Mapping Vermont's Critical Watershed Resource Areas: Data Integration using the Recovery Potential and Healthy Watersheds Approach.

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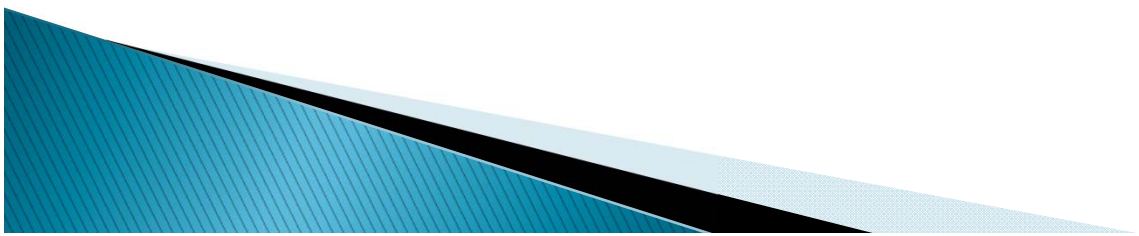
…and many others…

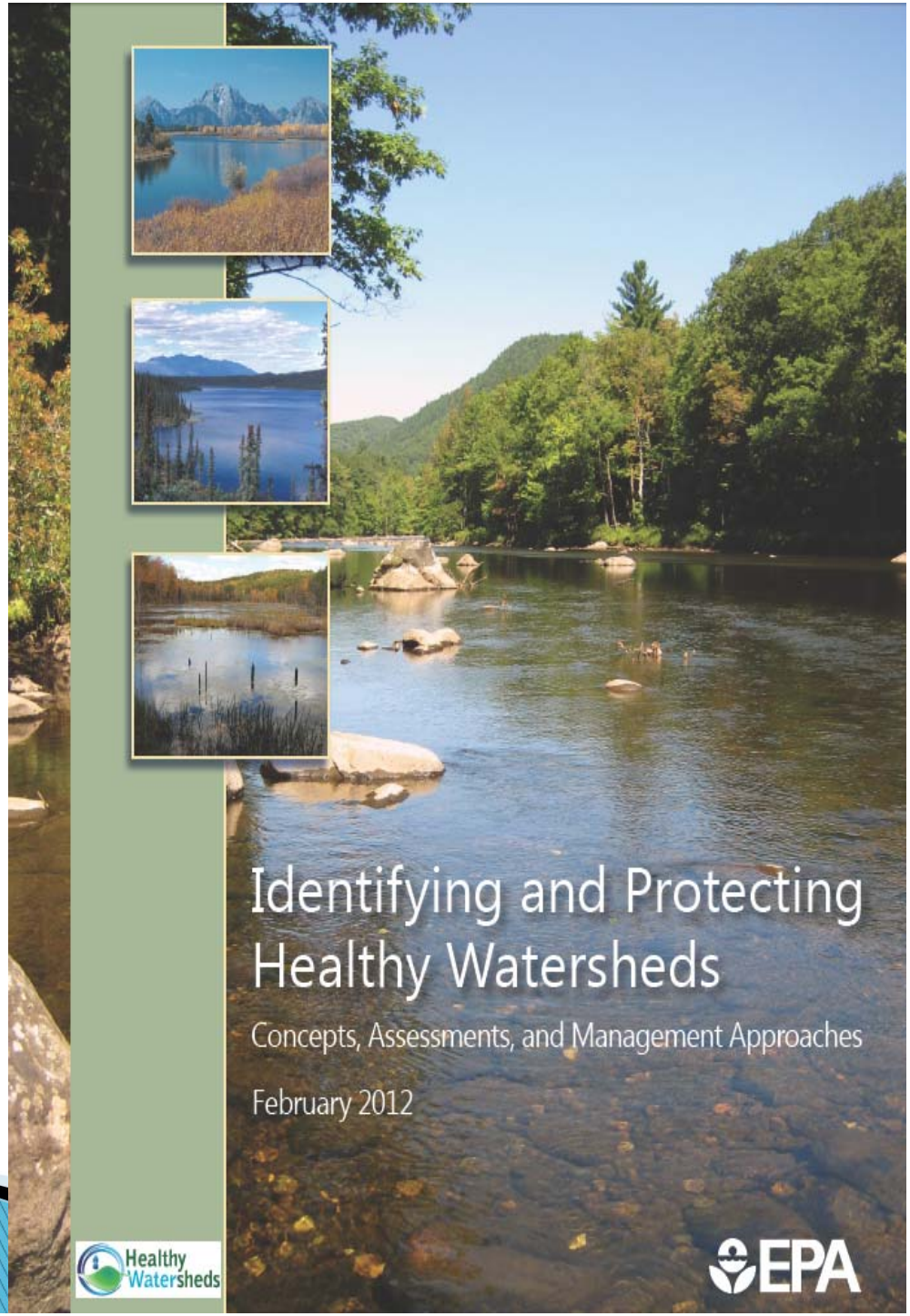
Itinerary

- Healthy Watersheds and Recovery Potential
- Demonstration of Healthy Watershed Analysis in VT
- Intersection with Recovery Potential
- Integrated assessments guide implementation of the VT Surface Water Management Strategy



Healthy Watersheds Identification

- Healthy watersheds (entirety or as components) have intact/connected and functioning biology, habitat, water chemistry, sediment transport and fluvial geomorphology, hydrology, and vegetative cover in the landscape.
- Process is defined at six basic hierarchal levels of evaluation (HWI technical document, www.epa.gov/healthywatersheds)
- Product of EPA OWOW – NPS Program Branch

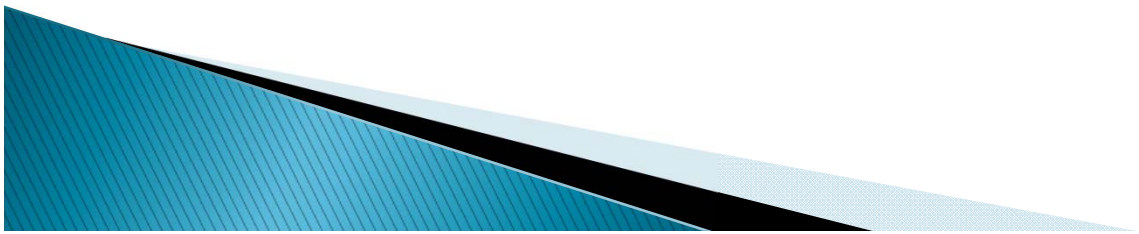

Identifying and Protecting Healthy Watersheds
Concepts, Assessments, and Management Approaches
February 2012
Healthy Watersheds
EPA

Healthy Watersheds Identification

Healthy Watersheds Assessment Component	
 Landscape Condition	Definable using landscape metrics in GIS
 Habitat	Landscape metrics in GIS, with monitoring data
 Hydrology	GIS evaluation of infrastructural controls on hydrology
 Geomorphology	May be remotely sensed, but must be field verified
 Water Quality	Field measurements and modeling
 Biological Condition	Field measurements, period.

