



Vermont Department of Environmental Conservation Water Quality Division

*Strategy Introduction and
Stakeholder Briefing
12/20/2010*



Today's Agenda

- Welcome
 - *Commissioner Justin Johnson, DEC*
- Re-Visioning the Water Quality Division
 - *Pete LaFlamme, Director, Water Quality Div.*
- The Vermont Surface Water Management Strategy
 - *Neil Kamman, Monitoring, Assessment, and Planning Program*
- Vermont Ambient Water Quality Monitoring Program
 - *Heather Pembroke, Monitoring, Assessment, and Planning Program*
- Strategy Implementation –proposal for a Tactical Basin Planning Process
 - *Ethan Swift, Monitoring, Assessment, and Planning Program*



Vision and Call

- A fully integrated Water Quality Division
- Coordinated and effective management of the State's surface waters
- Leadership over evolving statewide water resources management issues
- Priorities and Gaps Identified
- Efficient and effective identification of priority actions for protection and remediation



Three Part Plan

- Integrated Division w/ MAP
- Statewide Surface Water Management Strategy
- Tactical Basin Planning



Ongoing Initiatives

- Promote better coordination with external partners to prioritize actions and identify needs
- Gap Analysis
- Antidegradation Rule
- VWQS Update



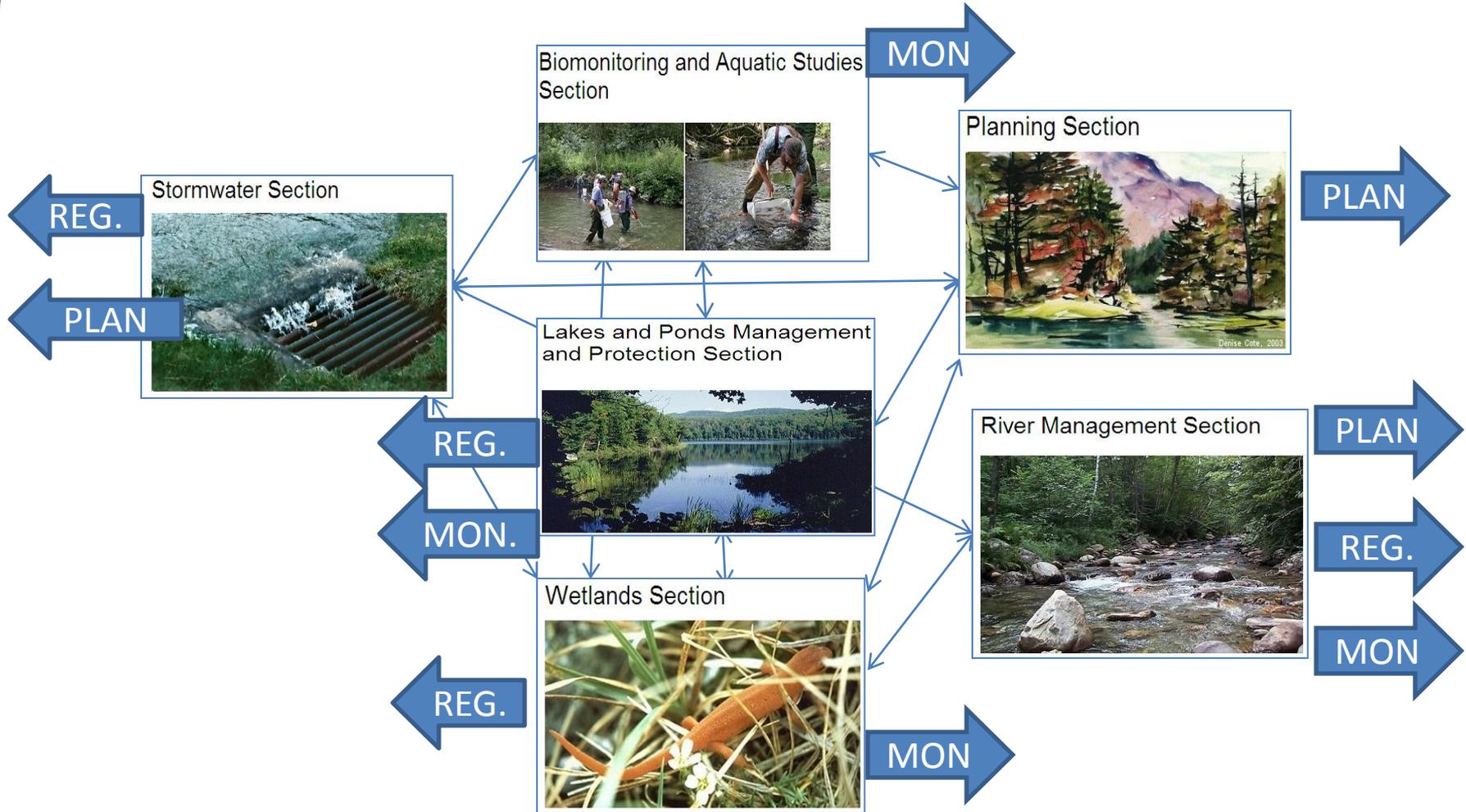


Vermont Department of Environmental Conservation Water Quality Division

...about the Strategy



The Water Quality Division's Evolution



Goals for the Planning Process

- ***Increase the efficiency and effectiveness of WQD...***
 - Align existing programs to Strategy objectives.
 - Provide coordination for other DEC programs and for implementation efforts.
 - Clearly communicate WQD Objectives and Priorities to the right groups.
 - Increase efficiency in developing Basin Plans.
 - Eliminate planning redundancy across WQD programs.



WQD's Realignment



Certain outcomes have already been realized:

WQD organizational structure re-defined

Relationship of Programs within WQD is clear

Relationship of WQD programs to DEC/ANR/External programs is clear



Strategy Describes How WQD Interacts with Partners to Protect and Improve Surface Waters

Clean and Clear Action Plan





- Articulates strategies to address multiple pollutants simultaneously by managing stressors;
- Provides a framework for coordinated implementation in support of WQD and partner programs;
- Promotes better coordination between WQD, DEC, C&C, and other programs.
- Identifies Division Priorities and enhances WQD/DEC role in implementation.



