State of California
The Resources Agency
Department of Water Resources
Division of Flood Management

2007
INSPECTION REPORT

OF THE
FLOOD CONTROL PROJECT
MAINTENANCE AND REPAIR

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1 INTRODUCTION

The purpose of this report is to document the results of the California Department of Water Resources (DWR) 2007 State Flood System inspections and any deficiencies that may be affecting the structural integrity of the system levees. This report is for use by the U.S. Army Corps of Engineers (USACE), DWR, the Central Valley Flood Protection Board (the Board), Local Maintaining Agencies (LMA), and other interested parties.

As stated in USACE's Standard Operation and Maintenance (O&M) Manual, each LMA is required to perform a detailed inspection every 90 days, including prior to the flood season, immediately following each major high water period, and at any other time deemed necessary by the LMA Superintendent. The findings of these inspections are to be reported to the Board's Chief Engineer through DWR's Flood Project Integrity and Inspection Branch (FPIIB).

To meet Federal Flood Control Regulations (Title 33 of the Code of Federal Regulations, Section 208.10 (33 CFR 208.10), each year the federal flood control facilities are to be inspected four times, at intervals not exceeding 90 days. As requested, DWR will report quarterly to the Board on inspection activities.

1.1 Executive Summary

This report summarizes the 2007 inspection activities for the State-federal portions of the flood management system within the Central Valley, hereafter referred to as the "State Flood System."

Significant regulatory changes occurred in late 2006 and in 2007 that had a major impact on the inspections of the State Flood System and the ratings given as a result of those inspections. Following Hurricanes Katrina and Rita in August and September, 2005 and the high water events in the Central Valley in January and April 2006, threats from floods and the condition of the flood protection system received increased attention. California voters approved two initiatives that provided approximately five billion dollars to improve the system. The flood control system has come under greater scrutiny and inspection criteria are being more rigorously applied by the USACE and DWR inspectors. DWR's recognition of the need for improved maintenance and the USACE's National Levee safety initiatives, including recent Corps policy statements on vegetation and encroachments, have led to a more thorough application of long-standing levee maintenance criteria.

DWR conducts two comprehensive levee inspections each year. DWR completed the annual fall inspections in December 2007, documenting the location, size, type, and rating of all maintenance deficiencies. DWR followed USACE criteria for most categories; however, it used interim vegetation criteria aimed at improving public safety by providing visibility for inspections and improving access for flood fight activities. DWR applied a new overall rating methodology to ensure objectivity and consistency of annual maintenance ratings.

As a result of the rigorous application of inspection criteria and the new rating methodology, 64 of the 107 LMAs received Unacceptable ratings, increasing from four Unacceptable ratings in 2006. Applying the most recent USACE vegetation draft criteria (allowing only short grass to remain on standard size levees) would probably have resulted in 103 of 107 LMAs receiving Unacceptable ratings.

DWR developed a more rigorous inspection program in an effort to assist locals in meeting national standards. This new program and DWR's higher expectations of improved maintenance significantly increase the number of Unacceptable ratings. These results do not mean that the levees are less safe than they were, but that needed improvements are more thoroughly identified. In fact, we have seen increased maintenance activities in many areas, indicating that the condition of the system has actually improved.

This report includes information on erosion surveys conducted from both the water and the land sides along the Sacramento and San Joaquin Rivers. Ratings for erosion sites not currently programmed for repair were included in the calculations of overall ratings. The report also identifies other related levee management issues that will be addressed over time (channel capacity, seepage, erosion, encroachments, vegetation).

To encourage improved maintenance practices throughout the system, DWR outlined a maintenance compliance process that identifies roles and responsibilities with regard to the operation and maintenance of the State Flood System.

1.2 Central Valley Flood Control System Overview

Congress authorized the Sacramento River Flood Control Project (SRFCP) in 1917, and subsequent supplemental authorizations (e.g. Sacramento River major and minor tributaries, American River levees, etc.) have added components to the SRFCP over the years. The San Joaquin River Flood Control System consists of a number of separate federally authorized flood control projects, most of which have been built since the 1940's (e.g. Merced and Fresno counties stream groups, Lower San Joaquin River, etc.). In addition, the Board has designated floodways on virtually all the Sierra rivers draining into the San Joaquin Valley and the Tulare Lake Basin. The two major river flood control systems (Plates 1 and 1A) have combined totals of approximately 1,613 miles of federal project levees (shown on Plate 2), 1,200 miles (148,000 acres) of designated floodways (shown on Plate 2), several thousand acres of project channels (shown on Plate 2), and 56 other major flood control works (e.g. overflow weirs, flood relief structures, outfall gates, and the Sutter Bypass pumping plants). Designated Floodways, adopted by the Board, are a significant part of the flood control system and include many major rivers and streams that are not Flood Control Project Channels.

