LOWER CONNECTICUT RIVER SHORELINE SURVEY REPORT – 2010

WILDER PROJECT
(FERC NO. 1892)

BELLOWS FALLS PROJECT
(FERC NO. 1855)

VERNON PROJECT
(FERC NO. 1904)

Prepared for:

TransCanada Hydro Northeast Inc.
Westborough, Massachusetts

Prepared by:

Kleinschmidt
Energy & Water Resource Consultants

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1.0 INTRODUCTION

The intent of this lower Connecticut River shoreline survey is to identify, collect and locate important baseline information of the shoreline conditions and characteristics within the project boundary associated with three TransCanada Hydro Northeast Inc., (TC Hydro NE) Federal Energy Regulatory Commission (FERC) regulated hydroelectric projects on the Connecticut River: Wilder Station (FERC No. 1892), Bellows Falls Station (FERC No. 1855) and the Vernon Station (FERC No. 1904). The focus of this study is to describe, photograph, and map instances of shoreline erosion and also identify and map land use, recreational features, and cultural features along the approximate 260 miles of reservoir shorelines. Information collected and presented in this report provides the basic groundwork for components of the Pre-Application Document (PAD) and will aid in identification of issues under future relicensing efforts.

This document provides an overview of the geographic scope of the survey, methodology, and general summary of information gathered. The report is intended to be a companion to the geodatabase reader application developed to collate field survey data, aerial photography and GIS-based mapping for spatial queries for data analyses. Therefore, limited tabular summaries and graphical depictions of resource information collected are provided in this report. Select representative photos are provided within the text of individual resource sections and Appendix A contains example mapping outputs that can be generated from the GIS reader application.

2.0 GEOGRAPHICAL EXTENT OF SURVEY

TC Hydro NE's Connecticut River System is a hydroelectric system located along the Connecticut River in New Hampshire and Vermont. The stations associated with the extent and scope of the shoreline survey includes the project boundaries of (listed north to south): Wilder Station (FERC No. 1892), Bellows Falls Station (FERC No. 1855) and the Vernon Station (FERC No. 1904).

2.1 WILDER STATION

The Wilder Station (three units) is located on the Connecticut River in Windsor and Orange Counties in Vermont, and Grafton County in New Hampshire. It is a conventional hydroelectric facility with a nominal capacty of 41 MW operated primarily on a run-of-the-river basis. The Wilder dam creates an approximate 45-mile long impoundment along approximately 107 miles of shoreline with a surface area of 3,100 acres at a full pond elevation of 385 ft (NGVD29). Wilder impoundment typically fluctuates between elevation 382 and 384.5 ft.

2.2 BELLOWS FALLS STATION

The Bellows Falls Station (three units) is located on the Connecticut River in Windham and Windsor Counties in Vermont, and Cheshire and Sullivan Counties in New Hampshire. It is a conventional hydroelectric facility with a nominal capacity of 49 MW operated primarily on a run-of–the-river basis. The Bellows Falls dam creates an approximate 26 mile long impoundment along approximately 74 miles of shoreline with a surface area of 2,804 acres at a full pool elevation of 291.63 ft (NGVD29). The Bellows Falls impoundment typically fluctuates between elevation 289.6 and 291.4 ft.

2.3 VERNON STATION

The Vernon Station (eight units, six of which are in service) is located on the Connecticut River in Windham County in Vermont and Cheshire County in New Hampshire. It is a conventional hydroelectric facility with a nominal capacity of 21 MW operated primarily on a run-of-the-river basis. The Vernon impoundmentextends approximately 26 miles upstream along approximately

78 miles of shoreline with a surface area of 2,550 acres at a full pond elevation of 220.13 vft (NGVD29). Vernon impoundment typically fluctuates between elevation 281.6 and 219.8 ft.

3.0 METHODS

In the months of October and November of 2010, a baseline survey of the Wilder Station, Bellows Falls Station, and Vernon Station reservoir shorelines was conducted to describe, photograph, and map instances of shoreline erosion, and also identify and map land use, recreational features, and cultural features along the approximate 260 miles of shoreline within the Project area boundaries.

Because of the extensive reach of each impoundment the field survey focused on the identification of large regions of the shoreline displaying similar habitat types. The habitat and land use portion of the survey inventoried and characterized occurrences of wetlands, floodplains, and changes of land use types simultaneously while assessing other important shoreline characteristics. During the habitat survey, field staff identified and collected the start and end points of any "significant" shoreline erosion features in the GPS. "Significant" shoreline erosion features for this study were identified as areas of actively eroding shoreline that are at least 25 ft long. For each erosion position data collected included height (vertical extent) of each erosion feature, type of erosion, if the erosion was active, estimated cause(s) of the erosion (*e.g.*, wind waves, adjacent land use, natural erosion process such as erosion of non-cohesive alluvial sands on outer bends, etc.), and additional characterizations including but not limited to bank armament (e.g., rip-rap, retaining walls, or other).

As part of the shoreline survey all public and or private recreational developments that were present at the time of the survey were identified (e.g., docks, boat launches, marinas, campgrounds, etc.) and located. However, because the field survey occurred during the late fall months, some recreational developments such as docks may not have been present at the time of the survey. Obvious areas of cultural significance were noted in the field, but no research specific to historic and cultural resources was conducted outside of the field survey.

Two Kleinschmidt field personnel surveyed the shorelines of the Wilder, Bellows Falls, and Vernon impoundments, including island shorelines and major tributaries within the Project boundaries, from boat. Features were collected using a Trimble™ YUMA tablet with high yield GPS 2±-meter accuracy positioning, real time differential correction and built-in geo-tagged photographs. Using the GPS, field personnel mapped the start and end points of major habitat types, erosion features, recreational developments, cultural and historic developments, and other significant shoreline characteristics.

Data acquisition used a rapid collection approach by specifying attributes for each feature from a menu-based list; that is, when a feature was noted at a specific location, field staff recorded various attributes for that site by choosing from a menu of options developed during the “desktop study” that were programmed into the GPS unit. This approach allowed for quick collection of data that corresponded to a specific location on the map. Field data collected also included representative geo-referenced digital photographs at each habitat reach and significant shoreline feature (*e.g.*, retaining wall, dock, erosion site). In the GPS, each data point collected recorded the file name of the photograph as well as specific information regarding the location of the habitat type or object of the photo (*i.e.*, distance from camera to object and the angle at which the photograph was taken). This data was then used to automatically reposition the mapped point to the actual feature location in GIS, and allows a user to simultaneously view a location’s characteristic data and corresponding photographs.

Data collected during the field study was developed into a GIS database, which is provided on the attached CD. Individual shapefiles provide the geospatial data for each item (e.g., habitat reach, erosion location, recreation development, etc). The GIS data is published to an ArcReader portable map file, which is also included on the attached CD.

4.0 HABITAT AND LAND USE

4.1 CONNECTICUT RIVER WATERSHED

The Connecticut River and the Connecticut River Valley is a prominent feature in the New England landscape. It is the largest river in New England and flows over 410 miles from its source at Fourth Connecticut Lake near the Canadian border, to Long Island Sound. The river forms the easterly boundary of Vermont and shares over 275 miles of the river's length with New Hampshire. The watershed is a long basin lying between the spines of the Green Mountains of Vermont and the White Mountains of New Hampshire. The Connecticut River drains 4.5 million acres or 7,000 square miles of New Hampshire and Vermont.

In the Connecticut River, flows vary significantly according to location, time of year, snow melt, precipitation, and management of dams. The river's depth also varies in most places, and is constantly changing as the river transports and rearranges its load of sediments. Fifty-three towns border the river, 27 in Vermont and 26 in New Hampshire. The shoreland on the New Hampshire side of the Connecticut River is protected by state law, which requires a 50 foot building setback and a 150 foot natural shoreland buffer, and in many towns by local zoning which is often more protective. While some Vermont towns have local zoning that protects their Connecticut River shoreland, there is no state protection of shorelands in Vermont. The Connecticut River is designated as an American Heritage River, and is also part of a National Fish and Wildlife refuge.

4.2 HABITAT

The stream banks of the river are well-defined and forested with common river bank tree species such as cottonwood (*Populus deltoides*), ash (*Fraxinus sp*.), and silver maple (*Acer saccharinum*). Such species function as an ecotone, connecting the riparian environment with the upland terrestrial habitat. Because of the extensive reach of each impoundment generally, the upper reaches of each impoundment exhibit characteristics of a riverine system subject to the dynamic flow conditions of the river in contrast to the pond like conditions lower in the reservoirs where flow is diminished and the river's influence and conditions appear more constant.

As noted in Table 1 the dominate wetland class observed in the impoundments is characterized as palustrine emergent wetlands. These narrow bands of emergent vegetation typically occurred along the shallow shoreline and in backwater coves. Broadleaf cattail (*Typa latifolia*) is the dominant wetland emergent species forming monoculture stands along the shoreline. Other wetland features observed to a lesser degree included relatively small areas of willow (*Salix sp.*) palustrine scrub-shrub wetlands and narrow silver maple dominated floodplain / stream side terraces. It should be noted that the field survey was conducted outside of the growing season when non-persistent emergent and submerged aquatic vegetation (SAV) is not conspicuous (e.g. actively growing or flowering) or easily identifiable. There were few instances of invasive species noted, ranging from a few occurrences of Phragmities (*Phragmites australis*) in the Wilder impoundment (4 locations) to larger stands of Phragmities and Japanese knotweed (*Fallopia japonica*) in the Bellows Falls impoundment (11 locations) and the Vernon impoundment (15 locations). Generally, inclusions of invasive species showed an increasing trend of occurrences from the rural Wilder impoundment to the more developed Bellows Falls and Vernon impoundments.

Wilder Impoundment Shoreline Emergent Wetland (10-22-10ZZ)

The Connecticut River and its surrounding bottomlands found throughout the project reach are important to the life cycle of a majority of the regions wildlife. These productive systems are critical to fishes, amphibians, water dependent mammals such as beavers, muskrats, and otters, and legions of aquatic invertebrates. The edges provide nesting and feeding grounds for migrating and breeding birds, from spotted sand pipers to great blue herons. The Connecticut River and the Connecticut River Valley is an important natural transportation system used for travel by a variety of species of wildlife, supporting a diverse web of ecosystems.

Vernon Impoundment Sediment Bar Wetland (11-19-10)

Table 1 provides a summary of the frequency of observed wetland classes and total percentage of wetlands within their respective impoundments:

TABLE 1 WETLANDS

Impoundment	Total % of Wetlands in Impoundment	Wetland Type	Frequency	Percentage
Wilder	4%	Emergent	27	71%
		Scrub-Shrub	4	11%
		Forested Floodplain	7	18%
Bellows Falls	5%	Emergent	17	71%
		Scrub-Shrub	3	12%
		Forested Floodplain	4	17%
Vernon	2%	Emergent	24	85%
		Scrub-Shrub	2	10%
		Forested Floodplain	1	5%

4.3 LAND USE

The project is located in the fertile soils of the Connecticut River Valley; as such much of the surrounding land use is agricultural and forested areas. Other land use types include: rural residential areas, commercial, industrial, and transportation developments, and wetlands. Rail road tracks are commonly found along the banks and in close proximity of all three impoundments, particularly where the river is in close vicinity to more developed areas such as the Dartmouth College area in Hanover, NH, Bellows Falls, VT, and Brattleboro VT.

Wilder Impoundment Example of Forested Shoreline (10-24-10)

Table 2 illustrates the relative percent land use cover within the project boundaries for each project including impoundments, project lands both owned in fee and held by others with flowage rights retained..

