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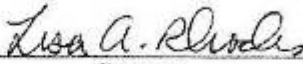
Quality Assurance Project Plan for Demonstration Project: Prioritizing Stream Crossing Improvements Using CAPS and WIRE – Revised June 2013

Prepared by

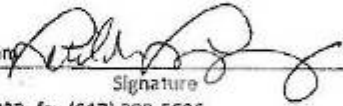
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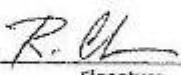
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SUB-SUB WATERSHEDS AND EXTENDED SUB-WATERSHEDS

As described in the main body of the QAPP, this project has two primary goals:

- 1) To conduct the CAPS scenario analyses for three sub-watersheds to determine if we need to assess all CAPS crossings in a sub-watershed to gain the benefit of field assessments or whether a more strategic approach (e.g. assess only high-priority sites) would provide satisfactory results. To determine this we plan to run the CAPS scenario analyses using three approaches:
 - a. CAPS mapped stream crossings, all modeled, none field assessed
 - b. CAPS mapped stream crossings, high-priority crossings field assessed, all others modeled
 - c. CAPS mapped stream crossings, all crossings field assessed, none modeled;
- 2) Conduct assessments on a minimum of 600 stream crossings (200 each in targeted sub-watersheds of the Chicopee, Buzzards Bay and Ipswich Watersheds) and maximize assessments of high quality waters and best case CAPS crossings.

During the summer of 2012 when survey teams were in the field, they encountered crossings for which there was no safe access to the site without additional equipment or personnel. Active railroad crossings and interstate highway crossings are typically considered to have unsafe access. The table below shows the accomplishment to date.

SUB-Watershed	# Crossings Already Assessed	# Crossings Not Assessed (i.e. total of next 3 columns)	# Interstate or Divided Highway Crossings Not Assessed	# Railroad Crossings Not Assessed	# Other Crossings Not Assessed (e.g. inaccessible, unsafe, no trespassing, not found)
IPSWICH	167	33	13	9	11
BUZZARDS BAY	103	97	66	21	10
CHICOPEE	145	55	18	36	1
TOTALS	415	185	97	66	22