Recovery Potential Evaluation

- Intersection of
  - Empirically derived probability that a site/reach/HUC can be restored
  - Social likelihood that restoration can be achieved
- Like HW, each recovery potential "axis" has multiple indicators.
- Product of EPA OWOW – TMDL Program Branch



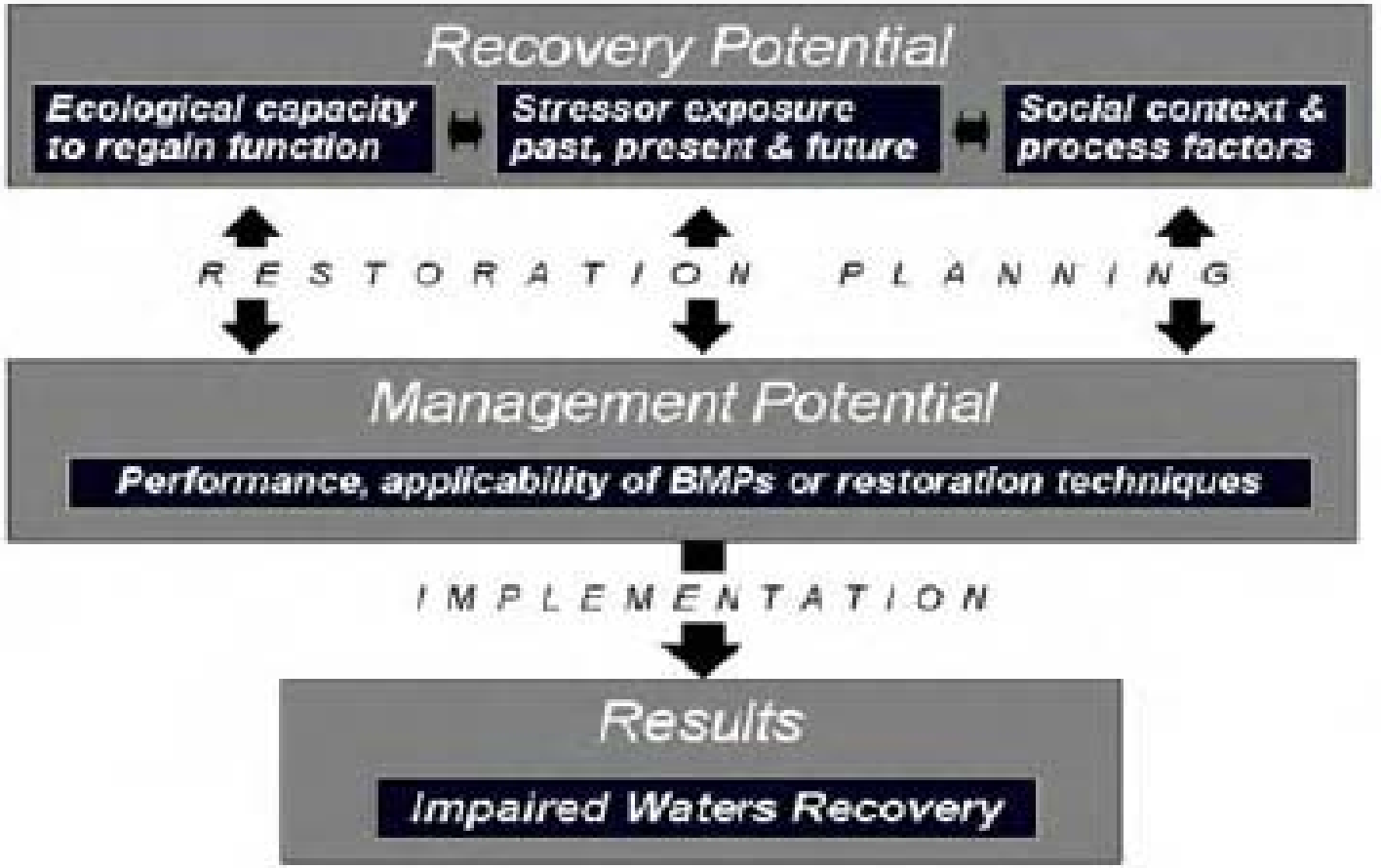


Fig. 1 A strategic approach for sequencing recovery potential and management potential in restoration planning and implementation.

VT's involvement in these processes

- VT Natural Heritage Program has analyzed habitat contiguity and blocks across the state.
- VT's River Science Program was highly informative to both EPA efforts
- VT Integrated bio, chem, and physical assessment programs provide useful data for State of modest aggregated capabilities

HW Evaluation in VT Landscape Condition

- Contiguous Habitat Block Analysis to identify areas of intact vegetative cover important for maintaining natural hydrology and nutrient/organic matter input into the aquatic ecosystem.
  - *HWI indicator was % of HUC in connected natural lands*

- Active River Area (TNC) used to define areas of river corridor and floodplain connectivity.
  - *HWI indicator was % of natural land in active area*

