Wildlife Habitat

Appraisal Procedure

(WHAP)

Last Revised January 12, 1995

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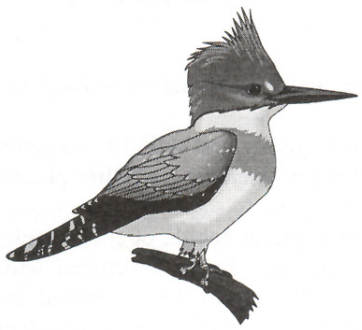


Texas Parks and Wildlife Department

Wildlife Habitat Appraisal Procedure (WHAP)

Overview: The Wildlife Habitat Appraisal Procedure was developed to allow a qualitative, holistic evaluation of wildlife habitat for particular tracts of land statewide without imposing significant time requirements in regard to field work and compilation of data.

Section IA measures key components which contribute to the ecological condition of the evaluated tract and resulting overall suitability for wildlife. Habitat quality values are generated and combined with acreage figures to provide available Habitat Units (HU). Section IB describes a method for assessing habitat impacts and calculating mitigation requirements. Section II addresses the degree of presence or absence of Protected Fauna and Flora. In Section III, factors which may affect acquisition priority or management strategies are addressed. Scores derived from evaluation parameters from each Section may be integrated into a final summary for the evaluated tract.

The method is based on the following assumptions.

1. that vegetation structure including species composition and physiognomy is itself sufficient to define the habitat suitability for wildlife;

2. that a positive relationship exists between vegetation diversity and wildlife species diversity;

3. that vegetation composition and primary productivity directly influence population densities of wildlife species.

As designed, the Wildlife Habitat Appraisal Procedure is intended to be used for the following applications:

1. Evaluating impacts upon wildlife populations from specific development project alternatives.

2. Establishing base line data prior to anticipated or proposed changes in habitat conditions for specific areas.

3. Comparing tracts of land which are candidates for land acquisition or mitigation.

4. Evaluating general habitat quality and wildlife management potential for tracts of land over large geographical areas, including wildlife planning units.

The WHAP was not designed to evaluate habitat quality in relation to specific wildlife species. Other procedures exist or are currently being developed which utilize this approach. Such species-oriented evaluations generally require more detailed life requisite information, may not portray overall ecological conditions and could be subject to change within different geographical locations.

Section IA

Biological Habitat Components

Procedures:

1. The WHAP method requires evaluating representative sites of each cover type present within the area of interest. Obtain or produce a vegetation/cover map of the entire tract to be evaluated. Procurement of aerial photography may be required. Cover types are delineated according to floristics that signify dominant plant species and physiognomy according to the categories listed in Appendix 1.

2. A minimum number of sites representing each delineated cover type should be inspected to ensure an acceptable appraisal. Detailed statistical analyses would require establishment of a compatible sampling procedure. Determination of the number of inspection sites for each cover type should be governed by the objective of the evaluation, size of the area to be evaluated, and constraints imposed by available time and resources.

3. View each site sufficiently to assure that an overall evaluation can be made. Consider each habitat component carefully as provided by the Field Evaluation Key. In the absence of statistical sampling requiring uniform quadrant boundaries, search effort should cover an area that is large enough to provide the observer with an adequate representation of dominantly occurring woody and herbaceous pants. This may require traversing areas larger than an acre in size to identify isolated trees within open or semi-open landscapes. However, in more heavily wooded areas, greater effort will be needed to determine plant composition, requiring observations on smaller sites. Experience has shown a search area of approximately 0.5 acres (circle with radius of 83 feet or 28 yards) may be sufficient to determine commonly occurring plants in most wooded areas. Awareness of sudden changes in soils, elevation, or vegetation disturbances should be considered in selecting sites for observation. Additional evaluation sites may be needed to account for these variations.

4. Determine the number of points to assign various habitat components according to the listed criteria on the Evaluation Key.

5. Enter the number of points assigned to each of the components on the appropriate line of the Biological Components Field Evaluation Form (Part 2, PWD 1137A).

   NOTE: A Biological Components Field Evaluation Form must be completed for each delineated cover type. Data for up to 7 inspection sites within a particular cover type may be included on the form.

6. After all sites are inspected, calculate average habitat quality for each cover type as guided by the Biological Components Field Evaluation Form (PWD 1137A).

7. Cover types within or between tracts may be compared using the habitat quality scores calculated from the Biological Components Field Evaluation Form. These scores may also be used to determine strategies and needs associated with resource management planning. Scores obtained from Section II, Protected Fauna and Flora, and Section III, Acquisition/Administration may also be used to collectively determine the overall value of the tract. Collective evaluation may be accomplished by completing the Wildlife Habitat Appraisal Summary (PWD 1137E).

8. Where habitat impacts due to changes in future conditions occurring naturally or as a result of human influences are anticipated, cover types may be evaluated with "projected" numerical ratings according to various future alternative scenarios. This tabulated data will yield values which may be compared with baseline conditions to determine the extent of projected impacts for each alternative and amount of habitat required to adequately offset (compensate) unavoidable adverse impacts. This process is summarized in Section IB (page 13).

Biological Habitat Components

Evaluation Key

Biological Habitat Components
Evaluation Key

Component 1 – Site Potential

Evaluate for all cover types.