The federal government, acting through the USACE, designed and constructed many of these federal levees and other flood control works; some existing levees were also incorporated into the Sacramento and San Joaquin flood control systems through the passage of federal statutes but in some cases without benefit of USACE design or construction. The State of California generally provides lands, easements, and rights-of-ways when necessary for project construction. An exception to this process is the Lower

San Joaquin River Flood Control Project that was designed and constructed to federal standards by the State of California (substituting physical works for acquisition of more costly flowage easements required for the authorized federal project). Local public entities within both river systems have the responsibility, liability, and duty to maintain and operate the levees and other flood control works on a day-to-day basis in accordance with guidelines provided in the USACE Standard O&M Manual, and each applicable supplement for individual project units. The only flood control features for which operation and maintenance are not performed by local entities are those SRFCP works maintained by DWR in accordance with Water Code Section 8361, and those facilities within Maintenance Areas (MA) that are maintained by DWR, with local beneficiaries paying the costs under Water Code Section 12878.

Since the beginning of federal participation, both the Sacramento River and San Joaquin River flood systems have been constructed, expanded, improved, and repaired through a series of subsequent federal authorizations. Components of these systems, for which the Central Valley Flood Protection Board (formerly the Reclamation Board) or DWR has provided the assurances of nonfederal cooperation to the United States, are considered the State-Federal 'Project' in the Central Valley.

1.3 Project Levee Operation and Maintenance Responsibilities

As construction of federally authorized project units was completed, project transfer letters were submitted by USACE to the Board for review and acceptance. Project levees and flood control works for which the State of California had provided the assurances of non-federal cooperation were formally accepted by the Board on behalf of the State for operation and maintenance in accordance with federal regulations.

Local public entities within the Sacramento and San Joaquin river systems have the responsibility, liability, and duty to maintain and operate the levees and other flood control works on a day-to-day basis in accordance with assurance agreements, guidelines provided in the USACE Standard O&M Manuals, and each applicable supplement. For the Sacramento River Flood Control Project, the LMA responsibilities were set forth in Water Code §8370 with the exception of enumerated works identified under Water Code §8361 and those for which provision is made by federal law. Flood control project responsibilities in the San Joaquin River basin are based upon assurance agreements between the Board and each LMA.

Currently, operation and maintenance responsibilities for the State Flood System levees in the Central Valley are carried out by 107 individual state and local maintaining agencies.

Each unit of the State Flood System is described in a supplement to the respective USACE Standard O&M Manual. These supplemental manuals serve as a guide to assist each LMA in carrying out its responsibilities for levee maintenance. Section 4 of the Standard O&M Manual and Section 2 of the supplements describe some of the standards to be met by LMAs in the performance of their routine maintenance.

1.4 Project Levee Operation and Maintenance Requirements

Title 33 of the Code of Federal Regulations, Section 208.10 (33 CFR 208.10) outlines federal regulatory requirements for the maintenance and operation of structures and facilities that comprise the State Flood System.

33 CFR 208.10 provides general operation and maintenance guidance to obtain the maximum benefits for the following features:

a) Structures and Facilities
b) Levees
c) Floodwalls
d) Drainage
e) Closure Structures
f) Pumping Plants
g) Channels and Floodways

Additionally, Standard and Supplement O&M Manuals were prepared by USACE, Sacramento District, for Project levees and flood control works in the Central Valley.

A Standard O&M Manual was published for the Sacramento River Flood Control Project in May 1955, and a Standard O&M Manual was published for the Lower San Joaquin River Levees, Lower San Joaquin River and Tributaries Project in April 1959. The purpose of these Standard O&M Manuals is to present general information for use by local interests who maintain and operate the various geographical units comprising the Projects. Detailed design and operation and maintenance information for each individual Project unit was furnished under separate supplemental manuals, which were prepared and published after completion of the construction work within each Project unit.

2 PROJECT LEVEE INSPECTIONS

2.1 Project Levee Inspection Requirements

Title 33 of CFR, Section 208.10 (33 CFR 208.10) outlines federal requirements for the maintenance and operation of structures and facilities that comprise Project flood protection works, and describes associated periodic inspection requirements. Inspections are required following high water events and at intervals of no longer than 90 days. The LMAs and DWR patrol and inspect all project levees during high water events. DWR interprets 33 CFR 208.10 to mean that four quarterly inspections are required per year.

DWR performs major, comprehensive levee inspections in the spring and fall. The pre-flood-season fall inspection serves as the annual inspection, for which an annual maintenance rating is given for each LMA. The LMAs are required to perform summer and winter inspections and are presently required to report the condition of their system in relation to the previous DWR inspection results. They do so by describing any changes in the condition of the system (since the last DWR inspection) or by reporting that none have occurred. The findings of these inspections are to be reported to the Chief Engineer of the Board through DWR's FPIIB. Because of the reporting requirements of Assembly Bill 156, the LMAs will likely have to conduct and report on more detailed inspections beginning in September 2008.

More specific levee operation, maintenance, and periodic inspection requirements and checklists for Project levees within the State Flood System can be found in the Standard O&M Manual and in the individual supplemental O&M Manuals.

