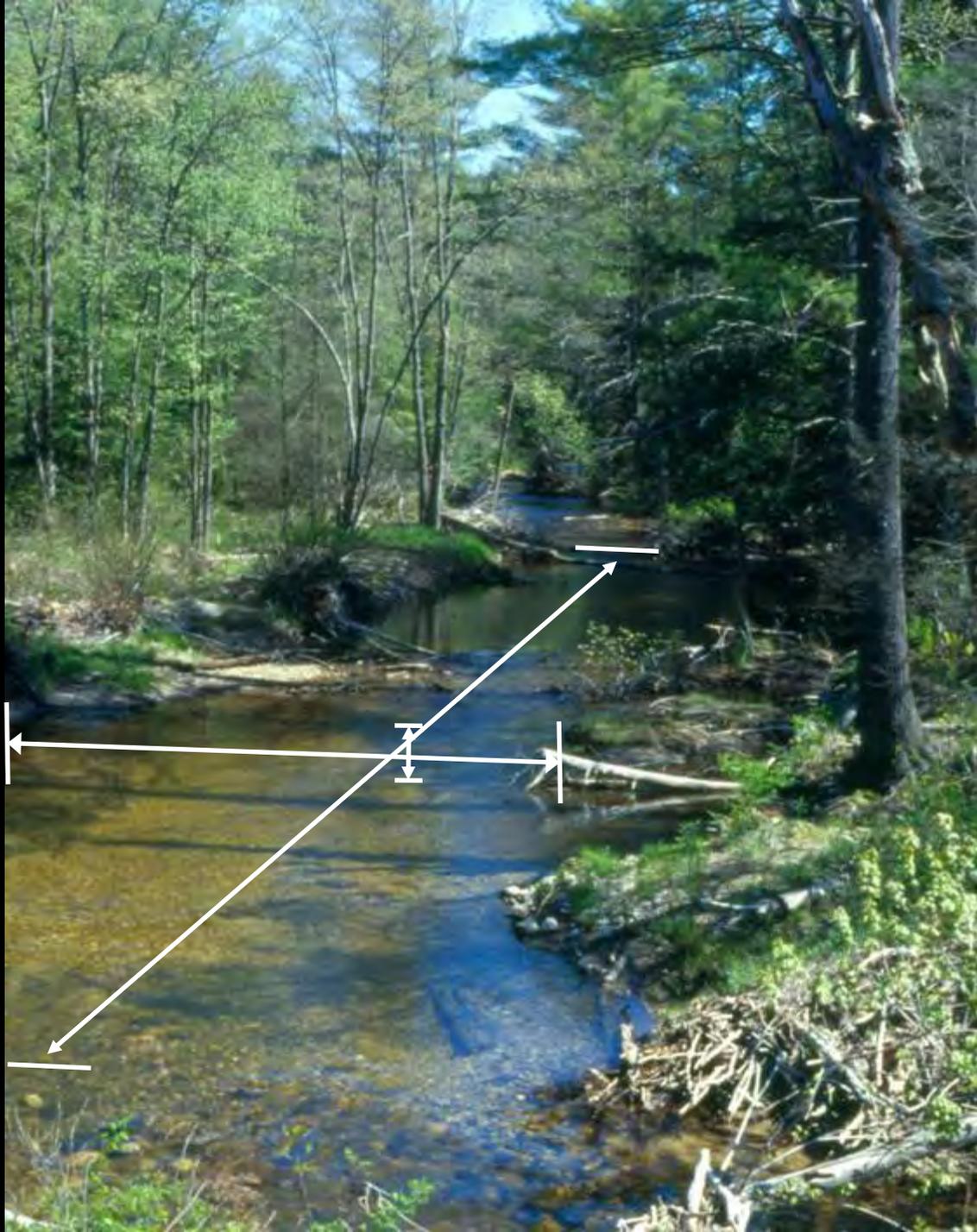


Culvert Condition Assessment





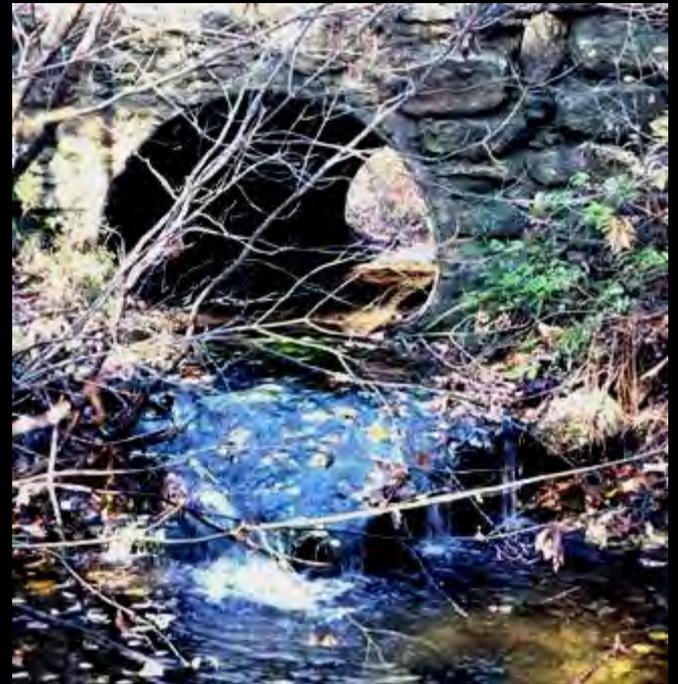
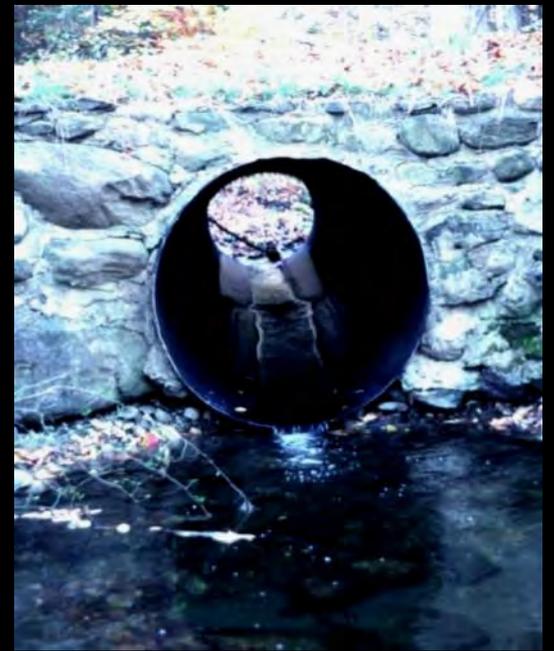


Dams





Sub-standard Culverts



Excessive Velocities





Inlet Drop

Outlet Drop (Perching)





Tail Water Armoring



**Insufficient Water
Depth**

Micrographia



Alan Richmond



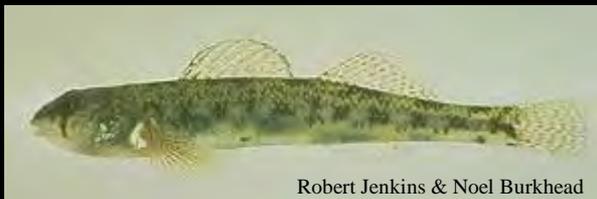
Micrographia



© 1999 Joyce Gross



Barry Wicklow



Robert Jenkins & Noel Burkhead









Wood turtle

Scott Jackson



Beaver



Muskrat

© 2003 John White



Scott Jackson

Snapping turtle

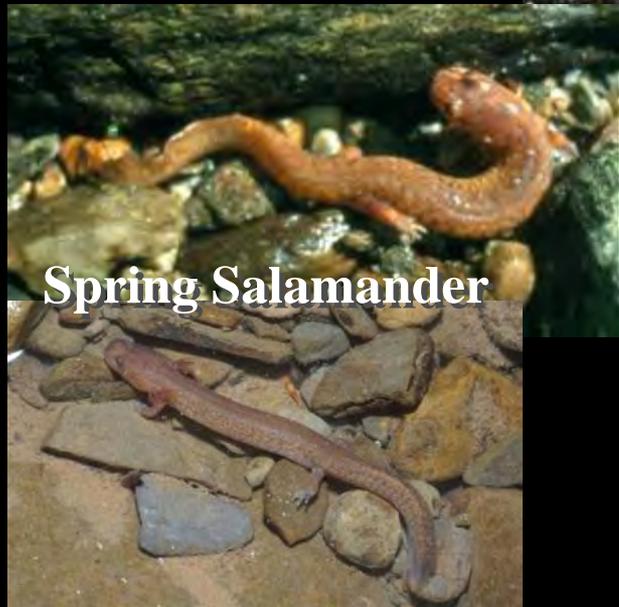


Star-nosed mole

Kenneth Catania



Otter



Spring Salamander



Scott Jackson

Dusky salamander



Mink

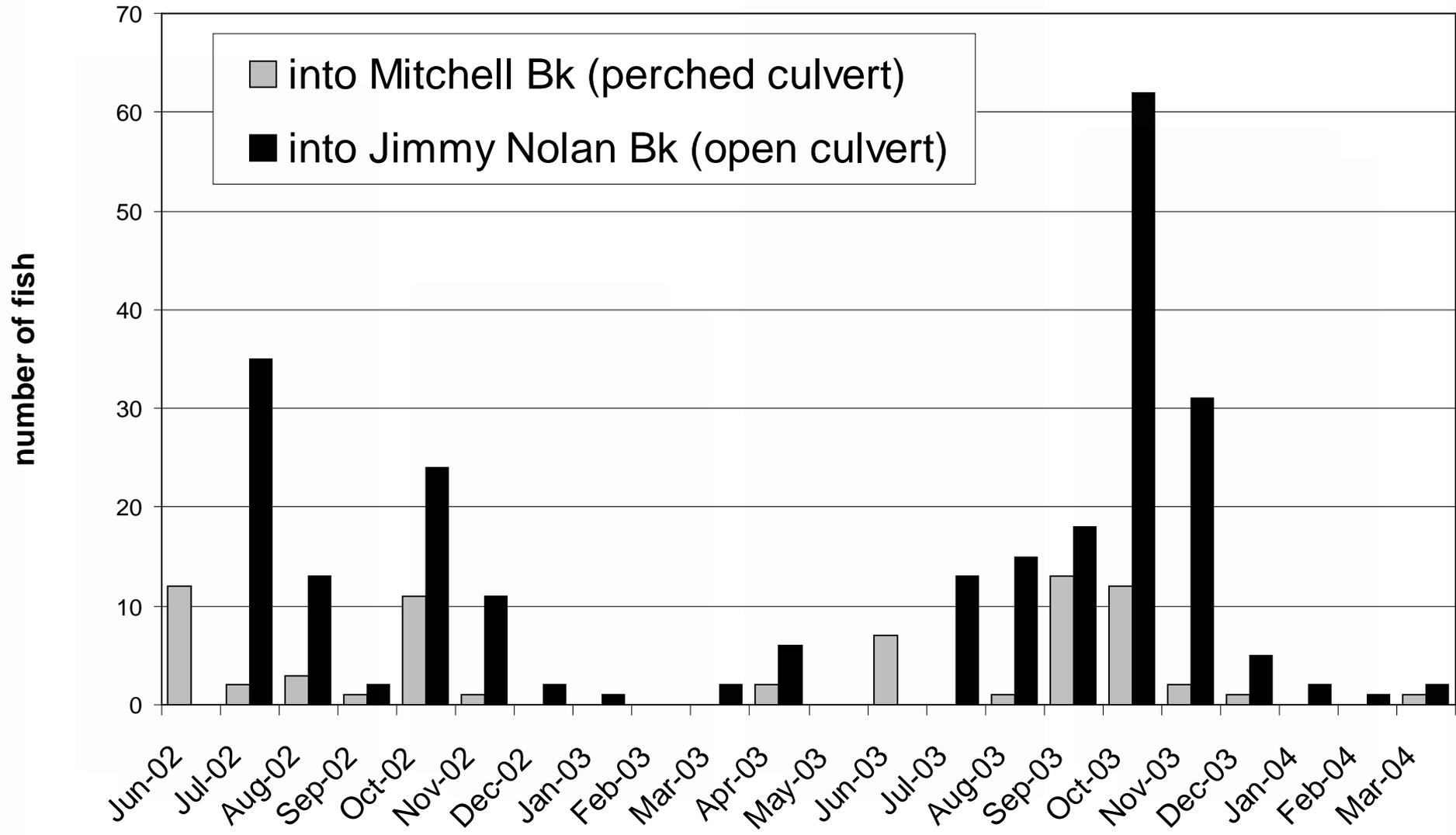


Importance of Small Streams

- Make up a large percentage of stream miles
- Cumulatively provide more habitat than large rivers
- Support species not found in larger streams and rivers
- High productivity
- Provide important spawning & nursery habitat for fish



Upstream Movement into Tributaries (total Atlantic salmon, brook trout, brown trout)



Glimpse of Existing Situation

A survey of 6,030 single and multiple culverts in five New England states:

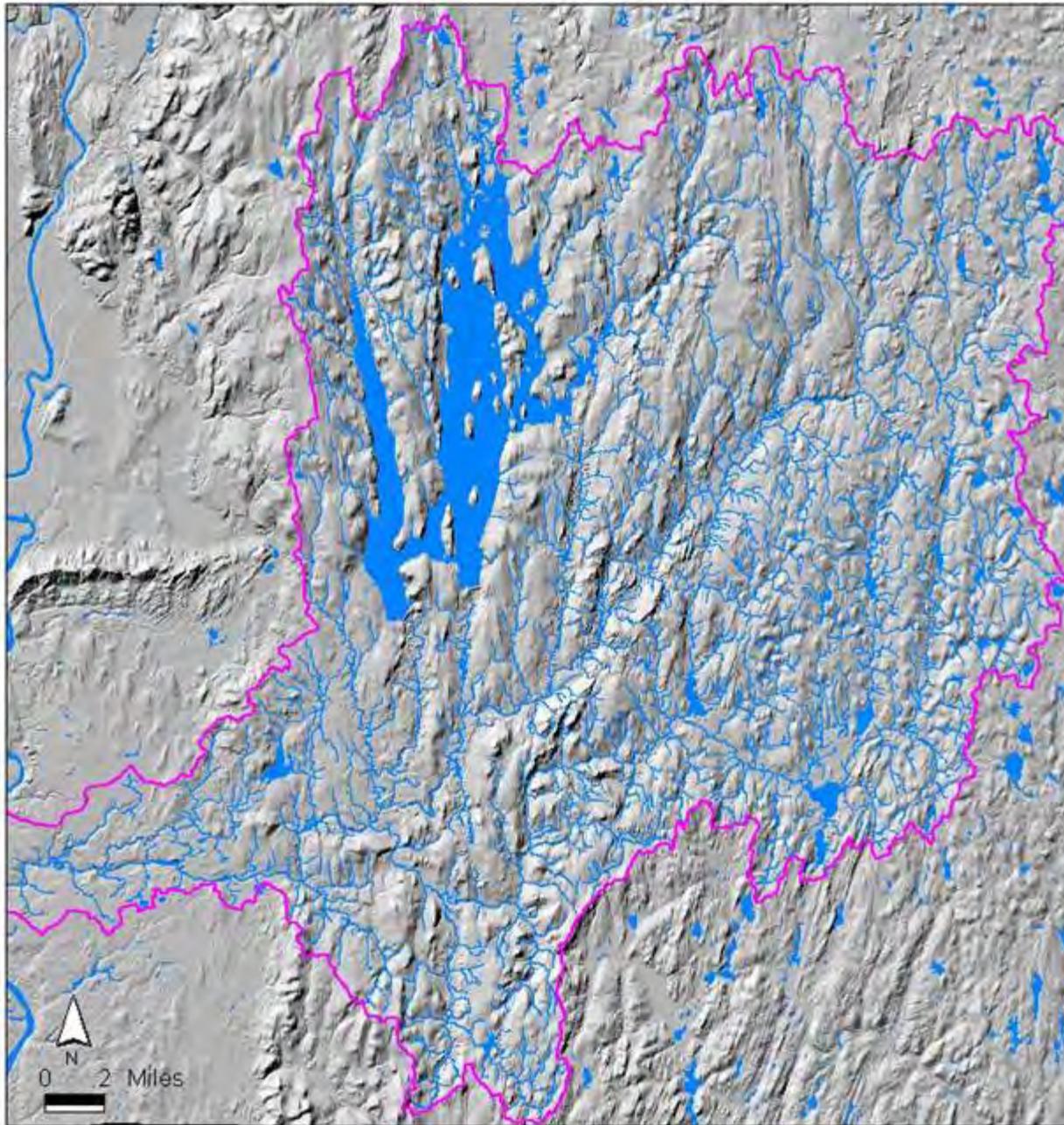
	Number	Percent
Severe barrier	93	1.5
Significant barrier	782	13.0
Moderate barrier	2,347	38.9
Minor barrier	2,539	42.1
Insignificant barrier	269	4.5
Full passage	0	0

53.4 % are moderate to severe barriers

None provided full aquatic organism passage

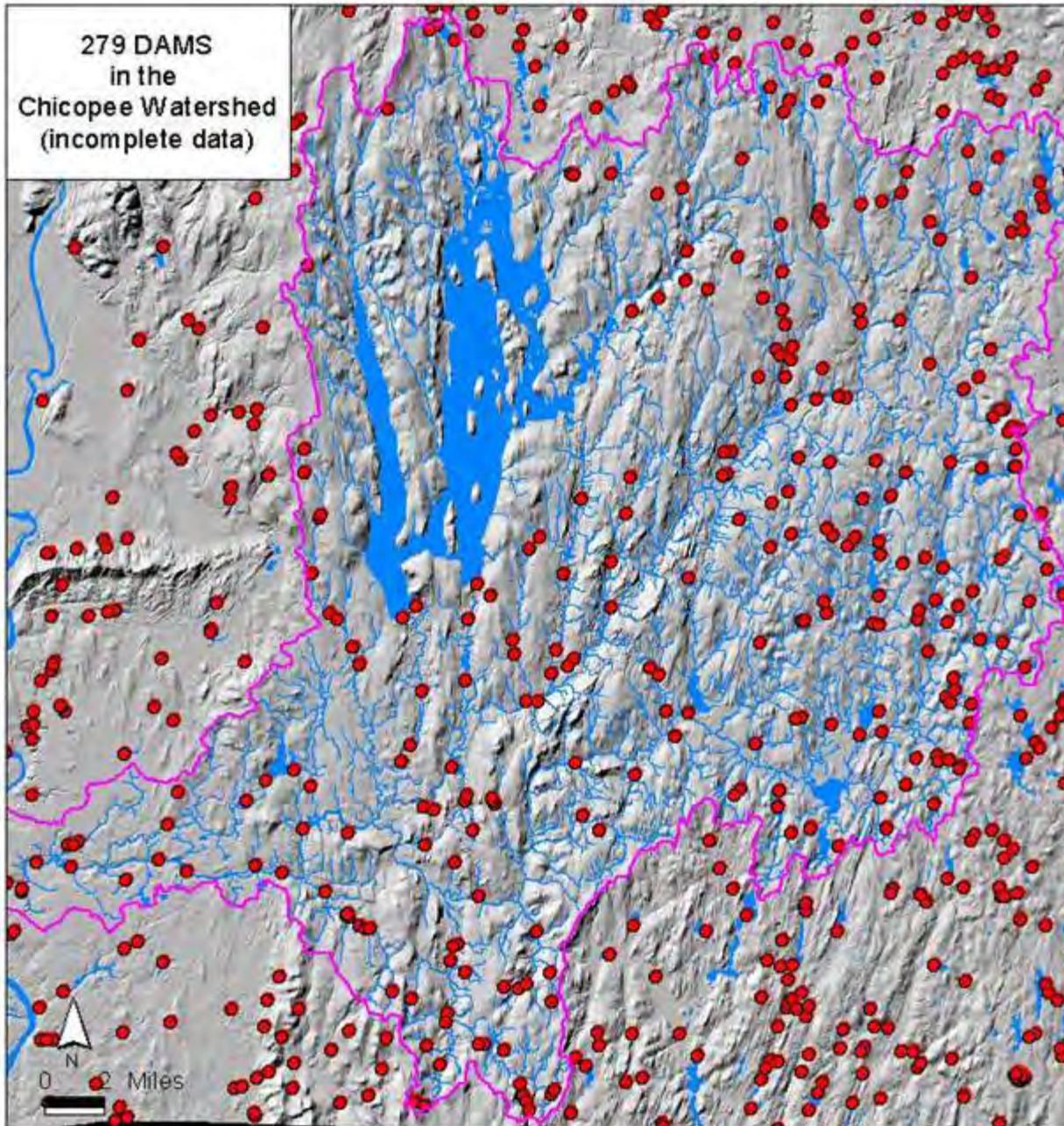
CHICOPEE WATERSHED

721 sq.mi.