Criteria [2/]	Value
Substrate is composed or exhibits one or more of the following: 1) at least periodically supports predominately hydrophytic vegetation; 2) is predominately undrained hydric soil and supports or is capable of supporting hydrophytic vegetation; 3) is saturated with water or covered by shallow water during 1-2 months during the growing season of each year (swamps, bogs, marshes, and hardwood bottomlands exhibiting a high frequency of flooding).	25
Alluvial substrate although less hydric than above; only temporarily or intermittently inundated or saturated for short periods (higher terraces of hardwood bottoms, riparian drainages).	20
Uplands with thick surface layer (generally greater than or equal to 10 inches) consisting of unrestricted loam (including sandy loam) or dark well-structured (granulated) clay (including sandy clay).	12
Uplands with shallow surface layer (generally less than 10 inches) consisting of shallow soil over restrictive layer (rock, gravel, claypan, etc.) or deep, leached, droughty sand or, relatively light colored poorly structured clay or gravelly/stony sand or clay.	7
Organic matter minimal or absent at the surface. (Includes undrained or saturated hydric soils not supporting vegetation, i.e., mud flats).	3
Surface contains chemical compounds which would potentially limit growth of primary producers (salt, mine overburden containing heavy metals or acid compounds, surface pollution).	1

Component 2 – Temporal Development of Existing Successional Stage

Determine currently existing successional stage (Criteria A); evaluate for all cover types except marshes. For this habitat type use Criteria B.

Criteria A [3/]	**Value**
Old timber (100 or more years, trees >25 inches*)	20
Mature timber, old brush, climax prairie (40-99 years, trees 12-25 inches)	12
Pole and young timer, mature brush (11-29 years, trees <12 inches)	6
Grasslands in grazing disclimax** or early and mid-successional perennial grasses and forbs, hay meadows	5
Seedlings, saplings, young brush (2-10 years)	3
Annual native or introduced grasses, forbs, crops	1

* Diameter at breast height (DBH)
**Example: Texas wintergrass-silver bluestem grasslands

Criteria B (Marsh wetlands)	**Value**
Established mature communities within or adjacent to an enclosed coastal water body with a free connection to the sea and a measurable quantity of salt in its waters but with abundant or semi-abundant freshwater inflow (estuarine areas).	20
Established mature communities or intermediate to well advanced successional stages occurring in fresh, brackish, or saline environments; freshwater inflow limited to generally small tributaries and localized runoff or overflow from flood conditions.	10
Aquatic or semi-aquatic communities occurring in generally early to intermediate successional stages as a result of periodic changes in moisture gradients; highly dependent on seasonal weather conditions.	5

Component 3 – Uniqueness and Relative Abundance

1. Evaluate the habitat within the site according to the categories below. Enter the value on the Biological Components Field Evaluation Form (Part 2, PWD-1137A).

Category	**Value**
Highly valuable for wildlife and is very uncommon, unique or irreplaceable (USFWS Mitigation Resource Category 1)	20

*Corresponds to scarcity and abundance criteria as contained in U.S. Fish and Wildlife Service Mitigation Policy; Federal Register Vol. 45:15, Jan. 23, 1981.

Highly valuable for wildlife but is relatively scarce or becoming scarce (USFWS Mitigation Resource Category 2)	15
Exhibits high to medium value for wildlife and is relatively abundant (USFWS Mitigation Resource Category 3)	10
Exhibits medium to low value for wildlife and is relatively abundant (USFWS Mitigation Resource Category 4)	5
Exhibits very low wildlife value regardless of abundance or scarcity	0

Component 4 – Vegetation Species Diversity

Criteria A
Diversity of Woody Species

Evaluate the composition of readily observable woody species in the overstory, midstory, and understory by determining the number of species groups as represented by the following categories. Evaluate for all cover types except Swamps (Criteria C) and Marsh wetlands (Criteria D.) Worksheet for Criteria A and B provided on "Species Diversity Worksheet" (Part 2, PWD-1137B).

Species Group [4/]	**Examples**
Berry/Drupe	hackberry, mulberry, paw paw, hawthorn, winterberry, black haw, soapberry, persimmon, choke cherry, yaupon, dogwood, Am, beautyberry, greenbriar, dewberry, poison ivy, rattan vine, blackgum, grape, mulberry, holly, juniper, bumelia, huckleberry, sumac, Virginia creeper, sassafras, prickly ash, chinaberry, crab apple, agarito, lotebush, ivy tree vine
Legume/Pod	mesquite, locust, redbud, Acacia spp.
Acorn	white oak, red oak, live oak, water oak, willow oak, post oak, bur oak
Nut/Nutlike	hickory, pecan, walnut, wax myrtle, ironwood, ephidra
Samara (Winged Fruit)	elm, ash, box elder, maple, river birch
Cone	pine, cypress
Achene	sycamore, Baccharis spp., sandsage, Clematis spp., salt bush
All Others (capsules, follicles, burrs, hairy seeds)	willow, cottonwood, sweetgum, salt cedar, yucca, cactus, buttonbush, sweetgum, bois d'arc, creosotebush

Value assigned is equivalent to the number of groups represented (Maximum = 8; If none is represented then value is 0).

Criteria B
Total Number of Occurring Woody Species

Determine the total number of readily observable woody species and assign the value according to the following categories. Do not use for Swamps (Criteria C) or Marsh wetlands (Criteria D).

