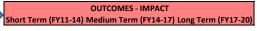
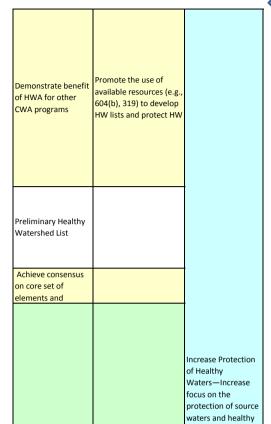
Short Torm (EV11 14)	Medium Term (FY14-17)	Long Torm (EV17.2
Short Term (FY11-14)	Wedium Term (FY14-17)	Long Term (F117-2
Agency network analysis, including user needs assessment (social		
network analysis of institutional structures and responsibilities that		
are needed to be involved)		
Quantified human and natural water use/needs		
Costs of protecting watersheds compared to drinking water treatment of degraded waters		
treatment or degraded waters		
Cost effectiveness of protecting active river area (e.g., floodplains) from development as compared to payments for storm damages		
Relationship between maintaining pre-development hydrology and		
load reduction (minimizing needs for TMDLs)		
Link between landscape-scale green infrastructure and aquatic		
related terrestrial health/WQ		
Cost-effectiveness of protection as compared to restoration (319		
program)		
Inventory of existing state and Federal data sources for HWIA		
Demonstrated utility of probabilistic monitoring data for		
identification of <u>all</u> healthy watersheds		
Evaluation of human disturbance indicators at watershed scale using available data and identification of thresholds of impairment		
Agency network analysis, including user needs assessment (social		
network analysis of institutional structures and responsibilities that are needed to be involved)		
Addition of multiple ecosystem types to conceptual model for integrated watershed assessments, including coastal systems		
Poff/Thorp spatial framework		
Tony morp spatial namework		
Proposed classification frameworks		
Proposed classification frameworks		
Examination of existing expertise and data		
Screening level landscape disturbance indicators		
Existing stressor-response relationships and thresholds		
Regional models for unaltered (and altered) flow regime prediction based on landscape, demographic, and climate attributes		
Available data on human and natural water use/needs		
Available data on numan and natural water dise/needs		
	Development and evaluation of cost-effective metrics for Healthy Watershed Assessment	
	elements, esp. functional and subsurface water reg	
	thermal regime, sedimen	
Regional models for unaltered (and altered) thermal regime	debris regime, connectivi	
prediction based on landscape, demographic, and climate attributes		
Regional models for unaltered (and altered) sediment regime		
prediction based on landscape, demographic, and climate attributes		
Available information on movement of aquatic-dependent organisms through watershed		
Existing optimization methods		
Existing optimization methods		

INPUTS

Short Term (FY11-14)		Medium Term (FY14-17)	Long Term (FY17-20)	PARTICIPATION
Cost/benefit analysis of applications of Healthy Watershed Clean Water Act programs, including relationship between healthy communities				
Flexible assessment framework to identify healthy watershound available state-level data	eds using diverse,			
Evaluation of approaches at state scale for HW protection Proposed definition of HW (condition, including resilience) Proposed set of elements and metrics for evaluation				
User needs/program assessment				
Conceptual model				
A consistent, nested framework Evaluation of existing and proposed methods for stratifying nested scales	HWIA, including use of	A consistent, nested framework		
Evaluate relationship between FPZs and ecoregions  Evaluation of differences in biological response to altered fl thermal regime across geomorphic unit types (e.g., Function		Classification framework		
Test of screening level landscape disturbance indicators				
Analyze gaps in stressor-response relationships and thresh	olds	Develop missing stressor-response relationships and thresholds		
Fill in gaps in regional models for unaltered flow regime pre				
Fill in gaps w respect to human and natural water use need: Assessment methods for woody debris regime, sediment re temperature, invasive species, flow regime, thermal regime	gime, connectivity,			
Evaluation of healthy groundwater regimes (and associated dependent community composition, functioning and water connectivity of critical ground-surfacewater interaction zon	requirements;	Assessment methods for woody debris regime, sediment regime, connectivity, temperature, invasive species, flow regime, thermal regime		
Fill in gaps in regional models for unaltered (and altered) th based on landscape, demographic, and climate attributes	ermal regime prediction	regime, definitive gime		
Fill in gaps in regional models for unaltered (and altered) se based on landscape, demographic, and climate attributes	diment regime prediction			
Demonstrate cost-effective geomorphology survey method of field and remote-sensing data	s, using best combination			
Modification of biological and habitat monitoring designs a longitudinal, lateral, and vertical connections	nd strategies to emphasize	Coordinated assessments of different system types		
Evaluate movement of organisms and barrier effects (e.g., o	ulverts)			
Joint optimization of conservation planning (e.g., gap analy network analysis) and protection of watershed-scale functions sediment regime, thermal regime, woody-debris regime)			Optimization of	
	Approaches for linking optimization of ecosystem-scale conservation at local township scale with optimizing preservation of watershed-scale function		multiple endpoints	

