


Overview of the Aquatic Resource Condition Level 2 Rapid Assessments

Dial-in number for Audio: 1-650-479-3208

Event Number: 649 553 642

WebEx Technical Support: 866-229-3239

Note: You will not hear any audio until the beginning of the webinar.

Tom Wolf, Governor

Patrick McDonnell, Acting Secretary

Purpose and Goals

- Provide overview of guidance
- Basic understanding of guidance
- Clarify any areas of confusion

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Aquatic Resources

- Wetlands
- Riverine
  - Intermittent and perennial wadeable watercourses and floodways/floodplains
- Lacustrine
  - Lakes, reservoirs and large rivers

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Significant Revisions

- Clarified Intermittent Watercourse
  - No Instream Habitat Index
- Incorporated drainage area cutoffs
  - Watercourses > 100 mi^2 ≤ 2,000 mi^2
    - No Riparian Zone of Influence Index
  - Lacustrine - Watercourses with > 2,000 mi^2
    - Case by case <2,000 mi^2 (dammed or otherwise controlled)

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Revisions Cont.

- Wetland
  - Removed Hydrogeomorphic Classification
  - Palustrine Community Classification
- Removed Qualitative Assessor Rating

Standardization

- Standardized Structure
  - Same Scoring Approaches
    - Indexed Based Method
  - Common Condition Indices
    - Same Condition Category Definitions
    - Resource Specific Defined Areas (e.g. floodplain, fixed width distances, etc.)

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Standardization

- Standardized Protocols Cont.
  - Qualitative
  - Rapid and low cost
  - Incorporated various approaches
    - Reference standard departure;
    - Resource structure; and
    - Stressor based

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Standardization

- Standardized Cont.
  - Multiple uses – E.A. and Compensation
  - Addresses majority of Ch. 105 applications
- ***Not*** intended for:
  - Water quality designation purposes
  - Ecological integrity evaluations

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Level 2 Condition Indices

- Wetland Indices (6)
  - ***Wetland Zone of Influence (ZOI)***
  - Roadbed Presence
  - Vegetation Condition
  - Hydrologic Modification
  - Sediment Stressor
  - Water Quality Stressor

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Level 2 Condition Indices

- Riverine Indices (5 or 4)
  - Channel Condition
  - ***Riparian Vegetation (floodplain)***
  - ***Riparian ZOI (aka buffer)***
  - Instream Habitat
  - Channel Alteration

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Level 2 Condition Indices

- Lacustrine Indices (4 or 1)
  - ***Riparian Shoreline Vegetation (50 feet)***
  - ***Riparian Vegetation ZOI (50 feet)***
  - Average Depth
  - Shoreline and Near-shore Human Alteration

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Basic Scoring Approach

- Uses 1-20 condition category scoring as basis for Condition Index (0.05-1)
  - Assessor assigns applicable condition category(s) then selects the score within category range; or
  - Calculate weighted index by using category score times percent areal cover

Optimal					Suboptimal					Marginal					Poor				
20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Weighted Scoring

- Wetland ZOI (300 feet)
- Riparian Vegetation (floodplain)
- Riparian ZOI (100 feet)
- Riparian Shoreline Vegetation (50 feet)
- Riparian Vegetation ZOI (50 feet)

Weighted Scoring

- Condition Categories Consider:
  - % cover of trees with > 3 inch DBH
  - Vegetation maintenance (i.e. cutting, spraying)
  - Presence of manmade structures, disturbance and alteration
  - Wetland presence regardless of type
  - Presence and size of open water

Common Weighted Index

1. Wetland Zone of Influence Condition Index

	Condition Category																			
Wetland Zone of Influence (300 foot area around AA perimeter)	**Optimal**					**Suboptimal**					**Marginal**					**Poor**				
	ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.		**High Poor:** ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.		**Low Poor:** ZOI area vegetation consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.		**CI = Total Score/20**
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	

1. Identify all applicable Condition Category areas within the wetland zone of influence using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(%Areas*Scores)

	Condition Category:							
Scoring:	% ZOI Area:	0%	0%	0%	**0%**	**0%**	**0%**	**Total Score:**
	Score:	0	0	0	**0**	**0**	**0**	
	Total Sub-score:	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**

0.00

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Assessment Areas

- Assessment Areas (AA) based on
  - Proposed direct and indirect impacts;
  - Size and type of resource; and
  - Location of impact within resources.
- Assessors do have some flexibility
  - Defining or adjusting AA boundaries
  - Aggregating small AAs
  - Other

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Assessment Areas

- Wetland
  - Minimum 1 acre or entire wetland if < 1 ac
    - **Must** be comprised of wetland
- Riverine
  - Impact area – plus upper & lower boundary minimum 100 feet u/s and d/s
- Lacustrine
  - Impact area bracketed 50 foot waterward and 100 feet u/s, d/s and landward

Wetland Condition L2 RAP

- Roadbed Presence Worksheet
- Invasive Species Worksheet
- AA Stressor Checklist
- Condition Index Data Sheet