	Value
15 or more species	7
10-14 species	5
5-9 species	3
1-4 species	1
None occurring	0

Criteria C
Diversity of Vegetation in Swamps

Evaluate swamp areas according to the following categories: [5/]

	Value
Seasonally flooded mixed bottomland hardwoods; inundation resulting from freshwater inflow	15
Seasonally flooded vegetation dominated by cypress-tupelo; inundation resulting from freshwater inflow	10
Continually flooded or infrequent, abrasively flooded vegetation comprised of one or more species; inundation resulting from freshwater, brackish or saline inflow	6
Continually flooded vegetation; inundation resulting from stagnant or impounded freshwater, brackish, or saline water conditions	2

Criteria D
Diversity of Vegetation in Marshes and
other similar wetland areas

Determine the major types of wetland vegetation present according to the following categories: rooted emergent vegetation, rooted submergent vegetation, rooted vegetation with floating leaves; algal mat communities (microalgae), benthic or drifting seaweeds (macroalgae).

	Value
High – includes three or more of above categories.	20
Medium – includes two of the above categories.	15
Low – includes one of the above categories.	5

Component 5 – Vertical Vegetation Stratification [6/]

Evaluate canopy coverage of the following three categories of vegetation for all cover types except crops and marsh wetlands.

Categories: 1) Vegetation greater than 12 feet high
2) Vegetation 3-12 feet high
3) Vegetation less than 3 feet high

Criteria	Value
All three categories present, each accounting for at least 25 percent of ground cover	5
Any two of the above categories present, each accounting for at least 25 percent of ground cover	4
Only one of the above categories present and accounting for at least 25 percent of ground cover	3
None of the categories together account for more than 25 percent of ground cover	1

Component 6 – Additional Structural Diversity Components

Evaluate for all cover types except crops. Determine the presence of brush piles, rock piles, rocky crevices, snags, fallen logs, thick grass cover, brambles or thickets according to the following categories.

Criteria	Value
Abundant – Three or more of the above components readily apparent and observable from most locations within the site	5
Moderate – Any of the above components present, and observable with very little search effort	3

	Value
Sparse – Any of the above components present, but occurring infrequently or requiring significant search effort to locate	1
Absent – None of the above components observed	0

Component 7 – Condition of Existing Vegetation – Other

Use: Criteria A&B for cover types (other than crops and marsh wetlands) containing woody and/or herbaceous vegetation.
Criteria C for cropland only.
Criteria D for marsh wetlands.

Criteria A Degree of utilization of woody vegetation by vertebrates and invertebrates	**Value**
Not evident – little or no evidence of plant utilization	5
Moderate – plant utilization observable with minimal damage to leaves and/or stems	3
Severe – damage to leaves and/or stems readily observable	1
No woody vegetation present	0

Criteria B Availability of Herbaceous Vegetation. Do not evaluate for Crops (Criteria C) or Marsh Wetlands (Criteria D).	**Value**
Good – Eight or more combined species of grasses and forbs readily observable	5
Fair – Four to seven combined species of grasses and forbs readily observable	3
Poor – One to three combined species of grasses and forbs readily observable	1
None – Herbaceous vegetation lacking or absent	0

Criteria C Available Biomass (Evaluate for croplands only).	**Value**
High – Biomass removed periodically, although not necessarily annually; removed biomass supplanted by other vegetation resulting from natural succession of invading species or overseeding of introduced species; (Ex. Rice or other crop on multi-year rotational system allowing for additional biomass accumulations between harvests).	10

	Value
Moderate – Most biomass removed annually or semi-annually but with some residual amount remaining during portions of the rotational period. Minimal bare ground conditions (Hay operations, crops grown for pasture or grazing, chiseled crops).	5
Low – Most biomass removed annually due to clean farming practices creating significant bare ground conditions (intensive row crop farming).	1

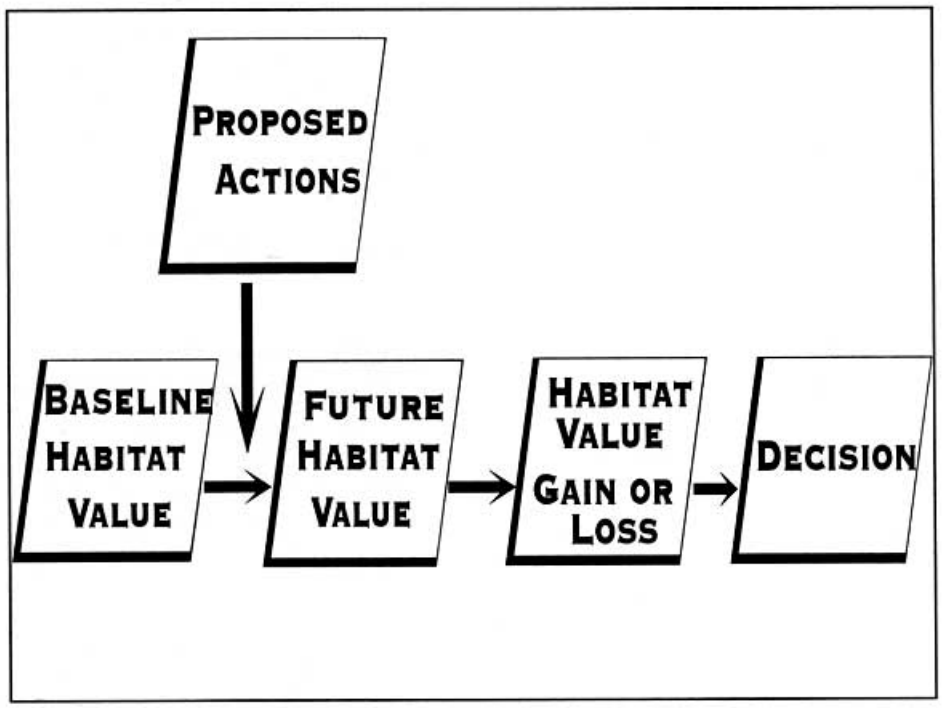
Criteria D Condition of Marsh Wetlands	**Value**
Unaltered – Quality of water and/or associated vegetation good, no foreseeable danger of environmental intrusion including pollution, contamination, sedimentation, or stagnation	10
Stable – Quality of water and/or associated vegetation good, although evidence exists that pollution, contamination sedimentation or stagnation could occur in the future or has occurred in the past	5
Degraded – Quality of water and/or associated vegetation poor or declining or degradation imminent	1