TABLE 2 LAND USE COVER

Impoundment	Agriculture	Forested	Developed	Wetland	Open Water	Other
Wilder	7%	15%	2%	4%	70%	1%
Bellows Falls	22%	24%	6%	5%	41%	2%
Vernon	1%	11%	2%	2%	80%	3%

5.0 EROSION

The Connecticut River is characterized by a complex fluvial geomorphology that includes dynamic shoreline sediment patterns associated with both natural and anthropogenic causes. Bank erosion is a natural process along rivers in equilibrium as a channel migrates across its floodplain. Extensive erosion, however, can be an indication of channel instability associated with human activity. The fertile valleys of the lower portions of the river are associated with deep alluvial and glacial deposits and natural erosion is expected, especially where non-cohesive sediments such as sand and silt occur over impermeable or semi-permeable subsurface strata such as dense clay or bedrock. Old ox-bows provide evidence of natural erosion processes that were in effect long before the dams. Anthropogenic factors such as agriculture, recreation, development, and management of hydro and storage projects can also affect shoreline erosion and shoreline vegetation conditions.

The river channel is primarily composed of alluvial banks, or banks rarely higher than 10 to 15 feet (above the low flow water level), that are composed of floodplain soils with a sandy loam texture. High non-alluvial banks, sometimes over 100 feet high but more typically 15 to 30 feet high are more prevalent where the valley is more confined and the river more frequently impinges against the non-alluvial glacial outwash deposits found along the valley side slopes.

The majority of the soils along the banks of the Connecticut River have formed in water-sorted sands and silts of glaciofluvial and alluvium deposits found on outwash stream terraces, flood plains, depressions and drainageways of the Connecticut River Valley. Sand and silt particles that make up the bank and bed material along the river erode most readily. Also, decreases in shear strength of the soil bank material may lead to failure. This is especially true where swelling of fine soil materials from absorption of water increases groundwater pressure within the bank, and soil creep (downhill slope movement) weakens the bank. While swelling of fine bank material or excessive groundwater are difficult to observe, cracks developing in the bank parallel to the stream are evident of soil creep and where the groundwater table is higher than the surface of the stream, pressure builds up behind the bank face causing seepage, forcing soil particles to loosen increasing the bank face sensitivity to erosion.

There are less frequent inclusions along the impoundments where bedrock or glacial till was observed immediate to the shoreline. Most notable areas of rocky shorelines were more commonly placed by anthropogenic activities. Typically these rocky areas were found along rail-road and roadside embankments to armor the hillside and protect the toe-of-slope from the river's erosive factors.

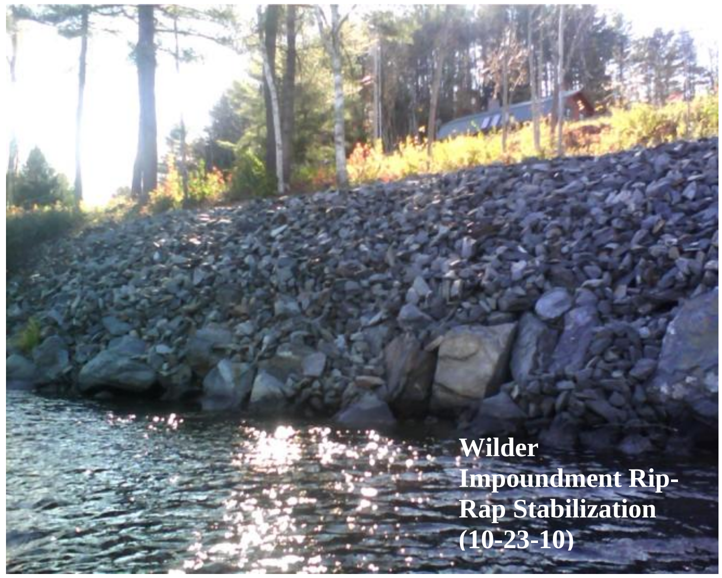
5.1 TYPES AND CAUSES OF EROSION

The primary type of erosion noted in all three impoundments is bank slumping. Bare near vertical bank walls are common, with large clumps of vegetated bank slumped below the obvious original location of the vegetation. Bank slumping, sometimes described as mass failure or collapse can occur from various mechanisms, but is most commonly a result of rapid draw down of stream flow following a prolonged period of bank-full flow (high water or flood flows with a relatively rapid reduction in flow) resulting in saturation of bank material. This type of erosion occurs mostly in high-velocity stream flows (often on the outside of stream bends) resulting in bed scour at the toe of the bank. This type of erosion is exacerbated by land/vegetation clearing that is commonly associated with farming practices observed along the project boundaries.

Wilder Impoundment Example of Active Major Erosion Adjacent to Agricultural Field (10-23-10)

The causes of erosion on the Connecticut River are complicated and varied. Some, such as natural scour, abrasion by ice, and wind-driven waves, are nearly impossible to control. Most instances of significant erosion observed were related to agricultural practices, where vegetation has been cleared to the water's edge and now soils lack root retention to stabilize soils on the river bank increasing sensitivity to the erosive forces of the Connecticut River.

Natural occurrences of water level fluctuations following spring melt and storm events can create a pressure imbalance. When the water level of a river is high for a sufficient length of time, water tends to move into the bank. When the level drops at a rate faster than the bank can drain, water retained by the bank face increases the outward pressure on the soil in the bank and reduces its stability. Other causes of erosion include: rapid recession of high water levels following spring, freeze-thaw and wet-dry cycles, ice and debris, obstacles in the river, and waves and boat wakes. In cases where the water freezes in the bank, the expanding ice layer pushes soil particles out of position. As the ice thaws, these particles settle back in a looser state, allowing them to be removed more easily by flowing water. Similarly, when wet fine soil material dries, it shrinks and cracks creating an erodible surface. Erosion of a stream bank by ice often occurs during ice break-up, when ice is forced along the bank by the flow of water. This abrasion does the least damage if the bank is still frozen, but can scour deeply when the bank is thawed. Other debris, such as tree limbs, can cause erosion if it strikes a bank with sufficient force. Whirlpool action around a piece of ice or debris can also cut dramatic holes in the bank.


Wilder Impoundment Rip-Rap Stabilization (10-23-10)

Anthropogenic causes of erosion are commonly associated with man-made obstacles in the river which can alter the natural flow of water resulting in erosion and/or deposition. Common man-made obstacles found within the project impoundments include docks, marinas, retaining walls, boat launches, and bridge abutments. Also boat wakes and waves wash away soil at the base of the bank undercutting it, particularly if it is un-vegetated, allowing the unsupported bank material above to collapse into the stream.

5.2 INSTANCES OF EROSION

As outlined in Table 3 in reviewing the data collected during the field survey the majority of located instances of significant erosion are largely associated with agriculture land use practices.

TABLE 3 INSTANCES OF EROSION

Impoundment	Total Instances Of Erosion	Occurrence with Agricultural Land Use	% Occurrences with Agricultural Land Use
Wilder	100	77	77%
Bellows Falls	51	28	54%
Vernon	19	9	47%

Table 4 illustrates the total estimated percentage of shoreline erosion for each impoundment.

TABLE 4 PERCENTAGE OF SHORELINE EROSION

Impoundment	Length of Impoundment	Total % Estimated Erosion
Wilder	107 miles	12%
Bellows Falls	74 miles	9%
Vernon	78 miles	2%

5.3 PROJECT INFLUENCE

Erosion sites are found in each of the impoundments. Flows in this section of the Connecticut River are regulated by upstream hydroelectric projects, except under high flow conditions. The Wilder, Bellows Falls and Vernon Projects are primarily operated on a daily run-of-river mode, meaning generally that over the course of a day, each Project passes the average daily inflow. During periods when average daily flows are less than maximum station flow capacity, the Projects use the limited daily storage in the impoundments to dispatch generation in specific hours as required to meet the generation schedule managed by the New England Independent System Operator (NE-ISO). Generation can vary during the course of any day between the required minimum flow and full capacity, if higher flows are available.

While this may result in daily pond level fluctuation, mainly at the downstream end of the Wilder impoundment due to the “pitch” of the river, relatively constant impoundment elevations are maintained. As such, there are not frequent sudden high flow releases from the Project of impounded water and velocities exceeding those created by natural flows, and therefore Project operations would not likely be a significant contributor to erosion in the impoundments as compared to naturally occurring high river flows; bank-full conditions.

6.0 SUBSTRATE

The middle Connecticut River ecological drainage unit (EDU) is classified primarily as medium elevation, moderate gradient headwaters draining to low elevation, with low gradient river systems entering the Connecticut mainstem. As expected substrate particle size typically decreases in a downstream direction as the distance from the source area increases and channel slope decreases. The increase in grain size is coincident with an increase in valley confinement that results in the river flowing more frequently against glacial outwash deposits along the valley margin. The outwash deposits provide a source of the coarse sediments that rejuvenate the system before the grain size begins to decrease as the valley once again becomes broad and unconfined. Mid-channel bars were found just downstream of points of tributary confluences, and high eroding banks. Bar formation, however, does not generally persist far downstream from these points. Delta bars were frequently seen forming at the mouths of both large and small tributaries with some sediment emanating from tributaries moving further downstream to form mid-channel bars. Delta bars particularly at the mouths of major tributaries can attribute to conditions rerouting the river flow towards the opposite bank, leading to erosion.

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7.0 RECREATIONAL FEATURES

Private and public recreational use occurs in all three impoundments. Common water dependent recreational uses observed included: docks, boat launches, marinas, stairs/water access, swim areas, hunting blinds, and ice-fishing shacks. Also noted along the banks of the impoundments are non-water dependent private and public recreational sites including: campsites, public parks, hiking trails, and wildlife conservation and management areas. Docks are the most frequently observed recreation feature within each reservoir accounting for 75% of recreation features observed in the Wilder impoundment, 63% in the Bellows Falls impoundment and 76% in the Vernon impoundment. The field survey occurred outside the peak recreation season (Memorial Day through Labor Day) so it is likely that some docks had been removed prior to the survey.

Bellows Impoundment Boat Launch (11-10-10)

8.0 CULTURAL AND HISTORIC FEATURES

Wilder Impoundment Old Bridge Abutment (10-21-10)

No significant cultural or historic resources were observed during the 2010 survey of the three impoundments. There were few instances of observed remnants of cut stone retaining walls, stone bridge abutments, or portions of concrete structures noted in the Wilder (3 occurrences) Bellows Falls (1 occurrences) and Vernon (3 occurrences) impoundments. There were also no observations of bank soil conditions (e.g., charcoal “pit” lenses/beds) indicative of potential historic or cultural significant sites.