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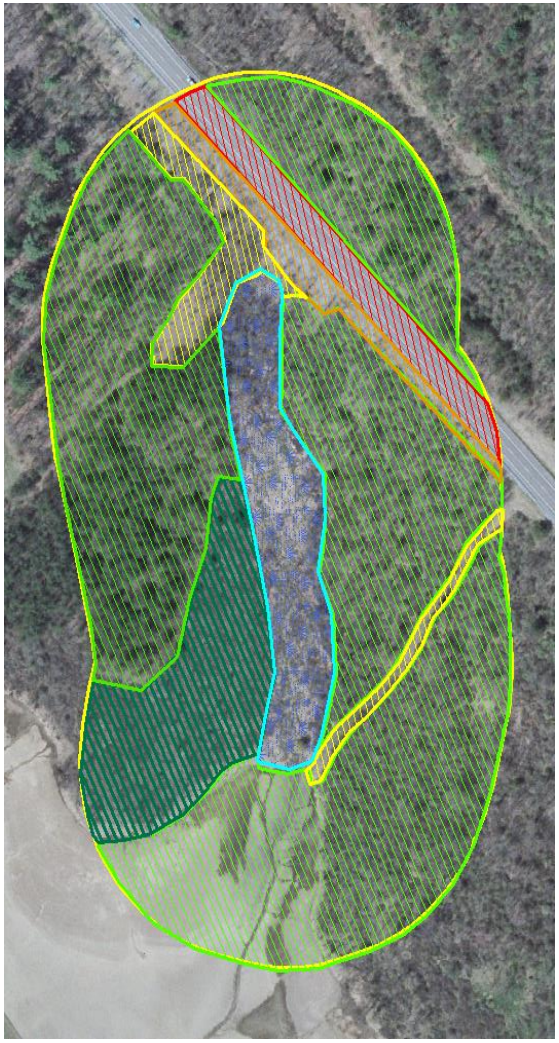
Wetland ZOI

- Wetland ZOI (300 ft beyond AA)
  - Desktop condition category classification



Wetland Zone of Influence

Color	Condition Category	Size (acres)	% Area
Red		0.87	0.05
Orange		0.57	0.03
Yellow		0.90	0.05
Light Green		13.24	0.75
Dark Green		2.09	0.12
	Total:	17.67	100%

Wetland ZOI Index

1. Wetland Zone of Influence Condition Index

	Condition Category																				CI = Total Score/20
Wetland Zone of Influence (300 foot area around AA perimeter)	**Optimal**					**Suboptimal**					**Marginal**					**Poor**					
	ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.					**High Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.			**Low Suboptimal:** ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.		**High Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.			**Low Marginal:** ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover with maintained understory.			**High Poor:** ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.		**Low Poor:** ZOI area vegetation consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.	
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	

1. Identify all applicable Condition Category areas within the wetland zone of influence using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(%Areas*Scores)

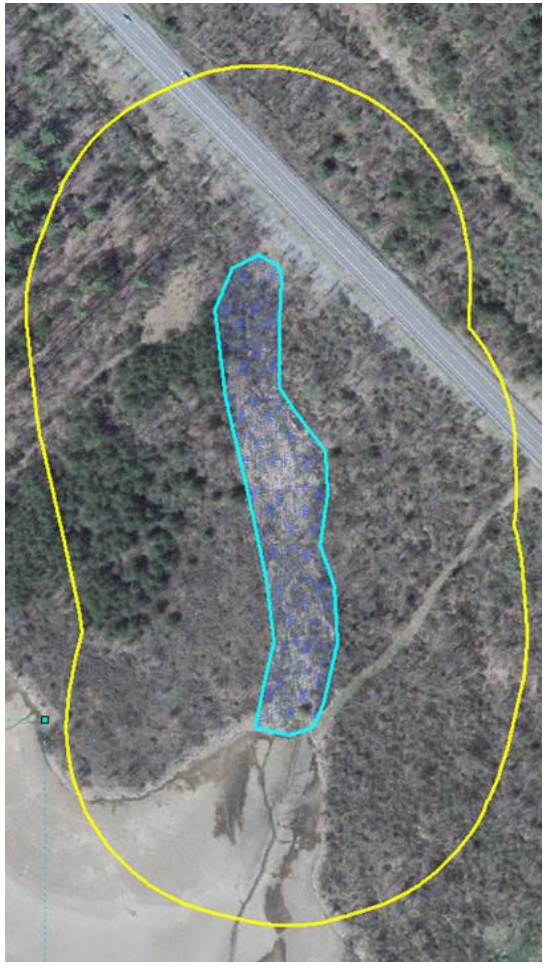
	Condition Category:							
Scoring:	% ZOI Area:	5%	3%	5%	**75%**	**12%**	**0%**	**Total Score:**
	Score:	1	4	7	**18**	**14**	**0**	
	Total Sub-score:	0.05	0.12	0.35	13.50	1.68	0.00	**15.70**

0.79

Comments:

Roadbed Presence and ZOI

- ZOI subdivided into Weighted Sub-indices:
  - 0-100 ft zone (67%)
  - 100-300 ft zone (33%)
- Record occurrences of roadbed types on Roadbed Worksheet



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Roadbed Presence

- Calculate score for each distance sub-index

Pennsylvania Wetland Condition Level 2 Rapid Assessment Version 2.0
Roadbed Worksheet

Project Name / Identifier			Date	Name(s) of Evaluator(s)
Resource Identifier	**AA #**	**Lat (dd)**	**Long (dd)**	**Notes:**

Roadbeds: Record the number of occurrences by roadbed type and distance category. Multiply the number of occurrences by the weighting factors for each roadbed type and distance category then sum the total score for each distance category. The total scores for each distance category are then compared to the condition category descriptions.

