

6.1 Overview

This chapter provides practical guidance on how to use the Santa Barbara HGM *Guidebook*. As discussed previously in this *Draft Guidebook*, waters/wetlands perform certain ecosystem functions differently. Ecosystem functions are defined herein as those processes that are necessary for the self-maintenance of an ecosystem, such as primary production, nutrient cycling, decomposition, *etc.* Functional differences are not always a result of disturbances or alterations, but can be a result of inherent differences. Therefore, it is essential for the HGM *Guidebook* user to follow ALL of the outlined steps throughout the chapter to assess the ecosystem functioning of riverine waters/wetlands in SCSBC.

The HGM models included within the *Guidebook* rely upon the use of 28 variables that are used in different combinations to define 15 ecosystem functions. Variables are defined as the attributes or characteristics of a water/wetland ecosystem or the surrounding landscape that influence the capacity of a water/wetland to perform an ecosystem function or a set of functions. To score each of the 28 variables, the *Guidebook* user can refer to Chapter 5 (Variables). This section provides a definition, rationale for selection of the variable, measurement protocol, scaling rationale, scaling, and the Authors' confidence for the scaling of each variable.

Scoring of all 28 variables allows the *Guidebook* user to calculate 15 functional capacity indices. Functional capacity indexes have been defined herein as indices of the capacity of a water/wetland to perform an ecosystem function relative to other waters/wetlands from a regional wetland subclass in a reference domain. Functional capacity indices are calculated by plugging the variable scores into simple formulae that are defined in the Assessment Model (Chapter 5). Chapter 5 (Functions) provides descriptions of each function that includes a definition, a rationale for the function in riverine ecosystems within the SCSBC, a discussion of characteristics and processes that influence the function, a description of the variables used to assess the function, rationale for selection of the variables, and a description of the rationale and formulae used to estimate the appropriate functional capacity indices.

As discussed in Chapter 1, not all sites or projects are useful candidates for an HGM assessment. Where impacts are minor or changes occur very slowly over time, it may be difficult to detect any change using this model. The HGM approach is also not particularly useful for assessing very small areas. Since it is designed to measure ecosystem functions, the area being examined must be large enough or exist within a large enough framework that examination of functions at scale can occur.

It should be emphasized that the documentation required in each of the steps discussed throughout this chapter constitutes the MINIMUM SUBMITTALS of information required for an HGM assessment. Failure to complete the Minimum Submittal Worksheets (see Chapter 7) is sufficient grounds for agency and/or peer rejection of an HGM assessment report, due to incomplete documentation. Thorough documentation of site conditions at a proposed project area facilitates accurate regulatory decision making at the federal, state, and/or local level. Also, the application of the HGM approach offered in this chapter should be accomplished in a manner that is consistent with standard interpretations of HGM model logic, terminology, and administrative procedures. That is, consistency requires articulation of conventions for field observations, field measurements, and documentation of assessment results.

6.2 Minimal Submittal Worksheet Requirement

HGM functional assessments cannot be performed without a thorough review of the proposed project area and its geomorphic setting, landscape context, and land-use history. **Reviews of the site need to be completed in both the office and in the field.** While elements of the HGM approach can be used to structure preliminary discussions of ecosystem functions and impacts, an HGM functional assessment requires the completion of all Minimum Submittal Worksheets and their organization into an assessment report. The Minimal Submittal Worksheets and Data Collection Worksheets are provided in Chapter 7. This chapter has been designed to guide the user through the completion of these worksheets and the production of an assessment report. As previously stated, the outlined steps constitute the *minimum* submittals required to for an HGM functional assessment in SCSBC. The process of preparing the Minimal Submittal and summarizing the HGM assessment information into a coherent report ensures a thorough documentation of the site conditions and facilitates accurate regulatory decision making at the federal, state, and/or local level.

6.3 Office Preparation

6.3.1 Step 1. Background Preparation

To support HGM analysis, field efforts require advance preparation. Prior to performing a field or design document review, it is important to collect information that is relevant to the proposed project site. Aerial photographs, topographic maps, geologic maps, soil surveys, NWI maps, jurisdictional delineation documents, and other relevant information should be compiled and reviewed *before going into the field* (Table 6.1).

Table 6.1 Recommended Office Steps and Procedures for Performing HGM Functional Assessments of Riverine Ecosystems in Southern Santa Barbara County.

OFFICE PREPARATION	
<i>Office Step 1. Background Preparation.</i>	<p>Collect and review background information relevant to proposed project area. This includes, but is not limited to:</p> <ul style="list-style-type: none"> a Relevant U.S. Geological Survey, State, County, and other maps at several scales (e.g., 1:24,000, 1:250,000) b Air photos and other imagery c Relevant GIS maps and/or CD-ROM that accompany this Draft Guidebook d Relevant geologic, geotechnical, hydrologic, soils, or environmental reports e Correspondence, construction plans and specifications, etc. on the proposed project f Relevant published literature on the project area, proposed activity, watershed, etc.
<i>Office Step 2. Bound and Stratify the Project Assessment Area.</i>	<p>Bound and stratify the proposed project area using maps, air photos, etc. Keep the map scale constant throughout all analyses. This includes:</p> <ul style="list-style-type: none"> a. Define and complete a preliminary delineation of the boundaries of the proposed project area b. Estimate the geographic extent of waters/wetlands within the proposed project area c. Estimate the proportion(s) and type(s) of waters/wetlands within the project area d. Estimate the proportion of waters/wetlands that fall into the subclasses of waters/wetlands addressed by and not addressed by this <i>Draft Guidebook</i> e. Estimate the geographic extent and type of proposed project impact(s) (i.e., primary, secondary, and/or cumulative effects)
<i>Office Step 3. Subclass Classification.</i>	<p>Identify, verify, and document the rationale used for recognizing HGM subclasses of riparian ecosystems in southern Santa Barbara County within the proposed project area. Show and/or explain why the proposed project area or parts of the proposed project area are covered by this <i>Draft Guidebook</i>.</p> <p><i>Step 4. Review the requirements for the Variable Assessment Area (VAA) for each variable presented in the Model. Table 6.4 has been provided for reference of each of the 28 VA A's</i></p>
<i>Office Step 4. Review the Measurement Methodology and Variable Assessment Area (VAA) for Each Variable</i>	<p>Before going into the field, the HGM <i>Guidebook</i> user should read Chapter 5 (Variables). This step will facilitate a review of the recommended methodologies to measure each variable presented in this model, as well as the different Variable Assessment Areas (VAA). Table 6.4 has been included to highlight the VAA size for each variable included in the Santa Barbara HGM model.</p>
<i>Office Step 5. Prepare GIS Maps.</i>	<p>Print out the appropriate GIS maps that include the proposed project area from the CD-ROM that accompanies this Draft Guidebook. There are 3 maps required to scale four variables ($V_{LANDUSE}$, $V_{PATCHNUMBER}$, $V_{PATCHAREA}$, and $V_{PATCHCONTIG}$). See the Measurement Protocol for each variable for further instructions on scaling. These variables can be scaled either in the office or in the field. However if the variables are scaled in the office, the maps should still accompany the field team in the field for verification.</p>
<i>Office Step 6. Coordination of Gear.</i>	<p>Coordinate gear using the recommended gear list (Table 6.5). The assembly of field and safety equipment should include a print out of the Variables (Chapter 5), Minimal Submittal Worksheets (Chapter 7), and Data Collection Worksheets (Chapter 7).</p>

During office preparation, particular attention should be given to the development of an understanding of the geomorphic setting of the proposed project area. (Geomorphic setting is defined as the location of a landscape with respect to landforms, such as stream headwater locations, valley bottom depressions, and coastal position.). Understanding the geomorphic setting will provide a foundation for the classification of the riverine subclass. For example, knowing that the proposed project site is located on a low gradient coastal basin is critical information to the classification of a riverine subclass.

