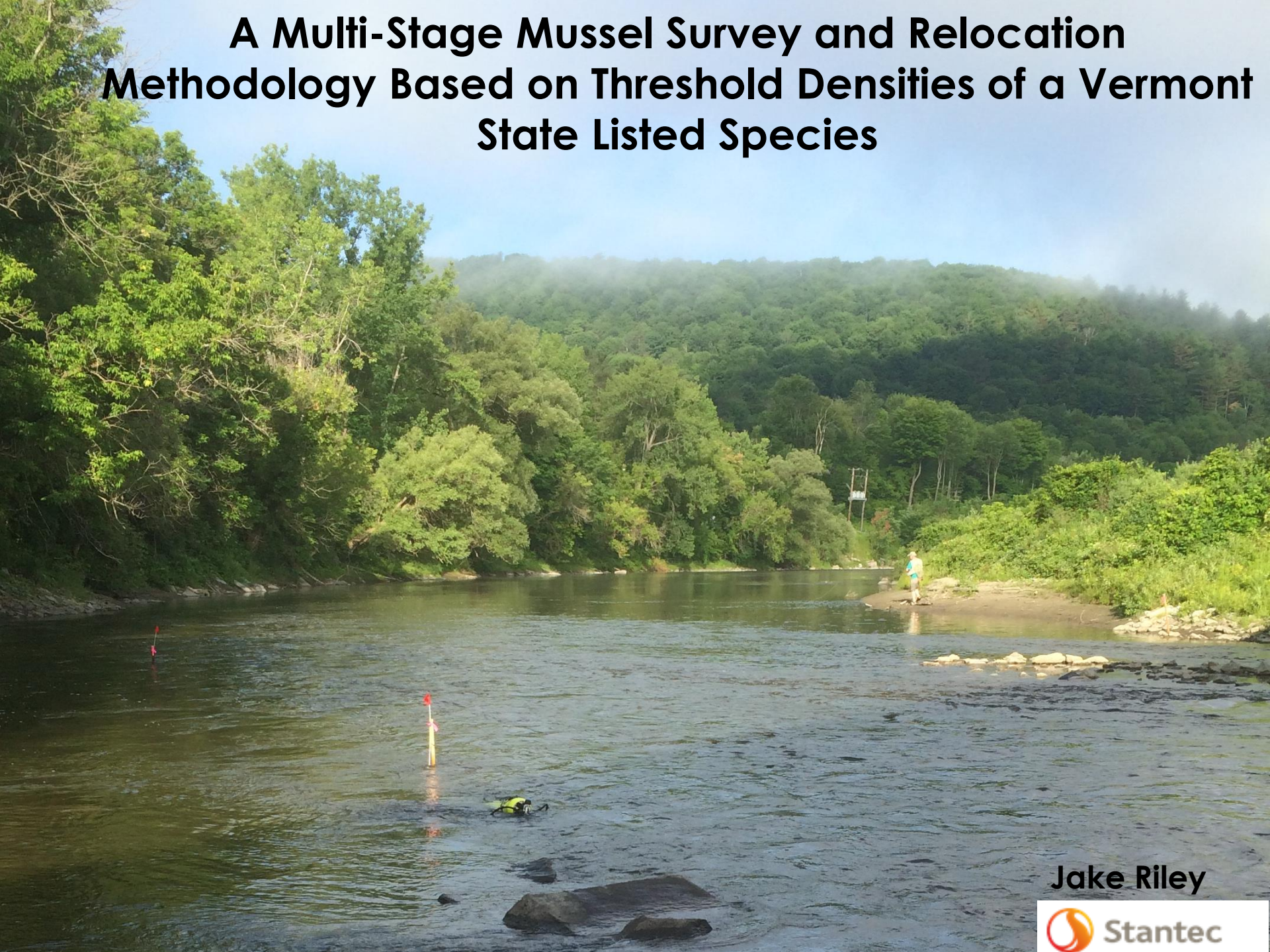


A Multi-Stage Mussel Survey and Relocation Methodology Based on Threshold Densities of a Vermont State Listed Species



