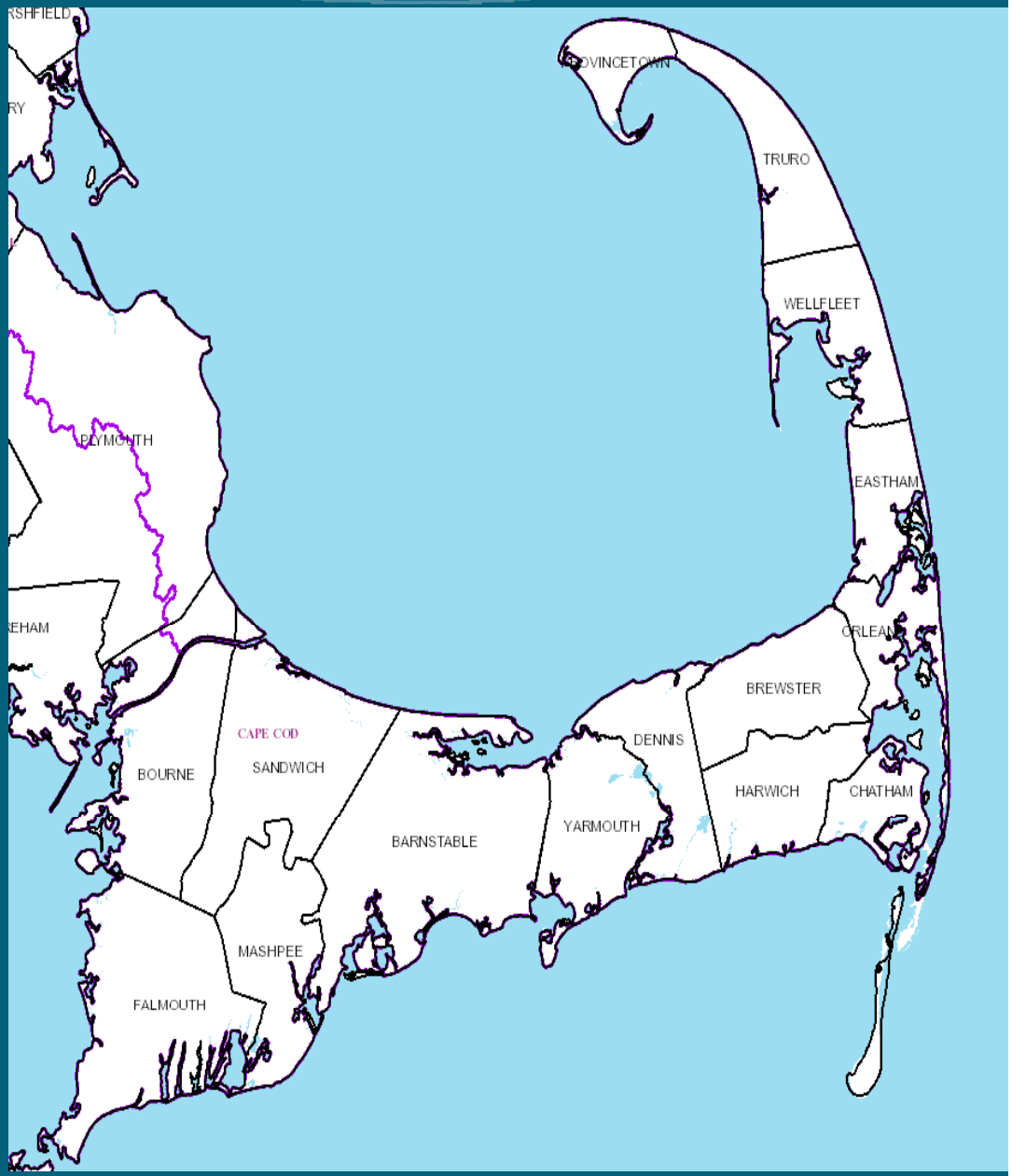
January 20, 2015
Cape Cod Community College Science Bldg.
Lecture Hall C

MA Executive Office of Energy and Environmental Affairs
Department of Conservation and Recreation
Department of Environmental Protection
Department of Fish and Game

Cape Cod Meeting

Agenda

- Introductions
- WMA Permit Process
- Cape Cod Specifics
- Questions & Answers
- Informal Agency Consultations



Meeting Purpose- Part One

- Explain the WMA permit renewal process, including:
  - WMA Purpose
  - Permit Renewal Schedule
  - Water Needs Forecasts
  - Safe Yield
  - Permit Conditions
  - Permit Requirements

Meeting Purpose- Part Two

- Review Cape Cod data and requirements, including:
  - Water Use
  - Baselines
  - Outdoor Water Use Restrictions
  - Coldwater Fisheries Resources (CFRs) and Requirements
  - Mitigation Requirements

Water Management Act Purpose

Chapter 21G, Section 7 Reasonable protection of …

- Public drinking water supplies
- Navigation
- Hydropower resources
- Fish and wildlife
- Water quality
- Water-based recreation
- Wastewater treatment capacity
- Agriculture
- Waste assimilation capacity
- Reasonable conservation practices consistent with efficient utilization of water
- Groundwater recharge areas
- Flood plains
- Wetland habitat
- Reasonable economic development and creation of jobs

Cape Cod Renewal Schedule

Timeline	Activity	Notes
January- Feb. 2015	Draft new Water Needs Forecasts (WNF) where applicable	DCR in consultation with PWS
January 2015	Outreach meeting and final WNF	
January - Sept 2015	Consultation meetings	As necessary
February 2015	DEP restarts permit application and issues Order to Compete (OTC) where necessary	
March – May 2015	Applicant prepares response to OTC	
June 2015	OTC response due back	
June - Sept 2015	DEP reviews	Mtgs. as necessary
September 2015	Draft permit issued and public comment period	
November 2015	Issue final permit	

Safe Yield- Standard Method

55% of Annual Drought Basin Yield + Reservoir Storage

- Statewide SY method not applicable on the Cape and Islands
  - Very few rivers and many kettle ponds
  - Unique Geology and extensive aquifers
- Used recharge values from regional USGS ground water models for Cape Cod
- Sagamore and Monomoy Flow Lenses used to represent the entire Cape Cod and Islands basins
- (USGS SIR 2004-5181 (Walter and Whealan)

Safe Yield- Cape Cod

- Average annual recharge 27.25 inches per year
- 1965 recharge 13.9 inches, or 51 percent of average
- Used 1965 recharge rate for probable driest period/drought year
- Due to the expansive thickness of aquifers, applied entire volume (100%) of recharge (vs. 55% Q90 Statewide)
- 1965 Recharge: 0.66 MGD/square mile
- Applied over 394.80 square miles = **261.1 MGD**

Basin	Safe Yield	Total Annual Authorized Withdrawals*	Total Annualized Registered Volume *	2013 Reported Use
Cape Cod	261.1 mgd	51.35 mgd	32.53 mgd	39.25 mgd

* Withdrawal volume calculated based on 365 days

Water Needs Forecasts (WNF)

- Applications for WMA Permits require a forecast of water needs for the permit term
- DCR develops forecast
- WRC Method:
  - Population and Employment forecasts
  - 65/10 (not applicable on Cape) and Current Trends scenarios
  - + 5% Buffer
  - At least 3 years of reliable data
  - Temporary allocation where necessary