Attention should also be given to the land-use history and landscape context of the proposed project area, as these factors may affect soils, biogeochemistry, plant communities, and/or faunal support/habitat within the PAA.

Office Step 1. Background Preparation.

Collect and review background information relevant to the proposed project area. This includes, but is not limited to:

- a. Relevant U.S. Geological Survey, State, County, and other maps at several scales (e.g., 1:24,000, 1:250,000)
- b. Air photos and other imagery
- c. Relevant GIS maps and/or CD-ROM that accompany this Draft Guidebook (*also refer to section 7.3.5*)
- d. Relevant geologic, geotechnical, hydrologic, soils, or environmental reports.
- e. Correspondence, construction plans and specifications, *etc.* on the proposed project
- f. Relevant published literature on the project area, proposed activity, watershed, *etc.*

6.3.2 One of the most important steps in any HGM assessment is to bound and stratify the proposed project area. Bounding and stratification of a proposed project site is best accomplished in a two-step process: the (a) **preliminary office delineations**, and (b) confirmation and refinement of preliminary boundaries in the field. Before attempting to bound and stratify the proposed project area, it is advisable to register all cartography developed for HGM assessments to the same map/photo scales. This step will allow the overlay of maps, which in turn, will facilitate more efficient project planning, implementation, and overall communication of assessment results. In addition, confirmation and interpretation of cartography in the field will be more effective and efficient during field work.

Step 2. Bound
and Stratify the Project
Assessment Area

It is always necessary in the context of an HGM assessment, to superimpose the proposed project impacts onto base cartography. If pertinent, the types of proposed project impacts should be clearly indicated and cartographically distinct. It is also important to understand that one cannot simply offer maps or air photos with lines on them and assert that part or all of the PAA does or does not fall into the subclass. The assessment team should use cartography and all other reference materials available that address/describe the proposed project site (*i.e.*, geotechnical, soils, and/or environmental reports, construction plans, previous waters/wetlands delineation reports, relevant published literature) and the waters/wetlands within the PPA. With respect to mapping scales, it is useful to know that planning scale documents for a proposed project are developed at mapping scales that are relevant to the activity being proposed. For example, a project of approximately 200 acres (*e.g.*, a golf course or campus) should be developed for planning purposes at a scale of approximately 1:100. Construction scales for the same project, especially in areas where activities will be within or near waters/wetlands are routinely 1:20. In addition, the Authors strongly recommend that every map layer needs to have all of the elements listed in Table 6.2.

Office Step 2. Bound and Stratify the Project Assessment Area.

Bound and stratify the proposed project area using maps, air photos, *etc.* Keep the map scale constant throughout all analyses. This includes:

- a. Define and complete a preliminary delineation of the boundaries of the proposed project area
- b. Estimate the geographic extent of waters/wetlands within the proposed project area
- c. Estimate the proportion(s) and type(s) of waters/wetlands within the project area
- d. Estimate the proportion of waters/wetlands that fall into the subclasses of waters/wetlands addressed by and not addressed by this Draft Guidebook
- e. Estimate the geographic extent and type of proposed project impact(s) (*i.e.*, primary, secondary, and/or cumulative effects)

Table 6.2 Top Ten Essential Elements of a Waters/Wetlands Map

1. Title
2. Legend that includes:
 - a. Scale (not to exceed 1":300')
 - b. North arrow
 - c. Site location (longitude/latitude or appropriate coordinate system)
 - d. Site elevation
 - e. Attribute identifications (prominent landmarks, features, *etc.*)
3. Other background information that includes:
 - a. Names of cartographers, delineation crew, *etc.*
 - b. If pertinent, waters/wetland delineation methodology used ('87, '89, Other)
 - c. If pertinent, definition of waters (33 CFR 328.3 (A)(1-8), or other)
 - d. If pertinent, name and address of survey company/crew
 - e. Review/revision blocks
 - f. Agency approval signature block(s)
4. Topographic contours [2 foot intervals recommended (scale dependent)]
5. Property or PAA boundaries/limit(s) of work (according to legal description of property (meets and bounds or survey bearings)
6. Waters/wetlands boundaries (areas within boundaries highlighted or stippled to be cartographically distinct) All waters/wetlands individually numbered or lettered
7. Location of:
 - a. All sample sites
 - b. All control points
8. Location of any other significant landmarks/features (to aid in orientation while on site - (*e.g.*, roads, culverts, powerlines, *etc.*))
9. For waters/wetlands delineation maps - a separate table that includes:
 - a. All waters/wetland loop numbers and respective area (ft.² &/or acreage)
 - b. All buffer/easement numbers and respective area (ft.²/acreage), if applicable (see below)
10. Optional layers:
 - a. Location and numbering of any buffer or easement boundaries (areas should be highlighted or stippled)
 - b. If applicable, location of project footprint(s) for alternatives A, B, C, *etc.*

- 6.3.3.** An essential part of the HGM functional assessment is to demonstrate why certain parts, or all of the proposed project area qualify as a part of a riverine subclass addressed by this *Draft Guidebook*. The *Draft Guidebook* has been written to address *only* those riverine ecosystems that have been classified into one of the three subclasses defined in the dichotomous key. **This Draft Guidebook does not address all water/wetland types in southern Santa Barbara County.** It is possible that a proposed project may impact waters/wetlands not addressed by this *Draft Guidebook* (i.e., tidally influenced lagoons). On the other hand, it is possible that a proposed project may impact several different subclasses of waters/wetlands within SCSBC.

The Minimal Submittal Worksheet *Preliminary HGM Classification* highlights essential components to a riverine ecosystem in SCSBC that should be addressed for an accurate classification of waters/wetlands in the proposed project area as one of the three riverine subclass identified by this *Draft Guidebook*. The dominant characteristics and/or components addressed by the Worksheet are: order of stream channel, landforms, longitudinal channel slope, surface and/or subsurface water connections, characteristic sediment load, plant communities, and sensitive animal populations. Table 6.3 provides a dichotomous key to the classification of riverine ecosystem subclasses in South Coast Santa Barbara County.

Office Step 3. Subclass Classification.

Identify, verify, and document the rationale used for recognizing HGM subclasses of riparian ecosystems in SCSBC within the proposed project area. Document your rationale for why the proposed project area or parts of the proposed project area are covered by this *Draft Guidebook*.

