

## Chapter 2.15 Biological Assessment Results

### 2.15.1. Results

To make assessments in this report, O/E values were calculated for 444 individual samples collected from 234 sites throughout the state for the 2008 assessments (Table 2.15.1). Biological assessments were conducted on 164 AUs, representing 5,116 miles of stream which is 36% of total perennial stream miles (14,250) in Utah. Some sites were sampled every year; however, the majority of sites were sampled in response to previously identified water quality concerns or on a rotating basin schedule. In general, samples used in these analyses were collected over the past 5 years. If there was evidence that major changes in land-use had not occurred since samples were collected, older data were used to corroborate more-recent findings. In addition, these analyses were limited to samples collected in the autumn (September to early November) to minimize seasonal changes in taxonomic composition.

O/E scores from all sampling events ranged from near 0.105 to 1.315 as shown in Figure 2.15.1. Based solely on the biological assessment of 164 AUs, 79 were fully supporting, 48 were non-supporting, and 37 were 3A. This is depicted graphically based on stream miles (Figure 2.15.2). The final aquatic life assessment (considering both biological and chemical data) concluded that 96 AUs were fully supporting, 63 AUs were non-supporting, 3 AUs required category 3A, and 2 AUs were identified as 4A (impairment with a completed TMDL). A look at the spatial distribution of the biological assessments revealed that biologically degraded sites occurred throughout the state, but with some localized clumping of degraded sites (Figure 2.15.3). Finally, the results were summarized as a function of the total number of stream miles assessed (Figure 2.15.4).

**Table 2.15-1 Assessment Unit Biological Sampling O/E Values and Aquatic Life (Class 3) Assessments**

Assessment Unit Name	Assessment Unit Number	Average O / E Score	Minimum O / E Score	Maximum O / E Score	Biological Data Assessment	Final Aquatic Life Assessment	Assessment Unit Stream Miles
American Fork River-1	UT16020201-001	1.184	1.184	1.184	Full Support	Full Support	14.1
American Fork River-2	UT16020201-002	0.675	0.610	0.915	3A*	Full Support	30.8
Antimony Creek	UT16030002-008	1.104	1.104	1.104	Full Support	Full Support	26.6
Asay Creek	UT16030001-011	0.546	0.455	0.637	3A*	Full Support	36.8
Bear River-2	UT16010204-008	0.328	0.328	0.328	Nonsupport	Nonsupport	41.5
Bear River-6	UT16010101-021	0.687	0.523	0.821	3A*	Full Support	17.0
Beaver Creek-1	UT16020101-029	0.645	0.645	0.645	3A*	Full Support	12.7
Beaver Creek-2	UT16020101-030	1.074	0.900	1.248	Full Support	Full Support	21.4
Beaver Creek-2	UT16030003-020	1.234	1.234	1.234	Full Support	Full Support	16.7
Beaver Dam Wash	UT15010010-002	0.698	0.698	0.698	3A*	Full Support	24.4
Beaver River-2	UT16030007-002	0.358	0.175	0.525	Nonsupport	Nonsupport	57.6
Beaver River-3	UT16030007-003	1.039	0.928	1.155	Full Support	Full Support	142.8
Benjamin Slough	UT16020202-030	0.588	0.588	0.588	3A*	Full Support	5.4
Big Cottonwood Creek-2	UT16020204-020	0.783	0.783	0.783	Full Support	Full Support	34.0
Birch Creek	UT14070005-002	0.668	0.668	0.668	3A*	Nonsupport	29.7
Blacksmiths Fork-1	UT16010203-020	1.041	1.041	1.041	Full Support	Full Support	10.4
Boulder Creek	UT14070005-018	0.788	0.788	0.788	Full Support	Full Support	51.8