Jake Riley

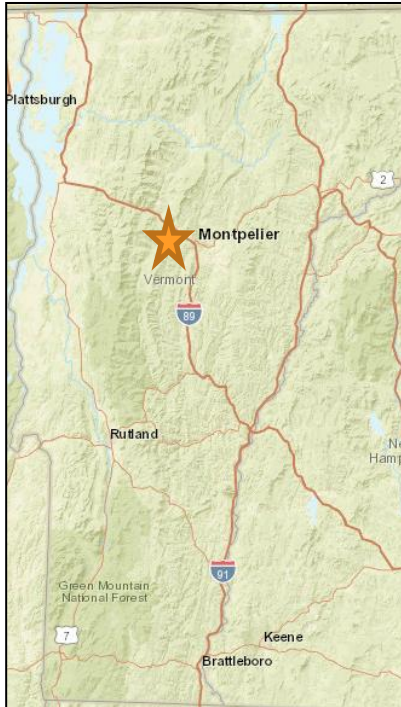


Protected Resources

- Eastern Pearlshell Mussel (EPM) (*Margaritifera margaritifera*)
- Listed as Threatened in Vermont - ANR T&E Permit
- Found in Winooski River – one of only 3 in VT
- Previous 2010 survey found over 100 EPM in Winooski River downstream of project