Table 6.3 Dichotomous Key for Subclass Classification in Riverine Ecosystems in Southern Santa Barbara County

SUBCLASS CLASSIFICATION KEY	
<p>1a. Project assessment area is not a riverine water/wetland. It is either a very steep, bedrock "0" order basin, or is not within the Santa Barbara County designated buffer of a water/wetland (<i>i.e.</i>, creek ecosystem of any order), or it is a relatively large lagonal or estuarine ecosystem that includes natural or anthropogenically altered "sloughs" or "esteros" that are regularly influenced by tides and have > 0.5 ppt salinity.....</p>	<p>..... Non-riverine waters/wetlands. Do not use this Draft Guidebook</p>
<p>1b. Project assessment area meets the definition of waters of the U.S., including wetlands, or lies within the Santa Barbara County designated buffer of a waters/wetland (<i>i.e.</i>, stream ecosystem), it is not a relatively large lagonal or estuarine ecosystem that includes natural or anthropogenically altered "sloughs" or "esteros" that are regularly influenced by tides and have > 0.5 ppt salinity, and is below 1000 ft in elevation.</p>	<p>2</p>
<p>2a. Project assessment area consists of a riverine water/wetland or lies within a stream ecosystem with very steep side slopes (>45% - 100%). These streams have little to no residual bed sediments, step pool, fall pool, and alternate run reaches. They have no perennial flow and are recognized as the headward-most extent of channel systems. Longitudinal creek gradients are > 6%.</p>	<p>..... High Gradient Streams On the Santa Ynez Mountain Front (1st and 2nd Order Streams)</p>
<p>2b. Project assessment area consists of a riverine water/wetland but side slopes of stream ecosystem do not exceed 4%. Longitudinal channel gradients are < 6%.</p>	<p>3</p>
<p>3a. Project assessment area consists of a riverine water/wetland or lies within a creek ecosystem on dissected or undissected alluvial and/or debris fans. Stream gradients are between 2% and 6%, and channel reaches are dominated by boulders, stones, and cobbles that alternate with pools. Channels are relatively confined and cannot meander except in their lower reaches where the longitudinal gradient approaches 2% and valley width is significantly greater than channel width. Springs, seeps, and residual pools may occur in the streambed and along the sides of incised canyons. Moderate gradient streams are usually recognized as 2nd and 3rd order channel systems at the 1:24,000 map scale. Riparian plant communities are dominated by either oak woodland or oak/sycamore woodland or willow scrub plant community types.</p>	<p>Moderate Gradient Stream On Dissected and Undissected Debris and Alluvial Fan Surfaces (2nd and 3rd Order Creeks)</p>
<p>3b. Project assessment area consists of a riverine water/wetland or lies within a stream ecosystem on marine terrace and/or filled coastal basin surfaces. Stream longitudinal gradients are between 0 and 2%, and channel reaches are dominated by sand and silt size particles. At their lowest points, reaches of the low gradient creeks can include tidally-influenced freshwater to brackish water, or can flow directly into tidally-influenced estuarine systems. Native riparian plant communities include riparian forests, scrub/shrub or persistent and non-persistent emergent wetland plant community types. They often dominated by invasive weedy species, or are highly manipulated/cultivated systems or absent. Low gradient creeks are usually recognized as 3rd, 4th, and 5th order channel systems at the 1:24,000 map scale.</p>	<p>Low Gradient Stream On Coastal Plain Surfaces (3rd, 4th, and 5th order Streams)</p>

6.3.4 This step is intended to assist the HGM *Guidebook* user in preparation for the required fieldwork of an HGM-based functional assessment. By reading through Chapter 5 (Variables) and section 6.4.4.4 (Scoring of Variables), the HGM *Guidebook* user will be apprised of the recommended methodology for collecting the appropriate data necessary to score each variable and foresee the necessary gear required (also see 6.3.6). In addition, the HGM user should note that the Variable Assessment Area (VAA) is not consistent for each of the 28 variables. In order to compensate for relevant scale at which to measure the 28 variables most effectively, the VAA fluctuates in size. For example, the scale at which $V_{\text{PATCHCONTIG}}$ is most effectively measured (*i.e.* the subwatershed) is very different from the scale at which V_{INCWD} is scaled (*i.e.*, active channel below OHW, 3.5 times the OHW width both upstream and downstream). Table 6.4 has been included to better facilitate this step, as well as highlighting the VAA in each variable description. Thus, this is another step to force the HGM user to review all necessary background information in the office before entering the field. By taking these steps, the HGM user reduces the chance for error in scaling the variables and thus the functional capacity indices.

Office Step 4. Review the Measurement Methodology and Variable Assessment Area (VAA) for Each Variable

Before going into the field, the HGM *Guidebook* user should read Chapter 5 (Variables). This step will facilitate a review of the recommended methodologies to measure each variable presented in this model, as well as the different Variable Assessment Areas (VAA). Table 6.4 has been included to highlight the VAA size for each variable included in the Santa Barbara HGM model.

Table 6.4 The size of the Variable Assessment Area (VAA) for the 28 Variables Addressed by this Draft Guidebook.

Variable	Size of the Variable Assessment Area (VAA)
1. V_{ASIGN}	The hydrologically active channel and the Santa Barbara County designated buffer, seven times the OHW width upstream and downstream from the PAA cross section.
2. $V_{BUFFCOND}$	The hydrologically active channel and the Santa Barbara County designated buffer, seven times the OHW width upstream and downstream from the PAA cross section.
3. $V_{BUFFCONT}$	The hydrologically active channel and the Santa Barbara County designated buffer, seven times the OHW width upstream and downstream from the PAA cross section.
4. $V_{BUFFWIDTH}$	The hydrologically active channel and the Santa Barbara County designated buffer, seven times the OHW width upstream and downstream from the PAA cross section.
5. $V_{CHANROUGH}$	A vertical plane representing the cross-sectional area of the PAA cross section from stream bed to OHW.
6. V_{DECOMP}	The hydrologically active channel and the Santa Barbara County designated buffer, three and a half times the OHW width upstream and downstream from the PAA cross section.
7. V_{EMBED}	The hydrologically active channel, three and a half times the OHW width upstream and downstream from the PAA cross section.
8. V_{HERBCC}	The six 0.01 acre circular plots along the river right and river left vegetative sampling transects.
9. V_{INCWD}	The hydrologically active channel and the Santa Barbara County designated buffer, three and a half times the OHW width upstream and downstream from the PAA cross section.
10. $V_{LANDUSE}$	The subwatershed for the PAA.
11. $V_{LONGPROF}$	The hydrologically active channel, seven times the OHW width upstream and downstream from the PAA cross section.
12. V_{OFFCWD}	The six 0.1 acre circular plots along the river right and river left vegetative sampling transects.
13. $V_{PATCHAREA}$	A 1000' radius ring surrounding the PAA.
14. $V_{PATCHCONTIG}$	The subwatershed for the PAA.

Variable	Size of the Variable Assessment Area (VAA)
15. V _{PATCHNUM}	A 1000' radius ring surrounding the PAA.
16. V _{RATIO}	The hydrologically active channel and the Santa Barbara County designated buffer, three and a half times the OHW width upstream and downstream from the PAA cross section.
17. V _{REGEN}	The six 0.01 acre circular plots along the river right and river left vegetative sampling transects.
18. V _{RESIDPOOL}	The hydrologically active channel, three and a half times the OHW width upstream and downstream from the PAA cross section.
19. V _{SED}	The hydrologically active channel and the Santa Barbara County designated buffer, seven times the OHW width upstream and downstream from the PAA cross section.
20. V _{SHADE}	The hydrologically active channel, three and a half times the OHW width upstream and downstream from the PAA cross section.
21. V _{SHRUBCC}	The six 0.1 acre circular plots along the river right and river left vegetative sampling transects.
22. V _{SNAGS}	The portion of the proposed project area proximate to the midpoints of the two (river right and river left) vegetative sampling transects.
23. V _{SOILINT}	The portion of the proposed project area, both in the hydrologic active channel and the Santa Barbara designated buffer, proximate to the PAA cross section.
24. V _{STRATA}	The portion of the proposed project area proximate to the two (river right and river left) vegetative sampling transects.
25. V _{SURFIN}	The hydrologically active channel, seven times the OHW width upstream and downstream from the PAA cross section.
26. V _{TREEBA}	The portion of the proposed project area proximate to the midpoints of the two (river right and river left) vegetative sampling transects.
27. V _{TREECC}	The six 0.1 acre circular plots along the river right and river left vegetative sampling transects.
28. V _{VINECC}	The six 0.01 acre circular plots along the river right and river left vegetative sampling transects.

