Final Report

Standardization of the CRAM Update Process, Manuals and Training Materials through the L2 Committee of the California Wetlands Monitoring Workgroup

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Final Report

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Document Intent
This document is intended to chronicle the efforts of the Central Coast Wetlands Group (CCWG) to meet the EPA grant objectives for the grant titled “Standardization of the CRAM Update Process, Manuals and Training Materials through the L2 Committee of the California Wetlands Monitoring Workgroup”.

This report will outline the success of CCWG in standardizing the CRAM methodology across the State, in the way it is taught, interpreted, and implemented. This document will describe the CRAM User’s Manual and Wetland Field Book update process, the development and refinement of CRAM QA documents, the calibration efforts of CRAM trainers, and the regular meetings of the Level 2 Committee of the CWMW. Finally it will report on the progress CCWG and its collaborators have made in developing an on-going, self-sustaining (or state-funded) Level 2 assessment program for California wetlands.

In addition to this document, several other documents have been completed and are provided as appendices and made available online for easy access and use at www.cramwetlands.org.

Overall Project Summary:
The main goal of this multi-year project was to further the development of a common set of tools and state resources to implement a California Level 1,2,3 monitoring strategy through partnerships with regional teams and resource managers, and provide leadership for the development of a statewide wetlands monitoring program. The coordinated effort of the regional teams involved in this project over the past 3 years allowed for a much higher degree of input, evaluation, and support for the development of the state’s wetland monitoring program than could have been achieved by a single entity.

Please see Appendices 1, 2, and 3 for a summary of activities completed by regional teams over the course of this grant.

Major products include: an updated CRAM manual independent of the field books, annual revisions to the CRAM manual, field books, and eCRAM, revised descriptions and definitions of CRAM metrics to reflect input from CRAM reviews, a standardized set of CRAM training materials with annual updates to reflect changes in the manual and field books, 36 CRAM self-training sites located around the state for training and wetland tracking purposes, new training materials to assist in the standardization of CRAM assessment data collection, annual meetings of the CRAM PI team and other CRAM trainers to address updates and revisions to existing CRAM modules, and support for the L2 Committee of the California Wetland Monitoring Workgroup.
Task Descriptions and Accomplishments:

Task 1: Project Coordination and Reporting

Task Description:
The purpose of this task is to regularly monitor progress and success on each project task, manage grant funds and deliverables, coordinate among regional partners, provide quarterly written updates to the EPA Project Manager, and submit a final report upon project completion. This task also includes updating a quality assurance project plan (QAPP) to govern the collection of new data.

Task 1.1: Report to EPA on the status of each work plan task and deliverable on a biannual basis.

Biannual reports that described the progress made on each task and associated deliverables were provided to the EPA Project Manager on the following dates over the course of this grant:

- 7/26/2011
- 1/27/2012
- 7/23/2012
- 10/23/2012
- 4/29/2013

Task 1.2: update quality assurance project plan (QAPP)

Extensive progress was made on revising the CRAM QA plan initially put together by SCCWRP during the early portions of the grant period. Subsequent to that, the Plan went through several rounds of review by the L2 Committee members during 2012 and 2013.

Following extensive discussion, it was decided that the precision and accuracy descriptions for CRAM were outdated and needed clarification and revision. Datasets from calibration events around the state held by the regional data centers were assembled and analyzed. The resulting precision and accuracy estimates were inserted into the final version of the CRAM QA Plan.

Concomitantly, Chris Solek at SCCWRP along with Ross Clark at CCWG lead efforts to get CRAM adopted as a “SWAMP compatible” assessment methodology. A presentation was made to the SWAMP Round Table in 2012 and the CRAM manual along with several CRAM field books and a draft version of the CRAM QA Plan were submitted as support materials. On March 18th, 2013, the SWAM Roundtable officially endorsed CRAM. A list of questions was included on the adoption letter, all of which were addressed in a letter back to SWAMP by members of the L2 Committee.

Please see Appendix 4: CRAM QA Plan
Please see Appendix 5: SWAMP Endorsement Letter and Response to SWAMP Questions from CWMW.