- URL: www.mass.gov/eea/wnf-method

Steps in Developing a Water Needs Forecast

- DCR compiles and analyzes data
- Public Notices: *Environmental Monitor*; status report to WRC
- DCR develops draft forecast; discussions with water supplier
- Basin-wide public meeting (this meeting)
- PWS includes forecast in WMA permit application

General Timeframe: 2 months

Criteria for Updating Water Needs Forecasts:

(Example: Falmouth)

2010 Population *Estimate*	2010 Population (U.S Census)	Difference	% Difference	Water Use Difference (65 rgpcd)
34,614	31,531	- 3,083	- 9%	0.2 MGD

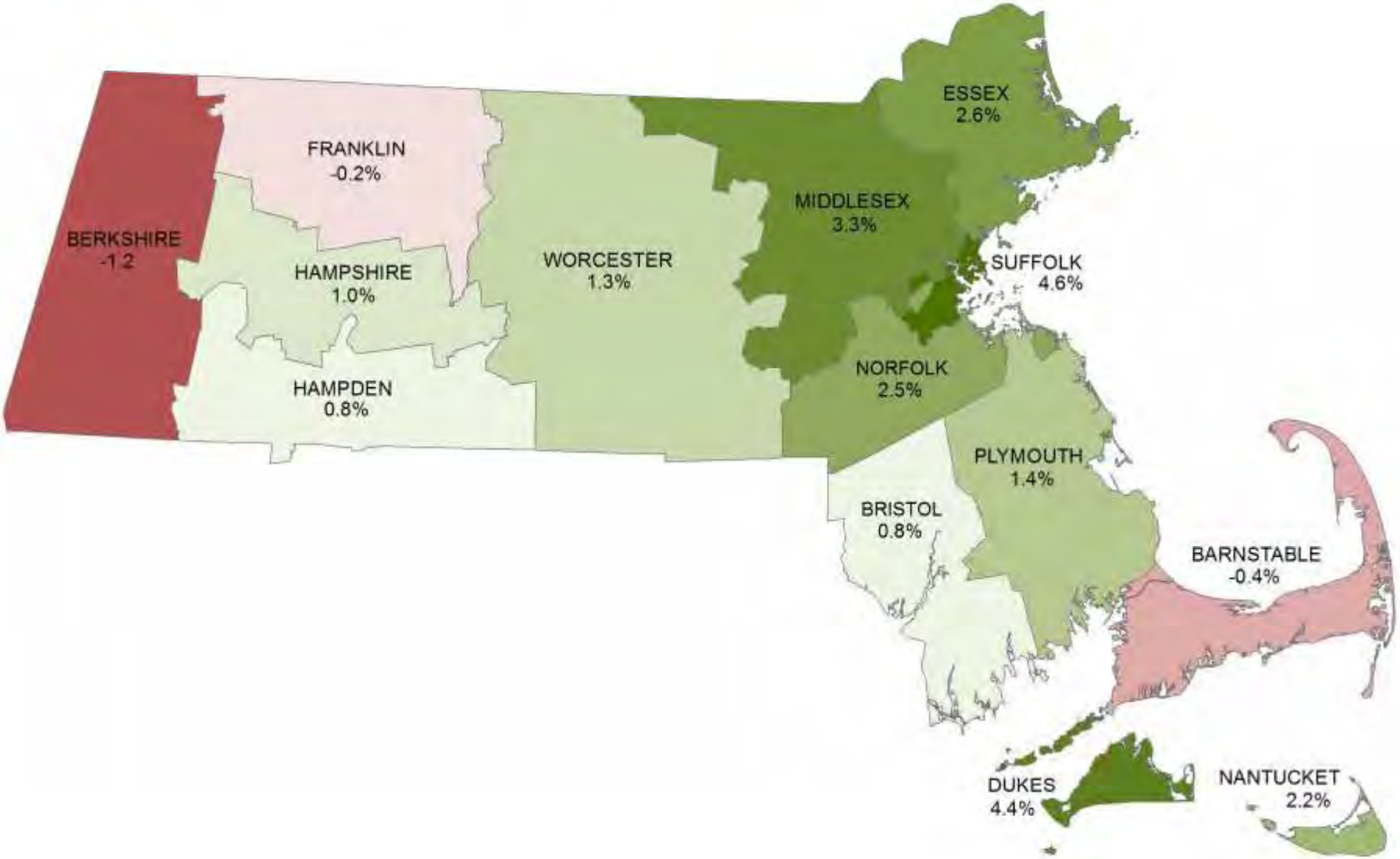
Used to develop original forecast

+/- 5% or more? ✓

AND

+/- 0.1 MGD or more? ✓

Estimated Cumulative Percent Change, Census 2010 to July 1, 2013
by Massachusetts County



Data from Water Supplier

1. Water-use data based on actual metering for 3 to 5 years (from ASRs):
   - Residential
   - Industrial, Commercial, Municipal (Nonresidential)
   - Treatment plant losses (if any)
   - UAW
2. Population served by water system (including out of town and seasonal)
3. Anticipated significant changes in water use (large projects not captured in projections)

Data Obtained by DCR

Data	Sources
Current Town-wide Population	U.S. Census, Town Planning Office & DCR estimated seasonal pop.
Population Projections	Executive Office of Transportation (EOT), Umass Donahue Institute
Current Employment	EOT
Employment Projections	EOT

UMass Donahue Institute

2008 Survey of Cape Cod Second-Home Owners

-16,000 second-home owners on Cape Cod surveyed (4,944 responses)

-characterized current use of 2nd homes

-evaluated impact of conversions to primary residence

http://www.capecodcommission.org/resources/economicdevelopment/CapeCod2ndHomeReportFinal.pdf

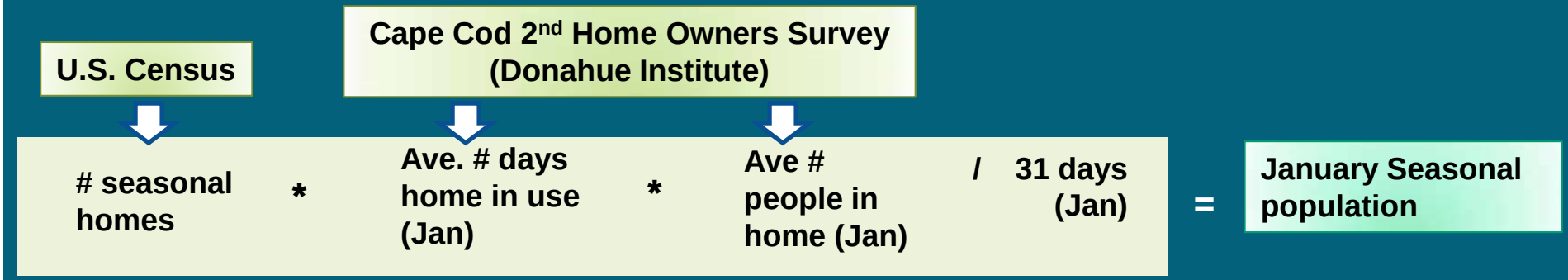
Table 18. Average number of people who use the second home by month	Upper Cape	Mid Cape	Lower Cape	Outer Cape	Total
January	1.8	2.0	2.2	2.0	2.0
February	1.8	2.0	1.8	1.8	1.9
March	1.9	2.1	2.0	1.9	2.0
April	2.4	2.5	2.5	2.3	2.4
May	2.9	2.8	2.8	2.8	2.8
June	3.4	3.5	3.5	3.4	3.5
July	4.4	4.5	4.6	4.4	4.5
August	4.4	4.5	4.6	4.5	4.5
September	2.9	3.1	3.1	3.0	3.0
October	2.4	2.5	2.5	2.5	2.5
November	2.1	2.3	2.3	2.2	2.2
December	2.0	1.9	2.1	2.1	2.0