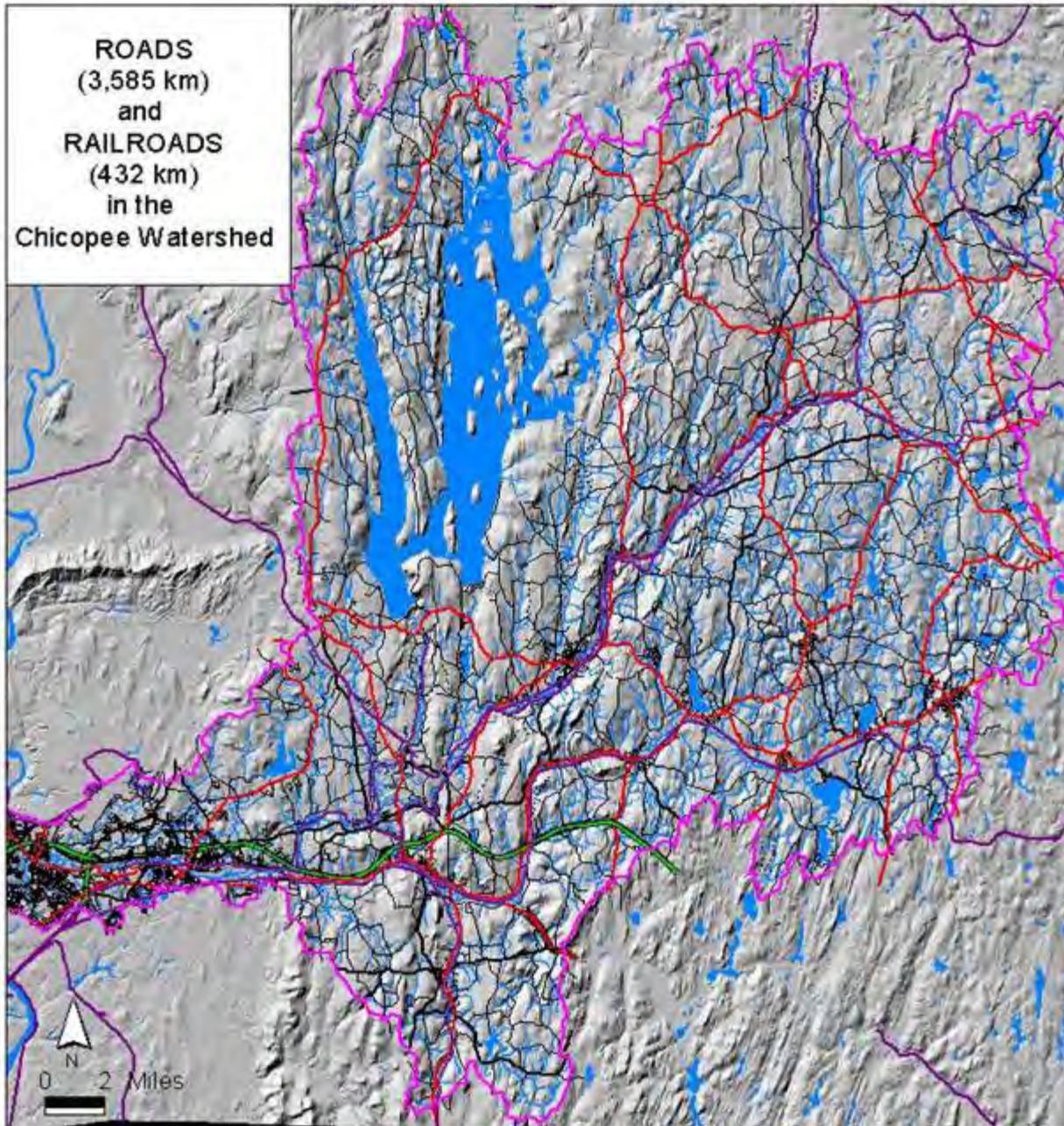
Source:
MA Riverways
Program

CHICOPEE WATERSHED



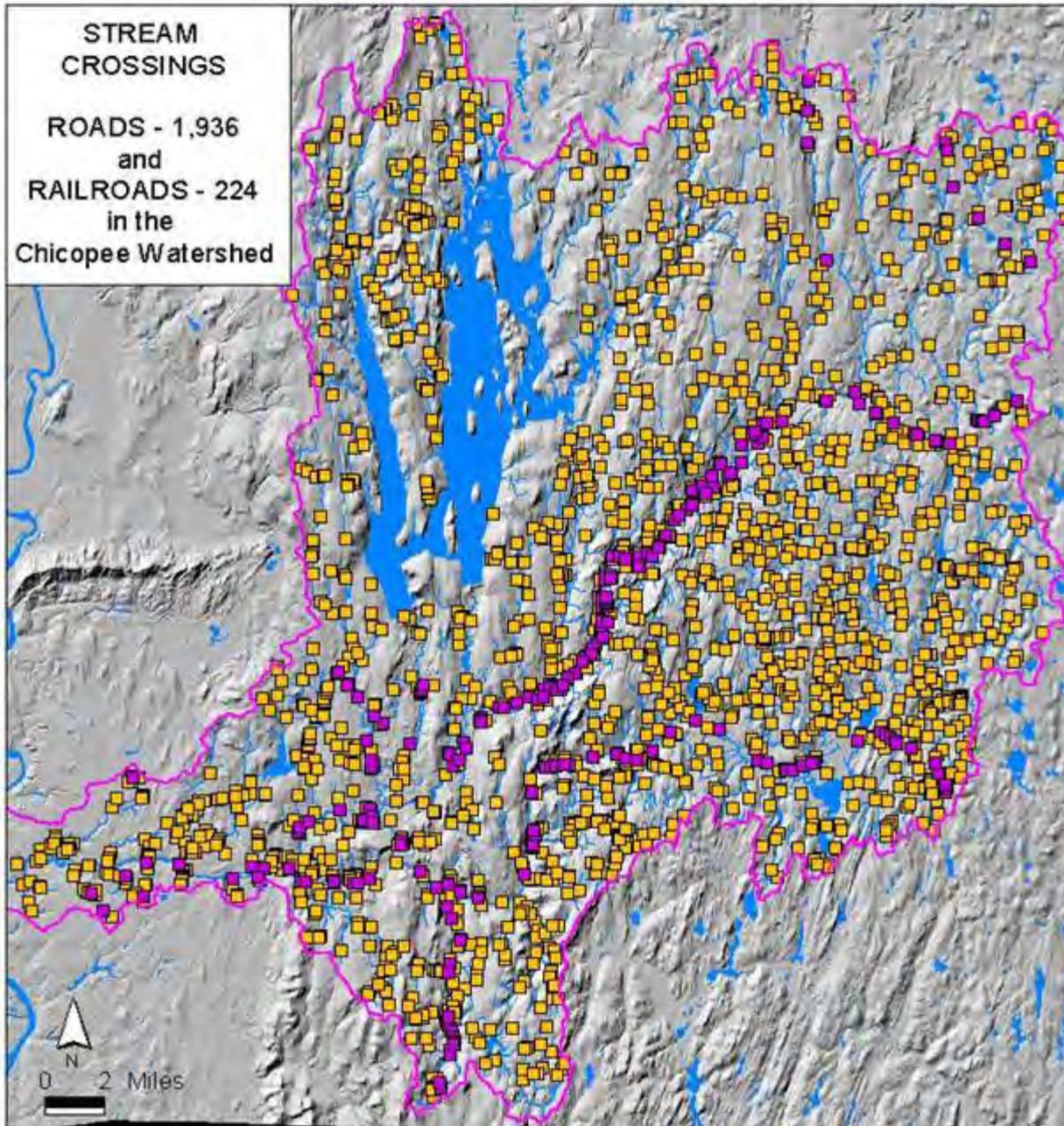
Source:
MA Riverways
Program

CHICOPEE WATERSHED



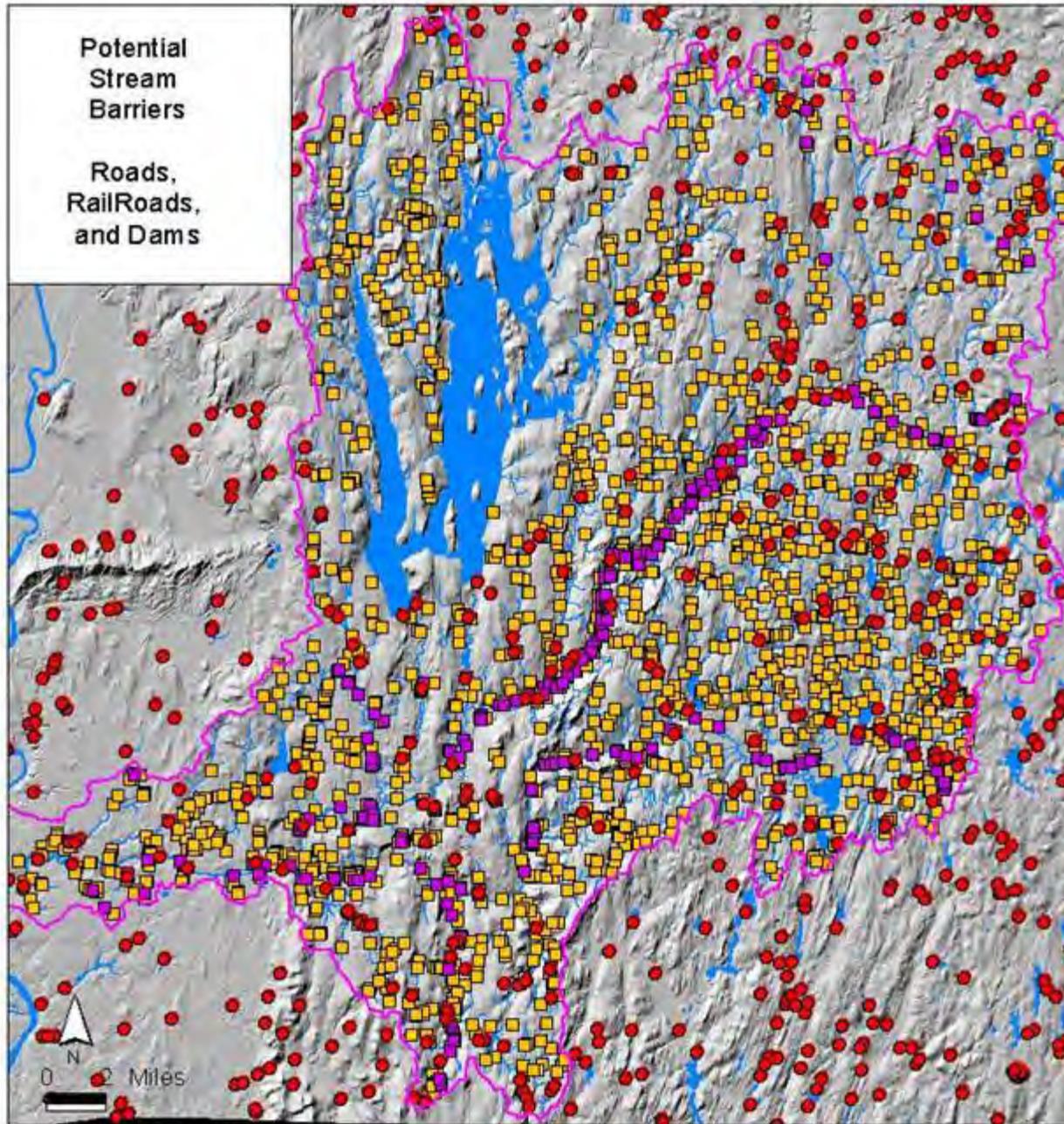
Source:
MA Riverways
Program

CHICOPEE WATERSHED



Source:
MA Riverways
Program

CHICOPEE WATERSHED



Source:
MA Riverways
Program

Culvert Failure





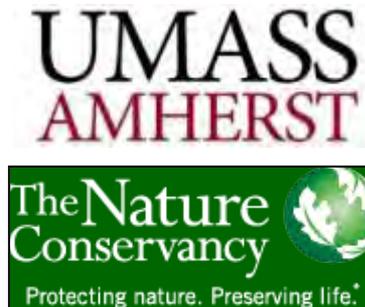
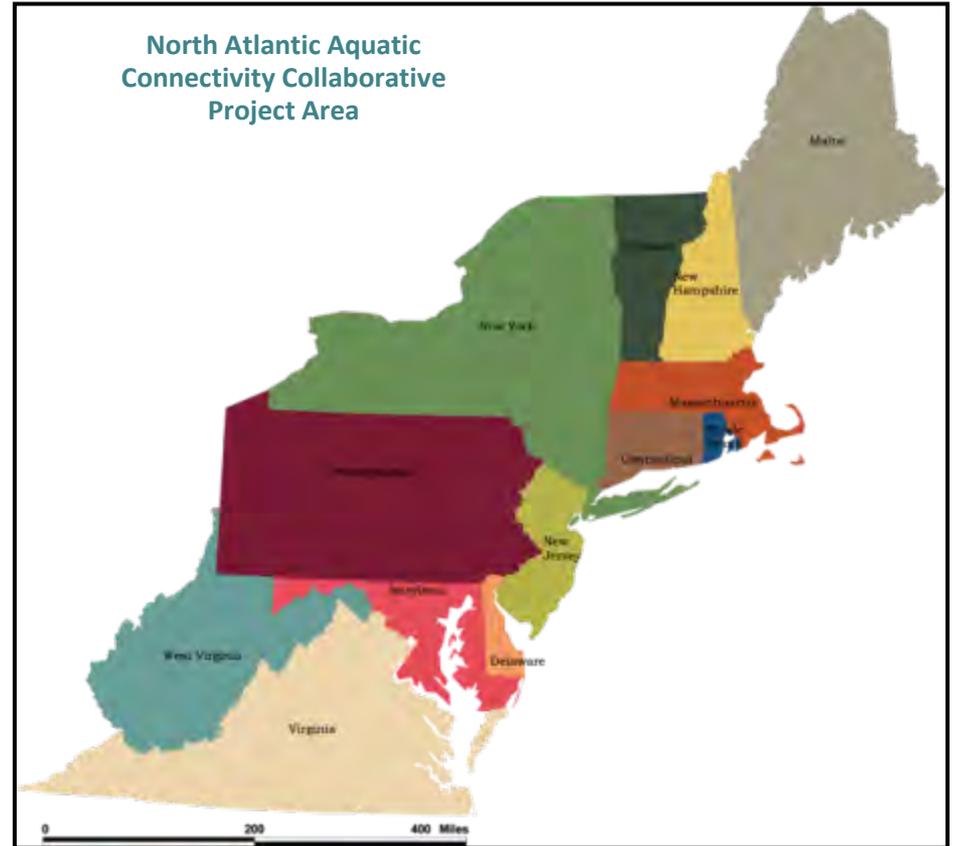
Culverts and Climate Change:
Changes in the climate make culverts a critical issue for natural resource conservation and protection of infrastructure and public safety





www.streamcontinuity.org/naacc

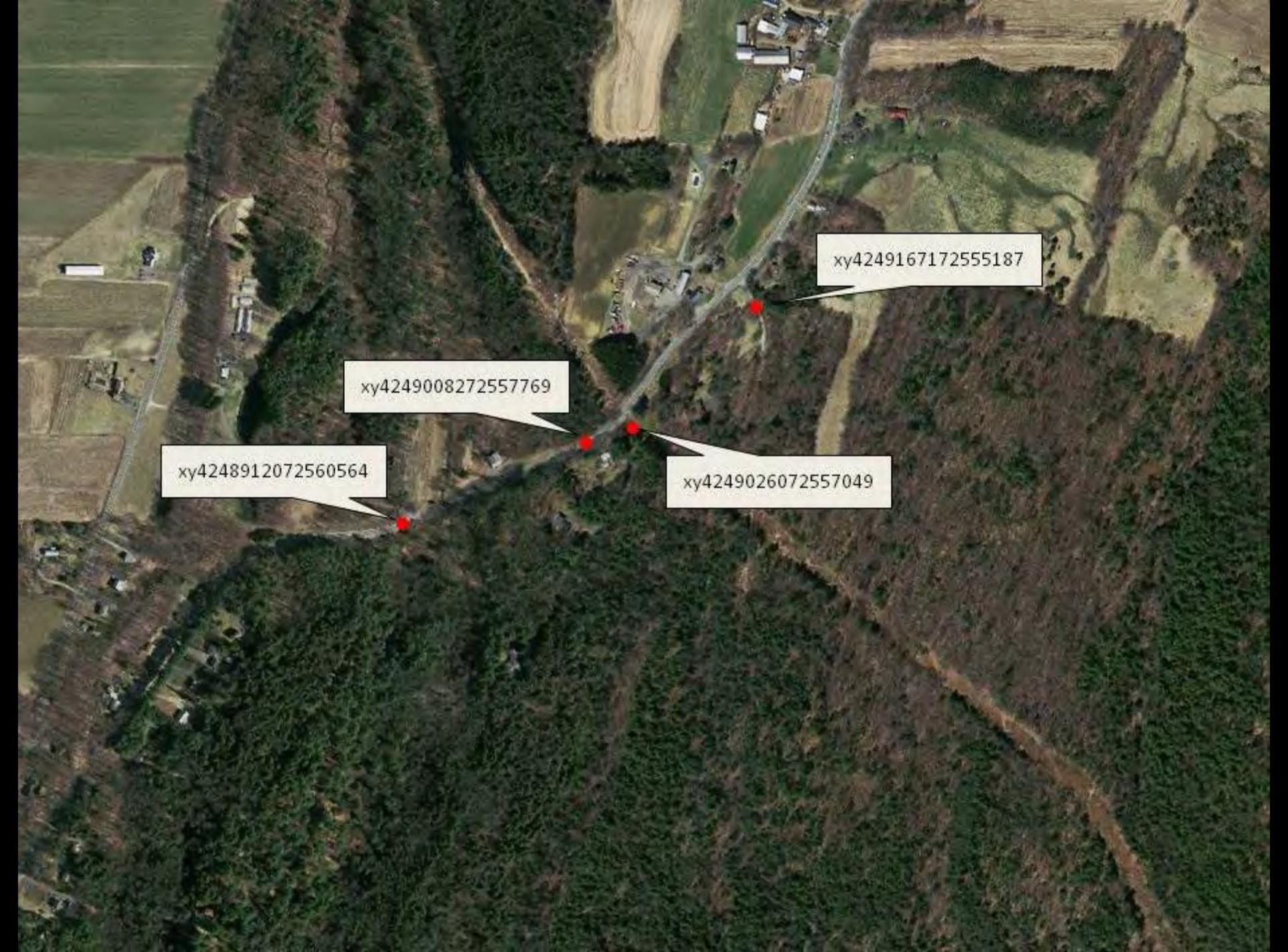
- ✓ Create a network in the North Atlantic region
- ✓ Develop a Unified Stream Crossing Assessment Protocols
- ✓ Create an infrastructure to support collection of road-stream crossing data





Project Infrastructure

- Crossing codes
- Protocols & field data forms
- Electronic data collection
- Online Database
 - Data storage & retrieval
 - Scoring
 - Map interface
 - Data filtering tool
- Prioritizing crossings for assessment
- Prioritizing crossings for mitigation
 - TNC Northeast Connectivity Project
 - UMass Critical Linkages Project
 - Designing Sustainable Landscapes (DSL)



xy4249167172555187

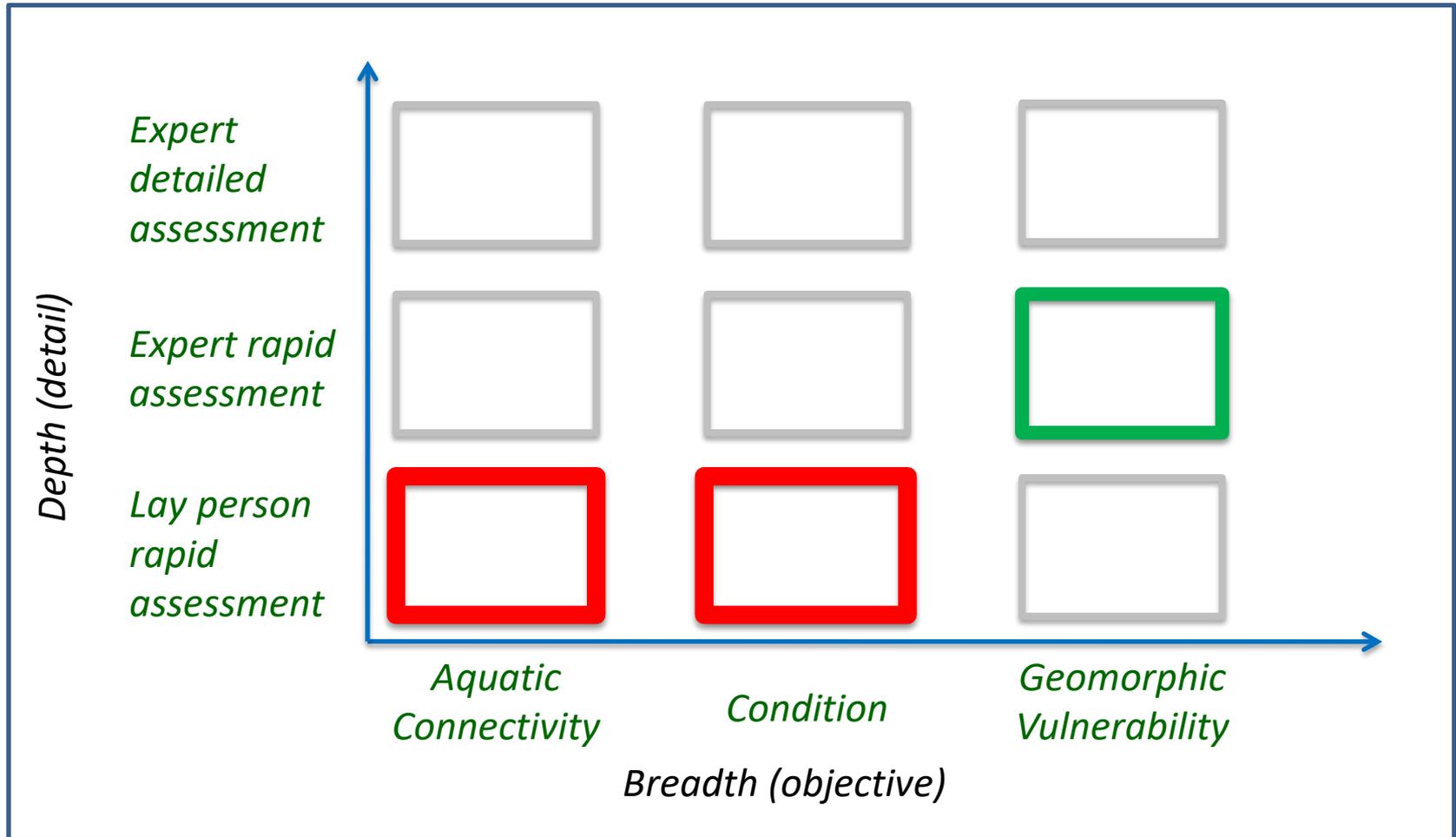
xy4249008272557769

xy4248912072560564

xy4249026072557049



Crossing Assessment Modules





AQUATIC CONNECTIVITY
Stream Crossing Survey
DATA FORM

DATE OBSERVED: 10/20/14
LOCAL ID: 2014-10-20-01

CROSSING DATA

Crossing Code: _____ Local ID: 2014-10-20-01

Date Observed: 10/20/14 Lead Observer: _____

Town/County: _____ Stream: _____

Road: _____ Type: UNPAVED PAVED BRIDGE DRAINAGE HWY FUTURE

GPS Coordinates (NAD83): N (Latitude) W (Longitude)

Location Description

Crossing Type: <input type="checkbox"/> BRIDGE <input type="checkbox"/> COVER <input type="checkbox"/> MULTIPLE CULVERT <input type="checkbox"/> FORD <input type="checkbox"/> ASCENDING <input type="checkbox"/> DESCENDING <input type="checkbox"/> RAMPED CROSSING	Number of Culverts/ Bridge Cells: _____
<input type="checkbox"/> BUILT-UP CURB <input type="checkbox"/> FLAGSTONE <input type="checkbox"/> UNPAVED BUILT-UP CURB <input type="checkbox"/> FULLY REASSEMBLED <input type="checkbox"/> BRIDGE-AND-GRADE	
Photo IDs: <input type="checkbox"/> FULL <input type="checkbox"/> SLIGHT <input type="checkbox"/> OPEN/BLK <input type="checkbox"/> ROW/USE-M <input type="checkbox"/> OTHER: _____	
Flow Condition: <input type="checkbox"/> SLOW <input type="checkbox"/> OPEN/BLK <input type="checkbox"/> UNKNOWN <input type="checkbox"/> HIGH	Crossing Condition: <input type="checkbox"/> OK <input type="checkbox"/> POOR <input type="checkbox"/> HWY <input type="checkbox"/> UNKNOWN
Tidal Site: <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> UNKNOWN	Alignment: <input type="checkbox"/> F/TW/RAISED <input type="checkbox"/> TRENCHED
Road Fill Height: _____	Road Fill Height: _____
Bankfull Width: _____ Confidence: <input type="checkbox"/> HIGH <input type="checkbox"/> MODERATE	Constriction: <input type="checkbox"/> COVER <input type="checkbox"/> NO COVER <input type="checkbox"/> SMALL/SLIGHTLY ENLARGED
Tailwater Scour Pool: <input type="checkbox"/> NONE <input type="checkbox"/> SMALL <input type="checkbox"/> LARGE	<input type="checkbox"/> SPARS ONLY <input type="checkbox"/> BENT/SLANTED CHANNEL

Crossing Comments: _____



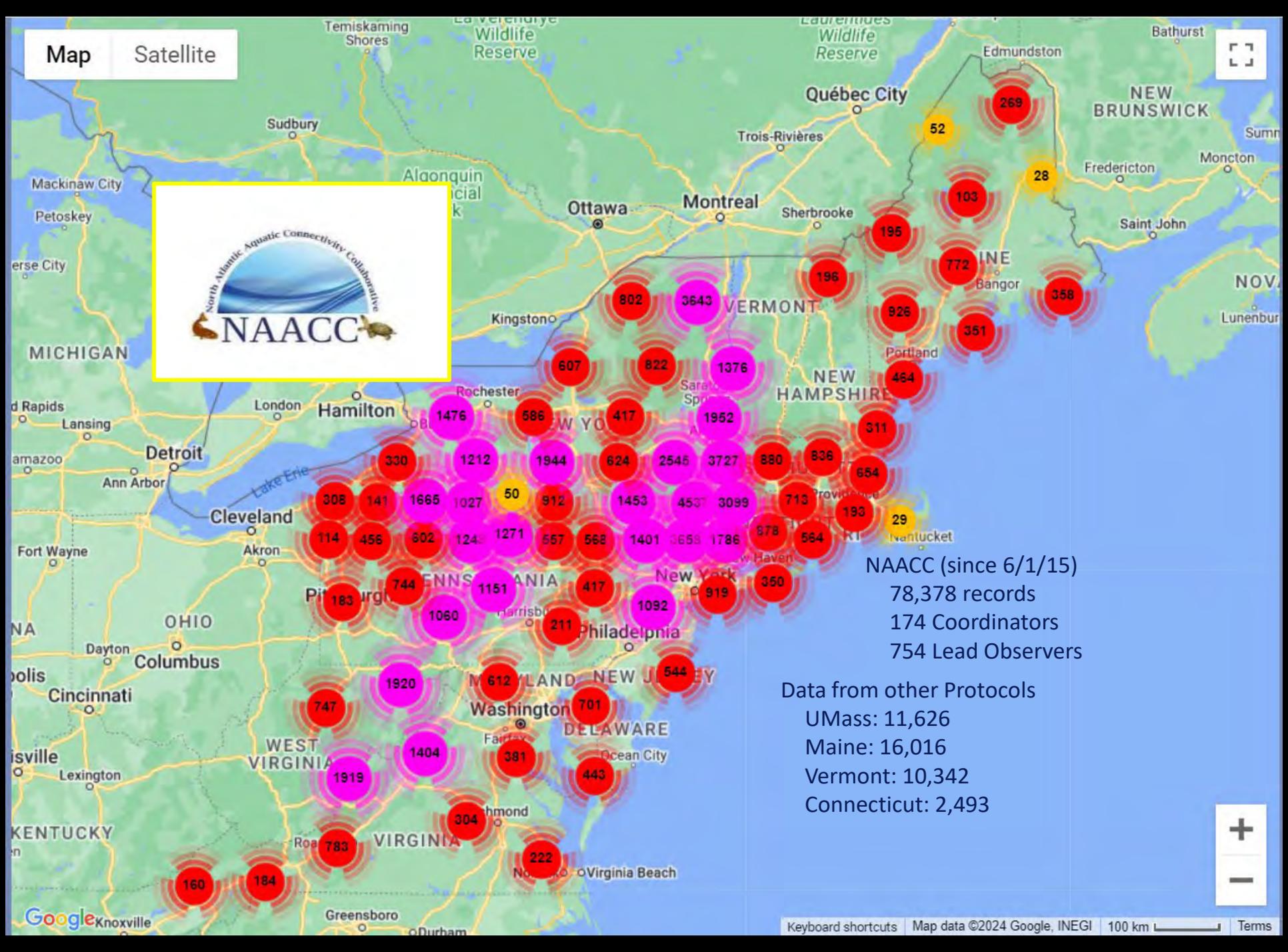
STRUCTURE 1

Structure Material: METAL CONCRETE PLASTIC WOOD ECOSYSTEM FIBERGLASS COMBINATION

OUTLET

Outlet Shape: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114

Map Satellite



NAACC (since 6/1/15)
78,378 records
174 Coordinators
754 Lead Observers

Data from other Protocols
UMass: 11,626
Maine: 16,016
Vermont: 10,342
Connecticut: 2,493



NAACC Terrestrial Connectivity Assessment



TERRESTRIAL CONNECTIVITY Stream Crossing Survey DATA FORM

Observer Name: _____ Date: _____
 Locality: _____

CROSSING DATA

Crossing Location: _____

Date Observed: _____

County: _____ Stream: _____

Road: _____ Type: HWY/BLVD UNPAVED UNRAID DRIVEWAY TRAIL OVERPASS

GPS Coordinates (WGS 84): UTM Zone: _____ WGS 84

Location Description:

Crossing Type: BRIDGE BOX CULVERT MULTIPLE CULVERT FORD FENCE/RAILROAD NATURE DEVELOPMENT ADEQUATE TERRESTRIAL PASSAGE
 FENCED STREAM UNACCESSIBLE PARTIALLY ACCESSIBLE

Photo(s) and Comments: _____

Flow Condition: NO FLOW TYPICAL FLOW INTERMITTENT HIGH Tidal Flow YES NO UNKNOWN

Road (if bridge) Condition and Use: _____

Reason for the Crossing: PROTECT PREVENT MOVE UNKNOWN

Score Pool Barrier: NONE PARTIAL COMPLETE Livestock Using Crossing YES NO UNKNOWN

Right of Way Fencing (Left Side): NONE CHAIN LINK WIRE MESH BARBED WIRE POST AND RAIL OTHER (DESCRIBE BELOW)

Right of Way Fencing (Right Side): NONE CHAIN LINK WIRE MESH BARBED WIRE POST AND RAIL OTHER (DESCRIBE BELOW)

Bank Erosion: NONE PARTIAL ONLY MOSTLY STREAM BOTH SIDES

Crossing Comments: _____

Conditions that may inhibit Wildlife from Crossing Near the Road:
 STEEP ENBANKMENT ROADWAY FENCING RETAINING WALLS NOISE BARRIERS
 JERSEY BARRIERS VERTICAL CURVES OF ROAD CUTS
 HIGH TRAFFIC VOLUME DESCRIBE RIGHT) OTHER (DESCRIBE RIGHT)

STRUCTURE DATA

Outlet Shape: 1 2 3 4 5 6 7 8 9 10 UNKNOWN REMOVED

Outlet Dimensions: A. Width: _____ B. Height: _____ C. Substrate/Inlet Width: _____ D. Water Depth: _____

E. Abutment Height (Type Structure only): _____ L. Structure Length (does length include abutments): _____

Inlet Shape: 1 2 3 4 5 6 7 FORD UNKNOWN REMOVED

Inlet Dimensions: A. Width: _____ B. Height: _____ C. Substrate/Inlet Width: _____ D. Water Depth: _____

Clear Line of Sight Through Structure: YES PARTIAL NO Comments: Dry Passage YES PARTIAL NO UNKNOWN

Minimum Width of Dry Passage (ft): _____ Minimum Height Above Dry Passage (ft): _____

Dry Passage Substrate: SAND/SILT GRAVEL COBBLE BOULDER BEDROCK Structure Comments: _____
 ASPHALT CONCRETE METAL PLASTIC OTHER (DESCRIBE BELOW) UNKNOWN

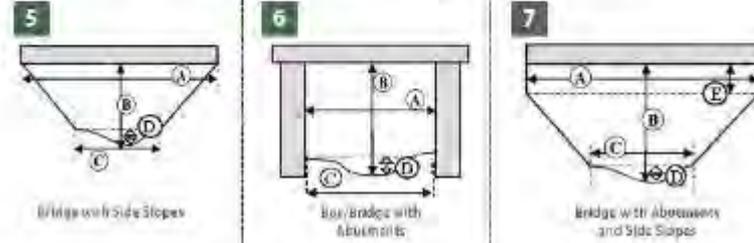
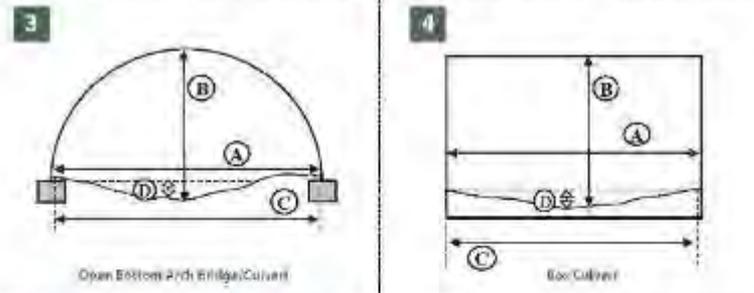
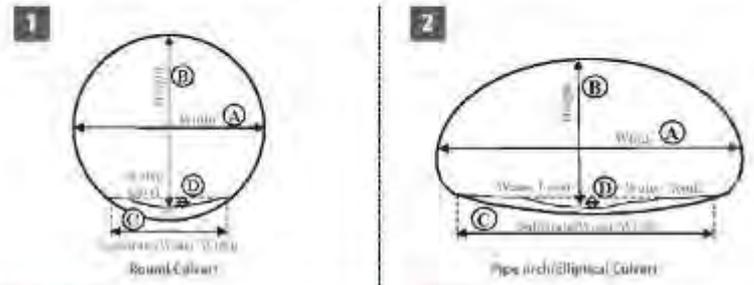
	Dry Passage (if not a structure with grade)					Barrier Severity (if not a structure with grade)				
Structure Type	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier
Structure with grade, barrier	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier
Structure with grade, barrier	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier
Structure with grade, barrier	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier
Structure with grade, barrier	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier
Structure with grade, barrier	none	insignificant	moderate to good	good	excellent	no passage	severe barrier	moderate barrier	partial barrier	no barrier

Circle 1-5 only. If passage with weight above passage, circle as barrier. Barrier severity (if not a structure with grade) is based on passage, not on barrier. Barrier severity (if not a structure with grade) is based on passage, not on barrier.