The Architecture of the Strategy

- Clear, defined **Goals and Objectives**
- Supported by a sound **Conceptual Model**
- Component Chapters and Appendices:

Structural components (Chapters)	Supporting documents (Appendices)
Framework of Surface Water Mgmt Managing Stressors Division Roles and Gap Analysis Tactical Planning Process	Activities that cause stressors Pollutants that result from stressors Surface Water Program roster Monitoring Strategy



Goals and Objectives of the Strategy

The three primary goals of the Water Quality Division are to manage Vermont's surface waters to:

- Protect, maintain, and restore the Biological, Chemical, and Physical Integrity of all Surface Waters*
- Support the Public Use and Enjoyment of Water Resources*
- Protect the Public Health and Safety*

Four objectives support these Goals:

Objective A. Minimize Anthropogenic Nutrient and Organic Pollution

Objective B. Protect and Restore Aquatic and Riparian Habitat

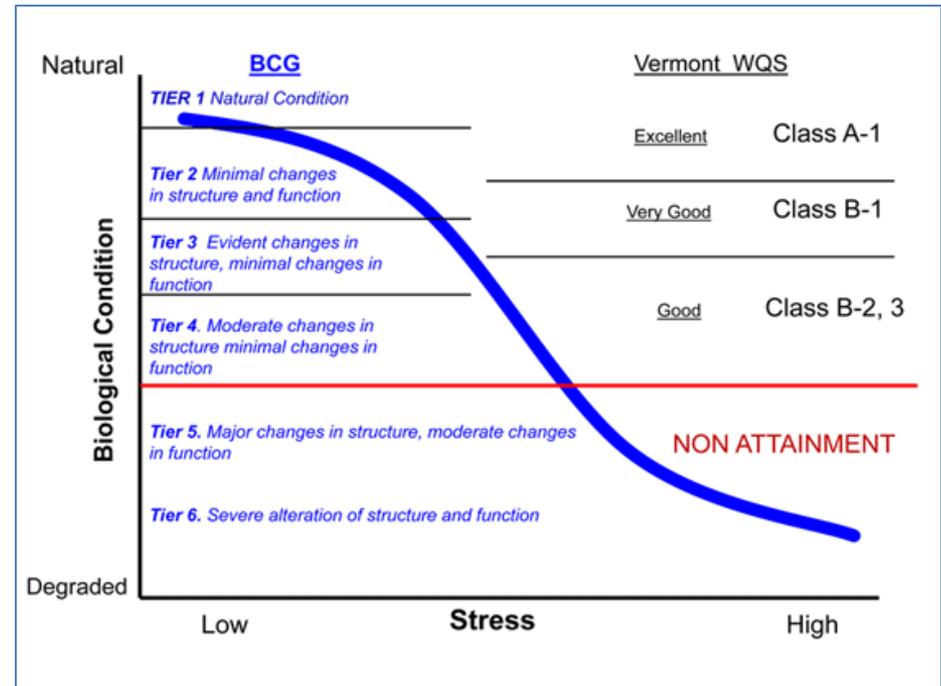
Objective C. Minimize Flood and Fluvial Erosion Hazards

Objective D. Minimize Toxic and Pathogenic Pollution, and Chemicals of Emerging Concern



Concept - Biological Integrity

- The integrity of biological system is defined by departure from the reference condition.
- Integrity is measured using biological assessment.
- Biological attributes respond predictably to stress

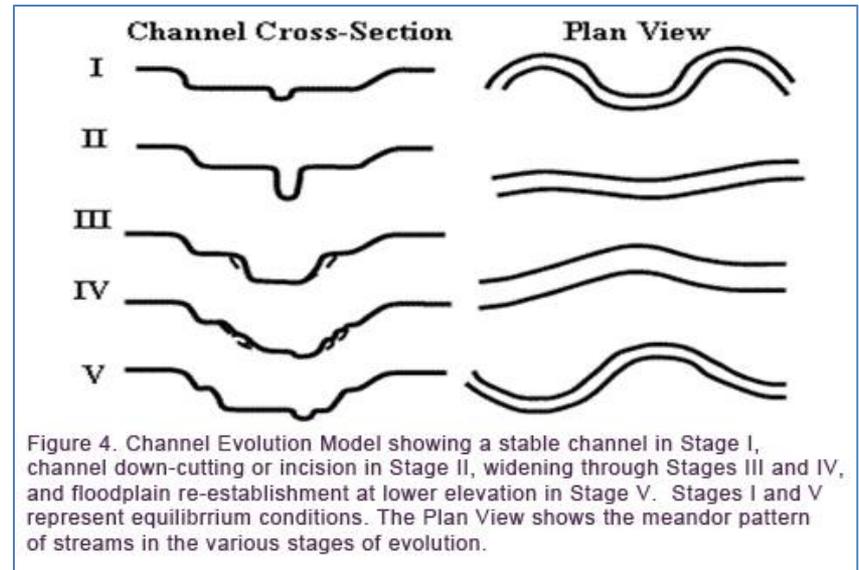


Bio-condition Gradient with Tiered Aquatic Life Uses



Concept - Physical Integrity

- The integrity of physical system is defined by equilibrium.
- Equilibrium is measured by geomorphic assessment (and sometimes littoral habitat).
- Equilibrium responds predictably to stress.



Channel Evolution Model



Concept - Chemical Integrity

- Chemical integrity is a function of physical and biological integrity, and of chemical inputs.
- Physical and biological response is not always a direct function of chemistry.

Chemical Gradient	Site Condition
Highest	High Quality Water
Lowest	
	Impaired

VT WQS terminology for chemical constituents



Concept - Chemical Integrity

- The antidegradation policy of WQS provides tiered protections for uses
- This policy is implemented by permitting programs within DEC

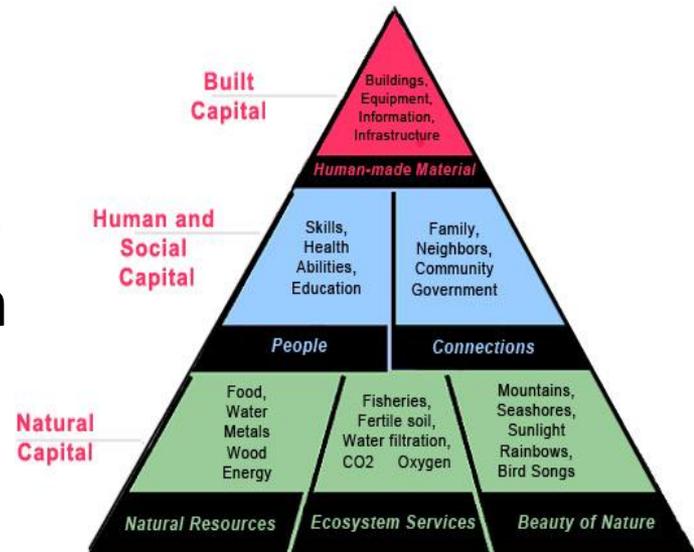
Chemical Gradient	Site Condition	Site Assimilative Capacity
Highest ↑	High Quality Water	Site ↑
Lowest	Impaired	