APPENDIX A

EXAMPLE MAPPING OF OBSERVED SHORELINE FEATURES

Appendix A Map List

Wilder Observation

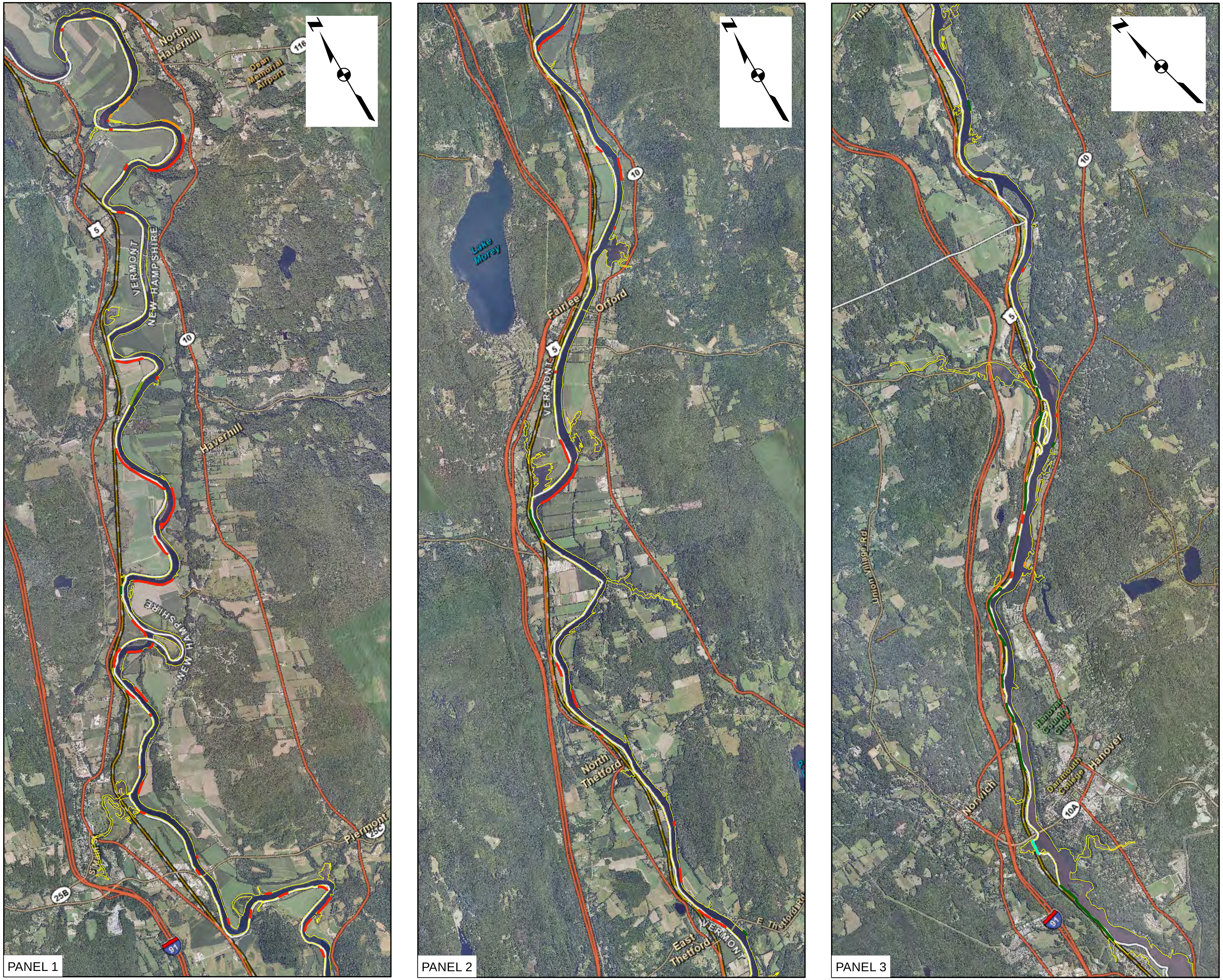
- **Erosion**
- **Land Use**
- **Substrate**

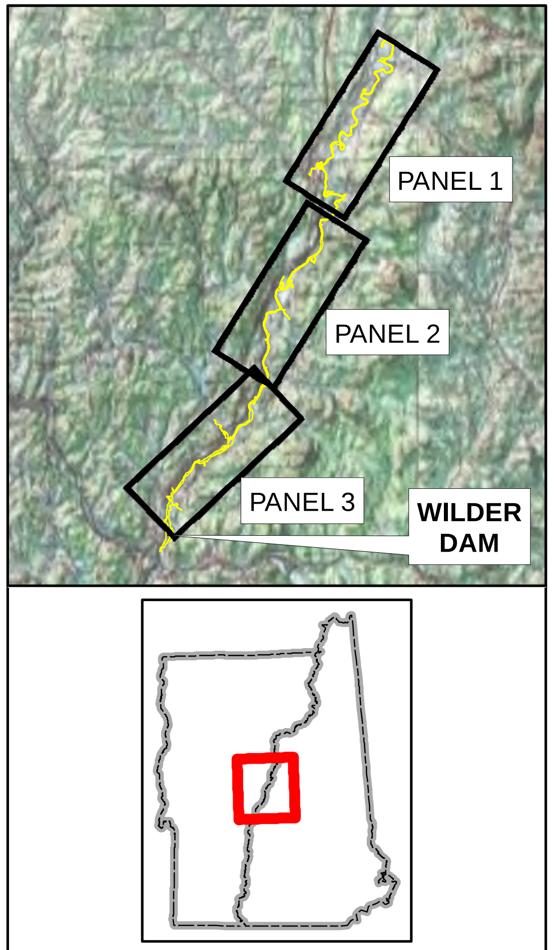
Bellows Falls Observations

- **Erosion**
- **Invasive Plans**
- **Wetlands**

Vernon Observations

- **Erosion**
- **Historic Features**
- **Recreation Facilities**
- **Water Conveyances**





Shoreline Erosion

- Increasing, Active (Major)
- Increasing, Active (Minor)
- Other, Histroic-Stabilized
- Stablized, Active (Minor)
- Stablized, Histroic-Stabilized
- Project Boundary

1 0.5 0 1

Miles

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TRANSCANADA HYDRO NORTHEAST

WILDER PROJECT
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OCCURANCES OF SHORELINE EROSION

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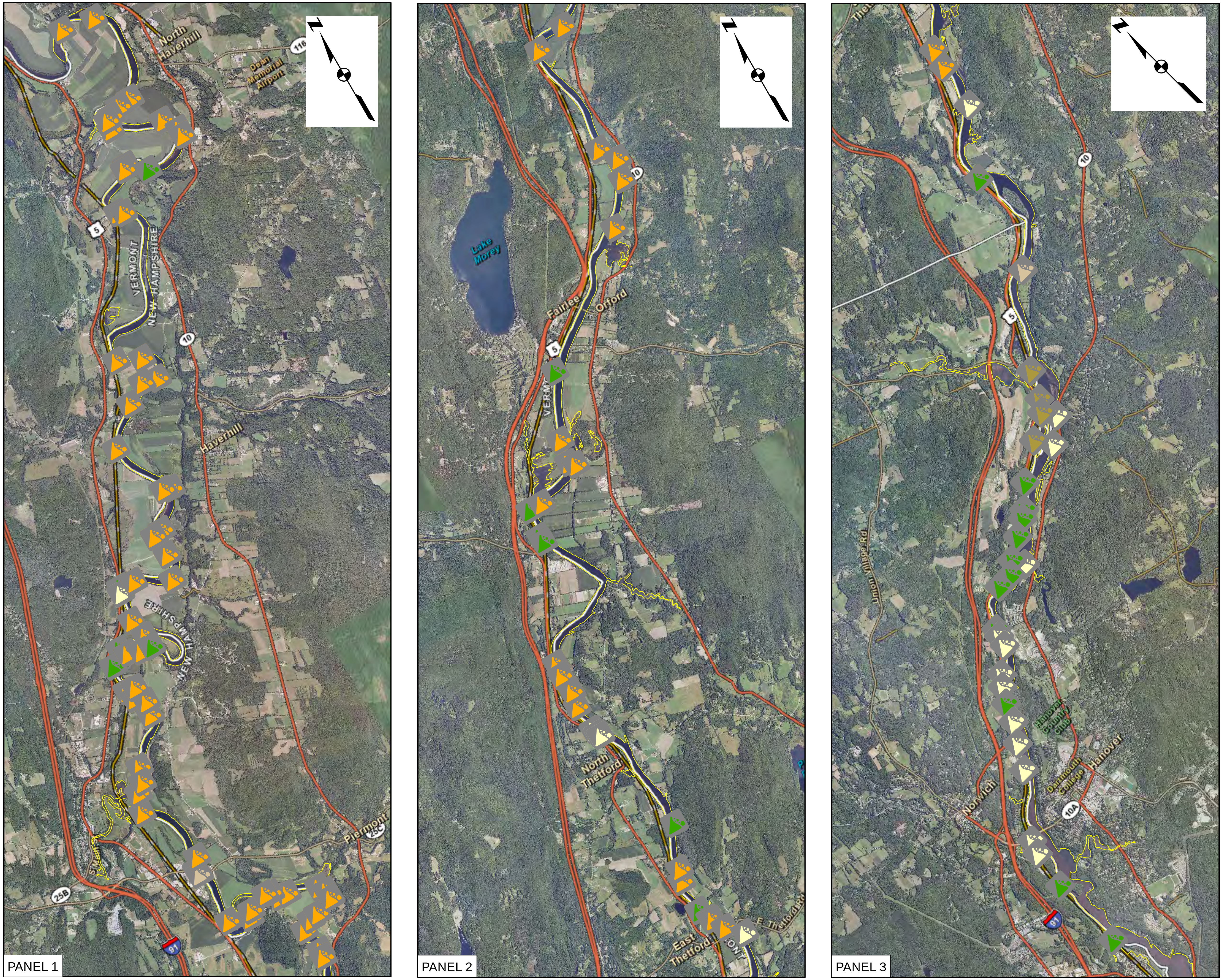

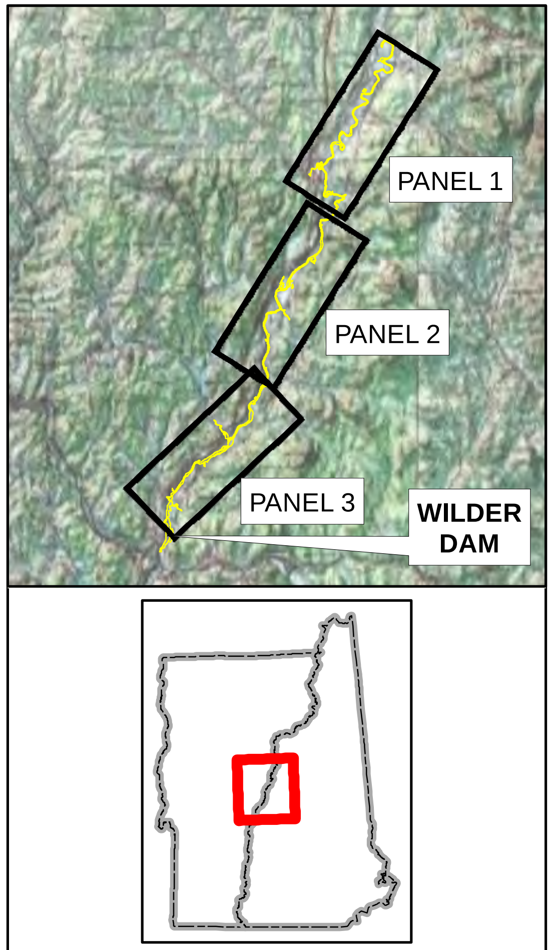

Land Use

- Agricultural
- Commercial
- Forested
- Grassland
- Industrial
- Residential
- Project Boundary

1 0.5 0 1

Miles

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CLASSIFICATIONS OF SHORELINE LAND USE

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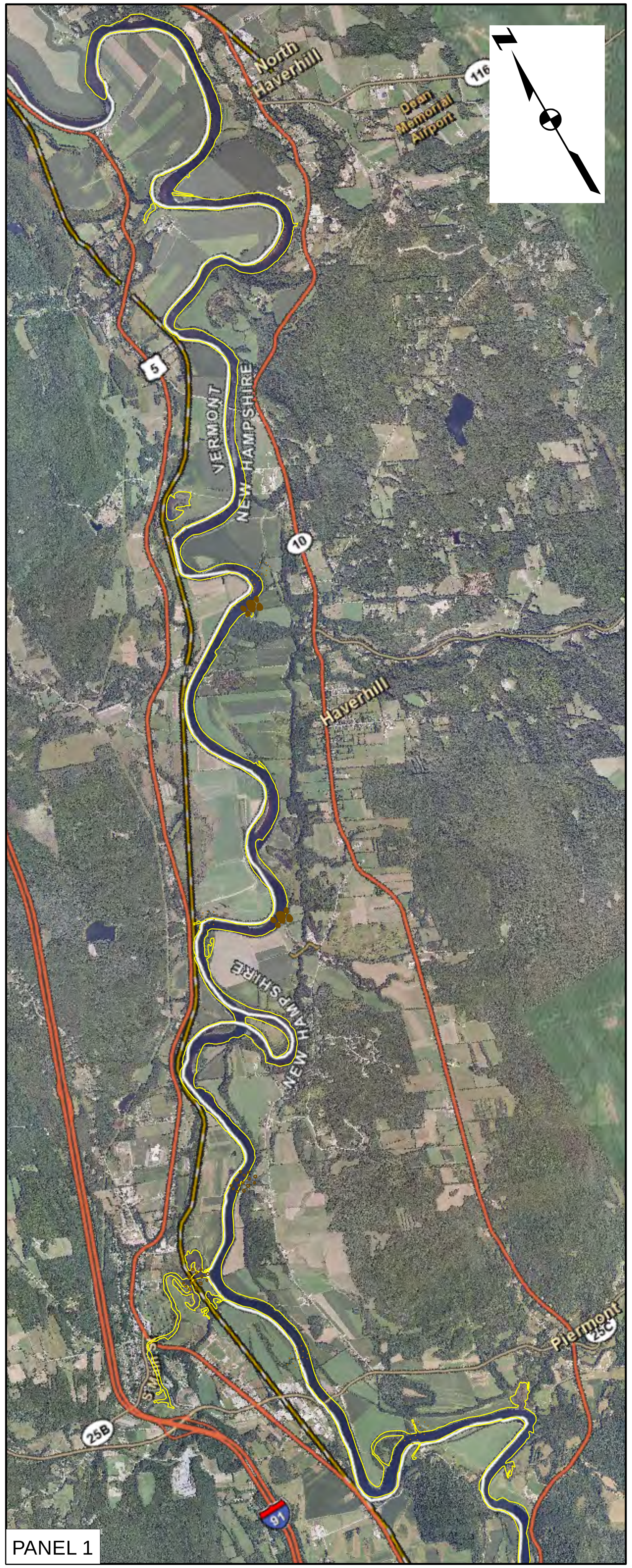

