

# Vermont Rivers and Roads Training Program 2014 Progress Report



February, 2015



## Introduction

Following Tropical Storm Irene, Vermont recognized the need to create a training program for persons involved in in-stream work. In particular state and local roads maintenance personnel need exposure and experience with practices that minimizes impacts to river stability and aquatic habitats and maximizes infrastructure stability. One of the Vtrans Post Irene Task Force Recommendations was to, "Expand VTrans, municipal, RPC and private sector operational knowledge of river dynamics at various levels." The legislature passed Act 138 which called for ANR to, "Provide training on how to conduct stream alterations... activities necessary during...emergency conditions that pose an imminent risk to life or a risk of damage to public or private property... these trainings shall be made available to municipal, state and federal agency personnel." The Agency of Natural Resources also recognized the benefits that such training would accrue and a river engineering staff position was allocated to work in conjunction with Vtrans and the Vermont Fish and Wildlife Department to develop and deliver the Rivers and Roads Training Program.

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## Meeting On the Ground Needs

During flood emergency and recovery scenarios VTrans Maintenance and Equipment Workers and Municipal road crews are on the front lines. River Management Engineer staffing limitations mean that VTrans operational staff have often had to implement recovery measures without technical assistance. Maintenance and Equipment Workers can call upon design and engineering assistance from within VTrans but that assistance is limited in number and river expertise as well. Municipal Road crews on the other hand are obligated to seek technical assistance from an ANR River Management Engineers and most often have no other alternative source of assistance. The extent of demand for assistance from municipalities can quickly outstrip ANR River Management Engineer capacity.

The consideration of river processes that promote long term river equilibrium (stability) and sustain quality habitat is a relatively new occurrence in the engineering and design fields and there is not yet a widely held expertise amongst design professionals within the private sector. Furthermore, financial constraints restrict the extent to which municipal and state professionals are able to utilize private sector expertise. Thus, the private sector does not at this time represent a sufficient resource to support flood recovery.

In order to increase Vermont's capacity to recover from flood events in a manner that leaves affected infrastructure more resilient to future floods, the professionals who repeatedly find themselves on the front lines of flood recovery must be given a basic level of knowledge around river processes, aquatic habitats and instream construction so they know when to take action in lieu of technical assistance and when not to. To that end the Rivers and Roads training is designed to do the following:

1. Increase capacity of front line transportation workers to identify the degree of difficulty associated with rebuilding flood damaged infrastructure while accommodating stream equilibrium;
2. Increase the capacity of front line workers to rebuild flood damaged infrastructure while accommodating stream equilibrium in less difficult situations;
3. Increase the capacity of VTrans design staff and private sector engineers to provide assistance on those projects where accommodating stream equilibrium is more difficult.

As importantly, the training will increase general awareness and technical knowledge of river dynamics and habitat, so that better decisions can be made by professionals on the ground during their day to day jobs.

### **Target Audiences and Course Descriptions**

A myriad of skill sets are involved with design, construction and maintenance of transportation infrastructure and the range of professionals do not all require the same degree of training. The Rivers and Roads training has been developed as a tiered training in order to provide the appropriate degree of training to the various target audiences. Those audiences include:

- VTrans technical and operational staff,
- Municipal road crew personnel,
- Private sector engineers,
- Private sector equipment operators, and
- Regional Planning Commission and VTrans transportation planners.

#### *Tier One Description*

The Tier One training is an online self-guided training that provides a general awareness and understanding of that societal value of rivers, physical river processes, aquatic habitat, a historical perspective on river management, and how transportation infrastructure affects and is affected by physical river processes.

#### *Tier Two Description*

The Tier Two training is a classroom and field based training targeting the range of design, construction, maintenance and planning professionals. Tier 2 delves more deeply into the topics of physical river processes, aquatic habitat and the interactions between rivers and adjacent infrastructure. The subject matter is presented via on-screen presentations and reinforced with in-field observations and discussion, and hands on construction exercises in river simulation models. Throughout the course of the training participants come to understand that maximizing the accommodation of natural river processes leads to more robust riverside infrastructure. An emphasis is placed on accommodating stream equilibrium, avoiding practices that trigger further instability, and minimizing impacts to aquatic habitat during emergency flood response and recovery operations when technical support is not available. Specific topics include:

- Lateral and vertical river stability;
- Equilibrium channel width and boundary resistance
- Reconstructing transportation infrastructure without creating or exacerbating vertical river instability,
- Recognizing where technical assistance is required to accommodate channel equilibrium.

#### *Tier Three Description*

The Tier 3 training is under development, will be directed at an advanced engineering and construction oversight audience, and will focus on design and construction oversight of stream alteration practices. Subject matter will be taken primarily from the Vermont Standard River Management Principles and Practices document (2014). Because of its advanced and in-depth nature, the T3 training will be developed as a series of modules with each module addressing approximately two stream alteration practices. The tier 2 training will be a prerequisite to the T3 training.