Assessment Unit Name	Assessment Unit Number	Average O / E Score	Minimum O / E Score	Maximum O / E Score	Biological Data Assessment	Final Aquatic Life Assessment	Assessment Unit Stream Miles
Carter Creek	UT14040106-010	1.090	0.907	1.274	Full Support	Full Support	89.9
Castle Creek- 1	UT14030005-009	0.291	0.291	0.291	Nonsupport	Nonsupport	9.1
Castle Creek- 2	UT14030005-012	0.931	0.931	0.931	Full Support	Full Support	9.1
Chalk Creek-1	UT16020101-010	0.644	0.552	0.736	Nonsupport	Nonsupport	7.7
Chalk Creek-2	UT16020101-012	0.621	0.483	0.805	Nonsupport	Nonsupport	4.5
Chalk Creek-2	UT16030005-019	0.957	0.957	0.957	Full Support	Full Support	33.8
Chance Creek	UT14070006-004	0.105	0.105	0.105	Nonsupport	Nonsupport	16.7
Clarkston Creek	UT16010202-013	0.581	0.436	0.726	3A*	Full Support	57.8
Clear Creek	UT16020202-019	0.428	0.428	0.428	Nonsupport	Nonsupport	12.6
Clear Creek	UT16030003-018	1.091	1.082	1.100	Full Support	Full Support	101.4
Corn Creek	UT16030005-021	0.620	0.620	0.620	3A*	Full Support	45.9
Cub River	UT16010202-010	0.705	0.498	0.871	3A*	Nonsupport	14.3
Deep Creek	UT15010008-017	1.207	1.207	1.207	Full Support	Full Support	60.4
Diamond Fork-1	UT16020202-006	0.458	0.458	0.458	Nonsupport	Nonsupport	20.1
Diamond Fork-2	UT16020202-007	0.628	0.628	0.628	3A*	Full Support	4.5
Dolores River	UT14030004-001	0.941	0.743	1.139	Full Support	NonSupport	61.7
Dry Fork Creek	UT14060002-009	1.088	1.088	1.088	Full Support	Full Support	41.3
Duchesne River-1	UT14060003-001	0.373	0.373	0.373	Nonsupport	Nonsupport	19.5
Duchesne River-3	UT14060003-006	0.466	0.466	0.466	Nonsupport	Nonsupport	39.5
Duchesne River-4	UT14060003-017	1.070	1.070	1.070	Full Support	Full Support	67.5
East Canyon Creek -1	UT16020102-024	0.578	0.388	0.778	3A*	Full Support	15.3
East Canyon Creek-2	UT16020102-026	0.623	0.170	0.366	Nonsupport	Nonsupport	34.7
East Fork Chalk Creek	UT16020101-015	0.658	0.485	0.809	Nonsupport	Nonsupport	28.4
East Fork Little Bear-1	UT16010203-014	0.765	0.765	0.765	Full Support	Full Support	7.0
East Fork Little Bear-2	UT16010203-017	1.245	1.245	1.245	Full Support	Full Support	27.9
East Fork Sevier-1	UT16030002-010	0.343	0.343	0.343	Nonsupport	Nonsupport	31.8
East Fork Smiths Fork	UT14040107-005	1.035	0.972	1.099	Full Support	Full Support	48.4
East Fork Virgin-1	UT15010008-018	0.758	0.732	0.836	Full Support	Full Support	37.1
East Fork Virgin-3	UT15010008-020	0.866	0.866	0.866	Full Support	Full Support	28.8
Echo Creek	UT16020101-007	0.432	0.393	0.472	Nonsupport	Nonsupport	41.5
Echo Creek	UT16020101-031	1.212	1.212	1.212	Full Support	Full Support	2.6
Fremont River-1	UT14070003-004	0.799	0.695	0.903	Full Support	Full Support	7.7
Fremont River-2	UT14070003-005	0.465	0.465	0.465	Nonsupport	Nonsupport	29.3
Fremont River-3	UT14070003-008	0.554	0.370	0.616	Nonsupport	Nonsupport	82.9
Green River-2	UT14060001-004	0.540	0.540	0.540	3A*	Full Support	91.4
High Creek	UT16010202-012	1.074	1.074	1.074	Full Support	Full Support	9.4
Huntington creek-2	UT14060009-004	0.628	0.536	0.763	3A*	Nonsupport	19.2
Indian Creek-2	UT14030005-002	0.930	0.743	1.095	Full Support	Full Support	15.5
JohImpairedon Creek	UT14080201-004	0.881	0.881	0.881	Full Support	Full Support	3.9
Jordan River-1	UT16020204-001	0.438	0.438	0.438	Nonsupport	Nonsupport	7.6
Jordan River-3	UT16020204-003	0.438	0.438	0.438	Nonsupport	Nonsupport	4.2
Jordan River-5	UT16020204-005	0.730	0.730	0.730	3A*	Nonsupport	1.6
Jordan River-6	UT16020204-006	0.517	0.436	0.727	Nonsupport	Nonsupport	10.3
Jordan River-7	UT16020204-007	0.271	0.000	0.542	Nonsupport	Nonsupport	4.2
Kimball Creek	UT16020102-027	0.495	0.475	0.554	Nonsupport	Nonsupport	13.0
LaSal Creek	UT14030002-001	1.016	0.786	1.247	Full Support	Full Support	18.0
Laverkin Creek	UT15010008-010	1.225	1.225	1.225	Full Support	Full Support	45.7
Leeds Creek	UT15010008-006	1.080	1.080	1.080	Full Support	Full Support	13.9
LF Huntington Creek	UT14060009-002	0.915	0.915	0.915	Full Support	Full Support	36.6
Little Bear River-1	UT16010203-009	0.516	0.348	0.718	Nonsupport	Nonsupport	16.5
Little Bear River-2	UT16010203-011	0.741	0.537	0.984	Full Support	Full Support	6.7
Little Cottonwood Creek-1	UT16020204-021	0.406	0.406	0.406	Nonsupport	Nonsupport	8.7