6.3.5 There are two possible approaches to scoring the four GIS-based variables, $V_{LANDUSE}$, $V_{PATCHNUMBER}$, $V_{PATCHAREA}$, and $V_{PATCHCONTIG}$, found in the Santa Barbara HGM model. The first method is to perform the required measurements and calculations within an ArcInfo/ArcView GIS environment. The CD-ROM that accompanies this Draft Guidebook includes .AVL files that contain the necessary thematic data needed for display within ArcInfo/Arcview. Locate the .AVL file for the appropriate map and display this file within the GIS environment. Follow the measurement protocols contained in Chapter 5 (Variables) and Section 6.4.4 for instructions on measuring and scaling the four GIS-based variables. Once the measurement and scaling of the four GIS-based variable is complete, print images of the maps containing the proposed project area to verify the results of the GIS analysis in the field.

Alternatively, the $V_{LANDUSE}$, $V_{PATCHNUMBER}$, $V_{PATCHAREA}$, and $V_{PATCHCONTIG}$ variables may be measured and scaled from hard copy versions of the maps. The CD-ROM that accompanies this *Draft Guidebook* includes .JPEG files that contain image versions of the three maps. Locate the .JPEG files on the CD-ROM and open them in a graphics software package such as *Corel Draw*, *Adobe Photoshop*, or any other software package that will read .JPEG files. Locate the proposed project area on the appropriate map. Print the entire map and/or a smaller version of the map including the proposed project area and the entire watershed within which the site is contained. Follow the measurement protocols offered in Chapter 6 (Variables) and Section 6.4.4 for instructions on measuring and scaling the four GIS-based variables.

Office Step 5. Prepare GIS Maps.

Print out the appropriate GIS maps that include the proposed project area from the CD-ROM that accompanies this Draft Guidebook. There are three maps required to scale four variables ($V_{LANDUSE}$, $V_{PATCHNUMBER}$, $V_{PATCHAREA}$, and $V_{PATCHCONTIG}$): 1) ETM Land Use Classification Analysis, 2) ETM Habitat Patch Analysis, and 3) ETM Habitat Patch Contiguity Analysis. See the Measurement Protocol for each variable for further instructions on scaling. These variables can be scaled either in the office or in the field. However if the variables are scaled in the office, the maps and variable scores should be verified in the field.

- 6.3.6** Part of any office background work for an HGM assessment includes careful preparation of field and safety equipment, and necessary field data sheets.
- Step 6. Coordination of Gear Table 6.5 lists all recommended sampling gear and minimal safety gear necessary to conduct an HGM assessment using this *Guidebook*. In addition, each field team member should have a copy of the Draft Model (Chapter 5), Minimal Submittal Worksheets and the Data Collection Worksheets (Chapter 7). A review of the provided measurement protocols (Chapter 5 and section 6.4.4.4) will also assist the HGM user in his/her preparation.

Office Step 6. Coordination of Gear.

Coordinate gear using the recommended gear list (Table 6.5). The assembly of field and safety equipment should include a print out of the Variables (Chapter 5), Minimal Submittal Worksheets and Data Collection Worksheets (Chapter 7).

Table 6.5. Recommended Field Gear for the HGM Model Offered in the Draft Guidebook for Assessment of the Functions of Riverine Ecosystems in Southern Santa Barbara County

<p>Essential Gear</p> <ol style="list-style-type: none"> 1. Minimum Safety Gear <ol style="list-style-type: none"> a. Water b. Foil blanket c. Power Bars or equivalent d. Signal Flares, mirror, <i>etc.</i> e. Radios/cell phone f. Matches/fire blocks 2. Pertinent NRCS soil surveys 3. Air photos and other imagery 4. USGS, State, County and other maps (at various scales) 5. A copy of all the Variables listed in this Guidebook 6. Submittal Worksheets that include Variable Score Sheets and Functional Score Sheets 7. GIS maps for the appropriate variables listed in this model 8. Shovel(s), and auger(s) 9. 300+ foot measuring tape(s) 10. 100 foot Spencer tape(s) 11. 25 foot Stanley measuring tape(s) 12. Clinometer &/or Abney level 13. Line (bubble) level 14. Clipboard 15. Ruler(s) (metric and English) 16. Camera & film 17. The Jepson Manual (Hickman) 18. Plastic bags (for unknown plants, soil samples, <i>etc.</i>) 19. Permanent markers (<i>e.g.</i>, Sharpies), pencils, <i>etc.</i> 20. Calculator 21. Variable and Functional Score Field Forms <p>Desirable/Optional Gear</p> <ol style="list-style-type: none"> 1. GPS 2. Laser level system (including tripod, rod, and target) 3. Laptop computer programmed to calculate functional capacity indices
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6.4

Field Work

Table 6.6 Recommended Field Steps and Procedures for Performing HGM Functional Assessments of Riverine Ecosystems in Southern Santa Barbara County

FIELD WORK
<p><i>Field Step 1. Reconnaissance of the Proposed Project Area and Set-up of Main Cross-section</i> Complete a thorough reconnaissance of the proposed project area and vicinity. Take particular note of geologic, landscape, hydrologic, soil, plant community, and faunal support/habitat conditions. Establish a representative cross section in a relatively straight reach of the stream.</p>
<p><i>Field Step 2. Bound and Stratify the Proposed Project Area and PAA(s).</i> Bound, stratify and complete mapping of the PAA. Confirm and refine all preliminary mapping in the field (<i>i.e.</i>, confirm office step 3 above). This includes:</p> <ol style="list-style-type: none"> a. Delineation of the proposed project boundaries b. Delineation of the geographic extent of waters/wetlands within the PAA c. Determination of the proportion(s) and type(s) of waters/wetlands within the PAA d. Determination the proportion of waters/wetlands that fall into the subclasses of waters/wetlands addressed by and not addressed by this draft Guidebook e. Estimation the geographic extent and type of proposed project impact(s) (<i>i.e.</i>, primary, secondary, and/or cumulative effects)
<p><i>Field Step 3. Required Worksheet 6 of 9. Subclass Classification.</i> Identify, verify, and document the rationale used for recognizing HGM subclasses of riparian ecosystems in southern Santa Barbara County within the project area. Show and/or explain why the project area or parts of the project area are covered by the Guidebook.</p>
<p><i>Field Step 4. Scoring of Variables.</i> Score the variables using criteria presented in the Guidebook. The variables should be scored, based on the following circumstances:</p> <ol style="list-style-type: none"> a. Existing conditions, and if applicable b. Proposed project conditions (or alternatives 1,2,3, etc)
<p><i>Field Step 5. Calculation of the Indices of Functions.</i> Calculate the indices of function (FCIs) in the field. FCI calculations should be completed based on the following circumstances:</p> <ol style="list-style-type: none"> a. Existing site conditions, and if applicable b. Proposed project conditions (or alternatives 1,2,3, etc)
<p><i>Field Step 6. Development of a Preliminary Profile.</i> Develop and refine a general description of existing conditions within the PAA. The description should include a discussion of geologic and landscape contexts, hydrology, soils, vegetation, faunal support/habitat, historic and current land uses, etc.</p>

6.4.1 Time is rarely wasted during a field reconnaissance of a proposed project area and its surrounding areas. In fact, it is short-sighted to perform an HGM assessment using this *Draft Guidebook* without first conducting a thorough reconnaissance of the entire PAA and vicinity. First, walk completely around the site with photos, maps, and other reference data in hand. If necessary, walk through the site several times to try to understand how water flows into, through, and away from the site. After orienting yourself in the proposed project area, establish a representative cross-section across the stream channel. Try to locate the cross section in a relatively straight portion of the channel, avoiding meanders or otherwise complex portions of the reach. Stretch a standard, non-stretch measuring tape at the point of the cross section, and clamp each end to the ordinary high water (OHW) point on river right and river left. The ordinary high water mark is defined within the Federal Register (33 CFR Part 328, Section 328.3 (a)(7)(e)) as “that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding area.” Make certain that the tape is taught and level. Measure the length of the cross section. Figure 6.1 shows an assessment team establishing a cross section.