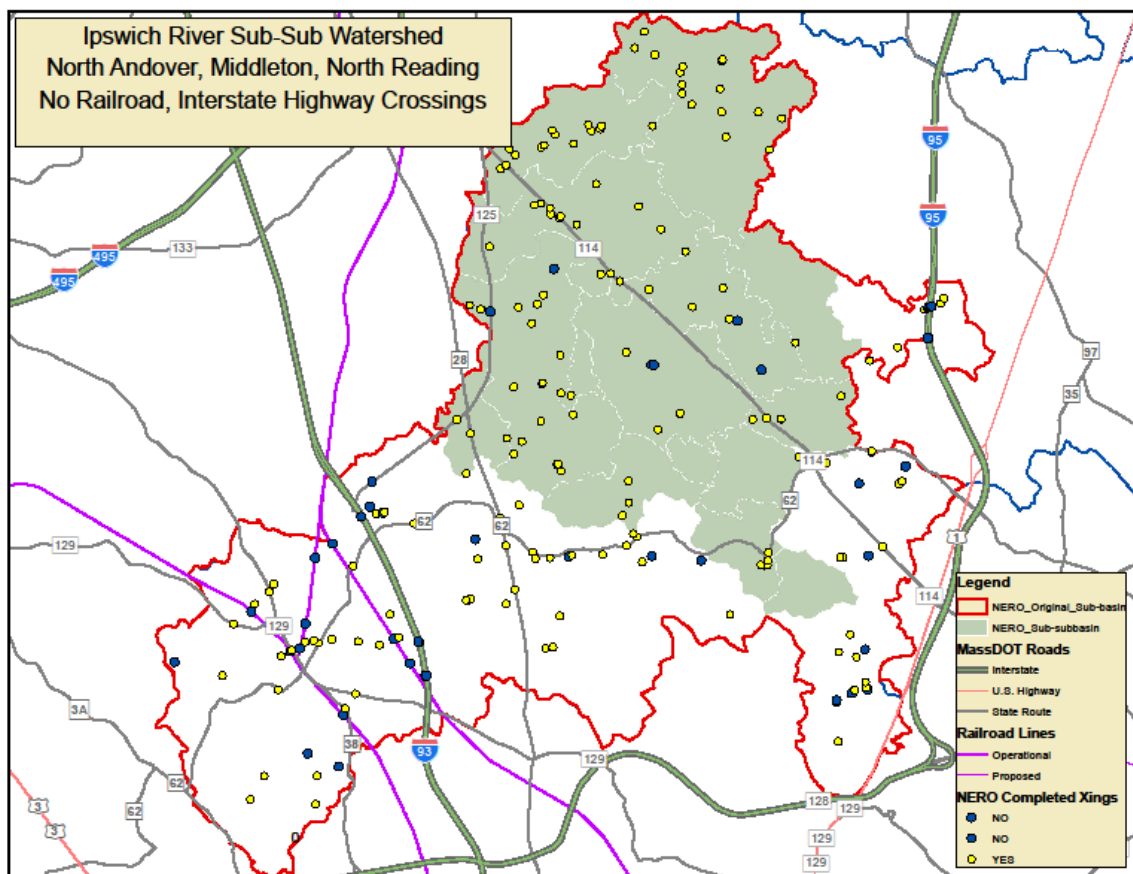
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As a result of this difficulty in accessing sites, we decided to define a reduced portion of each sub-watershed where we would try to complete all assessments to meet Goal 1 above (hereafter referred to as the “sub-sub watershed”), and then complete the remaining assessments to meet Goal 2 at crossings that are easier to access. Due to the difficulty in avoiding highways and railroads even under this strategy, we will attempt to complete all crossings in a minimum of two out of three sub-sub watersheds, and will likely eliminate the Chicopee sub-sub watershed from this effort (but will still meet the Goal 2 in that sub-watershed). This effort will reduce the number of highway and railroad crossings that need to be assessed overall. We have defined the minimum number of crossings needed in each sub-sub watershed where we will complete all assessments to be 75 crossings. Below, we have identified the areas described.

Sub-Sub Watersheds and Extended Sub-Watersheds

A. Ipswich

Ipswich Sub-Sub-watershed: To meet Goal 1 for CAPS model testing, the Sub-Sub-Watershed contains >75 crossings and minimizes Interstate, US Highways, and Railroad crossings to insure that all assessments can be completed (See Figure 1).



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Figure 1 – Ipswich Sub-Sub Watershed

Ipswich Sub-Sub-Watershed for All CAPS Assessments

# Crossings in sub-sub watershed	# Crossings Already Assessed in sub-sub watershed	# Crossings Remaining to be Assessed (i.e. Total of Next 3 Columns)	# Interstate or Divided Highway Crossings to be Assessed	# Railroad Crossings to be Assessed	# Other Crossings to be Assessed
100	94	6	0	0	6

Ipswich Extended Sub-Watershed to Complete Goal 2: The original sub-watershed was extended to include a minimum of 27 additional CAPS crossings (See Figure 2). The extended sub-watershed was selected to maximize crossing assessments of high quality waters and best case CAPS crossings. This allows us to conduct assessments on a total 200 crossings in the Ipswich River Watershed. Note that if there is any difficulty accessing any of the crossings in the identified extended area, we will add additional CAPS crossings for assessment that may or may not be in the Ipswich Extended Sub-Watershed in order to meet Goal 2.