Links related to the USACE rehabilitation and inspection program follow:

- Levee Owner's Manual
  http://www.usace.army.mil/cw/cecwhs/em/fcw/fcw.html

- ER 500-1-1 (Emergency Operations)
  http://www.usace.army.mil/publications/eng-regs/er500-1-1/toc.htm

- EP 500-1-1 (Emergency Operations - Provides supplemental information from ER 500-1-1)
  http://www.usace.army.mil/publications/eng-pamphlets/ep500-1-1/toc.htm

- ER 1130-2-530 (Inspection of Completed Works - Federal Levees)
  http://www.usace.army.mil/publications/eng-regs/er1130-2-530/toc.htm

- 33 CFR 208.10 (Inspection of Completed Works)
  http://www.access.gpo.gov/nara/cfr/waisidx_06/33cfr208_06.html

On September 4, 2007, DWR received from Jay Punia, General Manager of the Board, a copy of a letter dated July 27, 2007, and a Flood Damage Reduction System Inspection

Report form from Michael D. Mahoney, P.E., Chief, Construction-Operations Division of USACE, Sacramento District. The letter instructs the Board to use the enclosed Flood Damage Reduction System Inspection Report Checklist when performing inspections and writing semi-annual inspection reports.

There are significant differences between the flood protection systems constructed, maintained, and inspected by USACE and those maintained by California agencies and inspected by DWR. Project levees within California were generally not designed and constructed to the exacting standards of other federal project levees. USACE inspectors are registered engineers trained and experienced in flood protection works design and operation and their inspections are based on their evaluations of the integrity of the flood works and the works' ability to survive the next high water event. DWR inspectors are experienced, knowledgeable technicians familiar with the flood protection system maintenance requirements but are not qualified to make integrity evaluations as required by the USACE Checklist. Although DWR has traditionally made visual inspections that document observable maintenance deficiencies (not structural integrity), trained engineers have been introduced into the DWR inspection program to build the capability of making structural integrity determinations of maintenance deficiencies.

2.2 USACE and FEMA Actions Affecting Inspection Program

On September 25, 2006, the Federal Emergency Management Agency (FEMA) released Procedure Memorandum No. 43 – Guidelines for Identifying Provisionally Accredited Levees (Memo 43). Subsequently, on September 26, 2006, the USACE released an internal policy guidance memorandum to provide direction and to establish the priority for use of Inspection of Completed Works (ICW) inspection funds during Fiscal Year 2007. Memo 43 has direct implications to FEMA certification, and USACE internal policy guidance on the ICW program has the potential to deny an LMA eligibility status for flood damage rehabilitation assistance under Public Law 84-99 (PL 84-99) if the minimum acceptable level of maintenance cannot be sustained. The USACE originally published a list of 36 California-sponsored projects having inadequate maintenance that were to lose their PL 84-99 rehabilitation eligibility if their maintenance deficiencies were not corrected and verified prior to April 2007.

The USACE reviewed the DWR annual inspection reports written between 2002 and 2005. LMAs with questionable maintenance performance were identified and inspected by the USACE and the list of 36 California-sponsored projects was created. Subsequent joint (USACE, DWR, LMA) verification inspections of identified levee maintenance deficiencies reaffirmed USACE's high expectations for levee maintenance and the failure of some LMAs to perform adequate levee maintenance on a consistent basis. Some key maintenance deficiencies consistently identified through these ongoing inspections are: brush and vegetation on levee slope; excessive trees not pruned to standards; rodent activity; lack of access; minor erosion; and many unauthorized encroachments along with a lack of adequate maintenance on authorized encroachments. The joint verification inspections identified eight Project LMAs that corrected the noted deficiencies in the USACE inspections. Those eight LMAs were removed from the list, leaving a final list of 28 Project LMAs within California at risk of losing their PL 84-99 coverage.

USACE notified the Board, and the Board notified the 28 Project LMAs that they had until March 2008 to correct their deficiencies. Failure of an LMA to correct its deficiencies within that period would result in the LMA being declared inactive for rehabilitation coverage under PL 84-99. USACE will still provide emergency flood fight assistance to inactive LMAs; however, any high water damage suffered by an inactive LMA will not be eligible for rehabilitation assistance. Although some of the deficiencies had the potential to be corrected within the USACE one-year grace period to retain PL 84-99 eligibility, other LMA deficiencies require environmental agency negotiations or Board enforcement assistance that extends beyond this grace period.

All 28 LMAs identified by the USACE were required to submit a correction plan that clearly demonstrates how the deficiencies were to be corrected. Sixteen LMAs submitted acceptable correction plans and most have requested verification inspections by USACE. Those LMAs whose corrections are rated as acceptable or minimally acceptable will be removed from the maintenance deficient list. Those that did not submit a correction plan, submitted an unacceptable correction plan, or whose corrections are rated as unacceptable will be considered as inactive for PL 84-99 rehabilitation coverage. USACE has not informed DWR or the Board of its verification inspection findings so the PL 84-99 status of the LMAs on the list is still unknown.

This action by USACE emphasizes the importance of performing adequate maintenance and is one of the reasons DWR is more rigorously applying the maintenance criteria and its new method for determining the overall rating of each LMA. The goal is to ensure that the system is being correctly maintained and that each LMA performing adequate maintenance will retain its PL 84-99 protection.