Assimilative Capacity Model of Antidegradation for Tier 2

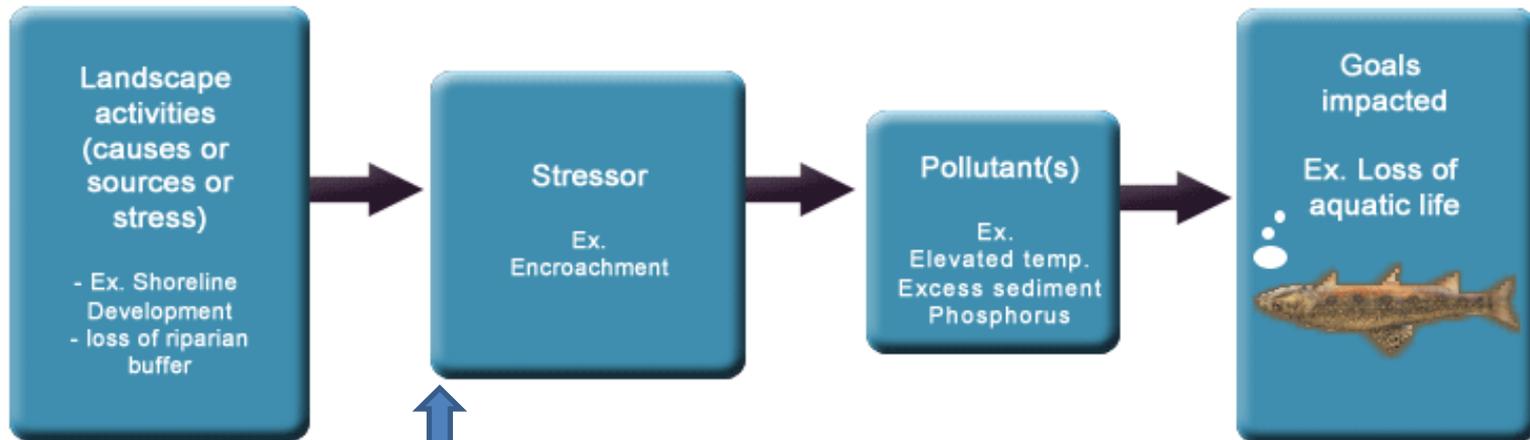


Concept - Ecosystem Services

- Integrity is inter and independent.
- Ecosystem services provides a framework to evaluate effects of environmental decisions on goals, objectives, and integrity.



Conceptual Model of the Strategy



Management intervention happens here
Each Stressor has an intervention “recipe.”



Surface Water Stressors



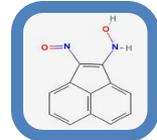
Invasive Species



Acidification



Channel Erosion



Toxic Substances



Encroachment



Flow Alteration



Thermal Stress



Nutrient Loading (non-erosion)



Land Erosion



Pathogens



Surface Water Stressors



Channel Erosion

Excess in-channel scour that results from disequilibrium, particularly from the disconnection of streams from floodplains



Encroachment

Placement of human infrastructure into river corridors/ floodplains, lakeshores, and wetland buffers, resulting in habitat alteration and disequilibrium.



Land Erosion

Overland erosion resulting from improperly managed surface water runoff. Combined with Channel Erosion, these are the sediment and nutrient delivery mechanisms for most surface waters.



Flow Alteration

Alteration of flows for flood control, hydropower, defunct purposes, or perceived benefit that impacts goals and objectives for surface waters.



Surface Water Stressors



Invasive Species

Numerous riparian and aquatic plants and animals threaten physical and biological integrity, and significantly affect public use and enjoyment of surface waters.



Acidification

Atmospheric deposition affects higher-elevation surface waters throughout Vermont as a result of nitrogen and sulfur deposition from out-of-state sources. Historic mining has also acidified some surface waters.

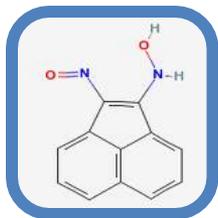


Thermal Stress

Results not only from climate change, but also as an indirect result of encroachment and flow alteration. The emphasis here is on developing surface water resiliency to climate change by mitigating effects of other stressors.

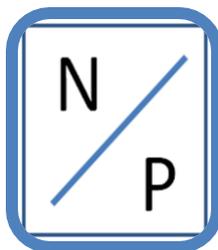


Surface Water Stressors



Toxic Substances

Five categories of toxic substances affect biological and chemical integrity, and public health and safety: atmospheric, organic/inorganic, pesticides, CEC's and biological.



Nutrient Loading (non-erosion)

Nutrients that are directly discharged or applied, or that runoff to surface waters. Typically under-regulated wastewater, overfertilization, and improperly-managed manure.



Pathogens

Pathogenic organisms, indicated by *E. coli*, that result from: improper management of manure, pet wastes, and stormwater; uncorrected CSO's; insufficiently treated septic waste; or natural sources.



Relating Stressors to Goals and Objectives

Table 1-1. Relationship of Goals, Objectives, and Stressors described by WQD's Vermont Surface Water Management Strategy.

<i>Strategy Goals</i>	Biological, Chemical, Physical Integrity Public Use and Enjoyment Public Health and Safety	Biological, Chemical, Physical Integrity Public Use and Enjoyment -----	----- Public Use and Enjoyment Public Health and Safety	Biological, Chemical, Physical Integrity Public Use and Enjoyment Public Health and Safety
<i>Objectives→ Stressors</i>	A. Minimize anthropogenic nutrient and organic pollution	B. Protect and restore aquatic and riparian habitat	C. Minimize and flood and alluvial erosion hazards	D. Minimize toxic, pathogenic pollution and chemicals of emerging concern
<u>Acidity</u>				
<u>Channel Erosion</u>				
<u>Flow Alteration</u>				



By managing stressors, we address pollutants

- Central feature of the Surface Water Management Strategy are 10 stressor evaluation whitepapers.
- They document:
 - Importance (empirically where possible);
 - Objectives met when stressor addressed;
 - Pollutants that result from the stressor;
 - Causes of stressors;
 - Key strategies to address the stressor, in the form of M+A, Tech. Assistance, Funding, Regulatory, and I+E tools.
- *Review GAPS and Key Steps*



Examples of Importance - Encroachment

- Rivers: 24% of river miles assessed are directly encroached upon. 70% of rivers are disconnected from floodplain due to encroachments.
- Wetlands: Prior to the first Wetland Rules, 121,000 acres lost due to encroachment
- Lakes: 71% of lakes in VT have moderate levels of shoreline disturbance (and another 11% have high levels).