Task 1.3: Produce Final Report

This report fulfills the deliverable requirement for this subtask of the grant.
Task 2: Standardization of expanded CRAM materials

Task Description:
As the use and number of CRAM modules has increased, so too has the need for annual updates to the CRAM manual and its associated field books. Like all assessment methods, CRAM has continued to evolve and be refined with application. Additionally, as the number of people in the State trained to conduct CRAM assessments increased, it became clear that descriptions and definitions in the CRAM manual and filed books were in some cases insufficient, leading to discrepancies in application of the tool and potentially poor precision and accuracy of the method.

Comments or suggestions regarding improvement, modification, or adaptation of CRAM for specific applications can be submitted on the CRAM website, are often received by trainers during CRAM Training classes and have come from agency personnel. No single member of the L2 Committee had taken the lead reviewing, addressing, and in some cases incorporating the submitted comments. This grant supported modifications to CRAM, its manual and field books, and minor updates to eCRAM with its associated plant list annually in winter, when field work is complete, and modifications were completed prior to revised manuals being released the following field season. Technical changes to CRAM were completed by the CRAM Principal Investigators in consultation with the regional teams and the L2 Committee. All individuals who registered on the CRAM website received email alerts regarding updates to CRAM.

Task 2.1: major update and produce formal CRAM manual

The CRAM User’s Manual was revised twice over the course of this grant, once in early 2012 and a second time a year later. In both occurrences there was a list of changes assembled over the course of a training season. The list of changes was reviewed by and commented on by the L2 Committee followed by CCWG initiating the changes. Input on the CRAM User’s Manual was obtained each year from the L2 Committee members and CRAM trainers prior to the beginning of the field season. Comments and suggestions were assembled and implemented by CCWG. A final revised version of the manual was released on the CRAM website prior to the beginning of the field season.

Major changes included the following:
• Removal of all figures and tables that are present in the wetland-specific field books
• Revision of Chapters 4 and 5 to make them more up-to-date with CRAM development and implementation in California
• Removal of all non-essential appendices to the Manual.
• Creation of a CRAM logo
Figure 1. The new CRAM logo.

*Please see Appendix 6 for a complete list of changes made in March 2012 and April 2013 to the CRAM User’s Manual.*

**Task 2.2: expanded CRAM descriptions and definitions**

Multiple figures, descriptions and definitions were added, expanded and revised both in the CRAM field books and in the CRAM User’s Manual. See below for several examples.

*For a complete list of changes made to the Riverine and Estuarine field books from version 5.0.2 to 6.1, please see Appendix 7.*

![Diagram of lateral extent of a riverine area](image)

Figure 2. New figure added to the Riverine Field book illustrating the lateral extent of the assessment area.
The glossary of terms in the CRAM user’s manual was greatly expanded and revised to ensure all terms mentioned in the CRAM User’s Manual were clearly defined. Please see page 57 of the CRAM User’s Manual (v. 6.1) for the revised glossary of terms.

**Task 2.3: major update of eCRAM for the vernal pool module**

A major revision of the Vernal Pool CRAM modules was needed. Initial development of the module had been completed by a small, but committed group of scientists and as a result, additional input was needed from a larger group of interested parties to ensure the method would reflect the condition of the wetland being assessed, met the CRAM method objectives, and would be adopted by the user community. As a result, a meeting was held in June 2011 with a group of vernal pool experts to review the current method in its entirety and look for potential issues with the metrics, their associated scoring bins and the method overall, and then revise it to address the issues. A long list of potential changes was made followed by a second meeting one month later to complete the revisions to the vernal pool systems module. Final changes were then made to the field book by CCWG and Carol Witham. The revised field book was presented to the L2 Committee in October 2012 where the revisions were accepted and an official “OK” was given for the revised field book to be used for trainings in spring 2012. Another round of final updates and revisions to the field book, and the individual VP field book took place in December 2012 in preparation for the CRAM v. 6.1 release in spring 2013. After extensive review and trouble shooting by SFEI, the revised Vernal Pool eCRAM module went live in Spring 2013.

*Please see Appendix 8 for a complete list of changes made to the Vernal Pool Systems and Individual Vernal Pool Field books between version 5.0.2 and 6.1. Please see Appendix 9 for a list of additional issues and potential changes for the vernal pool module that were developed after the spring training season in 2013.*
**Task 2.4:** annually updated CRAM manual and field books

Please see tasks 2.1, 2.2 and 2.3 for the list of work completed on this subtask and the deliverables.