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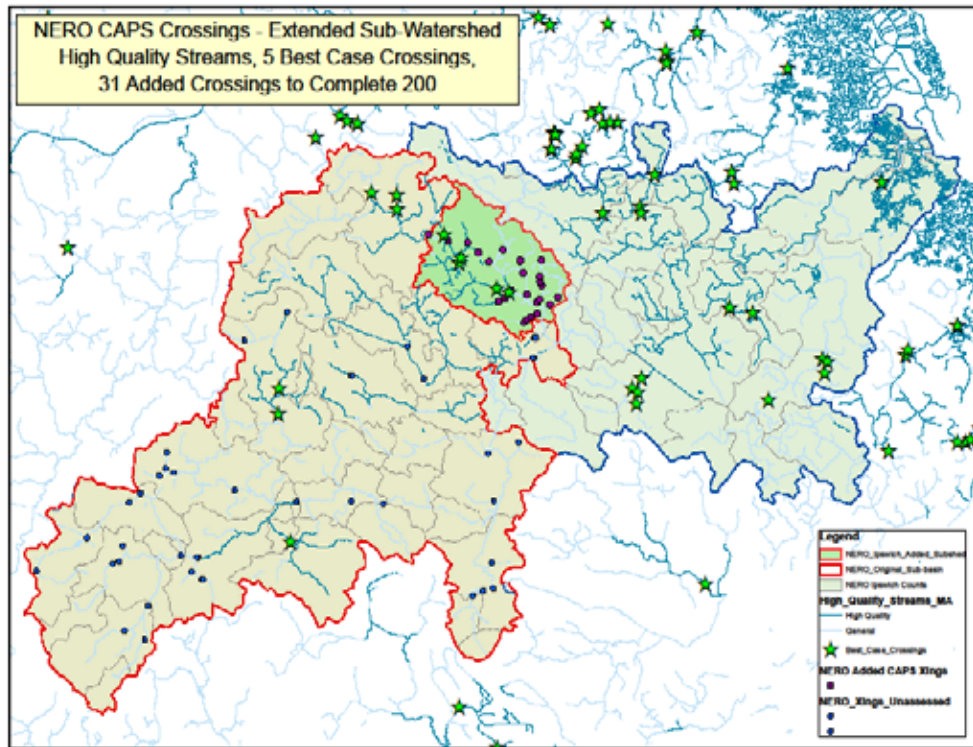


Figure 2: Ipswich Extended Sub-Watershed

Remaining Ipswich Crossings in Watershed to Meet Goal of 200:

# Crossings to be Assessed Total	# Crossings Already Assessed	# Crossings Remaining to be Assessed (i.e. Total of Next 2 columns)	# Crossings in Sub-Sub- Watershed Remaining to be Assessed	# Crossings in Extended Sub- Watershed (or elsewhere) Remaining to be Assessed
200	167	33	6	27

B. Chicopee

Chicopee Sub-Sub-Watershed: To meet Goal 1 for CAPS model testing, the best sub-sub-watershed contains >75 crossings and although it minimizes Interstate, US Highways, and Railroad crossings it was impossible to avoid the Mass. Turnpike and railroads altogether (See Figure 3). As a result, we will likely eliminate this sub-sub watershed from the Goal 1 analysis.