Project Location and Purpose



- Active railroad bridge #305
- 2 pier footings undermined/scouring from Irene
- Pier buttressing = 1,700 sq. ft. permanent impacts and 11,000 sq. ft. of temporary impacts for causeway and turbidity curtains

Project Plans and Layout

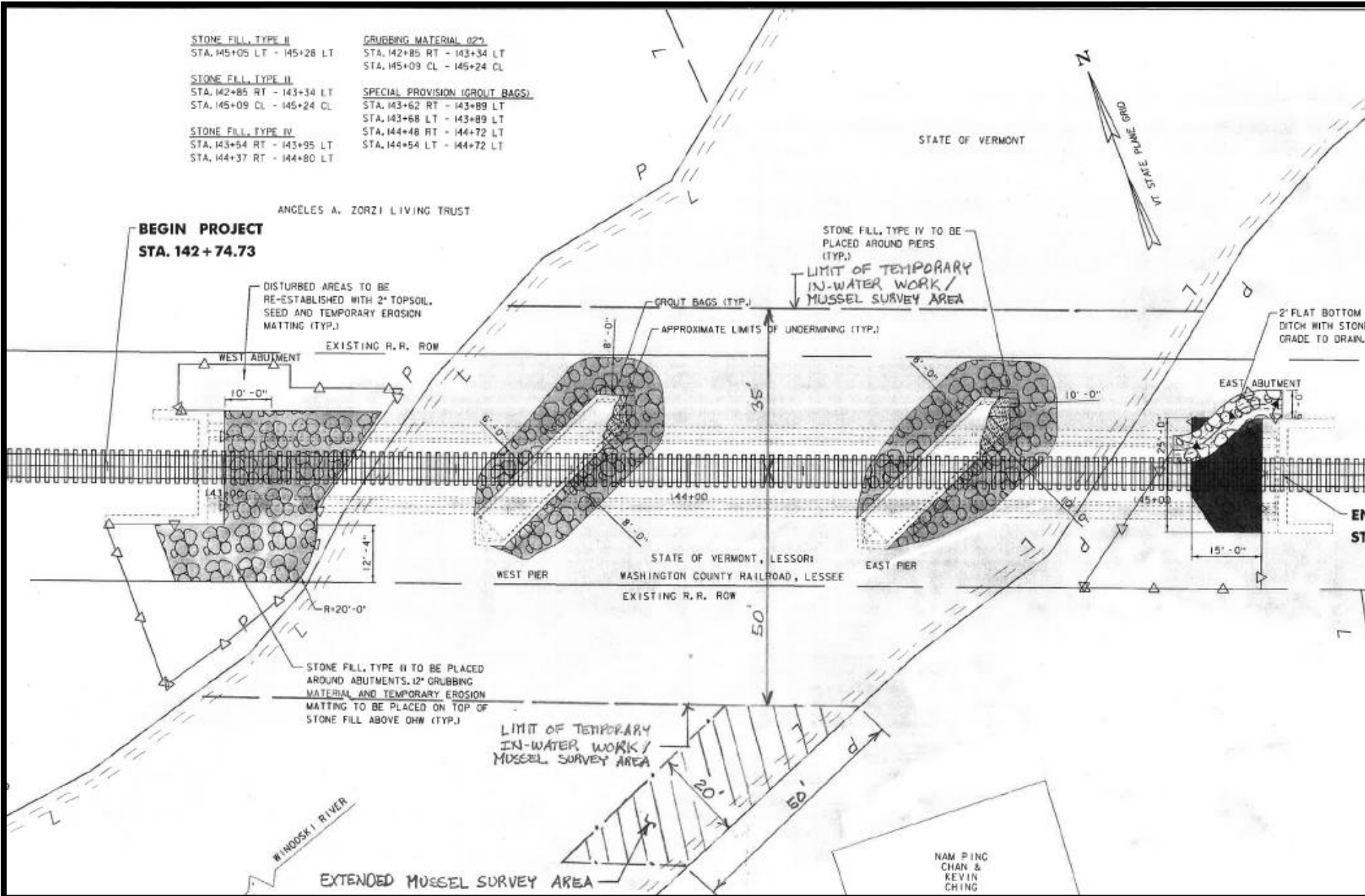
STONE FILL, TYPE II
STA. 145+05 LT - 145+28 LT