**Task 2.5:** annually updated eCRAM

Under the supervision of Cristina Grosso, SFEI staff participated in and implemented online updates to several CRAM Field books modified since October 2010. The most up to date CRAM Manual and Field books for five different wetland types are available online (in version 6.1, February 2013) along with copies of all the previous versions.

**Task 2.6:** annually updated CRAM plant list

The CRAM plant list was updated to be consistent with the new version of the Jepson Manual. This list was compared to the California IPC list to inform eCRAM which species are considered invasive. Additionally, several vernal pool experts (Carol Witham, Debra Sykes, Daria Snider) revised the original vernal pool endemic plant list which pulled directly from a report written by Todd Keeler-Wolf and associates in 1998. This was done for several reasons:

1. There were dozens of duplicate names in the list
2. There were lots of species that occur in vernal pool grasslands that would not be dominant in the vernal pools themselves
3. There were some species that cross multiple wetland types that should not be in the list (i.e. Juncus bufonius)
4. There was confusion with this list because it had multiple designations for the association of plants with vernal pools (vernal pool indicators, vernal pool associates, generalists, etc.)

The new 2013 CRAM Plant list used by eCRAM now has the most up-to-date plant species names for California, their invasive status, native status, and vernal pool endemic status.

*Please see Appendix 10: 2013 CRAM Plant list*

**Task 2.7:** continuously updated CRAM website

Working with the CWMW, L2 Committee, and CCWG, SFEI developed and manages the online California Rapid Assessment Method (CRAM) website (http://www.cramwetlands.org/) that houses CRAM documentation including:

1) CRAM Training announcements, materials and rosters,
2) CRAM Manual and Field books for all modules,
3) CRAM Plant List and other identification resources
4) Other CRAM reference materials

The website was continuously updated over the course of the grant to reflect updates to documentation, the CRAM training schedule, and training materials. A major revision of the website was completed in Spring 2013. The new website is easier to navigate, has a page dedicated to the L2
Committee and its role in CRAM development and implementation, as well as a table on the status of development of all CRAM modules.

**Task 3: Coordination of CRAM Training and Reference materials**

*Task description*: CCWG recognizes that wetlands and riparian areas vary significantly in natural form and function among the regions of the state, and that each region has a community of experts best suited to account for this variability through data interpretation. As a result, CRAM trainings are being held in multiple locations across the state by the CRAM PI team and trained trainers. With multiple training centers running simultaneously, the need to standardize training materials and keep them updated to changes in the manual and field books was apparent.

The focus of this task was to coordinate and update the existing training materials for three CRAM modules, and to develop new materials based on the unique wetland characteristics found in different regions of the state. These new materials include a photo dictionary of common indicators of hydrologic features, images of physical patch types and topographic complexity for three CRAM wetland types. Additionally, 3 “self training” sites for three wetland classes for each of the four main training regions of the state (Northern, SF Bay, Central, and Southern) were established. These sites represent a range of condition for each validated module of CRAM, and can be used as post-training sites where practitioners can test their assessment capabilities. The sites can also be used in cases where a regional audit team finds that a CRAM practitioners scores seem questionable.

The intent of this task was to develop the capacity to provide consistent and appropriate application of CRAM for regulatory, mitigation, and restoration projects across a variety of private, state and federal organizations. The combination of these new materials with the standardization of the existing materials will allow for more uniform and consistent training of CRAM practitioners. These updated materials, in addition to the “self training” site documentation and score justifications are available on the CRAM website.

**Task 3.1: standardized set of CRAM training presentations**

A large effort was made Spring 2011 to ensure all the presentations used for the agency and practitioner trainings for all wetland types used a core set of slides across the state to provide a unified message from the L2 on CRAM development, use and adoption that was consistent with CRAM v. 5.0.2. The resulting presentations were transferred to each of the CRAM Training Centers in California.

Multiple “CRAM Trainer” conference calls were held over the course of this grant. Trainers from each region discussed upcoming trainings, issues with trainings, and needed changes to the training presentations.

*Dates of CRAM trainer conference calls:*
- *March 2*nd*, 2012*
- *January 8*th*, 2013*
- *April 8*th*, 2013*
**Task 3.2: annual update of CRAM training presentations**

CCWG updated all of the module-specific presentations (riverine, estuarine, depressional, vernal pool) following the role-out of new CRAM versions in Spring 2012 (v.6.0) and Spring 2013 (v. 6.1). All figures and metric changes were updated in each presentation and transferred to each of the CRAM Training Centers to ensure uniform training materials.