Examples of Objectives Supported - Encroachment

Objective A. Minimize Anthropogenic Nutrient and Organic Pollution

Managing encroachment necessarily promotes equilibrium, resulting in lower rates of erosion

Objective B. Protect and Restore Aquatic, and Riparian Habitat

Minimizing encroachment reduces the likelihood of habitat fragmentation and loss of habitat function.

Objective C. Minimize Flood and Fluvial Erosion Hazards

A prudent and cost-effective public safety measure is to limit encroachment in floodprone areas.



Examples of Pollutants - Encroachment

- Phosphorus
- Nitrogen
- Sediment
- Pesticides
- Chlorides
- Temperature



Examples of Causes- Encroachment

- Structures – houses, camps, public infrastructure
- Fills within surface waters
- Transportation infrastructure
- Vegetation removal



Examples of key strategies - Encroachment

- M&A: Integrate monitoring and assessment using a **web-based data management** and map serve system to facilitate management and permitting.
- Tech Assistance: Technical assistance to municipalities in the development of floodplain, buffer, lakeshore, and wetlands **protections within municipal regulations**.
- Regulatory: Target the use of the ***least intrusive alternative*** for permitted encroachments, especially with respect to shoreland stabilization. Promote the use of vegetation and designs that mimic the natural shoreline.
- Funding: Develop **financial incentives** to promote floodplain, corridor, buffer and riparian protections within municipal regulations.



Bringing it together: Water Quality Division Roles, and Key Next Steps – Chapter 3

- Summarizes Stressor Plan Documents w/ respect to WQD's specific role.
- Reviews strategies, gaps, and next steps by stressor.
- Integrates Next Steps across stressors for:
 - Monitoring and Assessment
 - Technical Assistance
 - Regulatory
 - Funding
 - Education and Outreach

This is similar to the integration conducted to develop the LC TMDL Implementation Plan



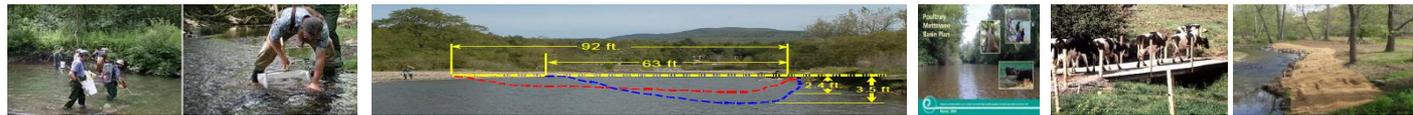
Implementing the Strategy

- Two basic types of implementation
- Internal and external organizational coordination to implement regulatory or policy options of statewide scope
- Targeted implementation within each planning basin:



Implementing the Strategy

- Two basic types of implementation
- Internal and external organizational coordination to implement regulatory or policy options of statewide scope
- Targeted implementation within each planning basin:



Chapter 4. Tactical Basin Planning: Managing Waters Along a Gradient of Condition



Appendix A: Overview of Legal Framework

- Water Quality Management & Planning – A Brief Federal History
- Water Quality Management Plans
- Water Quality Standards and Anti-Degradation



Appendix B: Pollutant Descriptions

- Phosphorus and Nitrogen
- Pathogens
- Heavy Metals
- Mercury
- PCBs
- Invasive Species
- Chlorides
- Pesticides
- CECs
- Acid Rain
- Habitat alteration - streams
- Habitat alteration - lakes
- Sediment
- Heat
- Cyanotoxins



Appendix C: Activities that cause stressors to affect waters

- Land conversion
- Agricultural activities
- Improperly managed forest
- Hydrologic modification
- Channel modification
- Lakeshore development
- Wastewater
- Transportation Infrastructure
- Invasive species
- Air emissions
- Legacy contaminants
- Legacy sediments
- Climate change



Appendix D: Programs

Type of program

- Monitoring and Assessment
- Technical Assistance
- Regulatory
- Funding
- Education and outreach



Who carries the program out

- WQD
- DEC
- ANR
- Partner organizations



Full Strategy Outline

- **Chap. 1 Introduction**
 - **Conceptual Framework**
- **Chap 2. Addressing Statewide Stressors of Surface Waters**
 - **What are our priority stressors**
 - **How do we address the stressors**
 - **What are the key next steps**
- **Chap 3. Program Integration and Gap Analysis**
- **Chap 4. Tactical Basin Planning: Managing Waters along a Gradient of Condition**
- **Appendix A – Vermont’s Surface Waters Regulations**
- **Appendix B – Description of Pollutants**
- **Appendix C – Activities on the Landscape that result in Stresses**
- **Appendix D - Programs to Address Surface Waters**



- Surface Water Management Strategy
- Chapter 1 - Intro
- Chapter 2 - Stressors
- Chapter 3 - Next Steps
- Chapter 4 - Tactical Planning Process
- Appendix A - Regulations
- Appendix B - Pollutants
- Appendix C - Activities
- Appendix D - Programs
- Appendix E - Strategies
- Monitoring, Assessment & Planning (MAPP)
- MAPP - Basin Planning
- MAPP - Biomonitoring & Aquatic Studies
- River Management
- Stormwater
- Wetlands



Learn About Water Quality Protection in Vermont

The Vermont Surface Water Management Strategy has been prepared to address pollutants and stressors that affect uses and values of Vermont Surface Waters. On this page you can access:

1. Goals and Objectives for managing Vermont surface waters in light of the goals of the federal Clean Water Act and Vermont's state surface Water Quality Policy;
2. Activities and Stressors that affect water, as well as individual pollutants;
3. Tools and Resources (Tool Kit) used to protect, and maintain and restore surface waters; and,
4. Planning Process for individual watershed management.