Structure Shape & Dimensions

- Select the Structure Shape number from the diagrams below and record it on the form for Inlet and Outlet Shape.
- Record on the form in the appropriate blanks dimensions **A**, **B**, **C** and **D** as shown in the diagrams. **C** captures the width of water or substrate, with/without water; for dry culverts without substrate, $C = 0$. **D** is the depth of water – be sure to measure inside the structure; for dry culverts, $D = 0$.
- Record Structure Length (L). (Record abutment height (E) only for Type 7 Structures).
- For multiple culverts, also record the inlet and outlet shape and dimensions for each additional culvert.

NOTE: Culverts 1, 2 & 4 may or may not have substrate in them, so height measurements (B) are taken from the level of the "stream bed" whether that bed is composed of substrate or just the inside bottom surface of a culvert (grey arrows below show measuring to bottom; black arrows show measuring to substrate).







(e) Inspecting inside culvert with flashlight

Distributed Coordination

Lead Observers (data collectors)

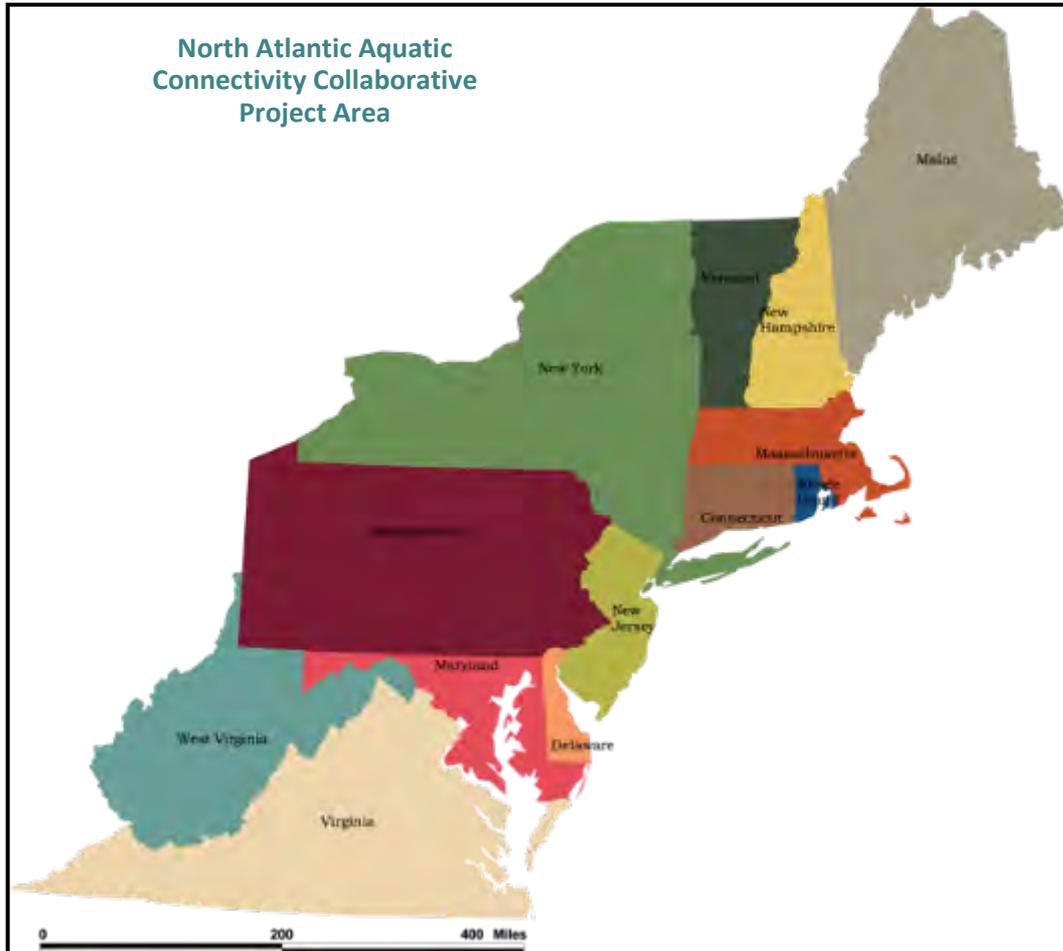
- Technicians
- Volunteers

L1: Local Coordinators

L2: Regional Coordinators

L3: Central Coordinators

North Atlantic Aquatic
Connectivity Collaborative
Project Area



Central Coordination

Scott Jackson (NAACC Project Leader)

Bob English (NAACC Data Center Director)

Data Collection & Entry

Lead Observers

- Collect data
- Match survey locations to xycodes
- Enter data into database

L1 Coordinators

- Review & approve records
- Field audit 10% of an lead observer's first 50 records
- Field audits not required for lead observers that have assessed >50 crossings

Culvert Assessment Form

CROSSING DATA

For multiple culvert crossings use one sheet per culvert. Go from left to right, standing at inlet looking downstream.

Crossing Code: _____ Local ID: (Optional) _____ Date Observed: (00/00/0000) ____ / ____ / ____ Lead Observer: _____

Number of Culverts: ____ Culvert ____ of ____ Stream: _____ Road: _____

Location: (St.#, Pole#, Etc.) _____ Town: _____ County: _____ State: _____

GPS Coordinates: _____ °N Latitude _____ °W Longitude Time: _____ Weather: _____

Crossing Type: Bridge Culvert Multiple Culvert Ford No Crossing Removed Crossing Buried Stream Inaccessible Partially Inaccessible
 No Upstream Channel

Culvert Material: Metal Concrete Plastic Wood Rock/Stone Fiberglass Combination Length of Culvert: _____

INLET

Appurtenance: Headwall Wingwalls Headwall & Wingwalls Mitered To Slope Projecting Flush Recessed Other None

Inlet Shape: 1 2 3 4 5 6 7 Inlet Dimensions: A. Width: ____ B. Height: ____ C. Substrate/Water Width: ____ D. Water Depth: ____ E. Abutment Height: ____

Inlet Grade: At Stream Grade Inlet Drop Perched Clogged/Collapsed/Submerged Unknown

OUTLET

Appurtenance: Headwall Wingwalls Headwall & Wingwalls Mitered To Slope Projecting Flush Recessed Other None

Outlet Shape: 1 2 3 4 5 6 7 Outlet Dimensions: A. Width: ____ B. Height: ____ C. Substrate/Water Width: ____ D. Water Depth: ____ E. Abutment Height: ____

Outlet Grade: At Stream Grade Free Fall Cascade Free Fall Onto Cascade Clogged/Collapsed/Submerged Unknown

Numbering Structures



Looking Downstream

2011/01/01

Bridge



Culvert





Ford



Removed Crossing

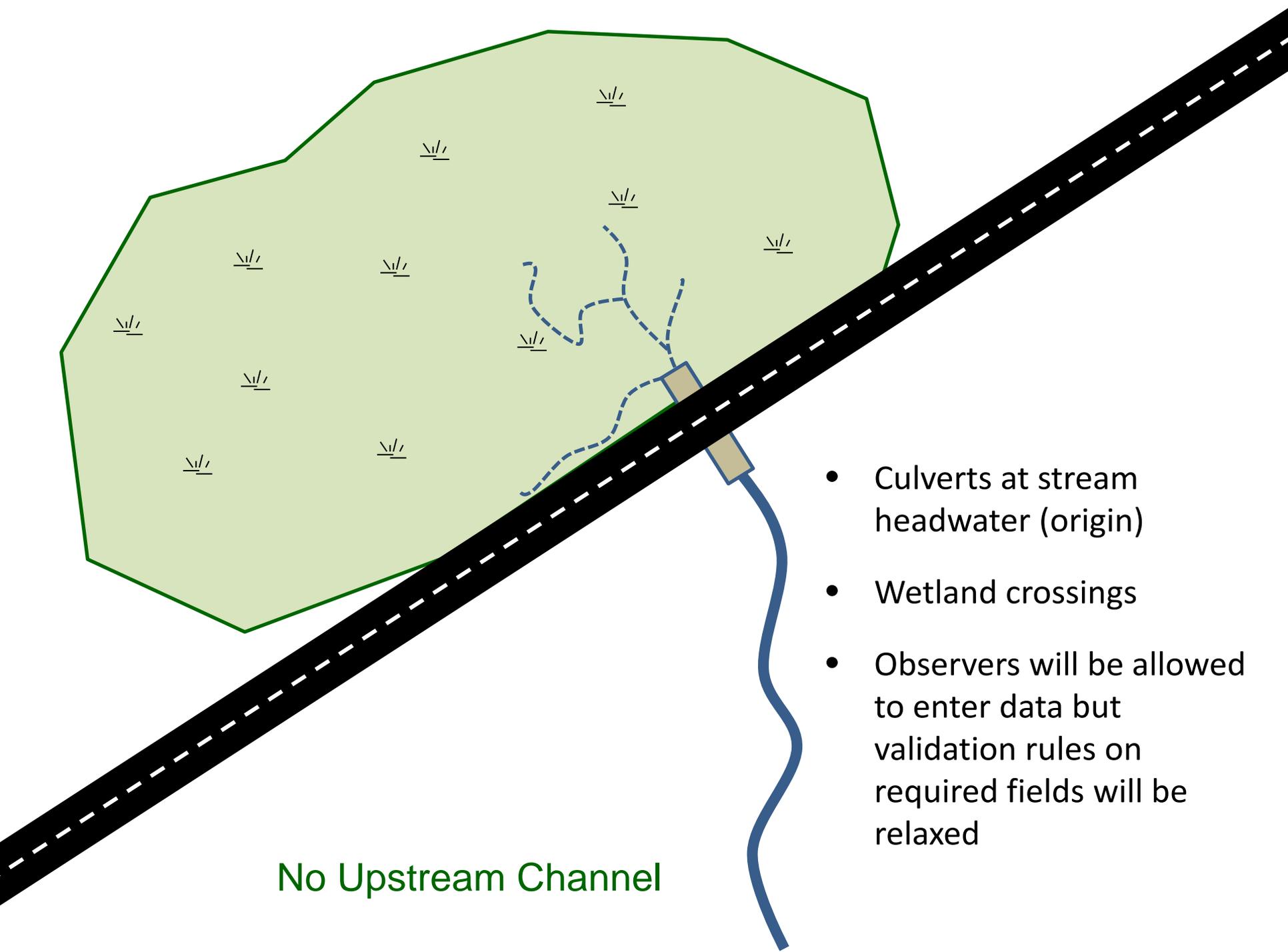


Inaccessible



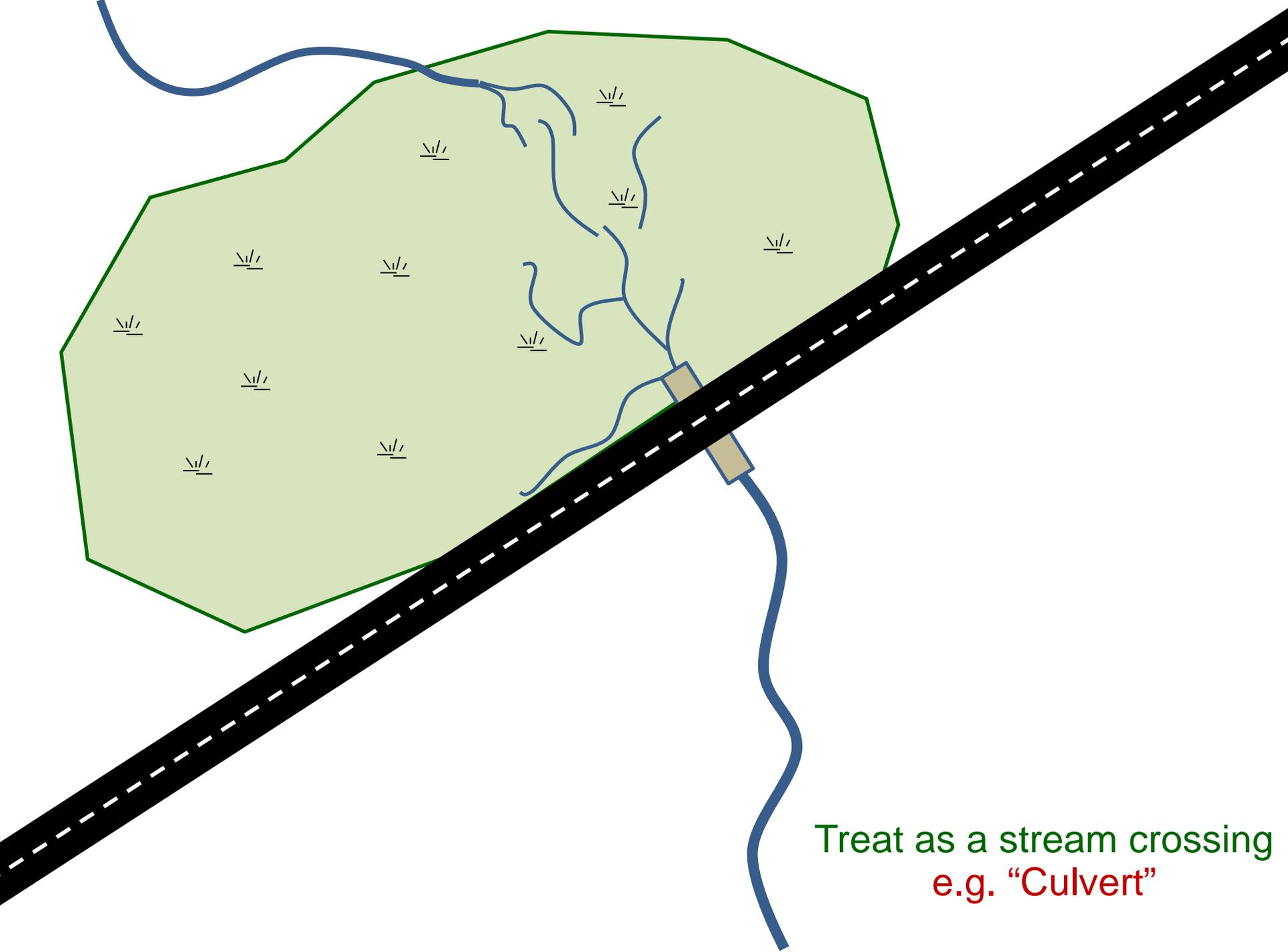
Partially Inaccessible

- For when you can access a crossing but can't access the inlet or outlet well enough to collect data
- Observers will be allowed to enter data but validation rules on required fields will be relaxed
- “Inaccessible” reserved for crossings that cannot be assessed at all



No Upstream Channel

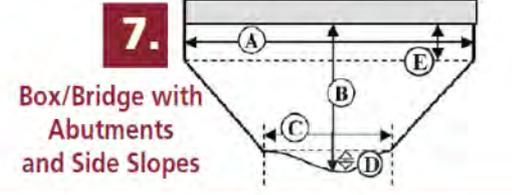
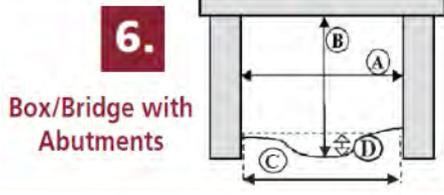
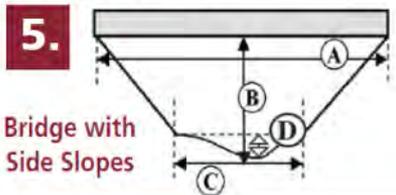
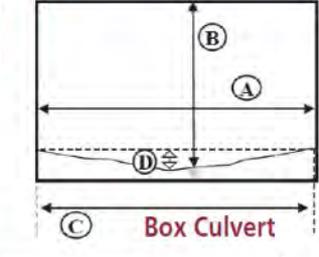
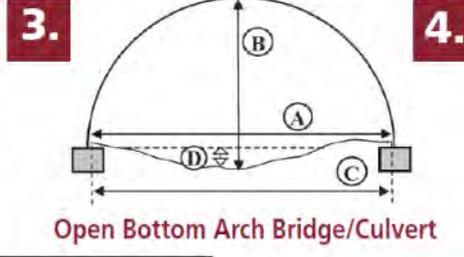
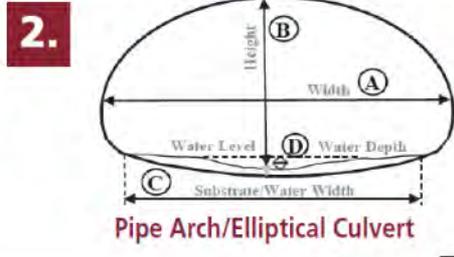
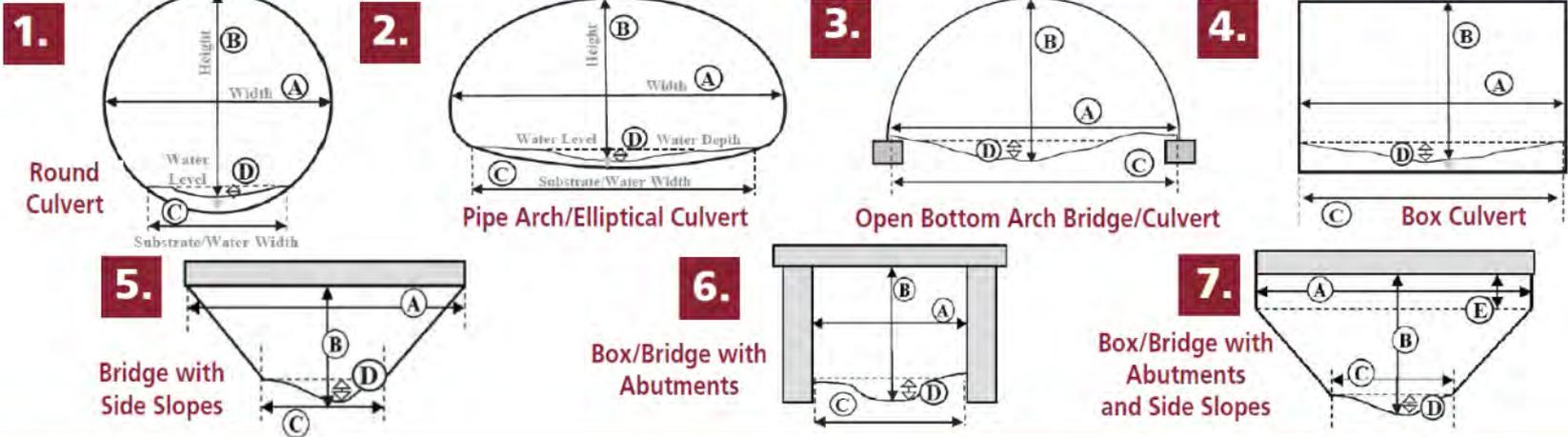
- Culverts at stream headwater (origin)
- Wetland crossings
- Observers will be allowed to enter data but validation rules on required fields will be relaxed



Treat as a stream crossing
e.g. "Culvert"

Culvert Assessment Reference Chart

CULVERT SHAPE & DIMENSIONS



Appurtenances

Headwall



Headwall/wingwalls



Appurtenances (supplemental structures)

Mitered



Projecting



Flared end sections



Scour Protection

Aprons



Scour Protection



Armoring



	INLET					OUTLET				
	<i>Please check only one level for each item</i>					<i>Please check only one level for each item</i>				
	Adequate	Poor	Critical	Unknown	N/A	Adequate	Poor	Critical	Unknown	N/A
Structural (Longitudinal) Alignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Channel Alignment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of Blockage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Flared End Section	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Invert Deterioration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Buoyancy or Crushing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Cross-Section Deformation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Structural Integrity of Barrel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Joints and Seams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Footings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headwall/Wingwalls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Armoring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Apron	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Embankment Piping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

To provide additional feedback on performance problems use the optional second sheet

Performance Problems Requiring Action

- | | | | | | |
|--|--------------------------|--------------------------------------|--------------------------|--|--------------------------|
| Debris/Veg Blockage >1/3 of rise | <input type="checkbox"/> | Local Outlet Scour | <input type="checkbox"/> | Embankment Slope Instability | <input type="checkbox"/> |
| Sediment Blockage >1/2 the opening | <input type="checkbox"/> | Previous and/or Frequent Overtopping | <input type="checkbox"/> | No Access/Ends Totally Buried/Submerged | <input type="checkbox"/> |
| Buoyancy or Crushing-Related Inlet Failure | <input type="checkbox"/> | Embankment Piping | <input type="checkbox"/> | Aggressive Abrasion/Corrosion/Chemical | <input type="checkbox"/> |
| Poor Channel Alignment | <input type="checkbox"/> | Channel Degradation/Headcut | <input type="checkbox"/> | Exposed Footing (Open-Bottom Culvert Only) | <input type="checkbox"/> |

Notes: _____

Photo #: _____ Description: _____	Photo #: _____ Description: _____
Photo #: _____ Description: _____	Photo #: _____ Description: _____
Photo #: _____ Description: _____	Photo #: _____ Description: _____
Photo #: _____ Description: _____	Photo #: _____ Description: _____

Assessment Details Sheet

	Poor	Critical
Invert Deterioration	<ul style="list-style-type: none"> <input type="checkbox"/> Perforations visible and/or connection hardware failing (metal) <input type="checkbox"/> Heavy abrasion and scaling with exposed steel reinforcement (concrete) <input type="checkbox"/> Heavy abrasion or scour damage (plastic) <input type="checkbox"/> Displaced mortar and/or blocks, holes in invert area (masonry) 	<ul style="list-style-type: none"> <input type="checkbox"/> Holes or section loss with extensive voids beneath invert and/or embankment/roadway damage <input type="checkbox"/> Holes and gaps with extensive infiltration of soil, bedding or backfill material (masonry)
Joints and Seams	<ul style="list-style-type: none"> <input type="checkbox"/> Open or displaced with significant infiltration of soil and/or leakage of water and voids visible <input type="checkbox"/> Missing mortar or displaced blocks (masonry) 	<ul style="list-style-type: none"> <input type="checkbox"/> Open or displaced with significant infiltration of soil and accompanying embankment/roadway damage
Cross-Section Deformation	<ul style="list-style-type: none"> <input type="checkbox"/> Significant perceptible deformation <input type="checkbox"/> Deformation with accompanying longitudinal cracking (concrete) 	<ul style="list-style-type: none"> <input type="checkbox"/> Excessive deformation resulting in significant reduction of available flow area, and/or extensive infiltration of soil, voids, structural failure or embankment/roadway damage
Structural Integrity of Barrel	<ul style="list-style-type: none"> <input type="checkbox"/> Open cracks >1/8" wide (concrete) or missing and/or displaced blocks (masonry) with voids and significant infiltration of soil and/or leakage of water <input type="checkbox"/> Several splits, tears and cracks >6" long (plastic) <input type="checkbox"/> Significant deformation of liner or wall buckling (plastic) <input type="checkbox"/> Heavy rust staining and/or exposed steel reinforcement in sides and top of barrel (concrete) 	<ul style="list-style-type: none"> <input type="checkbox"/> Cracks, tears, splits, bulges, holes or section loss have led to extensive infiltration of soil, structural failure, voids and embankment/roadway damage

CULVERT CONDITION REFERENCE

Structural (Longitudinal) Alignment

Poor: Significant horizontal or vertical misalignment of the pipe (Note: do not confuse this with constructed pipe bends).

Critical: Significant misalignment resulting in deformation of pipe or embankment/roadway damage.

Channel Alignment

Poor: The stream channel approaches the crossing at an angle of 45-70 degrees from the centerline of the structure.

Critical: The stream channel approaches the crossing at an angle of 70-90 degrees from the centerline of the structure.

Level of Blockage

Poor: Debris/sediment/vegetation blocks 1/3 of more of the inlet/outlet opening.

Critical: Sediment blocks more than ½ the inlet/outlet opening (and not designed that way for aquatic organism passage).

Flared End Section

Bouyancy or Crushing

Poor: Light to moderate denting or deformation of inlet and/or outlet end of flexible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).

Critical: Invert of inlet bent upward above streambed or mitered edges crumpled inward.

Cross-Section Deformation

Poor: Significant perceptible deformation. Deformation with accompanying longitudinal cracking (concrete).

Critical: Excessive deformation resulting in significant reduction of available flow area, and/or extensive infiltration of soil, voids, structural failure or embankment/roadway damage.

Structural Integrity of Barrel

Poor: *Concrete:* Open cracks >1/8" wide with voids and significant infiltration of soil and/or leakage of water. Heavy rust staining and/or exposed steel reinforcement in sides and top of barrel.

Masonry: Missing and/or displaced blocks *Plastic:* Several splits, tears and cracks >6" long. Significant deformation of liner or wall buckling.

Headwall/Wingwalls

Poor: Cracking or breaking off of flakes or chips affecting >50% of area and/or exposed steel reinforcement. Gap >4" between barrel and wall. Footing exposed and undermined.

Critical: Partially or totally collapsed with damage to embankment/roadway.

Armoring

Poor: Significant displacements, undermining or deterioration affecting the performance of the culvert structure.

Critical: Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.

Apron

Poor: Significant cracking affects >50% of apron. Significant piping or undermining.

Critical: Partially or totally collapsed, significantly affecting performance and/or causing embankment/roadway damage.

Structural (Longitudinal) Alignment

Horizontal or vertical alignment of the structure



Adequate:

Minimal horizontal or vertical misalignment of the pipe.

Structural (Longitudinal) Alignment

Horizontal or vertical alignment of the structure



Poor:

Significant horizontal or vertical misalignment of the pipe (note: do not confuse with constructed pipe bends).



Critical:

Significant misalignment resulting in deformation of pipe or embankment/roadway damage.

Structural (Longitudinal) Alignment

Horizontal or vertical alignment of the structure



Poor:

Significant horizontal or vertical misalignment of the pipe (note: do not confuse with constructed pipe bends).