Roadbed Type	Distance	Occurrences	Weighting Factor	Score	Distance	Occurrences	Weighting Factor	Score
>= 4 Lane Paved	0-100 ft.		4		100-300 ft.		4	
2 Lane Paved	0-100 ft.		2		100-300 ft.		2	
1 Lane Paved	0-100 ft.		1		100-300 ft.		1	
Gravel Road	0-100 ft.		1		100-300 ft.		1	
Dirt Road	0-100 ft.		2		100-300 ft.		2	
Railroad	0-100 ft.		2		100-300 ft.		2	
Other Roadbeds	0-100 ft.		1, 2 or 4		100-300 ft.		1, 2 or 4	
Total Scores:	0-100 ft.				100-300 ft.			

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Roadbed Presence Index

- Worksheet Scores to assign condition category and select score

2. Roadbed Presence Index

	Condition Categories																			
	Optimal					**Suboptimal**					**Marginal**					**Poor**				
a. Roadbed Presence (within 0 - 100 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 feet of the AA boundary				**Low Optimal:** Roadbed presence score within 0-100 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 0-100 foot distance of the AA boundary is greater than 12.	
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**

Comments:

	Condition Categories																			
	Optimal					**Suboptimal**					**Marginal**					**Poor**				
b. Roadbed Presence (within 100 - 300 foot Wetland ZOI distance)	**High Optimal:** No roadbeds present within 100 - 300 feet of the AA boundary				**Low Optimal:** Roadbed presence score within 100 - 300 feet of the AA boundary equal to or less than 2.		**High Suboptimal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 2 but equal to or less than 4.			**Low Suboptimal:** Roadbed presence score within 100 - 300 feet AA boundary is greater than to 4 but less than or equal to 6.		**High Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 6 but less than or equal to 8.			**Low Marginal:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 8 but less than or equal to 10.		**High Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than to 10 but less than or equal to 12.			**Low Poor:** Roadbed presence score within 100 - 300 feet of the AA boundary is greater than 12.	**CI = Total Score/20**
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**

	Condition Score	Weighting	Sub-Scores	
a. Roadbed 0-100:	0	*** (0.67)**	0	
b. Roadbed 100-300:	0	*** (0.33)**	0	**0.00**
		Total Score:	**0**	

Stressor Checklist Worksheet

- Vegetation Alteration
- Hydrologic Modification
- Sedimentation Stressors
- Eutrophication Stressors
- Contaminant/Toxicity Stressors

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Vegetation Condition Index

- Invasive Species Worksheet
  - Record species and percent coverage
    - ➢ Estimate Total % Relative Cover (≤ 100%)

Pennsylvania Wetland Condition Level 2 Rapid Assessment
Version 2.0
Invasive Species Presence Worksheet

Are invasive species (from list) present at the site in any layer? YES NO

If listed species present, enter the percent areal coverage for each species below:

Species Code	<5%	≥ 5-20%	≥ 20 - 50%	≥ 50%	*Species Code*	<5%	5-20%	20 - 50%	≥ 50%

Total % relative cover of all invasives, collectively on site: _____%

Comments:

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Vegetation Condition Index

- Total % Relative Cover (all layers) in AA
  - Sub-Index 3a: Used to assign condition category and score

3. Vegetation Condition Index

	Condition Category																			
a. Invasive Species Presence	**Optimal**					**Suboptimal**					**Marginal**					**Poor**				
	High Optimal: No invasives present.		**Low Optimal:** <5% of the total AA contains invasive species.			**High Suboptimal:** >5% but less than 10% of the total AA contains invasive species.		**Low Suboptimal:** >10% but less than 20% of the total AA contains invasive species.			**High Marginal:** >20% but less than 30% of the total AA contains invasive species.		**Low Marginal:** >30% but less than 50% of the total AA contains invasive species.			> 50% of the total AA contains invasive species.				
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**

Comments:

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Vegetation Condition Index

- Record presence/absence in AA
  - ROW – record # of occurrences

STRESSOR WORKSHEET	Y	#'s	N
Vegetation Alteration			
Mowing			
Moderate livestock grazing (within one year)			
Crops (annual row crops, within one year)			
Selective tree harvesting/cutting (>50% removal, within 5 years)			
Right-of-way clearing (mechanical or chemical)			
Clear cutting or Brush cutting (mechanized removal of shrubs and saplings)			
Removal of woody debris			
Aquatic weed control (mechanical or herbicide)			
Excessive herbivory (deer, muskrat, nutria, carp, insects, etc.)			
Plantation (conversion from typical natural tree species, including orchards)			
Other:			
Total Number:			

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Vegetation Condition Index

- Total Stressors Present
  - Sub-Index 3b: Used to assign condition category and score

	Condition Category																				CI = Total Score/40
b. Vegetation Stressor Presence	Optimal					Suboptimal					Marginal					Poor					
	High Optimal: No vegetation stressors present within the AA boundary.		**Low Optimal:** One vegetation stressor present within the AA boundary.			**High Suboptimal:** Two vegetation stressors present within the AA boundary.		**Low Suboptimal:** Three vegetation stressors present within the AA boundary.			**High Marginal:** Four vegetation stressors present within the AA boundary.		**Low Marginal:** Five vegetation stressors present within the AA boundary.			Greater than five vegetation stressors present within the AA boundary.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
Comments:											a. Invasive Sub-Score:								Total Score		0.00
											b. Vegetation Sub-Score:								0		