New visitors to this site are encouraged to review the Introduction first, to understand the layout of the Strategy. The buttons shown below provide access to introductory pages for each section of the Strategy, and drop down lists provide links to specific information within each section.



Print Friendly (PDF's) listed below:

- Chapter 1 - Introduction
- Chapter 2 - Stressors
- Chapter 3 - Next Steps
- Chapter 4 - Tactical Planning Process
- Appendix A - Regulations
- Appendix B - Pollutants
- Appendix C - Activities
- Appendix D - Programs

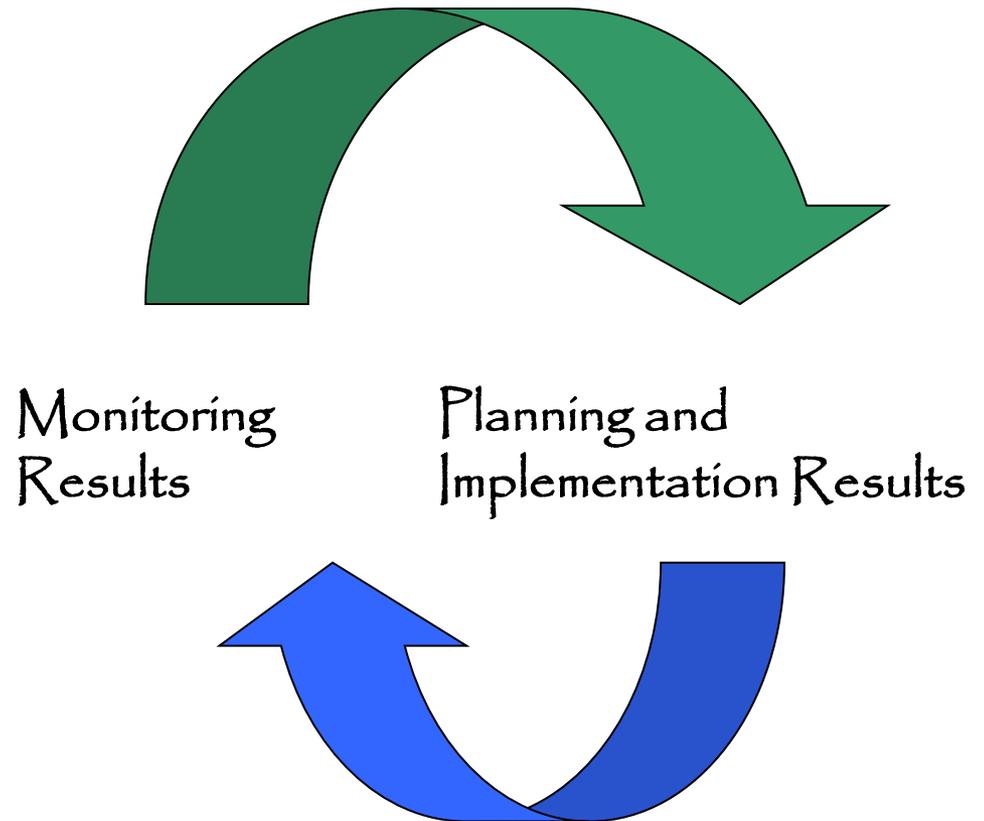
New Strategy Website

www.vtwaterquality.org



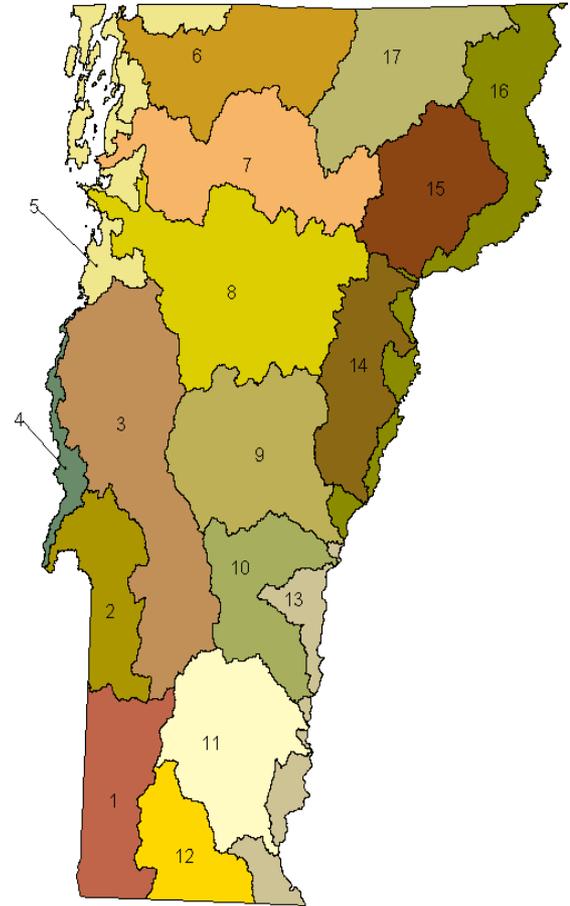
Water Quality Monitoring Program

- Monitoring and assessment results drive our planning and implementation efforts. (And vice versa)
- Did protection or mitigation efforts pay off?



Water Quality Monitoring Strategy: The Who, What, When, Where and Why

- Who: which program measures what
- What: what do we monitor?
Biological, chemical and physical attributes of waters.
- When and where: On a rotational basis, or as a response to an emergency, threat or impairment, or for long term monitoring or as a special study or assessment.
- Why: To lead to actions which will protect waters or remediate stressors



How we monitor should address these objectives from the Clean Water Act:

1. What is the overall quality of waters in the State?
2. To what extent is water quality changing over time?
3. What are the problem areas and areas needing protection?
4. What level of protection is needed?
5. How effective are clean water projects and programs?