Assessment Unit Name	Assessment Unit Number	Average O / E Score	Minimum O / E Score	Maximum O / E Score	Biological Data Assessment	Final Aquatic Life Assessment	Assessment Unit Stream Miles
Little Cottonwood Creek-2	UT16020204-022	0.479	0.332	0.629	Nonsupport	Nonsupport	21.5
Logan River-1	UT16010203-005	0.741	0.595	0.887	3A*	4A*	35.8
Logan River-2	UT16010203-006	0.962	0.962	0.962	Full Support	Full Support	64.5
Lost Creek-2	UT16020101-003	1.088	1.043	1.132	Full Support	Full Support	47.6
Lower Currant Creek	UT14060004-009	0.676	0.676	0.676	3A*	Full Support	60.6
Lower Escalante	UT14070005-011	0.761	0.761	0.761	Full Support	Full Support	66.2
Lower Range Creek	UT14060005-006	0.834	0.751	1.001	Full Support	Full Support	9.0
Lower Red Creek	UT14060004-006	0.571	0.571	0.571	3A*	Full Support	5.2
Malad River-1	UT16010204-006	0.293	0.293	0.293	Nonsupport	Nonsupport	52.0
Mamie Creek	UT14070005-005	1.033	1.033	1.033	Full Support	Full Support	0.0
Mammoth Creek	UT16030001-009	0.534	0.403	0.644	Nonsupport	Nonsupport	22.3
Mammoth Creek - 2	UT16030001-015	0.934	0.934	0.934	Full Support	Full Support	21.8
Manning Creek	UT16030003-021	1.315	1.315	1.315	Full Support	Full Support	13.9
Middle Fork Ogden River	UT16020102-009	1.187	1.187	1.187	Full Support	Full Support	22.7
Middle Range Creek	UT14060005-005	0.880	0.880	0.880	Full Support	Full Support	19.4
Middle Red Creek	UT14060004-007	0.489	0.489	0.489	Nonsupport	Nonsupport	14.8
Mill Creek-2	UT14030005-006	1.184	1.184	1.184	Full Support	Full Support	29.6
Mill Creek-3	UT16020204-018	0.753	0.510	0.996	Full Support	Full Support	14.5
Moon Lake Tributaries	UT14060003-021	1.080	1.080	1.080	Full Support	Full Support	118.3
Nebo Creek	UT16020202-025	1.080	1.080	1.080	Full Support	Full Support	36.7
Negro Bill	UT14030005-008	0.807	0.807	0.807	Full Support	Full Support	10.1
Newton Creek	UT16010202-002	0.725	0.725	0.725	3A*	Nonsupport	5.2
North Creek	UT14070005-003	1.024	1.024	1.024	Full Support	Full Support	41.5
North Creek	UT15010008-014	1.010	1.010	1.010	Full Support	Full Support	32.7
North Fork Duchesne	UT14060003-019	0.802	0.615	1.040	Full Support	Full Support	58.3
North Fork Virgin River-1	UT15010008-015	1.044	1.044	1.044	Full Support	Nonsupport	38.3
Ogden River-1	UT16020102-005	0.305	0.184	0.669	Nonsupport	Nonsupport	9.7
Otter Creek-1	UT16030002-002	0.381	0.194	0.520	Nonsupport	Nonsupport	59.8
Otter Creek-2	UT16030002-004	1.015	1.015	1.015	Full Support	4A*	19.5
Panguitch Creek-2	UT16030001-006	0.685	0.685	0.685	3A*	3A*	30.0
Paria River-1	UT14070007-001	0.145	0.145	0.145	Nonsupport	Nonsupport	16.8
Paria River-3	UT14070007-005	0.126	0.126	0.126	Nonsupport	Nonsupport	9.2
Pine Creek	UT14070005-004	1.123	1.091	1.155	Full Support	Full Support	25.7
Pinto Creek	UT16030006-002	0.520	0.434	0.644	Nonsupport	Nonsupport	28.0
Piute Creek	UT16030001-013	0.408	0.349	0.466	Nonsupport	Nonsupport	4.0
Pole Creek	UT17040211-002	0.695	0.695	0.695	3A*	3A*	13.2
Price River-1	UT14060007-003	0.546	0.364	0.729	3A*	Full Support	78.8
Provo Deer Creek	UT16020203-013	0.480	0.480	0.480	Nonsupport	Nonsupport	19.1
Provo River-1	UT16020203-001	0.611	0.531	0.664	Nonsupport	Nonsupport	10.3
Provo River-2	UT16020203-002	0.727	0.727	0.727	3A*	Full Support	3.7
Provo River-6	UT16020203-006	0.752	0.513	0.940	Full Support	Full Support	83.4
Roc Creek	UT14030002-002	1.020	1.020	1.020	Full Support	Full Support	20.2
Rock Creek	UT14060005-008	0.984	0.984	0.984	Full Support	Full Support	0.01
Rudd Creek	UT16020102-052	1.269	1.269	1.269	Full Support	Full Support	0.01
Salina Creek-2	UT16030003-006	0.576	0.461	0.692	3A*	Full Support	133.9
Salt Creek-1	UT16020201-004	0.931	0.931	0.931	Full Support	Full Support	5.3
San Pitch-5	UT16030004-009	0.519	0.415	0.623	Nonsupport	Nonsupport	65.7
Sand Creek	UT14070005-006	0.985	0.985	0.985	Full Support	Full Support	32.9
Santa Clara-2	UT15010008-002	0.687	0.635	0.740	3A*	Nonsupport	25.0
Santa Clara-3	UT15010008-003	1.212	1.212	1.212	Full Support	Full Support	14.8