OUTPUTS - ACTIVITIES/PRODUCTS





Refinement of methods

for HW assessment

Pilot demonstration of approaches at

state scale for HW

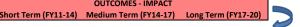
identification

watersheds to ensure they remain protected from degradation and depletion

States' Rivers and Streams Biocriteria Programs, analyze potential climate sensitivity of reference sites and need for methods to attribute effects to climate-related sources of impairment	For rivers and streams, develop or revise methods, indices, and models to monitor, detect, and attribute long term climate-change-related sources of impairment versus natural climate variability and other sources of impairment	For watersheds (including wetlands and lakes), develop methods to monitor and detect impairment due to climate change versus natural variability, and as separate from other sources of impairment	
	For rivers and streams, develop or revise predictive models to project into the future potential drifts in reference condition due to climate change	For watersheds (including lakes and wetlands), develop methods to project into the future potential drift in reference condition due to climate change	
For CWA programs built on definitions of "natural condition" (303(d) listing, Total Maximum Daily Loads, NPDES permits), analyze sensitivity of "natural condition" determination to climatic changes and assess need for methods to attribute changes in condition to climate-related sources	Develop or revise approaches, models, indices to detect and attribute long term climate-change-related shifts in natural condition versus other causes of impairment	Develop or revise predictive models to project into the future potential changes in natural condition due to climate change	
Define watershed resilience and evaluate available metrics/indices (e.g., recovery indices) for capability to capture resilience in response to changes in climate and land use; identify/develop new metrics of resilience where gaps exist	Modify biological and habitat monitoring: (1) to detect long term climate-change-related changes (such as movement/loss of organisms, changes in water quality and habitat condition, etc.); and (2) to collect data following climate-related disturbances to evaluate effects and recovery	Work with stakeholders to develop methods to: evaluate current watershed resilience, project future watershed resilience under conditions of changing land use and climate, and prioritize restoration and protection of the most resilient watersheds	
Develop new indicators for resilience where necessary		Work with stakeholders to develop methods to evaluate arrays of conservation/preservation/restoration options under uncertainty associated with climate change/land-use change projections, including critical placement of healthy subwatersheds to optimize future recovery/resilience of currently unimpaired ecosystems following catastrophe or climate change and of impaired systems following restoration <sup>1</sup>	

OUTPUTS - ACTIVITIES/PRODUCTS

Long Term (FY17-20)



nhance Watershed

Resiliency and

Communities—

approaches and

technologies that will

reduce the impacts

and risks associated

with climate change, population growth, increased urbanization,

infrastructure gaps,

and other factors.

Revitalize

Implement sustainable

OUTCOMES - IMPACT

CWA programs aligned to

enhancements of healthy

maintenance, and

vatersheds

Compatibility of other support protection,

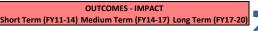
CWA programs with

protection goals

 $<sup>^{\</sup>rm 1}$  Also builds on research under  $\,$  LTG1 (related to scale convergence and Endpoint convergence)

Short Term (FY11-14)	Medium Term (FY14-17)	Long Term (FY17-20)	PARTICIPATION
Understanding of adaptive management requirements for healthy watersheds			
Agency network analysis, including user needs assessment			
Understanding and quantification of natural and human water use			USGS
Scale convergence: approaches for linking optimization of ecosystem-scale conservation and restoration at local township scale with optimizing preservation and restoration	Endpoint convergence: joint optimization of conservation and restoration planning (e.g. gap analysis, green infrastructure network analysis) and protection and restoration of watershed-scale functions (flow regime, sediment regime, thermal regime, woody debris regime)	Methods to identify arrays of options under uncertainty associated with climate change/land-use change projections	Stakeholders, including TNC
		Show people what will happen if resources are not protected	
		Climate change adaptation approaches to conservation/ preservation planning	
	Evaluation of critical placement of healthy subwatersheds to optimize future recovery/resilience of currently unimpaired ecosystems following catastrophe or climate change, and of impaired systems following restoration		
	Linkages between ecological health and socioeconomic factors1	Are HWs related to quality of life and economic sustainability; understand behavioral responses/incentives/disincentives created by a HW list	

OUTPUTS - ACTIVITIES/PRODUCTS



Restore Degraded

Waters—Enhance

the ability of EPA,

Identify what a

partnership to

look like, and

establish the

partnership

protect HW would

Coordinate both

conservation and

restoration programs

across multiple scales

with HW principles

states and tribes to

restore degraded

waters, restore

ecosystems, and

of restored water

bodies, including

nutrient impaired

waters

increase the number

take action to

 $<sup>^{1}</sup>$  Also builds on LTG1 short-term outcome 'Achive consensus on core set of elements and metrics for HW