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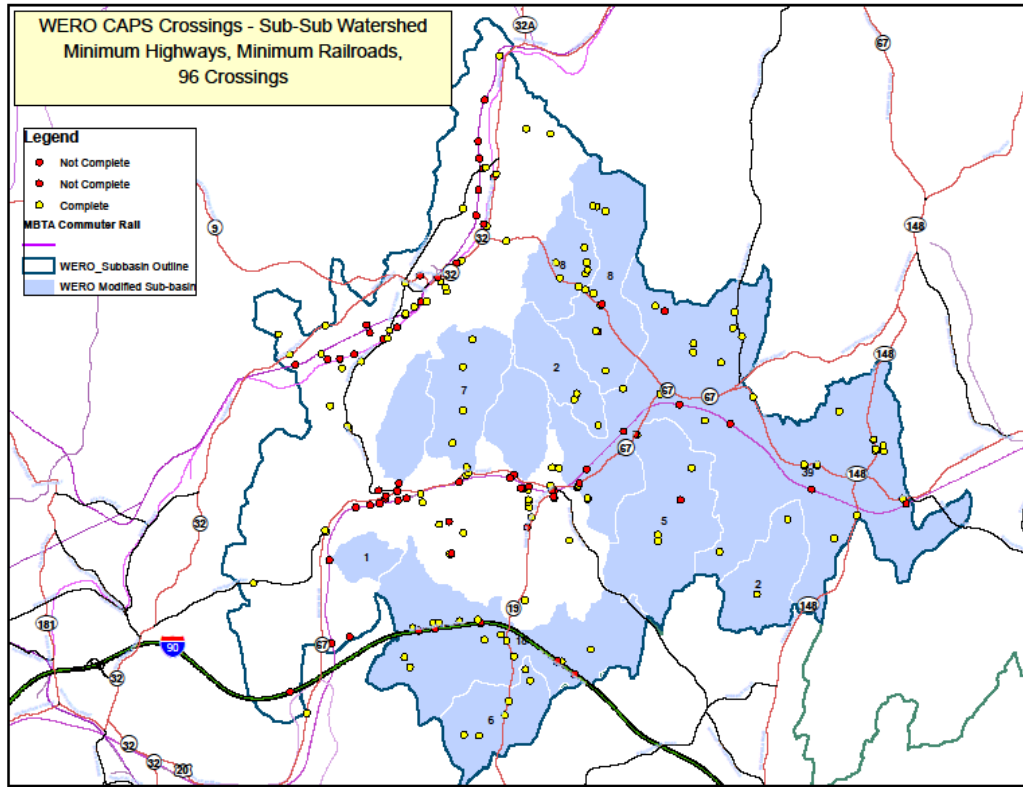


Figure 3: Chicopee Sub-Sub-Watershed

Chicopee Sub-Sub-Watershed for All CAPS Assessments

# Crossings in sub-sub watershed	# Crossings Already Assessed in sub-sub watershed	# Crossings Still to be Assessed (i.e. Total of Next 3 Columns)	# Interstate or Divided Highway Crossings to be Assessed	# Railroad Crossings to be Assessed	# Other Crossings to be Assessed (including 1 "No-Crossing")
96	74	22	10	6	6

Chicopee Extended Sub-Watershed to Complete Goal 2: The original sub-watershed was extended to include a minimum of 33 additional CAPS crossings (See Figure 4). The sub-watershed was selected to maximize crossing assessments of high quality waters and best case CAPS crossings. This allows us to conduct assessments on a total 200 crossings in the Chicopee River Watershed. Note that if there is any difficulty accessing any of the crossings in the identified extended area, we will add additional CAPS crossings for assessment that may or may not be in the Chicopee Extended Sub-Watershed in order to meet Goal 2. Additionally, if we

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eliminate the sub-sub watershed (See Figure 3) we will add an additional 22 crossing assessments that are easier to access to meet Goal 2.