Assessment Unit Name	Assessment Unit Number	Average O / E Score	Minimum O / E Score	Maximum O / E Score	Biological Data Assessment	Final Aquatic Life Assessment	Assessment Unit Stream Miles
Scofield Reservoir Tribs	UT14060007-002	0.600	0.280	0.906	3A*	Full Support	77.7
Sevier River-17	UT16030003-012	0.248	0.248	0.248	Nonsupport	Nonsupport	45.2
Sevier River-20	UT16030005-025	0.485	0.442	0.500	Nonsupport	Nonsupport	34.4
Sevier River-3	UT16030001-005	0.579	0.579	0.579	3A*	Nonsupport	20.7
Sevier River-6	UT16030003-017	0.387	0.290	0.483	Nonsupport	Nonsupport	28.1
Sheep Creek	UT14040106-007	1.018	0.935	1.117	Full Support	Full Support	70.1
Silver Creek	UT16020101-020	0.538	0.382	0.814	Nonsupport	Nonsupport	21.4
Soldier Creek-1	UT16020202-012	0.580	0.387	0.774	3A*	Nonsupport	18.5
South Creek	UT16030004-004	1.118	1.118	1.118	Full Support	Full Support	21.2
South Fork Ogden River	UT16020102-012	1.192	1.122	1.261	Full Support	Full Support	32.7
South Fork Ogden River-1	UT16020102-010	1.028	1.028	1.028	Full Support	Full Support	15.6
South Junction Creek	UT17040210-003	0.603	0.527	0.678	3A*	3A*	22.7
Spring Creek	UT16010203-008	0.592	0.417	0.834	Nonsupport	Nonsupport	7.4
Starvation Creek	UT16020202-020	0.709	0.574	0.843	3A*	Full Support	19.5
Starvation Tribs	UT14060004-003	0.911	0.911	0.911	Full Support	Full Support	0.6
Strawberry River-3	UT14060004-010	0.742	0.678	0.775	Full Support	Full Support	20.2
Summit Creek	UT16010202-011	1.169	1.169	1.169	Full Support	Full Support	
Summit Creek	UT16030006-003	1.046	1.046	1.046	Full Support	Full Support	13.5
Thistle Creek-1	UT16020202-022	0.695	0.658	0.768	Nonsupport	Nonsupport	18.3
Thomas Creek	UT16020306-003	0.872	0.872	0.872	Full Support	Full Support	12.1
Threemile Creek	UT16030001-014	0.609	0.603	0.615	3A*	Nonsupport	19.9
Trout Creek	UT16020306-001	1.211	1.211	1.211	Full Support	Full Support	18.4
Twelve Mile Creek	UT16030004-002	0.567	0.567	0.567	3A*	Full Support	43.8
Uinta River-4	UT14060003-024	0.973	0.973	0.973	Full Support	Full Support	85.8
UM Creek	UT14070003-002	0.632	0.555	0.713	3A	Nonsupport	21.8
unnamed	UT14070001-089	1.098	1.098	1.098	Full Support	Full Support	2.0
Hopkins Slough	UT16010202-003	0.504	0.504	0.504	Nonsupport	Nonsupport	7.6
Upper Ashley Creek	UT14060002-007	0.863	0.863	0.863	Full Support	Full Support	60.9
Upper Escalante	UT14070005-012	0.545	0.261	0.857	Nonsupport	Nonsupport	26.7
Upper Ferron Creek	UT14060009-009	0.790	0.790	0.790	Full Support	Full Support	83.6
Upper Range Creek	UT14060005-004	1.031	1.031	1.031	Full Support	Full Support	6.4
Upper San Rafael	UT14060009-013	0.532	0.532	0.532	Nonsupport	Nonsupport	23.3
Upper Whiterocks River	UT14060003-013	1.080	1.076	1.083	Full Support	Full Support	76.3
Upper Willow Creek	UT14060006-002	0.731	0.390	1.041	3A	Full Support	123.2
Upper Yellowstone	UT14060003-023	1.108	1.108	1.108	Full Support	Full Support	110.8
Virgin River-1	UT15010010-001	0.779	0.719	0.839	Full Support	Nonsupport	15.2
Weber River-1	UT16020102-001	0.623	0.534	0.668	Nonsupport	Nonsupport	60.2
Weber River-3	UT16020102-002	0.515	0.515	0.515	Nonsupport	Nonsupport	17.9
Weber River-6	UT16020102-022	0.531	0.531	0.531	Nonsupport	Nonsupport	12.4
Weber River-7	UT16020101-004	0.357	0.357	0.357	Nonsupport	Nonsupport	10.6
Weber River-8	UT16020101-017	0.964	0.964	0.964	Full Support	Full Support	10.7
Weber River-9	UT16020101-023	0.849	0.849	0.849	Full Support	Full Support	19.0
White River	UT14050007-001	0.635	0.635	0.635	3A*	Full Support	77.6
White River	UT14060007-001	0.672	0.672	0.672	3A*	Full Support	32.7
Yellow Creek	UT16010101-028	0.518	0.518	0.518	Nonsupport	Nonsupport	16.4
American Fork River-1	UT16020201-001	1.184	1.184	1.184	Full Support	Full Support	14.1