Water Quality Monitoring Strategy:

10 Elements:

- **Monitoring Strategy**
- **Monitoring Goals and Objectives**
- **Monitoring Project Design**
- **Core and Supplemental Indicators**
- **Quality Assurance**
- **Data Management**
- **Data Analysis and Assessment**
- **Reporting**
- **Programmatic Evaluation**
- **General Support and Infrastructure**

2 goals:

- **Direct the Division's efforts to gather information about Vermont's water resources;**
- **Work with partners to collect additional information and communicate how monitoring data is used to manage Vermont waters.**



Some Recommendations

Two-Year (18 items)

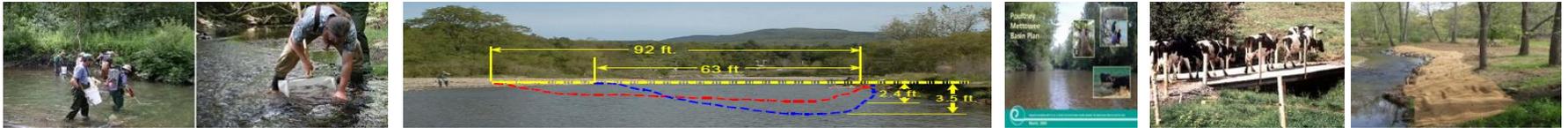
- ID Very High Quality Waters
- Integrate Physical, Chemical, and Biological assessments
- Integrate Invasive Species monitoring
- Rotational Approach for Stream Geomorphic Assessments
- Tune Volunteer LaRosa projects to Water Quality Division needs
- Incorporate more monitoring data into Act 250 and Section 248 decisions

Ten-Year (10 items) and On-going (12 items)

- Sediment screening Process
- Criteria for aquatic habitat
- Emerging threat monitoring
- Share information using social media
- Continue lake, wetlands, and low-gradient stream biocriteria development
- Continue long term and core monitoring programs and monitoring of impaired waters.



Implementing the Strategy



Tactical Basin Planning

Managing Waters Along a Gradient of Condition



Background of Basin Planning

Basin plans and the basin planning process are required by:

- Vermont Statute 10 V.S.A. Section 1253(d),
- Section 1-02D of the Vermont Water Quality Standards
- U.S. EPA 40 Code of Federal Regulations Part 130, Section 130.6 – Water Quality Management Plans.
- DEC has prepared a document entitled "**Vermont Watershed Initiative - Guidelines for Watershed Planning**" (updated 2007) as a way to help planning participants become aware of these requirements and to understand the planning process. The Guidelines have been the framework under which basin planning has evolved to date.



Tactical Planning

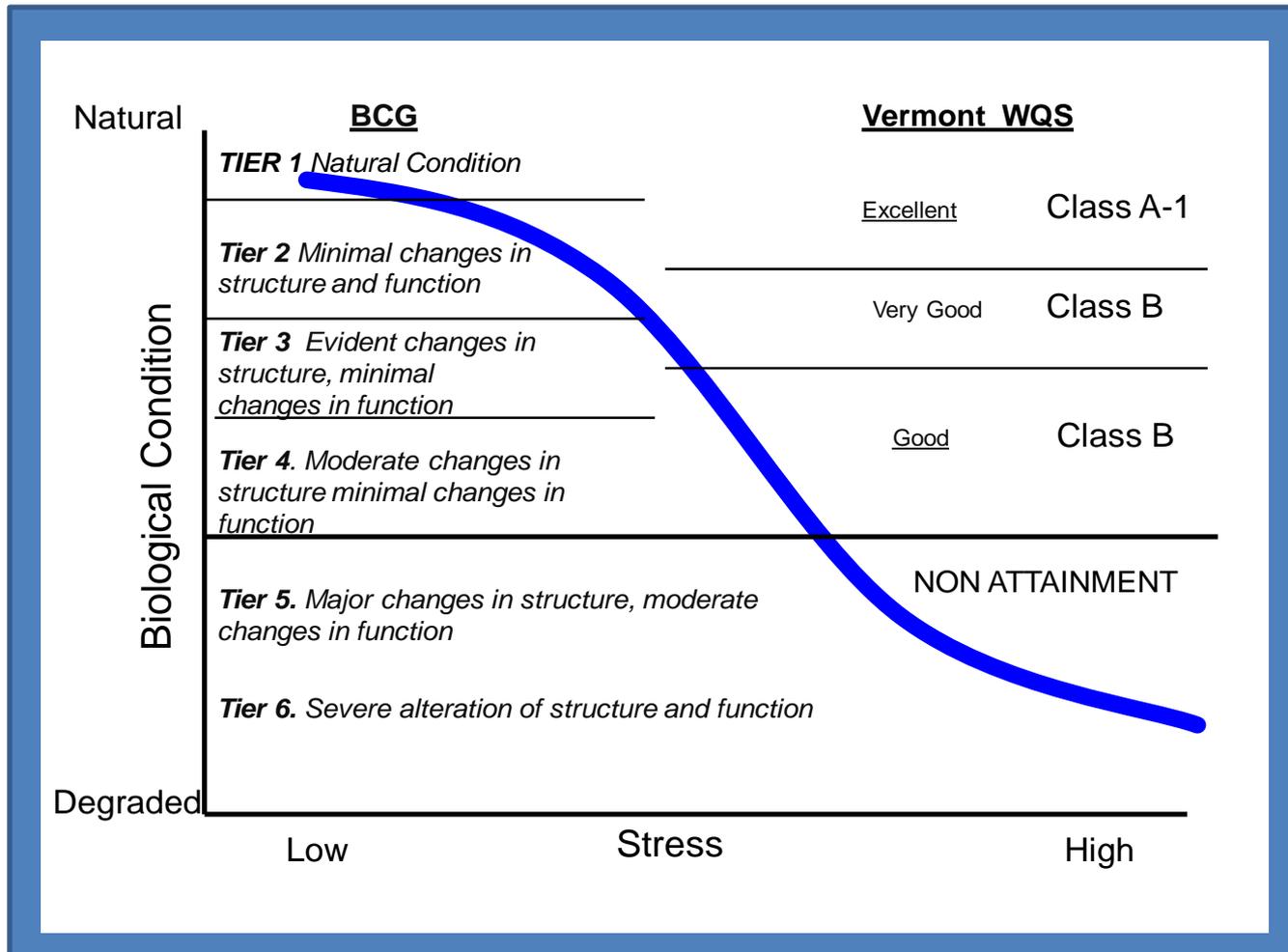
Where We'd Like to Go

- The Surface Water Management Strategy is the foundation of basin plans moving forward.
- Tactical Basin Plans created by:
 - Monitoring and Assessment Data
 - ANR and Partner Org. Agreements (a-priori)
 - Public involvement (e.g. watershed organizations)
 - **Prioritization and Targeting of Resources**