Landscape Condition

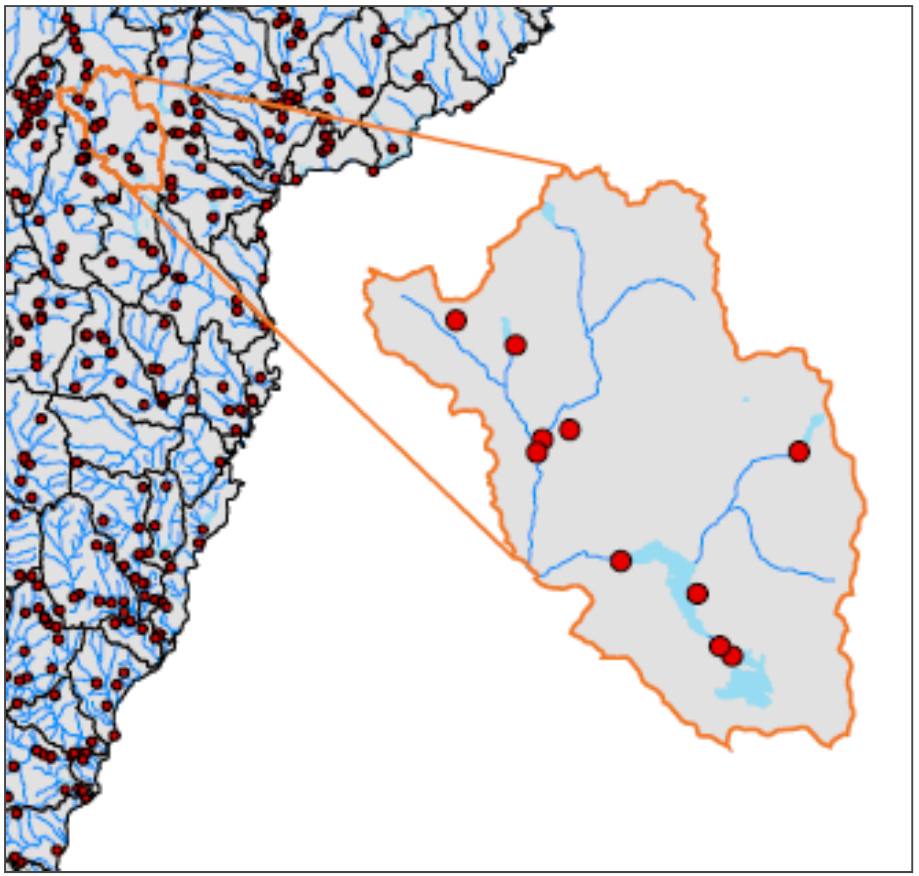
- Considerable areas of habitat contiguity in HUC
- Note river corridor and floodplains creates a perceived block in E-W migration
- However, ARA in many of these areas is in natural cover.

Habitat Condition

- Number of dams per stream mile
  - *Assesses AOP, thermal modification, disequilibrium threats*
- % of total mapped wetlands in Class I and II
  - *Direct aquatic habitat, connectivity between stream, and lake habitats, WQ functions and values*
- A moderate amount of wetland cover is evident in this HUC – large complex in the western portion, and a chain of floodplain wetlands upstream of Cabot

Hydrologic Modification

- HWI Metric: Impounded volume relative to annual flow
- 10 dams in HUC
- East portion of watershed has large annual impounded volume

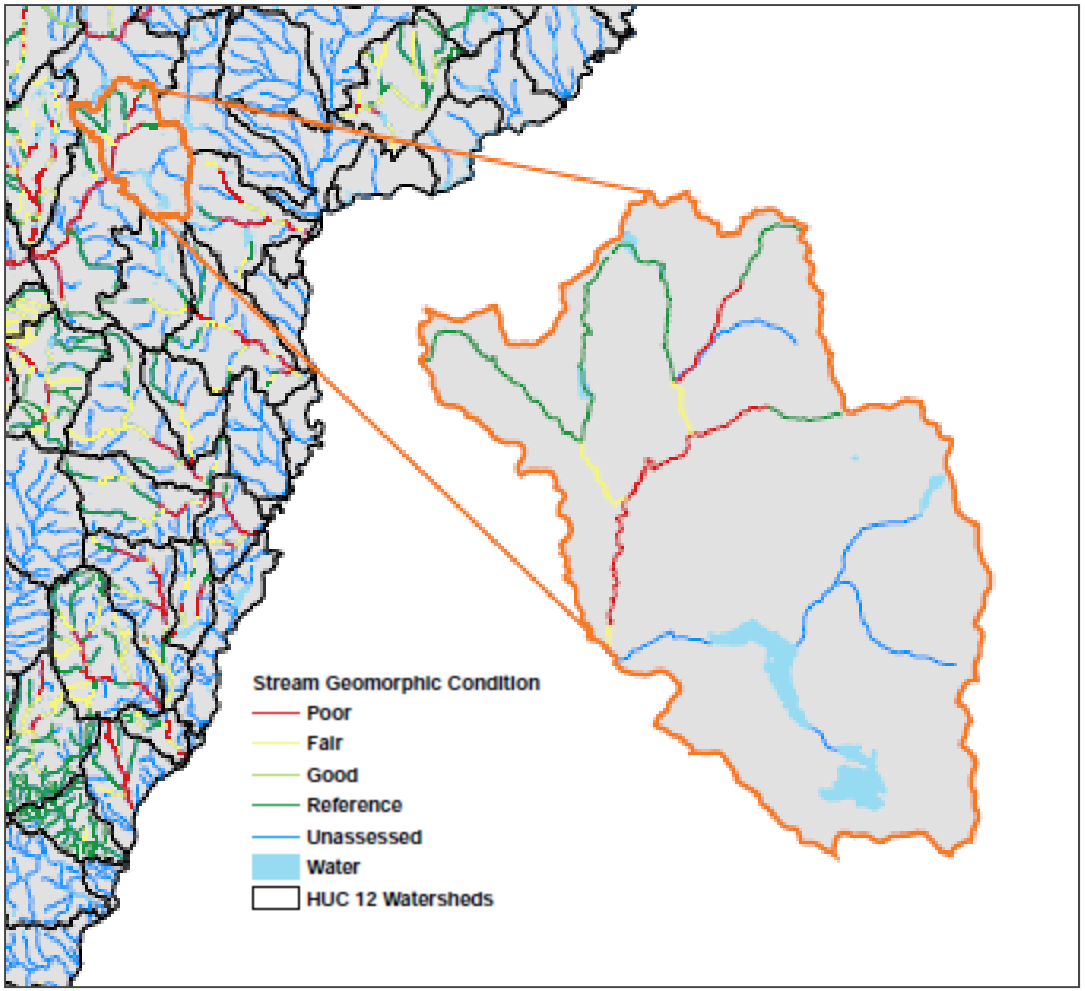


Geomorphology (Physical Integrity)