Table 19. Average number of days second home is in use by month	Upper Cape	Mid Cape	Lower Cape	Outer Cape	Total
January*	5.7	6.4	5.0	4.3	5.3
February*	5.4	6.3	4.7	3.9	5.0
March*	6.1	7.0	5.4	4.7	5.7
April*	8.0	8.9	7.3	6.7	7.7
May*	10.8	11.5	9.5	9.7	10.3
June*	16.6	16.6	15.3	15.7	16.0
July*	23.7	23.7	24.5	24.3	24.1
August*	23.7	23.2	24.4	24.8	24.1
September	14.3	14.4	13.7	14.0	14.1
October*	10.1	10.8	9.2	9.1	9.7
November*	6.9	7.6	6.5	5.8	6.7
December*	6.5	6.9	5.6	4.9	5.9
Total days for the year*	136.8	144.5	128.8	126.0	133.7

*All time periods marked with an asterisk have a statistically valid difference across the regions.

Determine seasonal population for each town for each month:

Example: January



Determine annualized seasonal population for each town:

Annual Total Seasonal population (Jan + Feb + Mar…) ÷ 12 = Annualized Seasonal Population

Determine total population for each town:

U.S. Census → Year-round population + DCR / UMDI → Annualized seasonal population = Total Annualized Population

WMA Permit Conditions

1. Efficiency Requirements
   - 10% unaccounted-for-water (UAW)
   - BMPs (leak detection & repair, metering, pricing, public education etc.)
2. Seasonal limits on nonessential outdoor water use/Cape specific requirements

Golf Standard Conditions

All permitted golf courses will be required to:

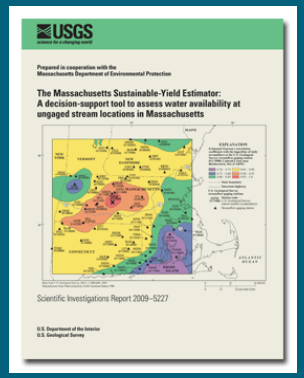
- have a conservation program that includes
  - metering,
  - irrigation system maintenance,
  - turf management, and
  - education;
- limit nonessential irrigation during drought;
- optimize withdrawals to protect cold water fisheries; and
- minimize impacts if the golf course is in a groundwater depleted subbasin (not applicable on Cape).

New or expanding golf courses may also be required to:

- mitigate irrigation impacts; and
- show that there is no alternative source that is less environmentally harmful.

Science and Policy Informing WMA Permit Requirements

- USGS Studies: August withdrawals and impervious cover have significant impact on fluvial fish



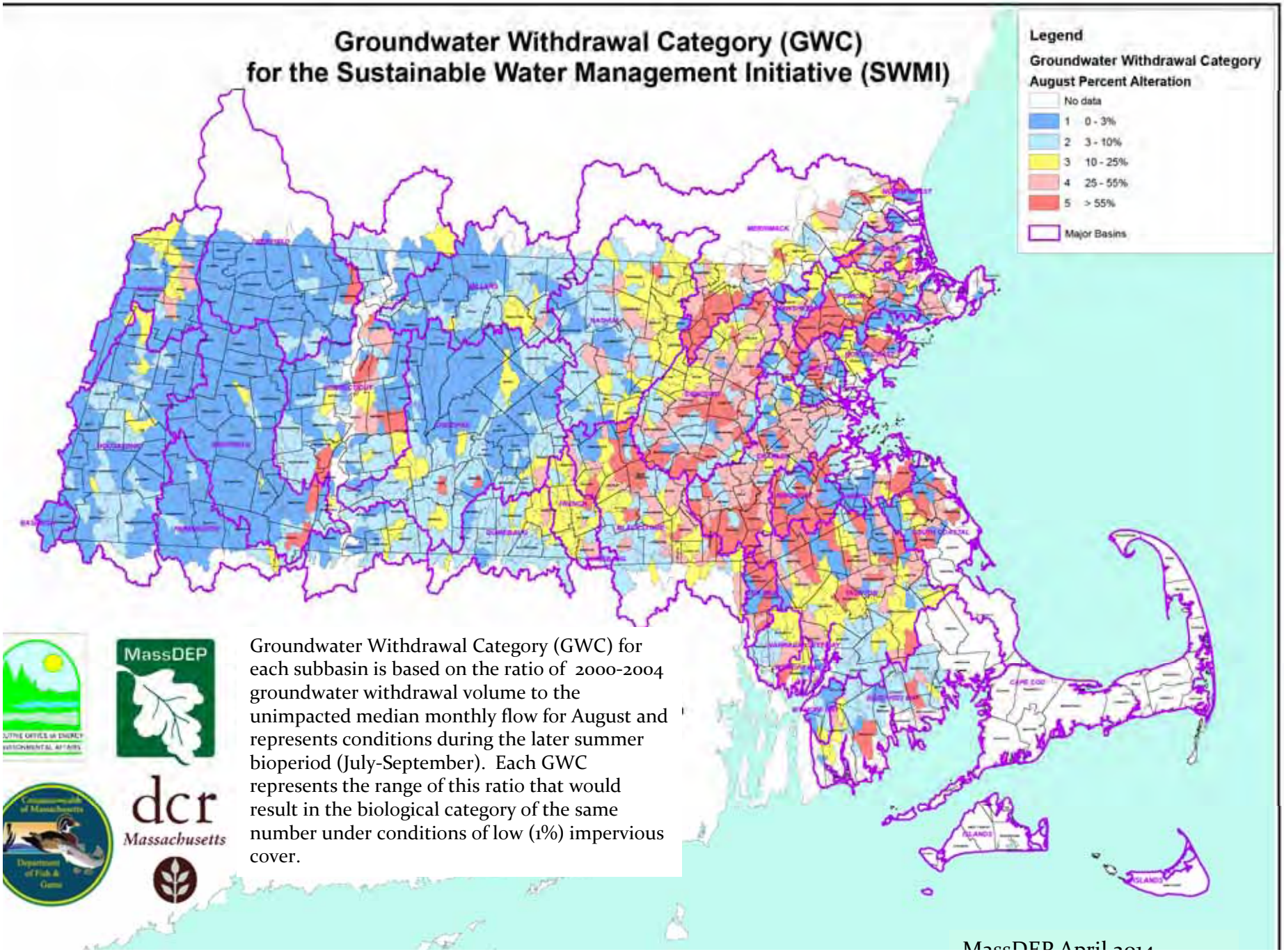
SYE

MWI

Fish and Habitat

- SWMI Advisory and Technical Committees helped us develop policy from science
- Five Biological and Groundwater Categories (1=least impact, 5 = most impact)
  - Categories use fluvial fish as surrogate for healthy aquatic habitat,
  - Impervious cover and August groundwater withdrawals used to represent impacts
- Streamflow Criteria mark the boundaries between categories (310 CMR 36.14)

Groundwater Withdrawal Category (GWC) for the Sustainable Water Management Initiative (SWMI)



Groundwater Withdrawal Category (GWC) for each subbasin is based on the ratio of 2000-2004 groundwater withdrawal volume to the unimpacted median monthly flow for August and represents conditions during the later summer bioperiod (July-September). Each GWC represents the range of this ratio that would result in the biological category of the same number under conditions of low (1%) impervious cover.