  - Add both Sub-scores together and divide by 40 to calculate Condition Index

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Hydrologic Modification

- Record presence/absence in AA
  - Ditching, Stormwater inputs – record # of occurrences

STRESSOR WORKSHEET	Y	#'s	N
Hydrologic Modification			
Ditching, tile draining, or other dewatering methods			
Dike/weir/dam			
Filling/grading			
Dredging/excavation			
Stormwater inputs (culvert or similar concentrated urban runoff)			
Microtopographic alterations (e.g., plowing, forestry bedding, skidder/ATV tracks)			
Dead or dying trees (trunks still standing) *			
Stream alteration (channelization or incision)			
Other:			
Total Number:			

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Hydrologic Modification

- Total Stressors Present
  - Used to assign condition category and score

4. Hydrologic Modification Index

	Condition Category																				CI = Total Score/20
	Optimal					Suboptimal					Marginal					Poor					
Hydrologic Modification Stressor Presence	**High Optimal:** No hydrologic stressors present within the AA boundary.			**Low Optimal:** One hydrologic stressor present within the AA boundary.		**High Suboptimal:** Two hydrologic stressors present within the AA boundary.		**Low Suboptimal:** Three hydrologic stressors present within the AA boundary.			**High Marginal:** Four hydrologic stressors present within the AA boundary.			**Low Marginal:** Five hydrologic stressors present within the AA boundary.		Greater than five hydrologic stressors present within the AA boundary.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0.00
Comments:																**Score:**			0		

  - Divide score by 20 to calculate Condition Index

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Sedimentation

- Record presence/absence in AA

STRESSOR WORKSHEET	Y	#'s	N
Sedimentation			
Sediment deposits/plumes			
Eroding banks/slopes			
Active construction (earth disturbance for development)			
Active plowing (plowing for crop planting in past year)			
Intensive livestock grazing (in one year, ground is >50% bare)			
Active selective forestry harvesting (within one year)			
Active forest harvesting (within two years, includes roads, borrow areas, pads, etc.)			
Turbidity (moderate concentration of suspended solids in the water column, obvious sediment discharges)			
Other:			
Total Number:			

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Sedimentation

- Total Stressors Present
  - Used to assign condition category and score

5. Sediment Stressor Index

	Condition Category																				CI = Total Score/20
	Optimal					Suboptimal					Marginal					Poor					
Sediment Stressor Presence	**High Optimal:** No sediment stressors present within the AA boundary.			**Low Optimal:** One sediment stressor present within the AA boundary.		**High Suboptimal:** Two sediment stressors present within the AA boundary.		**Low Suboptimal:** Three sediment stressors present within the AA boundary.			**High Marginal:** Four sediment stressors present within the AA boundary.			**Low Marginal:** Five sediment stressors present within the AA boundary.		Greater than five sediment stressors present within the AA boundary.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0.00
Comments:																**Score:**			0		

  - Divide score by 20 to calculate Condition Index

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Water Quality Stressor

- Sub-Indices 6a and b - Record stressor presence/absence or occurrence in AA

STRESSOR WORKSHEET	Y	#'s	N
Eutrophication			
Direct discharges from agricultural feedlots, manure pits, etc.			
Direct discharges from septic or sewage treatment plants, fish hatcheries, etc.			
Heavy or moderately heavy formation of algal mats			
Other:			
Total Number:			
Contaminant/Toxicity			
Severe vegetation stress (source unknown or suspected)			
Obvious spills, discharges, plumes, odors, etc.			
Acidic drainages (mined sites, quarries, road cuts)			
Point discharges from adjacent industrial facilities, landfills, railroad yards, or comparable sites			
Chemical defoliation (majority of herbaceous and woody plants affected, within one year)			
Fish or wildlife kills or obvious disease or abnormalities observed			
Excessive garbage/dumping			
Other:			
Total Number:			

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Water Quality Stressor

- Add sub-scores and divide by 40 to calculate Condition Index

6. Water Quality Stressor Index

	Condition Category																				
a. Eutro-phication Stressor Presence	**Optimal**					**Suboptimal**					**Marginal**					**Poor**					
	No eutrophication stressors present within the AA boundary.					One eutrophication stressors present within the AA boundary.					Two eutrophication stressors present within the AA boundary.					Three eutrophication stressors present within the AA boundary.					
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	

Comments:

	Condition Category																				
b. Contaminant / Toxicity Stressor Presence	**Optimal**					**Suboptimal**					**Marginal**					**Poor**					**CI = Total Score/40**
	No contaminant / toxicity stressors present within the AA boundary.					One contaminant / toxicitystressors present within the AA boundary.					Two contaminant / toxicity stressors present within the AA boundary.					Three contaminant / toxicity stressors present within the AA boundary.					
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	

Comments:

a. Eutrophication Score	0	**Total Score:**	**0.00**
b. Contaminant Score	0	**0**	

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Wetland Condition Index

- Sum the individual Condition Indexes and divide by 6
  - Score ranges from 0.05-1.0

Overall Wetland Level 2 Condition Score: Sum all six of the Condition Indexes and divide by 6 to calculate the overall condition score.	**Overall Condition Index:**	**0.00**

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Riverine Condition L2 RAP

- Channel/Floodplain Condition Index
- Riparian Vegetation Condition Index
- Riparian ZOI Condition Index
- Instream Habitat Condition Index
- Channel Alteration Condition Index

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Channel/Floodplain Condition

- Predominant condition along the AA and considers three related resource aspects
  - Channel geometry
  - Channel Stability
  - Active Floodplain
- Important to understand stream type and range of associated natural features.