Section 1B

Impact Assessment and Calculation of Mitigation Requirements

The Habitat Suitability Scores obtained from the WHAP Biological Components Field Evaluation Form (Part 2, PWD-1137A) can be used to make comparisons of habitat quality within and between vegetation cover types. This may be useful in developing management plans where habitat component deficiencies can be noted and improvement measures identified. The point scores portrayed by the evaluation form readily reveal where such habitat component improvements can be made. In these situations, no further calculations or analyses are needed. However, in conducting habitat assessments for proposed development projects, the WHAP may be used to quantitatively measure the extent of habitat impacts and allow the determination of appropriate mitigation measures. This process is conceptually outlined in Figure 1.

Figure 1. Impact Assessment Pathway



Proposed actions normally require mitigation measures that 1) minimize the impact by changing the project location, design, or operational plan; 2) rectify the impact by repairing or rehabilitating the affected environment; 3) reduce or eliminate the impact over time; and 4) compensate for any net wildlife losses created as a result of the impact. While the first three measures apply to reducing net losses, the latter provides a means for replacing resource losses that cannot be minimized or avoided. The following discussion concerning calculation of compensation requirements is taken from previously published information. [8]

The concept of compensation is based on the principle that wildlife resources are renewable and thus can be replenished through acquisition and management of suitable land. Habitat impacts and compensation credit may be quantified using habitat units (HUs). Habit units are calculated by multiplying habitat quality (HQ or HIS scores) by habitat quantity (acres).

A tract of land has an existing inherent habitat value. To receive compensation credit, the land must be managed to increase its carrying capacity (as measured by HQ) so it can maintain existing wildlife populations while concurrently supporting additional populations to make up for the wildlife lost as a result of the project impacts. Management may be through physical changes to improve the habitat or passive protection from disturbances, thus allowing natural succession. In either case, to obtain gains in habitat value for compensation from an acre of habitat, that acre must be managed to increase its existing habitat quality.

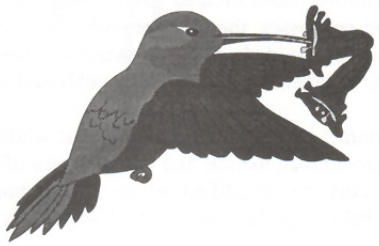
The formula for determining acreage requirements to compensate for project losses is as follows:

Compensation acres needed = Hus lost from project ÷ HQ increase[8]

The above formula can be applied very simply. If 10 acres of wildlife habitat with a habitat quality score of 0.6 were inundated from a reservoir, a total of 6 Hus would be lost [10 (acres) x 0.6 (HQ) = 6 (Hus)]. Full compensation to offset this loss would require an increase in habitat value of 6 Hus. If another 10 acres with an existing HQ of 0.6 were acquired, no compensation credit occurs because no increase in habitat value occurs over existing conditions. However, if by employment of habitat improvement measures, the existing habitat with an HQ score of 0.6 is increased by 0.4 to its maximum value of 1.0, then 15 acres would fully compensate [6 (Hus lost) ÷ 0.4 (HQ increase) = 15 (compensation acres)]. If the existing HQ of the mitigation tract is only slightly raised through management to 0.7, then 60 acres would be required to fully compensate for the losses [6 (Hus) ÷ 0.1 (HQ increase) = 60 (compensation acres)]. These examples illustrate that compensation acreage can become significantly higher as the potential gain in habitat quality decreases.

Project impacts may also be analyzed over time by using average annualized habitat units (AAHU) that represent the average habitat unit value generated by each cover type over a given period of analysis usually covering the life of the project. Using this approach, annualized habitat units are calculated under both "future with project" and "future without project" conditions. AAHUs calculated for the "future with project" are subtracted from "future without project" to determine the overall annualized gain or loss. Compensation requirements are calculated for each cover type using the calculated annualized loss.

This process is demonstrated using a hypothetical transmission lie project. The project will impact three existing cover types with the following acreages: grasslands (150 acres), upland woods (90 acres), bottomland forest (600 acres). The analysis also requires the establishment of several assumptions for the "Future With Project" and "Future Without Project" alternatives.



For a Future Without Project:

1. The period of analysis will be 10 years.
2. At the end of 10 years without any habitat alterations or modifications existing acreages of grasslands, upland woods, and bottomland forest *will not* change.
3. At the end of 10 years without any habitat modifications or alterations, existing habitat quality scores *will not* change.

For a Future With Project:

1. The project will involve the conversion within the transmission line ROW of 2 acres of existing upland woods to grasslands with a projected habitat quality score of 0.24 by Year 2 and 20 acres of bottomland forest to grasslands with a projected habitat quality score of 0.24 by Year 2.
2. The projected HQ for grasslands is 0.39 for Years 2—10.
3. Projected HQs for upland woods and bottomland forests *will not* change from baseline conditions during the 10-year analysis.