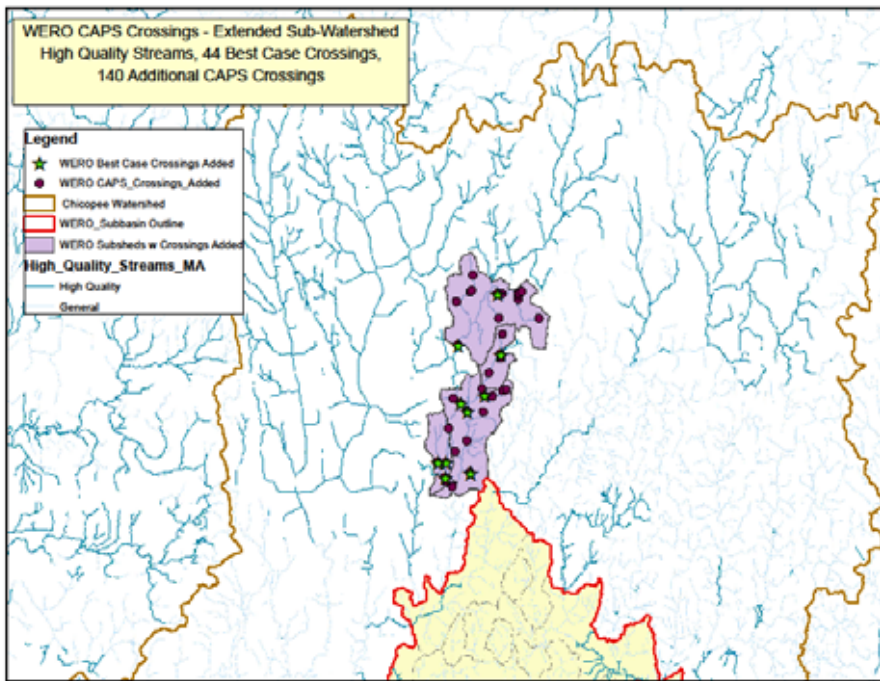


Figure 4: Chicopee Extended Sub-Watershed

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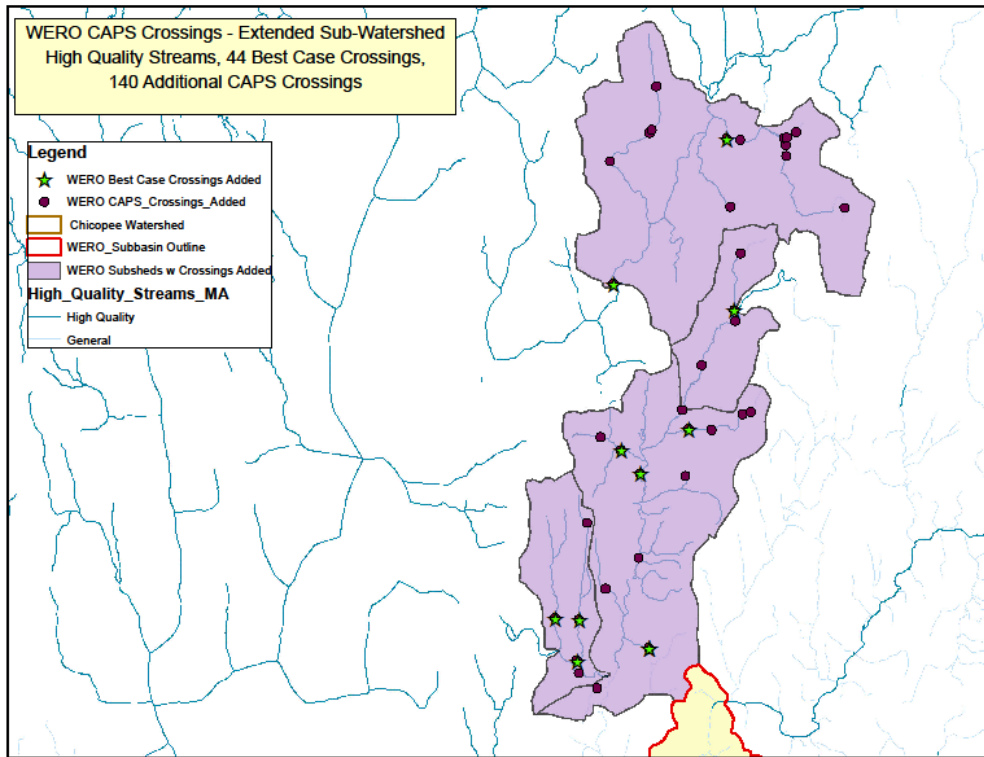


Figure 5: Chicopee Extended Sub-Watershed

Remaining Chicopee Crossings in Watershed to Meet Goal of 200:

# Crossings to be Assessed Total	# Crossings Already Assessed	# Crossings Remaining to be Assessed (i.e. total of next 2 columns)	# Crossings in Sub-Sub Watershed Remaining to be Assessed ¹	# Crossings in Extended Sub- Watershed (or elsewhere) Remaining to be Assessed
200	145	55	22	33

¹ Note if the sub-sub watershed assessments are eliminated due to access difficulties, we will add 22 assessments elsewhere to meet Goal 2.

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C. Buzzards Bay

Buzzards Bay Sub-Sub-watershed: To meet Goal 1 for CAPS model testing, the Sub-Sub-Watershed contains >75 crossings and minimizes Interstate, US Highways, and Railroad to insure that all assessments can be completed (See Figure 5).