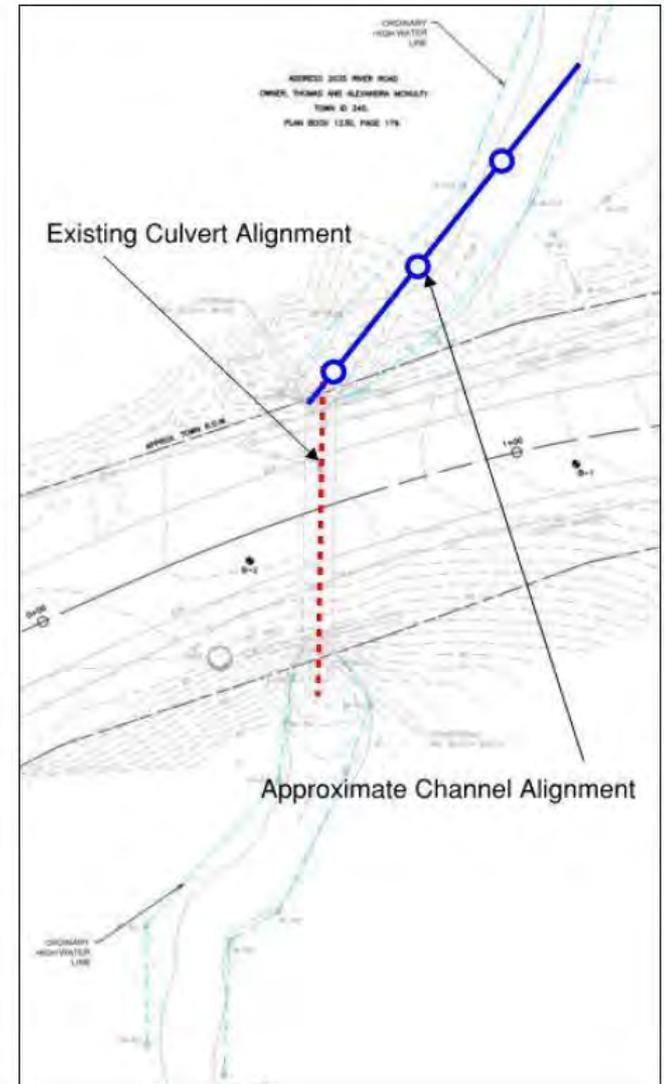
Critical:

Significant misalignment resulting in deformation of pipe or embankment/roadway damage.

CHANNEL ALIGNMENT

What is it?

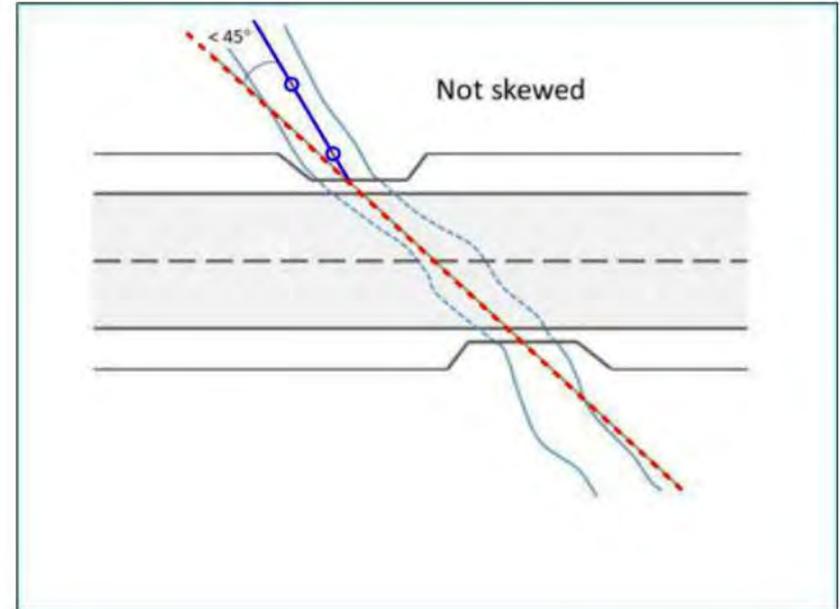
Indicates the alignment of the crossing structure relative to the stream at the inlet. Compare the crossing centerline to a centerline of the stream where it enters the crossing.



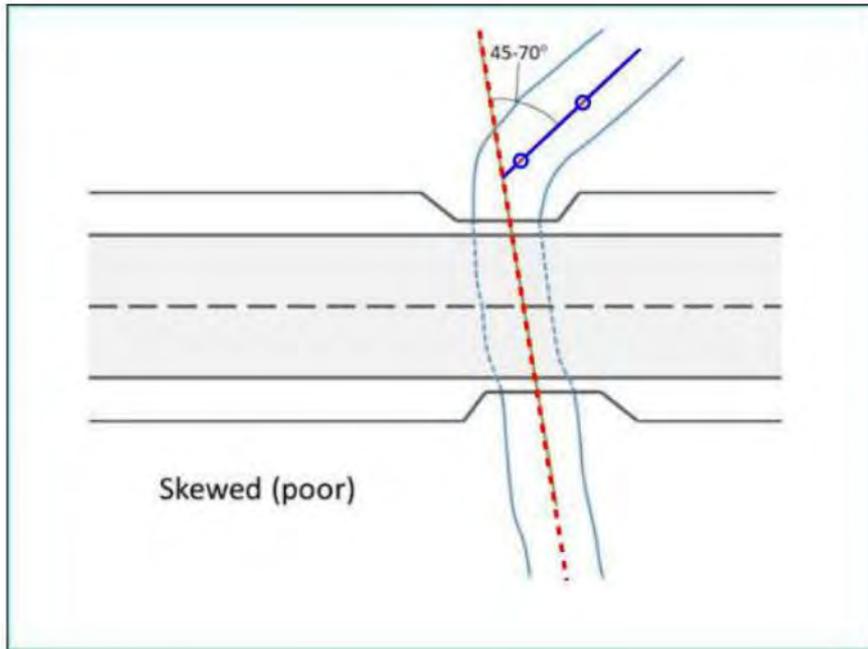
Channel Alignment

Adequate:

Angle measured from upstream channel to centerline of culvert barrel is from 0-45 degrees.

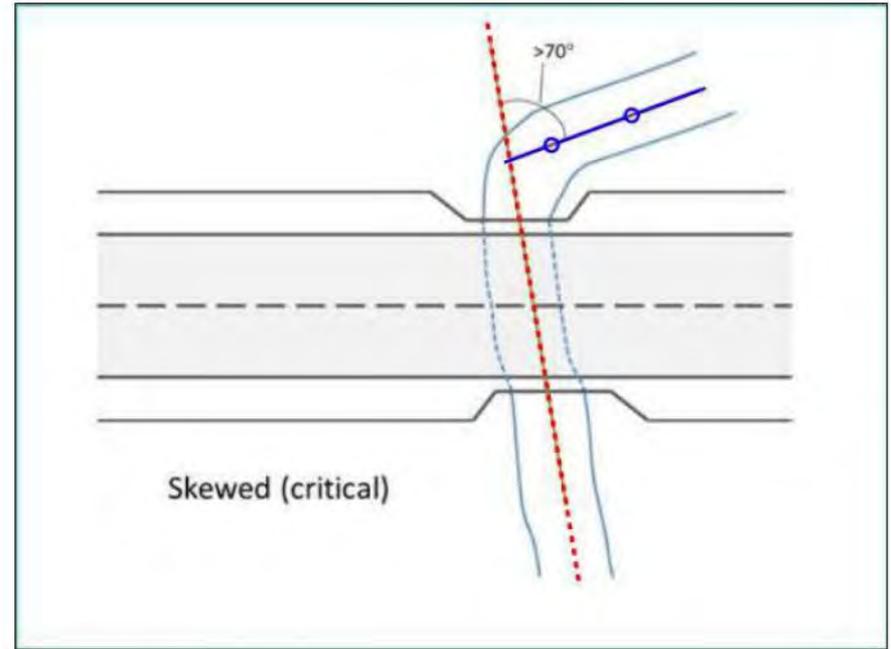


Channel Alignment



Poor:

The stream channel approaches the crossing at an angle of 45-70 degrees from the centerline of the structure.



Critical:

The stream channel approaches the crossing at an angle of 70-90 degrees from the centerline of the structure.



Level of Blockage



Poor:

Debris/sediment/vegetation blocks is 30 - 50% of the inlet/outlet opening.



Critical:

Sediment blocks more than 50% of the inlet/outlet opening (and not designed that way for aquatic organism passage).



Flared End Section

RATING THIS CHARACTERISTIC

Adequate:

Minor cracking, deterioration, or deformation. Minor undermining.



Flared End Section



Poor:

Significant cracks, piping (water flow along the outside walls of a structure) or undermining affects >50% of the structure. End crushed or separated from the barrel.



Critical:

Significant misalignment resulting in deformation of pipe/structure or embankment/roadway damage.

INVERT DETERIORATION

What is an Invert?

The part of a culvert below the spring line (the horizontal centerline of a pipe or structure) that represents the lowest point in the internal cross section. Also, the stream bed or floor within a structure or channel.

Invert Deterioration

RATING THIS CHARACTERISTIC

Adequate:

Metal: Minor corrosion and pitting, no holes or distortion. Cannot penetrate metal with sharp point of chipping hammer.

Concrete: Minor isolated scaling (loss of smooth cement surface) or spalls (exposing aggregate).

Plastic: No cracking or loss of section (part of the material structure) along the invert.



Scaling:



Spalling:



Invert Deterioration



- Poor:** Metal: Perforations are visible and/or connection hardware failing.
Concrete: Heavy abrasion and scaling with exposed steel reinforcement.
Plastic: Heavy abrasion or scour damage (plastic).
Masonry: Displaced mortar and/or blocks, holes in invert area.



- Critical:** All types: Holes or section loss with extensive voids beneath invert and/or embankment/roadway damage. Holes and gaps with extensive infiltration of soil, bedding or backfill material. No invert at all remaining.

Invert Deterioration

Critical:

Invert of the inlet is bent upward above the streambed or mitered edges are crumpled inward, or pipe has “popped” out of the ground, or pipe is crushed.







CMP Invert Deterioration



BUOYANCY OR CRUSHING

What is it?

Buoyancy is when the water is exerting upward pressure on the culvert, causing it to lift.

Crushing is caused by downward pressure on the culvert.

Buoyancy or Crushing

RATING THIS CHARACTERISTIC

Adequate:

Hydraulic uplift is overcome by a combination of the weight of the pipe, weight of the fill material over the pipe and weight of the water in the pipe.

Plastic, CMP (metal) and Concrete: 12" minimum
Metal/Steel Arches: 18" minimum

Note: Seldom see this in concrete culverts.



Buoyancy or Crushing



Poor:

Light to moderate denting or deformation of the inlet and/or outlet end of flexible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).



Critical:

Invert of the inlet is bent upward above the streambed or mitered edges are crumpled inward, or pipe has "popped" out of the ground, or pipe is crushed.

Buoyancy or Crushing



Poor:

Light to moderate denting or deformation of the inlet and/or outlet end of flexible pipe culvert. The invert of the inlet is at the streambed elevation (no uplift).



Critical:

Invert of the inlet is bent upward above the streambed or mitered edges are crumpled inward, or pipe has "popped" out of the ground, or pipe is crushed.



Cross-Section Deformation

RATING THIS CHARACTERISTIC

Adequate:

Minor distortions isolated within the pipe resulting in flattening of the invert and/or crown. Isolated sections are slightly non-symmetrical. Span dimension is within 5-15% of design.

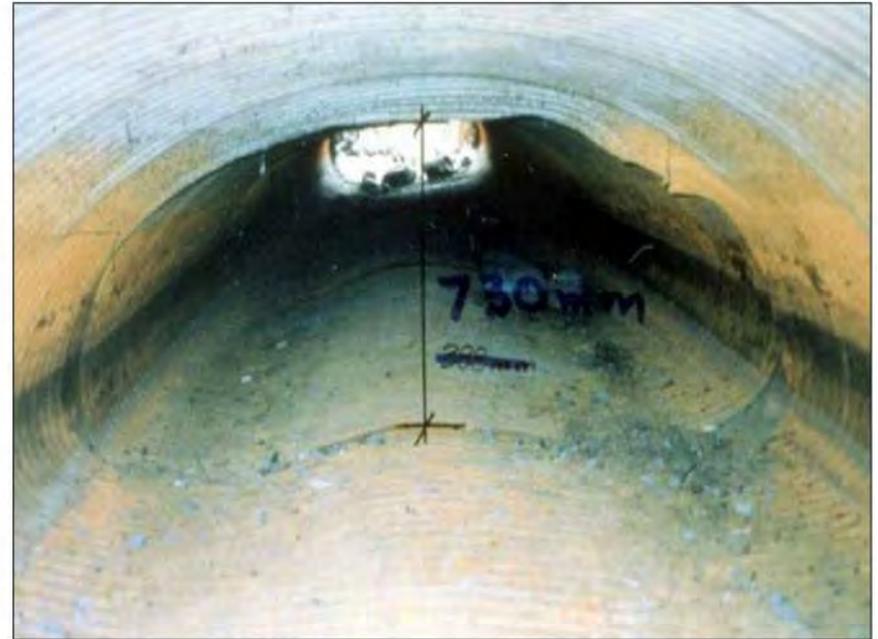


Cross-Section Deformation



Poor:

Significant distortions within the pipe resulting in flattening of the invert and/or crown of the pipe. Span dimension is within 15-20% of design.



Critical:

Severe distortions and deflection within the pipe; flattening of the crown or invert; structure is partially collapsed. Span dimension is greater than 20% of the design.



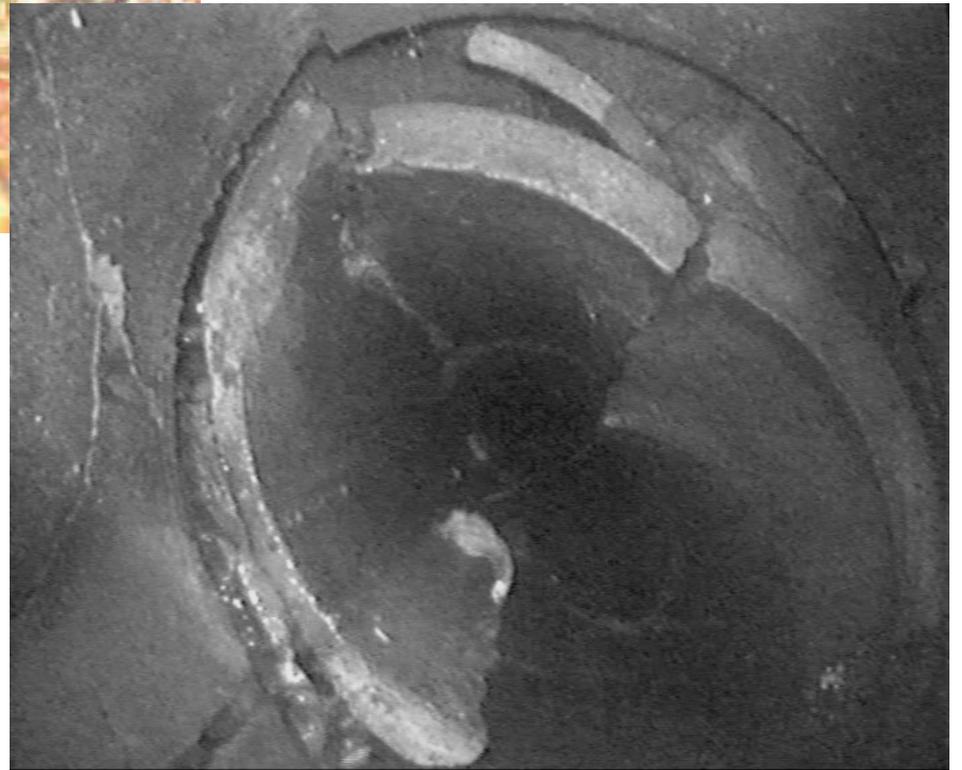
Deformation of crown with possible seam damage

Significant open joints and deformation





Critical



Structural Integrity of Barrel

RATING THIS CHARACTERISTIC

Adequate:

Concrete: Longitudinal cracks $< 1/8$ " in width, spalls up to $1/4$ " deep.

Plastic: Minor isolated rip or tear caused by debris, less than 6" in length and $1/2$ " in width. Minor cuts or gouges to end sections from maintenance or construction activities.

Metal: Minor cracking around bolt holes or seams at isolated sections.



Structural Integrity of Barrel

Poor:

Concrete: Open cracks $>1/8$ " wide with voids and significant infiltration of soil and/or leakage of water. Spalls $>1/2$ " deep, with exposed rebar. Heavy rust staining and/or exposed steel reinforcement in sides and top of barrel.

Masonry: Missing and/or displaced blocks.

Plastic: Several splits, tears and cracks >6 " long. Significant deformation or liner and wall buckling. Openings in pipe causing loss of backfill material.

Metal: Significant cracking and/or deterioration along bolt holes and isolated seams of plates.



Structural Integrity of Barrel

Critical:

Cracks, tears, splits, bulges, holes, or section loss have led to extensive infiltration of soil, structural failure, voids and embankment/roadway damage.

Concrete: Severe cracking and spalling $> \frac{1}{2}$ " on culvert walls, sections of culvert are partially collapsed, major corrosion of rebar.

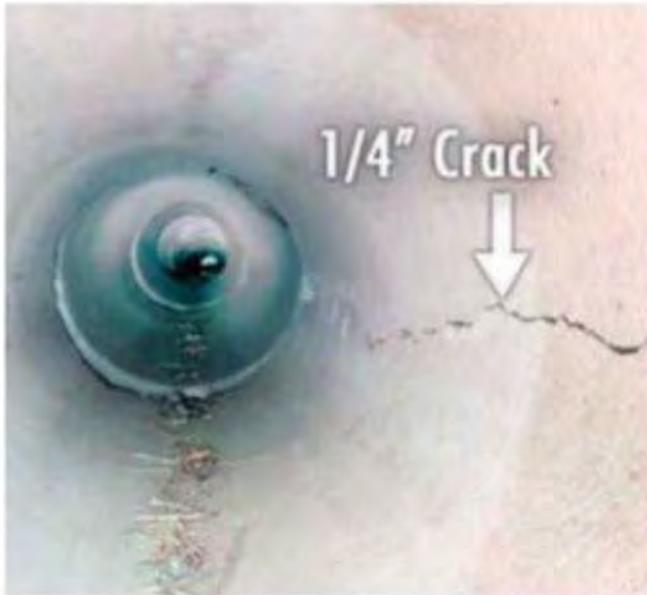
Plastic: Cracking, splits, punctures, or tears over 6" in length and over 1" wide. Openings in pipe causing loss of backfill material.

Metal: Severe cracking and deterioration along bolt holes and along seams of plates.



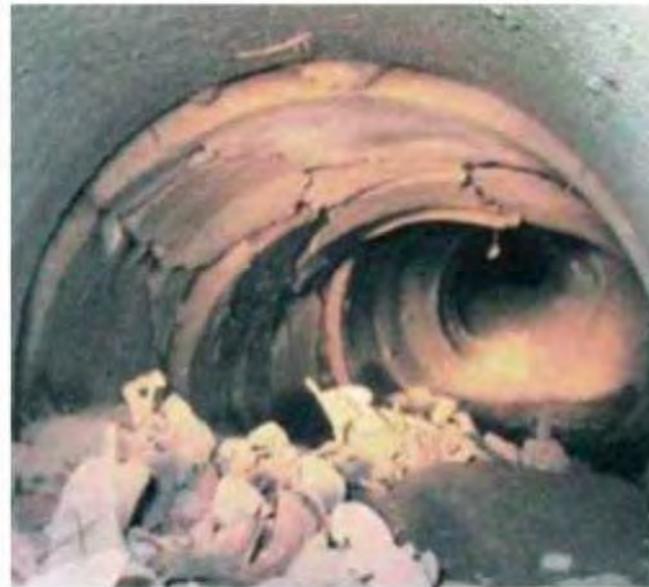
Structural Integrity of Barrel

Concrete



Poor

Longitudinal cracks between 1/8" - 1/4" in width, spalls larger than 1/2" deep, and spalls have exposed rebar.



Critical

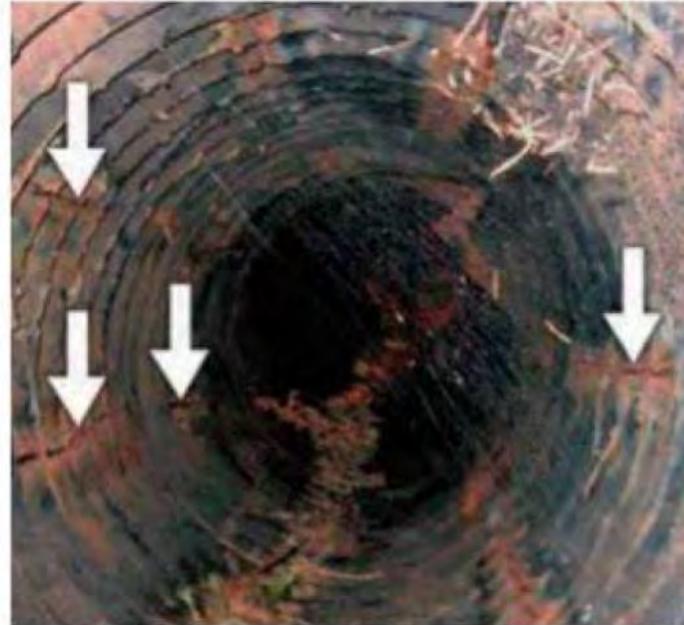
Severe cracking and spalls greater than 1/2" on culvert walls, sections of culvert are partially collapsed, major corrosion of rebar.

Structural Integrity of Barrel



Poor

Significant cracking and/or deterioration along bolt holes and isolated seams of plates.



Critical

Severe cracking and or deterioration along bolt holes and along seams of plates.

Metal







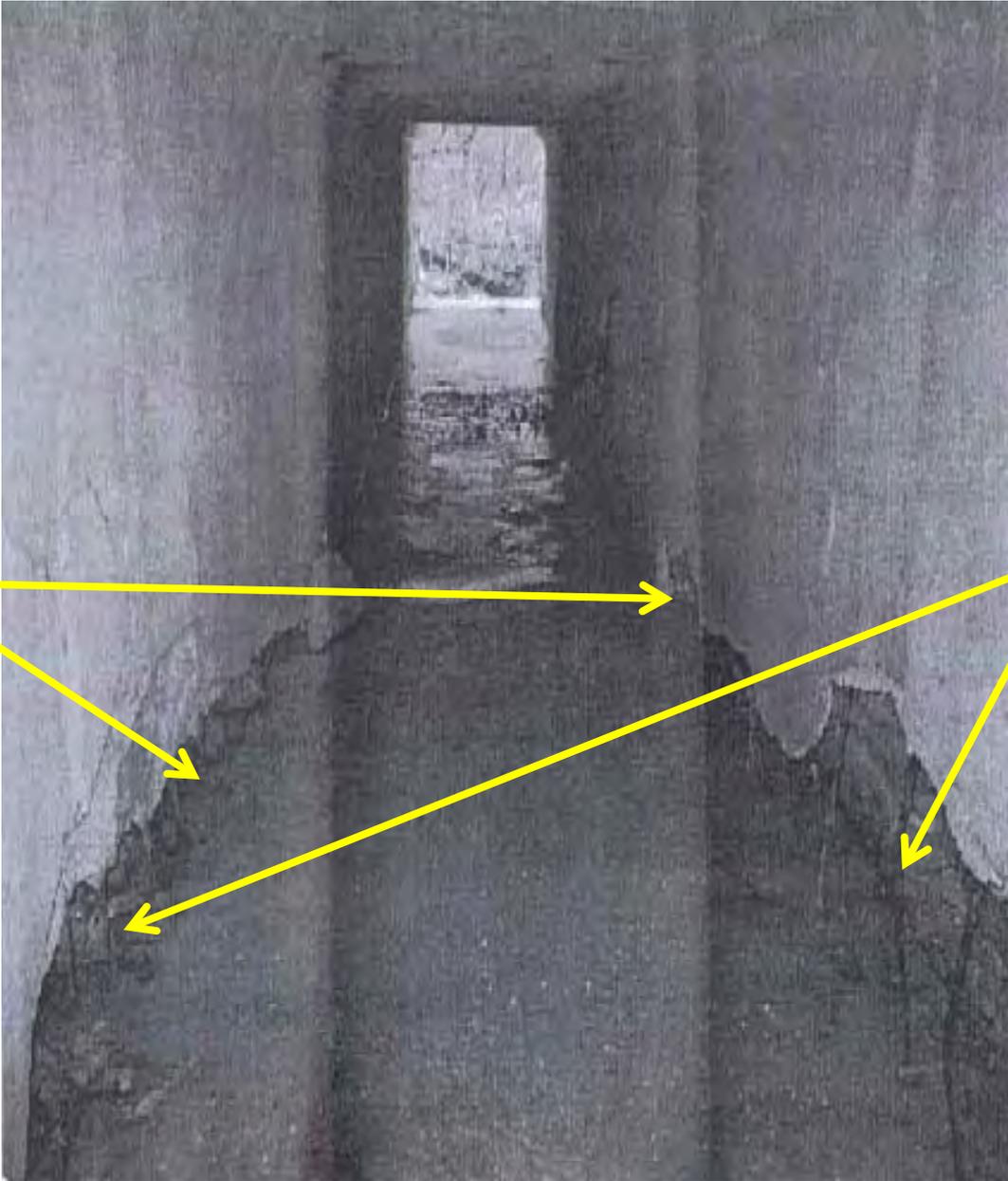


Deformation

Flaking & Chipping

Soil Infiltration

Poor



Heavy invert
abrasion

Exposed rebar

Poor



Open crack > ¼ in. wide



Flaking and exposed rebar

Poor



Joints displaced

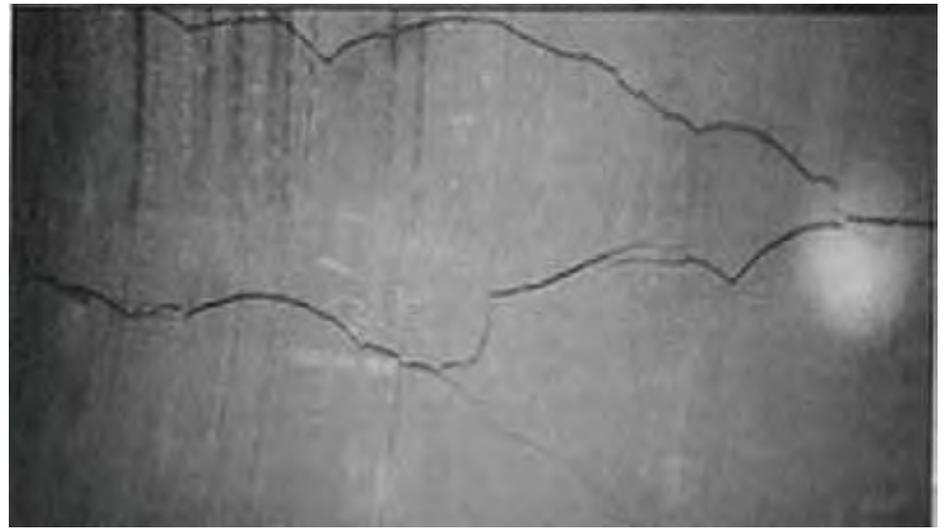


Joint deterioration



Soil infiltration at joint

Poor



Longitudinal cracks



Circumferential cracks



Poor

Critical





Critical





Critical



Joints and Seams

RATING THIS CHARACTERISTIC

Adequate:

Minor separation of joints and seams up to 1", minor backfill infiltration.