In 2007, USACE Headquarters and the Sacramento District of the USACE, through statements and documents (including an April 2007 draft white paper, *Treatment of Vegetation within Local Flood Damage Reduction Systems)* called for the removal of nearly all trees, wild growth, and other vegetation. The proposed new USACE criteria are different from historic inspection criteria applied by DWR and the Board in the following ways: existing trees and their root systems must be removed from levees and other project components; no new trees will be allowed; and no trees or brushy vegetation will be allowed anywhere on the levee slopes or within 10 feet of the landside or waterside levee toes. These proposed criteria have been very controversial, which has highlighted the need for a collaborative process to discuss vegetation management in California. See Section 5.5 for further information.

2.3 DWR Inspection Program Improvements & Accomplishments

Over the last two years DWR has increased its inspection activities to bring the DWR inspection program into closer compliance with the expectations of the USACE's National Levee Safety Program in the following ways:

- DWR increased the size, scope, and responsibilities of its Flood Project Inspection Section by reorganizing the section into a branch composed of four sections:
    - Inspection Section staffed with technicians and engineers responsible for inspecting and reporting the status of the State Flood System.

    - Two Integrity Sections staffed with engineers responsible for investigating and determining system conditions and capacities regarding hydraulic, geotechnical, and other integrity issues.
    - LMA Assessment Section staffed with engineers responsible for collecting, analyzing, and reporting information on the condition of the State Flood System in each of the 107 project LMAs.
- DWR began incorporating USACE levee inspection nomenclature and criteria for maintenance ratings into the DWR inspection program and implemented a self-inspection program that requires LMAs to inspect their levees in the summer and winter, while DWR continues inspecting in the spring and fall.
- DWR jointly inspected with the USACE many of the LMAs found to be unacceptable with regard to FEMA Memo 43 and continues outreach work with the LMAs.
- DWR has increased erosion inspections on major portions of the Sacramento and San Joaquin River Systems. DWR has independently developed and applied rating criteria for levee and bank erosion in the San Joaquin System.
- In 2007, DWR created a general inventory of trees and vegetation on project levees and newly extended toe easements to estimate the potential impact of implementing the USACE vegetation standards. DWR also completed a general inventory of encroachments in the system and in January 2008 documented windfall trees after a major windstorm.
- DWR inspectors identified and documented levee vegetation that required trimming and thinning of trees and other vegetation, and advised LMAs to take corrective action to allow flood fight access and visibility.
- DWR instructed LMAs to improve levee management practices to ensure visibility for inspections and flood fight access while adhering to their environmental resource obligations.
- DWR continues to inspect the levees each spring and fall and LMAs will inspect their levees in the summer and winter.
- DWR continues to inspect the construction or implementation of newly permitted encroachments to ensure that the work is done in accordance with the encroachment permit conditions. DWR also reports newly discovered unauthorized encroachments to the Board and works with the LMAs to abate unauthorized encroachments.
- DWR's inspection program will continue to actively: (1) perform high water patrols and high water staking; (2) continue outreach and communication to LMAs; (3) address critical encroachment issues; (4) perform investigations of critical site-specific integrity issues; (5) provide flood response; (6) provide flood fight training to state and local agencies; and (7) continue implementing improvements to the inspection program to ensure consistency and for broad public safety benefits.

In addition to continuing with the above inspection activities, DWR will implement the following improvements:

- DWR will field a newly created inspection database program allowing efficient documentation of system conditions and compatibility with USACE's National Levee Database reporting requirements beginning with the spring 2008 inspection.
- DWR will ensure that its inspection database is compatible with Flood Operations needs to provide information on levee conditions during high water and emergency events by winter 2008.
- DWR will develop a GIS-based inspection program by fall 2010 to become more consistent with USACE inspection methods and more comprehensive and efficient in inspection procedures.
- DWR expects to implement additional changes to the inspection program as existing USACE policies are clarified over time, as new policies are developed, and as other levee management issues arise.

2.4 Inspection Criteria

DWR used the checklist in the USACE Flood Damage Reduction System Inspection Report as the basic criteria for its fall 2007 inspections (the checklist can be found online after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/). However, strict application of the checklist criteria to the unique conditions of vegetation and encroachments on the California levees would have resulted in almost universally Unacceptable ratings throughout the system. DWR developed criteria that evaluate the level of maintenance in relation to historic standards of accepted practice since the state and local agencies undertook responsibility for the system.

2.4.1 Interim Inspection Criteria - Vegetation

USACE directed the Board, and by extension, DWR, to use the checklist when inspecting the system. This checklist is being updated by USACE. The Rating Guidelines for vegetation and encroachments contained in the checklist allow only short grasses on the levees. These vegetation criteria were not used in the fall 2007 inspection and will not be used in the performance of DWR inspections in the near future. DWR believes that the USACE's draft White Paper on Vegetation and the Ratings Guidelines for vegetation and encroachments do not adequately consider all positive and negative effects of vegetation on levees, nor do they consider the environmental and system integrity impacts that may result from the nearly complete removal of non-grassy vegetation from the levees, especially at this early date.

A collaborative group was created in 2005 by DWR, USACE, the Board, Sacramento Area Flood Control Agency, State and federal resources agencies, and local stakeholders with a goal of establishing short-term and long-term criteria for vegetation on the California levees and State Flood System. In addition, a Levees Roundtable group consisting of upper management from most of the same agencies was created following the August 2007 symposium on levee vegetation to resolve the controversies concerning the proposed removal of nearly all levee vegetation as mandated by the USACE criteria.

