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7 PROJECT MANAGEMENT

7.1.1 Project Management Overview

Successful completion of projects requires effective project management. This chapter provides guidance to Project Managers, Project Teams, SAGs, and CMER on how CMER research and monitoring projects should be managed to help meet the obligations of CMER: scientific credibility (e.g., applying best available science), operational efficiency, and fiscal accountability. These guidelines recognize that CMER is a collaborative and cooperative process. This process does not preclude any SAG or individual working on any of the project elements (i.e., scoping, study plan, literature review, or other elements) in advance of the formal project initiation process.

7.1.2 Project Development

Project management requires completing documents that initiate, develop, guide, update, and ultimately communicate results from the project to CMER, TFW Policy, and the general public. These documents are intended to accommodate regular CMER processes, products, or reports and facilitate appropriate review and approval by CMER.

This chapter discusses the following documents necessary for completion of research projects:

<u>Project Management Documents</u>	<u>Technical Documents</u>
Project Budget	Literature Review
Project Charter	Scoping Paper and Alternatives Analysis
Project Management Plan	Study Design Plan
Communication Plan	Site Selection and Data Collection plan
Risk Management Plan	Data Analysis
Document/Data Management and Closure Plan	Final Reports
Project Tracking Spreadsheet	

Some CMER projects do not require all above-listed documents, but all documents should be considered and explanations of omissions should be described in the Project Management Plan.

7.1.3 Adaptive Management Program Administrator (AMPA) Role in Project Management

The AMPA assigns Project Managers (PM) to CMER projects who, in turn manage projects. Details of PM responsibilities are presented in section 7.2.2. In a project management role, the AMPA has three general areas of responsibility:

1) Facilitation:

1. Manages the dispute resolution process (see chapter 3, section 3).
2. Oversees project proposal initiation development (see chapter 6, section 3).

2) Communication with TFW Policy:

The AMPA is the primary link between science emerging from CMER and the TFW Policy group, who evaluates and recommends whether that science justifies policy changes or changes in Forest Practice Rules. In this context, the AMPA:

1. Drafts cover letters and transmits findings report to TFW Policy (see section 7.6.3).
2. Presents biennial budgets for the AMP for TFW Policy and Board approval.

3. Determines if any CMER-approved revisions to project elements (e.g., problem/purpose statement, study objectives, or critical questions) of a project require additional approval by TFW Policy (see section 7.9.3).
- 3) Approves DNR and CMER staff participation in Project Teams and spending of AMP project funds:
 1. Approves requests from SAGs or CMER to assign DNR Project Managers to Project Teams (see section 7.2.2)
 2. Approves requests from SAGs or CMER for assignment of CMER staff to Project Teams, and works with SAGs and CMER to assemble effective Project Teams (see sections 7.2.3 and 7.2.4)
 3. Approves selection of Principal Investigators and other Project Team members who require Adaptive Management Program funds (see section 7.2.3)

Categories and subcategories in this summary of the AMPA's project-related management role are not meant to be exhaustive.

7.2 Project Team

7.2.1 Project Team Overview

Scientific Advisory Groups (SAGs) and CMER work with the AMPA to assemble and maintain Project Teams to implement CMER research and monitoring projects. Project Teams report to the committee that created it and are responsible for completing all project tasks and milestones. Project Teams can be assembled in several ways and can include a mixture of Project Managers, SAG members, CMER members, CMER staff, outside cooperators and contractors. Project Teams should include members with appropriate technical expertise about the project topic. The DNR will manage the contracts of Project Team Members who are brought onto a team as paid consultants/contractors. The AMPA should insure there is no conflict of interest when a Project Team member becomes a contractor for a project.

All members of the Project Team are expected to commit to the timely success of the project, and as such will not raise concerns without also immediately providing sound alternatives and pathways for consensus. Team members are expected to work in a cooperative and committed manner to resolve issues as they develop, while providing solutions to problems/issues that both they and other members raise.

The Communication Plan section (section 7.6) includes specific guidance on Project Team member roles and responsibilities related to communication.

Participation in a project gives team members access to unpublished data – the expectation is that CMER and Project Team members will not present or publish these data without approval of the CMER committee and the AMPA. Agreements should be put in place to ensure that data collected in cooperation with private entities is jointly available to CMER and its cooperators.

Members of the team may change as project milestones are met and different skills and expertise are needed with new project tasks, individuals retire, or project team members are not fulfilling their obligations. Generally, the Project Team consists of the following:

7.2.2 Project Managers (PMs)

Pursuant to AMPA delegation, PMs help guide projects through the CMER process, and coordinate with CMER and SAGs to facilitate the work of Project Teams to successfully complete projects on behalf of the

Adaptive Management Program. In this effort, PMs are responsible for managing program funds, budgets, and contracts to ensure projects are carried out as set forth in RCW 39.29 Personal Service Contracts, RCW 39.34 Inter-local Cooperation Act, the internal contracting requirements of DNR, and other rules and regulations indirectly related to contracting; ensure optimal and proper use of program resources; and pursue continuous improvement in program organization, consistency and accountability. In brief, PMs are responsible for facilitating project guidance through established steps as a project moves through its various phases to completion. Requests for a DNR PM to be assigned to a project team are made to the AMPA.

Project Manager responsibilities include:

1. Provide Oversight

1. Monitor project activities and the performance of Project Teams.
2. Communicate progress, problems, and problem resolution to the AMPA, CMER, and SAGs.
3. Work with the SAGs/CMER, and Project Teams to help develop Project Charters and Project Plans, and keep them updated as needed over time.
4. Work with the AMPA, SAGs/CMER, and Project Teams to develop and review proposals, RFPs or RFQs, review contractor proposals, monitor contract performance, and provide input on budgeting, schedule, scope changes, and contract amendments.
5. Work with CMER, SAGs, and Project Teams (including PIs, contractors, and Other Team Members) to resolve problems and build consensus.
6. As member of the Project Team, work with PI and Project Team members to develop interim and final draft reports.
7. Ensure communication between all team members is clear, concise, and consistent.
8. Ensure coordination between SAGs/CMER, Project Teams and landowners.
9. Coordinate with other PMs.
10. Coordinate all technical reviews and responses in a timely fashion.
11. Facilitate archiving of all data and documents.
12. See that contract provisions are followed.
13. Provide direction and support to the Project Team to achieve clear and specific scopes of work, schedules, and budgets within approved contracts.

2. Facilitate Communication with Contractors

Project Managers are responsible for communicating or authorizing communication with all project-related contractors. See Communication Plan (section 7.6) for guidance specifics on communication between PMs, Project Teams and contractors. The PM authorizes communication between Project Team members and Contractors on substantive project elements (see section 7.6.3)

3. Ensure Accountability

The PM maintains sole responsibility for all aspects of project management even if other individuals (meaning co-operators who may or may not be contracted under the project) are completing or helping complete parts of the project.

7.2.3 Principal Investigators (PIs)

Principal Investigators are responsible for executing the technical and scientific components of the project according to the project plan, and as such, take the lead in developing, writing and updating technical documents and plans. Principal Investigators can be CMER staff, a paid contractor, caucus scientists, or other appropriate individual. The sponsoring committee (SAG or CMER) generally selects/assigns PI for

the Project Team, in consultation with the PM if the Project Team already has an assigned PM. Depending on the size or complexity of a project, a sponsoring committee may assign multiple PIs to a project. However, one of the PIs will serve as a lead contact for technical questions/issues. If a project spends Adaptive Management Program funds, PI selection is approved by the AMPA. Requests for CMER staff to be assigned to a project team as the PI are made to the AMPA.

Principal Investigator responsibilities include:

1. Help develop project charters;
2. Work with the PM and the SAG to identify additional technical expertise and time commitments needed for successful completion of the project;
3. Provide materials needed by the PM;
4. Develop/write scoping documents, literature reviews, and study designs;
5. Help implement study designs, including site selection, data QA/QC, managing field crews, collecting data;
6. Analyze data;
7. Write interim and final draft reports;
8. Present technical findings to CMER, TFW Policy, and at science conferences.

The lead PI is responsible for communicating project status and issues to the Project Team as described in the Communication Plan (see section 7.6).

7.2.4 Other Project Team Members

Project Teams typically include members who are not the PM or the PI who provide specific skills that contribute to the success of the project. Other Project Team Members can include CMER and SAG participants, volunteer (non-CMER) experts, paid consultants/contractors, and CMER staff. The PM and PI in association with the SAG and/or CMER will help identify additional personnel with the skills and expertise needed to successfully complete the project. The SAG will forward to CMER proposed Team Members for approval.