The Future Without Project is illustrated by Table 1.

Table 1. Future Without Project

Cover Type	TY	Year Interval	HQ	Acres	Hus	Inv Hus	Cum Hus	AAHU
Grasslands	Base	0	.49	150	74			
	2	2	.49	150	74	148		
	5	3	.49	150	74	222		
	10	5	.49	150	74	370	740	74
Upland Woods	Base	0	.61	90	55			
	2	2	.61	90	55	110		
	5	3	.61	90	55	165		
	10	5	.61	90	55	175	550	55
Bottomland Forest	Base	0	.73	600	438			
	2	2	.73	600	438	876		
	5	3	.73	600	438	1314		
	10	5	.73	600	438	2190	4380	438

AAHUs calculated for baseline conditions for the hypothetical example are provided in Table 1. AAHUs were also calculated for the same cover types after impacts associated with the Alternative 1 project were included. These are provided in Table 2. Impacts from the Alternative 1 project can be measured by the calculated loss in AAHUs over the period of analysis. This number is located in the last column of Table 2.

Table 2. Future With Project – Alternative 1

Cover Type	TY	Year Interval	HQ	Acres	Hus	Inv Hus	Cum Hus	AAHU	Loss
Grasslands	Base	0	.49	150	74				
	2	2	.39	172	67	134			
	5	3	.39	172	67	201			
	10	5	.39	172	67	335	670	67	-7
Upland Woods	Base	0	.61	90	55				
	2	2	.61	88	54	108			
	5	3	.61	88	54	162			
	10	5	.61	88	54	270	540	54	-1
Bottomland Forest	Base	0	.73	600	438				
	2	2	.73	580	423	846			
	5	3	.73	580	423	1269			
	10	5	.73	580	423	2115	4230	423	-15
Total Loss									-23

After the calculated loss in habitat unit value is obtained, compensation acreage (the amount of land required to offset habitat unit value lost from the proposed project alternative) can be calculated. The number calculated is variable and dependent upon the level of habitat improvement (increase in habitat quality or suitability) obtained by management of the compensation land over the value existing for the same cover type impacted by the project, This level of increase is represented as **management potential** and is reflected in the top row of Table 3.

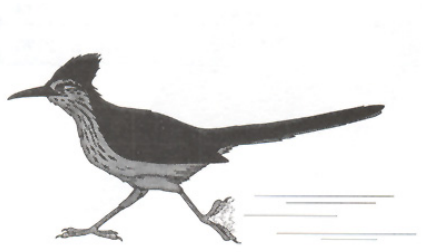


Table 3. Compensation Requirements – Alternative 1

		Management Potential								
Cover Type	**Annualized Loss**	**.1**	**.2**	**.3**	**.4**	**.5**	**.6**	**.7**	**.8**	**.9**
Grasslands	-7	70	35	23	18	14	12	10	9	8
Upland Woods	-1	10	5	3	3	2	2	1	1	1
Bottomland Forest	-15	150	75	50	38	30	25	21	19	17
Total	-23	230	115	76	59	46	39	32	29	26

The maximum habitat suitability scores for the major physiognomic cover type categories are provided in Table 4.

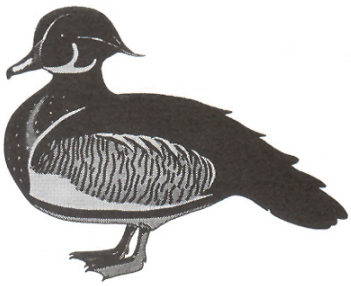
Table 4. Maximum Values for Habitat Components[1]

	Component Number							
Cover Type	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**Total**
Grasses/Forbes	25	12	21	15	5	5	5	87
Brush	25	12	20	15	5	5	5	87
Parks/Woods	24	20	20	25	5	5	5	95
Bottomland Forest	25	20	20	15	5	5	5	95
Swamps	25	20	20	15	5	5	5	95
Marsh	25	20	20	20	n/a	5	10	100
Crops	25	5	10	15	n/a	n/a	10	65

[1]Refers to Component Categories Listed in the WHAP Biological Habitat Components Evaluation Key

To determine the compensation requirements for Bottomland Forest in the hypothetical project example, the management potential of compensation land (preferably another bottomland tract that is forested or can be reforested) must first be determined. If a Bottomland Forest in close proximity to the project impact site is considered for compensation, it can be assumed that the HQ score would be similar to the measured score (0.73). If enough management can be applied to raise this score to the maximum possible (95 from Table 4 ÷ 100=0.95), the management potential is 0.22 (0.95 – 0.73) rounded to 0.2. With a management potential of 0.2, from Table 3, a total of 75 acres of bottomland hardwood forest is required to compensate for the loss of 20 acres of the same cover type. However, if little management can be applied to the compensation tract and only a management potential of 0.1 is possible, the required compensation increases to 150 acres. Compensation requirements increase substantially with those cover types that have higher habitat quality or suitability as the amount of habitat improvement that can be applied through management decreases.

There is a fallacy in always relying on the premise that poorer quality (low HQ) compensation lands are preferred for mitigation planning. Although less acreage may be required theoretically to compensate for losses, the management costs to realize the desired gain in Hus is often prohibitively expensive on these lands. Generally, it is most economically efficient to seek lands of moderate habitat value (or high value where protection is needed) for compensation. The expected future condition of the compensation lands in question may be a major factor in determining actual compensation requirements. If high quality habitat is being or will be degraded or lost by factors such as unregulated development, future HU losses prevented by protecting the area may be used as mitigation credit.