With general agreement from the collaborative group and the Levees Roundtable group, DWR performed its fall 2007 inspections using the criteria below. Minimal densities of vegetation not meeting these criteria were rated as Minimally Acceptable. Significant densities of vegetation not meeting these criteria were rated as Unacceptable. Elderberries were evaluated using the same criteria as trees or other vegetation. The criteria are as follows:

a) DWR inspectors will evaluate and rate all vegetation within the top 20 feet (slope length) of the waterside hinge point (intersection of crown and slope), anywhere on the landside slope, and within 10 feet of the landside toe. Valuable riparian vegetation and other vegetation beyond 20 feet from the waterside hinge point are not evaluated or rated at present.
b) Grass and weeds on the landside and upper waterside must be maintained at a height of less than 12 inches.
c) Trees must be trimmed at least five feet above the ground or 12 feet above the ground over roadways.
d) Trees must be thinned sufficiently to allow clear visibility and access for flood fight operations.
e) Brush and woody vegetation must be trimmed, thinned, or removed to allow clear visibility and access for flood fight operations.

These criteria are shown in Figures 2.1 and 2.2. They closely mirror the vegetation maintenance criteria that have been applied to California's levees since the state and local maintaining agencies took over responsibility for their maintenance from USACE over a half century ago. They protect levee operability and integrity by requiring open visibility and access to those portions of the levee most susceptible to high water damage while retaining vegetation that has habitat and environmental value and possibly a positive effect on levee integrity.