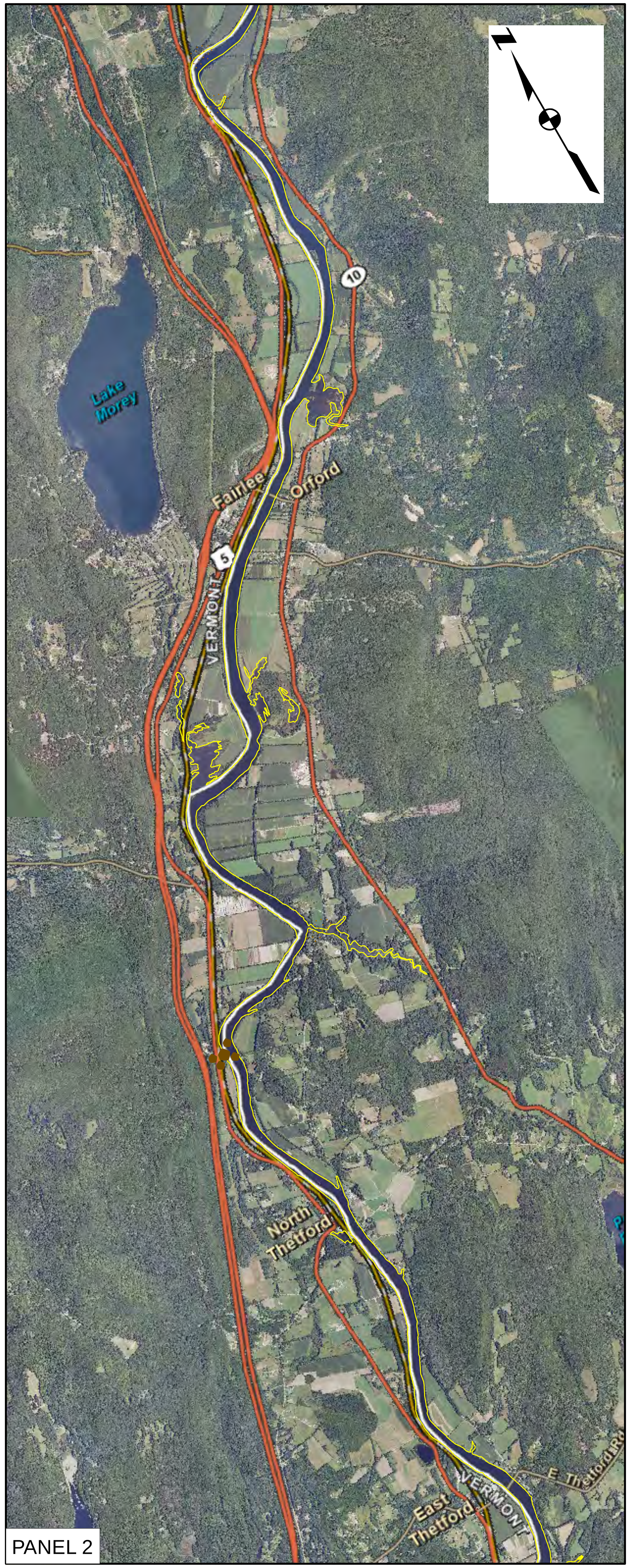

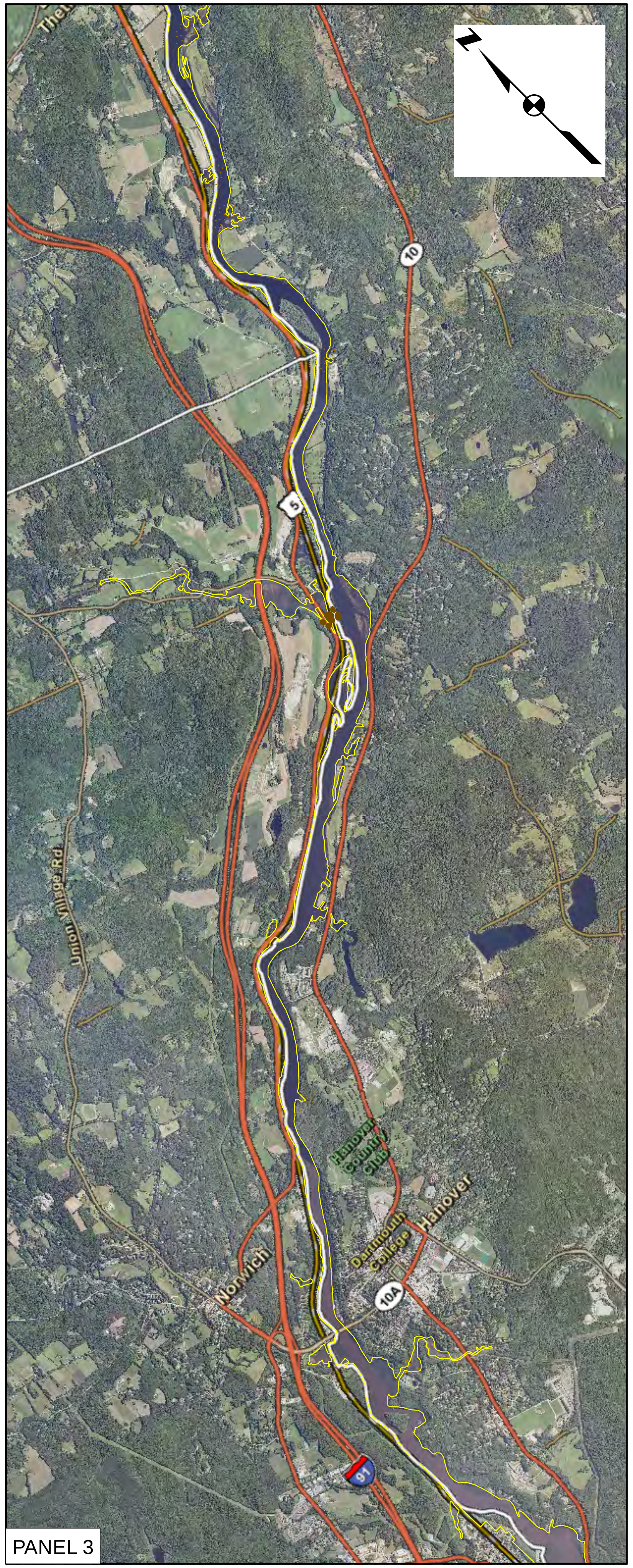

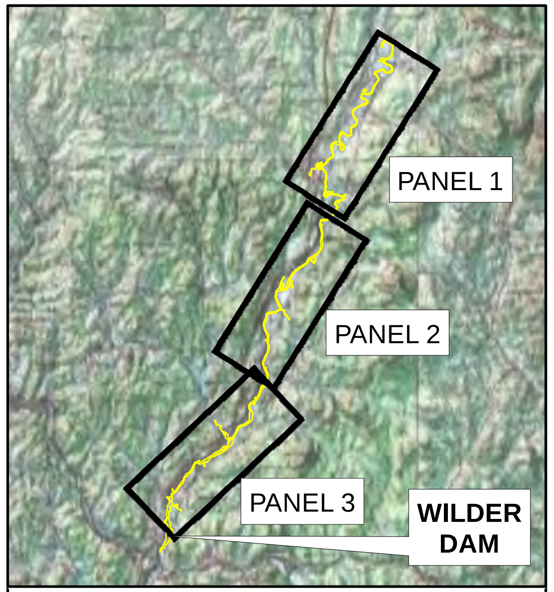

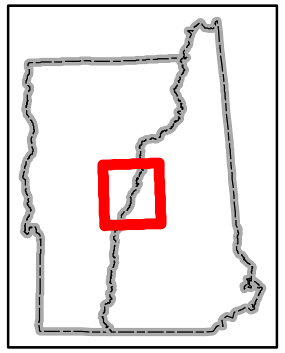

Substrate

- Fine (.0004-.062mm)
- Sand (.063-2.0mm)
- Gravel (2.1-64mm)
- Cobble (65-256mm)
- Project Boundary

1 0.5 0 1
Miles

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SUBSTRATE SIZE

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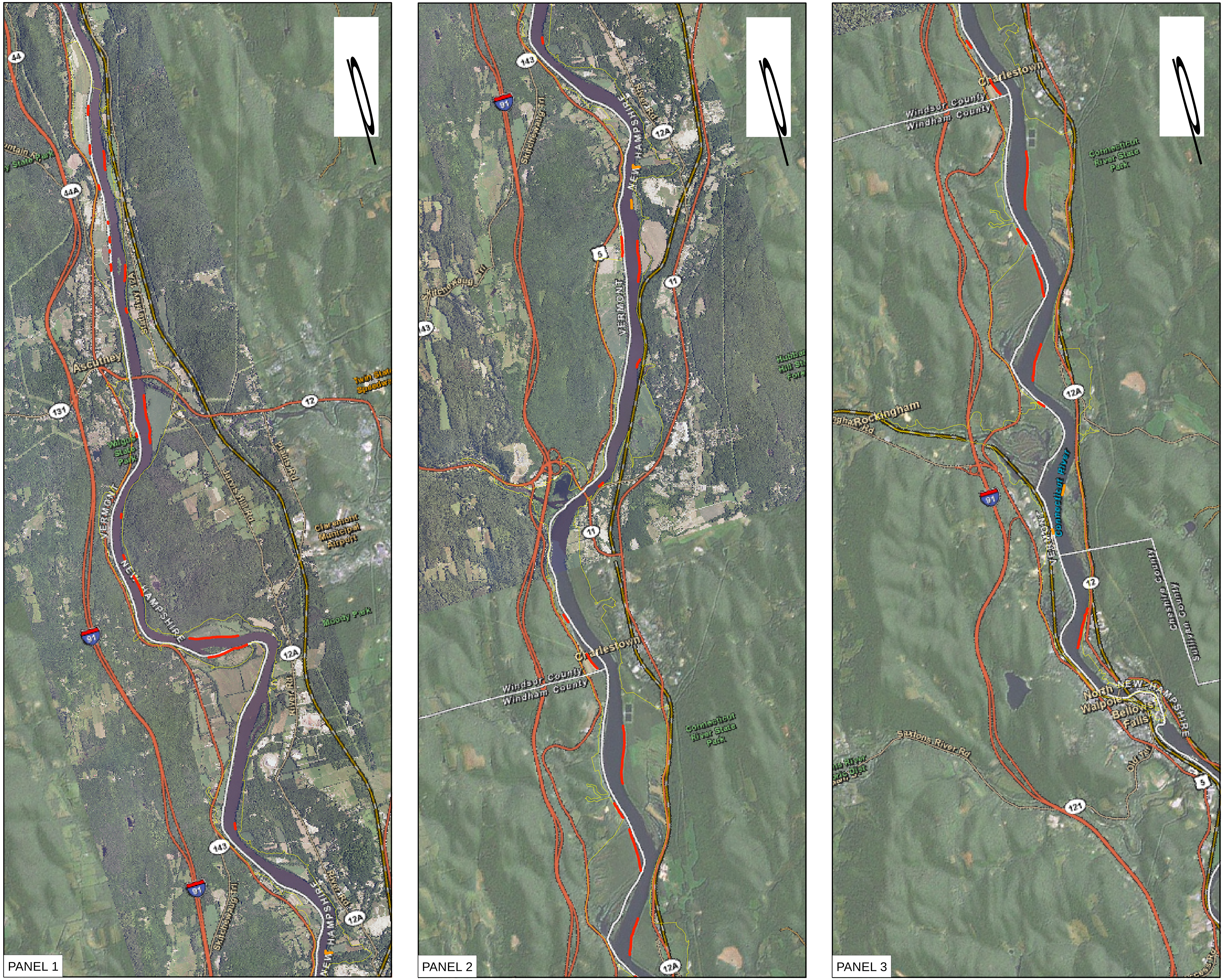