The PM and PI determine the minimum time commitments necessary for participation as a Project Team member. SAG or CMER members are encouraged to be Project Team members as long as they can meet these minimum time commitments. Requests for CMER staff to be assigned to work on a project as a project team member are made to the AMPA.

Other Project Team Members' responsibilities can include:

1. Help design and implement projects;
2. Provide expertise necessary for successful completion of projects;
3. Help write technical documents;
4. Assist in communicating with their caucus (if CMER member);
5. Provide constructive and timely feedback.

Project Team members should support consensus project decisions when discussed at CMER.

7.3 Project Budget

7.3.1 Project Budget Overview

Project budgets, listed in the CMER Master Project Schedule, are approved by the Forest Practices Board based on TFW Policy recommendations. Typically, these budgets are initial estimates based on prior

project experience, and are revised once a project is scoped and designed. Any supplemental funding may need Forest Practices Board approval.

The PM maintains the most current budget estimates for a specific project, along with current allocations and total funds spent to date. This budget will include the following information: (1) the existing CMER Master Plan Project Schedule project budget total; (2) an estimate of the major budget components and tasks for each project year, and (3) total funds spent to date per task/deliverable. Project Teams should update budgets as necessary throughout the year and develop budgets for each fiscal year a project is active. In-kind contributions by participants should also be identified by the PM and communicated to the AMPA.

As work on a project proceeds, budget adjustments will occur. The PM will develop with the Project Team and sponsoring SAG/CMER updated budgets, along with any requests for additional funds. The PM will provide regular budget updates to the Project Team, SAG and to CMER. The SAG/CMER request should describe the need for the supplemental funds and present the reasons for the underestimation in the approved budget. If total cost estimates are substantially over the budget allocated in the CMER Master Plan, research/monitoring options for the project may need reevaluation or a request for a budget increase to the Forest Practices Board.

A detailed project budget includes, but is not limited to, accounting for costs associated with the following:

- A list of contractors and their associated compensation(s)
- Personnel benefits
- Travel expenses
- Equipment/Supplies
- Goods and services, including any field crew expenses
- In-kind contributions

7.4 Project Charter

7.4.1 Project Charter Overview

The purpose of Project Charters is to describe the project and give the PM and the Project Team the authority to begin spending allocated project funds. The PM is responsible for writing the Project Charter and works with the coordinating SAG or CMER and the PI and other Team Members identified for the project. In general, Project Charters should be brief and updated as needed as the project is implemented to accurately, reliably and concisely communicate projects' basic elements and objectives. TFW Policy, CMER and the Project Team are the primary audiences for the Project Charter.

Project Charters should be created even when incomplete information exists. SAG/CMER and TFW Policy review and approve Project Charters. Generally, as projects develop and are implemented, changes to scope, critical questions, objectives, or budgets will require additional approval by CMER and/or TFW Policy. The AMPA will determine whether such changes also require review and approval by CMER and TFW Policy.

The most recent draft of the approved Project Charter will be stored in the CMER Information Management System. Information contained in the CMER Work Plan should be used as the starting place for developing charters (e.g. problem statement, purpose statement, project objectives, critical questions).

7.4.2 Project Charter Approval Dates

List date(s) that CMER and TFW Policy approved and amended the charter.

7.4.3 Title

If the CMER Work Plan does not contain a title for this project and the project does not yet have a title, create one. Titles should strive to be brief, distinct from other projects, and descriptive of the project's purpose.

7.4.4 Problem Statement

Information contained in the CMER Work Plan should be used as the starting place for developing a problem statement. If the CMER Work Plan does not contain this project, does not yet have an approved problem statement, or has an outdated problem statement, the PM will work with the Project Team (if it exists), or CMER and/or the overseeing SAG to generate a new/updated problem statement. If the project being launched is in response to TFW Policy guidance for CMER to answer specific questions or address/inform a general topic or issue, either use the problem statement provided by TFW Policy or other available policy guidance to help generate a draft problem statement.

An effective problem statement for a CMER research project should concisely incorporate the following:

- State the issue/problem the project addresses.
- Provide background on the issue; explain why the issue/problem is important such as by describing the potential risk(s) to specific resources the project is intended to inform/address.
- Identify the spatial and/or temporal scope (e.g. regional/statewide, near/long term, etc.) the project will address, if known.
- Describe the scientific uncertainty about the issue.
- Describe how the problem can be solved.

7.4.5 Purpose Statement

Define the specific purpose of the project and how the project will help resolve the issues identified in the problem statement. The purpose statement is a specific accurate summary of the overall purpose of the project. It should relate directly to the problem statement. When drafting a purpose statement, one should generally start with a sentence that begins with something like, "The purpose of this study/project is..." Briefly explain how this project complements any other projects that also address the issue/problem, if known. This may include any additional project phases or anticipated/potential follow-up studies.

Identify how the results of this project will inform the relevant resource objectives and/or performance targets outlined in the Forest Practices HCP.

7.4.6 Project Objectives

Describe the study objectives. Study objectives are clear, concise declarative statements that describe the pathway to addressing the problem statement. Study Objective(s) should summarize what the project will achieve. Project objectives may be revised during the scoping phase of the project.

7.4.7 Critical Questions

The CMER Work Plan contains critical questions at both program and project levels. Critical questions are the pivotal Adaptive Management Program questions that a project should answer, either in part or in full. Critical questions may be revised during the project's scoping phase. If an updated Charter includes

revised Critical Questions, briefly explain why the Critical Questions were updated. If the project is not currently in the CMER Work Plan, the Critical Questions will be developed during the scoping phase.

7.4.8 CMER Rule Group and Program

Copy the Rule Group and Program to which the project is tied from the CMER Work Plan. If the project is not in the current CMER Work Plan, identify which rule group and program the project informs.

7.4.9 Project Deliverables and Project Timeline

List the expected project deliverables. Include a best estimate of the project timeline, recognizing that it may need revision as the project moves through the study design phase.

7.4.10 Budget

State the current total budget allocated for the project. This is an initial budget estimate that may change pending the scoping and alternatives analysis process. May include projected costs of potential future phases as a separate budget estimate.

7.4.11 Project Team

Provide names, titles, affiliations, and roles (i.e. PM, PI, Other Team Members) of the Project Team members, if available (see section 7.2 for descriptions of Project Team Members roles and responsibilities). If not available, identify specific expertise that will be necessary for successful completion of the project. The charter will note the level of time commitment expected from Project Team members.

7.5 Project Management Plan

7.5.1 Project Management Plan Overview

The Project Management Plan breaks down project work into logical steps to help provide a framework to efficiently allocate resources, reliably estimate project costs, and help guide schedule, budget development and project scope. The Project Management Plan documents and tracks the progress of a CMER project through its various stages. The contents of the Project Management Plan will vary depending on the type and complexity of the project. The Project Team is the primary audience for the Project Management Plan; however, SAG/CMER members are encouraged to provide feedback on the plan.

An initial draft of the Project Management Plan is prepared once a Project Charter is completed. Project Management Plans are not static, but instead are iteratively revised and updated as needed through a project's life.

A Project Management Plan also lists the other complementary documents/plans (e.g., Scoping document, Project Risk Management Plan, Communication Plan, etc.) that currently exist or will be created to effectively plan and implement the project. The PM updates the Project Management Plan as necessary and stores the most recent drafts of this document in the CMER Information Management System for easy access and reference by Project Team members, and other CMER members.

7.5.2 Project Title

Record the project's formal title as it appears in the TFW Policy-approved Project Charter.

7.5.3 Project Milestones and Tasks

List the milestones and deadlines for the project, which will be updated as necessary. Examples of milestones include completion of a field manual, a QA/QC plan, site selection, fieldwork, data analysis, report writing, a pilot study, project phases, preparing an interim report, and SAG or CMER approval.

Identify tasks and schedule to be completed to meet each milestone.

The milestones and tasks can be represented in an outline format, organization chart, or just listed, depending on the size and complexity of the project (i.e., case study, pilot, or phasing). The milestones and tasks should be presented in sequence chronologically with expected dates of completion in a detailed schedule.

7.5.4 Project Deliverables

List all the deliverables for the project. Deliverables are the tangible products that result from the project, according to specified quantitative or qualitative measures of quality. For example: field data that is completed according to the field manual, submitted on a specific medium, and approved by the SAG or by CMER; an interim report approved by the SAG or by CMER; a SAG/CMER approved QA/QC report that will identify any deviations of the field protocol, and a final report reviewed by a technical editor and ISPR that is CMER approved; among others.