Joints and Seams



Poor:

Open or displaced with significant infiltration of soil and/or leakage of water and voids visible. Missing mortar or displaced blocks (masonry).



Critical:

Open or displaced with significant infiltration of soil and accompanying embankment/roadway damage.

Joints and Seams

Concrete



Poor

Significant separation of joints and seams between 1" to 3"; infiltration of backfill into culvert; voids visible in fill through offset of joints.



Critical

Severe separation of joints and seams greater than 3"; infiltration of backfill into culvert; large voids visible in fill through offset of joints.











Footings

RATING THIS CHARACTERISTIC

Adequate:

Minor to moderate deterioration of foundations or footings (if visible).

Concrete: minor/moderate cracking, scaling or spalling.

Masonry: moderate weathering (minor joint deterioration, loss of mortar). No/slight settlement or undermining. Minor footing exposure.



Footings



Poor:

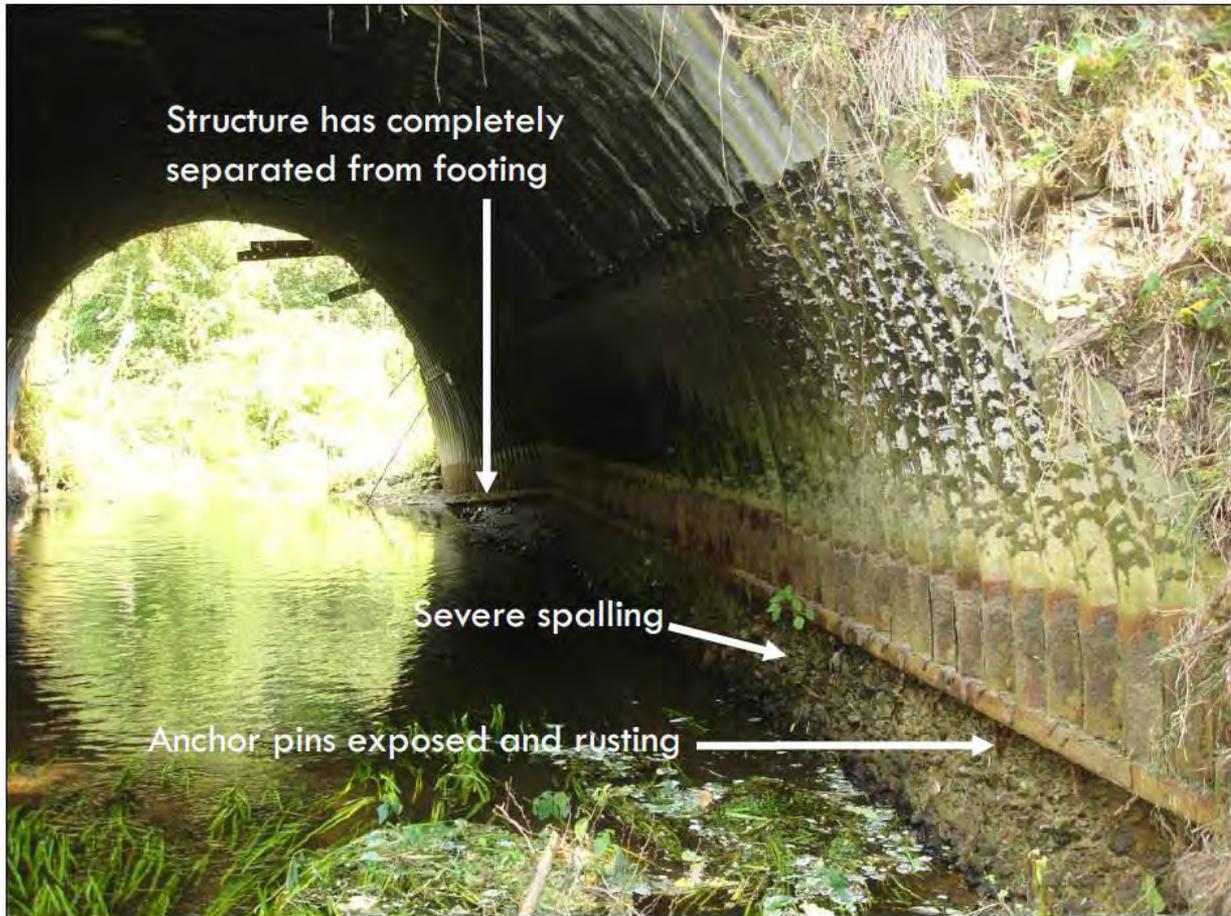
Extensive deterioration.

Concrete: extensive cracking or scaling (delamination (large scale separation of concrete cover of reinforcing steel (rebar)) or spalling may be prevalent).

Masonry: extensive weathering (significant joint deterioration or loss of mortar).

Significant settlement or undermining. Footing exposed and undermined.

Footings



Critical:

Severe or critical deterioration. Function or structural capacity of the culvert has been severely impacted - immediate repairs or structural analysis may be required.

Concrete: severe cracking, scaling, delamination or spalling.

Masonry: severe weathering (failed joints or displaced masonry blocks)

Severe settlement or undermining.

Headwall/Wingwalls

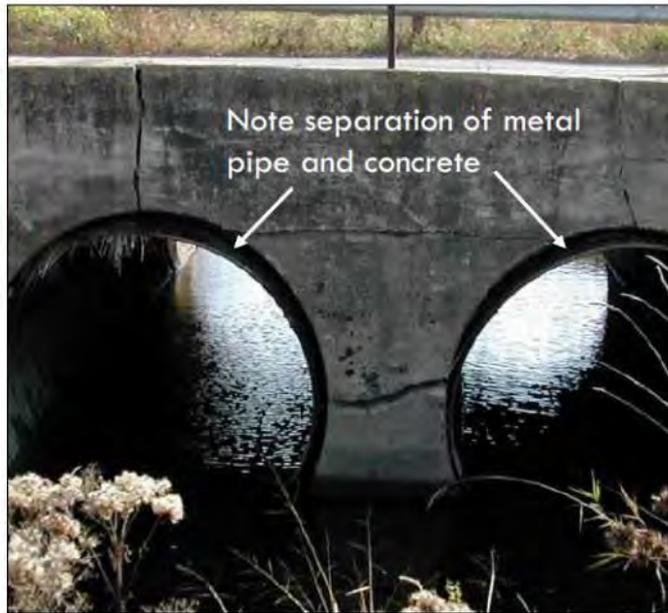
RATING THIS CHARACTERISTIC

Adequate:

Minor spalls and cracks less than 1/8" in width.
No exposed rebar or surface evidence of rebar corrosion. Minor settlement of the wall.



Headwall/Wingwalls



Poor:

Significant spalls and cracks between 1/8" to 1/4" in width. Exposed rebar with corrosion. Significant settlement of the wall.



Critical:

Extensive deterioration with loss of concrete. Corrosion of rebar and extensive section (full material integrity as a unit) loss. Extensive settlement of the wall.

A portion of the structure has broken off (section loss) and collapsed into the stream.











Armoring

RATING THIS CHARACTERISTIC

Adequate:

Streambed and streambanks are reinforced with a protective covering of rocks (natural) or engineering materials. No evidence of displacement of rocks or bed materials and substrate (stream bed).



Armoring



Poor:

Significant displacements, undermining or deterioration affecting the performance of the culvert structure and/or creating a scour pool.



Critical:

Partially or totally failed, significantly affecting performance and/or causing embankment/roadway damage or undermining of the culvert barrel or footings.

Apron

RATING THIS CHARACTERISTIC

Adequate:

Some minor undermining of culvert and small scour hole. Some deterioration of joint between apron and headwall.



Apron



Poor:

Significant undermining of culvert and evidence of scour hole. Significant deterioration of joint between apron and headwall.



Critical:

Extensive undermining of culvert and development of a large hole under a structural element of the culvert. Substantial deterioration of joint between apron and headwall.

EMBANKMENT PIPING

What is it?

Water or seepage flowing along the exterior of a culvert potentially causing erosion of the backfill soil or embankment.

Embankment Piping

RATING THIS CHARACTERISTIC

Fair:

Embankment moist only in areas surrounding culvert barrel. No evidence of flow or sediment transport observed.



Embankment Piping



Poor:

Evidence of seepage through the embankment along the outside of the culvert barrel, sediment transport not observed.



Critical:

Evidence of flow through embankment along the outside of culvert barrel. Evidence of sediment transport, "voids" or sink holes observed.

Embankment Piping

QUIZ

Joints and Seams
Critical:
Open or displaced
with significant
infiltration of soil
and accompanying
embankment/road
way damage.







NAACC Data Center

[Search Crossings](#) [Login](#)

Welcome to the NAACC Data Center!

This website stores all the North Atlantic Aquatic Connectivity Collaborative (NAACC) data for road-stream crossings assessments. You may search, view, map and download most of the data in Excel or Shapefile format without logging on. If you are logged on, pages accessed from the navigation bar allow for entering and correcting crossing records. If logged on, you may also manage user data and download the [Offline Data Manager](#). Only certified NAACC lead observers and coordinators can log on.

About the NAACC

The [NAACC](#) is a network of individuals from agencies and organizations focused on improving aquatic connectivity across a thirteen-state region. The NAACC provides protocols for road-stream crossings (culverts and bridges) to assess and score crossings for fish and wildlife passability, as well as culvert condition and other data useful for evaluating risk of failure.

Contact

contact@naacc.org

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www.naacc.org

Data Input

- Paper forms
- Electronic data collection
- Bulk uploads

← → ↻ 🏠 https://63.134.242.172/cdb2/naacc_add_correct_crossing.cfm?err=0#top 🔍 ☆

📱 Apps 📄 Getting Started 📁 Imported From Firef...



North Atlantic Aquatic Connectivity Collaborative
NAACC

North Atlantic Aquatic Connectivity Collaborative

[Search Crossings](#) [Add New Record](#) [Add-Edit-View Observers](#) [Edit-View Coordinators](#) [Login](#) [Logout](#)

Crossing Data

No images uploaded for this crossing

Date observed in field: (m/d/yyyy) / / Coordinator:

Lead Observer: Town:

Stream/River: Road:

Road type: Multilane road (>2 lanes) Paved Unpaved Driveway Trail Railroad

Location:

GPS Decimal Coordinates: (WGS 84 EPSG:4326) Lat: Long:

When done entering GPS coordinates, click 'View map' to choose a crossing code:

Crossing code: GPS to crossing distance (meters):

Crossing type:
 Bridge Culvert Multiple Culvert Ford Removed Crossing Inaccessible Buried Stream No crossing Unknown

Number of Culverts/Bridge Cells:

Crossing Comments:

Flow condition: No Flow Typical low-flow Moderate High

Condition of Crossing: OK Poor New Unknown

Tidal Site: Yes No Unknown Alignment: Flow-Aligned Skewed (>45°)

Road Fill Height (ft) (Top of culvert to road surface; Bridge = 0) Tailwater Scour Pool: None Small Large Unknown

Bankfull Width (optional): Bankfull Width Confidence: High Low/Estimated

Constriction: Severe Moderate Spans Only Bankfull/Active Channel Spans Full Channel & Banks Unknown

Please first complete the form above to prevent data entry validation messages from interfering with uploading images, and then add at least two images in JPEG format. Four images are recommended, and seven is the maximum. The upload file size limit is 5MB per image file.

After browsing to your image files, click "Add Images" and wait for the images to appear at the top of this page before clicking "Save Crossing Information." Your images will be automatically reduced in file size to below 250KB and renamed according to NAACC convention, which can take a few seconds per image depending on file size. Please be careful to upload the correct image for each "Browse" button because the image will be named using the text to the left of the button.

Inlet Photo: No file chosen

Outlet Photo: No file chosen

Upstream Photo: No file chosen

Downstream Photo: No file chosen

Other 1 Photo: No file chosen

Other 2 Photo: No file chosen

Other 3 Photo: No file chosen

Crossing Data

No images uploaded for this crossing

Date observed in field: (m/d/yyyy) / /

Coordinator:

Lead Observer:

Town:

Stream/River:

Road:

Road type: Multilane road (>2 lanes) Paved Unpaved Driveway Trail Railroad

Location:

GPS Decimal Coordinates: (WGS 84 EPSG:4326) Lat: Long:

When done entering GPS coordinates, click 'View map' to choose a crossing code:

Crossing code:

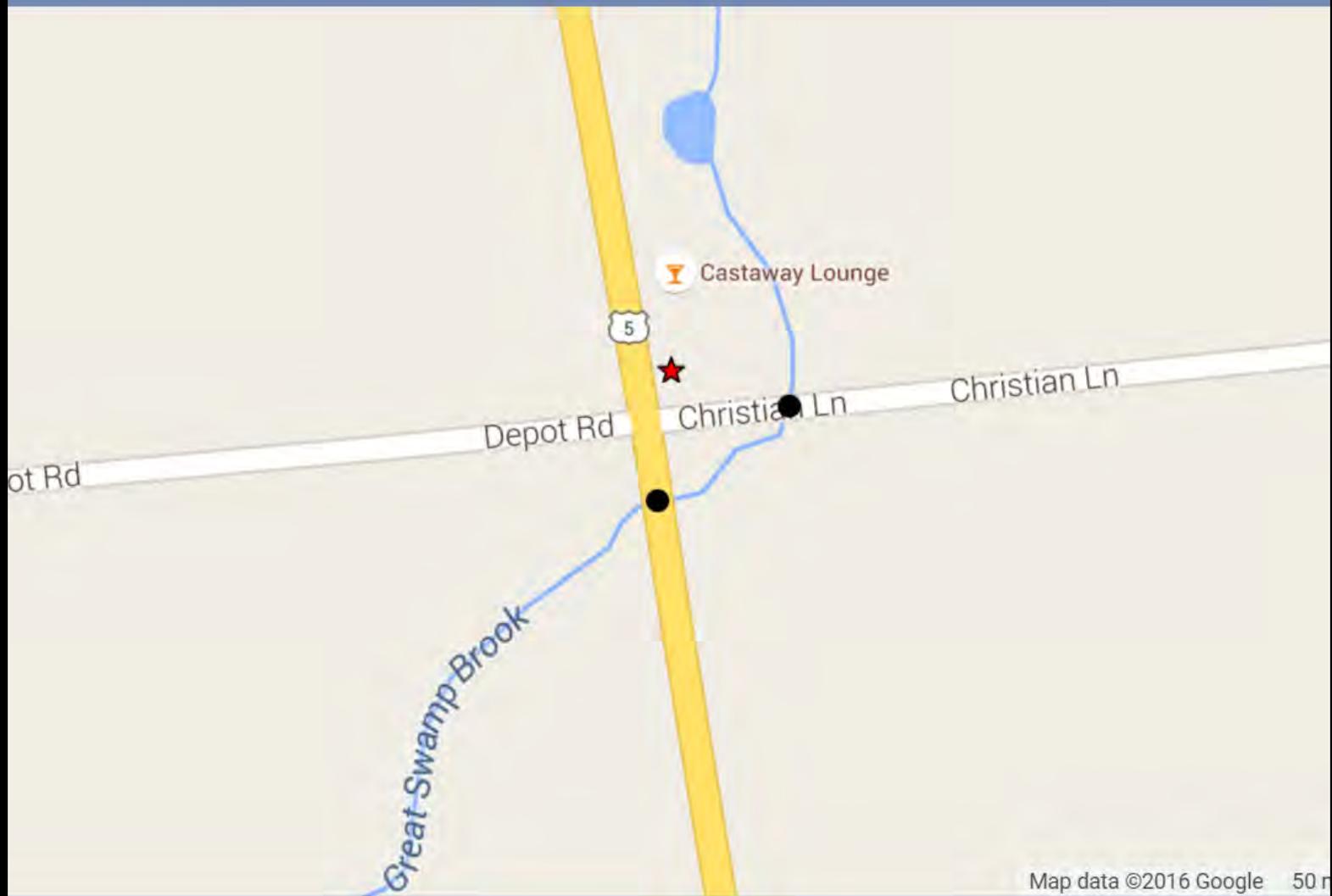
GPS to crossing distance (meters):

Crossing type:

Welcome to our new map page!

New users, please read "Map information" before using the map functions.

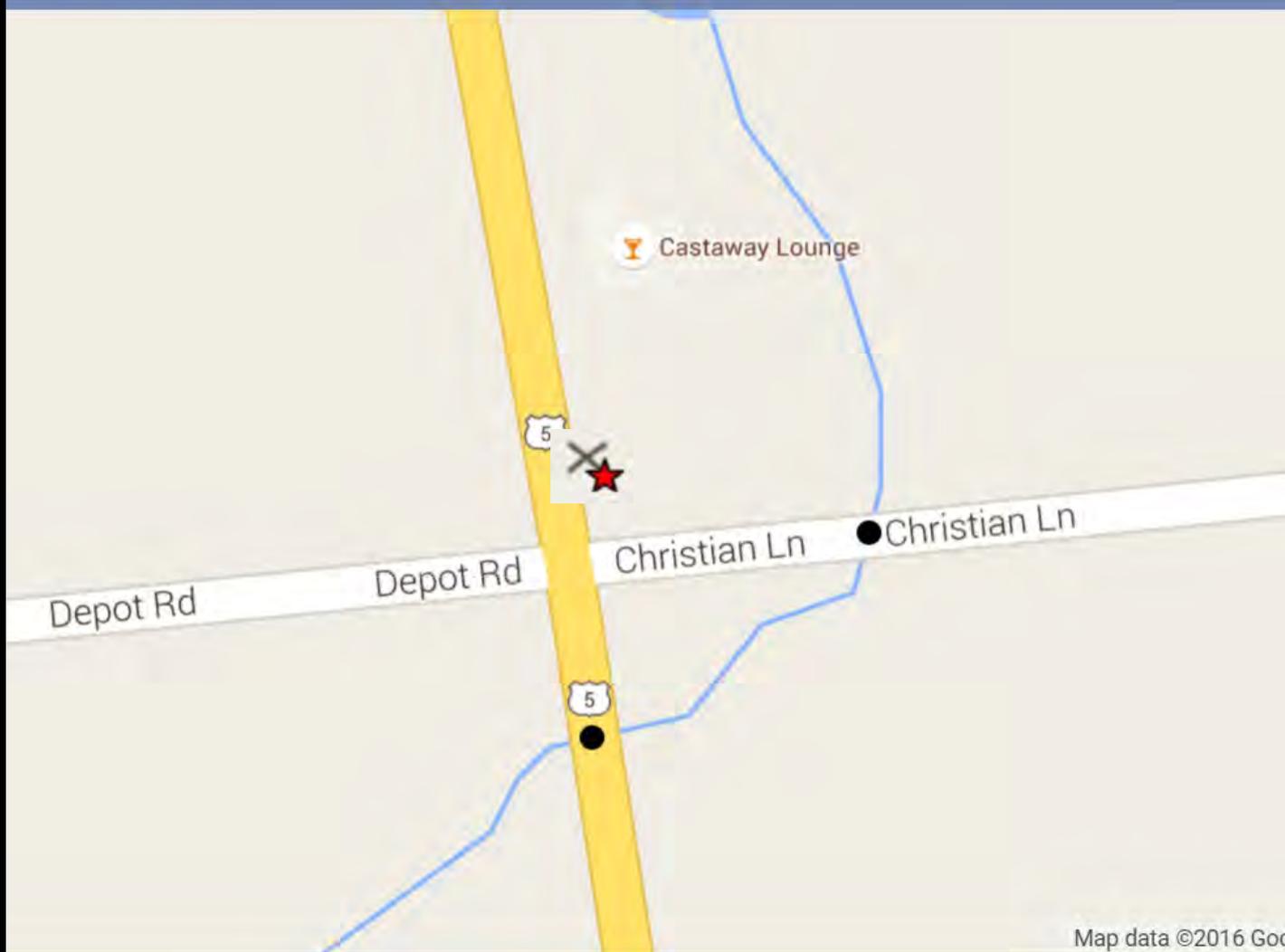
map information



Welcome to our new map page!

New users, please read "Map information" before using the map functions.

Map information



Welcome to our new map page!

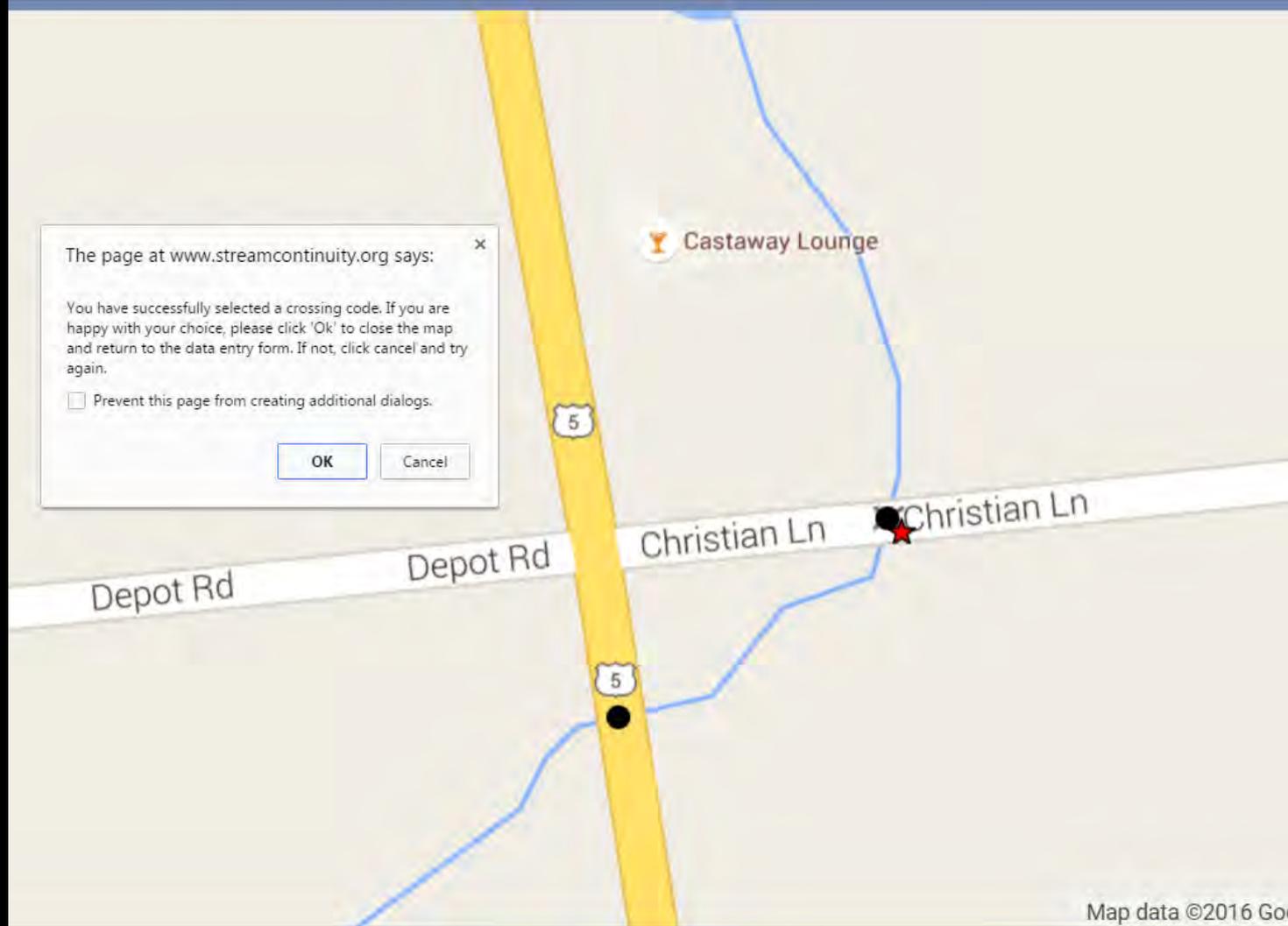
New users, please read "Map information" before using the map functions.

map information

The page at www.streamcontinuity.org says: ✕

You have successfully selected a crossing code. If you are happy with your choice, please click 'Ok' to close the map and return to the data entry form. If not, click cancel and try again.

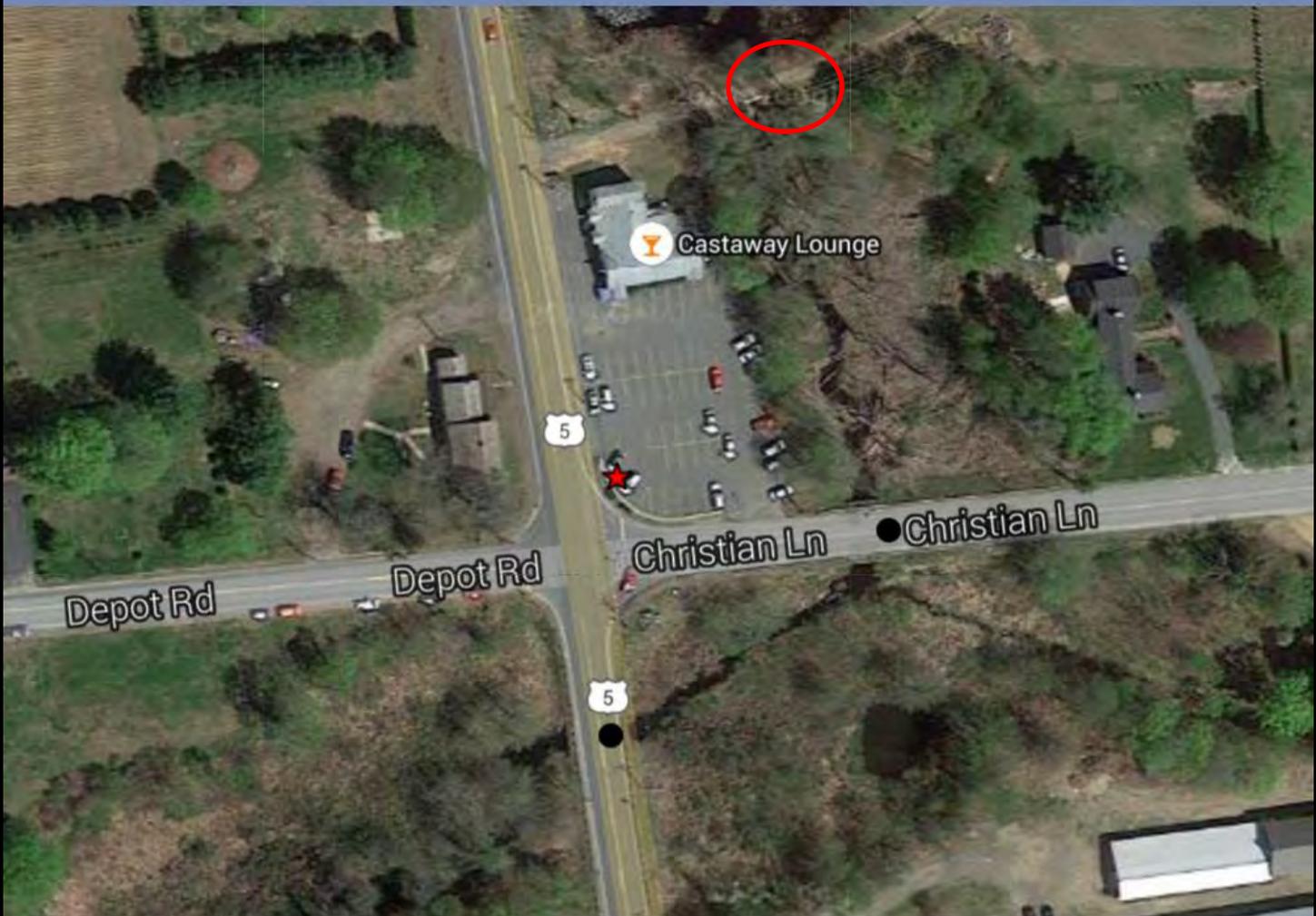
Prevent this page from creating additional dialogs.