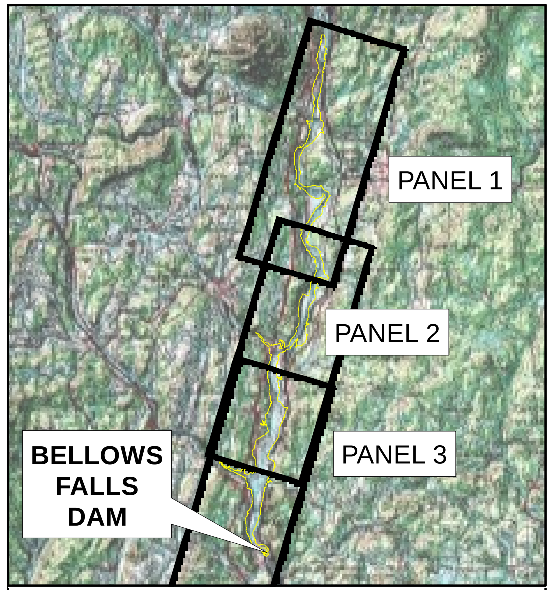

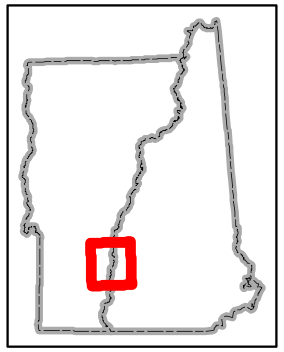

Shoreline Erosion

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- Increasing, Active (Minor)
- Other, Histroic-Stabilized
- Stablized, Active (Minor)
- Stablized, Histroic-Stabilized
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OCCURENCES OF SHORELINE EROSION

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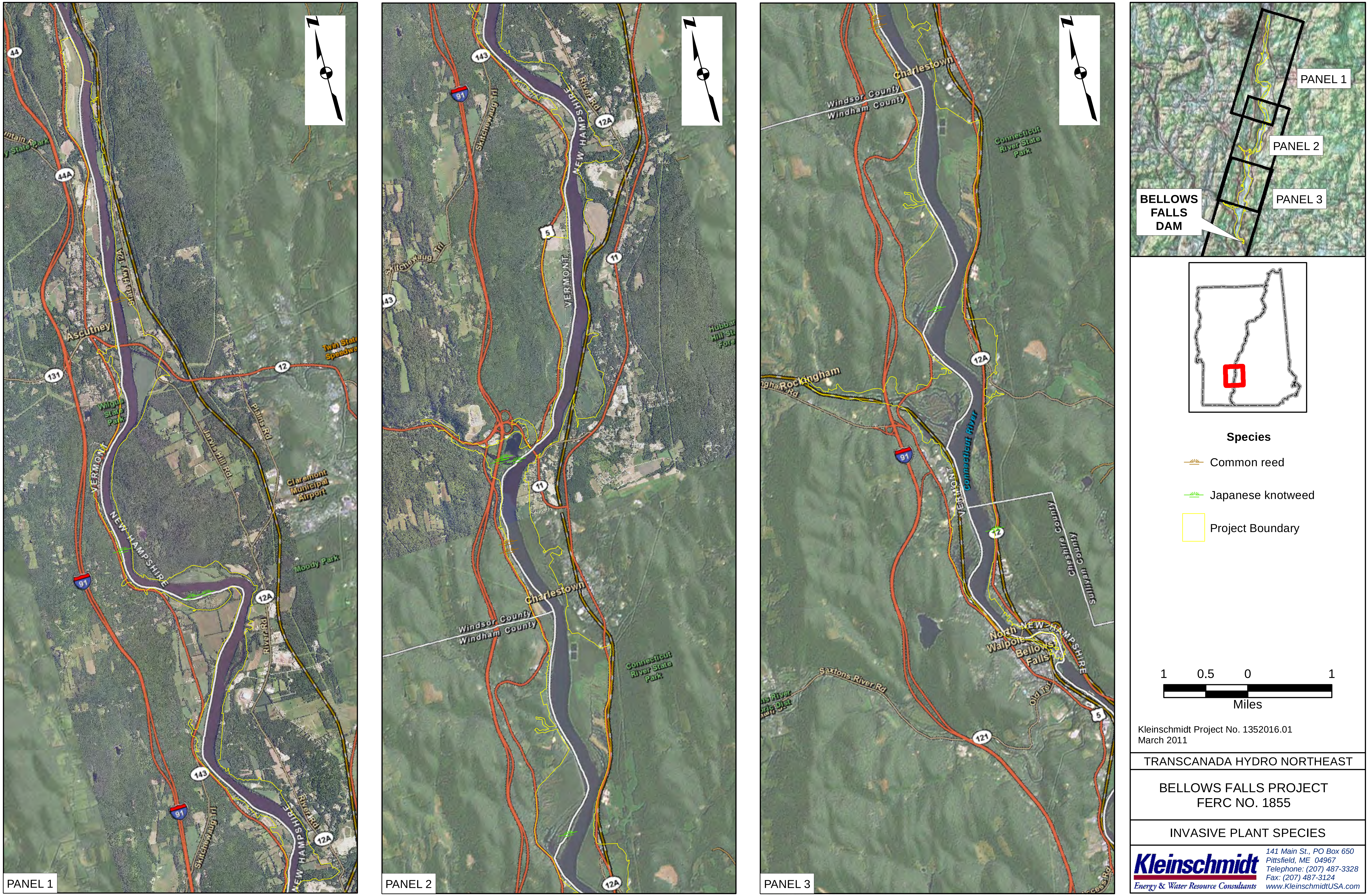

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TRANSCANADA HYDRO NORTHEAST

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INVASIVE PLANT SPECIES

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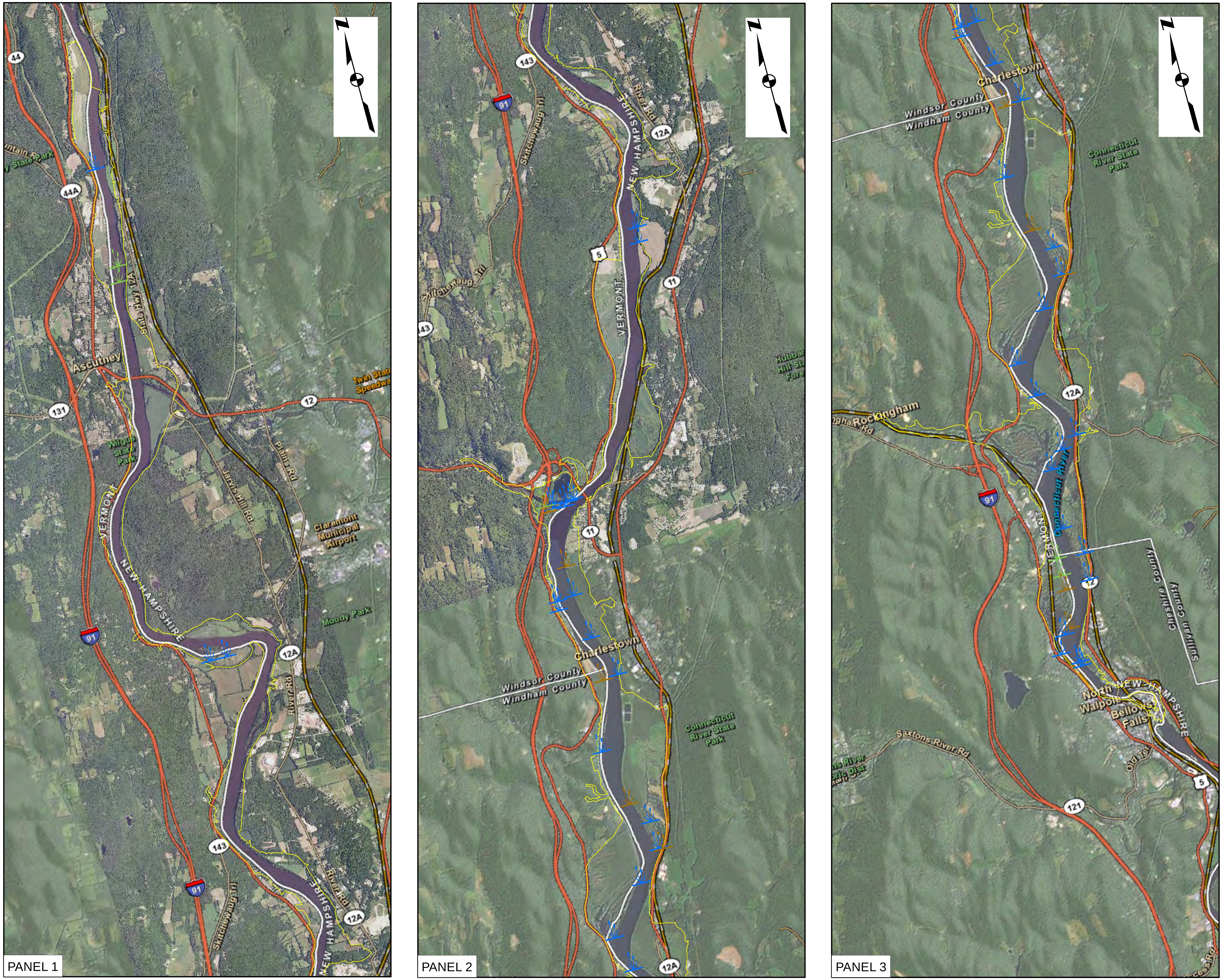