7.5.5 Project Team Members

List the Project Team members. Provide name, title, affiliation, contact information (phone number and e-mail address) and role (PM, PI, Other Team Member), of the individuals who are involved in completing the project, (see section 7.2 for descriptions of Project Team Members roles and responsibilities). Clarify, to the extent known, specific roles and responsibilities for each key player on the project.

Individuals may be added or dropped from a team with changes in project needs and the capacity of individuals to meet minimum time commitments. See section 7.2 for more information on Project Teams. Update the Project Plan when people join or leave a Project Team.

Identify which members are participating in the project through DNR contracting.

7.5.6 Project Constraints and Assumptions

Describe known project constraints and assumptions that will impact the project.

Project constraints are limiting factors (internal or external) that affect the initiation, planning, execution, monitoring and control, and close-out of a project. Constraints restrict or dictate the actions of the Project Team. Constraints may be organized into the following categories: schedule, budget, materials and equipment, access to study sites, and human resources. As the project evolves, constraints will materialize. In the planning phase, the identification of the project constraints are based on current scientific, policy, logistic, and budget considerations. If constraints within the categories below do not exist, state nonexistent or unknown.

Schedule constraints:

Limitations on the project schedule that affect when an activity can be scheduled. This is usually a fixed or imposed date or relationships with other projects that can strain resources.

Budget constraints:

Limitations on the project budget such as the availability of funds over time, fiscal year considerations, and grant considerations.

Human resource constraints:

Limitations on resource usage, such as what resource skills are limited during a specified time frame.

Resource constraints:

Limitations anticipated due to the lack of the technical resources, study sites, or product acquisitions necessary to complete the project.

Project assumptions are factors in the planning process that are considered to be true, real, or certain, without proof or demonstration and are outside the total control of the Project Team. It is important that the Project Team, SAG/CMER identify project assumptions and describe the potential impact the assumption could have on the project.

Project constraint and assumption information will be used to develop the Project Risk Management Plan.

7.5.7 Decision-Making Authority

Describe how decisions are made for the project. See also Communication Plan Tables 7.1, 7.3 and 7.4. The TFW Adaptive Management Program strives for a consensus decision-making process. Decision-making authority described in this section needs to be consistent with CMER process and ground rules (Adaptive Management Board Manual, Section 22).

- Describe the Project Team organization and approval authority (i.e. Project Team members, Project Manager, Principle Investigator, SAG, CMER, TFW Policy).
- Describe the decision-making procedures and timeline for the project. Identify when official reviews and approvals are needed to move the project forward. Describe the approval process of major decisions within the Project Team, the SAG, CMER, and TFW Policy.
- Describe how changes within the scope of work, contract, or study design will be addressed.

7.5.8 Project Resource Needs

List or describe any infrastructure or specialized equipment that will be necessary to complete the project (e.g., aerial photographs, orthophotos, special maps, vehicles, GPS unit, computer, software programs, field gear, thermographs).

7.5.9 Project Budget

Provide an estimated project budget that is linked to the project timeline, schedule and deliverables (see section 7.2).

7.5.10 Project Sites

Discuss what is known about project site selection to assess project resource and scheduling requirements. Much of this information may not be known until after the scoping and/or study design steps are done. Reference the location where this information is provided in detail if available.

7.5.11 Companion CMER Documents

List other stand-alone CMER documents that currently exist or will be created to complete the project, such as:

- Project Charter
- Communication Plan
- Literature Review
- Scoping Paper and Alternative Analysis

- Study Design Plan
- Site Selection and Data Collection Plan
- Risk Management Plan
- Final Results Report
- Document/Data Management and Closure Plan

With each document, include a completion date of the most recent draft, or a forecasted completion date. The remainder of chapter 7 describes the companion CMER documents.

7.6 Communication Plan

7.6.1 Communication Plan Overview

Transparent and accurate communication between the different adaptive management parties (Project Team/SAG/CMER/AMPA/TFW Policy) is critical for the Program to guide and oversee the work of the Project Team. The Communication Plan provides a framework to manage and coordinate the communications needed for all phases of a project. Project Teams should prepare a Communication Plan at the beginning of a project and update it as necessary over time increases the efficiency of project work at all stages.

Two primary pathways exist for project communication to occur when working on CMER projects – (1) between the Project Team and project oversight committees (i.e. SAGS/CMER/TFW Policy), and (2) communication within the Project Team. The primary audiences for the Communication Plan are CMER/SAG members and Project Team members. See Section 7.2 for more details on Project Teams.

The Communication Plan does not need to be archived in the CMER Information Management System but will be retained in DNR records in compliance with DNR policy.

7.6.2 Project Oversight Committee Communication

This section covers communication between the Project Team and the project oversight committees (CMER/SAG/TFW Policy). Project Teams work with SAGs or directly with CMER when completing projects. Communication within the Project Team is covered in subsection 7.6.3.

Project oversight communication includes three categories of documents/communication: 1) project management documents that enable oversight committees to understand how projects will be managed, 2) project tracking and communication to enable the oversight committees to track project progress and provide guidance and approvals to move projects forward, and 3) communication with contractors.

Project management documents

The PM is the lead author for the Project Charter, Project Management Plan, Communication Plan, and other project management documents (Table 7.1). If the PI has been identified at the time of project launch, the PM will work with the PI to draft the Project Charter and Project Management Plan, in consultation with the oversight committee.

Project management documents are described in more detail in other parts of this chapter.

Table 7.1. Project management/oversight documents and the primary authors.

	Primary author	Collaborators	Final approval ¹	Primary audience
Project management documents				
Project charter	PM	PI/Project Team (if identified)	CMER, TFW Policy	Project Team, TFW Policy, CMER/SAG
Project management plan	PM	PI	CMER	Project Team, CMER/SAG
Communication plan	PM	SAG/Project Team	NA	Project Team, CMER/SAG
Risk Management	PM	SAG/Project Team	NA	Project Team, CMER/SAG
Document management and closure plan	PM	PI	NA	Project Team, CMER/SAG
Project tracking and guidance documents				
Project updates	PM	PI	NA	Project Team, CMER/SAG, TFW Policy, AMPA
CMER quarterly and annual project progress reports	PM	PI	NA	SAG/CMER
CMER Requests	PM	Project Team	CMER ²	CMER
TFW Policy Requests/Check-ins	AMPA	Project Team	CMER	TFW Policy
Public presentations	PM	Project Team	NA	Public

¹ Committees that review and approve the document.

² CMER ultimately 'approves' CMER requests, but the actual wording of the request does not require CMER approval.

Project Tracking and Guidance

The first point of contact for a project is the Project Manager. Project Teams are expected to provide regular updates from the overseeing committee.

The PM is responsible for ensuring that all reporting tasks are complete and provided on schedule. When preparing progress reports, the PI is responsible for providing detailed and comprehensive costs, schedule, and project updates, in writing, to the PM consistent with prior written agreement. The PM, in turn, is responsible for summarizing project update information into progress reports, and presenting these progress reports to the overseeing SAG and to CMER per the project schedule or as requested by the SAG or by CMER. The PM may delegate preparation or presentation of progress reports to the PI or other Project Team members, with their consent.

The format of the communication between a Project Team and the oversight committee depends on which committee is involved, and the type of communication (Table 7.2).

Table 7.2. The different types of communication and documentation required when a Project Team communicates with the oversight committee.

Type of Communication	SAG	CMER	TFW Policy
Project Updates	Verbal (written may be appropriate)	Verbal/meeting minutes	Brief written report/presentation
Progress Reports	Brief written report	Brief written report	NA
CMER & TFW Policy Requests	Agenda Item	CMER Request form	TFW Policy Request form
Decision	Meeting minutes	Meeting minutes	TFW Policy Response form

Project Updates

Project updates are provided to the oversight committee (SAG(s)/CMER) per the schedule or as requested. Updates are verbal descriptions of the project's current status and include information on project tasks, milestones (e.g., site selection, data collection, report writing). If an update to CMER or to SAG results in a substantive change to a project, the PM will maintain written documentation of the change. What constitute a substantive change will be determined on a case-case basis depending on specific project issues, and is determined by the Project Team.

Occasions may also exist when the PM or PI will be asked to provide an update on the project to TFW Policy beyond the regular CMER project updates.

Progress Reports

Project progress reports are brief quarterly and annual written reports on the progress of the project. The reports should describe progress on project tasks, milestones, and timelines, and the status of the current budget. Reports should be distributed to the overseeing SAGs and to CMER when the meeting agenda is distributed. Any problems or deviations from predicted timelines that arise during periods between progress reports should be included in the progress reports.