**Task 3.3: regional photo inventories of common plants and indicators**

All pictures taken by CCWG and SFEI at all CRAM assessment sites since 2007 were reviewed for good images of indicators pertinent to a CRAM assessment that depict various indicators of conditions for the metrics and submetrics of CRAM. In particular, photos representative of each patch type for all modules were assembled. The first draft of the CRAM photo dictionary was presented to the L2 Committee at their October 24th 2012 meeting. Comments were received and changes made by CCWG. The final version of the CRAM photo dictionary was sent to SFEI for posting on the new CRAM website in Spring 2013.

*Please See Appendix 11: CRAM Photo Dictionary*

**Task 3.4: field verification/audits sites for each region of the State**

CCWG worked with SCCWRP to ensure there was a standard set of information associated with each of the 36 CRAM self-training sites (Table 1). The packet information is similar to the information in the packets developed for the CRAM reference network by SCCWRP in 2011. A list of potential sites was assembled for each region of the state in fall 2012 based on previous experience of each of the regional teams. For sites that had been assessed within the previous two years, existing data were used to develop the self-training site packets. For sites that lacked recent CRAM data, new assessments were conducted in summer 2013. It should be noted that the assessments represent a snapshot in time of the condition of the wetlands and as a result the scores are expected to change over time and may need to be re-assessed. Explanations of how each metric score was derived will help practitioners discern team misuse of the method from real changes occurring to the habitat on the ground.

For each site, the following information is provided:

- Site Coordinates
- Detailed directions to the site
- A local map of the location
- Information on access permission
- Contact info of the landowner
- Site history
- Characterization of land use in the catchment or around the site
- Information on site ownership and current management
- Anticipated future changes in land uses or other stressors
• An assessment area map (multiple scales)
• CRAM score and rational for each metric
• Photos of the site and score rational

Please see Appendix 12 for an example site packet.

Table 1. Location of 36 CRAM “self-training sites” across California.

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Wetland Type</th>
<th>Location</th>
<th>Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whitely Marsh</td>
<td>Depressional</td>
<td>North Coast</td>
<td>40.79476, -124.18013</td>
</tr>
<tr>
<td>Foothill Regional Park</td>
<td>Depressional</td>
<td>North Coast</td>
<td>38.56189, -122.79662</td>
</tr>
<tr>
<td>Bodega Dunes Pond</td>
<td>Depressional</td>
<td>North Coast</td>
<td>38.34397, -123.05742</td>
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<tr>
<td>Scott Lindsey Park</td>
<td>Depressional</td>
<td>SF Bay</td>
<td>37.73022, -122.20954</td>
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<tr>
<td>Maricich North Pond</td>
<td>Depressional</td>
<td>SF Bay</td>
<td>37.94601, -122.13411</td>
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<td>Sindicich North Pond</td>
<td>Depressional</td>
<td>SF Bay</td>
<td>37.94558, -122.14152</td>
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<tr>
<td>4 mile Beach Pond</td>
<td>Depressional</td>
<td>Central Coast</td>
<td>36.96706, -122.12486</td>
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<td>Marina Dunes Pond</td>
<td>Depressional</td>
<td>Central Coast</td>
<td>36.68990, -121.80582</td>
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<td>Quail Hollow Pond</td>
<td>Depressional</td>
<td>Central Coast</td>
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<td>Zuniga Pond</td>
<td>Depressional</td>
<td>South Coast</td>
<td>34.11213, -118.64253</td>
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<td>Michelson Pond</td>
<td>Depressional</td>
<td>South Coast</td>
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<td>San Dieguito Pond</td>
<td>Depressional</td>
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<td>Janes Creek</td>
<td>Riverine</td>
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<td>Jolly Giant Creek</td>
<td>Riverine</td>
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<td>Cambell Creek</td>
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<td>Devils Gulch</td>
<td>Riverine</td>
<td>SF Bay</td>
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<td>Penitencia Creek</td>
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<td>SF Bay</td>
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<td>Coyote Creek</td>
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<td>SF Bay</td>
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<td>Corralitos Creek</td>
<td>Riverine</td>
<td>Central Coast</td>
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<td>Fall Creek</td>
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<td>Central Coast</td>
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<td>Branciforte Creek</td>
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<td>Solstice Creek</td>
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<td>Serrano Creek</td>
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<td>Lytle Creek</td>
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<td>Pudding Creek Estuary</td>
<td>Bar-Built Estuarine</td>
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<td>Redwood Creek Estuary</td>
<td>Bar-Built Estuarine</td>
<td>North Coast</td>
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<td>Salmon Creek Estuary</td>
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<td>Redwood Shores Marsh</td>
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<td>Crissy Field Marsh</td>
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<td>SF Bay</td>
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<td>Mill Valley Marsh</td>
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<td>Lombardi Creek Estuary</td>
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<td>Coon Creek Estuary</td>
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<td>Central Coast</td>
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<td>Corcoran Lagoon</td>
<td>Bar-Built Estuarine</td>
<td>Central Coast</td>
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<tr>
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<td>South Coast</td>
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<td>San Juan Creek Estuary</td>
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<td>Ventura River Estuary</td>
<td>Bar-Built Estuarine</td>
<td>South Coast</td>
<td>34.27609, -119.30882</td>
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</table>
Task 4: Establish a QA Process for state agencies and CRAM development team