- VT has very advanced stream geomorphic assessment program
- 75% of State has been assessed at Phase I
- 35% at Phase II
- Corridor Plans in many watersheds
- HWI Thresholds
  - Reference: Equilibrium Condition
  - Good: Minor adjustment from equilibrium, or re-approaching equilibrium
  - Fair: Loss of floodplain access due to incision, or moderate to major planform adjustments
  - Poor: In active re-adjustment with highly altered sediment, thermal, and CWD regimes

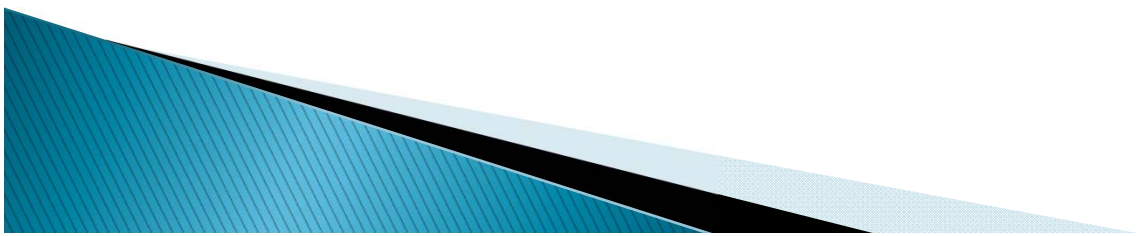
Geomorphology

- 1/2 of HUC assessed
- Headwaters exhibit equilibrium, but stream in downtown Cabot town center is “unraveling”



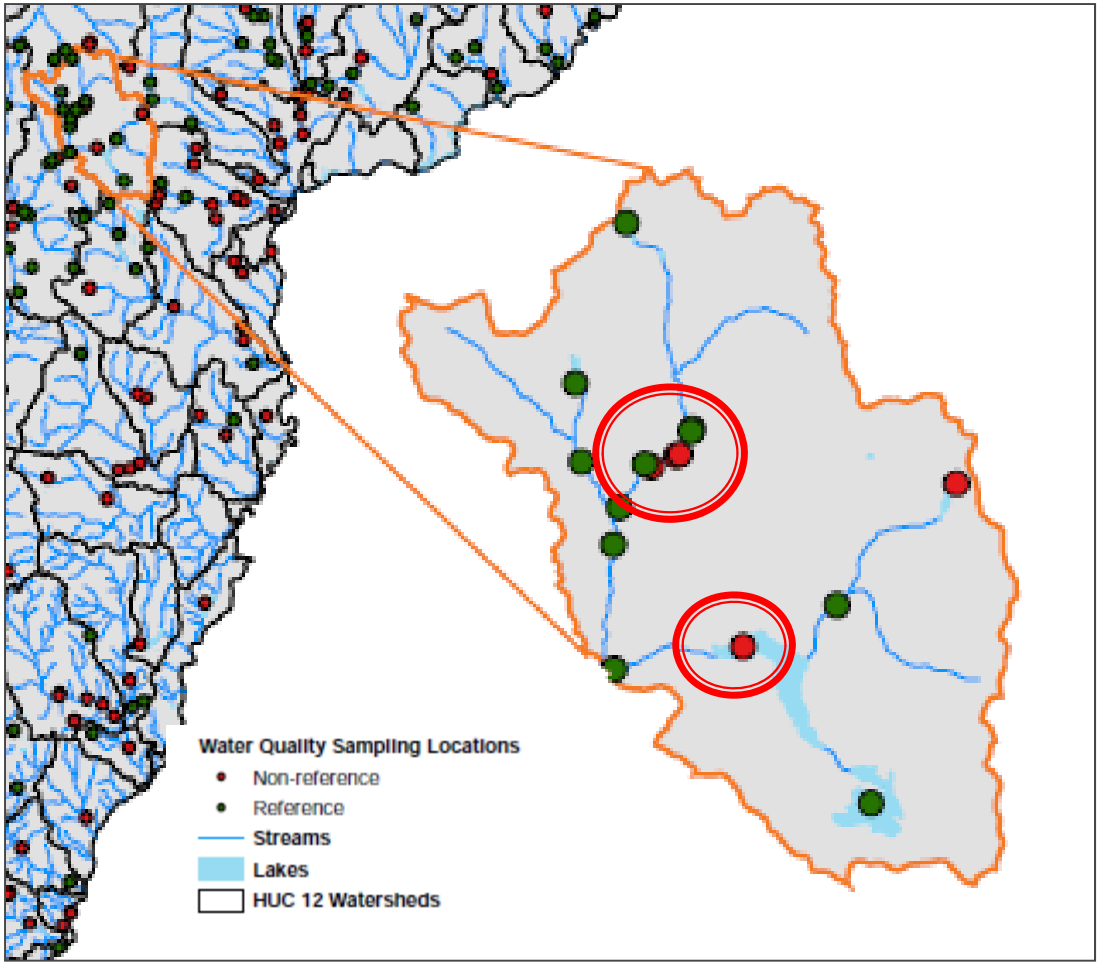
Water Quality

- VT has a mature WQ monitoring program consisting of a wide network of State, Partner, and Volunteer-managed sites.
- Over 1500 individual locations available
- HWI thresholds based on National Wadeable Streams Assessment reference screening criteria for sites.
  - *Good: Within upper 75th percentile of reference distributions*
  - *Fair: 5th – 25th percentile of reference distributions*
  - *Poor: <5th percentile of reference distribution.*



WQ Monitoring locations in reference condition

- Majority of sites in reference condition
- Dam outlet and Cabot Town Center are issues problem areas



Biotic Integrity

- VT has a mature ambient biomonitoring program.
- Over 1800 individual locations sampled
- Macroinvertebrate and fish indicators in VT's procedures
- HWI thresholds based on Tiered Aquatic Life Use framework