Welcome to our new map page!

New users, please read "Map information" before using the map functions.

map information



Welcome to our new map page!

New users, please read "Map information" before using the map functions.

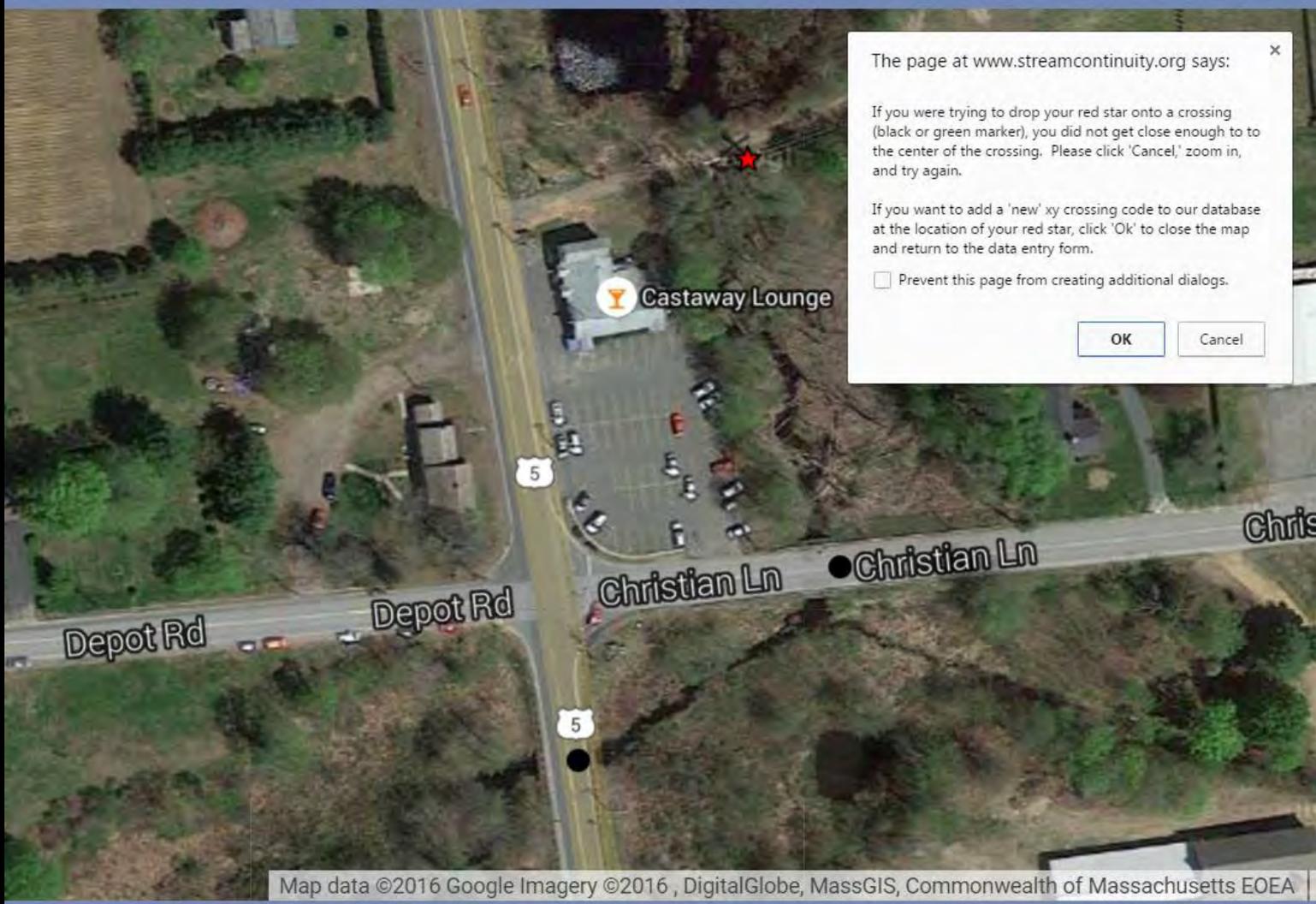
Map information



Welcome to our new map page!

New users, please read "Map information" before using the map functions.

map information



The page at www.streamcontinuity.org says:

If you were trying to drop your red star onto a crossing (black or green marker), you did not get close enough to the center of the crossing. Please click 'Cancel,' zoom in, and try again.

If you want to add a 'new' xy crossing code to our database at the location of your red star, click 'Ok' to close the map and return to the data entry form.

Prevent this page from creating additional dialogs.

OK

Cancel

Scoring Culvert Condition

Two “scores” are assigned to each crossing:

1. Culverts with performance problems will be flagged.
2. A condition score (0.0-1.0) is calculated for each crossing, as follows:
 - a) For each culvert, assign a score for each of the three variables below (V1, V2, V3) using data from the Condition Assessment Form.
 - b) The minimum score resulting from V1, V2, or V3 is the overall condition score for each culvert. The score will range from 0 (most critical condition) to 1 (good condition).

PLUS

If any Section is marked “Unknown” then add “not fully assessed” to the score unless the score is 0.0. For example: “0.7-not fully assessed” or “0.3-not fully assessed” but not “0-not fully assessed”

- c) For multiple culvert crossings, the overall condition score for the crossing is the lowest condition score among the culverts that make up the crossing.

V1 Structural Deficiency – Highly Critical

Variables marked "Critical"	Score
Any one of the following	0.0
Cross-Section Deformation	Inlet or outlet
Structural Integrity of Barrel	Inlet or outlet
Footings	Inlet or outlet
Level of Blockage	Inlet or outlet

V2 Structural Deficiency – Critical

Any three or more of the following	0.0
Any two of the following	0.1
Any one of the following	0.2
Variables marked "Critical"	Score
Buoyancy or Crushing	Inlet or outlet or both counts as 1
Invert Deterioration	Inlet or outlet or both counts as 1
Joints and Seams	Inlet or outlet or both counts as 1
Longitudinal Alignment	Inlet or outlet or both counts as 1
Headwall/Wingwalls	Inlet or outlet or both counts as 1
Flared End Section	Inlet or outlet or both counts as 1
Apron/Scour Protection	Outlet
Armoring	Inlet or outlet or both counts as 1
Embankment Piping	Inlet or outlet or both counts as 1
Variables marked "Poor"	
Cross-Section Deformation	Inlet or outlet or both counts as 1
Structural Integrity of Barrel	Inlet or outlet or both counts as 1
Footings	Inlet or outlet or both counts as 1
Level of Blockage	Inlet or outlet or both counts as 1

V3 Structural Deficiency – Poor

Variables marked “Poor”	Score
For each of the following identified as “Poor”	0.1 pt. deduction from 1.0 down to a minimum score of 0.3
Buoyancy or Crushing	Inlet or outlet or both counts as 1
Invert Deterioration	Inlet or outlet or both counts as 1
Joints and Seams	Inlet or outlet or both counts as 1
Longitudinal Alignment	Inlet or outlet or both counts as 1
Headwall/Wingwalls	Inlet or outlet or both counts as 1
Flared End Section	Inlet or outlet or both counts as 1
Apron/Scour Protection	Outlet
Armoring	Inlet or outlet or both counts as 1
Embankment Piping	Inlet or outlet or both counts as 1

Online Crossings Database

Choose Data Sets (choose multiple):

New Hampshire (2006 - 2016)
Culvert Condition Assessments
Culvert Condition Assessments (all before 2019)
Terrestrial Passage Assessments
NAACC (after 2018)
Tidal Stream Assessments
NAACC (after 2018)

Administrators Tools Login Logout

Dates:

Last updated from ...

All

Last updated until ...

All

Date observed from ...

All

Date observed until ...

All

Personnel:

Any Observer

Any Coordinator

25 per page

Choose Data Sets (choose multiple):

Aquatic Passability Assessments

NAACC (after 6/1/2015)

UMass Stream Continuity Project (2005-2017)

Connecticut (2004-2013)

Vermont (11/20/2002-10/29/2015)

Maine (2007-2015)

New Hampshire (2006 - 2016)

Culvert Condition Assessments

Search



Mapping Support

Location (choose multiple towns, watersheds):
 Massachusetts [1231]
 All MA Cities/Towns or Counties
 Abington [0]
 Acton [0]
 Acushnet [0]

 All MA Watersheds
 Blackstone
 Cape Cod
 Charles

Other:
 Survey ID:
 Crossing Code:
 All NAACC Evaluations
 25 per page
 Choose Data Sets (choose multiple):
 Aquatic Passability Assessments
 NAACC (after 6/1/2015)
 UMass Stream Continuity Project (2005-2017)
 Connecticut (2004-2013)
 Vermont (11/20/2002-10/29/2015)
 Maine (2007-2015)
 New Hampshire (2006 - 2016)
 Culvert Condition Assessments

Dates:
 Last updated from ...

 Last updated until ...

 Date observed from ...

 Date observed until ...

Personnel:
 Any Observer
 Any Coordinator



Data Set	GIS	Excel Reports		
NAACC (after 6/1/2015)	shapefile	simple	detailed	Not available

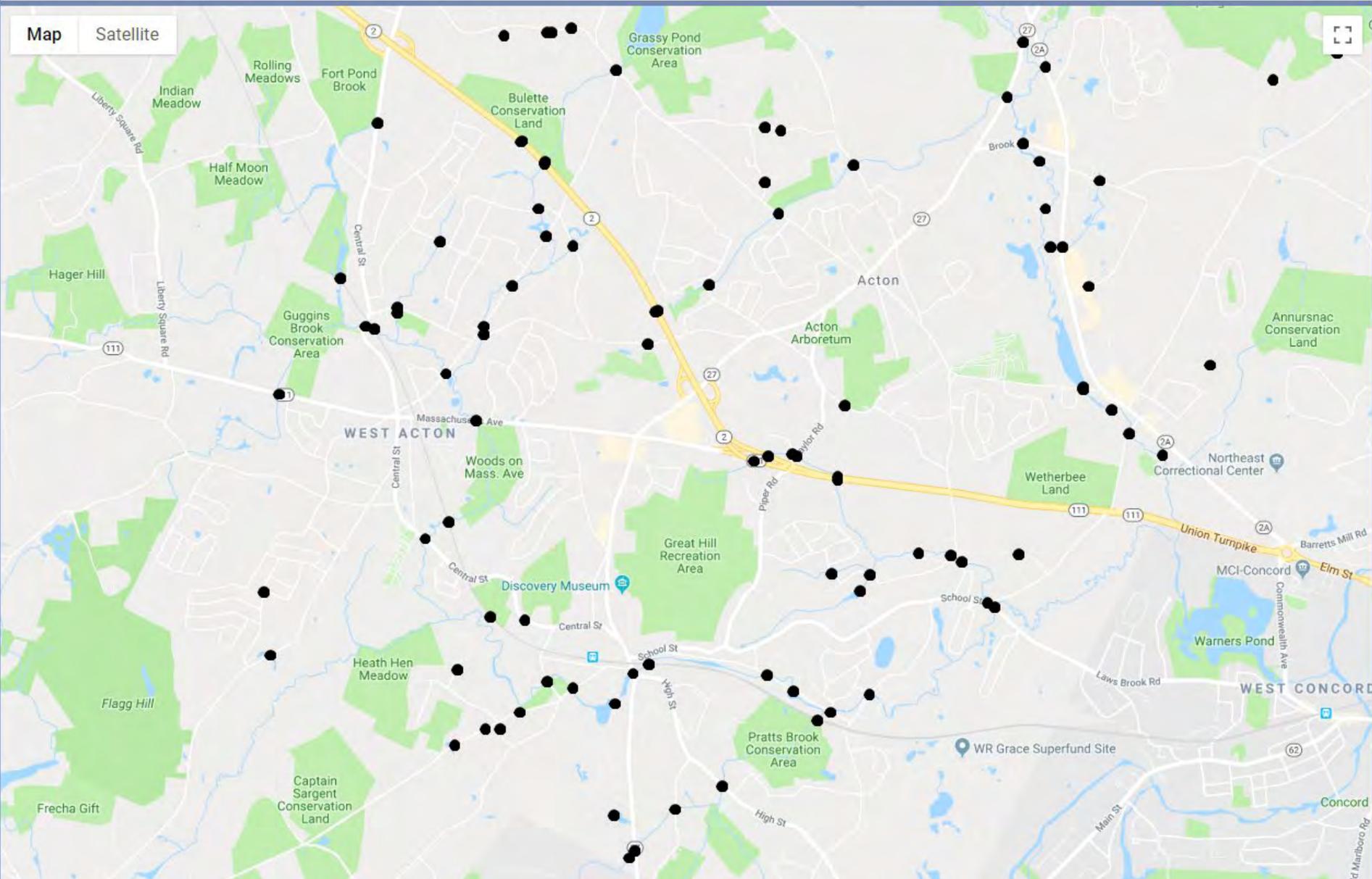
Showing 1255 Records , 25 per page.

Next [1230]

Survey ID	Crossing Code	Date Observed	Last Updated	Town	Stream	Road	Evaluation	Culvert
20001	xy4242796572955280	2015/06/22	2016/03/08	Worthington MA	Unnamed to Whitmarsh Brook	Route 143	Severe barrier	1
20003	xy4265055771254573	2016/07/11	2016/02/25	Tewksbury MA	Unknown	Mt. Joy Rd.	no score - missing data	1
20004	xy4264844271243666	2016/07/11	2016/02/29	Tewksbury MA	Unknown	Maplewood Rd.	Severe barrier	1

Map

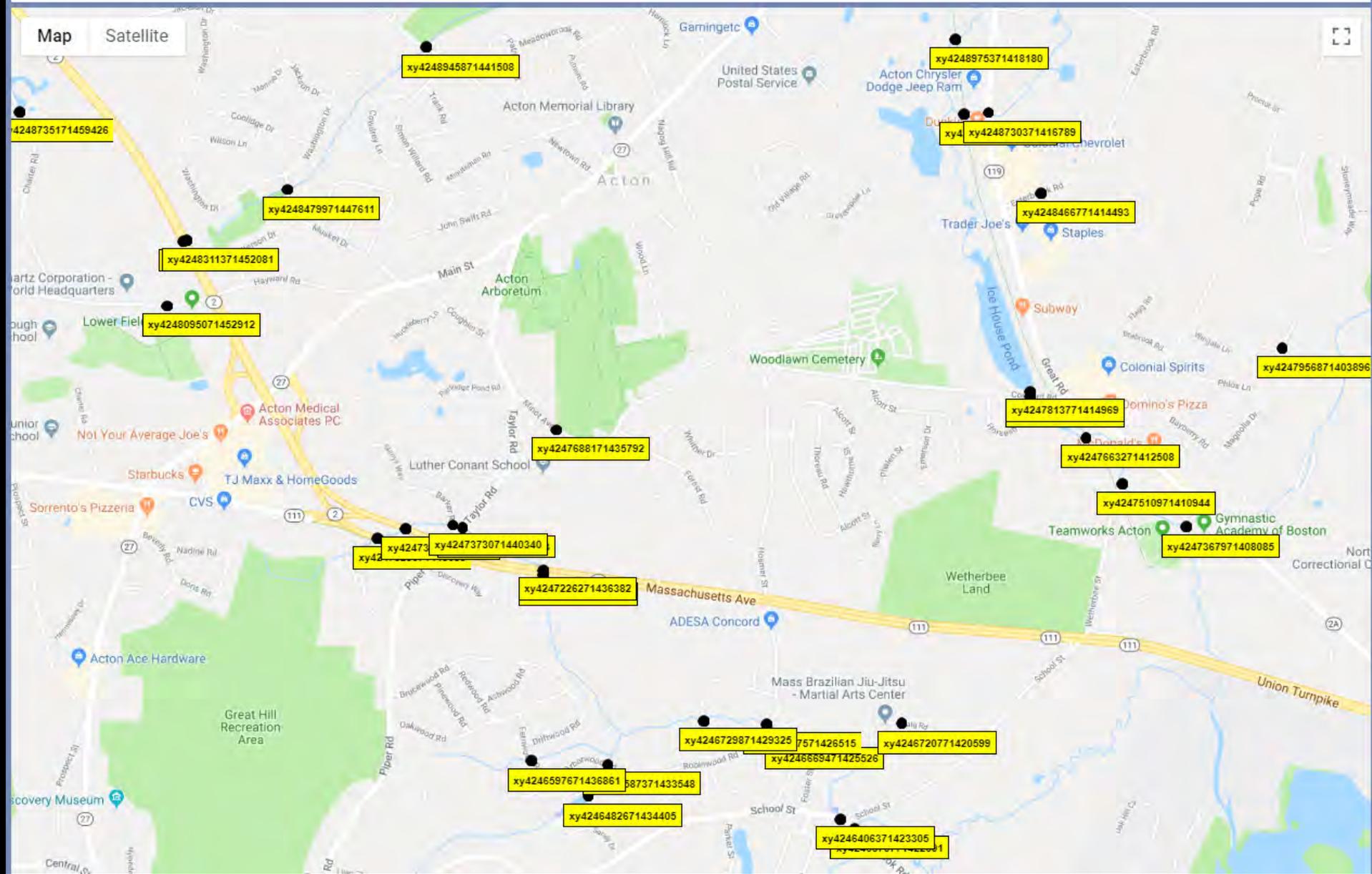
Satellite



Welcome to our search results mapping page. Please be patient when mapping large data sets.

Note that 0 of 0 surveyed records in your search results have been mapped. Only surveyed records having valid xy crossing codes or GPS information can be mapped. However, we have mapped all the unsurveyed crossings in the state, watershed or town you chose. Please note that you may have to zoom in quite far to see unsurveyed crossings.

Map information Click to show/hide map information



Data Reports

- *Excel files*
- *Shapefiles*
- *Mapping interface*

The screenshot shows the NAACC web application interface. At the top, there is a browser address bar with the URL https://www.streamcontinuity.org/cdb2/naacc_search_crossing.cfm?sp=1. Below the browser bar is the NAACC logo and the text "North Atlantic Aquatic Connectivity Collaborative". There are buttons for "Search Crossings" and "Login".

The main search area contains several filters:

- Location (choose multiple towns, watersheds):** Pennsylvania [531], All PA Cities/Towns or Counties (Abbott [0], Abbottstown [0], Abington [0]), All PA streams, All PA Watersheds (Bald Eagle, Beaver, Brandywine-Christina).
- Other:** Survey ID, Crossing Code, All Evaluations, 25 per page.
- Dates:** Last updated from (2/22/2005), Last updated until (1/7/2016), Date observed from (8/5/2002), Date observed until (1/7/2016).
- Choose Data Sets (choose multiple):** NAACC (after 6/1/2015), UMass Stream Continuity Project (through 8/31/2015).
- Personnel:** Any Observer, Any Coordinator.

A "Search" button is located at the bottom right of the filter area. Below the filters, there are buttons for "Map results" and "Export: [Shapefile NAACC](#) - [Excel Simple NAACC](#) - [Excel Comprehensive NAACC](#)".

The results section shows "Showing 532 Records , 25 per page." and a "Next [507]" link. Below this is a table with the following columns: Survey ID, Crossing Code, Date Observed, Last Updated, Town, Stream, Road, Evaluation, and Culvert.

Survey ID	Crossing Code	Date Observed	Last Updated	Town	Stream	Road	Evaluation	Culvert
20345	xy4099648677528049	2015/08/04	2016/01/01	Lamar PA	Spring Run	Unnamed driveway	Coming soon...	2
20346	xy4099071677492480	2015/08/04	2016/01/01	Lamar PA	Cherry Run	Narrows Road	Coming soon...	1
20762	xy4098538677487394	2015/08/05	2016/01/01	Lamar PA	Bear Run	Narrows Road	Coming soon...	1
21058	xy4135100677924888	2015/08/17	2016/01/01	Leidy PA	Kettle Ck.	Kettle Creek Road	Coming soon...	3
21094	xy4133738477904410	2015/08/17	2016/01/01	Leidy PA	UNT to Kettle Ck.	Kettle Creek Road	Coming soon...	1
21095	xy4134134677909855	2015/08/17	2016/01/01	Leidy PA	Summerson Run	Kettle Creek Road	Coming soon...	2
21144	xy4138872177932930	2015/08/17	2016/01/01	Leidy PA	UNT to Kettle Ck.	Kettle Creek Road	Coming soon...	1
21145	xy4137760977930855	2015/08/17	2016/01/01	Leidy PA	Bearfield Run	Kettle Creek Road	Coming soon...	1

Location (choose multiple towns, watersheds):

All States [8692]

All NHD-HUC8 Watersheds
Albemarle
Allagash
Appomattox

Personnel:

Any Observer

Any Coordinator

Other:

Survey ID:

Crossing Code:

All Evaluations

25 per page

Choose Data Sets (choose multiple):

NAACC (after 6/1/2015)
UMass Stream Continuity Project (2005-2016)
Connecticut (2004-2013)

Dates:

Last updated from ...

All

Last updated until ...

All

Date observed from ...

All

Date observed until ...

All

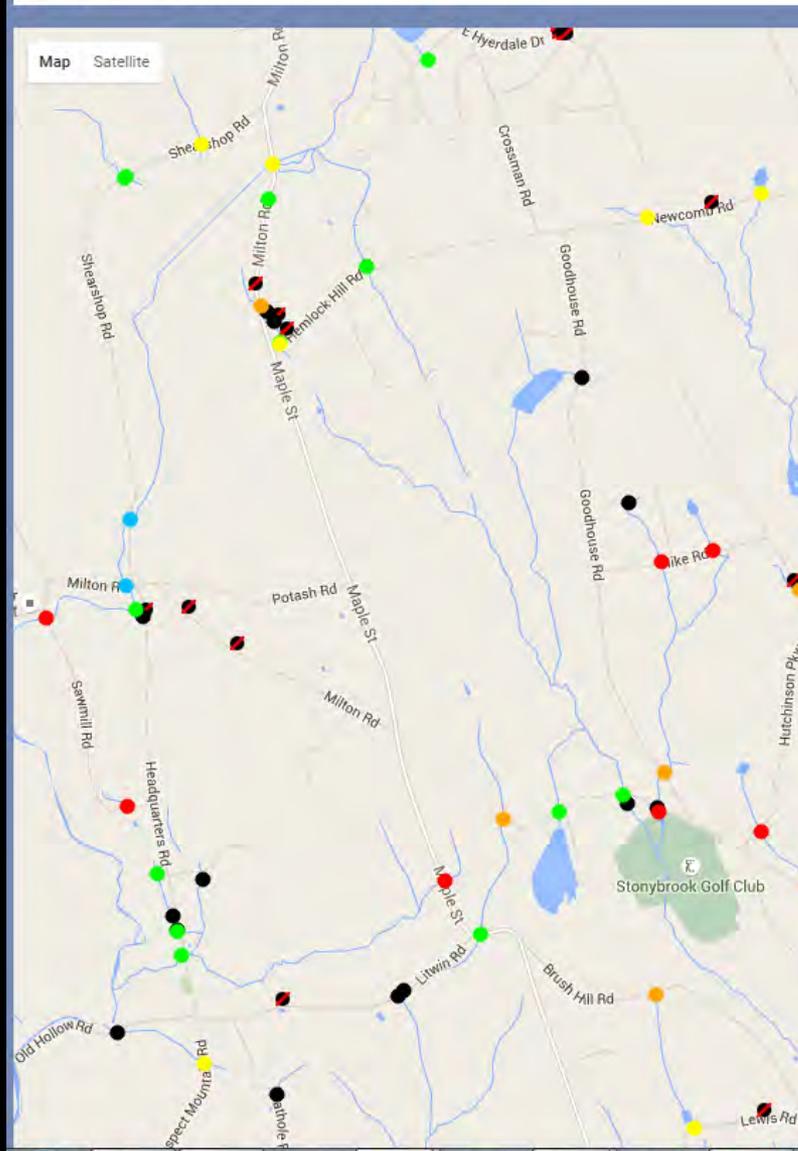
Map results

Data Set	GIS		Excel Reports	
NAACC (after 6/1/2015)	shapefile	simple	detailed	Not available

Showing 6252 Records , 25 per page.