Section II – Significance of Protected Fauna and Flora

Endangered Species

Procedure:

1. Evaluate the tract according to the occurrence of endangered species (plant and animal) as listed by the Texas Parks and Wildlife Code.

2. Determine which species (if any) apply to the categories listed below. List these species on the Protected and Endangered Species Evaluation Summary (Part 2, PWD-1137C).

3. Select the category most applicable for the species and assign the appropriate points. Calculate the Endangered Species Score (ES) as indicated by the Protected and Endangered Species Evaluation Summary.

Category	Points
Resident, Confirmed Occurrence	100 (plants, if applicable)
Breeding Migrant, Confirmed Occurrence	90
Resident, Probable Occurrence	80 (plants, if applicable)
Breeding Migrant, Possible Occurrence	50
Non-breeding Migrant, Confirmed Occurrence	40
Non-breeding Migrant, Probable Occurrence	30
Non-breeding Migrant, Possible Occurrence	20
No listed species	0

Threatened and/or Protected Nongame Species

4. Evaluate the tract according to the occurrence of protected nongame species as listed by the Texas Parks and Wildlife Code.

5. Determine which species (if any) apply to the categories listed below. List these species on the Protected and Endangered Species Evaluation Summary (Part 2, PWD-1137C).

6. Select the category most applicable for the species and assign the appropriate points. Calculate the Protected Species Score (PS) as indicated by the Protected and Endangered Species Evaluation Summary.

Category	Points
Resident, Confirmed Occurrence	80
Breeding Migrant, Confirmed Occurrence	70
Resident, Probable Occurrence	60
Breeding Migrant, Probable Occurrence	50
Resident, Possible Occurrence	40
Breeding Migrant, Possible Occurrence	30
Non-breeding Migrant, Confirmed Occurrence	25
Non-breeding Migrant, Probable Occurrence	20
Non-breeding Migrant, Possible Occurrence	10
No listed species	0

7. Compare the numerical ratings obtained for each of the protected and endangered species categories. Enter the highest assigned value on the Wildlife Habitat Appraisal Summary (Part 2, PWD-1137E, page 2).

Section III – Management Components Evaluation

This section is utilized to evaluate tracts of land according to factors affecting management goals and strategies. [7] Due to the significance of these components, the scores may be used exclusively to establish acquisition priority among tracts having similar biological habitat component scores or may be combined with either the Protected or Endangered Species or Biological Habitat Component scores.

Procedures:

1. Consider each of the components listed below and determine the number of points to assign according to the listed categories.

2. Enter the number of points assigned to the component on the appropriate lilne of the Acquisition Components Evaluation Summary (PWD 1137D).

3. Calculate total score as guided by the form and enter on the Wildlife Habitat Appraisal Summary (PWD 1137E, page 2).

Component 1 – Educational, Scientific, and Socio-Economic Value

Evaluate tract(s) according to the following attributes:

1. Provides consumptive wildlife recreational use potential.

2. Provides non-consumptive wildlife recreational use potential.

3. Demonstrates special value for ecological or biological processes.

4. Provides exceptional, unusual, or unique physiographic, topographical or hydrologic situations.

Category	Points
Tract(s) exhibit all 4 attributes	25
Tract(s) exhibit 3 attributes	15
Tract(s) exhibit 2 attributes	10
Tract(s) exhibit 1 attribute	5
Tract(s) exhibit none of the above	0

Component 2 – Recognizable Boundaries

Category	Points
Entire perimeter fenced	20
Mostly fenced (more than 50%)	18
Partially fenced (less than 50%)	15

Cleared (bulldozed boundary)	10
Painted boundary	5
No recognizable boundary	2

Component 3 – Contiguity

Category	Points
Single or two separate tracts but closely spaced (3 miles or less)	15
Two tracts widely spaced (more than 3 miles)	12
Several tracts (3 or 4) closely spaced (3 miles or less)	9
Several tracts (3 or 4) widely spaced (more than 3 miles)	6
Multiple tracts (5 or more) closely spaced (3 miles or less)	3
Multiple tracts (5 or more) widely spaced (more than 3 miles)	0

Component 4 – Configuration

Category	Points
A block of land with average width of 1 mile or more.	10
A linear strip with an average width of at least ½ mile but less than 1 mile.	8
A linear strip with average width of at least ¼ mile but less than ½ mile.	4
A linear strip with average width of less than ¼ mile.	2

Component 5 – Acreage

Category	Points
10,000 acres or more	10
7,000—9,999 acres	8
4,000—6,999 acres	6
1,000—3,999 acres	4
less than 1,000 acres	2

Component 6 – Accessibility

Category	Points
Ample access points to allow full public use of area, but adequately situated so as to facilitate needed regulation and enforcement.	10
Access points adequate to allow public use of entire area, but situated or so numerous as to create minor problems in regulation and enforcement.	8
Access points adequate to allow public use of entire area, but situated or so numerous as to create major problems in regulation and enforcement.	6
Access points limited or so situated as to allow public use of ½ or more, but less than ¾ of the area.	4
Access pointes limited or so situated as to allow public use of less than ½ of area.	2
Access points inadequate to allow public use of the area.	0

Component 7 – Distance to Urban Areas

Radius distance to urban area having 500,000 or more Texas residents.