After establishing the representative cross section, walk up gradient 3.5 times the length of the cross section and tie a flag, using plastic flagging, to mark that length of stream reach. Walk up gradient again another 3.5x the length of the cross section, and again flag that length for a total up-gradient reach of 7x the length of the cross section. Repeat these steps downstream. By marking these different lengths of stream reaches, you have established the different variable assessment areas (VAA's) used by the Santa Barbara HGM model.

Throughout the site reconnaissance, take note of animals signs, surrounding landuse, buffer conditions, manipulation of channel bed and/or banks, surface flow in and/or out of channel, average size of channel bed material, dominant plant communities, sources of sediment, *etc.* These observations will better facilitate the scoring of variables later on.

Figure 6.1
Example of a Stream
Cross Section - Cañada
del Coho Creek.
The tape is located at
the Ordinary High
Water mark.



Field Step 1. Reconnaissance of the Proposed Project Area and Set-up of Main Cross-section

Complete a thorough reconnaissance of the proposed project area and vicinity. Take particular note of geologic, landscape, hydrologic, soil, plant community, and faunal support/habitat conditions. Establish a representative cross section in a relatively straight reach of the stream. Flag the different VAA transects both upstream and downstream of this cross section.

6.4.2.
 Step 2. Bound and
 Stratify the Project
 Assessment Area

This step is intended to confirm the preliminary bounding and stratification of the Project Assessment Area that was done in the office (Office Step 2), and to make any corrections if necessary. It is critical that the proposed project area and the PAA(s) be bounded and delineated correctly for three reasons. First, if the PAA includes uplands and waters/wetlands, then the PAA must be bounded such that only the portion of the PAA that is waters/wetland subclasses treated by this *Draft Guidebook* is included in the assessment (Figure 6.2). Note, however, that sites that are not currently waters/wetlands due to natural or anthropogenic disturbance may still be part of the regional wetland subclass based on long-term, large-scale cyclic processes that may return them to reference standard conditions. Figure 6.2 outlines four different circumstances in which the PAA can vary dependent upon the location of the proposed project area.

Second, if several HGM subclasses exist on the same project site, then separate HGM models must be used in the functional assessments of these areas. For example, dependent on the scale of the where riverine waters/wetlands occur adjacent to slope waters/wetlands (*e.g.*, vernal pool complex), each waters/wetland should be assessed using a separate guidebook and associated HGM models.

Third, if different stages of development and/or different disturbance regimes exist on the same project site, then separate functional assessments may need to be performed for each area. For example, consider a project site that contains a wetland of a single subclass (*e.g.*, medium gradient alluvial fan/debris flow riverine wetlands). A portion of this wetland may be undisturbed, while another portion may be modified hydrological by riprap, channelization, and so forth. These areas may need to be separated into two assessment areas.

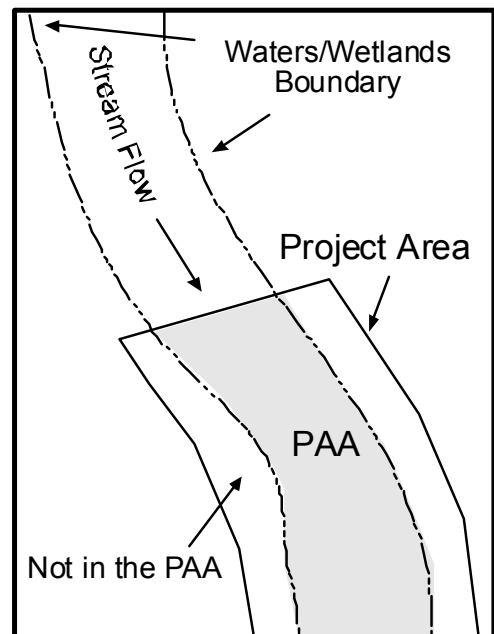
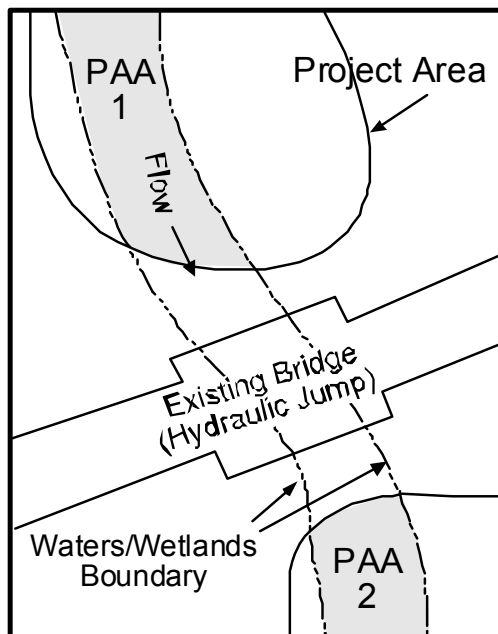
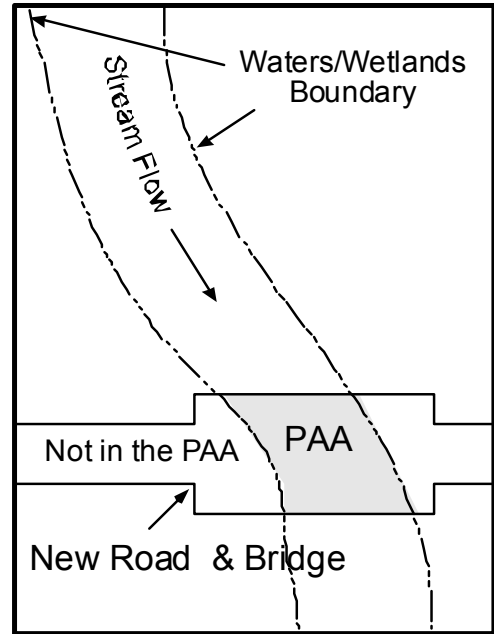
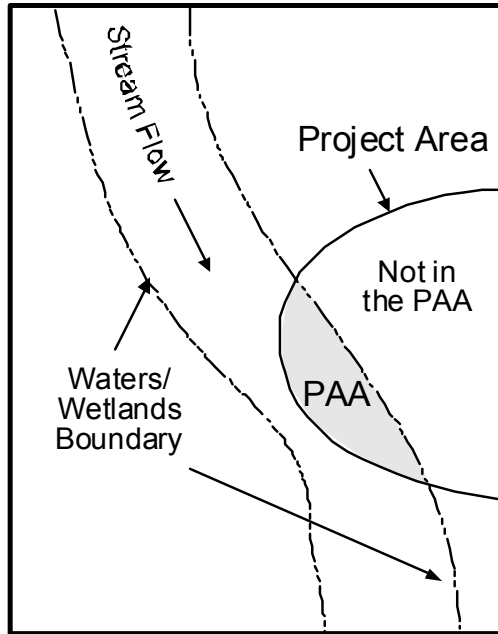
In addition to bounding the PAA, Step 3 also requires modifying the preliminary maps created in the office.