CMER Requests

CMER requests are written documents from the Project Team that with PM support formally seek project approvals, changes to prior agreed upon study elements, guidance and/or resources. The PM is responsible for preparing CMER requests, though depending on the nature of the request, may delegate this task to the PI, Project Team, or SAG co-chair, with prior agreement. For requests that ask for guidance on project direction, changes in scope, priorities, or any other substantive issue, the PM needs to consult with the SAG and Project Team when drafting the request. For CMER requests that are procedural in nature, such as asking for CMER review of a specific document, the PM will inform the SAG or Project Team when drafting the request prior to forwarding the request to CMER.

CMER requests are frequently accompanied by additional documents, such as a report that is to be reviewed/approved, or a short memo that describes in detail the issue surrounding the CMER request. Any attachments that accompany a CMER request will be distributed and approved by the SAG before forwarding to CMER, if the SAG is the Project Team oversight committee. Depending on the nature of the issue/request, either the PM or PI can be lead author on the memo, though ultimately it is the responsibility of the PM to ensure these memos are ready for distribution to CMER at the appropriate time (i.e. with the CMER mail-out).

CMER requests may also take the form of project issues/questions' that are brief summaries of issues or questions that the Project Team would like to discuss with the oversight committee as it relates to completing project tasks or milestones. This can include any problems or circumstances that may result in changes in project scope, budget or integrity (quality). The CMER request in this situation should be in the form of a short memo. Specific questions the Project Team would like answered should be listed with enough information so the members of the oversight committee(s) will have a basic understanding of the context within which the questions are being asked.

TFW Policy Requests

TFW Policy requests are written requests submitted by CMER seeking approval of a document (e.g., Project Charter, the scoping documents, final reports, project budgets); or asking for clarification or guidance on specific issues identified by the Project Team or CMER. The AMPA facilitates communication between CMER and TFW Policy, and depending on the nature of the request can delegate preparation/presentation of the request/update to either the PM, PI or other CMER member/Project Team member with prior agreement.

The AMPA works with members of the Project Team and CMER to draft the request in a way that clearly and concisely communicates the issues, purpose, and/or decision identified in the submittal. If a TFW Policy request includes a presentation to TFW Policy about the request, report or issue, such a presentation can be given by the PM, PI, or the AMPA, depending on the nature of the request. When a TFW Policy request originates from a Project Team, the PM will consult with the AMPA and submit it to CMER for approval before forwarding to TFW Policy.

Contractor Communications

In all cases, the PM is primarily responsible for facilitating open and transparent communication between contractor(s) and Oversight Committee members. Committee members should generally not directly communicate with the contractor(s) about substantive project elements outside of formally organized meetings, conference calls or PM-facilitated group e-mail discussions unless specifically authorized in pre-established contract terms, or approved in advance to do so by the PM. The PM may verbally grant authorization, and the rest of the Project Team and Oversight Committee should be informed when this occurs. The PM is responsible for informing the contractor(s) of this policy as well.

7.6.3 Intra- Project Team communication

The following section outlines expectations for open and effective communication among the team members. It is intended to guide communication, not restrict it. The expectation is that team members, including PMs and PIs, who communicate outside of normal project meetings, conference calls, and other venues will share substantive conversations they have with the rest of the team.

Project Manager

The PM provides assistance to Project Team members by coordinating communication (e.g. one-on-one and group meetings, conference calls, etc.) when needed as well as maintaining the e-mail distribution list for the Project Team. The PM also ensures that any communication resulting in a formal decision about the project occurs in a transparent and inclusive way.

In all cases, the PM is responsible for communicating any changes to a contractor's scope of work – other project Team members are not authorized to provide such guidance. Conversations affecting the scope of a contractor's work on a project, or a substantive change in project objectives or tasks, need to include the entire Project Team.

The PM is responsible for keeping track of the project status. To this end, the PM works with the Project Team members to develop a status and progress reporting schedule. These reports will be written memos prepared by the PM and presented at scheduled Project Team meetings/conference calls. Draft copies of the memos will be sent out to Project Team members via e-mail prior to the meeting. Status and progress reports should include information on the status of project, tasks, milestones (e.g., site selection, data collection, report writing), and budget as well as any issues that require Project Team input. With prior agreement, the PM may delegate preparation or presentation of the project status and progress reports to the PI or another Project Team member. These memos may also then be used later as updates and project status reports to CMER, as appropriate.

Principal Investigator

The PI is responsible for preparing and writing technical reports for CMER (Table 7.3). How the PI communicates and works with other Project Team members to produce these documents will vary based on the nature of the project and dynamics of the Project Team. The PI works together with the PM to coordinate communicate with other team members as described in the above section concerning the PM role in Intra-Team Communication.

The PI is responsible for communicating to the PM concerns or issues that may come up throughout project implementation.

Table 7.3. Technical project documents.

Technical Document	Primary author	Co-authors	Review/approval ¹	Primary audience
Stand-Alone Literature Review	PI	Project Team	SAG, CMER	SAG/CMER
Scoping Document	PI	Project Team	SAG, CMER, TFW Policy	SAG/CMER, TFW Policy
Study Design Plan	PI	Project Team	SAG, CMER	SAG/CMER
Site Selection and Data Collection Protocols	PI	Project Team	—	SAG/CMER
Draft and Interim Reports	PI	Project Team	SAG	SAG
Final Project Reports	PI	Project Team	SAG, CMER	SAG/CMER, TFW Policy

¹ Committees which review and approves the document.

Other Team Members

Communication by individual team members includes participation at meetings and conference calls, providing feedback on draft documents, researching specific topics/issues, taking the lead on writing report sections, and/or acting as co-author(s) of CMER documents. The PM will document expectations on individual team member roles, responsibilities, tasks, deliverables, and levels of participation in the Communication Plan. Other Project Team members may engage in 'off-line' communications about the project with other Project Team members and/or adaptive management participants. In the spirit of transparency, team members will share the elements of any substantive, project-related conversation with the Project Team.

Project Findings

Once a final report has gone through ISPR and has final approval by CMER, the PM and PI prepare the answers to the 'six questions' document (see Chapter 2, section 2.7) in collaboration with the overseeing

committee, that is ultimately delivered to TFW Policy (Table 7.4). The PI is responsible for ensuring the scientific findings communicated in the six questions document are accurate. The AMPA is responsible for writing the cover letter accompanying the answers to the six questions.

Table 7.4. Findings reports.

	Findings Report	Primary author	Co-authors	Final approval	Primary audience
1	Answers to Six questions	PI	Project Team/SAG	CMER	TFW Policy
2	Findings report cover letter	AMPA	--	--	TFW Policy
3	Final CMER-approved report	PI	Project Team	--	TFW Policy

Other Communication

Presentations

Findings from CMER studies are often formally presented at CMER science conferences, at CMER and TFW Policy meetings, as well as in other venues based on solicitations from outside groups and organizations. The PM works with the Project Team to identify the appropriate presenter based on the nature of the presentation. Any presentation that uses adaptive management funding should explicitly acknowledge CMER and Adaptive Management Program contributions. The Project Team should be part of the preparation/review of project presentations.

7.7 Literature Review

7.7.1 Literature Review Overview

'Literature review' in this manual refers to multiple types of reports and products that inform CMER on the currently best available science about a scientific issue, question, subject, available methods, and research approaches. The topics, issues, or questions in stand-alone literature reviews are developed by the Project Team, SAG or CMER, and are approved by CMER. A literature review may be used by other scientists and needs to be directed to the scientific community. Evaluation of the quality and applicability of literature cited in scoping documents, study designs and/or final reports is done as part of the review process for these documents.

Literature included in a review should be selected based on relevance, availability, and quality, with preference given to peer-reviewed publications that are publicly available. Gray literature should be used with caution, but is acceptable if the content can be evaluated for accuracy and credibility, and it is available to CMER and the general public. Internal reports, papers presented at conferences, articles in preparation, and other types of scientific information should be treated as unpublished and assessed for quality (accuracy and credibility). Regardless of source, authors of CMER reports may provide literature referenced in a study design or report if requested during a CMER review process.

The Project Team, SAG, CMER and TFW Policy members are the primary audiences for the literature reviews. The literature review needs to be properly organized and written to best facilitate scientific use.

Archiving: Completed stand-alone literature reviews should be treated and archived like final reports, including pre- and post-ISPR drafts and associated ISPR response letters, ISPR cover letters, comment matrices, etc. (See section 7.12 below). Literature review documents should be archived in the CMER Information Management System and in the DNR contract file if it is a contract deliverable.