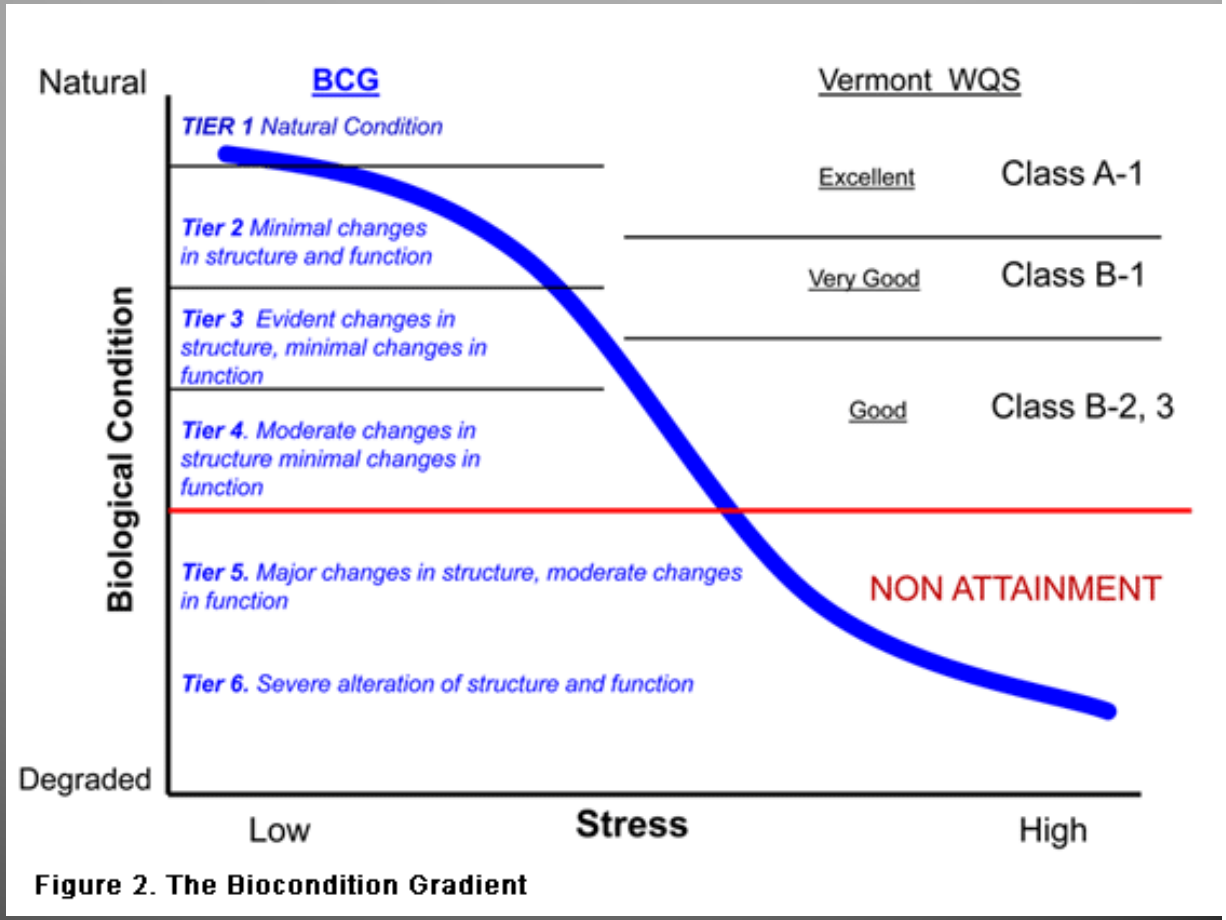
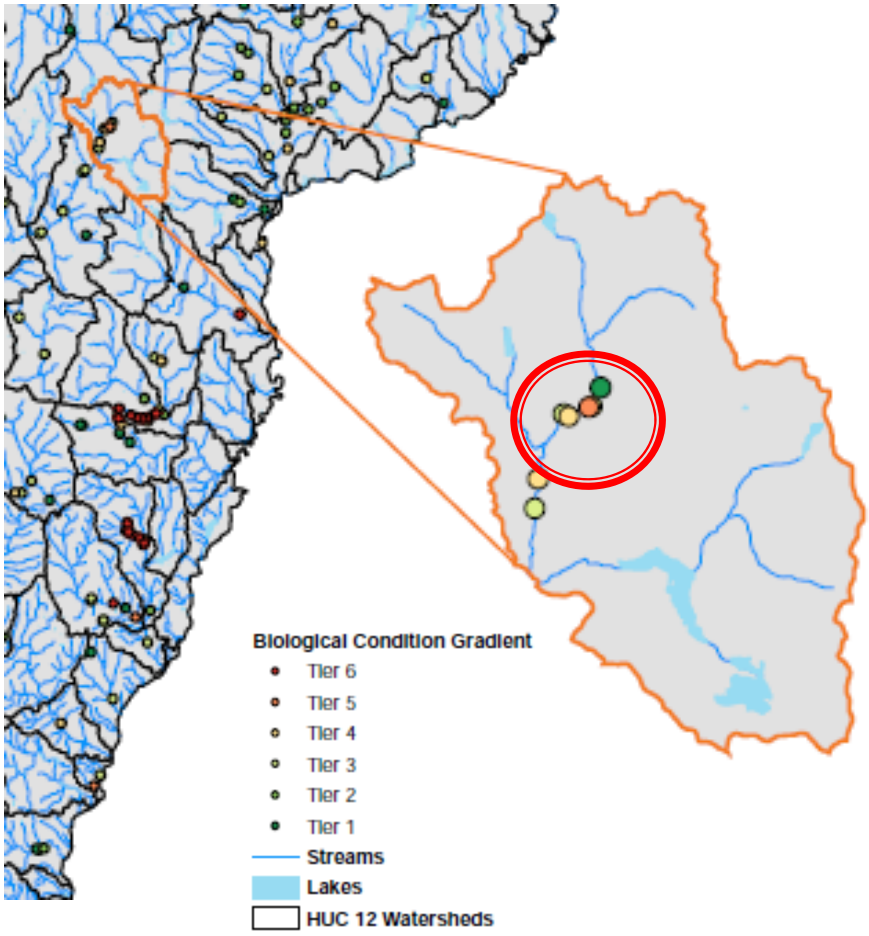