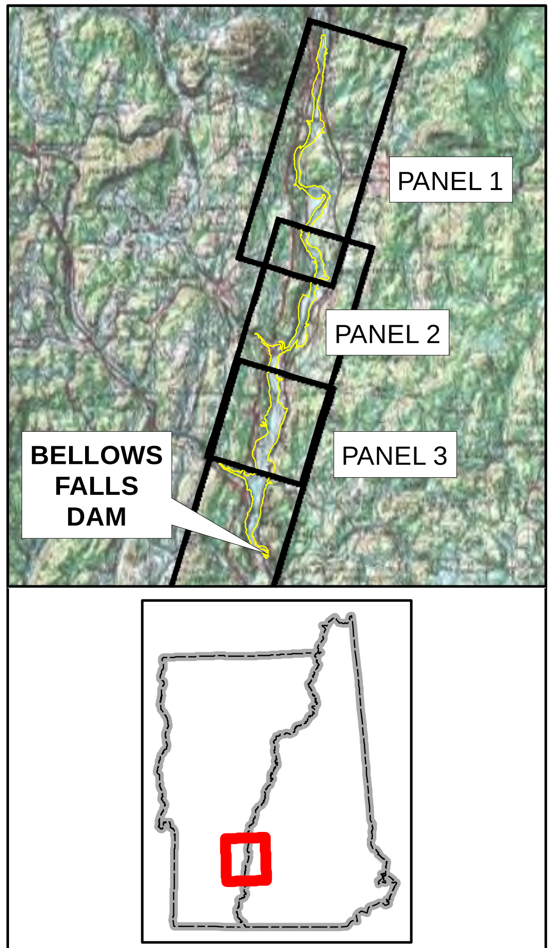

Wetlands Type

- Emergent
- Floodplain Forest
- Scrub-Shrub
- Project Boundary

1 0.5 0 1

Miles

Kleinschmidt Project No. 1352016.01
March 2011

TRANSCANADA HYDRO NORTHEAST

BELLOWS FALLS PROJECT
FERC NO. 1855

SHORELINE WETLANDS

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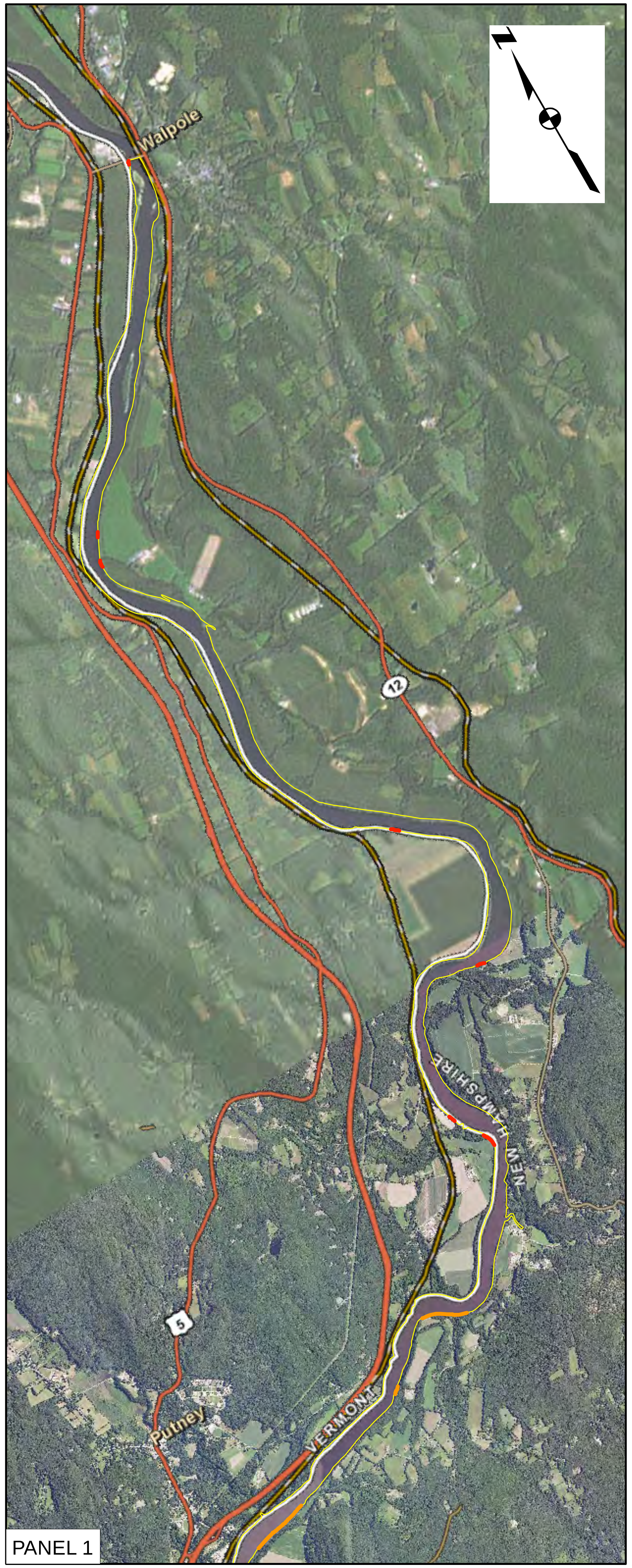

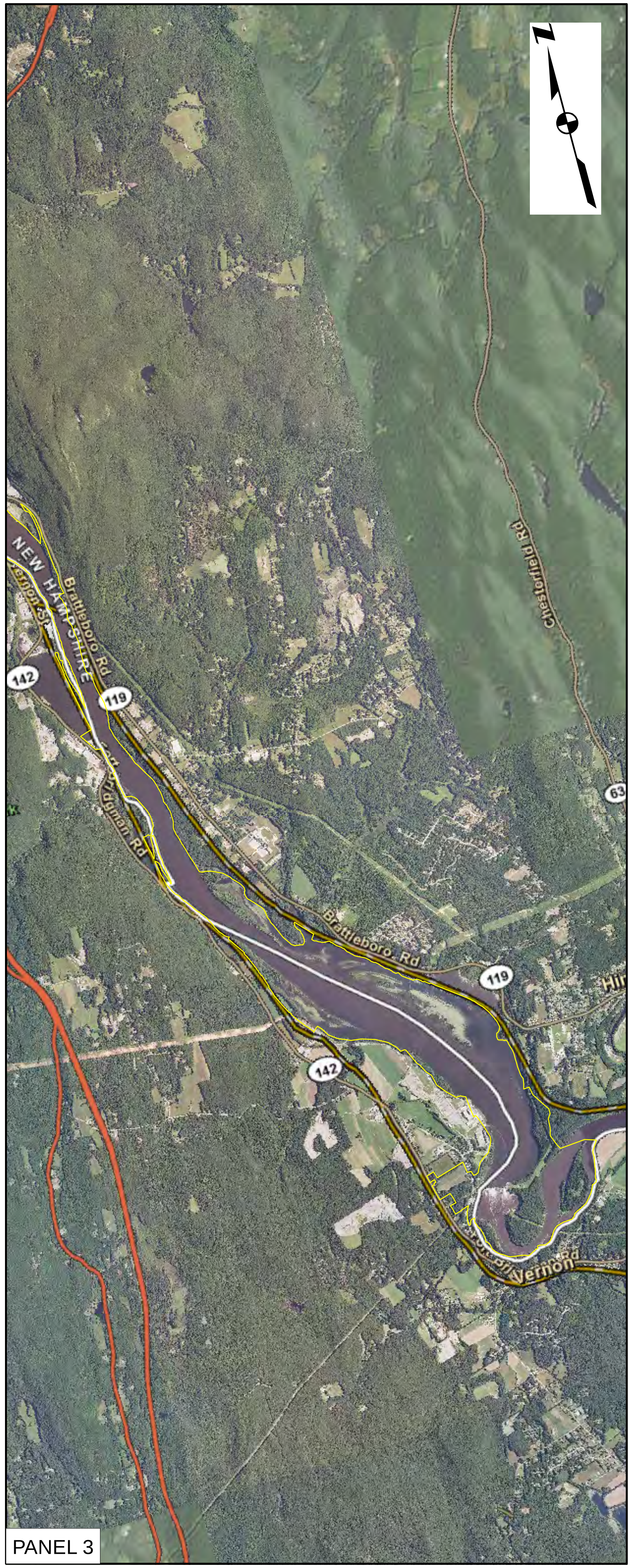

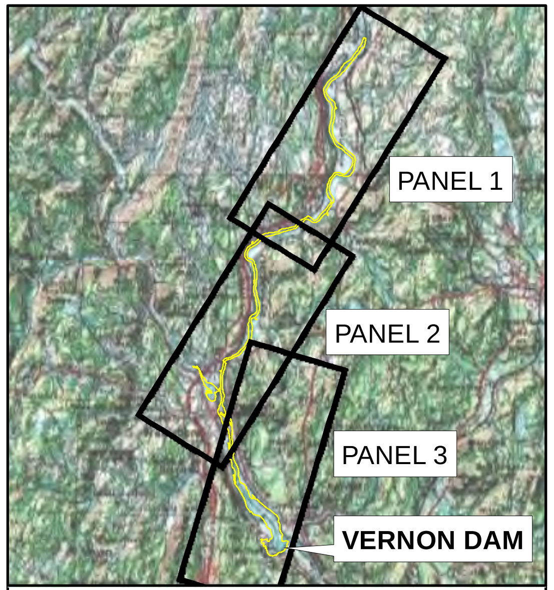

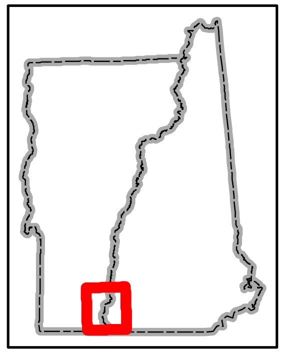

Shoreline Erosion

- Increasing, Active (Major)
- Increasing, Active (Minor)
- Other, Histroic-Stabilized
- Stablized, Active (Minor)
- Stablized, Histroic-Stabilized
- Project Boundary

1 0.5 0 1

Miles

Kleinschmidt Project No. 1352016.01
March 2011

TRANSCANADA HYDRO NORTHEAST

VERNON PROJECT
FERC NO. 1904

OCCURENCES OF SHORELINE EROSION

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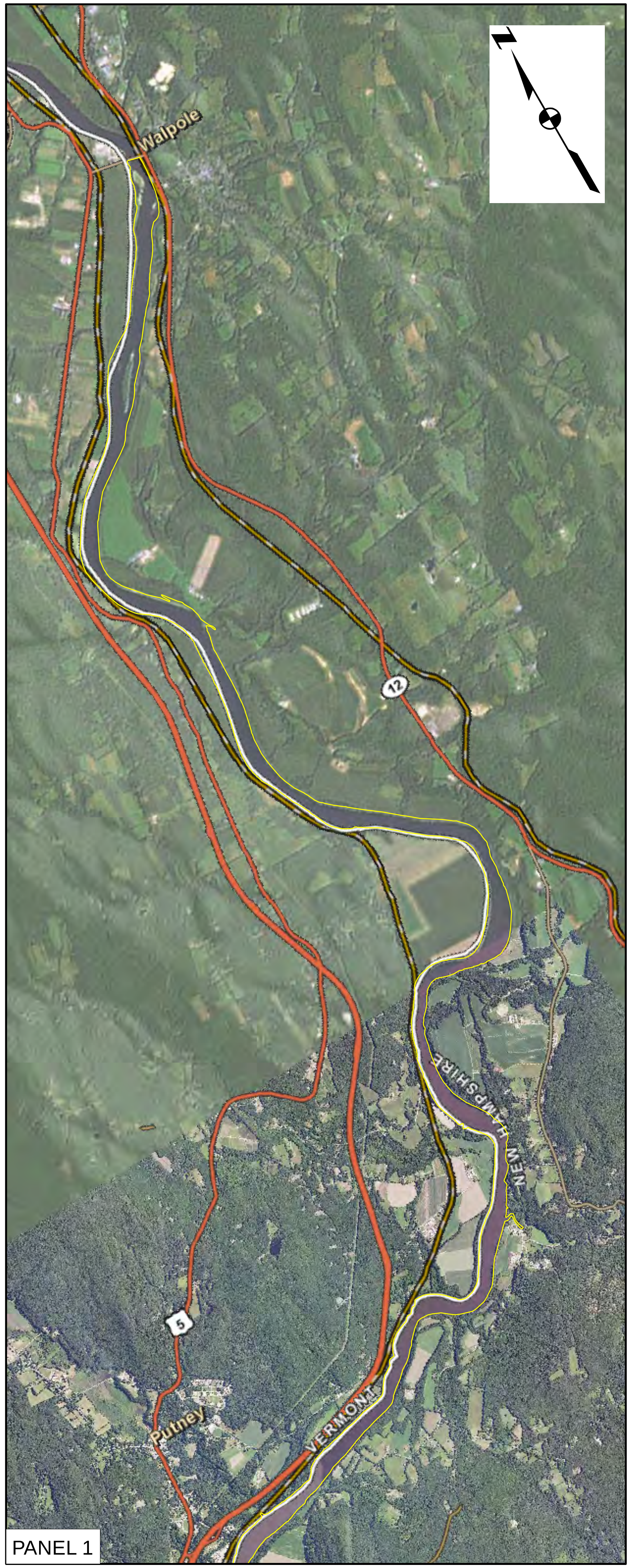