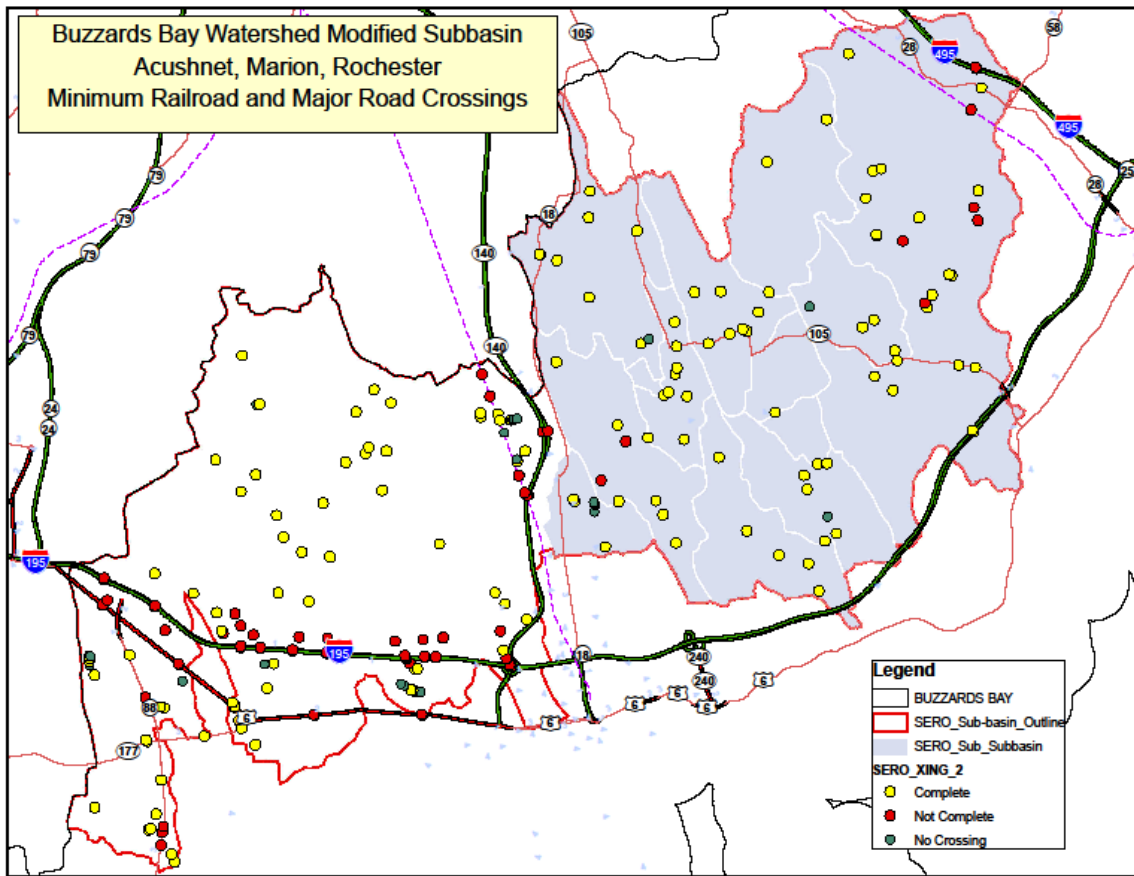


Figure 5: Buzzards Bay Sub-Sub Watershed

Buzzards Bay Sub-Sub-Watershed for All CAPS Assessments

# Crossings in sub-sub watershed	# Crossings Already Assessed in sub-sub watershed	# Crossings Not Found	# Crossings Remaining to be Assessed (i.e. total of next 3 columns)	# Interstate or Divided Highway Crossings Remaining to be Assessed	# Railroad Crossings Remaining to be Assessed	# Other Crossings to Remaining to be Assessed
92	64	11	17	5	2	10

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Buzzards Bay Extended Sub-Watershed to Meet Goal 2: The original sub-watershed was extended to include a minimum of 80 additional CAPS crossings (See Figure 6). The sub-watershed was selected to maximize crossing assessments of high quality waters and best case CAPS crossings. This allows us to conduct assessments on a total 200 crossings in the Buzzards Bay Watershed. Note that if there is any difficulty accessing any of the crossings in the identified extended area, we will add additional CAPS crossings for assessment that may or may not be in the Buzzards Bay Extended Sub-Watershed in order to meet Goal 2.

