

Appendix 4.1: USEPA Habitat Assessment Index (HAI) field data sheet.

GLIDE/POOL PREVALENT STREAMS (LOW GRADIENT)

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 70% (50% for low gradient streams) of substrate favorable for epifaunal colonization and fish cover; most favorable is a mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% (30-50% for low gradient streams) mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% (10-30% for low gradient streams) mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% (10% for low gradient streams) stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2b. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or submerged vegetation.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3b. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large- deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small- shallow or pools absent.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE ____	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Appendix 4.1 (Continued)

6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE __	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7b. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE __	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left of right side by facing downstream	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE __ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE __ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zones covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE __ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE __ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE __ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE __ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Appendix 4.2: Habitat Assessment Index field data sheet.

HABITAT PARAMETER	EXCELENT	GOOD	FAIR	POOR
1. BOTTOM SUBSTRATE/AVAILABLE COVER	20 19 18 17 16 > 50% rubble, gravel, submerged logs or other stable habitat.	15 14 13 12 11 30-50% rubble, gravel or other stable habitat.	10 9 8 7 6 10-30% rubble, gravel or other stable habitat.	5 4 3 2 1 0 <10% rubble, gravel or other stable habitat.
2. EMBEDDEDNESS	20 19 18 17 16 Gravel, cobble and boulder particles 0-25% surrounded by fine sediment.	15 14 13 12 11 Gravel, cobble and boulder particles 25-50% surrounded by fine sediment.	10 9 8 7 6 Gravel, cobble and boulder particles 50-75% surrounded by fine sediment.	5 4 3 2 1 0 Gravel, cobble and boulder particles >75% surrounded by fine sediment.
3. BIOTOPE DIVERSITY CATEGORIES	20 19 18 17 16 SIC, MV, SOOC, sand, mud or gravel all present.	15 14 13 12 11 3 of 4 categories present (absence of SIC receives lower score)	10 9 8 7 6 2 of 4 categories present (absence of SIC receives lower score)	5 4 3 2 1 0 Only 1 of the 4 categories present. If no SIC, score 0.
4. VELOCITY/DEPTH CATEGORIES	15 14 13 12 slow (<0.3m/s), deep (>0.5m); shallow (<0.5m); fast (>0.3m/s), deep; fast, shallow habitats all present.	11 10 9 8 3 of 4 categories present (absence of riffles or runs receives lower score than absence of pools)	7 6 5 4 2 of 4 categories present (absence of riffle/runs receives lower score)	3 2 1 0 Dominated by 1 velocity/depth category (usually pool)
5. BOTTOM AREA AFFECTED BY SCOURING & DEPOSITION	15 14 13 12 <5% of bottom affected by scouring & deposition.	11 10 9 8 5-30% affected. Scour at constrictions and where grades steepen. Some deposition in pools.	7 6 5 4 30-50% affected. Deposits and scour at obstructions, constrictions and bends. Some filling of pools.	3 2 1 0 >50% of bottom changing nearly year long. Pools almost absent due to deposition. Only large rocks in riffle exposed.
6. POOL/RIFFLE & RUN/BEND RATIOS	15 14 13 12 Variety of habitat. Deep riffles and pools, runs and bends.	11 10 9 8 Adequate depth in pools and riffles. Bends provide habitat.	7 6 5 4 Occasional riffle or bend. Bottom contours provide some habitat.	3 2 1 0 Essentially a straight stream. Generally all flat water.
7. BANK EROSION POTENTIAL	10 9 Stable. No evidence of erosion or bank failure. Side slopes generally <30%. Little potential for future problems.	8 7 6 Moderately stable. Infrequent small areas of erosion mostly healed over. Side slopes up to 40% on one bank. Slight erosion potential in extreme floods.	5 4 3 Moderately unstable. Moderate frequency and size of erosional areas. Side slopes up to 60% on some banks. High erosion potential during extreme high flow.	2 1 0 Unstable. Many eroded areas. Side slopes >60% common. Raw areas frequent along straight sections and bends.
8. BANK VEGETATIVE STABILITY	10 9 >80% of the streambank surface covered by veg. or boulders & cobbles	8 7 6 50-70% of the streambank surface covered by veg., gravel or larger material.	5 4 3 25-49% of the streambank surface covered by veg., gravel or larger material.	2 1 0 <25% of the streambank surface covered by veg., gravel or larger material.
9. STREAMSIDE COVER (Dominant veg.)	10 9 Veg. is mainly shrub & tree form.	8 7 6 Dominant veg. is of tree form.	5 4 3 Dominant veg. is grass, forbes or reeds.	2 1 0 >50% of the streambank has no veg. dominant material is soil, rock, bridge materials, culverts or mine tailings.