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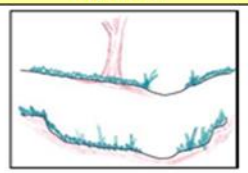
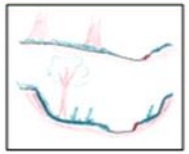
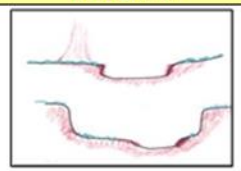
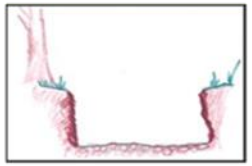
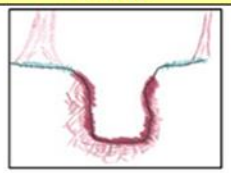
Channel/Floodplain Condition

1. Channel Condition: Assess the cross-section of the stream and prevailing conditions

	Condition Category																			
	Optimal				**Suboptimal**				**Marginal**				**Poor**				**Severe**			
Channel Condition	 **Channel Geometry:** These channels show very little incision or widening and little or no evidence of active erosion or unprotected banks; **Channel Stability:** Visual indicators of this stability include: 1) vegetative surface protection or natural rock stability present along greater than 80% of the banks; 2) stable point bars and bankfull benches may be present; 3) mid-channel bars and transverse bars are rare and if transient sediment deposition is present, it covers less than or equal to 10% of the stream bottom; **Active Floodplain Connection:** The channel has access to the active floodplain or has fully developed wide bankfull benches.				 **Channel Geometry:** These channels are slightly incised and contain a few areas of active erosion or unprotected banks. **Channel Stability:** Visual indicators of this slight instability include: 1) vegetative surface protection or natural rock stability present along greater than 60% and less than 80% of both banks; 2) depositional features such as point bars and bankfull benches are likely present; 3) if transient sediment is present, it affects or buries greater than 10% and less or equal to 40% of the stream bottom. **Active Floodplain Connection:** The stream has access to bankfull benches, or newly developed floodplains along portions of the reach.				 **Channel Geometry:** These channels are often incised or their course has been widened, but to a lesser degree than the Severe and Poor channel conditions. **Channel Stability:** Visual indicators of a marginal stream include: 1) erosional scars present along greater than 40% and less than or equal to 60% of both banks; 2) vegetative surface protection may be present along greater than 40 and less than or equal to 60% of the banks; 3) the stream banks may consist of some vertical or undercut banks or nick points associated with head cuts; 4) portions of the bankfull channel may still widen while some portions are beginning to narrow; 5) temporary and transient sediment deposit covers greater than 40 and less than or equal to 60% of the natural stream bed or bottom. However, streams that have degraded channel profiles which are recovering will exhibit different characteristics, including: 1) presence of depositional features such as point bars, mid-channel bars, transverse bars and bank full benches may be forming or present; 2) channels have a V shape; 3) vegetative surface protection is present on greater than 40% of the banks but evidence of instability can be observed in unvegetated areas. **Active Floodplain Connection:** Marginal streams have no connection to the active floodplain.				 **Channel Geometry:** These channels are over-widened or are incised. These channels are vertically and/or laterally unstable and are more likely to widen rather than incise further. **Channel Stability:** Visual indicators of over-widening and incision include: 1) both banks are near vertical with shallow to moderate root depths; 2) erosional scars present on greater than 60 and less than or equal to 80% of the banks; 3) vegetative surface protection is greater than 20 and less than or equal to 40% of both banks and is insufficient to prevent significant erosion from continuing; 4) greater than 60 and less than or equal to 80% of the natural stream bed or bottom (pools and riffles) is covered by substantial sediment deposition, often uniformed-sized materials; 5) depositional features such as point bars and bank full benches are absent. **Active Floodplain Connection:** Poor streams are not connected to the				 **Channel Geometry:** Severe channels are deeply incised (or excavated) with vertical and/or lateral instability and will likely continue to incise or widen. **Channel Stability:** visual indications of a deeply incised stream include: 1) the streambed elevation is below the average rooting depth; 2) both banks are vertical or undercut; 3) vegetative surface protection present on less than 20% of the banks and is not preventing erosion from continuing; 4) bank sloughing present; 5) erosional scars or raw banks present on greater than 80% of the banks; 6) greater than 80% of the natural streambed or bottom (pools and riffles) is covered by substantial sediment deposition; 7) Multiple thread channels and/or subterranean flow may be present in certain aggrading channels. **Active Floodplain Connection:** Severe streams are not connected to the active floodplain.			
Score	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Comments:

CI = (Score)/20	CI

Riparian Vegetation Condition Index

- 100-yr Floodplain Area
  - Desktop condition category classification

Riparian Vegetation

Color	Condition Category	Size (acres)	% Area
Red		0.87	0.18
Yellow		0.53	0.11
Green		3.39	0.71
	Total:	4.79	100%

Riparian Vegetation Condition Index

2. RIPARIAN VEGETATION: Assess the floodplain along the entire AA (Visual estimates of areal coverage from aerial photos with field verification acceptable).