\* note: 3A refers to assessments where more data are needed; 4A indicates a TMDL has been approved

## 2.15.2. Conclusions and Next Steps

The 2008 *Integrated Report* is the first time that biological monitoring has been incorporated into Utah's Water Quality Analyses for assessments of biological beneficial use support. While the biological assessment program remains in its infancy, this program represents a valuable new tool that better achieves the mandate to protect, maintain, and restore the quality of Utah's waters.

When interpreting the results of these assessments it is important to note that the sites were not randomly selected but in many cases deliberately selected to evaluate sites that were previously identified as being potentially degraded. For example, sites were targeted with elevated phosphorous because of the inability to list AUs based on DWQs phosphorous indicator value. Because sites were not randomly selected these results are not indicative of the overall condition of Utah's waters. Over the next couple of years DWQ plans to sample >50 randomly selected sites to allow more robust generalizations about the biological integrity of all of Utah's streams and rivers.

Development of the Utah RIVPACS model was an iterative process and for this first reporting period the best data available was used for these analyses. Over the past couple of years, additional reference sites were sampled encompass the diversity of sites throughout Utah. Currently, a new model is under development that will incorporate these additional data. The new model and subsequent results will be incorporated into the 2010 *Integrated Report*.

As stated earlier, this assessment represents a work in progress as additional gap improvements to the biological assessment process have been identified. For instance, DWQ plans to create similar biological assessment tools for diatoms. Diatoms have the potential to provide a clearer picture of biological conditions because these organisms are diverse and numerous throughout Utah. Moreover, diatoms are primary producers and data suggests may be more sensitive to some stressors (i.e., nutrients) than macroinvertebrates due to their role in stream ecosystems. Diatom samples have been collected at reference sites and sufficient data to begin development of tools that will allow us to use these assemblages to provide another measure of biological integrity. Just how resulting diatom assessment tools will be integrated with those obtained for diatoms will be determined as we evaluate these data.