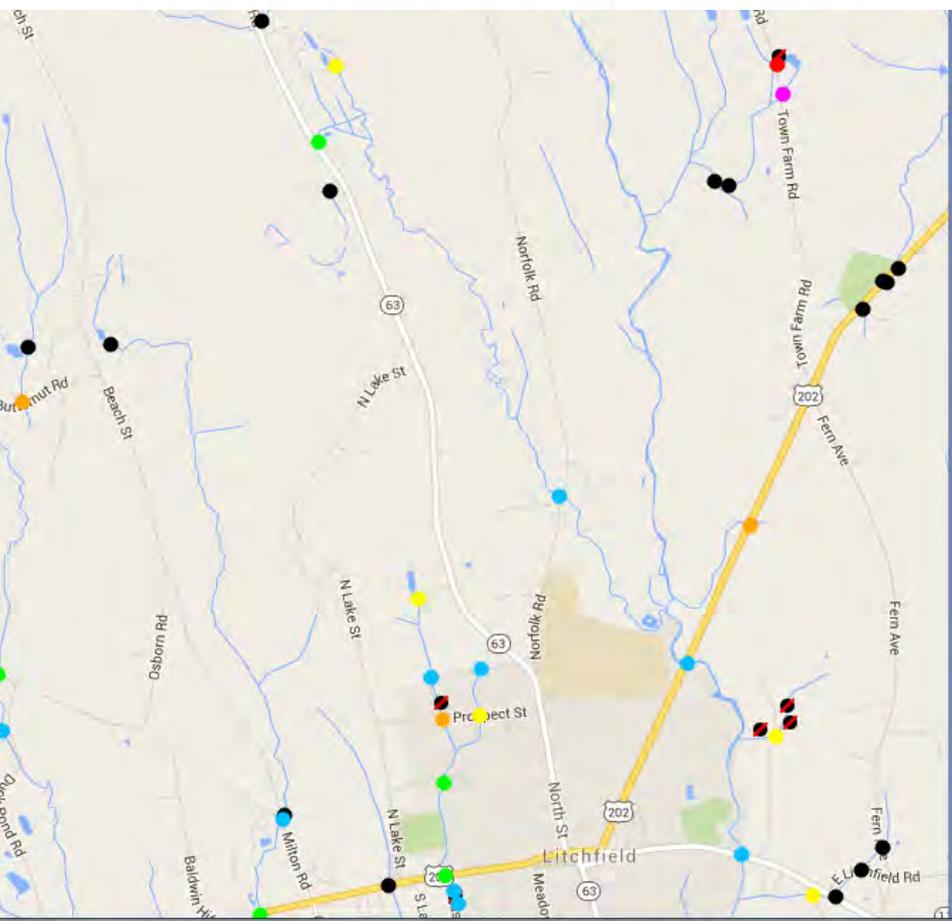
Welcome to

(Note that 1105 of 1116 surveyed records in your search results have been mapped. O records with du

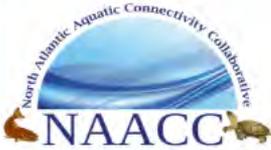


1. The colored circles on the map represent surveyed crossings color coded as follows:

- o **No barrier:** blue ●
- o **Insignificant barrier:** blue green ●
- o **Minor barrier:** green ●
- o **Moderate barrier:** yellow ●
- o **Significant barrier:** orange ●
- o **Severe barrier:** red ●
- o **Missing data:** magenta ●
- o **No crossing:** black circle with bold red x ✘
- o **New crossing pending approval:** black circle with red slash ✂



NAACC (after 6/1/2015) - Google Chrome
 https://naacc.org/naacc_display_crossing.cfm?aqlid=40748



NAACC Data Center

[Search Crossings](#) [Add New Record](#) [Add-Edit-View Observers](#)
[Edit-View Coordinators](#) [Tools](#) [LogIn](#) [LogOut](#)

Data Set: **NAACC (after 6/1/2015)**

Survey Id: **40748** Crossing Code: **xy4269447071758734**
 AOP Coarse Screen: **Reduced AOP** NAACC Aquatic Passability Score: **0.68**
 Data checked and accurate by **Carrie Banks** on **06-23-2017**



[xy4269447071758734\(downstream\)11-14-2016.jpg](#)



[xy4269447071758734\(inlet\)11-14-2016.jpg](#)



[xy4269447071758734\(outlet\)11-14-2016.jpg](#)

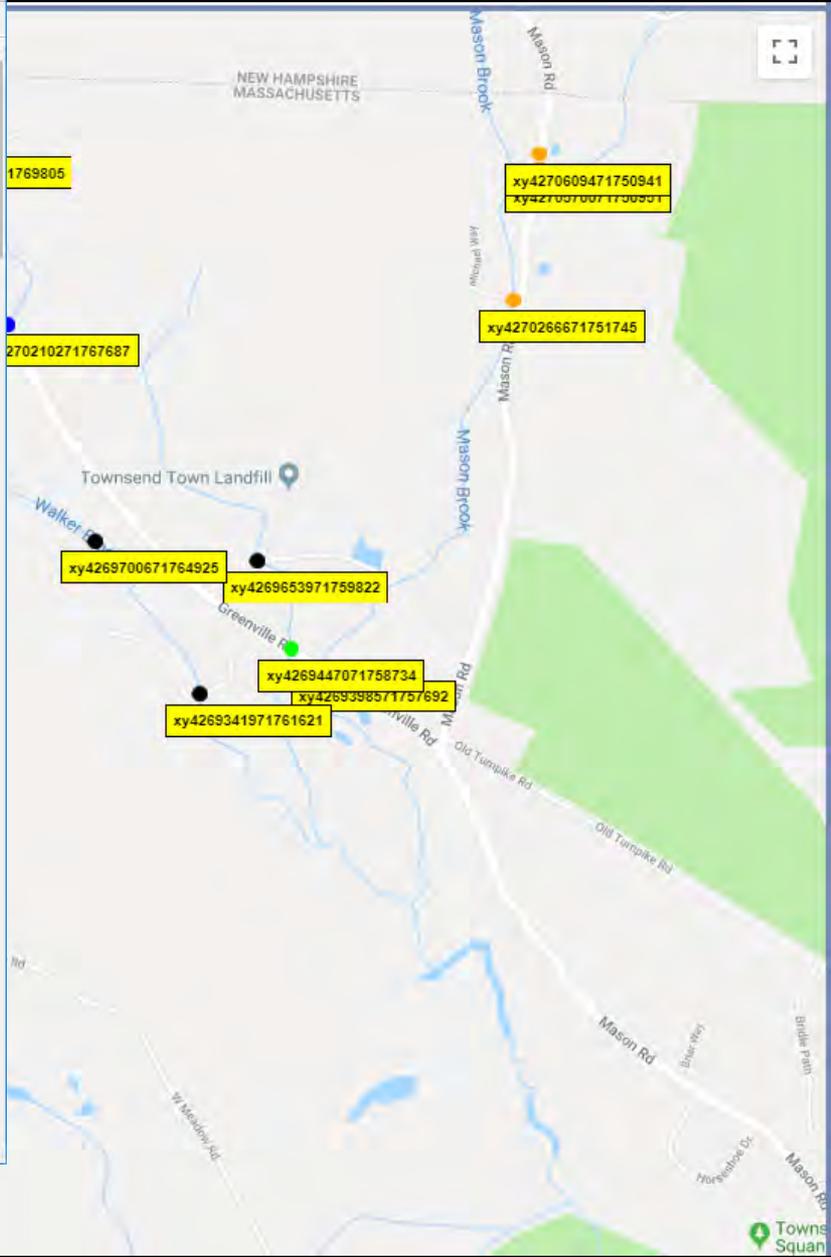


[xy4269447071758734\(upstream\)11-14-2016.jpg](#)

Crossing Data:

[Correct Crossing Data](#) [Add a Structure](#)

Database Entry By: Carrie Banks	Entry Date: 11-15-2016
Coordinator: Carrie Banks	Last Updated: 06-23-2017
GPS to Crossing Distance (meters): 5.5	NHD-HUC8 Watershed: Nashua
Crossing Code: xy4269447071758734	Local ID: No data
Date Observed: 11-14-2016	Lead Observer: Kathryn Nelson
Town/County: Townsend, MA	Stream/River: unnamed trib to Walker Brook





NAACC Data Center

[Search Crossings](#) [Add New Record](#) [Add-Edit-View Observers](#) [Edit-View Coordinators](#) [Tools](#) [LogIn](#) [LogOut](#)

Stream Crossing Explorer (SCE):

To analyze search results with the SCE, check the box before choosing your search parameters.

Note that **only** parameters still showing after checking the box will be used for your search

Location (choose multiple towns, watersheds):

Massachusetts [6702] ▼

All MA Cities/Towns or Counties -

Abington [40]

Acton [40]

Acushnet [26] ▼

All MA Watersheds -

Blackstone

Cape Cod

Charles ▼

Personnel:

not available for the dataset(s) you selected

Other:

"Survey Id" is not available when using the SCE.

"Crossing Code" is not available when using the SCE.

Evaluation is not available for the dataset(s) you selected.

Choose Data Sets (choose multiple):

datasets are chosen by default when using SCE

Dates:

"Last updated" is not

available

"Date observed" is not

available

Search

Your search returned 7912 records.
(results may include multiple surveys of some locations)

Map With SCE

Attribute Selection

Selecting an attribute makes it available as a dropdown option for mapping in the 'Layers' window and graphing in the 'Charts' window

Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Select All

Stream Characteristics

- Stream Order
- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance
- Select All

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

Current All

Mid-Century All

Select All

Terrestrial Impassibility

- Terrestrial Impassibility 1 (Small mammals & squamates)
- Terrestrial Impassibility 2 (Medium mammals & box turtles)
- Terrestrial Impassibility 3 (Bobcat & lynx)
- Terrestrial Impassibility 4 (Bear, coyote, cougar, wolf)
- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

Attribute Selection

Selecting an attribute makes it available as a dropdown option for mapping in the 'Layers' window and graphing in the 'Charts' window

Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

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Stream Characteristics

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- Stream Temperature Resistance
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- Geomorphic Risk

Hydraulic Risk Models

Current All

Mid-Century All

Select All

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- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

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Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Select All

Stream Characteristics

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- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance
- Select All

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

Current All

Mid-Century All

Select All

Terrestrial Impassibility

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- Terrestrial Impassibility 3 (Bobcat & lynx)
- Terrestrial Impassibility 4 (Bear, coyote, cougar, wolf)
- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

Attribute Selection

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Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Select All

Stream Characteristics

- Stream Order
- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance
- Select All

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

Current All

Mid-Century All

Select All

Terrestrial Impassibility

- Terrestrial Impassibility 1 (Small mammals & squamates)
- Terrestrial Impassibility 2 (Medium mammals & box turtles)
- Terrestrial Impassibility 3 (Bobcat & lynx)
- Terrestrial Impassibility 4 (Bear, coyote, cougar, wolf)
- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

Attribute Selection

Selecting an attribute makes it available as a dropdown option for mapping in the 'Layers' window and graphing in the 'Charts' window

Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Select All

Stream Characteristics

- Stream Order
- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance
- Select All

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

Current All

Mid-Century All

Select All

Terrestrial Impassibility

- Terrestrial Impassibility 1 (Small mammals & squamates)
- Terrestrial Impassibility 2 (Medium mammals & box turtles)
- Terrestrial Impassibility 3 (Bobcat & lynx)
- Terrestrial Impassibility 4 (Bear, coyote, cougar, wolf)
- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

Attribute Selection

Selecting an attribute makes it available as a dropdown option for mapping in the 'Layers' window and graphing in the 'Charts' window

Crossings

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Select All

Stream Characteristics

- Stream Order
- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance
- Select All

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

- Current All
- Mid-Century All

Select All

Terrestrial Impassibility

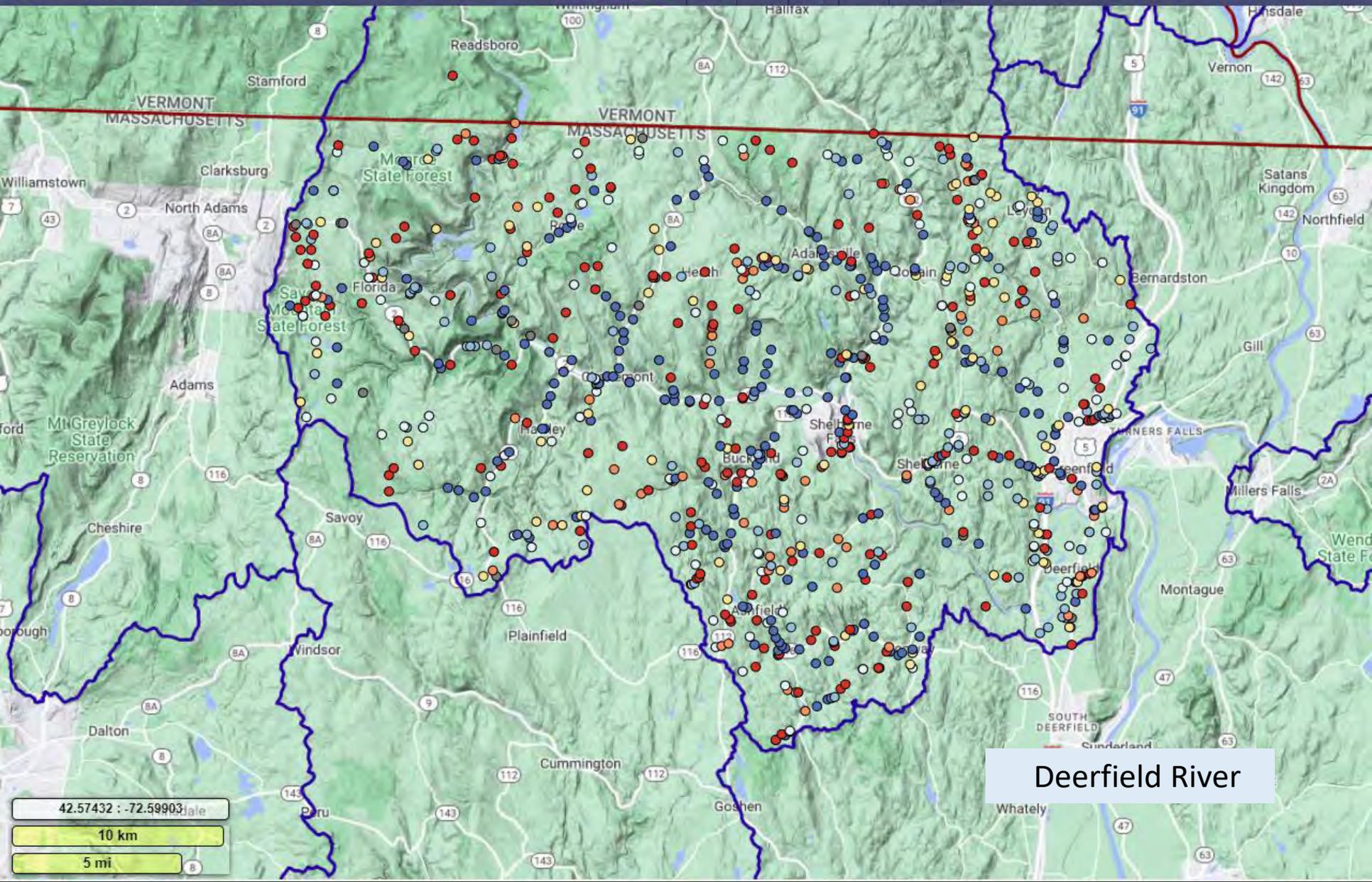
- Terrestrial Impassibility 1 (Small mammals & squamates)
- Terrestrial Impassibility 2 (Medium mammals & box turtles)
- Terrestrial Impassibility 3 (Bobcat & lynx)
- Terrestrial Impassibility 4 (Bear, coyote, cougar, wolf)
- Terrestrial Impassibility 5 (Deer)
- Terrestrial Impassibility 6 (Moose)
- Terrestrial Impassibility 7 (Average)
- Select All

Display unsurveyed crossings on map

Continue with Current Selections

NAACC: STREAM CROSSINGS EXPLORER

Select Baselayer Select Overlay Layers Search map...      



Deerfield River

42.57432 : -72.59903
10 km
5 mi



Layer Select Overlay Layers Search map...



Attribute Selection

Selecting an attribute makes it available as a dropdown option for mapping in the 'Layers' window and graphing in the 'Charts' window
 NOTE: Addition of attributes for large geographic regions (e.g. States) can take extended querying times and may result in a timeout error

Ecological Disruption

- Impassability Score
- AOP Classification
- Connectivity Loss
- Connectivity Restoration Potential
- Anadromous Restoration Potential

Coldwater Restoration

Current 16° C 18° C 20° C 22° C

Stream Characteristics

- Stream Order
- Trout Habitat Suitability
- Stream Temperature
- Stream Temperature Resistance

Risk of Failure

- Overall Risk
- Structural Risk
- Geomorphic Risk

Hydraulic Risk Models

Current All

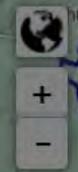
Mid-Century All

Terrestrial Impassability

- TI-1 (Small mammals & squamates)
- TI-2 (Medium mammals & box turtles)
- TI-3 (Bobcat & lynx)
- TI-4 (Bear coyote cougar wolf)
- TI-5 (Deer)
- TI-6 (Moose)
- TI-7 (Average)

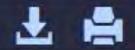
Continue with Current Selections

Structural Risk	Complete
Impassability	Complete
Habitat Suitability	Complete
Temperature Resistance	Complete

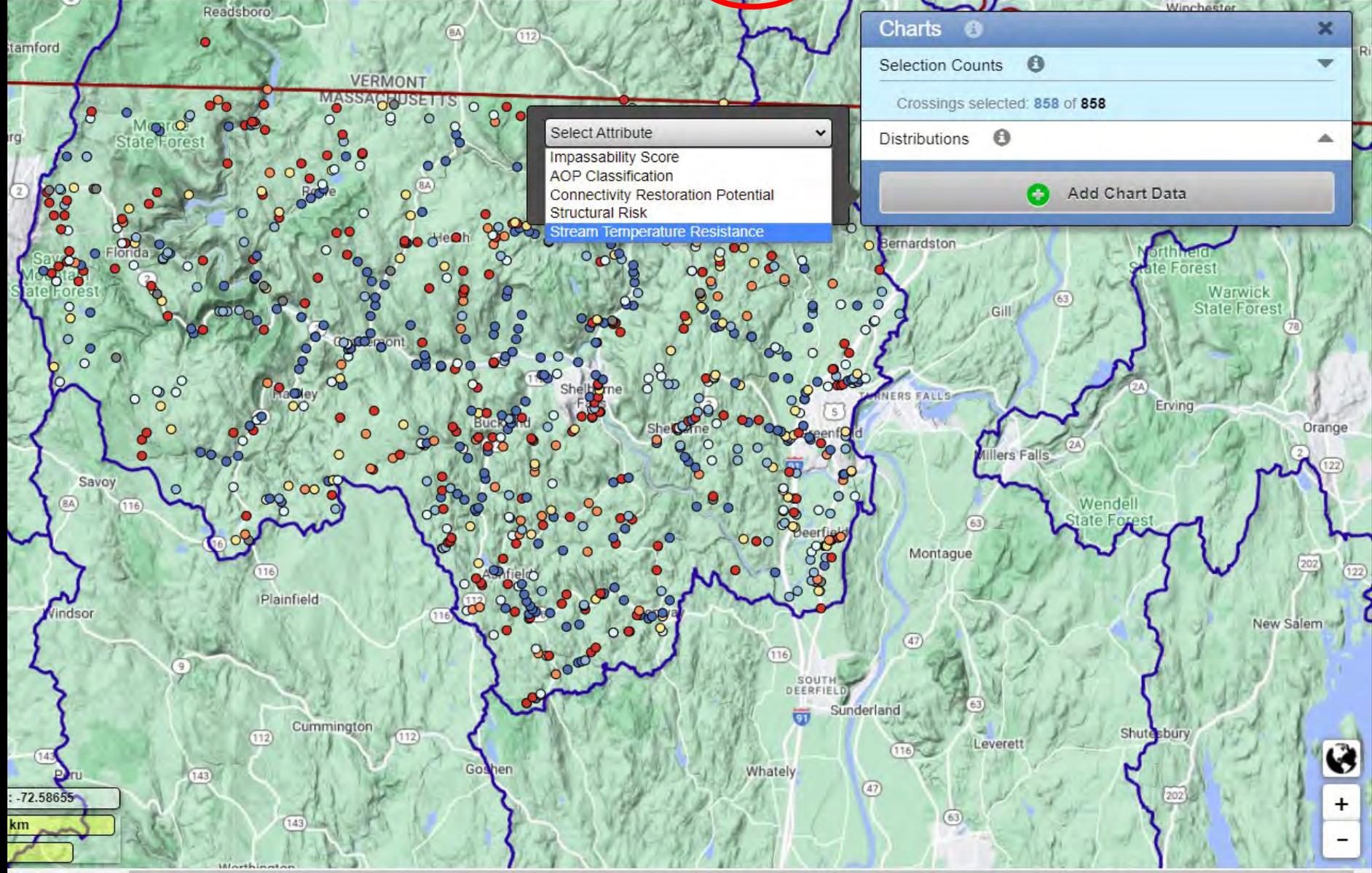


STREAM CROSSINGS EXPLORER

Welcome Tutorial About SCE SHEDS Home



Layer Search map...



Select Attribute

- Impassability Score
- AOP Classification
- Connectivity Restoration Potential
- Structural Risk
- Stream Temperature Resistance**

Charts

Selection Counts

Crossings selected: **858 of 858**

Distributions

-72.58655

km

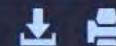
STREAM CROSSINGS EXPLORER

Welcome

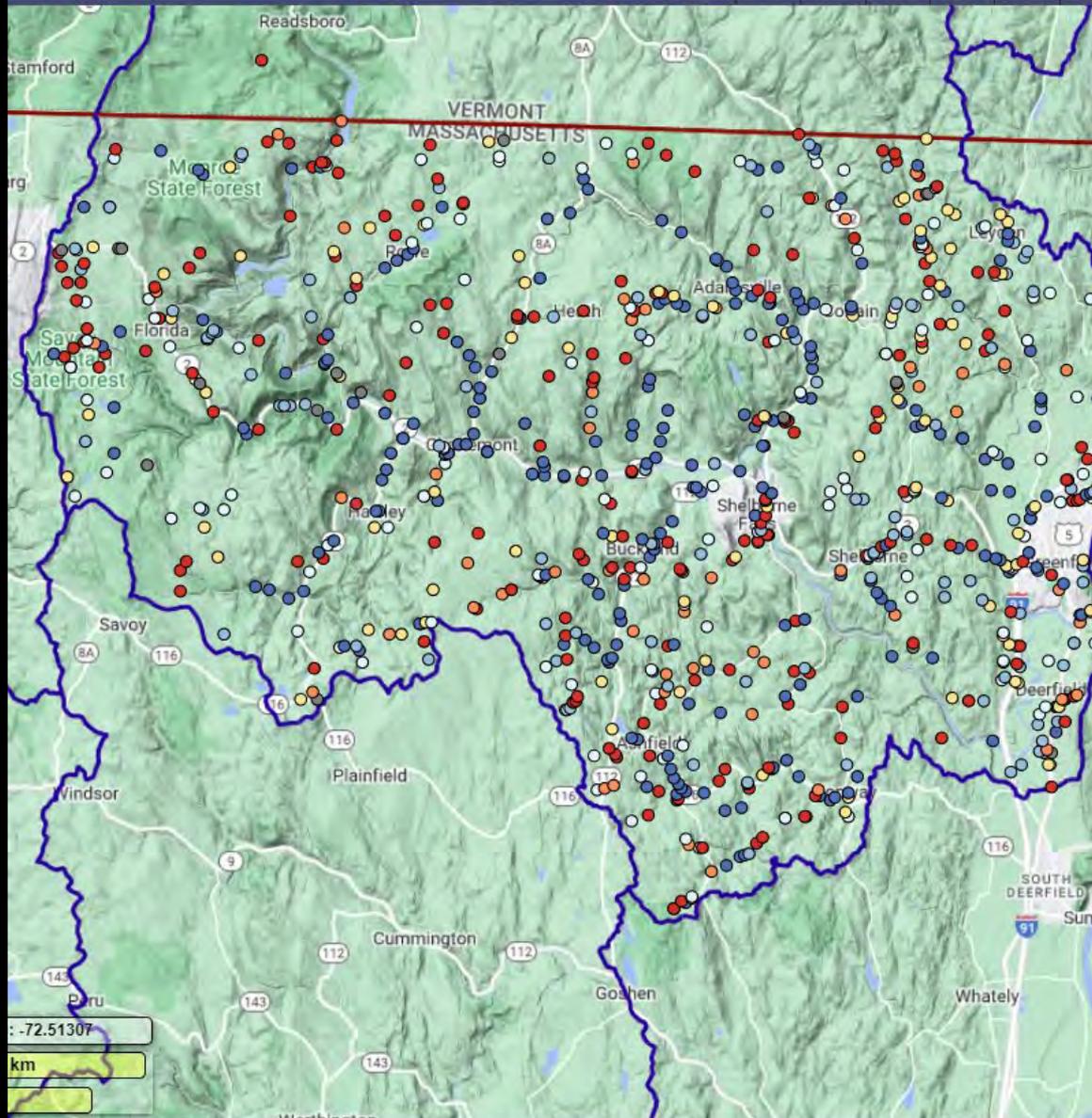
Tutorial

About SCE

SHEDS Home



Layer Search map...



Charts

Selection Counts

Crossings selected: **858 of 858**

Distributions

Crossings: **Stream Temperature Resistance**

- Mean: 0.48

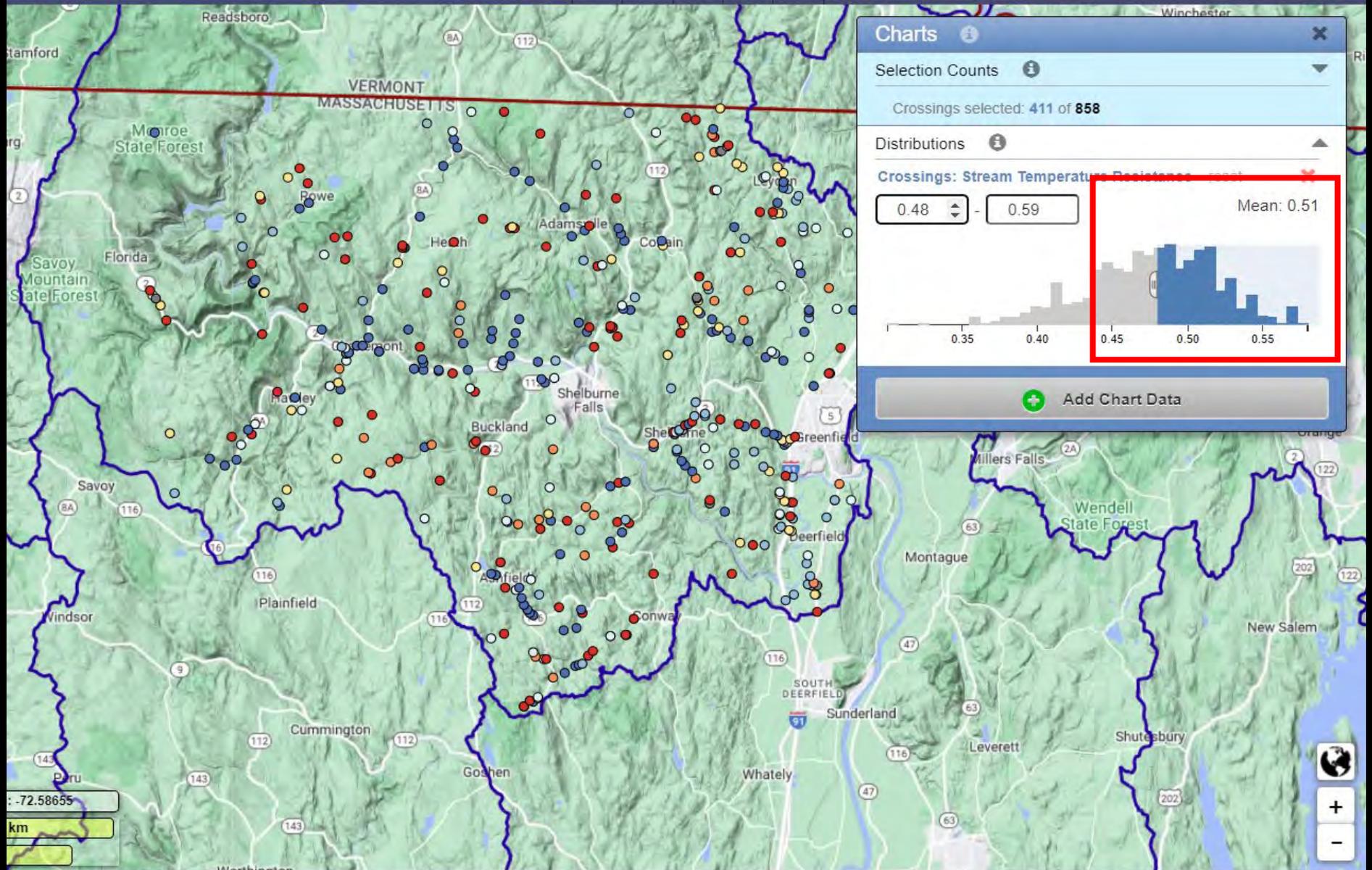
Scale: 72.51307 km

Map navigation controls:

STREAM CROSSINGS EXPLORER

Welcome Tutorial About SCE SHEDS Home

Layer Search map...