Description: As with any assessment method, discussion and debate on some elements of CRAM and its application is ongoing. As a result, CRAM will continue to evolve in response to new data and changing needs of the user community. This task has allowed for ongoing dialogue among the major regions of the state on differing viewpoints and perspectives with the goal of continuing to improve the utility of CRAM for both ambient and project assessments. To facilitate dialogue on technical aspects of CRAM and the policy implications of its use, four regional teams and the associated CRAM trainers met once annually for 3 years in coordination with the L2 Committee of the CWMW. All three meetings were a great success and laid the groundwork for annual CRAM trainer meetings in to the future.

These “CRAM-aganza” events took place over the course of this grant in Moss Landing (Spring 2011, Fall 2012) and in Costa Mesa (Fall 2011). At these meetings trainers from around the state met to conduct calibration exercises, discuss method use to ensure they are assessing wetlands in a consistent way, teaching the methodology consistently, and reviewed any questions that arose over the past training season. Additionally, these meetings allowed for extensive discussion of ongoing deliberations amongst the L2 Committee members on several metrics in CRAM. As a result of these meetings and several other calibration events in 2012 and 2013 between the CRAM PI Team, CRAM Trainers and qualified practitioners, revised data quality objectives were developed for CRAM (Table 2).

| CRAM-aganza #1, Correlitos | CRAM-aganza #2, Newport Bay | CRAM-aganza #3, Ano Nuevo SP |

Please see Appendix 13 for the results of the calibration assessments during the Fall 2011 and Fall 2012 CRAM-aganza events.

Table 2. Revised DQOs for the California Rapid Assessment Method.

<table>
<thead>
<tr>
<th></th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRAM Index Score</td>
<td>+/- 2.5 points</td>
</tr>
<tr>
<td>CRAM Final Attribute Score</td>
<td>+/- 4 points</td>
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</table>
**Task 4.1: agenda and minutes from biannual meetings**

Funds were used to assist in the development of the L2 Committee (Table 3) through the recording of minutes from each meeting, and the sending out of agendas for meetings as well as other important notifications. Agendas and meeting notes were produced for the following L2 Committee meetings over the course of this grant:

- 10 March 2011, Moss Landing*
- 18 May 2011, Costa Mesa
- 17 August 2011, Oakland
- 20 October 2011, Costa Mesa*
- 07 February 2012, Oakland
- 24 May 2012, Richmond
- 07 August 2012, Richmond
- 24 September 2012, Moss Landing*
- 28 January 2013, Costa Mesa
- 08 May 2013, Richmond
- 31 July 2013, Richmond
- 23 October 2013, Richmond

* L2 Committee meeting occurred during a CRAM-aganza event*
Table 3. List of Level 2 (Rapid Assessment) Committee Members, 2013.

<table>
<thead>
<tr>
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</tbody>
</table>

**Task 4.2: record of potential changes to CRAM modules**

A list of all changes made to the CRAM manual and field books each year was generated and distributed with the revised books.

*Please see Appendices 7, 8 and 9 for lists of all changes made to the CRAM User’s Manual and field books.*