## Biological Assessment - Stream Miles by Category

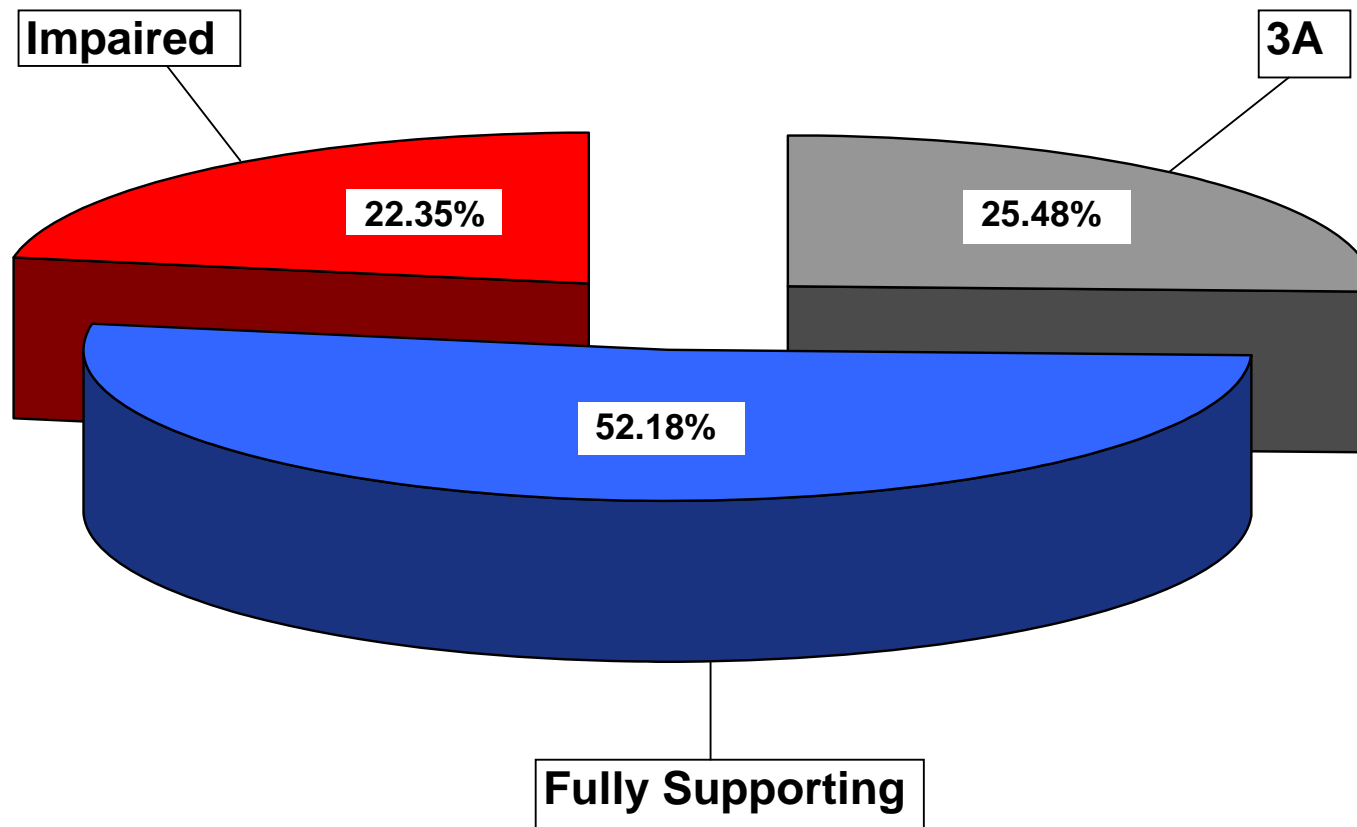


Figure 2.15-1 Biological assessment in percentage of stream miles