STONE FILL, TYPE II
STA. 142+85 RT - 143+34 LT
STA. 145+09 CL - 145+24 CL

STONE FILL, TYPE IV
STA. 143+54 RT - 143+95 LT
STA. 144+37 RT - 144+80 LT

GRUBBING MATERIAL 02%
STA. 142+85 RT - 143+34 LT
STA. 145+09 CL - 145+24 CL

SPECIAL PROVISION (GROUT BAGS)
STA. 143+62 RT - 143+89 LT
STA. 143+68 LT - 143+89 LT
STA. 144+48 RT - 144+72 LT
STA. 144+54 LT - 144+72 LT



Project Objectives

1. Protect EPMs from direct construction impacts, indirect impacts (i.e. turbidity) but avoid unnecessary handling/marking
2. Provide flexibility to the contractor - a. landowner access issues, b. to adapt to field conditions to minimize river-bottom disturbance
3. Minimize costs/time

How do you permit a survey methodology to accomplish all of these?

Multi-Stage/Threshold Mussel Survey

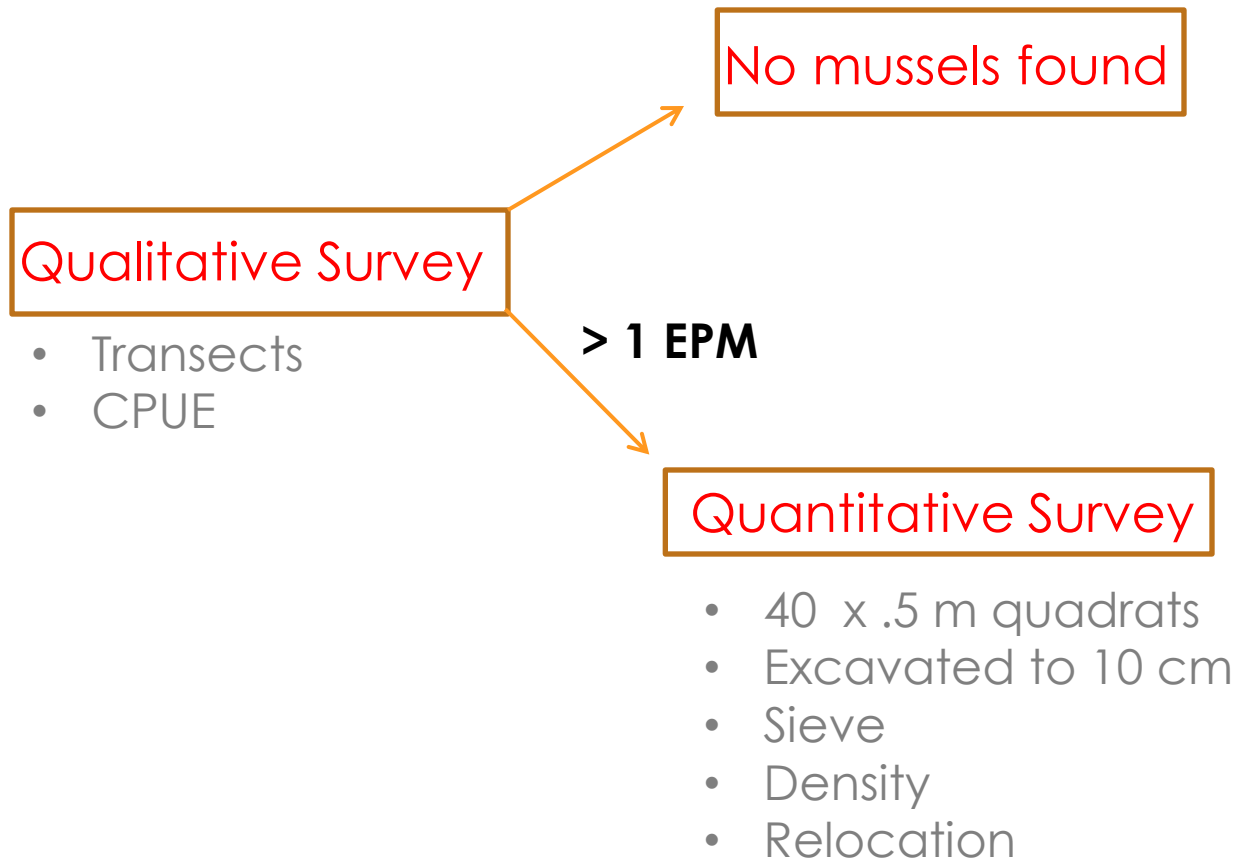
After collaboration/consultation with VTFW and project engineers in 2015...