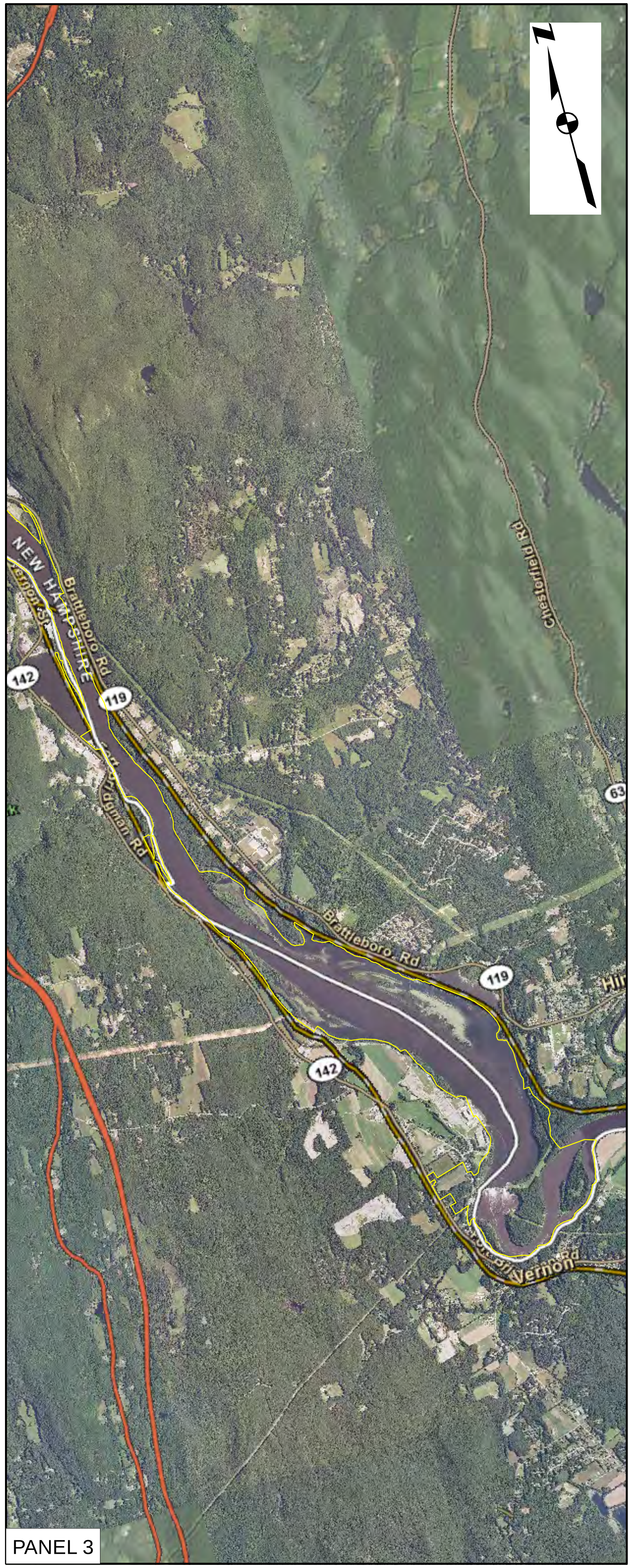

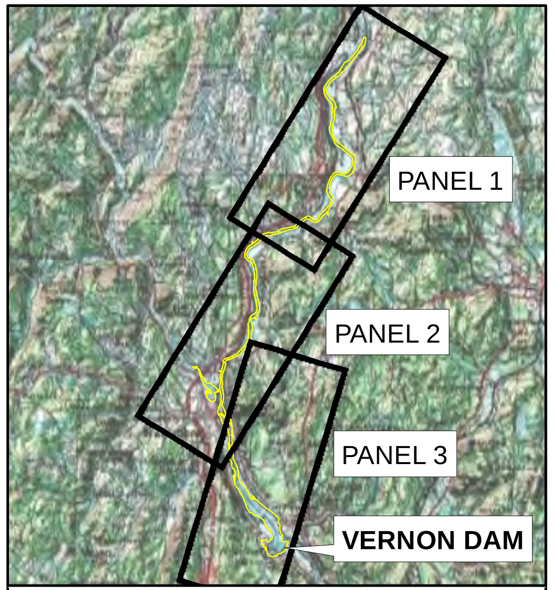

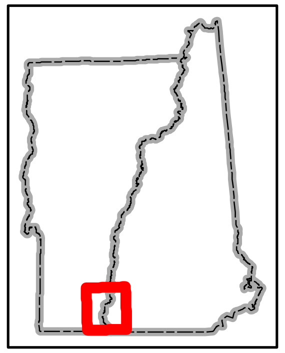

Potential Historic Sites

Project Boundary

1 0.5 0 1

Miles

Kleinschmidt Project No. 1352016.01
March 2011

TRANSCANADA HYDRO NORTHEAST

VERNON PROJECT
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POTENTIAL HISTORIC SITES

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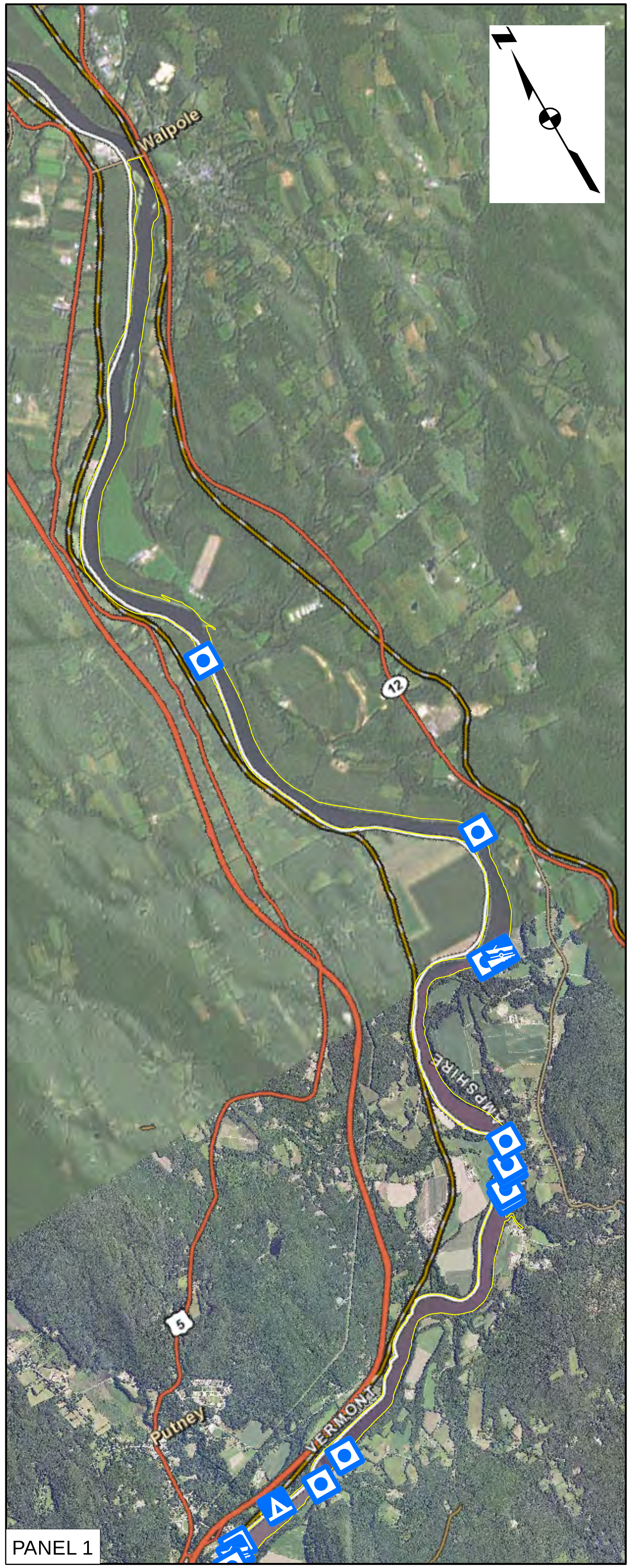