# Biological Assessment Sites 2008

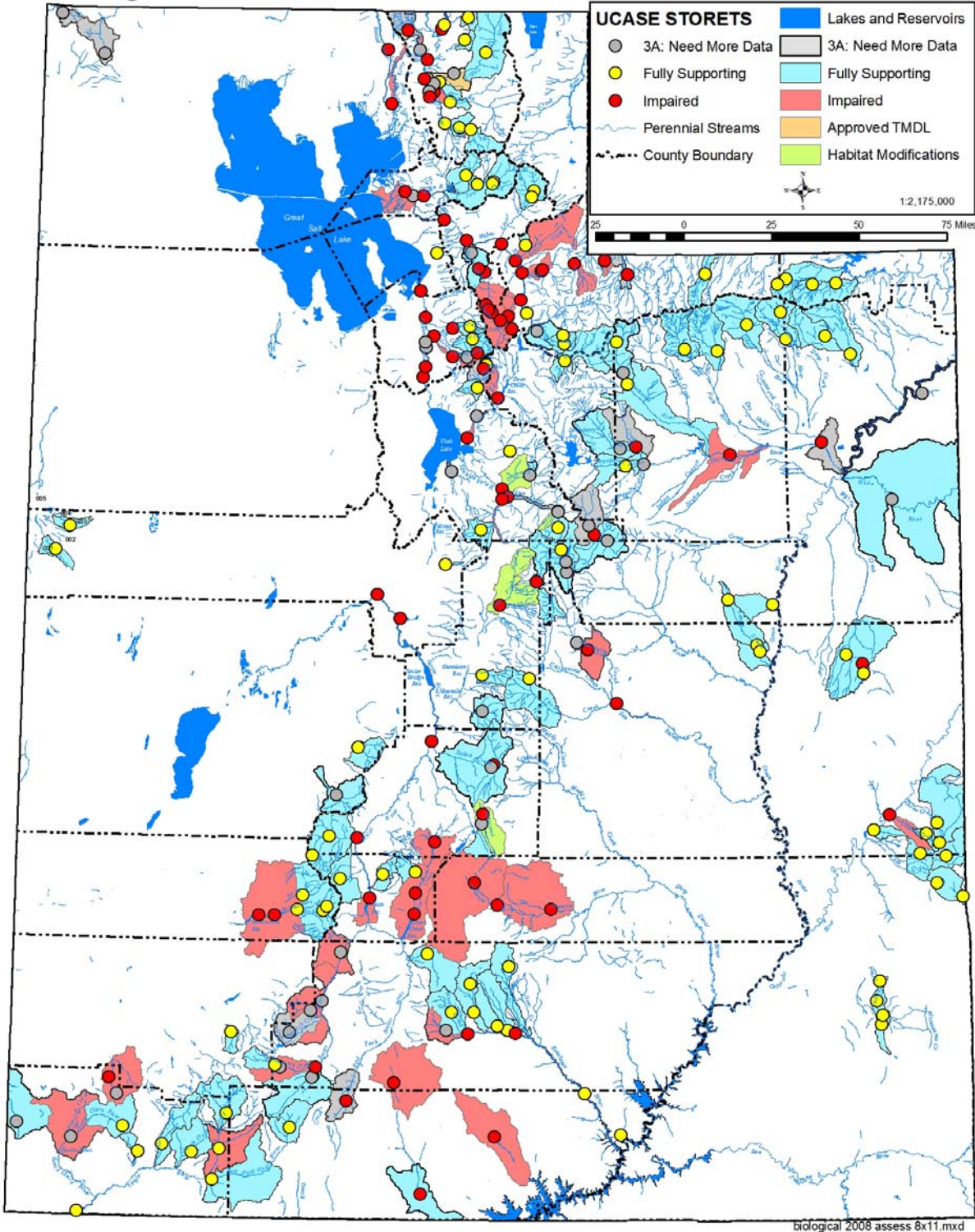


Figure 2.15-2 Final Class 3 aquatic life assessment for units with biological data