Qualitative Survey

- Transects
- CPUE

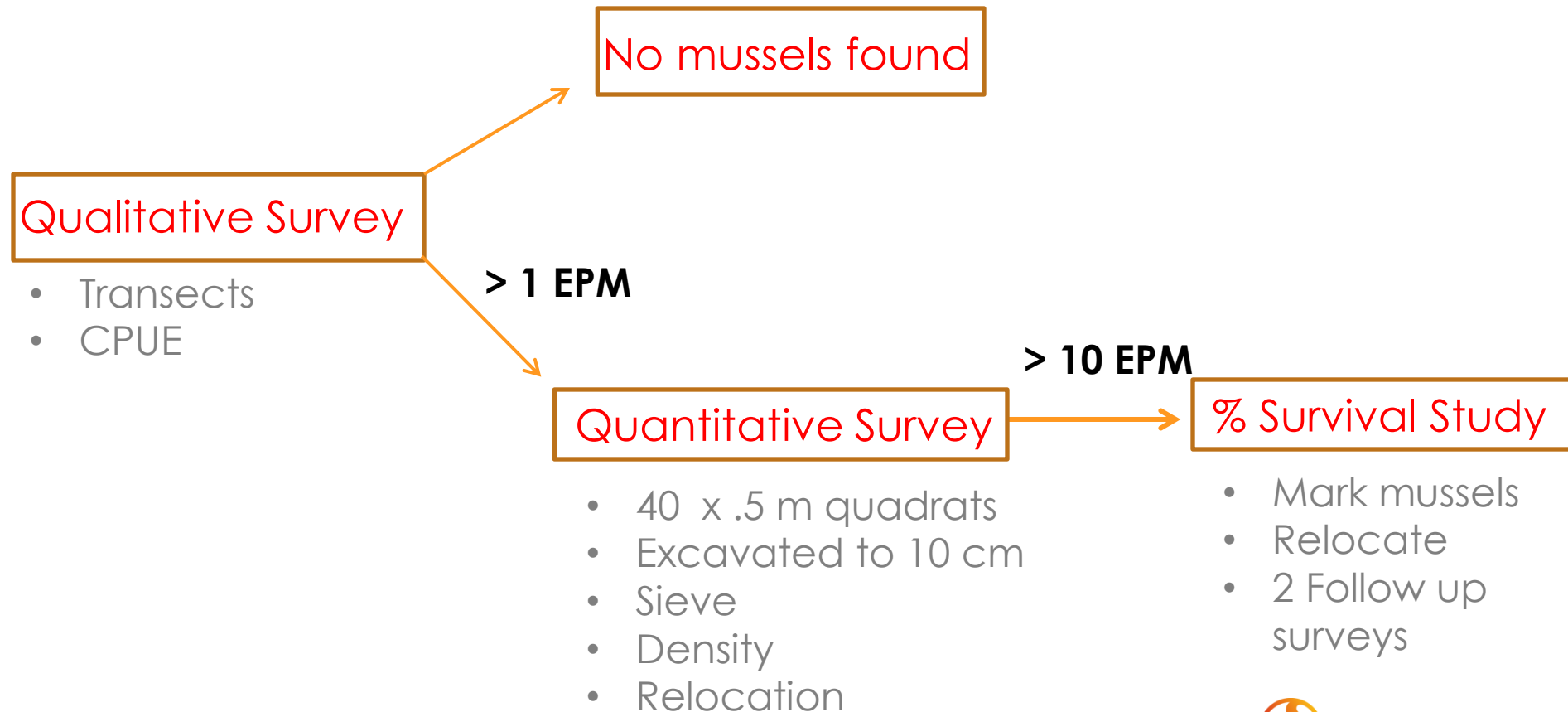
Multi-Stage/Threshold Mussel Survey

After collaboration/consultation with VTFW and project engineers in 2015...



Multi-Stage/Threshold Mussel Survey

After collaboration/consultation with VTFW and project engineers in 2015...