Stand-alone literature reviews can be one of the following:

Annotated bibliography – An annotated bibliography is a broad list of citations to books, articles, and documents. Each citation is followed by the annotation – a brief description and evaluation of the citation that informs the reader of the relevance, accuracy, and quality of the cited source.

Literature synthesis – A literature synthesis identifies what is known and not known about a specific subject, but also typically distills information not necessarily readily evident from the literature upon which it is based. This information may be used to frame or evaluate a potential CMER project. A literature synthesis may either be a final product or an early phase of a more complex project. The “early phase” literature synthesis should be used to aid in project scoping and development of the study design.

Systematic literature review – A systematic literature review is similar to a literature synthesis but focuses on answering specific, carefully worded research questions by systematically identifying and synthesizing the most appropriate research evidence relevant to those questions. Depending on the question(s) asked in the systematic literature review, literature will be ranked for inclusion based on its strength, reliability and appropriateness to answering the question(s). The process of identifying and selecting literature for inclusion in the systematic literature review must be carefully planned and documented (See Pullin and Stewart 2006; Burnett et al. 2008).¹

7.7.2 Document Creation

Literature reviews as stand-alone documents are developed and written by Project Teams under the direction of either a SAG or by CMER.

Depending on the type and need, a literature review can include the following five elements: background, methods, results, discussion, and conclusions, depending on the type of literature review being produced.

7.7.3 Background

This section describes the need for the review, its purpose, and the questions to be answered.

7.7.4 Methods

The methods section should delineate the types of literature reviewed, the span of publication dates, and any other limits on the review. For all stand-alone literature reviews, the methods section should include how the literature sources were identified (search engines, key words, screens for relevance and acceptance). For systematic literature reviews, the methods section should additionally include explanation of how types of literature were ranked.

7.7.5 Results

The results section is generally either an alphabetical listing of annotated reviews, or a summary of the findings in a systematic or synthesis review. In systematic or synthesis reviews, it may be appropriate to combine the results and discussion sections.

¹ Burnett, K. M., G. R. Giannico, and J. Behan. 2008. A Pilot Test of Systematic Review Techniques: Evaluating Whether Wood Placements in Streams of the Pacific Northwest Affect Salmonid Abundance, Growth, Survival, and Habitat Complexity. Institute for Natural Resources, Oregon State University, Corvallis, OR.

Pullin, A. S. and G. B. Stewart. 2006. Guidelines for systematic review in conservation and environmental management. *Conservation Biology*. Vol 20, pg. 1647 – 1656.

7.7.6 Discussion

A discussion will place the findings in context and should include:

- Limitations
- Significance
- Generalizations
- Discuss the level of confidence in the answers to the questions provided by the literature.

7.7.7 Conclusions

State the salient conclusions drawn from the results of the review, or explain why conclusions cannot be drawn. Depending upon the purpose of the review, the conclusion may suggest a direction for further research or policy considerations.

7.8 Scoping Paper and Alternatives Analysis

7.8.1 Scoping Document and Alternatives Analysis Overview

The purpose of a Scoping Paper and Alternatives Analysis is to facilitate the process of designing CMER projects. The scoping paper is a key communication tool for all levels of the Adaptive Management Program, and is the vehicle for the Project Team to communicate to the SAG, CMER and TFW Policy on how they would like to proceed to successfully meet a project's objectives.

The scoping document is submitted by the Project Manager to CMER for review and approval. Once approved by CMER, the scoping paper is submitted to TFW Policy for review and approval.

Writing the scoping paper allows the Project Team to work on and clarify how the project will meet CMER goals and objectives. During this process, the Project Team can review and propose updates as necessary to refine any existing Problem and Purpose Statements, Project Objectives and Critical Research Questions. However, in the case where these goals have been developed through prior consensus, the Project Team should get agreement by CMER and in some cases TFW Policy for any substantive changes prior to moving the project forward. A scoping paper will include an evaluation of alternative approaches for achieving the project objectives to determine a recommended approach. The scoping paper should include a general description of scientific, statistical and implementation issues to the extent known to facilitate a better understanding and evaluation of the project.

For projects where the opportunity for integration exists, compare the following:

- Rule Group critical questions that are comparable to both projects.
- Additional program research, or sub-questions to the rule group questions that are identified in the Work Plan that can be supported by both projects.
- Is work duplicated with other research? What work has been completed on this topic outside of the CMER program? Can other scientific research be incorporated into the project to reduce cost, improve effectiveness, and reduce duplication?
- Can multiple projects use the same study sites?

The final approved scoping document is archived in the CMER Information Management System and DNR records.

7.8.2 Context

This section contains the basic identification information for the project. It introduces the reader to the project and the adaptive management/regulatory context for the project.

Project Title: Record the project's title as it appears in the Project Charter.

Rule Group: Record the Rule Group and Program under which the project is listed in the Project Charter.

Forest Practice Rules: Identify the forest practices rules by Washington Administrative Code (WAC), guidance by board manual section number and part to be evaluated, tested, or informed by the project. Describe the scientific basis that underlies the rule, numeric target, performance target, or resource objective that the study informs and how much of an incremental gain in understanding the study results will represent.

Links to Adaptive Management: Describe the connection between the project and other projects, questions, and strategies identified in the master project schedule, CMER work plan, TFW Policy initiatives, Board proposals, etc.

Timeline: Identify the fiscal year(s) the project will occur. If during the scoping phase the Project Team recommends changing the project timeline from what was described in the Project Charter such that it would affect the budget, the Project Teams needs SAG and CMER to approve these revisions. These changes need to be brought to TFW Policy for review and approval in an amended charter.

Resource Objectives, Issues and Performance Targets: List, and describe as necessary, the Forest and Fish Report schedule L-1 resource objectives, performance targets, and L-2 projects this project will address upon completion. Describe the potential risks to resources and forest practices management effects.

7.8.3 Problem Statement

Include the problem statement that was approved by CMER and TFW Policy in the Work Plan or Project Charter. If during the scoping phase the Project Team recommends updating the Problem Statement, the Project Team needs SAG and CMER consensus for Problem Statement revisions. These changes need to be brought to TFW Policy for review and approval.

7.8.4 Purpose Statement

Include the Purpose Statement that was approved by CMER and TFW Policy in the Project Charter Purpose. If during the scoping phase the Project Team recommends updating the Purpose Statement, the Project Team needs SAG and CMER consensus for these revisions. These changes need to be brought to TFW Policy for review and approval.

7.8.5 Study Objectives and Critical Questions

Include the Study Objectives and list the Critical Questions that were approved by CMER and TFW Policy in the Project Charter. If during the scoping phase the Project Team recommends updating or modifying either the Study Objectives and/or Critical Questions from what were included in the Project Charter, the Project Team needs SAG and CMER consensus for these revisions. These changes need to be brought to TFW Policy for review and approval.

7.8.6 Testable Research Hypotheses

The study objectives, as expressed through the specific critical questions may be reduced to a testable hypothesis or hypotheses, where applicable, to facilitate scientific resolution. A literature review or baseline monitoring project does not necessarily include a hypothesis.

7.8.7 Data Requirements

Identify the type of data/information needed to answer the objectives and critical questions.

7.8.8 Alternatives Analysis

Alternatives analyses use best available science² (BAS) to compare methods, study design frameworks, anticipated outcomes, acceptable accuracies, and costs to answer the critical questions.

If CMER has already conducted a BAS review relevant to the project in a stand-alone literature review, incorporate the appropriate elements in the alternatives analysis.³ Otherwise, review relevant literature and summarize the following:

- Current understanding of the topic based on information contained in available literature (from both within and outside of CMER).
- Approaches and general methods/analyses that have been used successfully in similar projects.

Based on the results of the BAS review, describe different options and approaches that could effectively answer the critical questions and accomplish the study objectives. Summarize the advantages and disadvantages of various approaches. Include logistics, cost, time, staffing, environmental or landowner limitations, and other appropriate elements, as well as scientific and technical merit. This comparison of the various options provides the basis for making and explaining key decisions concerning the project design. A table listing the various options is recommended.

Consider the following BAS elements in the alternatives analysis (BM22-9):

1. Information source
2. Spatial scale
3. Temporal scale
4. Study design
5. Methods
6. Data
7. Quantitative analyses
8. Context
9. References
10. Logical conclusions and reasonable inferences
11. Level of peer review

7.8.9 Recommended Approach

State the Project Team recommended approach based on the alternatives analysis. Describe any trade-offs between expected costs and anticipated statistical power and inference, if known. Be specific about

² See Appendix XXXXX for CMER memo on Best Available Science (2013).

