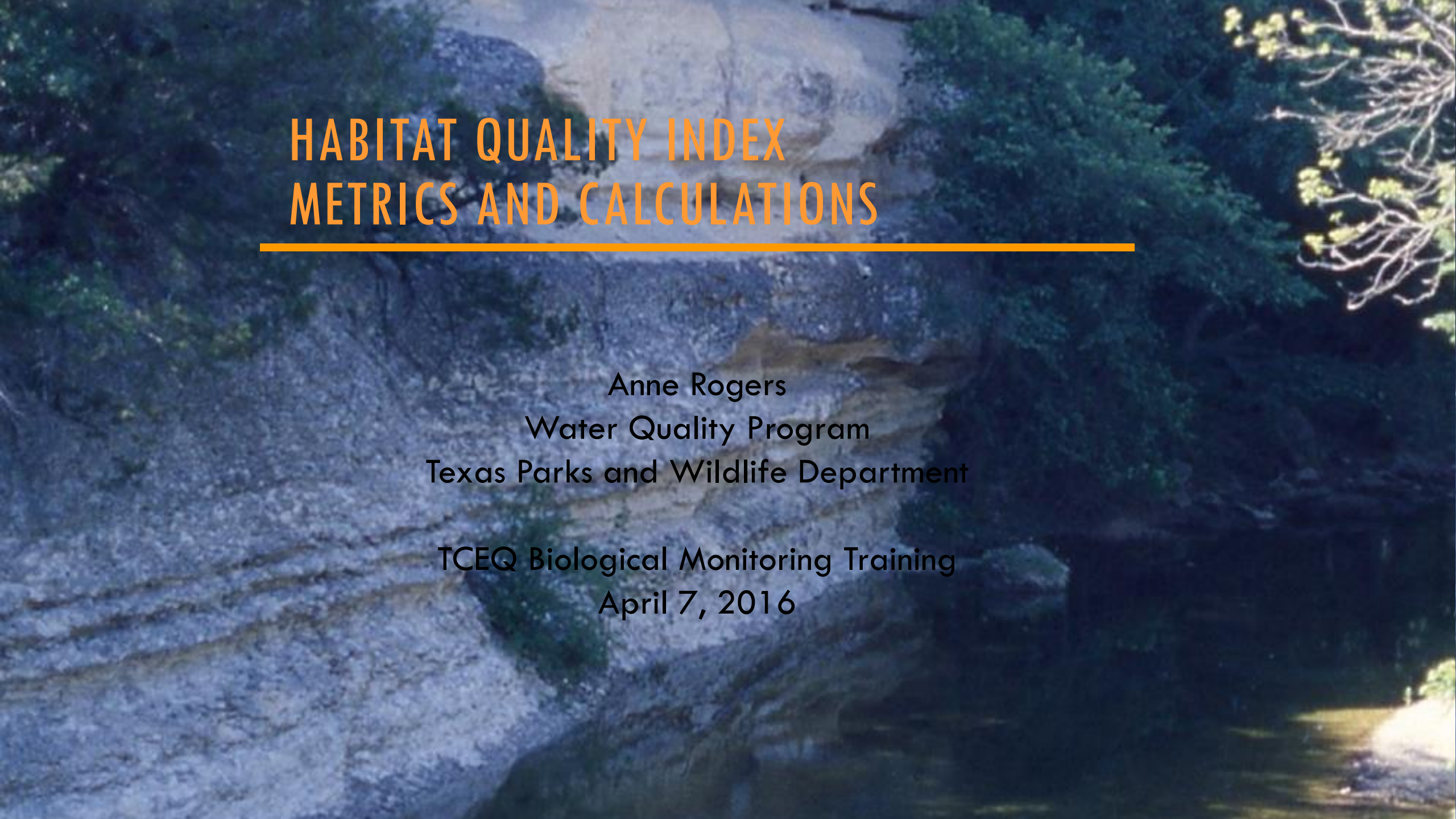

HABITAT QUALITY INDEX METRICS AND CALCULATIONS

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TCEQ Biological Monitoring Training
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POST PROCESSING PHYSICAL HABITAT DATA