Project Plans and Layout

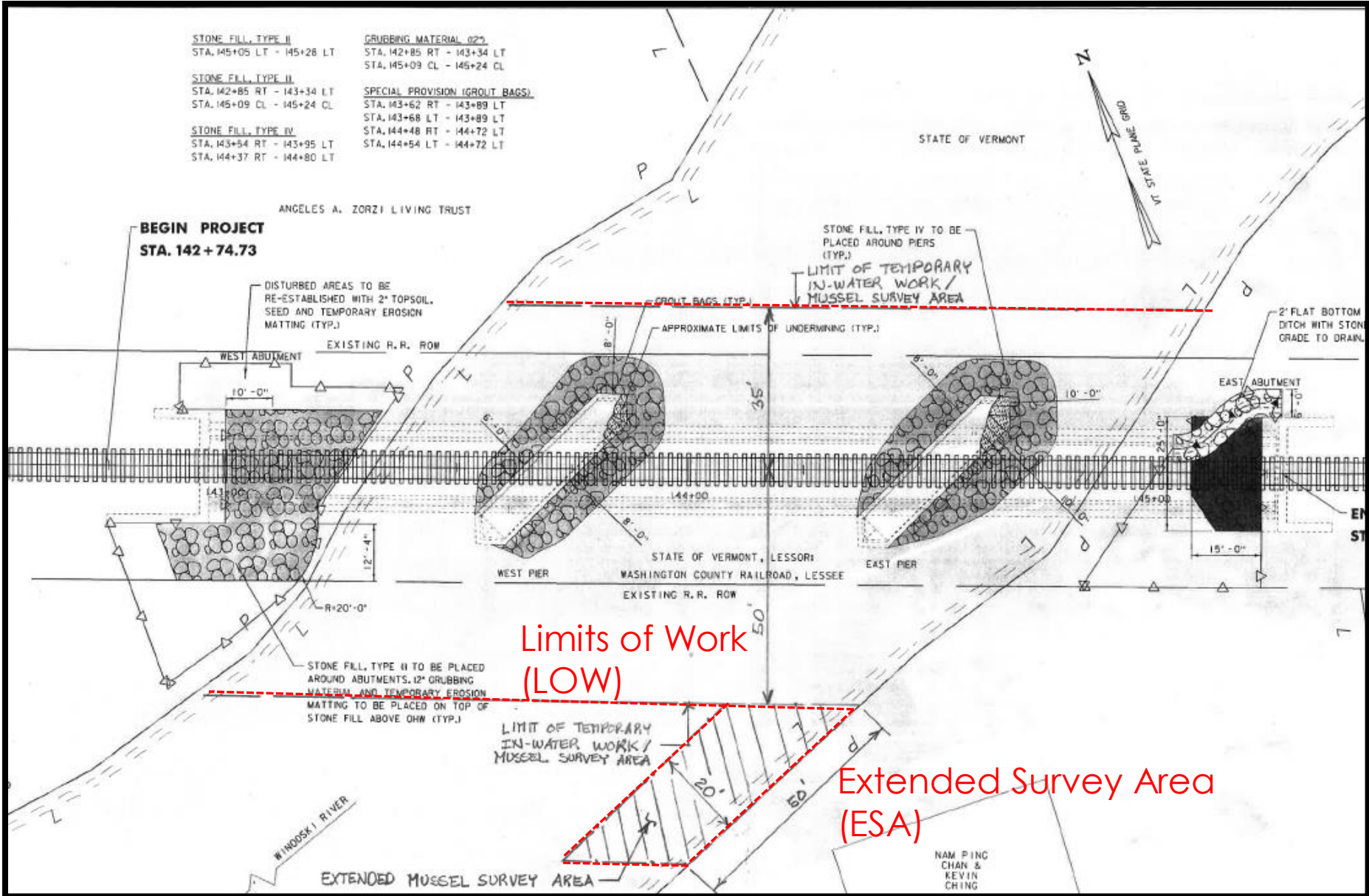
STONE FILL, TYPE II
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Limits of Work (LOW)

Extended Survey Area (ESA)