³ See section 7.6, Literature Reviews.

the reasons the selected approach will meet the project's stated objectives. This statement is the basis for the argument that the project is using the BAS.

7.8.10 Budget

Provide a budget range for each alternative and describe the underlying assumptions used.

7.9 Study Design

7.9.1 Study Design Overview

The study design provides the scientific design for a CMER project. The study design is based on the selected alternative from the scoping document. This is the primary decision document that supports funding the project and provides the guidance to develop the project. It needs to be detailed, scientifically correct, and suitable for technical scientific review. The study design is intended to assure adaptive management participants and others that the project is technically sound.

The study design is developed by the PI and Project Team under the direction of a SAG or another CMER-authorized group. CMER reviews and approves the study design.

Any substantial changes from the approved scoping document should be highlighted and explained in the study design. The study design should typically include the elements described in the following subsections.

7.9.2 Introduction

Explain the context within which this project will be conducted, including the relationship to AMP issues and existing research. Include in the introduction the problem statement from the scoping document.

7.9.3 Project Purpose/Study Objectives/Critical Questions

The Project Purpose, Study Objectives and Critical Questions should be consistent with the scoping document (See section 7.8). However, while writing the study design, the Project Team may recommend additions and refinements to the Study Objectives and Critical Questions. These proposed revisions should be forwarded to CMER for review and approval prior to transmittal to TFW Policy for their approval.

7.9.4 Literature Summary

Include a brief summary of the literature pertinent to the study design. This material should have largely been summarized in the scoping document.

7.9.5 Research/Monitoring Approach

Describe the research approach and explain how the objectives and critical questions will be addressed. If an experimental approach will be used, clearly state the hypothesis to be tested.

7.9.6 Study Population

Describe the study population that is being studied from which sampling will occur and how inferences will be made.

A. Site Selection

Describe the methods and procedures that will be used to identify the population to be sampled and to select a sample of that population. List any other factors that will be used to screen potential study sites, such as logistics and feasibility of data collection. Specific site selection protocols are described in the site selection strategy section 7.10 below.

B. Experimental Unit

Describe the unit of the population for which measurements will be taken and used in analysis.

C. Sample Size

Where sufficient data exist, identify the precision and confidence objectives for the data. Estimate the numbers of samples needed and the procedures or other basis used to develop this estimate.

D. Data Parameters

Identify the study variables and data that will be collected and used in the analysis. Indicate the role of various data parameters in the analysis (i.e., whether they will be used as response variables, covariates descriptive parameters, monitoring metrics).

7.9.7 Data Collection Procedures

Describe the general methods, procedures and tools that will be used to obtain the data. The description should be detailed enough for peer review. Specific data collection protocols are described in the Field data collection section 7.10 below.

7.9.8 Quality Assurance/Quality Control (QA/QC)

Describe the plan for conducting QA/QC, including protocols on how to ensure data are collected, processed and documented appropriately and correctly. Describe how the project will insure the quality data handling, how the project will minimize errors, recognize and correct developing errors and trends, quantify errors, and how errors will be handled during analysis and in conclusions.

7.9.9 Statistical Analysis Procedures

Describe the methods and procedures to analyze the data. Depending on the approach, these may include the use of descriptive statistics to characterize populations or statistical tests or analyses that will be used to test hypotheses. The description should contain enough detail for peer review.

7.9.10 Project Risk Analysis

Discuss any anticipated problems in data collection, the data, or data analysis. Contingencies for dealing with these problems should be offered and developed. Describe sensitivity of potentially losing study sites.

7.9.11 Budget

Provide the most current project budget. If the budget estimates are greater than the allocation in the CMER Master Plan, a revised budget may need to be approved by TFW Policy or the project re-scoped (see section 7.3).

7.10 Site Selection and Data Collection Plan

7.10.1 Site Selection and Data Collection Plan Overview

The project Site Selection and Data Collection Plan provides detailed logistical information about the project's site selection, field and data management, and in-progress reporting. It identifies any existing applicable cooperator agreements and new agreements that need completion as part of the project.

The Site Selection and Data Collection Plan describes how the project will be implemented, and what kind of logistical support the project might need. It provides guidance on identifying the equipment, human resources, and sequence of activities needed to effectively implement the study design. Writing the Site Selection and Data Collection Plan may begin after the study design has been reviewed and approved to minimize potential revisions.

The Site Selection and Data Collection Plan is primarily for the Project Team to review and use. It is not submitted to CMER for review and approval though CMER members are welcome and encouraged to provide comments and suggestions to the plan. However, any modifications to the Site Selection and Data Collection Plan that changes the study scope or increases the project budget will be submitted to CMER for review and approval.

Archiving: All site selection and data collection documents should be archived in the CMER Information Management System, including the most current draft of the Site Selection and Data Collection Plan, landowner/cooperator names and contact information, all versions of field manuals used to guide collecting data (including early manuals that were later updated as the data collection progressed) and any QA/QC reports.

7.10.2 Summary

Provide a brief summary of the study and site selection/data collection plans.

7.10.3 Site Selection Strategy

The site selection strategy section of the plan should include the following elements:

1. Study site criteria
2. Site selection process
3. Site access

1. Study Site Criteria

Describe specific site selection criteria already compiled in the study design (section 7.9). A contingency plan should describe how to address exceptions to the selection criteria, losing sites for unforeseen circumstances, and similar procedures.

- Explain whether the project needs sites or not (i.e. field study vs. literature review, modeling exercise).
- Briefly describe the geographic extent of the study area
- Describe the different strata that frame site selection
- List specific site selection criteria
- Describe the minimum number of sample sites needed for the study

2. Site Selection Process

Describe the process of identifying potential study sites, based on site selection criteria, and the process for accepting and rejecting sites. This may involve GIS, LiDAR, and other mapping tools to generate pools of potential sites.

Develop a schedule for site selection, identifying appropriate milestones for different steps in site selection process.

List the people who will be doing the site selection and their roles and responsibilities.

List any other projects that share any or all of the proposed study sites.

Describe what data/information needs to be collected/compiled for each site during the site selection process, either in the office and/or as part of site visits.

- Describe how site treatment responsibility will be continued/maintained.
- Identify the most likely risks to finding sufficient sites of the target population and how this potential outcome will be factored into the study's site selection process.

3. Site Access

The Project Team or representatives will work with landowners (private, state, federal, tribal) to get permission to use specific sites for CMER research. SAG members, agency staff, or contractors may make preliminary contact with landowners during the project development phase of a project. A brief description of the study, what data will be collected at the sites, an estimate of the duration of access to the sites, and how the data will be used in adaptive management will be helpful when communicating with potential cooperators. However, prior to landowner contact, a lead person should be identified as the focal point of landowner contact (with an alternative identified in case the lead becomes inaccessible) to minimize confusion that can occur if multiple project members are contacting landowners. The PM should send the formal request on CMER letterhead. A Project Summary that includes participant expectations will accompany the request (see Cooperator Agreement below). Landowner participation in CMER projects is voluntary. Defining access requirements is the responsibility of individual landowners. CMER interaction with landowners is not limited to formal requests for permission to access research sites. Landowners may be requested to assist in site selection during project development.

The PM may want to communicate with the Washington Forest Protection Association and the Washington Farm Forestry Association when formal site access requests are being made. This will help them respond in case any of their members have questions about a specific request. Consider presenting the study site selection needs to these organizations.

Once permission to use a site is granted, it is the responsibility of the PM and his or her delegate(s) to maintain contact and process access agreements. It is the responsibility of the field teams to follow stipulations contained in the access permits.

Cooperator Agreements

Cooperator agreements should include (as appropriate):

- Time commitments.
- Landowner roles and responsibilities within the project.
- Operational and managerial contacts applicable to each site
- Site treatments (List the people/agency/company/etc. responsible for implementing any site treatments).

- Access (keys, and conditions of access) to research participants. Describe the expected frequency and timing of sampling/visits over the life of the project and expected date of data sampling completion
- Obtaining research exemptions (with assistance from DNR)
- Determining who will lay out sites
- Limitations on future use of the study sites (i.e. logging, road building, etc.) for pre-determined time period.

Because the time required to obtain sites and landowner access agreements is typically long, it may be advisable to conduct or contract site location and permission activities prior to and separately from negotiating with potential contractors who will complete field work. If site location or permission tasks are contracted, the inherent uncertainty of the time and effort required should be clearly noted, and arrangements negotiated to accommodate it without incurring excess costs to the project budget.