MassDEP

dcr
Massachusetts

MassDEP April 2014

New Permit* Requirements

- CFR Consult for withdrawals in subbasins with Coldwater Fishery Resources (CFRs)
- ~~Minimization for groundwater withdrawals in "≥25% August Net Groundwater Depleted" Subbasins~~
- Mitigation commensurate with impact, for requests above baseline, in consultation with agencies

*Those with registrations only are not subject to these requirements

Coldwater Fisheries Resource (CFR) Consult

- Basin meeting serves as the preliminary consult
- Goal: Reduce impacts to CFRs through optimization
- Optimization template will be provided

Mitigation

Mitigation Standard:

- "commensurate with impact", defined as:
  - volume of increase over baseline
  - does the increase cause a category change?
- considers cost and efficacy

Baseline is the largest of the following:

- 2003 – 2005 water use + 5%
- 2005 water use +5 %
- the community's registered volume
- Volume must be in compliance

Permit Tiers	Mitigation Requirements
Tier 1 = No increase above baseline →	no mitigation
Tier 2 = Increase but no category change →	commensurate mitigation
~~Tier 3 = Increase and category change~~ →	~~commensurate mitigation (2:1 if indirect mitigation) show no feasible alternative~~

Direct Mitigation

Can be volumetrically calculated

Eligible Activities:

1. Infiltration and inflow improvements
2. Stormwater recharge (directly connected impervious area redevelop to recharge)
3. Surface water releases

Indirect Mitigation Activities

Qualitative Credit System for Cape Cod

- Install & Maintain a fish ladder
- Culvert replacements meeting crossing standards
- Stream restoration
- Private well bylaw
- Water Quality improvements
  - Wastewater & Stormwater
- Acquire property in Zone I or II, or for other resource protection
- Infiltration/Inflow removal program
- Remove dam/flow barrier

Mitigation Plan Development

Action hierarchy

1st: Demand Management to stay below baseline

2nd: Direct/quantifiable mitigation

3rd: Indirect/non-quantifiable mitigation

Location hierarchy (where a choice exists)

1st: same subbasin as withdrawals (considering water quality)

2nd upstream from the subbasin of withdrawals (considering water quality)

3rd: same major basin as withdrawals

4th: different major basin

Take cost and feasibility into account

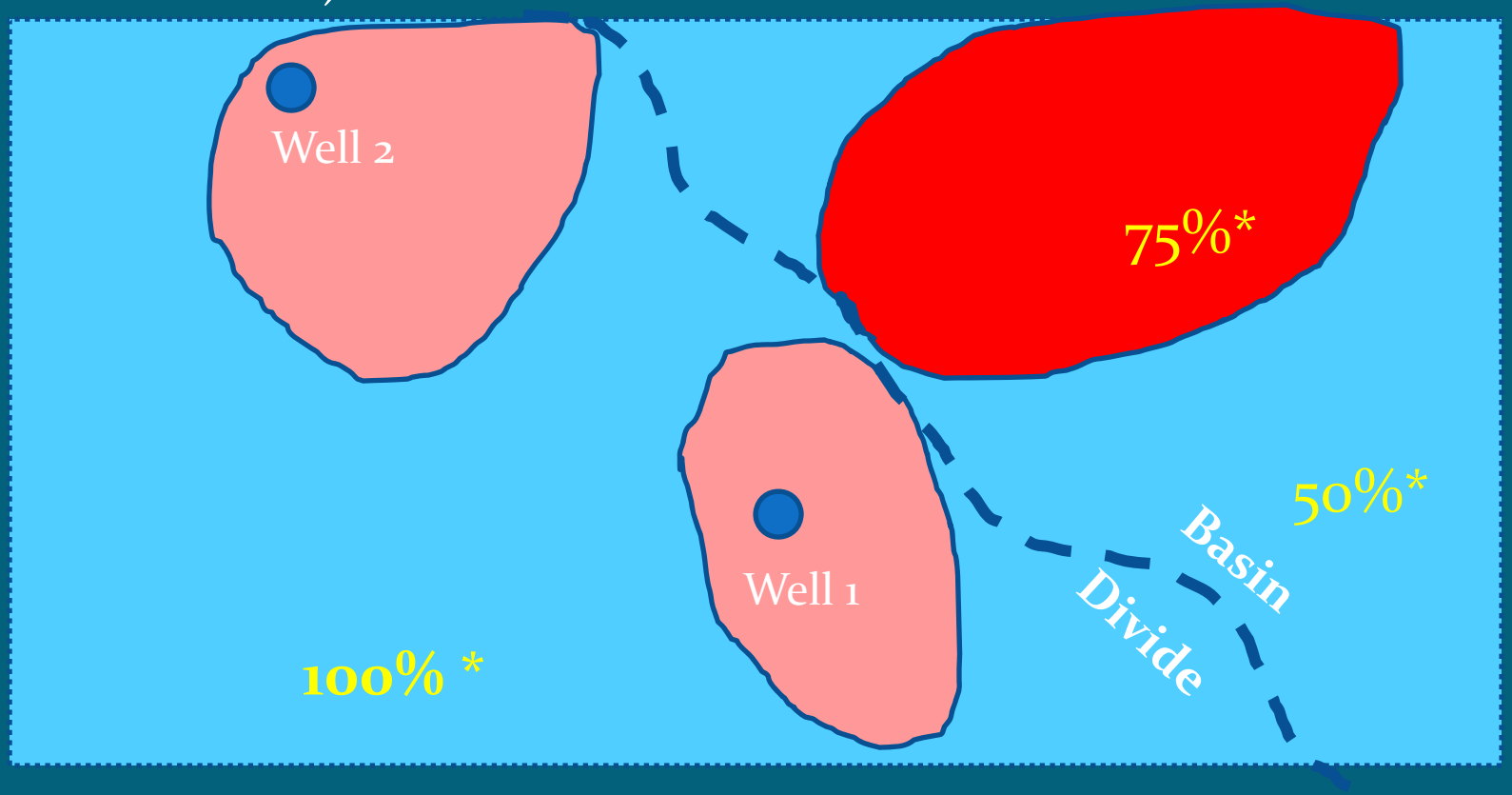
Mitigation Plan Timing

- Mitigation Plan is a live document
- Must be submitted at start of permit, can be phased-in based on use
- Retroactive credits (since 2005) considered if activity/benefit still in effect
- Volumes over Baseline must be mitigated prior to withdrawal (with allowances if withdrawals are already over baseline)

Mitigation Adjustments

Withdrawal location(s) and wastewater returns may result in adjustments in mitigation volumes and credits

- Wastewater Adjustment (* also adjusted by consumptive use factor)
- Location Adjustment Factor



Cape Cod Basin Specifics

- Who withdraws & how much?
- What are my water use restriction triggers?
- Who has Cold Water Fishery Resources?
- What is my baseline?
- Do I need to mitigate? Projected Tier?
- What mitigation options exist?