- Check that all data forms are complete before leaving the field
  - Especially the reach-based evaluations
- Check that all data is legible and corrections are clear
- Catalog photographs with appropriate file names for future reference
- Perform any desktop evaluations to better characterize data
  - Sinuosity
  - Riparian vegetative buffer width
  - Land uses that may affect ALU

SUMMARY OF PHYSICAL CHARACTERISTICS OF WATER BODY

- Field data is summarized on Part II
- Additional calculations are made from topographic maps or GIS, Google Earth, etc.
- Summary sheet is then used to score themetrics of the HQI

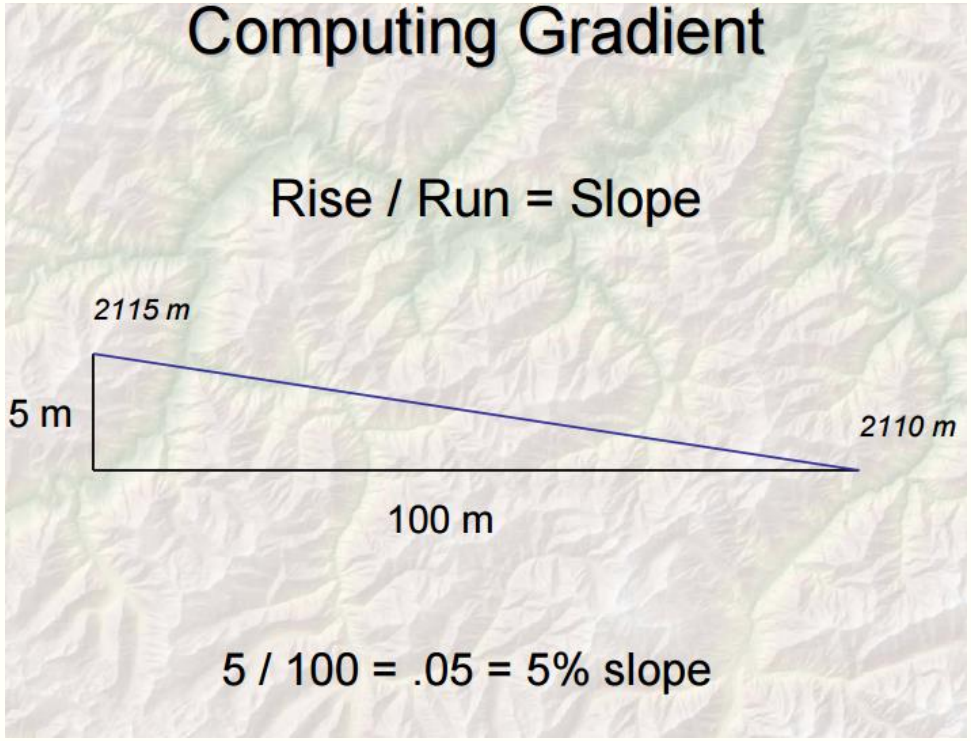
Cibolo Creek - Reach F at station 15126 - 06/12/08

Table of raw habitat data from each transect with averages shown in bold

depth	width	bank angle	erosion pot	% gravel	% instream cov	% canopy	riparian width
0.01	11.4	10.9	25	45	55	84	15
0	8.9	28.8	20	85	70	91	18
0.36	17	26.5	35	10	45	91	5
0.45	21	41	10	100	90	94	20
0.43	6	30.2	50	5	10	98	20
0.4	21	38	60	20	30	85	20
0.39	**14.22**	9.3	10	**44.17**	**50.00**	**90.50**	**16.33**
0.38		60.8	80				
0.35		16.5	30				
0.33		31.5	25				
0.11		33.6	50				
0.02		3.1	0				
0.16		**27.52**	**32.92**				
0.32							
…							
…							
0.38							
0.27							
0.15							
0.32							