Category	Points
Less than 30 miles	10
31—74 miles	8
75—150 miles	6
151—250 miles	4
Greater than 250 miles	2

TEXAS PARKS & WILDLIFE

Wildlife Habitat Appraisal Procedure
Biological Components Field Evaluation

Project: _____ Date: _____

Cover Type or Plant Association: _____

Habitat Components	**Component Points (from Key)**							
Site No.								**Total**
1. Site Potential								
2. Temporal Development								
Criteria A								
Criteria B (Marsh Wetlands Only)								
3. Uniqueness and Relative Abundance								
4. Vegetation Species Diversity								
Criteria A								
Criteria B								
Criteria C (Swamps Only)								
Criteria D (Marsh Wetlands Only)								
5. Vertical Stratification								
6. Additional Structural Diversity Components								
7. Condition of Existing Vegetation								
Criteria A (Woody Vegetation)								
Criteria B (Herbaceous Vegetation)								
Criteria C (Croplands Only)								
Criteria D (Marsh Wetlands Only)								

Average Habitat Quality Score for all Sites within this cover type = $\frac{\text{Total Points}}{\text{Total number of sites}} \times \frac{1}{100} =$ _____

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Wildlife Habitat Appraisal Procedure
Species Diversity Worksheet

Project: _____

Cover Type: _____

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Berry/Drupe						
Legume/Pod						
Acorn						
Nut/Nutlike						
Samara						
Cone						
Achene						
All Others						

TEXAS PARKS & WILDLIFE

Wildlife Habitat Appraisal Procedure
Protected and Endangered Species Evaluation Summary
(Refer to Section II)

Endangered Species	Points
No listed species	0
Total	

Endangered Species Score (ES) = Total Points =

Protected Species	Points
No listed species	0
Total	

Protected Species Score (PS) = Total Points =

Enter the sum of the Protected Species (PS) and Endangered Species (ES) scores on the Wildlife Habitat Appraisal Summary Sheet (PWD 1137E, page 29).

[Continued on next page.]

TEXAS PARKS & WILDLIFE

Wildlife Habitat Appraisal Procedure
Acquisition and Administration Components Evaluation Summary
(Refer to Section III)

Component	Points
1. Educational, Scientific, and Socio-Economic Use Value	
2. Recognizable Boundaries	
3. Contiguity	
4. Configuration	
5. Acreage	
6. Accessibility	
7. Distance to Urban Areas	
Total Score (Total Points/100)	

Enter total score for Acquisition and Administration Components on the Wildlife Habitat Appraisal Summary Sheet (PWD 1137E, page 29).

TEXAS PARKS & WILDLIFE

Wildlife Habitat Appraisal Summary

1 Cover Type Category	2 Type or Plant Association	3 Average Habitat Quality Score	4 Total Acres	5 Habitat Units (Col. 3 X Col. 4)
Grasses				
1.				
2.				
Shrub				
1.				
2.				
Brush				
1.				
2.				
Parks				
1.				
2.				
Woods				
1.				
2.				
Forest				
1.				
2.				
Young Forest				
1.				
2.				
Marsh				
1.				
2.				
Swamp				
1.				
2.				

1 Cover Type Category	2 Type or Plant Association	3 Average Habitat Quality Score	4 Total Acres	5 Habitat Units (Col. 3 X Col. 4)
Cropland				
1.				
2.				
Urban				
1.				
2.				
Unvegetated				
1.				
2.				

Total: _____

1. Total Habitat Units = Total Column 5 (From Section I) = _____

2. Protected Species (PS) or Endangered Species (ES) (From Section II) = _____

3. Acquisition and Administration Components Score (AC) (From Section III) = _____

Appendix 1

Physiognomic Classes
(Revised – November 6, 1980)

Grasses Herbs (grasses, forbs, and grasslike plants) dominant; woody vegetation lacking or nearly so (generally 10 percent or less woody canopy coverage).

Shrub Individual woody plants generally less than nine feet tall widely scattered throughout arid or semi-arid regions (less than 30 percent wood canopy coverage).

Parks Woody plants mostly equal to or greater than nine feet tall generally dominant and growing as small clusters, or as randomly scattered individuals within continuous grass or forbs (11 to 70 percent woody canopy cover overall).

Brush Woody plants mostly less than nine feet tall dominant and growing as random or evenly spaced individuals, small clusters or closed canopied strands (greater than 10 percent canopy cover).

Woods Woody plants mostly nine to 30 feet tall with closed crowns or nearly so (71 to 100 percent canopy cover); midstory usually lacking.

Forest Deciduous or evergreen trees dominant; mostly greater than 30 feet tall with closed crowns or nearly so (71 to 100 percent canopy cover); midstory generally apparent except in managed monoculture.

Young Immature deciduous or evergreen trees generally equal to or less than 30 feet tall (greater than 30 percent canopy cover); midstory usually absent; potential to form mature forest; usually encountered in associations under silvicultural treatments.

Marsh Emergent herbaceous plants dominant in inundated areas; woody vegetation lacking or nearly so (generally 10 percent or less woody canopy coverage.

Swamp Deciduous or evergreen trees with varying heights (canopy cover generally greater than 10 percent) within inundated or almost constantly inundated sites.

Brushy Swamp Woody plants mostly less than nine feet tall growing as random, or evenly spaced individuals, small clusters or closed canopied stands (greater than 10 percent canopy cover) in inundated or almost constantly inundated sites.

Parkland Swamp Woody plants most equal to or greater than nine feet tall generally dominant and growing as clusters or as randomly scattered individuals (11 to 70 percent woody canopy cover overall) within inundated or almost constantly inundated sites.