Total Cape Cod Water Use

Use Type	Registered Users	Permitted Users	Registered Volumes (mgd)	Permitted Volumes (mgd)
PWS	16	16	19.8	18.07
Golf	22	8	1.37**	0.75**
Other	3	0	2.55**	0
Cranberry*	43	0	8.81**	0
Total	84	24	32.53	18.82

* 991.62 registered cranberry acres; 0 permitted cranberry acres; 21.02 certified cranberry acres; 13.6 credit cranberry acres

** Withdrawal volume calculated based on 365 days

Permitted Cape Cod Users

Public Water Suppliers

Name	Registration Volume (mgd)	Permit Volume (mgd)	Total Authorized Volume (mgd)
Barnstable	0.34	0.32	0.66
Bourne	0.73	0.79	1.52
Brewster	0.63	0.94	1.57
COMM	1.98	1.59	3.57
Chatham	0.7	0.62	1.32
Cotuit	0.27	0.37	0.64
Dennis	2.1	1.16	3.26
Falmouth	2.95	1.36	4.31
Harwich	1.2	0.96	2.16
Hyannis	2.71	0.71	3.42
Mashpee	0.14	1.4	1.54
Orleans	0.86	1.12	1.98
Provincetown	0.85	0	0.85
Sandwich	0.77	1.87	2.64
Upper Cape	0	3	3
Yarmouth	3.03	1.92	4.95

Other Users

Name	Registration Volume (mgd)	Permit Volume (mgd)
Ballymeade Golf and Country Club	0	0.17
Captains Golf Course	0.08	0.13
CPG Ridge Club LLC	0	0.12
Kingsway Trust	0	0.1
Olde Barnstable Fairgrounds Golf	0	0.13
The Golf Club at Cape Cod	0	0.13
Town of Yarmouth Golf Courses	0.12	0.12
Willowbend Golf Course	0	0.27

Cape Cod PWS Baseline Volumes

PWS	Baseline Volume (mgd)	Reported Use 2011 (mgd)	Reported Use 2012 (mgd)	Reported Use 2013 (mgd)
Barnstable Fire District	0.58	0.46	0.5	0.53
Bourne Water District	1.4	1.21	1.24	1.28
Brewster Water Department	1.37	1.24	1.22	1.24
Centerville-Osterville-MM	3.28	2.64	2.78	2.78
Chatham Water Department	1.17	1.15	1.26	1.16
Cotuit Water Department	0.48	0.51	0.54	0.55
Dennis Water District	3.21	2.65	2.8	2.72
Falmouth Water Department	4.2	4.32	4.34	4.19

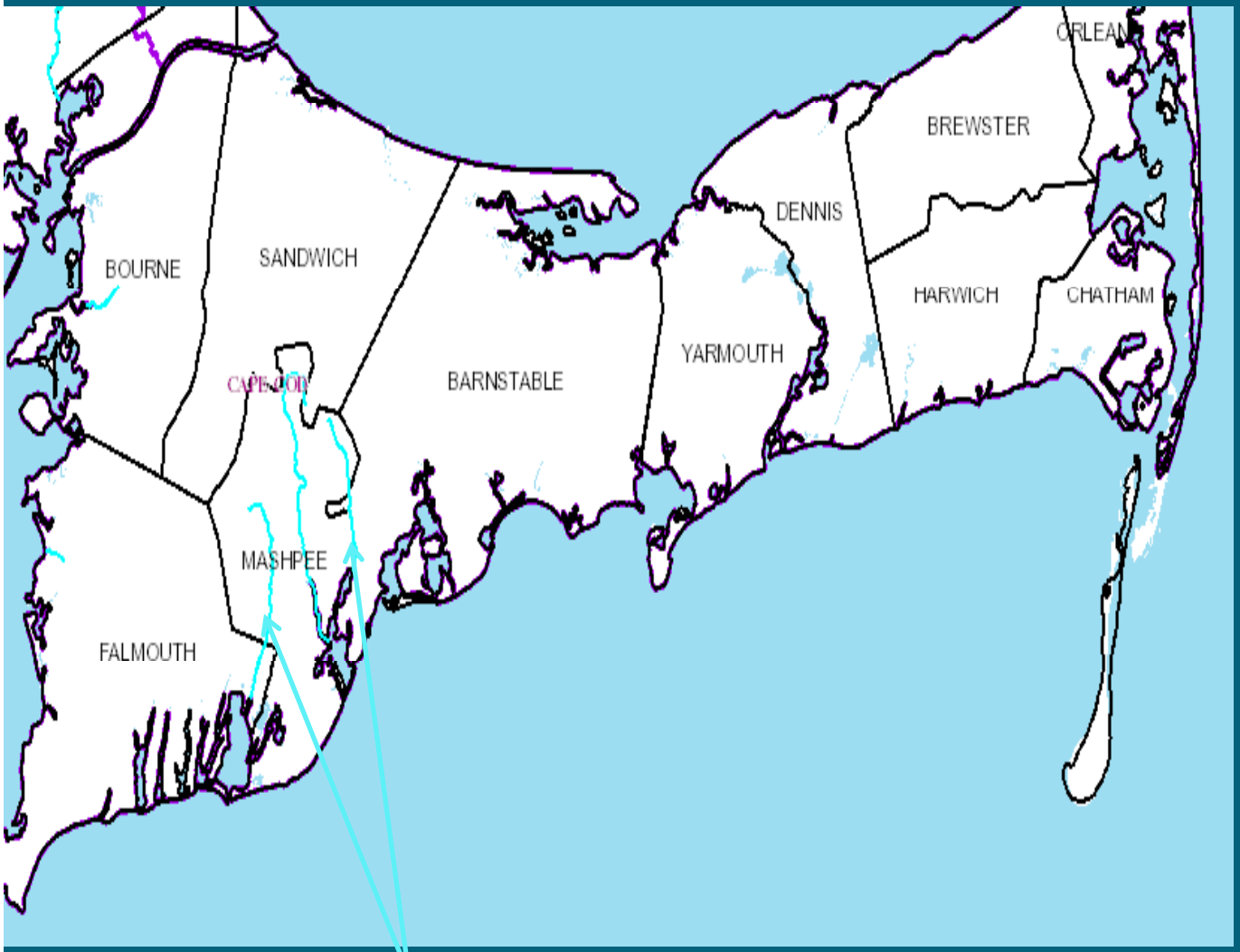
Cape Cod PWS Baseline Volumes

PWS	Baseline Volume (mgd)	Reported Use 2011 (mgd)	Reported Use 2012 (mgd)	Reported Use 2013 (mgd)
Harwich Water Department	2.16	1.87	2.14	1.78
Hyannis Water System	2.89	2.21	2.32	2.18
Mashpee Water District	1.28	1.31	1.36	1.33
Orleans Water Department	1.03	0.92	0.94	0.89
Provincetown Water Department	0.85	0.66	0.66	0.62
Sandwich Water District	2.03	1.62	1.68	1.69
Upper Cape Regional Co-op	N/A	1.17	1.27	1.06
Yarmouth Water Department	4.19	3.65	3.47	3.5