Figure 2. The Biocondition Gradient

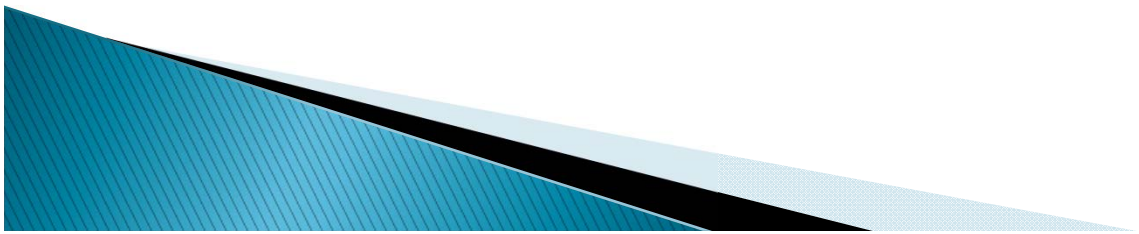
Biotic Integrity using TALU

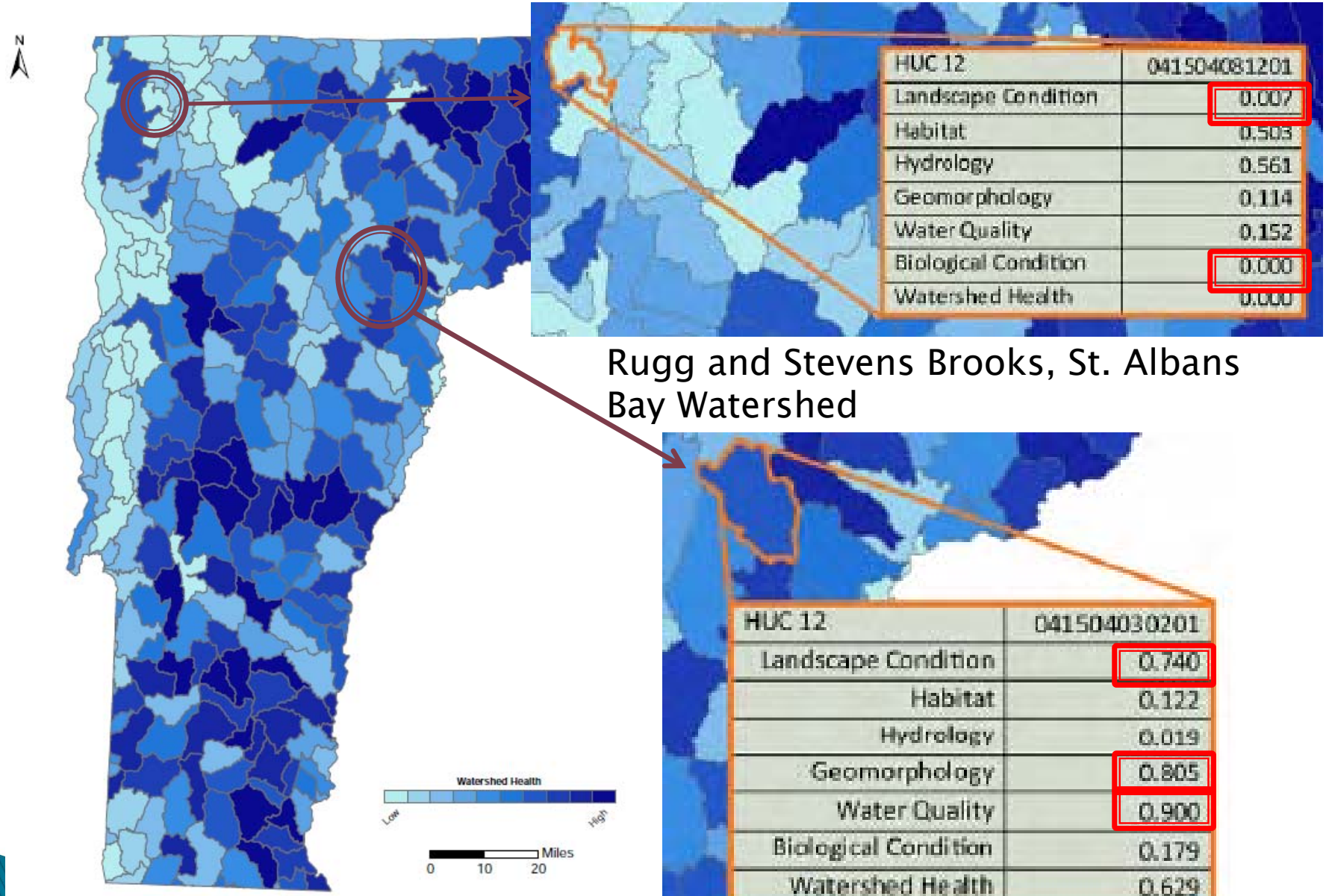
- Only one true reference site in HUC
- Data are sparse for a comprehensive assessment of this HUC.
- Stresses to BI in Cabot