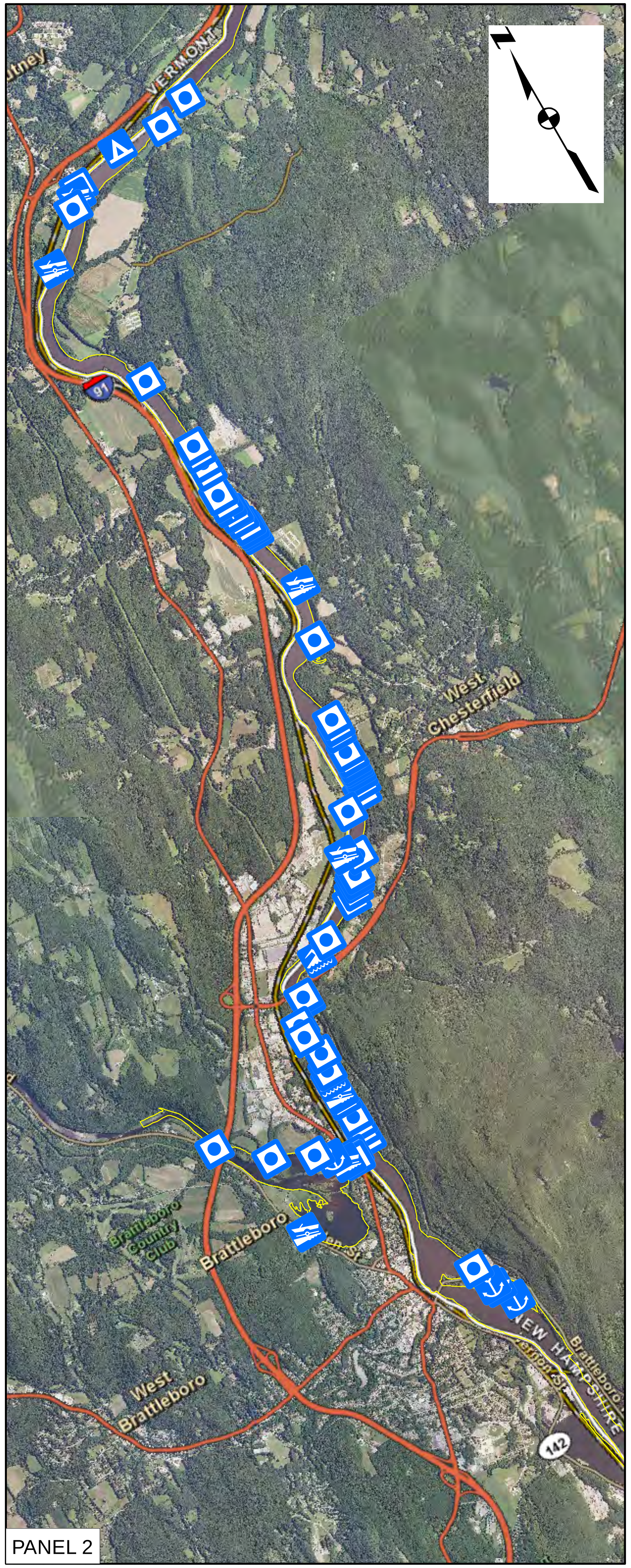

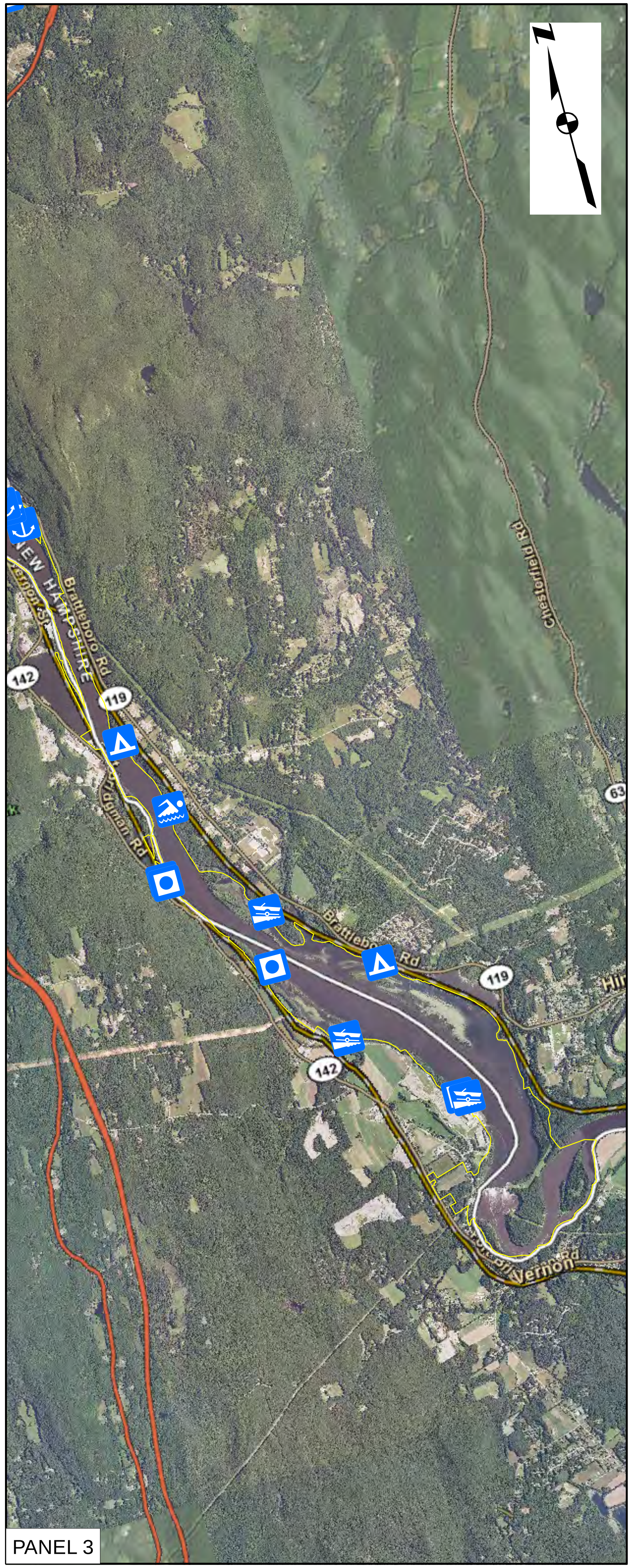

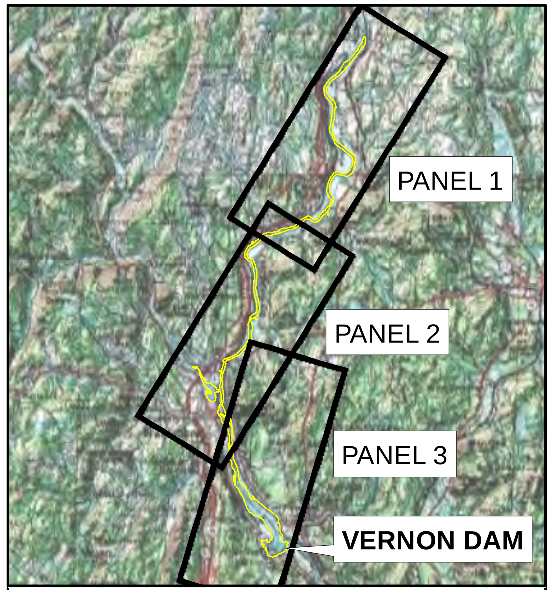

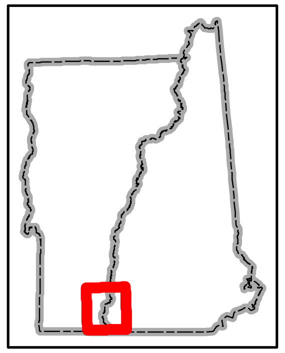

- Boat Launch
- Camp Site
- Dock
- Marina
- Other
- Park
- RV Park
- Swimming Area
- Project Boundary

1 0.5 0 1

Miles

Kleinschmidt Project No. 1352016.01
March 2011

TRANSCANADA HYDRO NORTHEAST

VERNON PROJECT
FERC NO. 1904

RECREATION FACILITIES

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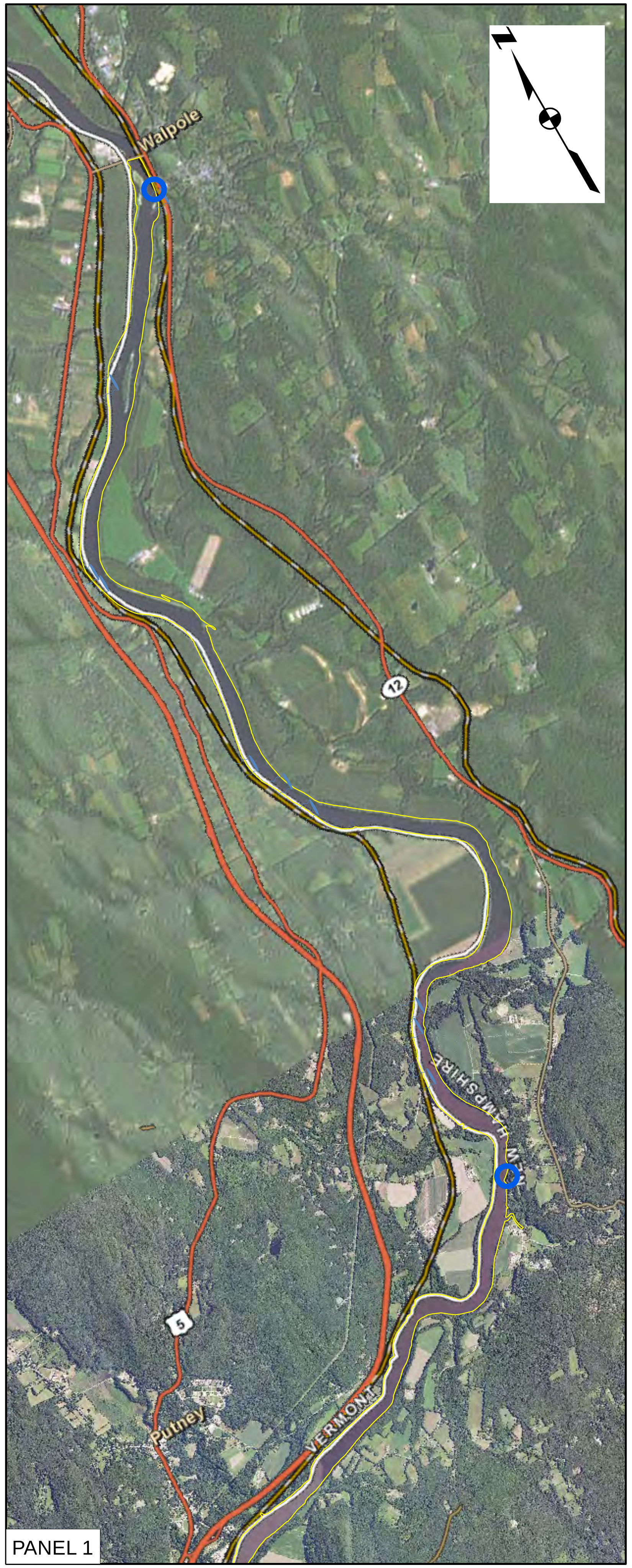

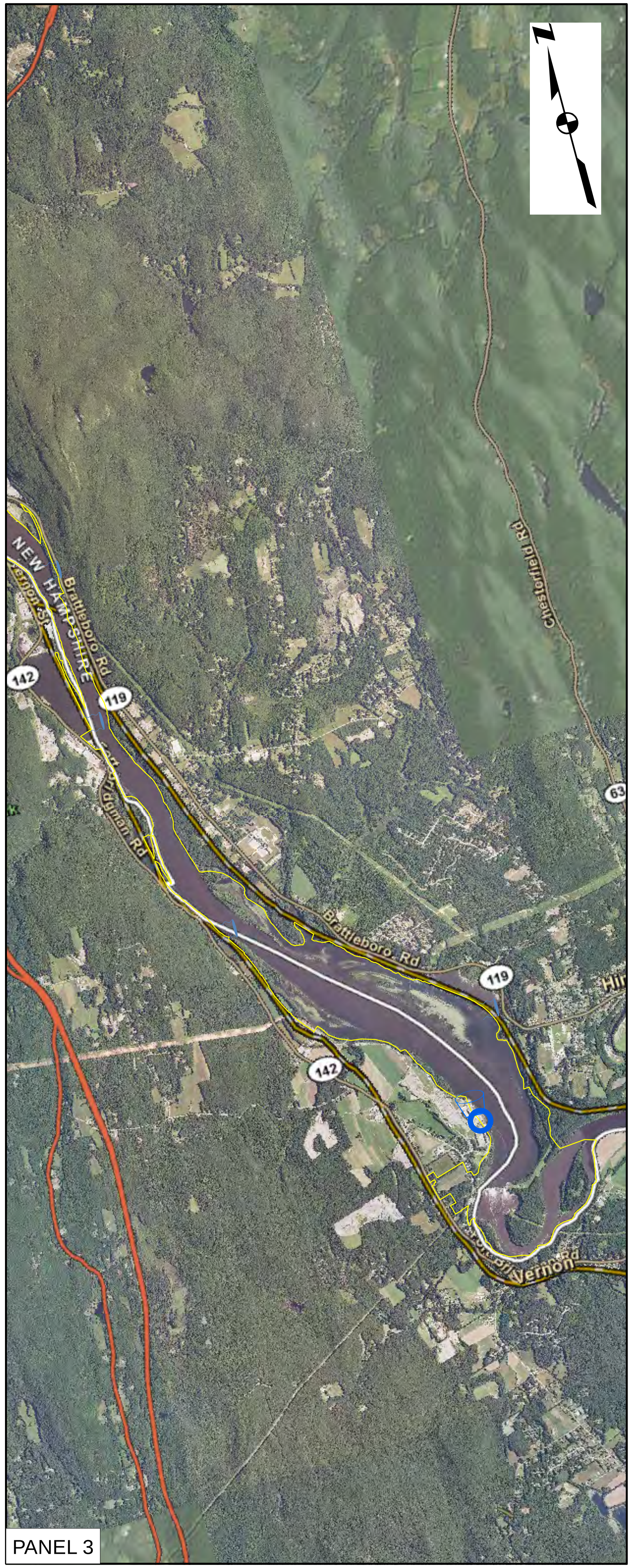

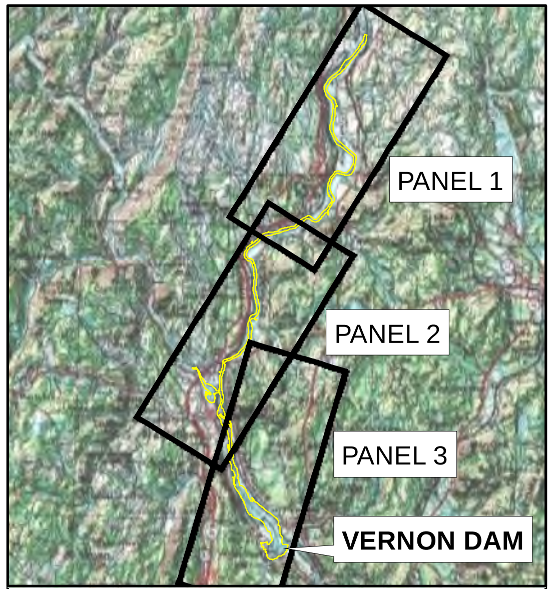

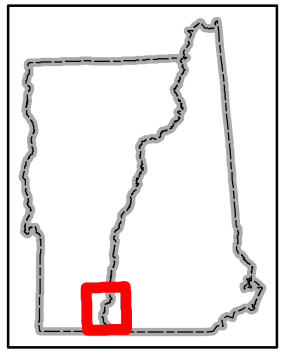

Conveyance Type

- Culvert
- Intake
- Pipe
- Swale
- Project Boundary

1 0.5 0 1

Miles

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March 2011

TRANSCANADA HYDRO NORTHEAST

VERNON PROJECT
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WATER CONVEYANCE INVENTORY

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