Field Step 2. Bound and Stratify the Proposed Project Area and PAA(s)

Bound, stratify and complete mapping of the PAA. Confirm and refine all preliminary mapping in the field (*i.e.*, confirm office step 3 above). This includes:

- a. Delineation of the proposed project boundaries
- b. Delineation of the geographic extent of waters/wetlands within the PAA
- c. Determination of the proportion(s) and type(s) of waters/wetlands within the PAA
- d. Determination the proportion of waters/wetlands that fall into the subclasses of waters/wetlands addressed by and not addressed by this draft *Guidebook*
- e. Estimation the geographic extent and type of proposed project impact(s) (*i.e.*, primary, secondary, and/or cumulative effects).

Figure 6.2
 Examples of Project
 Assessment Area
 (PAA) Bounding



6.4.3. The HGM Guidebook user must verify, and document the rationale for classifying waters/wetlands within the Project Assessment Area as one of the riverine subclasses defined by this Guidebook. Again, this step demonstrates the importance of building upon office preparation. It is important to demonstrate clearly why the waters/wetlands satisfy a particular subclass definition. A worksheet has been provided (Chapter 7) that guides the user through the verification of dominant characteristics and/or components used in defining the three riverine subclasses.

Step 3. Verification of Subclass Classification

Field Step 3. Subclass Classification

Identify, verify, and document the rationale used for recognizing HGM subclasses of riparian ecosystems in southern Santa Barbara County within the project area. Document the rationale for why the project area or parts of the project area are covered by the Guidebook.

6.4.4
Step 4. Scoring of
Variables

The models in the Santa Barbara HGM Guidebook rely upon the use of 28 variables that are combined in a variety of ways to calculate 14 indices of functions. The majority of the 28 variables are used in several indices of function and cannot be simply estimated. ***Measurements and field observations are required for all variables used in this Guidebook.*** Estimation of even one variable score can have significant cascading effects. Therefore, please take the time in the field to obtain the data required to score the variable, or come back to the proposed project site to obtain the data when you have more time. A summary of the recommended methodology, as well as *Data Collection Worksheets* (Chapter 7), have been provided to walk the HGM *Guidebook* user through acquiring all the required data necessary to score all 28 variables.

Record the measurement results on the *Data Collection Worksheets*, and the associated variable score and the team's rationale in selecting the variable score on the *Variable Score Sheet*. Please note that the field forms include space for recording rationale or making comments on the decision to score a variable in a certain way. The intent is to provide model users with an opportunity to make notes on each variable score and to facilitate meaningful discussions about the results at a later date. ***Use the comment/rationale column every time to document your team's decision structure or logic.***

The following summary has been provided to better facilitate the HGM *Guidebook* user through the data collection necessary to score the variables. Complete and detailed directions on data collection procedures are provided in Chapter 5 of the *Draft Guidebook, Assessment Model*. Offered in the following text, however, is a condensed version of the field protocols developed to facilitate efficient and effective scoring of the variables. We have ordered the variables throughout the text in a way that we found to allow for efficient and effective data collection.

It is important to remember that variables require different ranges or scales of observation within the proposed project area. Refer to Table 6.4 and/or the variable measurement protocols in *Chapter 5* for the size of each variable assessment area (VAA). Also, remember to take photographs and draft sketches throughout your field visit to record important site characteristics such as stream channel morphology, vegetative communities, animal use, anthropogenic disturbances, surrounding landuse, *etc.*

Field Step 4. Scoring of Variables

Score the variables using criteria presented in the Guidebook. The variables should be scored, based on the following circumstances:

- a. Existing conditions,
and if applicable:
- b. Proposed project conditions (or alternatives 1,2,3, *etc.*)

6.4.4.1

Measurements to Score Channel Variables

 $V_{\text{CHANROUGH}}$, V_{EMBED} , V_{RESID} , V_{DECOMP} and V_{INCWD}

$V_{\text{CHANROUGH}}$ Begin data collection by standing 25 feet downstream from the PAA cross section. Looking upstream at the main cross section, identify all natural and anthropogenic features (*e.g.*, boulders, rip-rap, *etc.*) in the cross section that will contribute to channel roughness. Use the photographs and line drawings in Chapter 5 (Figure 5.6) to estimate the percentage of the channel cross section occupied by roughness elements.

V_{EMBED} After identifying the “target” size class for streambed material, select twenty representative samples that represent the size range of the target class. Ten samples should be taken from the upstream transect (3.5 times OHW cross section width), and ten samples from the downstream transect (3.5 times OHW cross section width). Before picking up a sample, remember to note its orientation in the streambed. After placing the sample on the ground or in your hands in a manner that allows you to obtain a side view of its orientation in the streambed, estimate the proportion of the medial axis that was buried (“embedded”) in and below the surrounding sediment. In addition, take note of the common matrix of channel bed material in which the twenty samples were found.

V_{RESID} Starting at 3.5 times the OHW width of the main cross section downstream, walk upstream and count the number of residual pools larger than 10 square feet and 0.5 feet deep. In addition, measure the distance (in feet) between adjacent pools and average these measurements over the entire distance. The measurements should begin from the upstream end of the downstream pool to the downstream end of the upstream pool. In the event that the water level is above or below average on the hydrological gradient, the HGM user must project or visualize the average flow level to determine the size of residual pools. Field indicators have been provided in Chapter 5 to assist the HGM user.

V_{INCWD}
 V_{DECOMP} Beginning upstream at 3.5 times the OHW width of the main cross section, walk downstream through both transects (upstream and downstream) and count the number of pieces of coarse woody debris (CWD) greater than 3 inches in diameter and below OHW. All pieces of CWD that intersect the OHW line should be counted. Record the length, midpoint diameter, and decomposition class (Table 5.9) of each piece of CWD. Calculate the volume for each piece (formula for volume is provided in Appendix E). Sum the volume calculations to attain a total volume of CWD below OHW. In addition, determine the range (number of classes) and mode (most frequently occurring class) of the identified decomposition classes below OHW.

6.4.4.2

Measurements to Score Plant Community Variables,
Including V_{OFFCWD} and V_{SHADE}

V_{HERBCC} V_{SHRUBCC} V_{TREECC} V_{VINECC} V_{REGEN}	<p>Cover class values for the five identified strata (herb, shrub, tree, vine, and seedling/sapling) are determined by using three, variable-sized, circular plots established along two transects, one on stream right and one on stream left, for a total of six plots. (Due to constraints of riparian vegetation and County buffers, circular sampling plots will not always be possible or effective in sampling the vegetation. The shape of the plot can be changed, without changing the sampling area to compensate for size constraints of riparian vegetation or County buffers.) To establish each vegetation sampling transect, begin by locating the channel cross-section established for the hydrology variables. From this point on either stream right or stream left, locate the midpoint of the riparian zone between the top of bank (TOB) and the ordinary high water (OHW) mark. This will become the midpoint of your vegetation transect, and the midpoint of the middle plot for vegetation variables. From these midpoints, establish two transects that run parallel to the stream 75 feet upstream and 75 feet downstream. Establish new vegetation plot centers at the ends of each transect, for a total of three vegetation plots along a single vegetation transect. Repeat this procedure on the opposite side of the stream. Refer to Figure 5.10 in the <i>Draft Guidebook</i> that illustrates this protocol.</p>
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If the vegetation transects cannot be established according to the articulated HGM protocol because of extremely steep terrain, a narrow riparian zone, or extensive poison oak, then locate the six vegetation plots in accessible, but representative portions of the riparian zone. If the establishment of six plots is not possible at all, given hazardous or unsafe conditions, then the data vegetation variables should be estimated from a remote location (*e.g.*, from the creek bed).