Integrating the Assessments

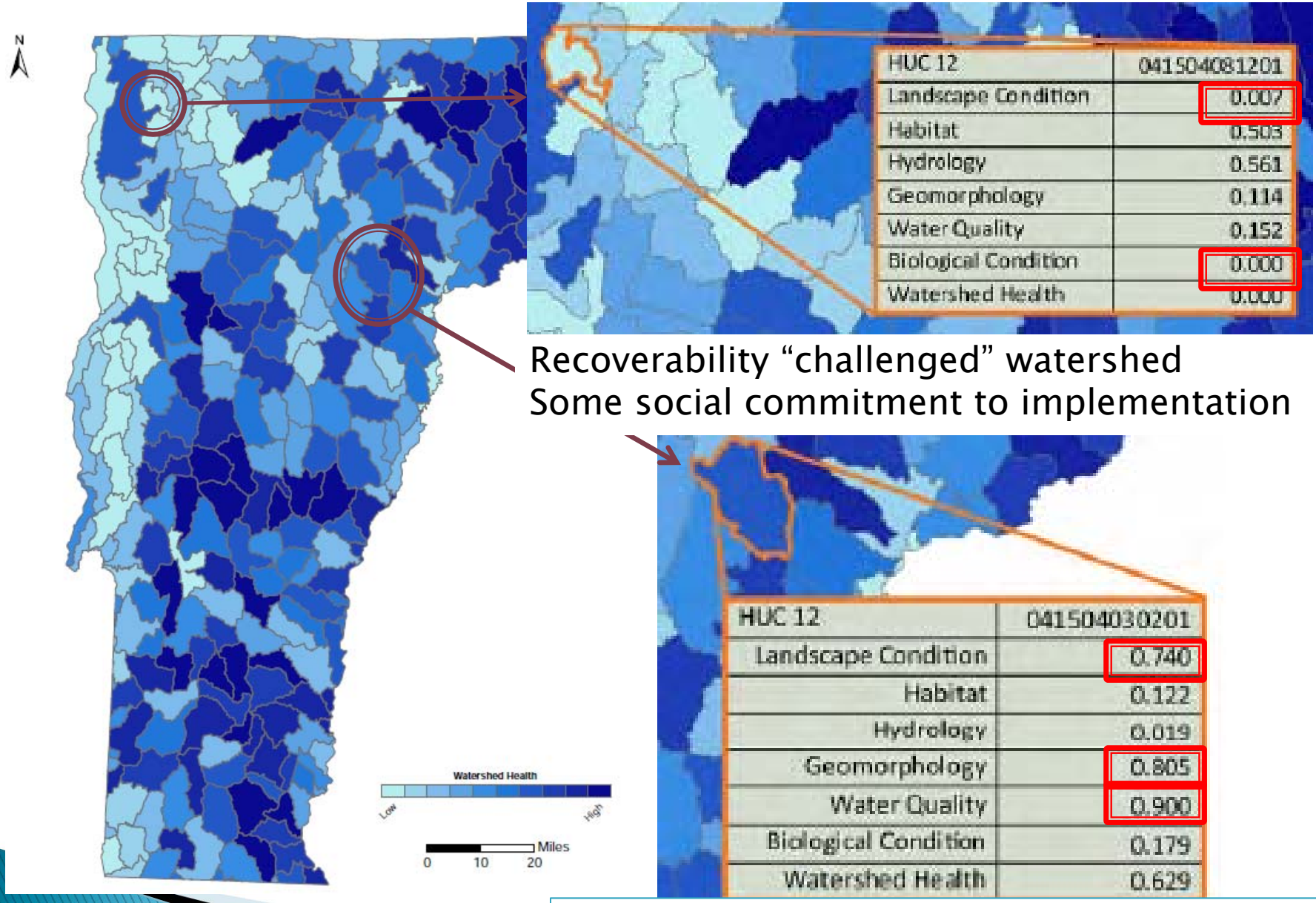
- Each indicator normalized
- No weighting was applied
  - Food for thought – is it reasonable to weight SGA's and biological assessments higher due to the strength of these assessments and importance in regulatory processes?
- Sum of scores scaled lowest watershed health to highest





Rugg and Stevens Brooks, St. Albans Bay Watershed

Upper Winooski Headwaters



Recoverability "challenged" watershed
Some social commitment to implementation

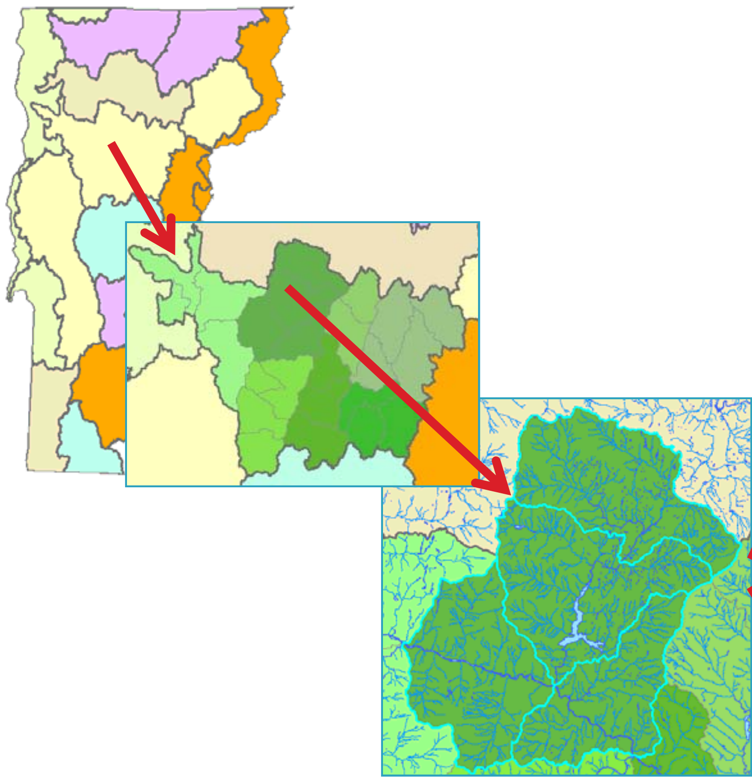
Recoverability certain
Strong social commitment to implementation

Using the HW Integration to support Basin Planning

- VT's Surface Water Management Strategy is designed to protect and restore surface waters
- Strategy is applied using Tactical Basin Planning to implement specific stressor management approaches, guided by monitoring and assessment results
- HWI strongly supports this by providing initial maps that Basin Planners can use with stakeholders to secure buy-in and commitment