Landowner Access to Research Data

Upon request, the PM or the AMPA will provide the landowner with the QA/QC'd data collected on their property as part of a CMER project.

Permits

The Site Selection and Data Collection Plan will identify all of the permits required, such as Forest Practice Applications, Alternative Plans, Section 10 (a)(1)(A) Endangered Species Act, Hydraulic Permit Applications, or Section 404 Clean Water Act permits. Some projects may need Forest Practices Board approval as pilot/feasibility projects. The scope of landowner cooperation will be identified in order to inform landowners if any action, such as the timing and design restrictions on timber harvest expected.

The access permits/agreements need not be complete at the time the site selection and data collection plan is approved. However, permit processing is encouraged where possible prior to plan approval for permit requests with long lead-time requirements.

7.10.4 Field Data Collection

This section covers the following topics:

1. Equipment and materials
2. Field methods
3. Field crew training and safety
4. Quality control & management
5. Data collection and storage

The PI is responsible for oversight of preparation for data collection. The following guidance applies to all members of the Project Team that collect data.

1. Equipment and materials

The Site Selection and Data Collection Plan should provide a list of the equipment and material types and quantities needed for field implementation. In most cases, equipment will be gathered or provided from diverse sources. With support as needed from the PM, the PI will verify that all survey equipment and materials have been obtained, that measuring equipment is of the quality and accuracy required by the study and that equipment is in good condition. Which equipment has special calibration needs is also important and those needs should be reflected in the budget.

2. Field Methods

The PI is responsible for ensuring that the field crews start data collection on schedule and that data collection proceeds on schedule over the survey period. The field crew will be trained in and follow the approved data collection protocols. Logistical preparation is critical to efficient data collection and management. Common problems to anticipate during this part of the field and data management stage include:

- Loss of field crew members, either temporary (due to sickness) or permanent (due to resignation/termination)
- Equipment failure or loss
- Contracting problems
- Implementation schedule adjustments due to study site conditions and access
- Loss or rejection of study sites (due to, e.g., low or loss of water flow, disturbance, landowner complications)
- Questions about protocol application and data documentation
- Site access requirements

The PI is responsible for notifying the PM if any problems arise that may affect the data collection schedule or following the approved data collection protocol.

Data collection protocols

The quality of data collection protocols is directly related to the quality of the data collected. The general components found in comprehensive data collection protocols include:

- a) Pre-survey preparation instructions;
- b) Data collection methods;
- c) Data dictionary;
- d) Protocols for consistent application of methods for survey;
- e) Field forms with completed examples; and
- f) Data management system and protocols.

The PI is responsible for preparing, obtaining, or collating the data-collection protocols as well as reviewing them for adequacy. The PI ensures that proper data collection protocols are followed, reviews them for accuracy and archives the protocols as described in the project closure plan. Once the protocols have been assembled, the PI will ensure that each field crew has a copy.

Existing data collection protocols may be suitable for use in the project with or without modification. In all cases, the protocols must be clear and specific so that different crews can replicate data collection procedures and interested parties can assess the robustness of data collection procedures.

Where protocols are unavailable or incomplete, the budget and schedule in the site selection and data collection plan must reflect the time and cost needed to finalize the protocols before beginning field data collection.

3. Field Crew Safety and Training

The PI in consultation with the PM will ensure that all crew members meet minimum qualifications. Crew qualifications must be clearly identified.

Crew training

Good training or evaluation of experience with the collection procedures provides confidence that the data collected represent actual field conditions and not crew variability in method interpretation or field application.

Crew safety

Field crew safety is paramount in any CMER study. Field locations are usually remote and rugged. It is ultimately up to the field crews to prepare adequately for these conditions.

The PM ensures safety procedures are in place that addresses personnel, vehicle, fire, and other specific site/environmental safety issues. The PI ensures that safety procedures are followed. Field vehicles should carry safety gear such as citizen band (CB) radio for use on forest roads. Field crews must follow any specific fire and safety protocols that landowners require. Significant problems with access to unsafe survey sites may require modifications to the study design, the Site Selection Data Collection Plan, or both. Such modifications should be resolved cooperatively among PI, PM, field crews and Project Team representatives, before data collection begins when possible.

4. Quality Control and Management

For each CMER project, the PI ensures a quality control (QC) plan is prepared so that data are collected according to data collection protocols. The scope of this plan depends upon the project type. The QC information must be documented and appear in the in-progress and final reports.

Several strategies exist to ensure quality control, including:

Field Assistance: The PI and/or their designee visit field crews during the field season—preferably more than once, to ensure consistency and understanding of methods, and to check for “protocol-drift.” These visits provide hands-on assistance and additional training as needed to ensure that the field crews remain data collection competent. This will help ensure consistency in applying the protocols within and among field crews. Each visit must be documented in writing that briefly describes strengths and weaknesses of crews and protocols and steps taken to improve weaknesses.

Observational surveys: Observational surveys provide a higher degree of quality control. The protocols, including procedures and expectations for this QC survey, must be clearly identified before the survey is conducted. These are qualitative surveys and are most often conducted with prior notice to the crews. The general approach is for the expert to observe the field crews over a specified reach length or time and record strengths and weaknesses of their parameter-specific application of the protocol. After completion of the QA/QC survey, the expert immediately reviews their findings onsite with the field crews to discuss calls. This review is critical to understanding the underlying causes for variability and correcting any deficiencies.

Replicate methods: Replication provides the highest degree of quality control, and can help reduce the variability in field data measurements. Some protocols and parameters lend themselves better to replicate surveys such as habitat unit, large woody debris, and stream discharge. Replicate surveys take careful planning to ensure that comparisons between crews cover the exact same stream reaches and field conditions. Multiple types of replicate surveys can be employed, including open—where the field crew knows they are being tested, and blind—where the field crew are unaware of the testing.

Data entry and sampling error checking implementation and management: Data entry has the potential for introducing errors that are difficult to find once data entry is complete. Besides the common “typographical error,” errors can arise when field data are recorded in diverse or unspecified units of measure, on different coordinate systems, or by use of undefined notations. Ensure that collected data

are recorded consistently, with limited and standard data entry options, double checking inputs in the field prior to leaving a site, and randomized checking of data entry. Make sure field equipment is appropriately calibrated and functioning properly.

For example, when collecting field samples for offsite analysis, double tag the sample(s) to ensure sample identification integrity, and use daily sample log(s).

Equipment: The PI is responsible for assuring that data collection/recording equipment are in good working condition and calibrated correctly. It is also important to identify and make contingency plans for critical equipment and material elements that would cause significant problems if broken or lost during data collection. Often a contractor will provide the necessary equipment, and in these cases, the PI or some delegate is responsible for assessing its condition and overseeing its proper calibration. In other cases, equipment will be gathered or provided from diverse sources, and the PI is responsible for determining its usability and calibrating it.

5. Data Collection and Storage

Describe how the data will be recorded and transcribed or transferred to spreadsheets or databases. Describe how field samples will be collected, stored, analyzed, and documented (see section 7.13). Describe how copies of the raw and QC data will be transferred to the PM as part of contract deliverables.

7.10.5 In-progress Results Reporting Strategy

Describe how the PI will inform the PM and CMER on site selection and data collection progress. A schedule of updates should be established based on project milestones (e.g., site selection completion, field season ending) that inform the PM and Project Team on project status. Any problems that arise during site selection/data collection should be reported, as necessary, to the PM.

The in-progress reporting strategy should agree with strategy outlined in the Communication Plan (section 7.6).

7.10.6 Budget

The budget contained in the Site Selection and Data Collection plan should provide a detailed breakdown of the expected cost to complete each part of the project. These parts include, but are not limited to, field and data management (including any equipment that needs to be purchased, sent to calibration, and repaired), data analysis, and report writing and revisions. This is a refinement of the budget in the study design, not an addition to that budget. This refinement is based on the project information developed during preparation of the Site Selection and Data Collection Plan.

7.11 Risk Management

7.11.1 Risk Management Overview

Project Teams assess potential risks (e.g. a lack of acceptable study sites, budget cuts, changes in landowner participation etc.) to projects and identify potential actions to reduce, avoid or mitigate impacts to projects. The level of detail needed in the risk assessment should reflect project complexity. Risk assessments can contain estimates of likely risks with both high and low impact, as well as mitigation strategies to help the project avoid being derailed should common problems arise. CMER will be consulted if the Project Team determines that risk(s) to the project could significantly impact the project scope, budget, timeline, results, or other elements.