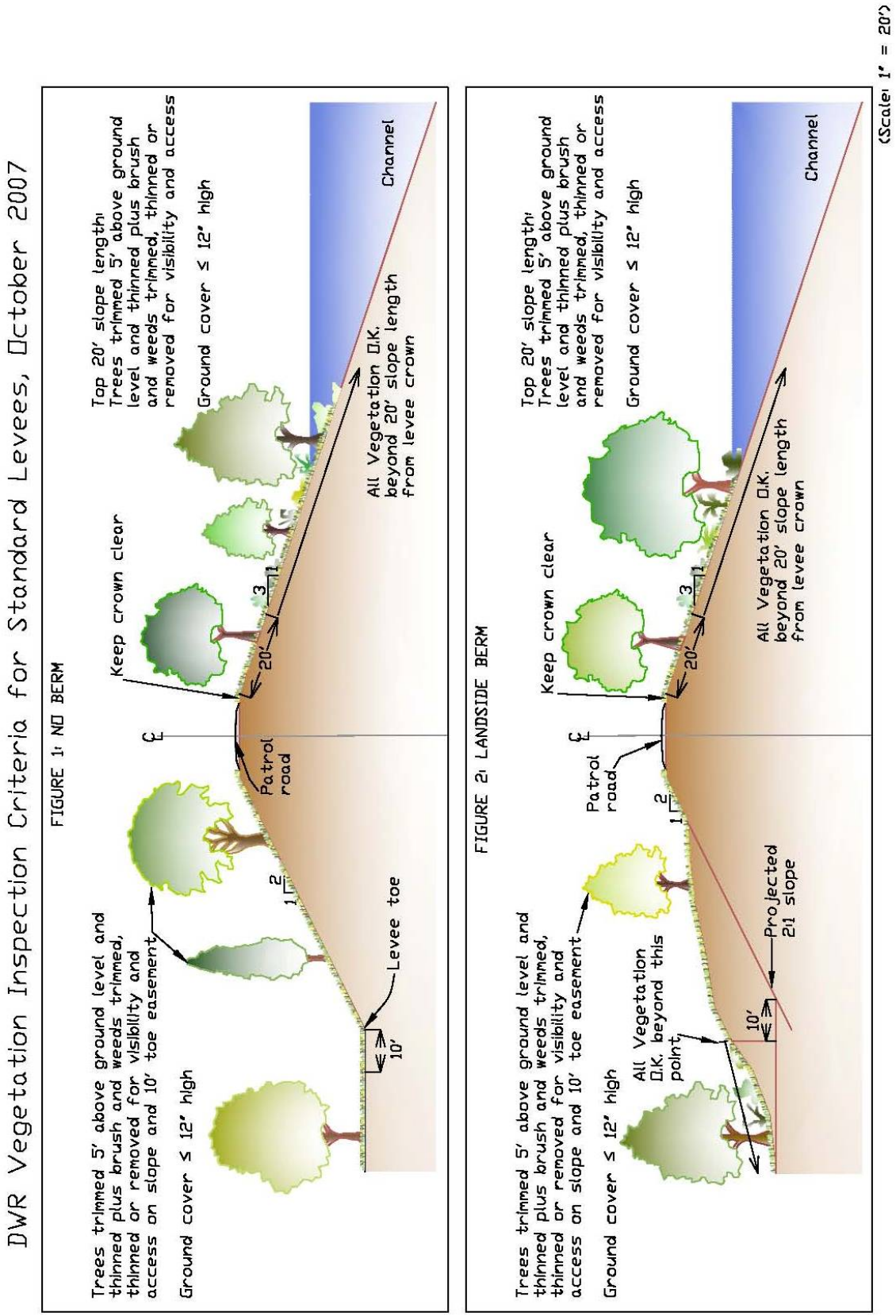

DWR Vegetation Inspection Criteria for Standard Levees, October 2007
FIGURE 1: NO BERM
Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access on slope and 10' toe easement
Ground cover ≤ 12" high
Keep crown clear
Patrol road
Levee toe
10'
20'
Top 20' slope length: Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access
Ground cover ≤ 12" high
All Vegetation O.K. beyond 20' slope length from levee crown
Channel
FIGURE 2: LANDSIDE BERM
Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access on slope and 10' toe easement
Ground cover ≤ 12" high
Keep crown clear
Patrol road
All Vegetation O.K. beyond this point
Projected 2:1 slope
10'
20'
Top 20' slope length: Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access
Ground cover ≤ 12" high
All Vegetation O.K. beyond 20' slope length from levee crown
Channel
(Scale: 1" = 20')

Figure 2.1

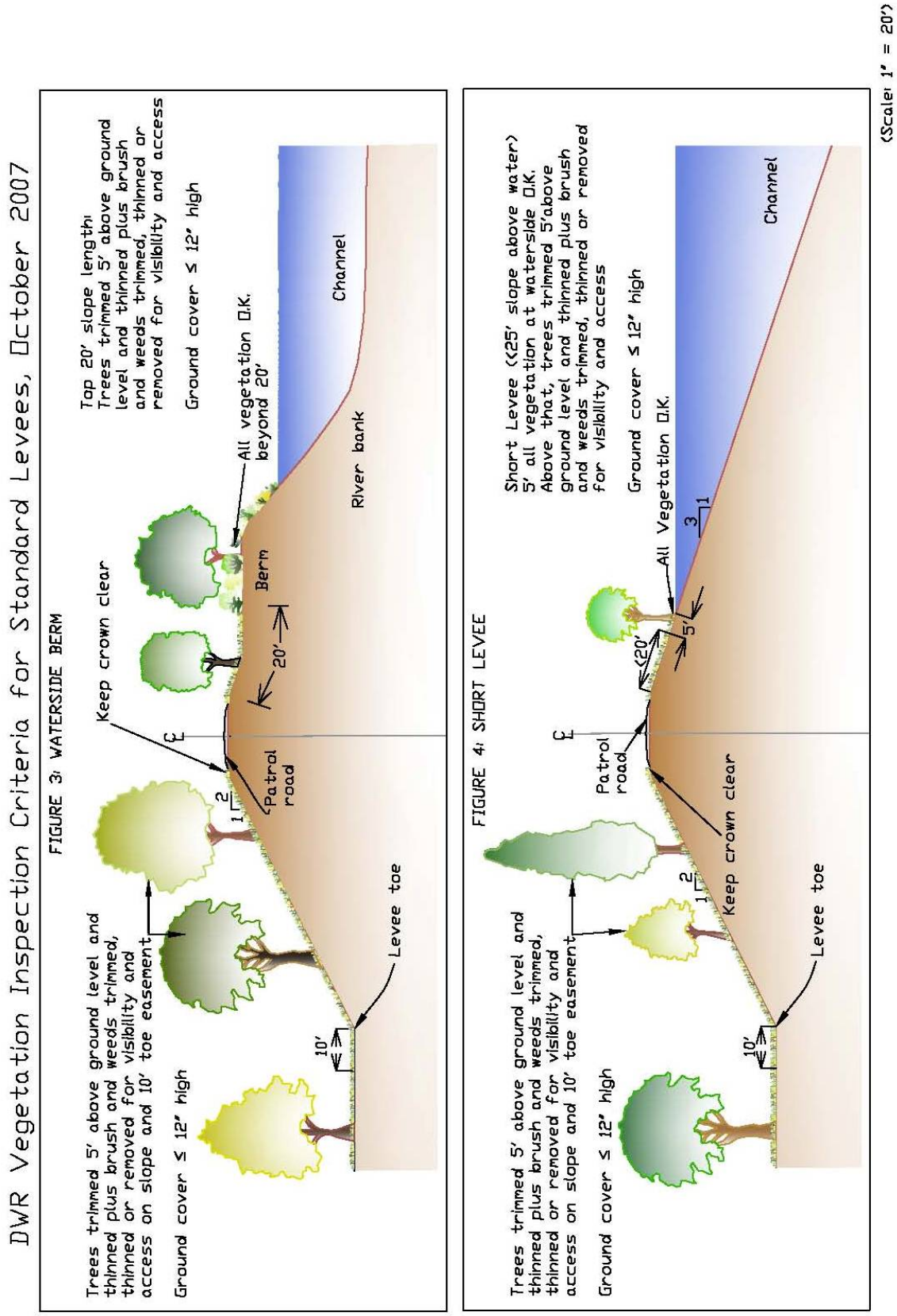

DWR Vegetation Inspection Criteria for Standard Levees, October 2007
FIGURE 3: WATERSIDE BERM
Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access on slope and 10' toe easement
Ground cover ≤ 12" high
Keep crown clear
Patrol road
Levee toe
10'
2
1
20'
Berm
All vegetation O.K. beyond 20'
Top 20' slope length: Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access
Ground cover ≤ 12" high
River bank
Channel
FIGURE 4: SHORT LEVEE
Trees trimmed 5' above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access on slope and 10' toe easement
Ground cover ≤ 12" high
Patrol road
Keep crown clear
Levee toe
10'
2
1
(20')
5'
All Vegetation O.K.
3
1
Short Levee (<25' slope above water) 5' all vegetation at waterside O.K. Above that, trees trimmed 5'above ground level and thinned plus brush and weeds trimmed, thinned or removed for visibility and access
Ground cover ≤ 12" high
Channel
(Scale: 1" = 20')