	Condition Category					Comments:
	Optimal	**Suboptimal**		**Marginal**		**Poor**	
Riparian Vegetation (Floodplain)	Riparian area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.	**High Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.	**High Marginal:** Riparian area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.	**Low Marginal:** Riparian area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover	**High Poor:** Riparian area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Riparian area consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.
		High	**Low**	**High**	**Low**	**High**	**Low**
SCORE	**20 19 18 17 16**	**15 14 13**	**12 11**	**10 9 8**	**7 6**	**5 4 3**	**2 1**

1. Identify Condition Category areas along the floodplain using the descriptors above.
2. Estimate the % area within each condition category.
3. Enter the % Riparian Area in in decimal form (0.00) and Score for each category in the blocks below. Ensure the sum of the % Riparian Area Blocks equal 100

								Side Sub-Index	
	Condition Category								
Right Side	% Riparian Area:	18%	11%	71%	0%	0%	0%	**0.68**	**Side Sub-Index = SUM(%Areas*Scores)/20**
	Score:	1	5	18	0	0	0		
	Total Sub-score:	**0.18**	**0.55**	**12.78**	**0.00**	**0.00**	**0.00**		
	Condition Category								
Left Side	% Riparian Area:	0%	0%	0%	0%	0%	0%	**0.00**	**CI = (Left Side CI + Right Side CI)/2** / **CI**
	Score:	0	0	0	0	0	0		**0.68**
	Total Sub-score:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**		

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Riparian ZOI Condition Index

- Riparian Zone of Influence (extends 100 feet from floodplain)
  - Desktop condition category classification
- N/A when > 100 mi^2 but ≤ 2,000 mi^2 drainage area

Riparian Zone of Influence

Color	Condition Category	Size (acres)	% Area
Red		0.84	0.14
Yellow		0.62	0.11
Green		4.35	0.75
	Total:	5.81	100%

Riparian ZOI Condition Index

3. RIPARIAN ZONE OF INFLUENCE: Assess land cover along both sides, 100 feet from edge of floodplain into the upland along the entire AA. (rough measurements of length & width may be acceptable)

	Condition Category								Comments:
	Optimal	Suboptimal		Marginal		Poor			
Riparian ZOI	Riparian ZOI area vegetation consists of a tree stratum present (diameter at breast height (dbh) > 3 inches) with greater than or equal to 60% tree canopy cover. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.	**High Suboptimal:** Riparian ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian ZOI area vegetation consists of a tree stratum (dbh > 3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with a maintained understory.	**High Marginal:** Riparian ZOI area vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh > 3 inches) present, with less than 30% tree canopy cover.	**Low Marginal:** Riparian ZOI area vegetation consists of non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum, areas of hay production, and ponds or open water areas (< 10 acres). If trees are present, tree stratum (dbh > 3 inches) present, with less than 30%	**High Poor:** Riparian ZOI area vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Riparian ZOI area consists of impervious surfaces; mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.		
		High	Low	High	Low	High	Low		
SCORE	20 19 18 17 16	15 14 13	12 11	10 9 8	7 6	5 4 3	2 1		

1. Identify Condition Category areas along the floodplain using the descriptors above.								
2. Estimate the % area within each condition category.								
3. Enter the % Riparian Area in decimal form (0.00) and Score for each category in the blocks below.						Ensure the sums of % Riparian ZOI Blocks equal 100		
	Condition Category						**Side Sub-Index**	
Right Side	% Riparian Area:	14%	11%	75%	0%	0%	0%	**0.71**
	Score:	1	5	18	0	0	0	**Side Sub-Index = SUM(%Areas*Scores)/20**
	Total Sub-score:	**0.14**	**0.55**	**13.50**	**0.00**	**0.00**	**0.00**	
	Condition Category							
Left Side	% Riparian Area:	0%	0%	0%	0%	0%	0%	**0.00**
	Score:	0	0	0	0	0	0	**CI = (Left Side CI + Right Side CI)/2**
	Total Sub-score:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**CI** **0.71**

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In-Stream Habitat Condition Index

- Predominant Condition along AA
  - Substrate
  - Typical Velocity and Depths
  - Riffle/Pool
  - CWD Debris/SAV
- Condition Index is not applicable for intermittent watercourses

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In-Stream Habitat Condition Index

- Important to understand stream size, type and range of associated natural features.

4. INSTREAM HABITAT: Varied substrate sizes, water velocity and depths, woody and leafy debris, stable substrate, low embeddedness, shade, undercut banks, root mats, SAV, macrophytes, emergent vegetation, riffle-pool complexes, stable features.