Cape Cod Non-PWS Baselines

Name	Baseline Volume (mgd)	Reported use 2011	Reported use 2012	Reported use 2013
Ballymeade Golf and Country Club	0.12	0.11	0.11	0.1
Captains Golf Course	0.16	0.13	0.17	0.17
CPG Ridge Club LLC	0.09	0.12	0.12	0.11
Kingsway Trust	0.09	0.08	0.1	0.07
Olde Barnstable Fairgrounds Golf	0.13	0.1	0.11	0.12
The Golf Club at Cape Cod	0.12	0.1	0.1	0.11
Town of Yarmouth Golf Courses	0.25	0.27	0.29	0.25
Willowbend Golf Course	0.27	0.21	0.13	?

Coldwater Fishery Resources



CFRs are light blue

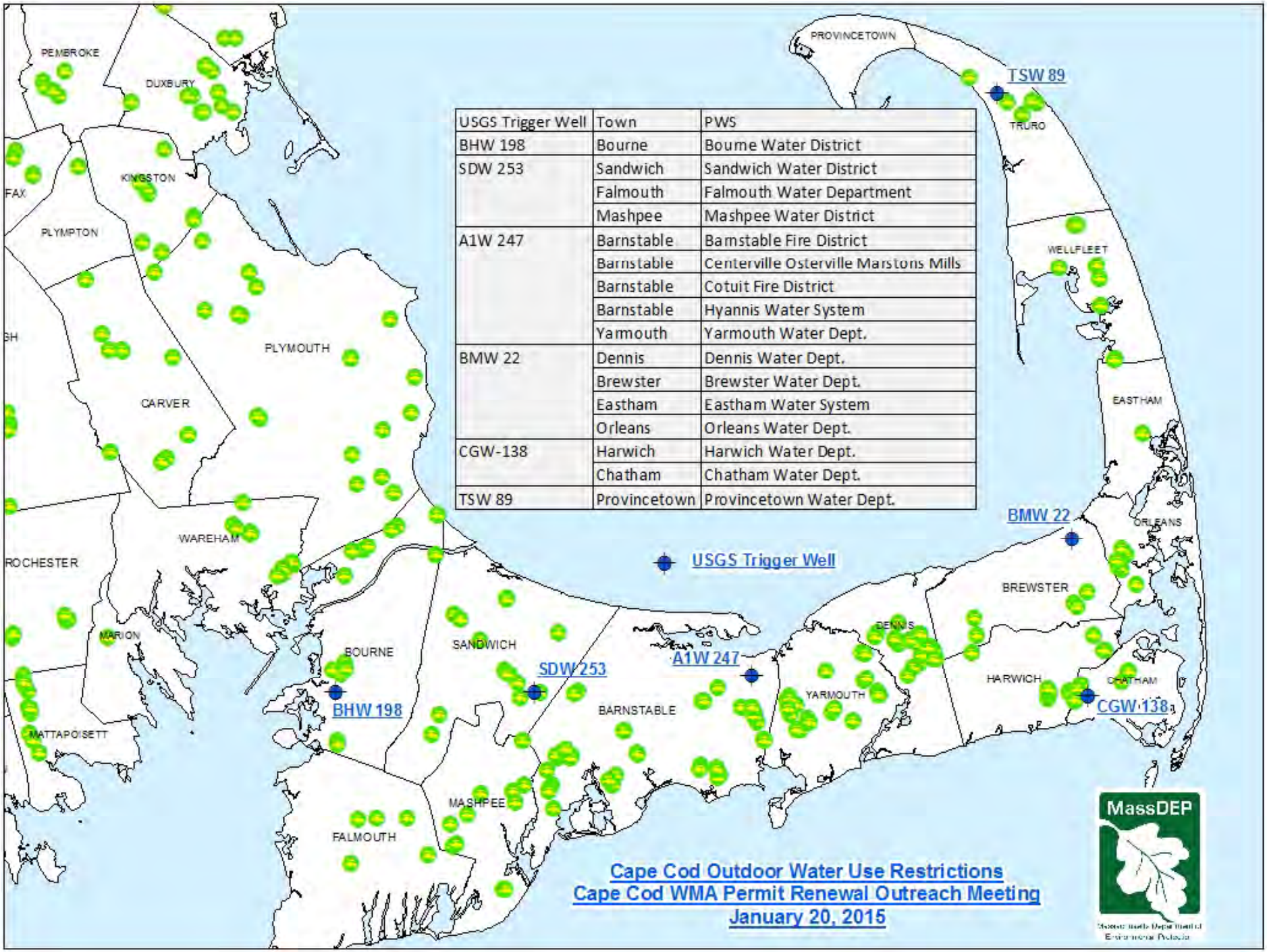
CFRs are considered a particularly sensitive receptor warranting protection.