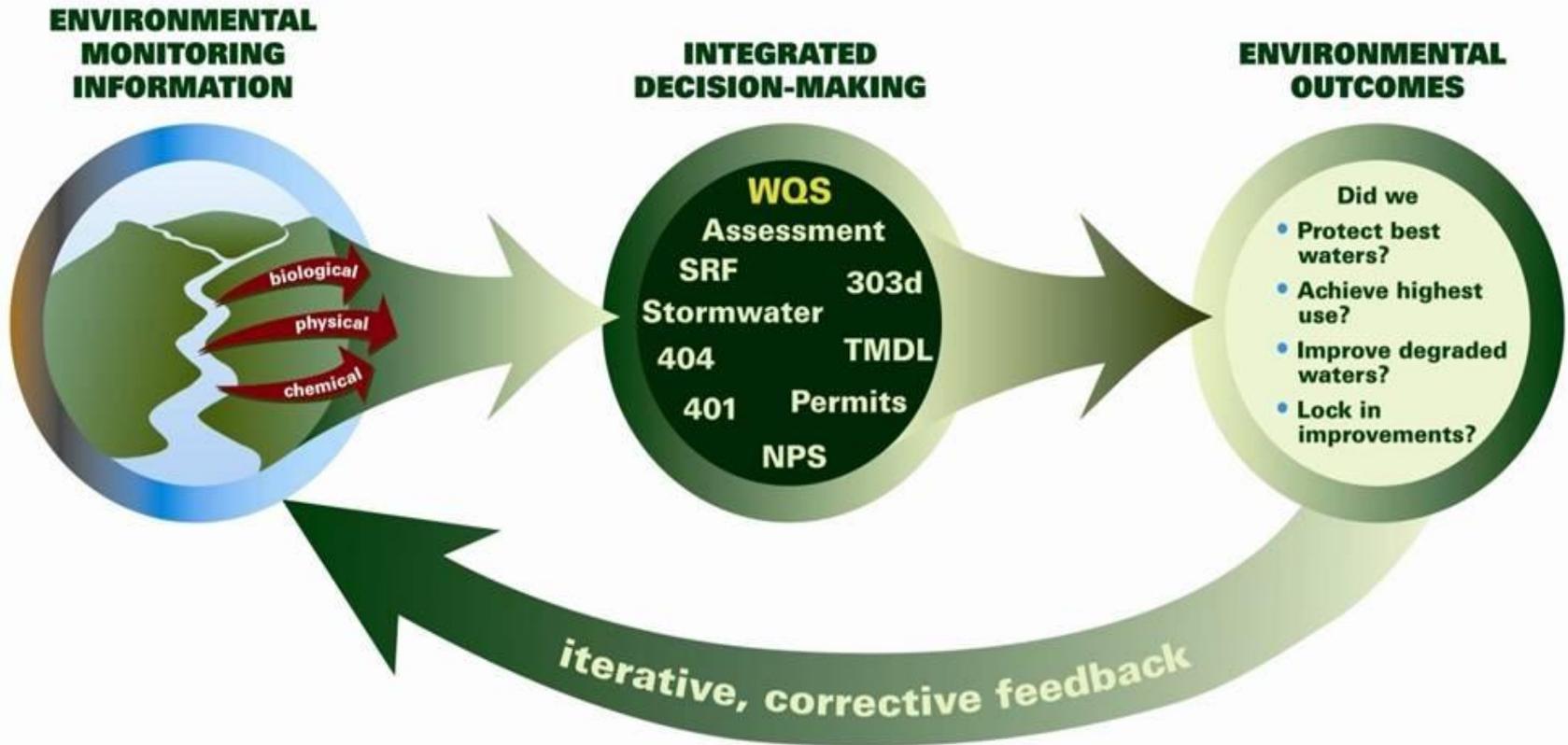
Goals for Tactical Basin Planning

Managing Waters Along *a Gradient of Condition*



Use of Monitoring & Assessment Data

Adaptive Management



Tactical Planning

Principles:

- Within Basins,
 - identify the major (highest priority) surface water “stressors”
 - Identify surface waters in “Very High Quality” condition
 - Identify priority implementation steps
- Address legal requirements for a basin plan
- Define clear roles for each participant
- Provide understandable connections between the roles of all participants and the environmental outcomes
- Use a simple report card for tracking the outcomes and monitoring the commitments of the participants



Tactical Planning

General Structure of Tactical Basin Plan

- Focus on **priority waterbodies** within major planning basin (identified through most recent rotational basin monitoring and assessment, and/or has previously been identified via waterbody listing) for
- Targeted maintenance and protection of certain **very high-quality waters** exhibiting “intact” processes, as well as
- Remediation using available or reasonably attainable strategies (i.e., regulatory programs exist where we have the ability to enhance implementation)



Tactical Planning Process

- Focus on Protection of Very High Quality Waters and Healthy Watersheds
 - **Existing Data:** Biomonitoring (bugs), stream geomorphic condition (SGA/ corridor plan), chemical water quality data (watershed group?), wetlands assessment (headwater wetlands identified for protection?), RTE species (NGNHP), and/or unique feature identified in the Jenkins (and Zika) Reports.
 - **Data Needed:** GIS - Land cover/ land use, Conserved land info (local/ regional land trusts, etc), town zoning, watershed forestry projects, USFS-GMNF assessment info, *additional WQ monitoring on xyz trib.*



Tactical Planning Process

Tools to Protect Very High Quality Waters:

- *Anti-Degradation and Very High Quality Waters (Tier 2.5)*
 - *Existing Uses (currently a requirement for basin plans)*
 - *Outstanding Resource Water Designations*
- *Water Management Typing (B1, B2, B3)*
- *Class B to Class A1 Re-Classifications*
- *Class 1 Wetland Designation*
- *Other inventories, studies, assessments, and reports available to document excellent or very high quality waters*



Tactical Planning Process

- Focus on Impaired or Altered Waters

Ex: AG – impaired sub-basin (Hammered Brook)

- **Existing Data:** Biomonitoring (bugs), physical alterations and riparian buffer gaps (SGA/ corridor plan), chemical water quality data (LaRosa Program watershed group?), wetlands assessment (identified wetlands for restoration?), NRCS flow accumulation data, etc.
- **Data Needs:** Inventory of NRCS cost share program enrollment, AAFM assessment of resource concerns and recommended AG BMP needs per MOU, and/ or more *“bracketed monitoring” of these critical source areas.*



Tactical Planning Process

Process

Step 1 – Scoping and information gathering (monitoring and basin assessment)