### Class Sizes

The overall number of potential participants for each tier is large and the desired timeframe for getting those participants trained is short. An effective training program requires multi-day courses with small instructor to participant ratios. The below tables and graphs present a participant estimate and participant-instructor ratios for Tiers 2 and 3 trainings.

Table 1. Participant community and class sizes.

	Estimated Number of Participants			Class Sizes		
	VTrans	Other*	Total	Instructors Per Class	Participants Per Class	Participant Instructor Ratio
<b>Tier 1</b>	200	316	<b>516</b>	N/A	N/A	N/A
<b>Tier 2</b>	200	301	<b>501</b>	3	25	8.3
<b>Tier 3</b>	40	50	<b>90</b>	2	15	7.5

\*Includes participants from municipalities, regional planning commissions and the private sector.

### Progress to Date

#### Tier 1 Trainings

Because the Tier 1 training is self-guided and offered via the internet with unrestricted access, visits are not tracked and it is not possible to state how many individuals have taken the training. However, the Tier 1 training is a prerequisite to the Tier 2 training and based on informal surveys of Tier 2 participants it is estimated that 90-95% of all Tier 2 participants have taken the Tier 1 training.

#### Tier 2 Trainings

In October of 2012 a pilot Rivers and Roads Tier 2 Training was held for the purposes of testing the program as it had been developed at that point in time. Twenty Five Vtrans staff participated in the pilot training program.

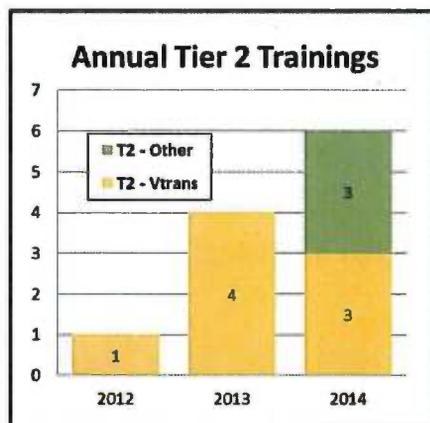


Figure 1. Tier 2 Trainings, 2012 - 2014

In 2013 four Tier 2 trainings were offered to VTrans staff at the Vtrans Training Center in Berlin, VT and field sites in Berlin and Waterbury. Approximately 25 Vtrans staff participated in each of these trainings resulting in a total of 100 Vtrans staff trained.

In 2014 three Tier 2 trainings were offered to Vtrans staff at the Vtrans Training Center and three Tier 2 trainings were offered to municipal road crew members, local officials and regional planners. Approximately 25 participants attended each training resulting in a total of 75 Vtrans staff and 75 municipal road crew members, local officials and regional planners being trained.

#### Tier 3 Trainings

The Tier 3 training is on schedule to be developed during 2015. Tier 3 trainings will be directed at an advanced engineering level audience and focus on design and construction oversight of river management practices. Subject matter will be taken primarily from the Vermont River Management Standard Principles and Practices document (2014). The tier 2 training will be a prerequisite to the T3 training.

## Going Forward

### Tier 1

Tier 1 trainings will continue to be a prerequisite to the Tier 2 training and delivered via the internet.

### Tier 2

Going forward there will be no distinction between the Tier 2 training for Vtrans staff and the Tier 2 training for municipal staff. In 2015 five trainings will be offered for Vtrans and municipal road crew staff, one special Tier 2 training for planners will be offered to Regional Planning Commission and VTrans planning staff and one Tier 2 training will be offered to the consulting engineer community. It is expected that 50 Vtrans staff, 75 municipal road crew staff, 30 planning professionals and 25 consulting engineers will attend Tier 2 trainings in 2015.

Looking further down the road, it is expected that the need for training of Vtrans staff will decrease as the total number of staff trained approaches the number of staff needing training. However, staff turnover and the potential interest in refresher trainings will mean that an estimated 10 Vtrans staff will require training each year going forward. With 255 municipalities across the State, it is estimated that a total of 350 – 500 municipal road crew personnel could participate in the T2 trainings over time. Staff turnover at the municipal level is also a reality that must be kept in mind. To accommodate this need three Vtrans-Municipal trainings are planned for years 2016 through 2018. At the end of the 2018 field-training season, the remaining training need will be assessed and inform further T2 offerings.