At each of the six identified sample plot midpoints, define both a 0.01-acre (radius = 11.8 feet) and a 0.1-acre circular plot (radius = 37.3 feet). This is best accomplished by stretching a tape from the plot midpoint to the targeted radius, and walking slowly in a circle around the midpoint of the plot. Within the 0.01-acre circular plots, make ocular estimates of the percent cover for the herb and vine strata. Percent cover measurements should be recorded using midpoints of standard canopy cover classes (Appendix E.6). Then make ocular estimates of the percent cover for the shrub, tree, and seedling/sapling strata within the 0.1-acre circular plots. Average the six estimates of cover class for each of five cover class variables.

One additional measurement must be obtained for V_{HERBCC} . After all the vegetation cover class data have been obtained, estimate the cover class for the single dominant herb. This value will be necessary to score the variable for herbaceous cover.

V_{OFFCWD}	Record the length and midpoint diameter of all CWD that falls within each of the six 0.1-acre sample plots. All pieces of CWD that intersect the sample plot perimeter should be counted. Calculate the volume of each piece of CWD, and sum the volumes across all six sample plots.
V_{TREEBA} V_{SNAGS}	Return to the two sample plot midpoints proximate to the main cross section. From each of these midpoints, determine the basal area (square feet per acre) for all trees and all snags on river right and river left. Measurements of basal area are made by using a standard plotless cruise with a BAF 10 prism or angle gauge.
V_{STRATA}	Walk 40 feet downstream along the transects from the two midpoints proximate to the main cross section and record the total number of strata (<i>i.e.</i> , herbs, vines, shrubs, and trees) that intersects the transect at 10 foot intervals. Ten sample points for the river right and river left transect should be recorded. Using the 20 observations, calculate the average number of vegetation strata for this variable.
V_{RATIO}	A thorough walk of the riparian zone (3.5 times OHW cross section width upstream and downstream) should then be made to determine the three dominant species for each of the four strata (<i>i.e.</i> , tree, shrub, vine, and herb). Carefully assess the relative dominance of all species found in the tree, shrub, vine and herb strata, but concentrate on the three dominants for each stratum. Again, percent cover measurements should be recorded using midpoints of standard canopy cover to confirm each species' relative dominance (Appendix E.6). If three species are not present in a given stratum, list all that are present and their respective cover class values. Identify the indigenous status (<i>i.e.</i> , native, exotic, cultivated, ornamental) for all recorded dominant species. Calculate the ratio of native to non-native (including exotic, cultivated, or ornamental) species using the three dominant species in all four strata. Typically this ratio calculation will involve a total of 12 species.
V_{SHADE}	Return to the main cross section and stand in the middle of the stream channel. Look upstream on stream right a total distance of 3.5 times the width of the main cross section and make an ocular estimate of the average percent canopy cover of trees and shrubs that overhangs the channel below OHW. Along the same reach, measure the average distance that all the trees, shrubs, and understory overhang from OHW towards the center of the channel reach. Make the same set of measurements on upstream river left, downstream river right, and downstream river left. Calculate two measures, the average canopy cover and the average overhang distance using these measurements. A shade index can then be calculated by multiplying the average measurement of canopy overhang by the average percent canopy coverage.

6.4.4.3

Measurements to Score the Remaining Hydrologic, Biogeochemical, Landscape, and Faunal Support/Habitat Variables

V_{SOILINT} Returning to the main cross section, dig a soil pit in the representative soil type to a depth of approximately 3 feet or to the depth of impenetrable debris or excess water. If available, examine relatively undisturbed portions of road cuts, cutbanks associated with stream channels, excavations, etc. In at least two representative soil pits, identify each horizon and their respective width, color, and texture. Identification, nomenclature, and description of soil horizons should be consistent with guidance provided by the USDA Natural Resource Conservation Service (SCS 1962, NRCS 1998).

After having performed a thorough reconnaissance of the proposed project area, the scaling of V_{SED} , V_{SURFIN} , V_{LONGPROF} , and V_{SIGN} should be relatively easily and can be performed near the main cross section. The variable assessment area (VAA) for each of the four variables is 7 times the width of the main cross section upstream and downstream.

V_{SED} V_{SED} requires the identification of all sources of sediment, both anthropogenic and natural within the VAA. It is also important to record any direct observation of input of sediment into the stream, accumulation of sediment in the channel, and/or anthropogenic manipulation of the stream banks and/or channel.

V_{SURFIN} V_{SURFIN} requires the identification of all surface water connections, natural or anthropogenic, that intersect the OHW level and into the stream channel from surrounding landscape positions. In addition, take note of surrounding land use to determine whether surface water connections are manipulated and/or maintained by engineered structures.

V_{LONGPROF} The scoring of V_{LONGPROF} requires the identification of all human activities below the OHW line. Refer to Table 6.20 to determine whether the upstream portions of the variable assessment area have a debris basin.

V_{ASIGN} Finally, V_{ASIGN} requires that all direct observations of animals or signs of animal use (*i.e.*, calls, scat, scrapes, nests, *etc.*) made by field team members throughout the field visit be aggregated and recorded on the Data Collection Worksheet. Determine the number of animal classes (limited to 5 - mammals, birds, reptiles, amphibians, and fish) that were observed using direct or indirect indicators within the VAA. In addition, note if any indicator species (*i.e.*, black bear, mountain lion, steelhead trout, red-legged frog, arroyo toad, and/or California newt) were observed in the VAA.

$V_{\text{BUFFWIDTH}}$ Of the three buffer related variables identified by the Santa Barbara HGM model, only $V_{\text{BUFFWIDTH}}$ requires an actual field measurement. Starting at the stream right top of bank point on the study reach cross section, measure the width of the buffer. Complete the same measurements at the upstream and downstream ends of the VAA (*i.e.*, 7 times the OWH channel widths) and on stream left of the study reach (Figure 5.4). Average the three sets of measurements (*i.e.*, 6 measurements total) to obtain an estimate of the average buffer width required by Santa Barbara County within the PAA.

V_{BUFFCONT} Count the number of times that the Santa Barbara County designated buffer (urban, 50 ft; rural, 100 ft) is "broken" and/or interrupted by man-made structures and/or human activities. Be sure to include activities that result in a narrowing of the buffer to less than the 25% minimum of the County-required width. By definition, the minimum width of the VAA for V_{BUFFCOND} (*i.e.*, the minimum width of the zone wherein one needs to look for breaks in buffer continuity) is 10% of the width of the buffer required by Santa Barbara County for the PAA. If the buffer width is less than 25% of the required width, ***then by definition it does not exist***. Along the V_{BUFFCONT} transect, a buffer can be "broken" as many times as the width is <10% of the County requirement.

V_{BUFFCOND} To scale V_{BUFFCOND} , air photos, maps, and other remote sensing tools can be helpful in estimating the dominant (*i.e.*, > 50%) land use within the Santa Barbara County designated buffer (urban, 50 ft; rural, 100 ft). For this variable, it is easiest to divide the VAA into four zones: upstream left, upstream right, downstream left, and downstream right to obtain a variable score. In (relatively rare) cases where there is an equal partitioning of land use conditions within the buffer (*e.g.* 50% forest - 50% road), develop and document a clear and defensible logic as to why one would assume that one buffer condition is dominant over another.