Instream Habitat/ Available Cover	Condition Category					Comments:														
	Optimal					Suboptimal					Marginal					Poor				
	Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 50% of the reach. Substrate is favorable for colonization by a diverse and abundant epifaunal community, and there are many suitable areas for epifaunal colonization and/or fish cover.					Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 30% and less than 50% of the reach. Conditions are mostly desirable and are generally suitable for full colonization by a moderately diverse and abundant epifaunal community.					Physical Elements that enhance a stream's ability to support aquatic organisms are present in greater than or equal to 10% and less than 30% of the reach. Conditions are generally suitable for partial colonization by epifaunal and/or fish communities.					Physical Elements that enhance a stream's ability to support aquatic organisms are present in less than 10% of the reach. Conditions are generally unsuitable for colonization by epifaunal and/or fish communities. The reach.					CI = (Score)/20	CI
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SCORE 0	0.00

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Channel Alteration Condition Index

- Percent of channel in AA affected
  - Primarily **Structural Alterations**
    - Fills, Riprap, Culverts, etc.
  - Channelization/Straightening
    - Must be recent (not recovered)

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Channel Alteration Condition Index

Alteration is the structure or change; not the affect on the resource

5. CHANNEL ALTERATION: Stream crossings, riprap, concrete, gabions, or concrete blocks, straightening of channel/channelization, embankments, spoil piles, constrictions, etc.

	Condition Category																				Comments:	
	Negligible					Minor					Moderate				Severe							
Channel Alteration	Channel alterations listed above are absent in the SAR. The stream has unaltered pattern or has normalized.					**Minor High:** Less than or equal to 20% of the stream reach is disrupted by any of the channel alterations listed above. Alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent alteration is not			**Minor Low:** Greater than 20% and less than or equal to 40% of the stream reach is disrupted by any of the channel alterations listed above. Alteration or channelization present, usually adjacent to structures, (such as bridge abutments or culverts); evidence of past alteration, (i.e., channelization) may be present, but stream pattern and stability have recovered; recent			**Moderate High:** Greater than 40% and less than or equal to 60% of reach is disrupted by any of the channel alterations listed above. If the stream has been channelized, normal stable stream meander pattern has not recovered.		**Moderate Low:** Greater than 60% and less than or equal to 80% of reach is disrupted by any of the channel alterations listed in the parameter guidelines. If the stream has been channelized, normal stable stream meander pattern has not recovered.		Greater than 80% of reach is disrupted by any of the channel alterations listed above. Greater than 80% of banks shored with gabion, riprap, or concrete.							
						High			Low		High			Low							CI = (Score)/20	CI
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	SCORE	0.00

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Riverine Condition Index (RCI)

- Sum of individual condition Indexes divided by 5
  - RCI ranges from 0.05-1.0
- Intermittent or drainage areas > 100 mi^2 divide by 4

RIVERINE CONDITION INDEX (RCI)		RCI
NOTE: The CIs and RCI should be rounded to 2 decimal places.	RCI = (Sum of all CI's)/5	0.00
If a CI is not applicable (e.g. due to use on intermittent watercourse or >100 sq. mile drainage area) in order to utilize the auto calculator feature the user will need to modify the RCI formula or enter the maximum score for that CI to achieve a CI of 1.0 which will offset the divisor difference.		

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Lacustrine Condition L2 RAP

- Average Depth Condition Index
- Riparian Shoreline Vegetation Condition Index
- Riparian Zone of Influence (ZOI) Vegetation Condition Index
- Shoreline and Near-shore Human Alterations Index

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Average Depth Condition Index

- Average of five depth measurements along a line parallel to shoreline and midway of the AA.

1. Average Depth Condition Index

	Condition Category																				CI= Total Score/ 20
	Optimal					Suboptimal					Marginal					Poor					
Average Depth of Impact Area	**High Optimal:** Depth of the AA is greater than 0 and less than or equal to 6 feet in depth on average.*		**Low Optimal:** Depth of the AA is greater than 6 and less than or equal to 10 feet in depth on average.			Depth of the AA is greater than 10 and less than or equal to 15 feet in depth on average.					Depth of the AA is greater than 15 and less than or equal to 20 feet in depth on average.					Depth of the AA is greater than 20 feet in depth on average.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0.00
																Score			0		

* Special aquatic habitats such as mud flats, submerged aquatic vegetation beds, emergent wetlands (occurring within the defined limits of the lacustrine resources) are scored optimally regardless of depth conditions.

** The average depth is determined by taking a minimum of five measurements along a line that runs the width of the entire AA (parallel to the shoreline), midway between the shoreline and the outer boundary of the AA. Note: The condition category can be raised one level if below High Optimal when habitat complexity is present as described in Section 2.0 narrative .

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Riparian Shoreline Vegetation Condition Index

- Extends from shoreline 50 feet landward

2. Riparian Shoreline Vegetation Condition Index								
	Condition Category							
	Optimal	Suboptimal		Marginal		Poor		
Riparian Shoreline Vegetation (from water's edge to 50 ft. inland)	Riparian area vegetation consists of a tree stratum (diameter at breast height (dbh) > 3 inches) present, with greater than or equal to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.	**High Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh >3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.	**Low Suboptimal:** Riparian area vegetation consists of a tree stratum (dbh >3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with maintained understory.	**High Marginal:** Riparian area vegetation consists of a non-maintained, dense herbaceous vegetation with either a shrub layer or a tree stratum (dbh >3 inches) present, with less than 30% tree canopy cover.	**Low Marginal:** Riparian area vegetation consists of a non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum and areas of hay production, and ponds or open water areas (< 10 acres)present. If tree stratum (dbh >3 inches) present, less than 30% tree canopy cover with maintained understory.	**High Poor:** Riparian area consists of lawns, mowed and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, recently seeded and stabilized, or other comparable condition.	**Low Poor:** Riparian area consists of impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.	**CI= Total Score/ 20**
SCORE ___	20 19 18 17 16	15 14 13 12 11		10 9 8 7 6		5 4 3 2 1		

1. Identify all applicable Condition Category areas within the riparian shoreline area using the descriptors above.
2. Estimate the % area within each condition category.
3. Enter the % Shoreline Area in decimal form (0.00) and Score for each category in the blocks below.