Charts

Selection Counts

Crossings selected: 411 of 858

Distributions

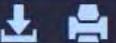
Crossings: Stream Temperature Resistance

0.48 - 0.59

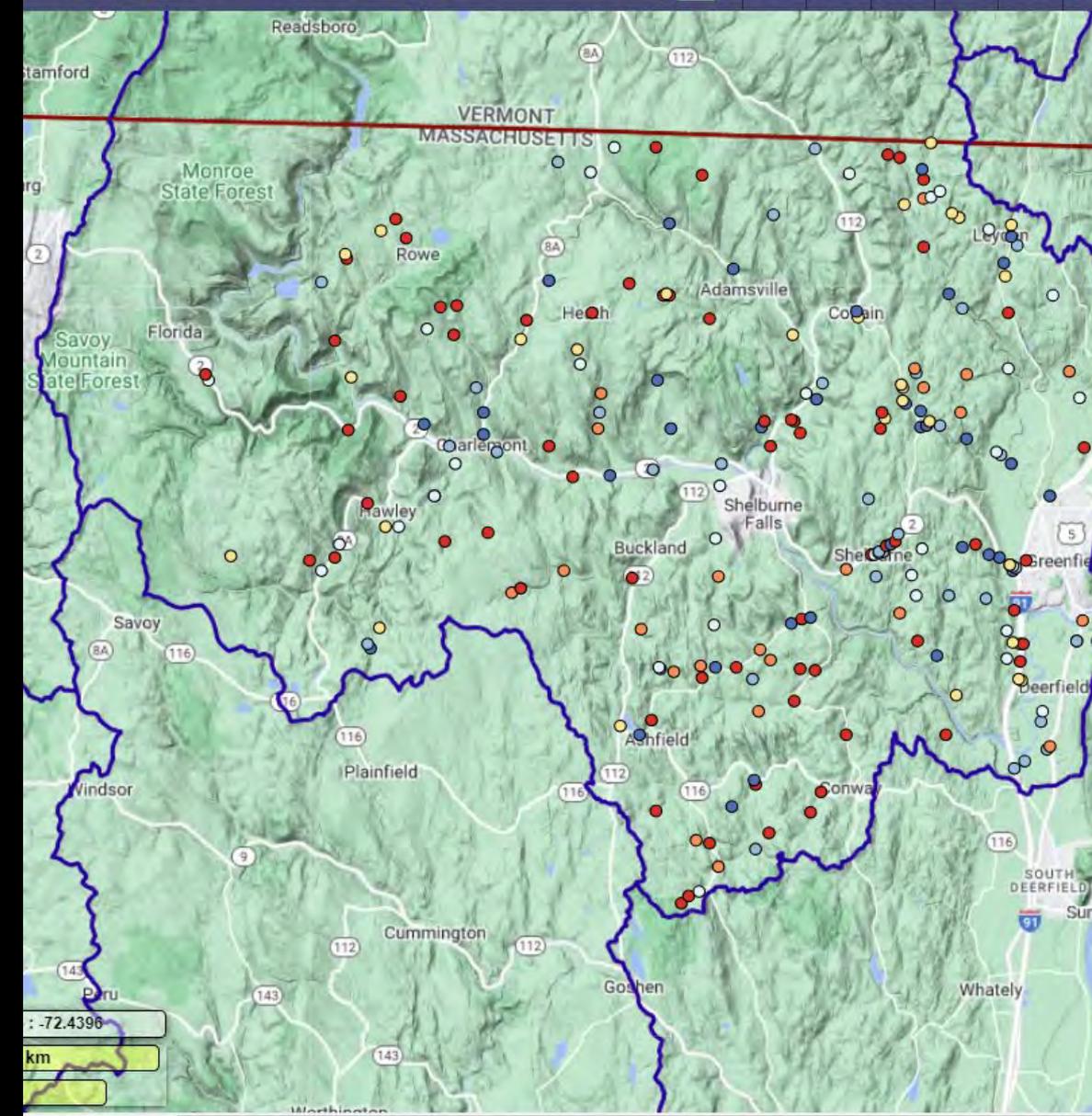
Mean: 0.51

The histogram displays the frequency distribution of stream temperature resistance values. The x-axis ranges from 0.35 to 0.55. The distribution is unimodal and slightly right-skewed, with a peak between 0.45 and 0.50. A red box highlights the area between 0.45 and 0.55, with a mean value of 0.51 indicated.

STREAM CROSSINGS EXPLORER



Layer Search map...



Charts

Selection Counts

Crossings selected: **229** of **858**

Distributions

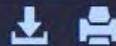
Crossings: Structural Risk

- Mean: 0.28

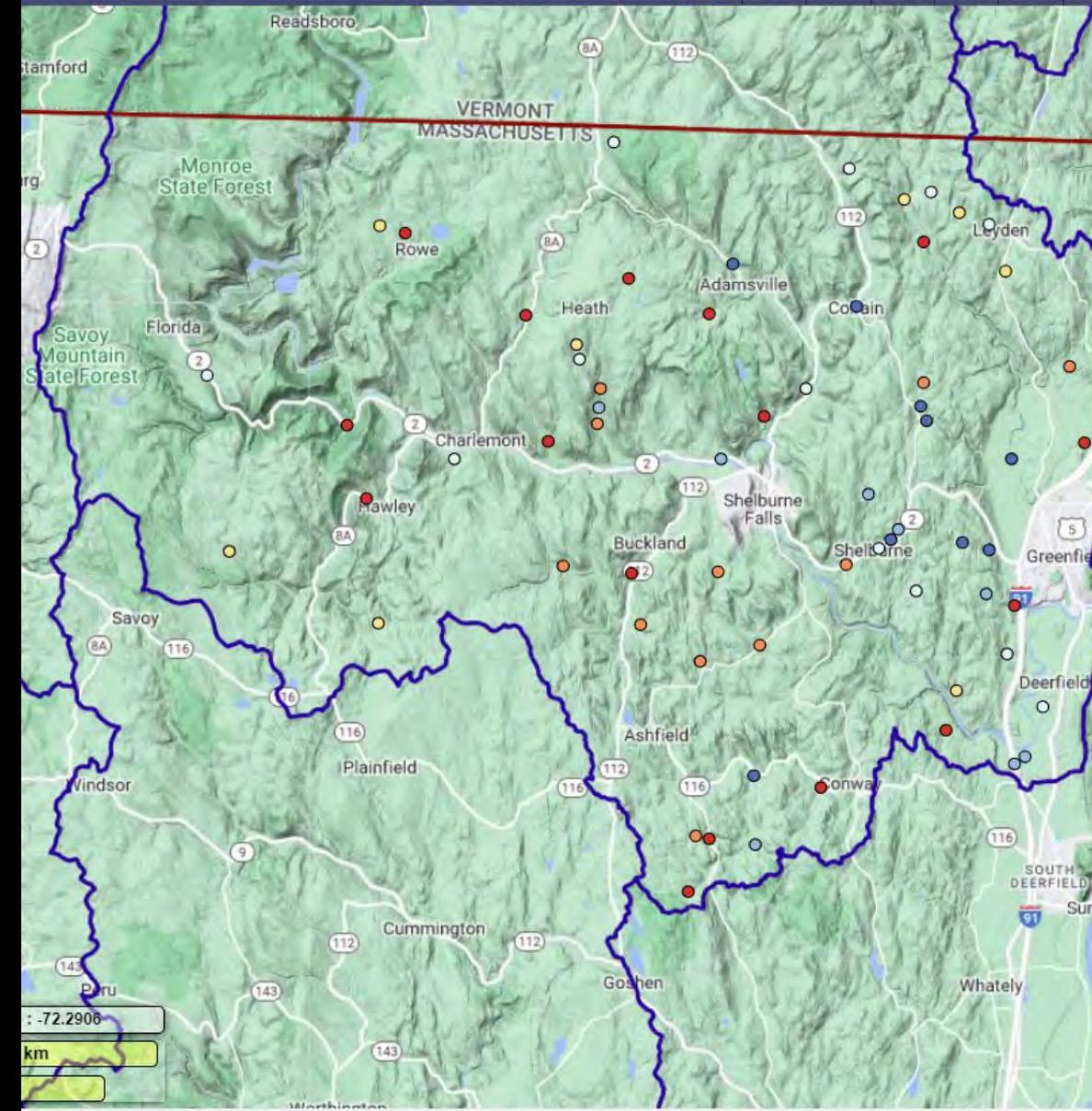
Crossings: Connectivity Restoration Potential

- Mean: 0.53

STREAM CROSSINGS EXPLORER



Layer Search map...



Charts

Selection Counts

Crossings selected: 64 of 858

Distributions

Crossings: Structural Risk

- Mean: 0.85

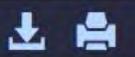
Crossings: Connectivity Restoration Potential

- Mean: 0.55

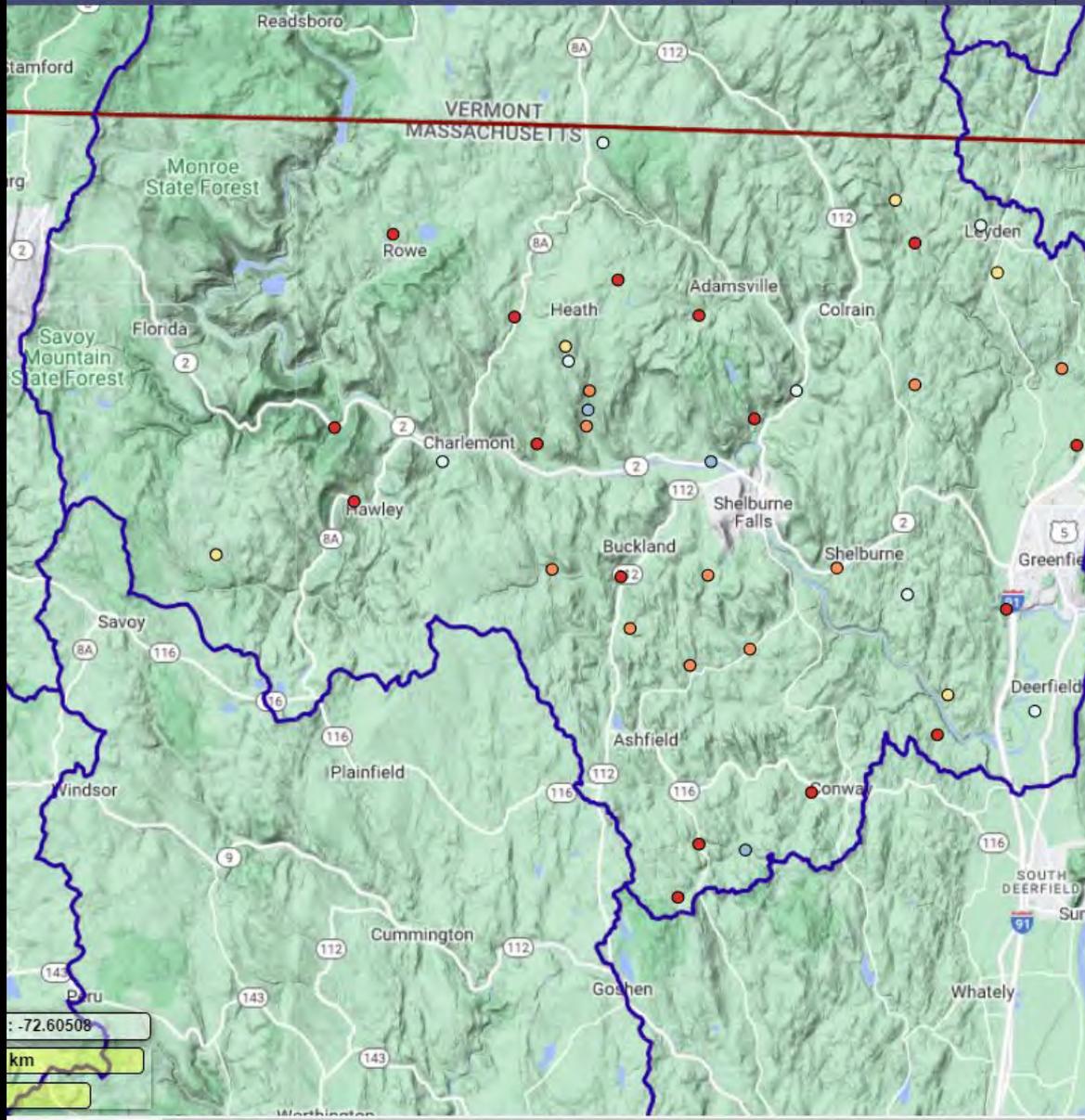
Add Chart Data

Coordinates: -72.2906
Scale: km

STREAM CROSSINGS EXPLORER



Layer Search map...



Charts

Selection Counts

Crossings selected: **41 of 858**

Distributions

Crossings: Structural Risk

- Mean: 0.86

Crossings: Connectivity Restoration Potential

- Mean: 0.68

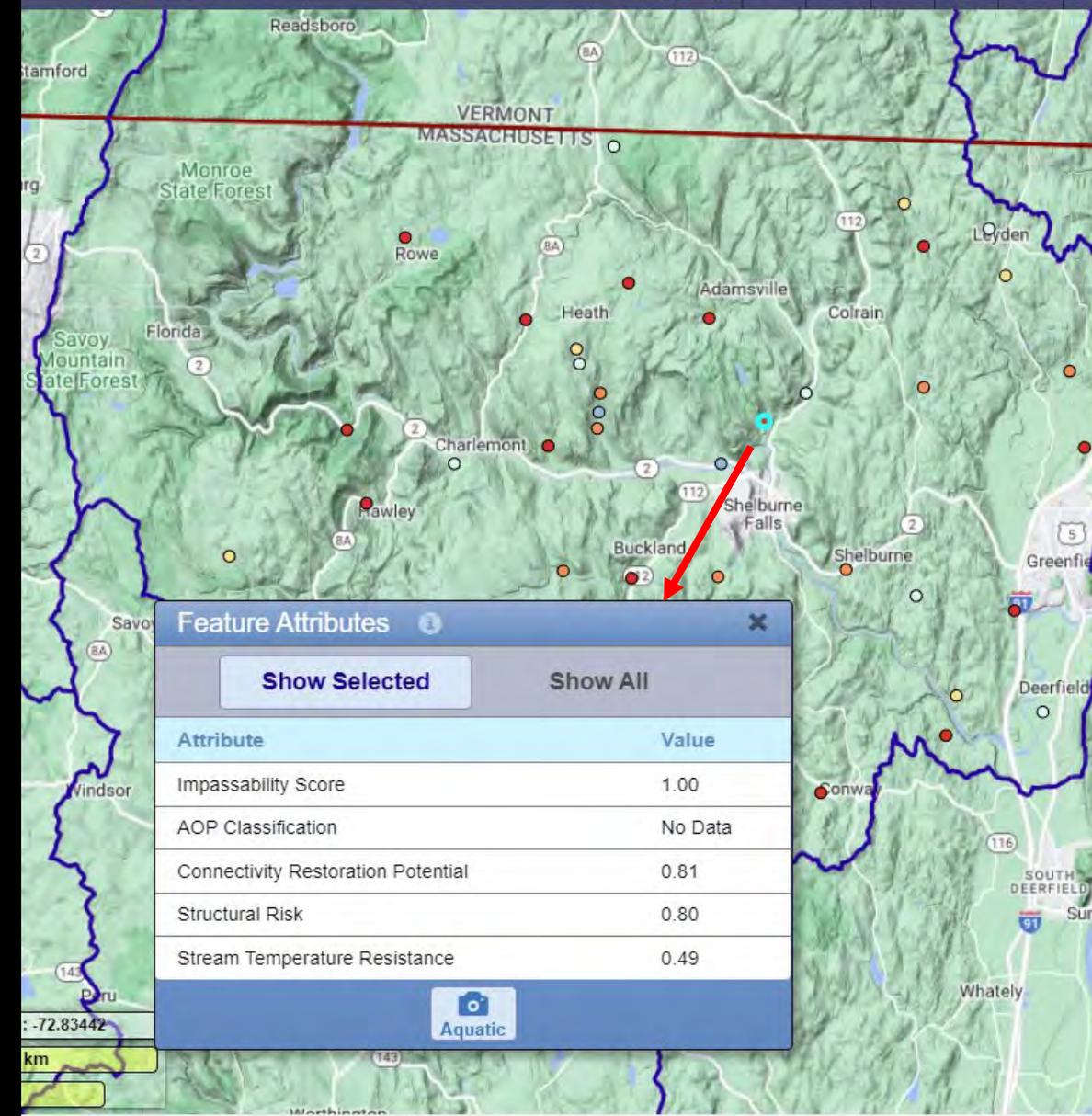
72.60508
km



STREAM CROSSINGS EXPLORER



Layer Search map...



Feature Attributes

Attribute	Value
Impassability Score	1.00
AOP Classification	No Data
Connectivity Restoration Potential	0.81
Structural Risk	0.80
Stream Temperature Resistance	0.49

Charts

Selection Counts
Crossings selected: 41 of 858

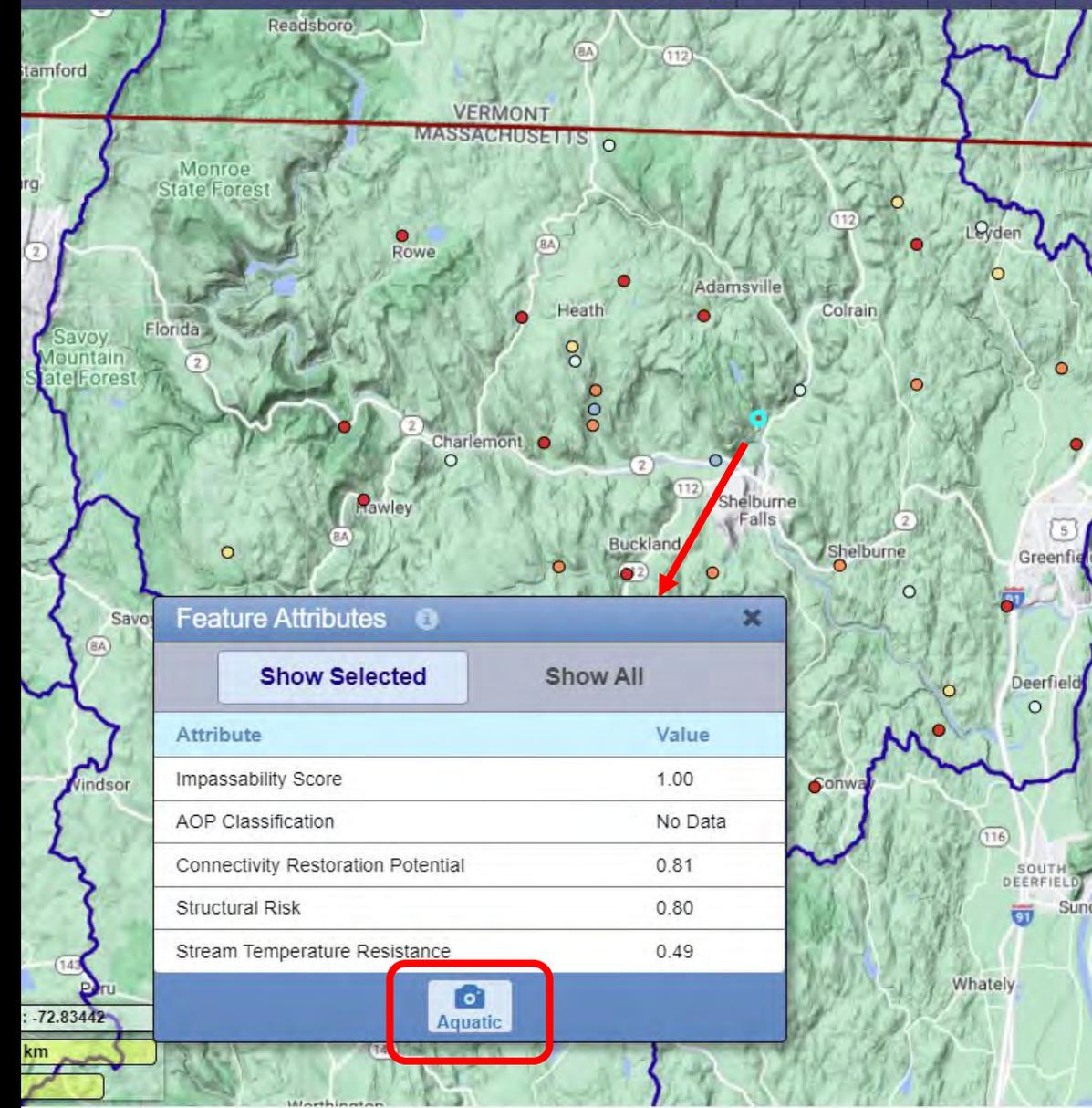
Distributions

Crossings: Structural Risk

0.4 - 1.03 Mean: 0.86

Crossings: Connectivity Restoration Potential

0.5 - 0.92 Mean: 0.68

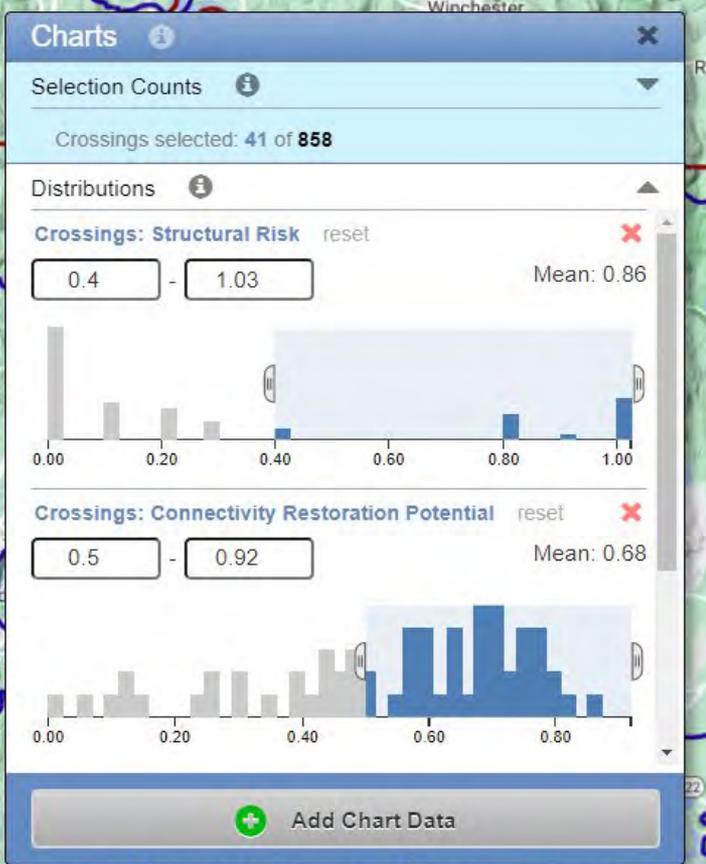


Feature Attributes

Show Selected Show All

Attribute	Value
Impassability Score	1.00
AOP Classification	No Data
Connectivity Restoration Potential	0.81
Structural Risk	0.80
Stream Temperature Resistance	0.49

 Aquatic





NAACC Data Center

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Data Set: UMass Stream Continuity Project (2005-2017)

Survey Id: 9351 Crossing Code: xy4263579772739234

UMass Aquatic Score: 0.33 NAACC Aquatic Passability Score: 0.00

Terrestrial Passability Score: 0.0 Condition Score (entire crossing): 1.0

(Data entry checked and accurate)



[22731In1.JPG](#)



[22731Out1.JPG](#)

Crossing Data:

General Information for Road-Stream Crossing

Coordinator: Erin Rodgers (last login: 01-28-2016)

Observer: Erin Rodgers

Date observed in field: 06-25-2014

Stream/River: Houghton Brook

Road: Charlemont Road

Road Type: 1-Lane Road

Crossing Code: xy4263579772739234

First entered: 07-07-2014

Last updated: 07-07-2014

StreamID: No data

Town: Colrain, MA



North Atlantic Aquatic Connectivity Collaborative

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NAACC

The North Atlantic Aquatic Connectivity Collaborative (NAACC) is a network of individuals from universities, conservation organizations, and state and federal natural resource and transportation departments focused on improving aquatic connectivity across a thirteen-state region, from Maine to West Virginia. See below for some of our stream crossing assessments.



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NAACC Data Center

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Welcome to the NAACC Data Center!

This website stores all the North Atlantic Aquatic Connectivity Collaborative (NAACC) data for road-stream crossings assessments. You may search, view, map and download most of the data in Excel or Shapefile format without logging on. If you are logged on, pages accessed from the navigation bar allow for entering and correcting crossing records. If logged on, you may also manage user data and download the [Offline Data Manager](#). Only certified NAACC lead observers and coordinators can log on.

About the NAACC

The [NAACC](#) is a network of individuals from agencies and organizations focused on improving aquatic connectivity across a thirteen-state region. The NAACC provides protocols for road-stream crossings (culverts and bridges) to assess and score crossings for fish and wildlife passability, as well as culvert condition and other data useful for evaluating risk of failure.

Contact

contact@naacc.org

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www.naacc.org

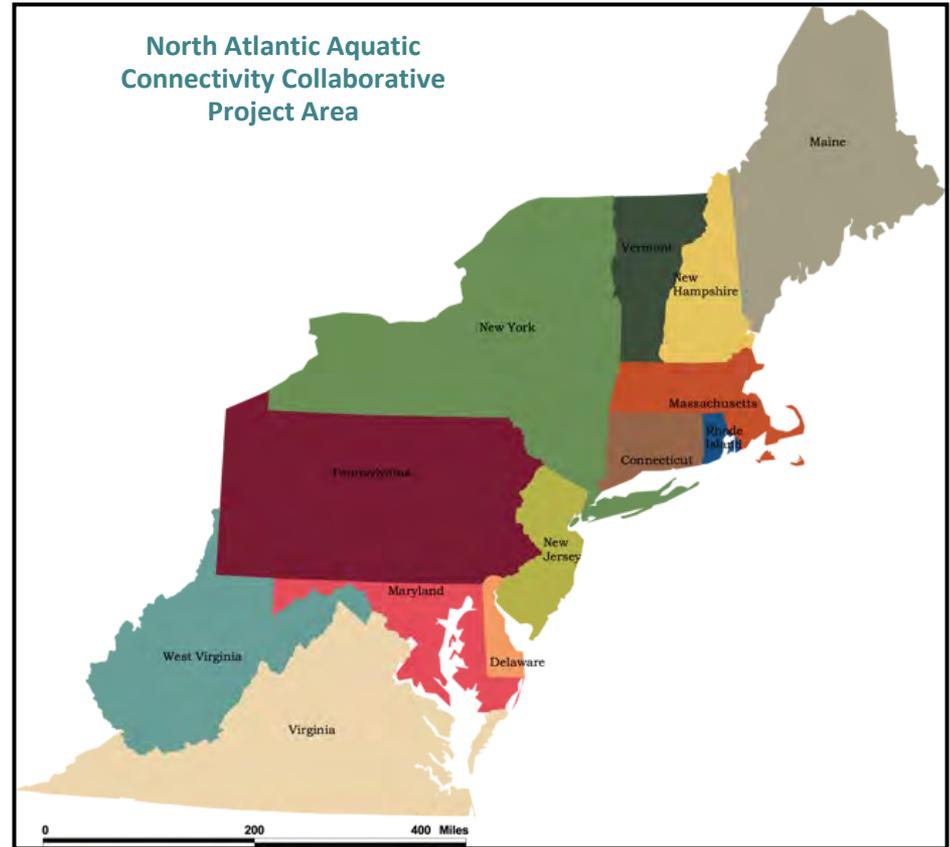


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www.streamcontinuity.org

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Thank You



UMass Amherst