Step 2 – Prioritization and Targeting of Resources (both internal and external)

Step 3 – Public Outreach and Awareness of the Basin Planning Process

Step 4 – Development of Tactical Basin Plans and Attendant Strategies

Step 5 – Implementation of Tactical Basin Plans

Step 6 – Adaptive Management to Inform the Implementation Process



Rotational Watershed Assessment

Vermont's Rotational Watershed Assessment

Five Year Rotation

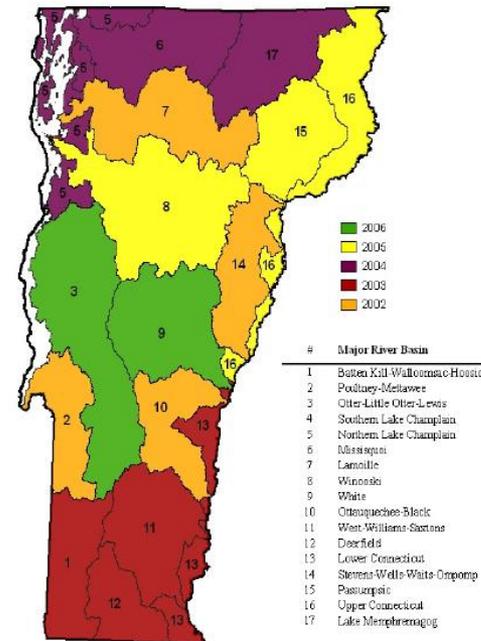
Determine Biological Condition

1-Identify Impaired Waters

2-Identify High Quality Waters

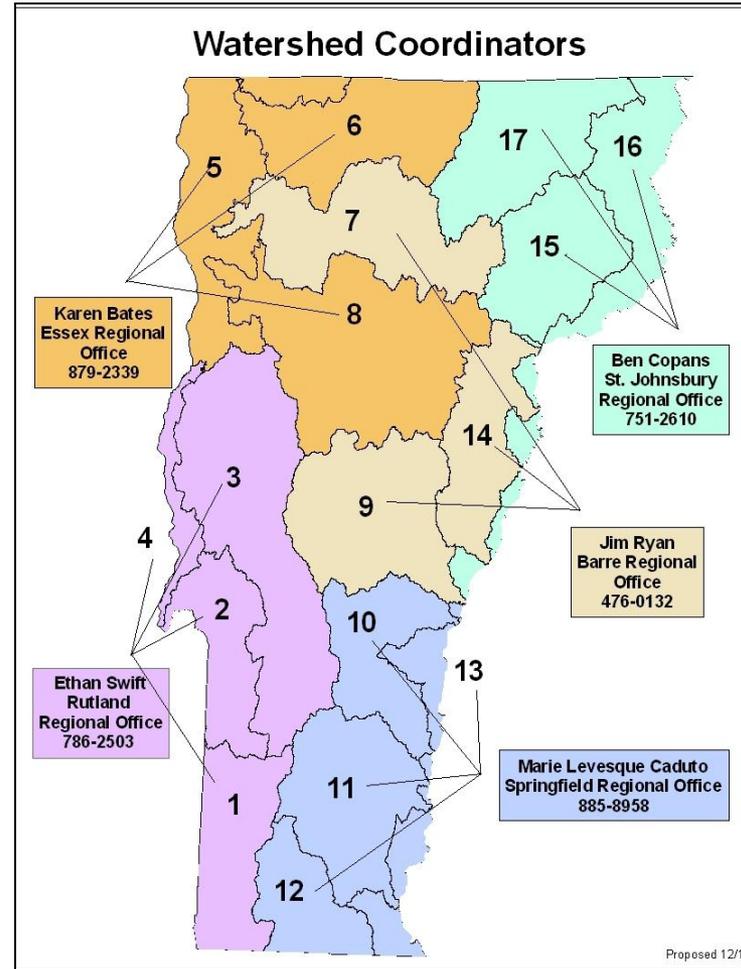
3-Document trends of Recovery or Degradation

4- Estimate ALS Condition for % of All wadable streams in Vt



Tactical Planning

Within these major river basins, **priority sub-basins** will be identified for enhanced monitoring, assessment, and project development within the span of any given rotational cycle. This rotational planning process also identifies topics or areas of special importance in the basin, available management tools to address those topics, and specific recommendations on how to address key topics, including recommendations for technical assistance, project implementation, and education and outreach.



Tactical Planning

Tactical Basin Planning Timeline	Month																								
Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Scoping and information gathering (monitoring and basin assessment info compiled)	█	█	█	█	█	█																			
Prioritization and Targeting of Resources (internal) Identify and Secure Sources of Funding				█	█	█	█	█	█																
Prioritization and Targeting of Resources (external) Identify and Secure Sources of Funding				█	█	█	█	█	█	█	█														
Public Outreach and Awareness of the Basin Planning Process SW Plan and draft Tactical Plan presentation									█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
Development of Tactical Basin Plans and Attendant Strategies												█	█	█	█	█	█	█							
Implementation of Tactical Basin Plans																									
Milestone(s)	Initial Assessment Report drafted						Final Assessment Report produced, Initial Tactical Plan drafted						Final Tactical Plan produced, Implementation Table, Report card drafted						Track implementation progress via report card, Sequence Rotational Basin Planning Process (ongoing)						



Tactical Planning

Timeline of Tactical Plans

Tactical Basin Plans will contain critical paths/timelines established and shall be based upon the priority issues identified and incorporated into the Statewide Surface Water Quality Management Strategy.

- Near-term Actions (2010 - 2012)
- In addition, Longer-term Actions (2010 and beyond) and Measures of Progress will be developed that address the planned strategies for the aforementioned land use categories as well as General Actions for All Stressors.
- An Adaptive Management component of plan implementation will also be to guide and redirect implementation actions and to accrue information needed to improve future management.



Approach for Integrated Coordination among other Agencies, Organizations, and Stakeholders

Stakeholder Process and Team Approach *a priori*:

Coordination among technical stakeholder partners to consider their role for plan coordination and implementation and how this collaboration can be mutually beneficial

Determine which other programs would complement the effort to coordinate existing programs to protect or improve water quality. Solicit input from stakeholder programs (e.g. AAFM, USDA-NRCS, Vtrans, RPC's, NRCDs, other technical partners) in how this can be achieved – **why we are here now.**



Questions? Comments?