PWS Potentially Impacting CFRs
Bourne
Cotuit
Sandwich
Mashpee

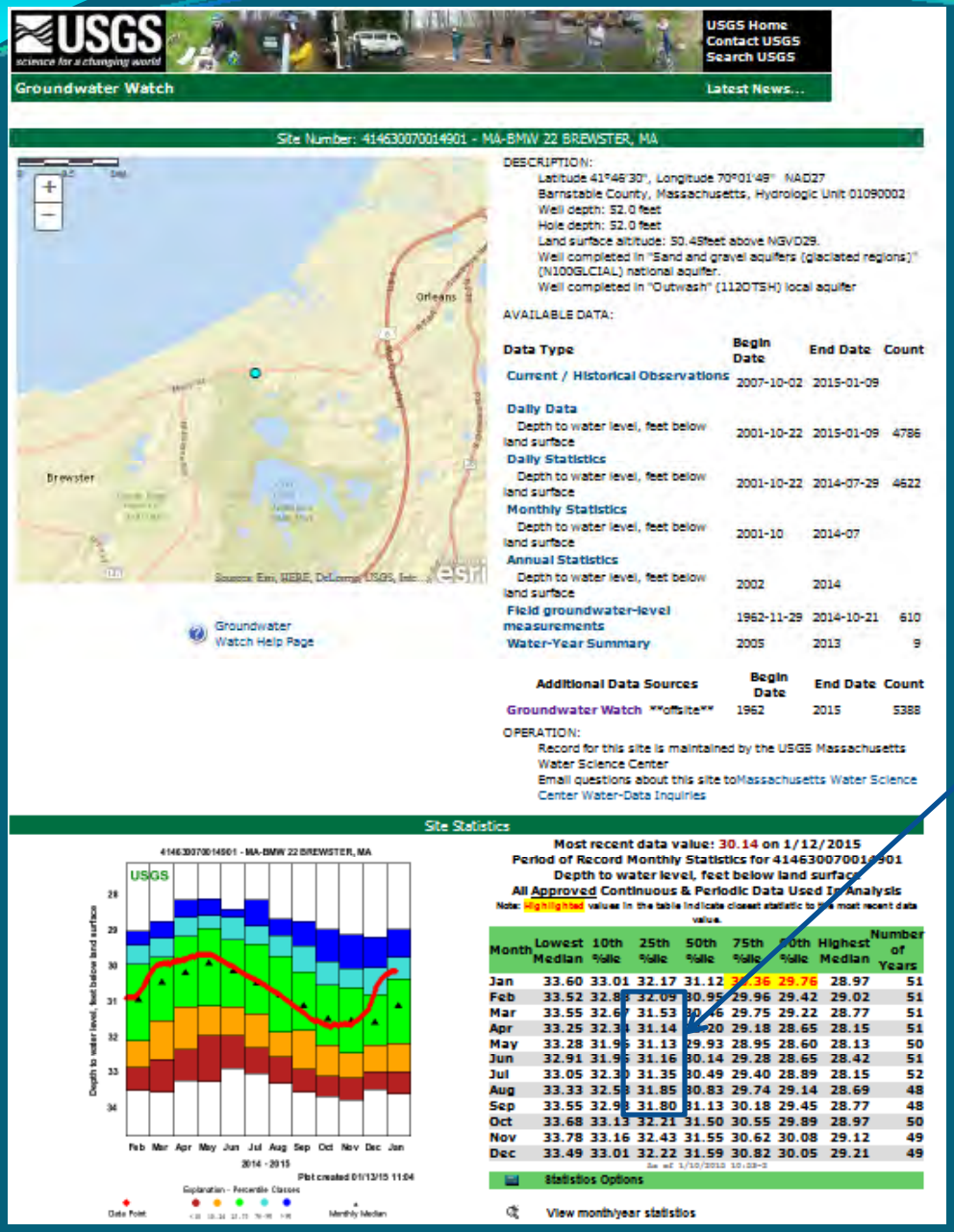
Groundwater Level Triggered Outdoor Restrictions for PWS

- Triggered by:
  - MA Drought Advisory or greater declared for the Cape and Islands Region; or
  - Below-normal groundwater levels.
    - Below USGS monthly 25th percentile values
    - Monitoring begins March 1st for May 1st start date
    - Apply if below trigger level for 60 consecutive days; Lifted when levels are above trigger for 30 days

- When restrictions are implemented:
  - Notify MassDEP within 14 days
  - No lawn watering from 9 am to 5 pm
  - Irrigation systems/sprinklers allowed 2 days per week



USGS Trigger Well	Town	PWS
BHW 198	Bourne	Bourne Water District
SDW 253	Sandwich	Sandwich Water District
	Falmouth	Falmouth Water Department
	Mashpee	Mashpee Water District
A1W 247	Barnstable	Barnstable Fire District
	Barnstable	Centerville Osterville Marstons Mills
	Barnstable	Cotuit Fire District
	Barnstable	Hyannis Water System
	Yarmouth	Yarmouth Water Dept.
BMW 22	Dennis	Dennis Water Dept.
	Brewster	Brewster Water Dept.
	Eastham	Eastham Water System
	Orleans	Orleans Water Dept.
CGW-138	Harwich	Harwich Water Dept.
	Chatham	Chatham Water Dept.
TSW 89	Provincetown	Provincetown Water Dept.



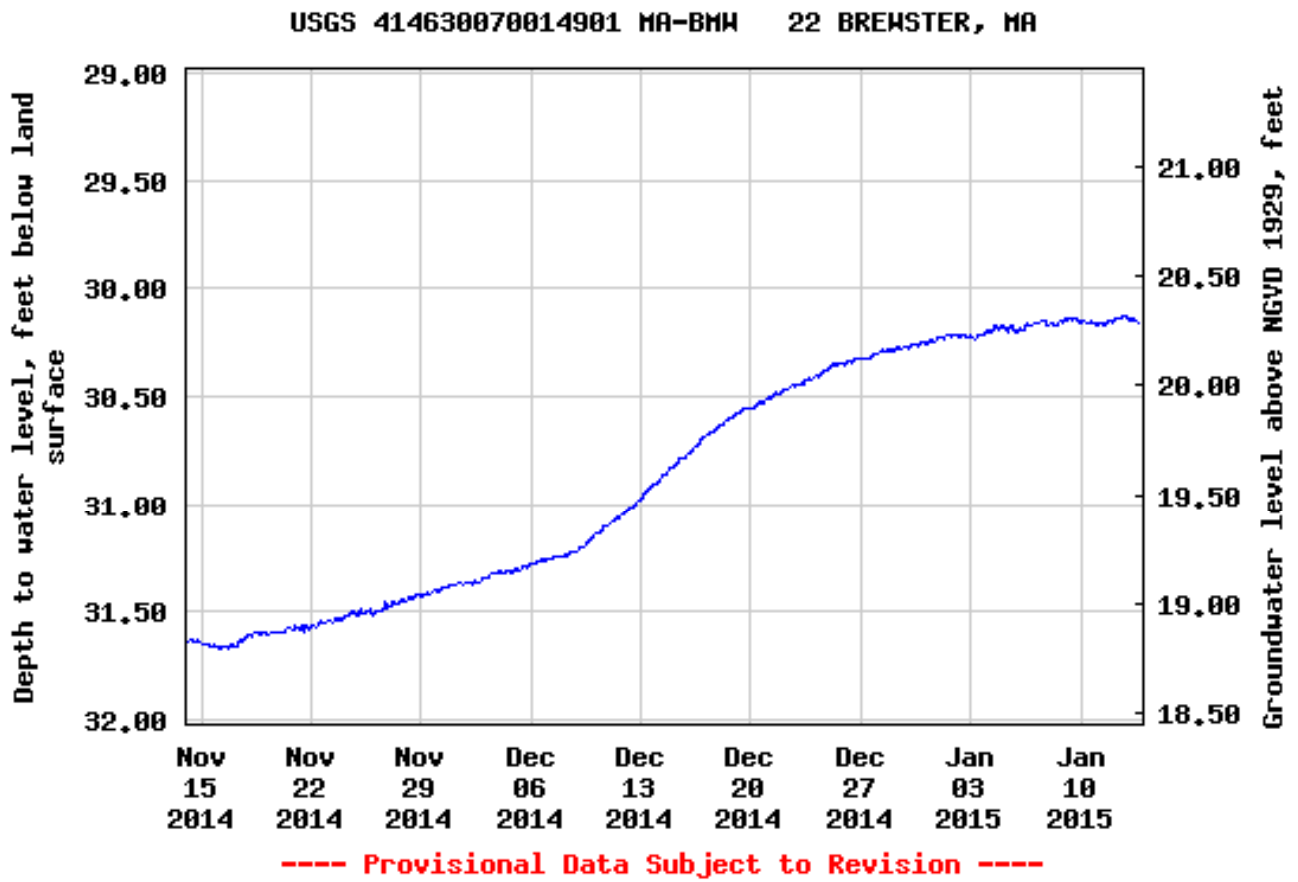
- USGS Groundwater Level Statistics for BMW 22
- Trigger = monthly 25th percentile*

* Will be updated in permits every 5 years.