6.4.4.4

Scale the GIS-based Variables

As discussed in section 6.3.5, there are two possible approaches to scoring the four GIS-based variables, V_{LANDUSE} , $V_{\text{PATCHNUMBER}}$, $V_{\text{PATCHAREA}}$, and $V_{\text{PATCHCONTIG}}$, of the Santa Barbara HGM model. The first method is to perform the required measurements and calculations within the ArcInfo/ArcView GIS environment. The CD-ROM that accompanies this Draft Guidebook includes .AVL files that contain the necessary thematic data needed for display within ArcInfo/Arcview. Locate the .AVL file for the appropriate map and display this file within the GIS platform. Collection of necessary data required to scale the four variables (see below) can be done within a GIS environment. However, it is important to note that **all analyses must be verified in the field**. Alternatively, these four variables may be measured and scaled from hard copy versions of the maps. See Section 6.3.5 for instructions on how to print the maps. To begin, delineate the subwatershed for the PAA on the printed maps or in a GIS environment.

V_{LANDUSE}	For the V_{LANDUSE} variable, calculate the proportion of ETM land use types that exist within the project site sub-watershed. This can be done using the ETM land use classes provided in the map key and a 1:24,000 scale dot grid. Determine the proportion of the subwatershed that is either native chaparral/forest (ETM Class 6) or native chaparral/woodland (ETM Class 5).
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$V_{\text{PATCHCONTIG}}$	To score $V_{\text{PATCHCONTIG}}$, identify the shortest route, along the digital stream network, from the project site to the “core” wilderness habitat patch (<i>i.e.</i> , Santa Ynez Forest Service Boundary). Along this route, count the number of stream reaches classified as “unsuitable” habitat between the PPA and the “core” habitat patch. Stream reaches are determined as unsuitable if they are bordered by “unsuitable” habitat patches both on river right and river left.
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$V_{\text{PATCHAREA}}$ $V_{\text{PATCHNUMBER}}$	The remaining two GIS-based variables, $V_{\text{PATCHAREA}}$ and $V_{\text{PATCHNUMBER}}$, require the HGM user to delineate a 1000-foot radius circle centered around the PPA. Using a 1:24,000 scale grid (Appendix E), measure the size of the “good” and “fair” patches as classified by the ETM Habitat Patch Analysis map. Habitat patches that extend beyond this 1000-foot ring should be truncated and only the area within the ring should be concluded in the area measurement. Using the same map, count the number of “good” and “fair” habitat patches within the 1000-foot ring. Habitat patches that are intersected by, but also extend beyond the 1000-foot ring should be included in the count.
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- 6.4.5. To streamline the functional assessment process, the functions and their corresponding functional capacity indices are summarized on the *Functional Score Sheets* (Chapter 7). The calculations and review of the preliminary assessment results should be reviewed by the assessment team members **in the field, and not in the office.**
- Step 5. Calculation of the Indices of Functions

Again, the functional score field forms include space for recording rationale or making comments on the decision with the intent of facilitating meaningful discussions at a later date. If the functional assessment is conducted based on proposed project conditions, the rationale/comment chapter should include any assumptions that were made.

Field Step 5. Calculation of the Indices of Functions

Calculate the indices of function (FCIs) **in the field**. FCI calculations should be completed based on the following circumstances:

- a. Existing site conditions, and if applicable:
- b. Proposed project conditions (or alternatives 1,2,3, etc.)

- 6.4.6. This final step requires the syntheses of existing conditions within the proposed project area with respect to geologic and landscape contexts, hydrology, soils, vegetation, faunal support/habitat, historic and current land uses, etc. In a sense, this part of the field work allows the assessment team the opportunity to profile the PAA and describe its condition with respect to the subclass profile and reference standard conditions developed in this Draft Guidebook. Developing a narrative that presents a general description of the existing conditions within the project assessment area will assist in the production of an assessment report.
- Step 6. Development of a Preliminary Profile

Field Step 6. Development of a Preliminary Profile.

Develop and refine a general description of existing conditions within the PAA. The description should include a discussion of geologic and landscape contexts, hydrology, soils, vegetation, faunal support/habitat, historic and current land uses, etc.

6.5 Preparation of an HGM Assessment Report

Consistent with the guidance offered in Table 6.7, a written report of all HGM assessment results should be prepared by the assessment team. As shown in this table, the assessment report should include:

- 1. Introduction:** This Chapter shows the location of the site and describes the proposed activity and anticipated types of activity. This Chapter should include maps of the site and documentation of the proposed activity (*e.g.*, construction plans), if available.
- 2. Assessment report objectives:** This Chapters states the purpose for conducting the functional assessment and discusses how the results will be applied to the proposed project.
- 3. Description of the project assessment area:** This Chapter should include a detailed description of the site conditions and relevant landscape context, and should be based on the preliminary profile that was developed in Field Step 5.
- 4. Methods:** This Chapter discusses the methods that were used throughout the assessment process, including (a) the HGM approach, (b) functional assessment of waters/wetlands, and (c) application of the results to the proposed project.
- 5. Results:** This Chapter presents the results of the functional assessment based on (a) existing conditions in the PAA, and (b) proposed project conditions.
- 6. Conclusions:** This Chapter provides a synthesis and interpretation of assessment results.
- 7. Literature Cited:** Discussions throughout the report should be bolstered with citations from current literature. All citations should be listed in the Literature Cited Chapter.
- 8. Appendices:** The appendix Chapter should include (a) multiple photographs of the site, (b) copies of the Minimal Submittal Worksheets, and (c) resumes of the assessment team members.

Table 6.7 Recommended Outline for Assessment Report

ASSESSMENT REPORT
<i>Title Page</i>
<i>Acknowledgements</i>
<i>Table Of Contents</i>
<i>List of Tables</i>
<i>List of Figures</i>
<i>List of Photos</i>
<i>List of Appendices</i>
Executive Summary
I. Introduction, Background
A. Location of proposed project
B. Description of proposed activity and anticipated types of impacts
II. Assessment Report Objectives
III. Description of the Proposed Project Area And Relevant Landscape Context
A. Geographic extent of jurisdiction in waters/wetlands
B. Historical and current land uses and conditions
1. Hydrology
2. Soils / Biogeochemistry
3. Plant Communities
4. Faunal Support/Habitat
C. Regulatory Context
1. Federal
2. State
3. Local (<i>i.e.</i> , County)
D. Proposed project activities and resulting conditions
1. Area and volume of fill to waters/wetlands
2. Anticipated changes to:
a. Hydrology
b. Soils / Biogeochemistry
c. Plant Communities
d. Faunal Support/Habitat

III. Methods

- A. Overview of the HGM approach
 - 1. HGM Background
 - a. Explanation for the use of HGM as the assessment approach for this project
 - 2. Components of the HGM Approach
 - a. HGM Classification
 - b. Identification of Functions of HGM Subclasses
 - 3. Definitions of Key HGM Terms
- B. Overview of the functional assessment of waters/wetlands
- C. Application of results to the proposed project: Listing and annotation of technical and administrative assumptions

IV. Results

- A. Existing conditions in the proposed project area waters/wetlands
 - 1. Summary of the geographic extent of waters/wetlands (delineation map)
 - 2. Summary of waters/wetlands functions
 - 3. Summary of functional assessment results

And if applicable:

- B. With project conditions in project assessment area waters/wetlands
 - 1. Summary of geographic extent of waters/wetlands (with project delineation map)
 - 2. Summary of with project waters/wetlands functions
 - 3. Summary of with project functional assessment results

V. Conclusions/Summary: Synthesis and interpretation of assessment results

VI. Literature Cited

VII. Appendices

- A. Photographs
- B. Minimum Submittal Requirements that include:
 - 1. Assessment Data Sheets
 - 2. Calculations of FCI's
- C. Resumes of principal scientists/technical staff