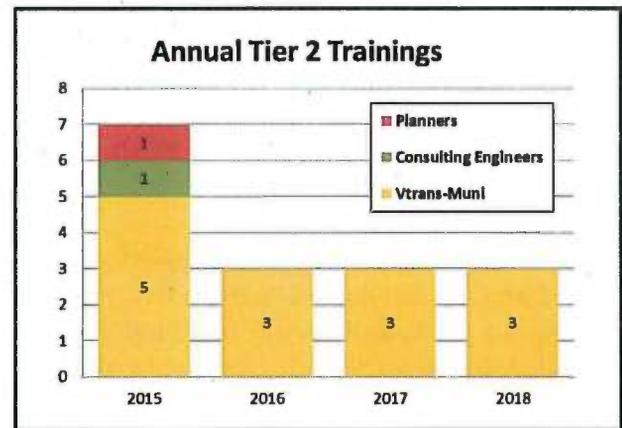


Figure 2. Planned Tier 2 Trainings 2015 - 2018

### Tier 3

The Tier 3 training program is being developed by a private sector consultant as part of a grant funded project overseen by the Lake Champlain Committee and in consultation with Rivers and Roads Training Program staff. Development is set to begin in March of 2015 and be completed by December of 2015. Based on this timeline it is expected that Tier 3 training offerings will begin in 2016.

It is estimated that 40 Vtrans staff and 50 non-Vtrans transportation infrastructure professionals will be interested in Tier 3 trainings. Because of their advanced and in-depth nature, the Tier 3 training will be developed as a series of modules with each module addressing approximately two stream alteration practices. Each Tier 3 training participant will have the option of participating in one or more Tier 3 training module. It is anticipated that approximately three to four modules will comprise the Tier 3 training. Based on experience with the Tier 2 trainings it is expected that the appropriate number of individuals per training will be approximately 15. Assuming that all 90 potentially interested individuals decide to take the entire Tier 3 series, a total of 18 Tier 3 training events will need to be offered.



Figure 3. Planned Tier 3 Trainings 2016 - 2018

The current plan is to offer three Tier 3 trainings each year beginning in 2016 and running through at least 2021.

In 2021 the demand for continued Tier 3 trainings will be assessed and conclusions of that assessment will inform further Tier 3 offering plans.

### Measuring Success

The best indicator of success will be the change in efficiency and effectiveness of the interactions between training participants and River Management Engineers and how river-adjacent road work gets done during post-flood recovery. However, sufficient data on this indicator would be difficult to gather and would not be available for several to many years. As a substitute, Tier 2 evaluation forms are completed by each participant at the end of every training session. These evaluations provide information on how participants feel about the training and the extent to which the training has increased the competency of participants.

Evaluations results compiled for years 2013 and 2014 are provided in figure 4. Tier 2 training participants feel that the training is a good use of their time and that the content is applicable to their job. As shown in figure 4 all participants agree that the training is a good use of their time and that the content will be applicable to their jobs with 46 percent agreeing and 54 percent agreeing strongly with each statement.

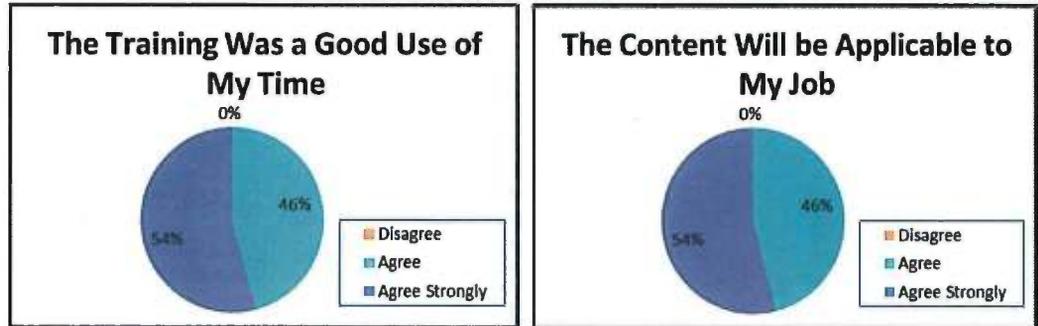


Figure 4. Participant feelings about the Tier 2 training.

The Tier 2 training program is significantly increasing Vermont's transportation infrastructure professional's ability to consider and accommodate river stability and aquatic habitat in the design and construction of flood recovery projects. Figure 5 shows that 84 percent of participants reported a moderate to very large increase in their ability to incorporate river equilibrium and habitat elements into their flood recovery work as a result of taking the T2 training. The remaining 16 percent of participants reported no to only a slight change in their ability to incorporate river equilibrium and habitat elements into their flood recovery work.

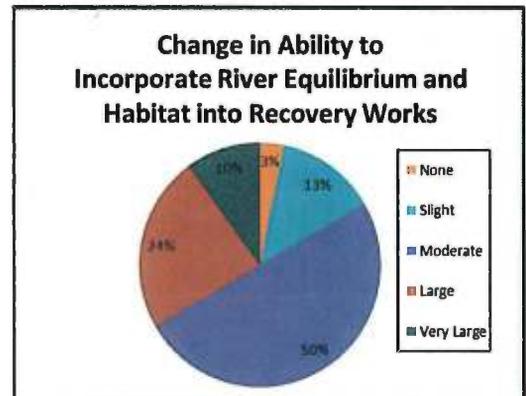


Figure 5. Change in participants abilities as a result of the Tier 2 training.