Streambed Slope

- Use a USGS topographic map of the reach
- Measure the change in elevation between the first contour line crossing the stream upstream of the upstream reach boundary and the first contour line crossing the stream downstream of the downstream reach boundary
- Convert to meters
- Divide this by the length of the stream reach in meters from Part I
- Multiply by 1,000 to get m/km



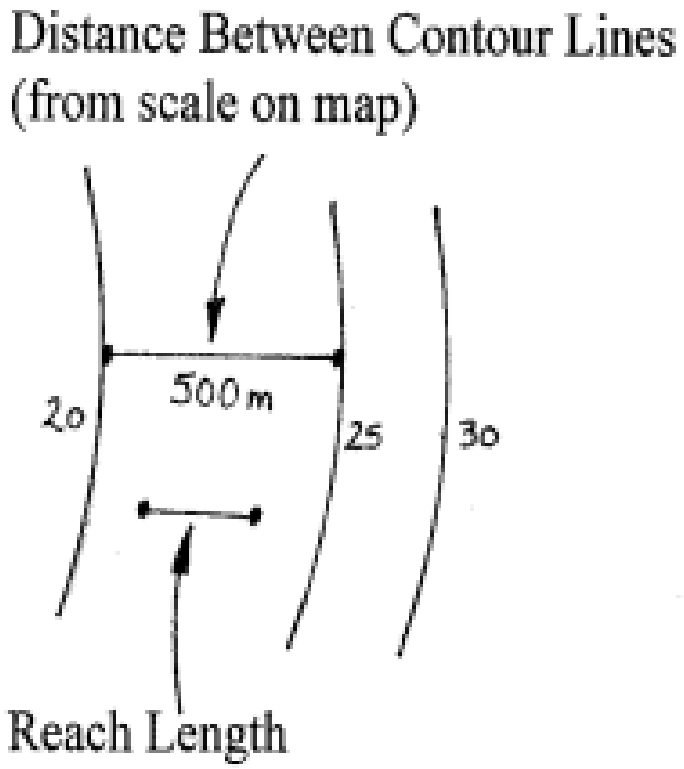
Example: 10 ft/250 m = 3.048 m/250 m
× 1000 = 12.192

(1 ft = 0.3048 m)

Streambed Slope

For low-gradient streams or for short reach lengths, the reach may fall between two contour lines.

In these instances, determine the slope over the entire interval between the two contour lines that encompass the reach and assign that slope to the reach.