Figure 2.2

2.4.2 New Inspection Criteria - Encroachments

USACE inspections under Memo 43 (Section 2.2) identified as unacceptable numerous encroachments that blocked visibility and/or access to the levee as unacceptable, but USACE did not investigate the permit status of the encroachments. In order to identify all encroachments that USACE would likely find to be unacceptable, DWR inspectors followed a similar approach during its fall inspections.

DWR documented and rated three types of encroachments in fall 2007. Two of the types could be rated as either Minimally Acceptable (M) or Unacceptable (U): those that threaten levee integrity; and those that have no business on the levee, such as trash, prunings, abandoned equipment, etc. These encroachments are included in the overall ratings and should be corrected by the LMAs.

DWR also documented a third type of encroachment that the USACE identified as Unacceptable in some of their Quality Assurance inspections but that may be beyond the current authority of the LMAs to correct or remove. Within the same levee sections as described above for vegetation, DWR inspectors recorded the location, length, and type of all encroachments that obstruct visibility and access and rated them as Partially Obstructing (PO) or Completely Obstructing (CO). These PO and CO encroachments are not included in the overall ratings but identify those encroachments that could affect the operation of the system and that could be rated as Unacceptable by USACE. DWR identified approximately 129 miles of PO and 7 miles of CO encroachments in fall 2007. These encroachments were identified to inventory those encroachments that the USACE has in the past found to be Unacceptable; permit status of these encroachments was not determined.

2.5 Inspection Ratings

USACE Document ER 500-1-1, paragraph 5-5.b (2) (b) defines the following project condition as presented in EP 500-1-1, Table 5-2:

a) Acceptable – No immediate work required, other than routine maintenance. The flood control project will function as designed and intended, with a high degree of reliability, and necessary cyclic maintenance is being adequately performed.
b) Minimally Acceptable – One or more deficient conditions exist in the flood control project that needs to be improved/corrected. However, the project will essentially function as designed and intended but with a lesser degree of reliability than what the project should provide. Specific items of the project must be improved/corrected.
c) Unacceptable – One or more deficient conditions exist that can reasonably be foreseen to prevent the project from functioning as designed, intended, or required.

USACE is in the process of modifying the levee inspection checklist and has indicated that new requirements for maintenance and inspection of flood control works are forthcoming.

Prior to the 2007 inspection, DWR arrived at each overall unit and LMA rating by making an estimation of the number, expanse, and seriousness of the deficient conditions found during the annual inspection and arriving at one of the above project condition ratings. This system was subjective and possibly inconsistent. It did not always reflect the possible negative effect of the combined deficiencies.

Under the current USACE ratings directive, an LMA with a single Minimally Acceptable deficient condition may have received the same overall Minimally Acceptable rating as an LMA with dozens of Minimally Acceptable deficient conditions throughout its length. DWR believes that the LMAs should be rated by their overall maintenance condition rather than just by the rating of their worst deficient condition.

DWR created a new methodology, whereby 2007 overall ratings were calculated using the percentage of an LMA's overall mileage receiving less-than-acceptable ratings. Thresholds were established that determine the overall rating as shown below. If over 20 percent of the total LMA mileage was given a Minimally Acceptable rating, the overall rating was deemed Unacceptable. Since 12 main categories and numerous minor categories were inspected, with most receiving ratings for both the landside and the waterside (so double the length of the levee), it was possible for a poorly maintained levee to receive Minimally Acceptable or Unacceptable ratings for well over 100 percent of its length.

The new overall ratings method and thresholds are explained below. Figures 2.3 through 2.6 graphically explain the rating method.

Table 2-1: Overall Ratings Thresholds

A = Acceptable, M = Minimally Acceptable, U = Unacceptable

Only M ratings within Unit or LMA:

Zero to < 10 % M results in Overall A rating. 10% to < 20% M results in Overall M rating. ≥ 20% M results in Overall U Rating.

$\frac{\text{If Miles of M in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ > 0 but < 0.10, Overall Rating = A

$\frac{\text{If Miles of M in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ ≥ 0.10 but < 0.20, Overall Rating = M

$\frac{\text{If Miles of M in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ ≥ 0.20, Overall Rating = U

Only U ratings within Unit or LMA:

> Zero to < 5% U rating results in Overall M rating. ≥ 5% U rating results in Overall U rating.

$\frac{\text{If Miles of U in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ > 0 but < 0.05, Overall Rating = M

$\frac{\text{If Miles of U in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ ≥ 0.05, Overall Rating = U

Both M and U ratings within Unit or LMA:

If (M + 4U) < 20%, Overall rating is M. If (M + 4U) ≥ 20%, Overall rating is U.