On-Line Monitoring (BMW 22)

Depth to water level, feet below land surface

Most recent instantaneous value: 30.16 01-13-2015 15:00 EST



Monthly 25th Percentile Trigger Values*

	BMW 22	BHW 198	SDW 253	CGW 138	A1W 247	TSW 89
March	31.53	33.32	50.97	24.32	24.90	12.00
April	31.14	32.99	50.86	24.10	24.53	11.86
May	31.13	32.74	50.40	23.81	24.44	12.00
June	31.16	33.12	50.53	23.99	24.57	12.14
July	31.35	33.68	50.74	24.43	24.86	12.37
August	31.85	34.01	50.86	24.75	25.15	12.52
September	31.80	34.31	51.09	25.06	25.60	12.56
	Brewster W. Dept.	Bourne W. Dist.	Falmouth W. Dept.	Chatham W. Dept.	Barnstable F.Dist.	Provincetown W. Dept.
	Dennis W. Dept.		Mashpee W. Dist.	Harwich W. Dept.	Centerville-Osterville MM	
	Orleans W. Dept.		Sandwich W. Dist.		Cotuit F.D.	
	Eastham W. Dept.				Hyannis W. D.	
					Yarmouth W. D.	

•As of January 2015; updated values in permits will be as of date of permit issuance; Revised USGS values based on updated records will be included in 5-year permit revisions or upon request

Summary Info for PWS Permits

PWS	CFR present	Baseline (mgd)	Potential Permitted volume (mgd)	Potential Mitigation Volume after wastewater adjustment (mgd)	DCR 2030 Forecast with Buffer Vol. (mgd)
Barnstable Fire District	No	0.58	0.66 Requested	0.012	0.81
Bourne Water District	Yes	1.40	1.52 existing	0.018	1.77
Brewster Water District	No	1.37	1.57 Requested	.003	Redo
Centerville-Osterville-MM	No	3.28	3.57 existing	0.0435	Redo
Chatham Water Department	No	1.17	1.32 existing	0.0225	Redo
Cotuit Water Department	Yes	0.48	0.64 existing	0.024	0.77
Dennis Water Department	No	3.21	3.26 existing	0.0075	Redo
Falmouth Water Department	No	4.20	4.31 existing	0.0165	Redo
Harwich Water Department	No	2.16	2.16 existing	0.00	2.51
Hyannis Water Department	No	2.89	3.25 Requested	0.054	3.27
Mashpee Water District	Yes	1.28	1.54 existing	0.039	2.02
Orleans Water Department	No	1.03	1.72 requested	0.1035	1.21
Provincetown Water Department	No	0.85	0.85 existing	0	NA
Sandwich Water Department	Yes	2.03	2.64 existing	0.0915	2.3
Yarmouth Water Department	No	4.19	4.21 requested	0.003	Redo

Online SWMI Interactive Maps

- GIS map provides an interactive graphic display that includes:
  - Water use points
  - Cold Water Fishery Resources
  - Aquifers and more

- Map is at

http://www.mass.gov/eea/agencies/massdep/water/watershed/ sustainable-water-management-initiative-swmi.html

DEP Permitting Tool

- Displays data and equations to determine BC, GWC, August NGD for 1400 subbasins.
- User may increase or decrease water use and see resulting change in above values.
- Two main views:
  - PWS information includes: recent usage, baseline volumes, projected usage, sources, and other users
  - Subbasin information includes: cumulative area, % of impervious cover, streamflow values, etc.

DEP Permitting Tool

Find by PWSID: | Find by PWS NAME: HYANNIS WATER SYSTEM | Preview Report

PWSID: **4020004**

Public Water Supplier Name: **HYANNIS WATER SYSTEM**

Baseline and 20 Year Water Needs Forecast Rates:

BASIN	BASELINE RATE (MGD)	BASELINE METHODOLGY	20 Year Water Needs Forecast + 5% (65/10)
CAPE COD	2.89	2005 +5%	Final WNF pending permit renewals in this basin

2010 Authorized Rates:

BASIN	REGISTERED RATE (MGD)	2010 PERMITED RATE (MGD)	2010 AUTHORIZED RATE (MGD)
CAPE COD	2.71	0	2.71

Actual Annual Use (mgd):

BASIN	2006	2007	2008	2009	2010	2011	2012
CAPE COD	2.57	2.77	2.35	2.21	2.39	2.21	2.31

PWS Authorized Rates, Water Use Points and Subbasins

Renewal Authorized Rates | PWS Withdrawal Points by Subbasin | All Water Use Points In PWS's Subbasins | Subbasins

Double Click on Subbasin ID to view Subbasin Characteristcs Form

SUBBASIN ID	BASIN

Community-Specific One-Page Summary Sheet

- Includes 6 summary tables:

1) Reported Use 2009-13
2) Performance Standards
3) WNF Scenarios
4) Permit Data
5) Subbasin Data
6) Groundwater Triggers

example

Permit Requirements*	
CFR Consult?	Yes/no
Minimization required?	Yes/no
Estimated renewal request in mgd	1.47
Baseline (BL) in mgd	1.54
Projected increase above BL in mgd	-0.07
Estimated Permit Tier	1
Mitigation Required?	no

*includes comments to explain data sources and decisions

WMA Regulations and Permit Assistance

- Regulation (Promulgated in November 7, 2014) and Policy Development (Ongoing)
- Permit application forms and worksheets (Winter 2015)
- Financial assistance (Annual Grant Program)
  - Eligible planning projects:
    - Optimization
    - Outdoor water use restrictions
    - Implementation of reasonable water conservation
      - NEWWA and MWWA Toolbox of BMPs
  - Eligible implementation projects:
    - Demand management (water audits, soil moisture sensors etc..)
    - Mitigation projects designed to improve flow impacts
      ex. dam removal, culvert replacement, etc.

Permit Reviews

Permit Holder	Reviewer
Ballymeade Golf & Country Club	Chen
Barnstable Fire District	Connors
Bourne Water District	Connors
Town of Brewster	McCann
Captain's Golf Course	Butler
Centerville Osterville Water Dept.	D'Urso
Town of Chatham	Connors
Cotuit Fire District	D'Urso
CPG Ridge Club LLC	Chen
Dennis Water District	D'Urso
Town of Eastham	Friend
Town of Falmouth	McCann
Town of Harwich	Connors
Hyannis Water System	Connors
Kingsway Trust	Butler
Mashpee Water District	McCann
Town of Provincetown	Friend
Olde Barnstable Fairgrounds GC	Chen
Town of Orleans	D'Urso
Sandwich Water District	McCann
Golf Club at Cape Cod	Butler
Town Yarmouth Golf Course	Butler
Upper Cape Water Supply Coop.	Connors
Willowbend Golf Course	Chen
Town of Yarmouth	Connors

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Further information

- MassDEP Technical Resources webpage at: http://www.mass.gov/eea/waste-mgnt-recycling/water-resources/preserving-water-resources/sustainable-water-management/

- MassDEP SWMI webpage at: http://www.mass.gov/dep/water/resources/swmi.htm

- Massachusetts Sustainable Water Management Initiative (SWMI), Framework Summary, November 28, 2012 at : http://www.mass.gov/eea/docs/eea/water/swmi-framework-nov-2012.pdf

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