## Final Aquatic Life Assessment - Stream Miles by Category

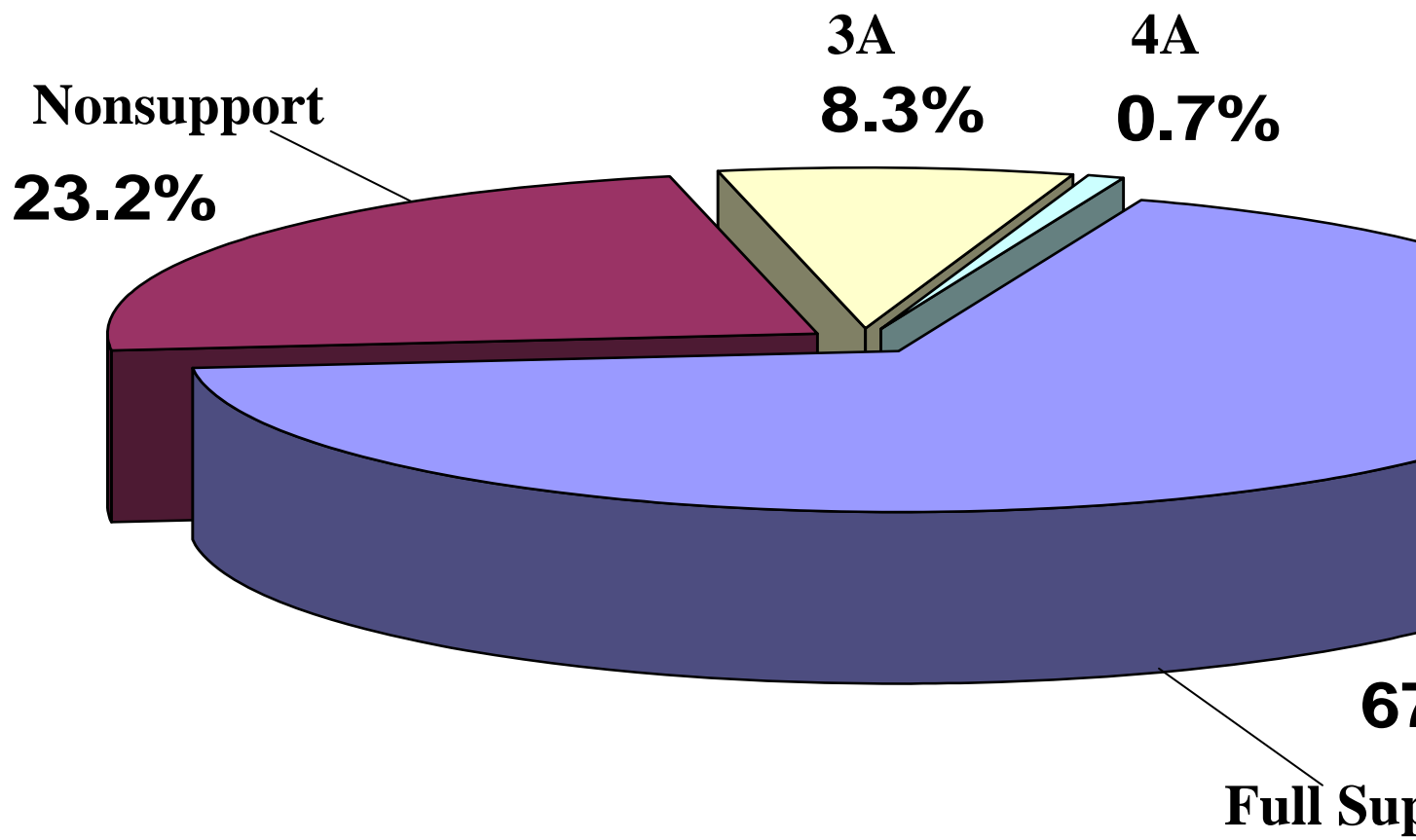


Figure 2.15-3 Final aquatic life assessment in percentage of stream miles