Total Score = SUM(% Areas*Scores)

	Condition Category:								
Scoring:	% Area:	0%	0%	0%	**0%**	**0%**	**0%**	**Total Sub-Scores:**	
	Score:	0	0	0	**0**	**0**	**0**		
	Sub-score:	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Riparian ZOI Vegetation Condition Index

- Extends 50 -100 feet from the shoreline

<table>
<tr><th colspan="9">3. Riparian Zone of Influence (ZOI) Vegetation Condition Index</th></tr>
<tr><th></th><th colspan="7">Condition Category</th><th rowspan="5">CI= Total Score/ 20</th></tr>
<tr><th rowspan="2">Riparian Zone of Influence (from 50-100 feet inland)</th><th>Optimal</th><th colspan="2">Suboptimal</th><th colspan="2">Marginal</th><th colspan="2">Poor</th></tr>
<tr><td>Riparian ZOI vegetation consists of a tree stratum (diameter at breast height (dbh) > 3 inches) present, with greater than or equal to 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory. Areas comprised of stream channels, wetlands (regardless of classification or condition) and lacustrine resources ≥ 10 acres are scored as optimal.</td><td><u>High Suboptimal:</u> Riparian ZOI vegetation consists of a tree stratum (dbh >3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover and containing both herbaceous and shrub layers or a non-maintained understory.</td><td><u>Low Suboptimal:</u> Riparian ZOI vegetation consists of a tree stratum (dbh >3 inches) present, with greater than or equal to 30% and less than 60% tree canopy cover with maintained understory.</td><td><u>High Marginal:</u> Riparian ZOI vegetation consists of non-maintained, dense herbaceous vegetation with either a shrub layer or a tree layer (dbh >3 inches) present, with less than or equal to 30% tree canopy cover.</td><td><u>Low Marginal:</u> Riparian ZOI vegetation consists of a non-maintained, dense herbaceous vegetation, riparian areas lacking shrub and tree stratum and areas of hay production, and ponds or open water areas (< 10 acres)present. If tree stratum (dbh >3 inches) present, less than 30% tree canopy cover with maintained understory.</td><td><u>High Poor:</u> Riparian ZOI vegetation consists of lawns, mowed, and maintained areas, nurseries; no-till cropland; actively grazed pasture, sparsely vegetated non-maintained area, pervious trails, recently seeded and stabilized, or other comparable condition.</td><td><u>Low Poor:</u> Riparian ZOI vegetation consists of impervious surfaces, mine spoil lands, denuded surfaces, row crops, active feed lots, impervious trails, or other comparable conditions.</td></tr>
<tr><td>SCORE ___</td><td>20 19 18 17 16</td><td colspan="2">15 14 13 12 11</td><td colspan="2">10 9 8 7 6</td><td colspan="2">5 4 3 2 1</td></tr>
<tr><td colspan="5">1. Identify all applicable Condition Category areas within the riparian ZOI using the descriptors above.
2. Estimate the % area within each condition category. Calculators are provided for you below.
3. Enter the % ZOI Area in decimal form (0.00) and Score for each category in the blocks below.</td><td colspan="3">Total Score = SUM(% Areas*Scores)</td></tr>
<tr><td rowspan="4">Scoring:</td><td>Condition Category:</td><td></td><td></td><td></td><td></td><td></td><td></td><td rowspan="4">0.00</td></tr>
<tr><td>% ZOI Area:</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td>0%</td><td rowspan="2">Total Sub-Scores:</td></tr>
<tr><td>Score:</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>Sub-score:</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td><td>0.00</td></tr>
</table>

Shoreline and Near-shore Human Alterations Index

- Alterations 50 feet landward from the shoreline

4. Shoreline and Near-shore Human Alterations Index

	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					CI= Total Score/ 20
Shoreline and Near-shore Human Alterations Index	**High Optimal:** No man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline.		**Low Optimal:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline occupying less than 10% of the shoreline.			**High Suboptimal:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline occupying greater than or equal to 10% but less than 25% of the shoreline.		**Low Suboptimal:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline occupying greater than or equal to 25% but less than 40% of the shoreline.			**High Marginal:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline occupying greater than or equal to 40% but less than 55% of the shoreline.		**Low Marginal:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine shoreline occupying greater than or equal to 55% but less than 70% of the shoreline.			**High Poor:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine (shoreline) occupying greater than or equal to 70% but less than 85% of the shoreline.		**Low Poor:** Man-made structures, roads or other disturbances within 50 feet or along the lacustrine (shoreline) occupying greater than or equal to 85% of the shoreline.			
SCORE	**20**	**19**	**18**	**17**	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**0.00**
Comments:																**Score**			**0**		

Lacustrine Condition Index

- Sum the individual condition indexes and divide by 4.

Overall Lacustrine Level 2 Condition Score: Sum all four of the Condition Indexes and divide by 4 to calculate the overall condition score (value between 0.05 and 1.0).	**Overall Condition Index:**	**0.00**

- Impact areas > 50 feet from the shoreline, utilizes the Average Depth Condition Index only.

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Questions?

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