△ Elevation/Distance Between contour Lines x 1000 = Slope

5m/500m x 1000 = 10

Monitoring Station ID: 15126 **Lattitude:** 29.775283 **Longitude:** -98.709514

Short Description: CIBOLO CREEK BELOW MENGER CR

WaterShed DataPage

WS OpenWater: (% Total WaterShed Data)	.7564947	**RP OpenWater:** (% Riparian Area)		**Station Elevation:** (m)	411.3486633
WS DevOpenSpace: (% Total WaterShed Data)	4.2243351	**RP DevOpenSpace:** (% Riparian Area)		**Average Rainfall:** (cm)	89.986
WS DevLowIntensity: (% Total WaterShed Data)	1.3376201	**RP DevLowIntensity:** (% Riparian Area)		**Main ChannelSinousity Ratio:** (unitless)	1.494722736
WS DevMedIntensity: (% Total WaterShed Data)	.54502	**RP DevMedIntensity:** (% Riparian Area)		**MinimumElevationInWaterShed:** (m)	411.728
WS DevHighIntensity: (% Total WaterShed Data)	.208036	**RP DevHighIntensity:** (% Riparian Area)		**MaximumElevationInWaterShed:** (m)	612.926
WS BarrenLand: (% Total WaterShed Data)	.0257896	**RP BarrenLand:** (% Riparian Area)		**MainChannelSlopeStation:*** (m/km)	.00313053
WS DeciduousForest: (% Total WaterShed Data)	5.5155339	**RP DeciduousForest:** (% Riparian Area)	15.8878505	**WaterShed Area:*** (km2)	163.3255199
WS EvergreenForest: (% Total WaterShed Data)	40.1354813	**RP EvergreenForest:** (% Riparian Area)	48.5981308	**Straehler StreamOrder at Station:** (unitless)	1
WS MixedForest: (% Total WaterShed Data)	.0103158	**RP MixedForest:** (% Riparian Area)		**Road Density:** (Road Density/Square km of watershed)	2.017484214
WS DwarfShrub: (% Total WaterShed Data)		**RP DwarfShrub:** (% Riparian Area)		**Main ChannelLength:** (km)	27.52062201
WS ScrubShrub: (% Total WaterShed Data)	33.6038375	**RP ScrubShrub:** (% Riparian Area)	20.5607477	**WaterShed Perimeter:** (km)	65.7
WS GrasslandHerbaceous: (% Total WaterShed Data)	13.401991	**RP GrasslandHerbaceous:** (% Riparian Area)	14.953271	**Main ChannelSlopeInWS:** (m/km)	10.067156

Main Channel Slope Station:

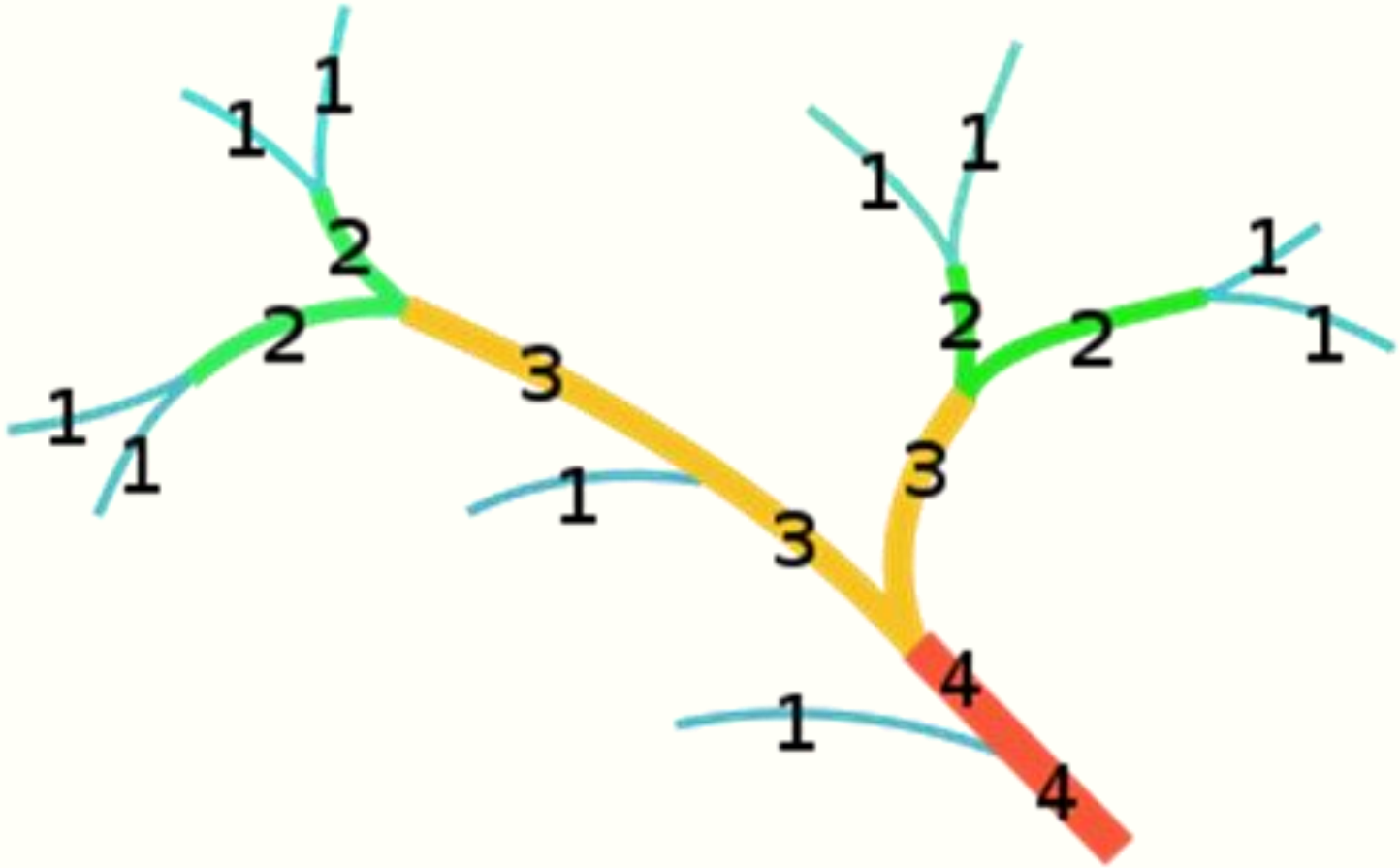
Channel slope in m/km; calculated by determining elevation at monitoring station and 1KM upstream, and then dividing change in elevation between these 2 points by length of main-channel line segment connecting the 2 points.