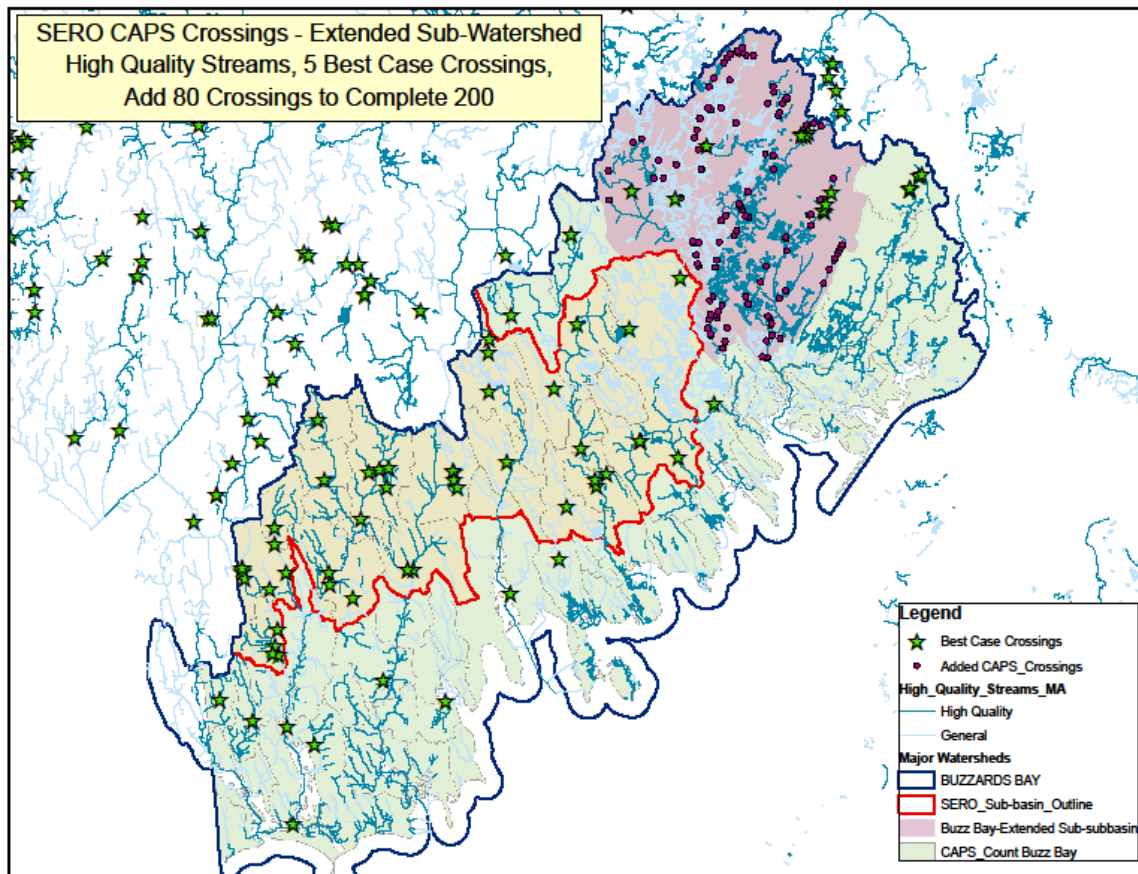


Figure 6: Buzzards Bay Extended Sub-Watershed

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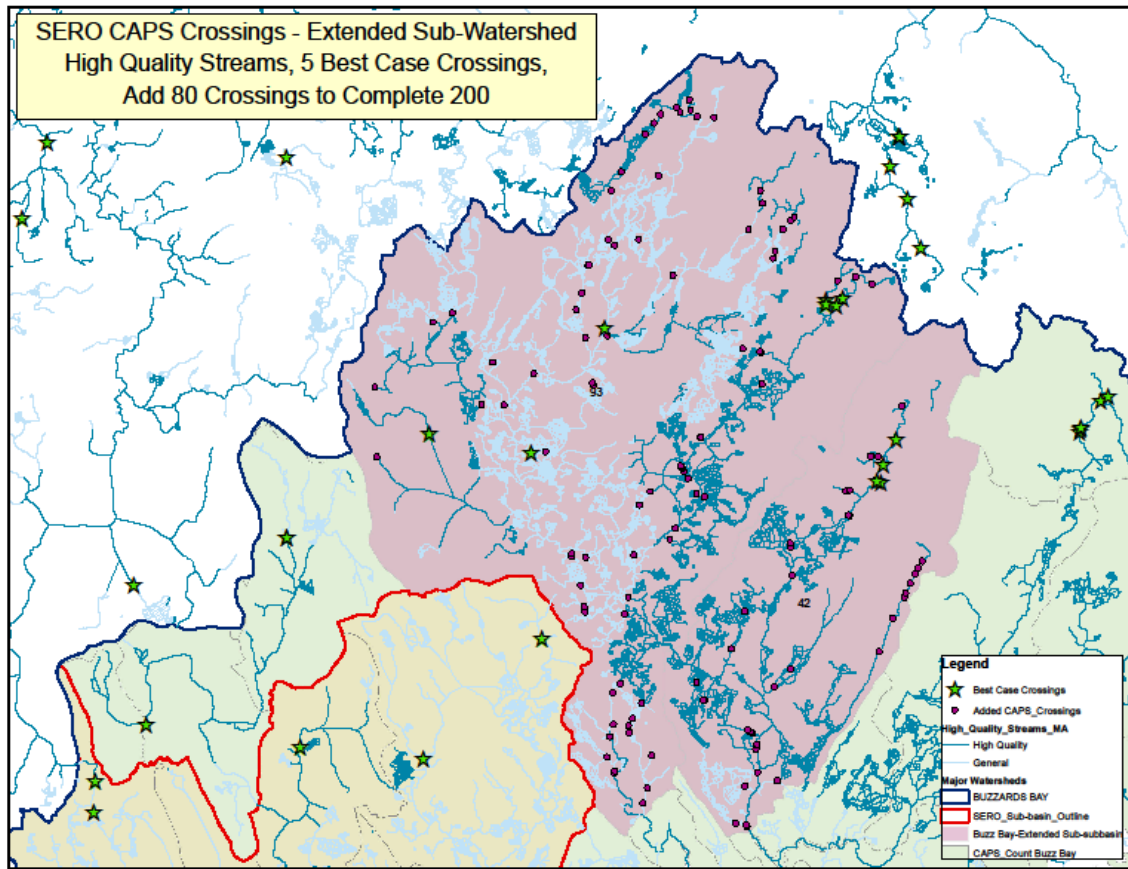


Figure 7: Buzzards Bay Extended Sub-Watershed

Remaining Crossings in Watershed to Meet Goal of 200:

# Crossings to be Assessed Total	# Crossings Already Assessed	# Crossings Remaining to be Assessed (i.e. total of next 2 columns)	# Crossings in Sub-Sub- Watershed Remaining to be Assessed	# Crossings in the Extended Sub- Watershed (or elsewhere) Remaining to be Assessed
200	103	97	17	80

Conclusion

With the implementation of this protocol we will meet Goal 1 for 2/3 sub-sub watersheds² and will fully meet Goal 2. With the exception of the redefinition of basin boundaries described in this Appendix, all other procedures and protocols in the original QAPP remain in full effect and will be followed.

² Note we may eliminate any one of the three sub-sub watersheds depending on site difficulties, but it is likely to be the Chicopee that is eliminated.