Broadly, three potential strategies exist, with numerous variations. Projects may choose to:

- **Avoid risk** — Change plans to circumvent the problem;
- **Control/Mitigate risk** – Reduce impact or likelihood of risk (or both) through intermediate steps;
- **Accept risk** — Take the chance of negative impact, budget the cost (e.g. via a contingency budget line).

7.11.2 Elements to consider when assessing project risks

1. Identify Potential Risks and for each include a brief description and its anticipated consequences.
2. Prioritize risks and their likelihood of occurrence based on probability and impact. This process prioritizes identified risks and their probability of occurring along with the corresponding impact to the project objectives and other factors (time, budget, etc.).
3. Consider strategies to respond to the identified risks.
4. Select a strategy for risk response: Depending on how the SAG would like to proceed, at a minimum, a strategy should identify high-priority risks. In developing a risk response strategy, the Project Team should define the risk including the potential impacts to project timelines, budget, scope or quality of the project.
5. Monitor Risk. The PM and PI monitor current potential risks and identify new risks as the project develops. When a risk event occurs, the SAG or project manager can then refer to the risk assessment and respond appropriately. Elements for monitoring risks include:
 - Monitor for adequacy as project is implemented
 - Monitor for unanticipated risks
 - Report status at regular intervals
 - Upon a risk event, execute the response strategy.

7.12 Final Project Reports

7.12.1 Final Project Reports Overview

Final reports inform CMER, TFW Policy and the FPB on what was learned during the course of the study, relative to addressing the problem statement, study research objectives and the extent to which the study was able to answer the critical questions.

All final report documents should be archived in the CMER Information Management System and in the DNR contract file. This includes the pre- and post-ISPR drafts and associated ISPR communication documents, comment matrices, finding reports and the answers to the six questions documents (See section 1.12).

Much of the information appearing in the final report can be obtained from the study and Site Selection and Data Collection Plan.

7.12.2 Executive Summary

Provide a short summary of the major elements of the study, including overarching objectives, high-level methods, and focal findings.

7.12.3 Introduction

Provide a concise description of the study purpose, objectives and background. Include recent and appropriate citations in support of the methodology and current understanding of the literature leading to the hypothesis statement. Avoid rewriting the literature review. The study purpose and objectives should match those listed in the study design.

7.12.4 Study Sites

Provide a description of the study site characteristics. Briefly restate the selection methodology from the study design and justification for any deviations. Site descriptions should also include information of the site condition that helps the reader analyze and interpret the results in the context of prior knowledge. A map is a useful way to show the distribution of the study sites and their relationship to the state boundaries.

7.12.5 Methods

The precise and thorough description of the methodology permits evaluation of the quality of the data and analyses and permits replication of the study. This section should be based on the methods section of the study design, and any modifications from that plan should be noted and explained.

Describe the overall study design, equipment, materials, protocols, data collection and quality control strategies, laboratory analyses, and statistical methods. Published descriptions of equipment or procedures may be cited rather than repeated. Complex protocols, equipment, or parameters can be displayed in a table, figure, or relegated to an appendix.

Document the sample selection criteria and screening process. This section should be based on the methods section of the study design, and any modifications from that plan should be noted and explained.

7.12.6 Results

Present the data in a meaningful form, using tables, figures, and text as appropriate, but avoid interpretation. Each figure and table should stand alone and be clearly understood without the need to search through the text for explanation. Large data sets are difficult for a reader to interpret, and they should be placed in one or more appendices, with summary statistics presented in the results section. Figures are useful for showing trends and summarizing categorical data. Figures and tables must be numbered in order and should be referred to by number in the accompanying text. The text should emphasize important aspects of the data but should not simply repeat what is in tables or figures.

7.12.7 Discussion/Conclusions

The Discussion/Conclusions sections is the place for interpreting the results. The merits of a report can be greatly enhanced by a fully informed discussion. This is the place to provide synthesis of results in relation to the available literature, to relate what has been learned to what is known, to identify important information gaps or limitations, to search for generalities, and to establish basic principles. In it, authors should indicate the significance of their research, levels of inference to the landscape, how it relates to current knowledge, and any avenues that it suggests for further research. Here the results can be placed in context with the current state of knowledge expressed in the literature review.

The Discussion/Conclusions section should include pertinent literature used when developing the project study design, as well as any pertinent literature published during the course of completing the study. Interpretations of the study results should draw on relevant CMER and non-CMER BAS. The literature

incorporated in the Discussion is intended to integrate findings in the context of BAS to provide the most supportable answers to research questions. Throughout the Discussion, the tables and figures in the Results should be cited to unambiguously link the two sections and support focal assertions.

Avoid wordiness and speculation. Any speculation or extrapolation included should be clearly labeled as such and supporting evidence identified.

Authors should avoid merely restating their results and/or (re)summarizing the literature. The weakest discussions are brief literature surveys appended to mechanical restatements of the results.

The Discussion/Conclusions section should provide context as to how the results have improved knowledge beyond past research while addressing limitations of the projects. New hypotheses or scientific questions that are logical extensions of findings and conclusions may also be presented in this section. Finally, the section should close with an overview or summary of important points and/or conclusions of the study.

7.12.8 Recommendations

If recommendations are proposed, they may include, suggestions for further research, or potential follow-up studies. Technical recommendations may also be made depending on the study's objectives. Recommendations should not include rule change suggestions. See Findings Report (see chapter 2, section 7) for the process on communicating results to TFW Policy with potential policy implications.

7.13 Document/Data Management and Closure Plan

7.13.1 Document/Data Management and Closure Plan Overview

The document management plan outlines which project documents, including data, are to be archived and in what locations – the CMER Information Management System and/or DNR records. The guidance provided here serves as the default document management plan for all CMER projects.

The following list of documents, reports, data and other products (e.g., photos, ISPR letters) serves as checklist of items to be stored. The PM is responsible for ensuring these products are forwarded to the appropriate contact person for archiving in either the CMER Information Management System and/or DNR records, as appropriate.

Some CMER projects may generate products not listed in the tables. It is up to the Project Team and/or CMER to determine whether to archive these products, and where.

7.13.2 CMER Information Management System (IMS)

A. Overview

1. Brief description of the project (few sentences), program strategy, link to CMER Work Plan TOC.
2. TFW Policy/CMER approved project charter(s)

B. Scoping

1. Final scoping document
2. Key documents and/or maps produced in the process of scoping the project.

C. Study Design

1. Pre-ISPR draft study design with watermark "Draft"
2. Letter of submittal to ISPR with review questions

3. ISPR response letters
4. CMER response matrix
5. Final Study Design

D. Site Selection and data collection

1. Site selection and data collection plan
2. Any stand-alone field guides
3. Site locations (lat/long)
4. Landowner contacts
5. Quality Assurance plans and reports

E. Final Reports (including stand-alone literature reviews)

1. Pre-ISPR Draft Final Report with watermark "Draft"
2. Submittal letter to ISPR with review questions
3. ISPR response letters
4. CMER response matrix
5. Final CMER-approved Report

F. Data

The Project Team and CMER will decide using regular CMER process the type and format of data that will be stored in the CMER Information Management System, taking into account DNR data archiving and public records access guidelines. The following types of data should be considered when determining what data will be stored in the CMER IMS:

- QA/QC data
- Data summarized to the primary metrics used in the analyses
- Data dictionary
- GIS data geo-referenced to sites in final report
- Raw data
- Field forms and notes
- Photographs (e.g., site, hemiview)

G. Link to Adaptive Management

1. Findings Report

H. Presentations (to CMER, TFW Policy, FP Board, CMER Science Conference)

1. Final results
2. Interim results/updates

J. Additional Information

1. Additional Project documents, maps, or other relevant items the Project Team or CMER deem appropriate for archiving

7.13.3 DNR Records

The PM will ensure all relevant project related material, including data, documents, photos, contracts and contract addendums, RFPs/RFQs, or other relevant items are stored/archived as necessary in DNR records.

7.13.4 **CMER Work Plan Update**

The PM will ensure the CMER Work Plan is updated with the most recent policy-approved project elements (e.g., problem statements, objectives, critical questions). The PM will also ensure that final study results and findings are incorporated into the CMER Work Plan. The PM may delegate as appropriate tasks related to updating the CMER Work Plan to SAG co-chairs, SAG members, or CMER co-chairs/members.

7.13.5 **Contract Closure**

The PM will ensure that all project-related contracts are closed out appropriately according to DNR contracting guidelines.