Main Channel Slope In WS:

Channel slope in m/km; calculated by determining elevation at 10 & 85% of distance along main channel length, and then dividing change in elevation between these 2 points by length of main-channel line segment connecting the 2 points.

Stream Order

Use 1:24,000 USGS topographic map



Part II—Summary of Physical Characteristics of Water Body

Using information from all of the transects and measurements in Part I and other sources, report the following general characteristics or averages for the entire reach:

Stream Name:	**Date:**
Physical Characteristics	**Value**
Stream bed slope over evaluated reach (from USGS map; elevation change in meters / reach length in kilometers)	
Approximate drainage area above the transect furthest downstream (from USGS or county highway map in km^2)	
Stream order	
Length of stream evaluated (meters or kilometers)	
Number of lateral transects made	
Average stream width (meters)	
Average stream depth (meters)	
Stream discharge (ft^3/sec)	

Flow measurement method	
Channel flow status (high, moderate, low, or no flow)	
Maximum pool width (meters)	
Maximum pool depth (meters)	
Total number of stream bends	
Number of well-defined bends	
Number of moderately defined bends	
Number of poorly defined bends	
Total number of riffles	
Dominant substrate type	
Average percent of substrate gravel-sized or larger	
Average percent instream cover	
Number of stream cover types	
Average percent stream-bank erosion potential	
Average stream-bank slope (degrees)	

Average width of natural buffer vegetation (meters)	
Average percent composition of riparian vegetation by: (total to equal 100%)	
Trees	
Shrubs	
Grasses and forbs	
Cultivated fields	
Other	
Average percent of tree-canopy coverage	
Overall aesthetic appraisal of the stream	

HABITAT QUALITY INDEX – PART III

Scoring and Evaluation Criteria

Primary Attributes

- Bottom Substrate Stability (1-4 score)
- Dimensions of Largest Pool (1-4 score)
- Available Instream Cover (1-4 score)

Secondary Attributes

- Number of Riffles (1-4 score)
- Channel Flow Status (0-3 score)
- Channel Sinuosity (0-3 score)

HABITAT QUALITY INDEX – PART III

Scoring and Evaluation Criteria

Tertiary Attributes

- Bank Stability (0-3 score)
- Riparian Buffer Vegetation (0-3 score)
- Aesthetics of Reach (0-3 score)