EXTENDED MUSSEL SURVEY AREA

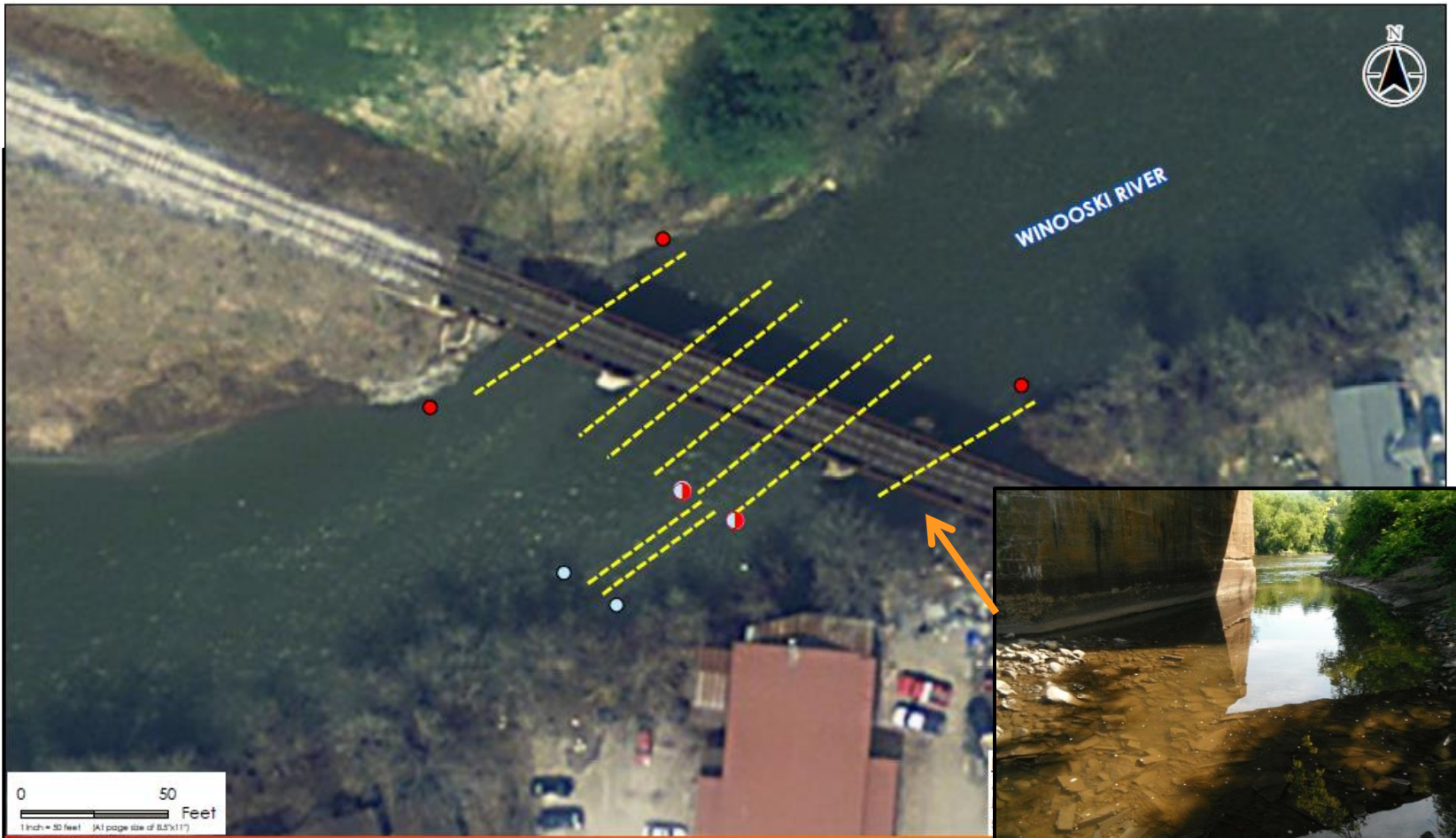
NAM PING CHAN & KEVIN CHING

Methods



- Measured, GPSed and staked out LOW and ESA
- Set up transects 1m-5M apart

Methods



Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases any way from the content or provision of the data.



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Prepared by DLJ on 2016-07-11
Quality Review by GAC on 2016-07-11
Independent Review by JWR on 2016-07-11

195311150_02_SurveyArea_Transects.mxd



Legend

- Limit of Work
- Extended Survey Area
- Extended Survey Area/Limit of Work
- Survey Transect

Client/Project

Vermont Agency of Transportation
VTrans Montpelier BR 305 Mussel
Montpelier, Vermont

Figure No.

2

Title

Survey Area & Transects

7/11/2016

Methods



- Qualitative Survey in LOW and ESA
- 246 total min searched by 2 divers on July 1st and 2nd, 2016

Results



- 1 half of an EPM

Takeaways

- Each project is unique - requiring adaptive survey methods to meet all of the objectives
- Engage and work with the regulatory agencies, DOTs, contractors and design engineers early in the permitting process