Implementation guided by Tactical Basin Planning

Vermont Surface Water Management Strategy



Protection Actions	Project or Action	Lead Partner(s)	Funding Source	Target Implementation	Performance Metric	Completed?
Waterbody A	Easement on Reach 1.2.3	RMP	ERP	2012	A	
Waterbody B	Floodplain Restoration on reach 4.5.6	RMP	ERP	2012	A	
Waterbody C	Conservation acquisition for subwatershed to Frog Pond Lake	VRC	LARC, ERP, Foundation	2013	B	
Waterbody D	Wetland Reserve/CREP Project on Reach 7.8.9 and adjacent wetlands	DU	NRCS-WRP	2011	C	√
Restoration Actions						
Waterbody E	Corridor beltwidth acquisition and fencing project on Reach 2.3.5	WNRCD, LCA, AAFM	ERP, AAFM, NRCS	2011	A	√
Waterbody F	Culvert replacement at XYZ Road to reduce sediment at Reach 4.6.4	VYCC, Municipality B	Vtrans Local Roads, ERP	2013	D	
Waterbody F	Fabric/rocklining of ditch along ABC Road draining to Reach 4.6.5	Municipality B	BBR	2013	D	
Mon, Assess., Planning Actions						
Watershed G	Phase 2 Geomorphic Assessment and Corridor Plan	WNRCD, RMP	ERP	2011	E	√
Watershed H	Ambient Biomonitoring and LaRosa Partnership Monitoring	MAPP	WQD	2013	E	
Watershed I	Comnprehensive AEM Evaluation for 6 farms	AAFM, NRCD	AAFM	2013	F	
Municipal Planning Actions						
Municipality A	FEH Zone Delineation and Protection	--	--	2012	G	
Municipality A	Better Backroads Inventory	--	--	2011	E	√
Municipality A	Bridge and Culvert Inventory	--	--	2012	E	
Municipality B	Revised town road design and maintneance standards	--	--	2012	H	
Municipality B	Revision of DRB Procedure to adhere to new floodplain zoning	--	--	2013	H	
Waterbody A	Easement on Reach 1.2.3	RMP	ERP	2012	A	
Waterbody B	Floodplain Restoration on reach 4.5.6	RMP	ERP	2012	A	
Waterbody C	Conservation acquisition for subwatershed to Frog Pond Lake	VRC	LARC, ERP, Foundation	2013	B	
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Waterbody F	Fabric/rocklining of ditch along ABC Road draining to Reach 4.6.5	Municipality B	BBR	2013	D	
Mon, Assess., Planning Actions						
Watershed G	Phase 2 Geomorphic Assessment and Corridor Plan	WNRCD, RMP	ERP	2011	E	√
Watershed H	Ambient Biomonitoring and LaRosa Partnership Monitoring	MAPP	WQD	2013	E	
Watershed I	Comnprehensive AEM Evaluation for 6 farms	AAFM, NRCD	AAFM	2013	F	
Municipal Planning Actions						
Municipality A	FEH Zone Delineation and Protection	--	--	2012	G	
Municipality A	Better Backroads Inventory	--	--	2011	E	√
Municipality A	Bridge and Culvert Inventory	--	--	2012	E	
Municipality B	Revised town road design and maintneance standards	--	--	2012	H	
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Mon, Assess., Planning Actions						
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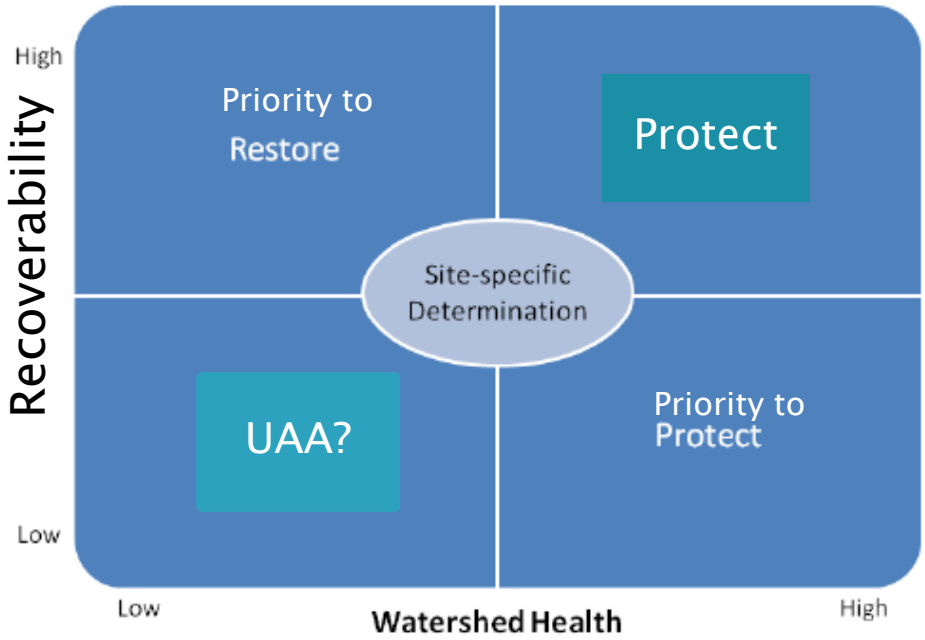
Watershed I	Comnprehensive AEM Evaluation for 6 farms	AAFM, NRCD	AAFM	2013	F	
Municipal Planning Actions						
Municipality A	FEH Zone Delineation and Protection	--	--	2012	G	
Municipality A	Better Backroads Inventory	--	--	2011	E	√
Municipality A	Bridge and Culvert Inventory	--	--	2012	E	
Municipality B	Revised town road design and maintneance standards	--	--	2012	H	
Municipality B	Revision of DRB Procedure to adhere to new floodplain zoning	--	--	2013	H	

Protection and Restoration

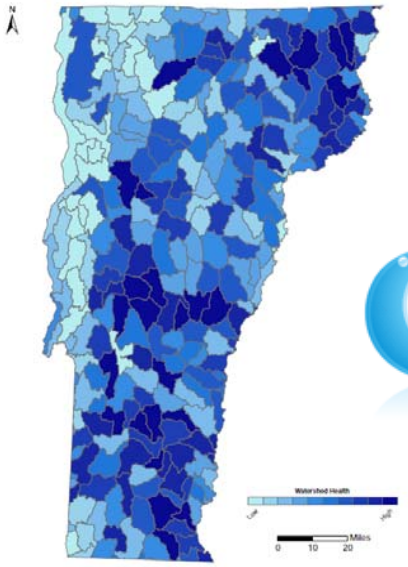
- HWI can indicate priorities for where to protect *and* where to restore
- Coupled with an assessment of Recovery Potential, waters can be slotted into four categories



Next steps

- Integration of HWI into Tactical Basin Plans
- Presentation of HWI results as a “Report Card.”
- Identify specific protection or restoration activities that tie directly to identified HUCs.
- Prioritize projects and tie implementation funding to highest priority projects.

For more information…



Vermont Surface Water Management Strategy

www.vtwaterquality.org

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