Habitat Parameter	Scoring Category			
Available Instream Cover	**Abundant** > 50% of substrate favorable for colonization and fish cover; good mix of several stable (not new fall or transient) cover types such as snags, cobble, undercut banks, macrophytes	**Common** 30–50% of substrate supports stable habitat; adequate habitat for maintenance of populations; may be limited in the number of different habitat types	**Rare** 10–29.9% of substrate supports stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed	**Absent** < 10% of substrate supports stable habitat; lack of habitat is obvious; substrate unstable or lacking
Score_____	4	3	2	1
Bottom Substrate Stability	**Stable** > 50% gravel or larger substrate; gravel, cobble, boulders; dominant substrate type is gravel or larger	**Moderately Stable** 30–50% gravel or larger substrate; dominant substrate type is mix of gravel with some finer sediments	**Moderately Unstable** 10–29.9% gravel or larger substrate; dominant substrate type is finer than gravel, but may still be a mix of sizes	**Unstable** < 10% gravel or larger substrate; substrate is uniform sand, silt, clay, or bedrock
Score_____	4	3	2	1
Dimensions of Largest Pool	**Large** Pool covers more than 50% of the channel width; maximum depth is > 1 meter	**Moderate** Pool covers approximately 50% or slightly less of the channel width; maximum depth is 0.5–1 meter	**Small** Pool covers approximately 25% of the channel width; maximum depth is < 0.5 meter	**Absent** No existing pools, only shallow auxiliary pockets
Score_____	4	3	2	1

Number of Riffles To be counted, riffles must extend >50% the width of the channel and be at least as long as the channel width	**Abundant** ≥ 5 riffles	**Common** 2–4 riffles	**Rare** 1 riffle	**Absent** No riffles
Score_____	4	3	2	1

Water Level	**High** Water reaches the base of both lower banks; < 5% of channel substrate is exposed	**Moderate** Water fills >75% of the channel; or < 25% of channel substrate is exposed	**Low** Water fills 25–75% of the available channel or riffle substrates are mostly exposed	**No Flow** Very little water in the channel and mostly present in standing pools, or stream is dry
Score_____	3	2	1	0

Channel Sinuosity	**High** ≥ 2 well-defined bends with deep outside areas (cut banks) and shallow inside areas (point bars) present	**Moderate** 1 well-defined bend **or** ≥ 3 moderately-defined bends present	**Low** < 3 moderately-defined bends **or** only poorly-defined bends present	**None** Straight channel; may be channelized
Score_____	3	2	1	0

Bank Stability	**Stable** Little evidence (< 10%) of erosion or bank failure; bank angles average < 30º	**Moderately Stable** Some evidence (10–29.9%) of erosion or bank failure; small areas of erosion mostly healed over; bank angles average 30–39.9°	**Moderately Unstable** Evidence of erosion or bank failure is common (30–50%); high potential of erosion during flooding; bank angles average 40–60°	**Unstable** Large and frequent evidence (> 50%) of erosion or bank failure; raw areas frequent along steep banks; bank angles average > 60°
Score_____	3	2	1	0

Riparian Buffer Vegetation	**Extensive** Width of natural buffer is > 20 meters	**Wide** Width of natural buffer is 10.1–20 meters	**Moderate** Width of natural buffer is 5–10 meters	**Narrow** Width of natural buffer is < 5 meters
Score_____	3	2	1	0
Aesthetics of Reach	**Wilderness** Outstanding natural beauty; usually wooded or unpastured area; no obvious indications of human activity	**Natural Area** Trees or native vegetation is common; some development evident (from fields, pastures, rural dwellings) little evidence of human activity	**Common Setting** Not offensive; area is developed, but uncluttered such as in an urban park	**Offensive** Stream does not enhance the aesthetics of the area; cluttered; highly developed; may be a dumping area
Score_____	3	2	1	0
Total Score_____				

TOTAL SCORE FOR AQUATIC LIFE SUBCATEGORIES

26-31 Exceptional

20-25 High

14-19 Intermediate

8-13 Limited

≤ 7 Minimal