Wooded Swamp — Woody plants mostly nine to 30 feet tall with closed crowns, or nearly so (71 to 100 percent canopy cover) within inundated or almost constantly inundated sites.

Forested Swamp — Deciduous or evergreen trees greater than 30 feet tall with closed crowns or nearly so (71 to 100 percent canopy cover) within inundated or almost constantly inundated sites.

Beds — Permanently or almost permanently submerged stands of plants occurring in brackish or saline bays and estuaries but not necessarily limited to these areas.

Crops — Includes cultivated cover crops or row crops used for the purpose of producing food and/or fiber for either man or domestic animals.

Cultivated Wetlands — Includes periodically inundated cover crops used for the purpose of producing food and/or fiber for either man or domestic animals.

Water — Streams, lakes, ponds, estuaries, lagoons, flooded oxbows, and water treatment facilities.

Inert Materials

Sparsely Vegetated	Includes intensively overgrazed pastures, eroded terrain, arroyos, and areas containing little vegetation.
Urban	Includes roads, industrial, commercial, and residential development.
Spoil	Bare soil deposited from dredging operations in marsh, swamp, estuaries or streams.
Dunes	Unvegetated hill or ridge of sand piled up by the wind.
Beach	Smooth sloping accumulations of sand, shell, and gravel along shorelines.
Salt Flats	Unvegetated flat-flooded bottoms of interior desert basins.
Mud Flats	Periodically exposed unvegetated or sparsely vegetated wetlands.
Mining	Unrehabilitated overburden resulting from industrial excavation of raw materials.

Other/Unclassified — Vegetated or unvegetated areas which portray physiognomy difficult to define or categorize and which could produce significant classification error if labeled separately; includes those groups that do not appear to fit above criteria.

Appendix 2

Footnote Citations

1. U. S. Fish and Wildlife Service. 1980. Habitat Evaluation Procedures. Div. Ecol. Services; Washington, D.C. ESM102:pp. 102 ESM5.2D-5.2E.

2. Criteria derived from Soil Conservation Service Soil Surveys, generalizations of net primary production (dry weight) of plant associations occurring on various substrate as provided by range site descriptions compiled by the Soil Conservation Service, and information contained in:

   a. Day, J. W., W. H. Conner, and G. P. Kemp. Contribution of Wooded Swamps and Bottomland Forests to Estuarine Productivity, pp. 33-50 in; Fore, P. L. and R. D. Peterson, eds. 1980. Proc. of the Gulf of Mex. Coast. Ecosystems Workshop. USFWS, Albuquerque; FAS/OBS-80/30; 215 pp.

   b. Odum, Eugene P. 1959. Fundamentals of Ecology. W. B. Saunders Co., Philadelphia; 545 pp.

   c. See 5b below, page 25.

3. Criteria for classifying various ages of existing vegetation derived in part from:

   Launchbaugh, J. L. 1955. Vegetational Changes in the San Antonio Prairie Associated with Grazing, Retirement from Grazing, and Abandonment from Cultivation. Ecol. Monogr. 25(3):39-57.

   Thomas, Jack Ward, Rod Miller, Chris Maser, Ralph Anderson and Benie Carter, pp. 281-303 in Proc. Classification, Inventory and Analysis of Fish and Wildlife Habitat; Jan. 24-27, 1977, Phoenix, AZ; FWS/OBS-78/76.

4. For determination of appropriate fruit class of an identified species consult: Van Dersal, William R. 1938. Native Woody Plants of the United States. U. S. Govt. Print. Off. Washington, D. C.; 362 pp.

5. Criteria derived from:

   a. Day, J. W., W. H. Conner and G. P. Kemp. Contribution of wooded swamps and bottomland forests to estuarine productivity, pp. 33-50 in Fore, P. L. and R. D. Peterson, eds. 1980. Proc. of the Gulf of Mex. Coast. Ecosystems Workshop, FWS, Albuquerque, FWS/OBS-80/30; 214 pp.

   b. Wharton, Charles H., W. M. Kitchens, E. C. Pendleton, and T. W. Sipoe. 1982. The Ecology of Bottomland Hardwood Swamps in the Southeast: A Community Profile: FWS; Washington, D. C.; FWS/OBS-81/37; pp. 80-83.

6. Contribution to overall species richness discussed in:

   a. Odum, Eugene P. 1959. Foundamentals of Ecology. W. B. Saunders Co., Philadelphia pp. 270-273;

   b. Willson, M. F. 1974. Avian Community Organization and Habitat Structure. Ecology 55:1017-1029.

7. Criteria derived (in part) from:

    a. Herring, Michael and Ron Welborn 1977. Preliminary Rating System for Texas Natural Areas. Texas Parks and Wildlife Department. Unpublished Doc. 8p.

    b. Kothmann, H. G. 1984. Criteria Rating System for Evaluation of Proposed New Wildlife Management Areas. Texas Parks and Wildlife Department Unpublished Doc. 4p.

8. Formula documented from:

    a. Frye, Roy G. and David A. Curtis. 1990. Texas Water and Wildlife. Texas Parks and Wildlife Department Doc. PWD-BK-7100-147-5/90.

    b. U. S. Army Corps of Engineers. 1980. A Habitat Evaluation System for Water Resources Planning. Pub prepared by Environ. Anal. Br. Planning Div., Lower Ms. Valley Div. Vicksburg, MS. 151 pages.