Multiply miles of U by 4 and add to miles of M = M + 4U

$\frac{\text{If Miles of M + 4U in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ > 0 but < 0.20, Overall Rating = M

$\frac{\text{If Miles of M + 4U in Unit or LMA}}{\text{Total miles in Unit or LMA}}$ ≥ 0.20, Overall Rating = U

Example 1: Unit length = 10.00 miles, M = 0.60 mile, U = 0.30 mile:
4U = 4(0.30) = 1.20 miles. M + 4U = 0.60 mile + 1.20 mile = 1.80 miles

$\frac{\text{M + 4U}}{\text{Total unit miles}} = \frac{\text{1.80 miles}}{\text{10.00 miles}} = 0.18 < 0.20$ so Overall Rating = M

Example 2: Unit length = 10.00 miles, M = 1.10 mile, U = 0.30 mile:
4U = 4(0.30) = 1.20 miles. M + 4U = 1.10 miles + 1.20 miles = 2.30 miles

$\frac{\text{M + 4U}}{\text{Total unit miles}} = \frac{\text{2.30 miles}}{\text{10.00 miles}} = 0.23 > 0.20$ so Overall Rating = U

OVERALL MAINTENANCE RATING FLOW CHART

Step 1: DWR Inspections

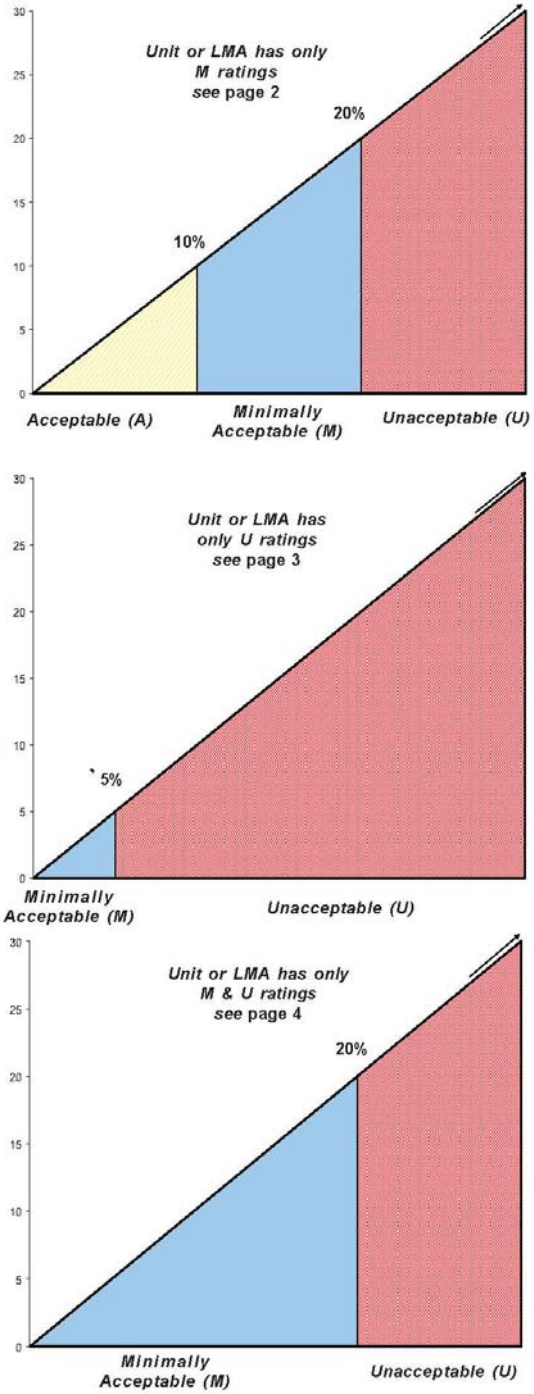
DWR inspectors document location and length of maintenance deficiencies (categories listed below).

Deficiencies are rated either as **Minimally Acceptable (M) or Unacceptable (U).** Total mileages of each rating in each unit and LMA are calculated and divided by total unit and LMA length to determine percentages of M or U. Percentage thresholds are then applied to determine overall unit and LMA ratings as shown at right and on subsequent pages:

Rated Deficiency Categories

Vegetation
Trim / Thin Trees
Enchroachments
Animal Control
Slope Stability
Erosion / Bank Caving
Cracking
Crown Surface/Depres-sions/Rutting
Rip Rap Revetments
Seepage / Sandboils
Underseepage Relief Wells
Repair Gates

Step 2: Overall Levee Rating



Overall Maintenance Rating Flow Chart Page 1

Figure 2.3

OVERALL MAINTENANCE RATING FLOW CHART

Unit or LMA has only (M) Minimally Acceptable ratings:

The total length of all Minimally Acceptable entries in a unit is calculated and divided by the length of the unit to obtain a percentage of total unit miles rated as **M**, which we refer to as a *mileage rating percentage*. These total percentages are then compared to thresholds established by DWR to determine the unit's overall rating. This process is repeated for all LMA ratings. The calculations are as follows:

From 0.01% to 9.99% M rating results in rating of A.

From 10.00% to 19.99% rating of M results in rating of M.

≥ 20.00% rating of M results in rating of U.

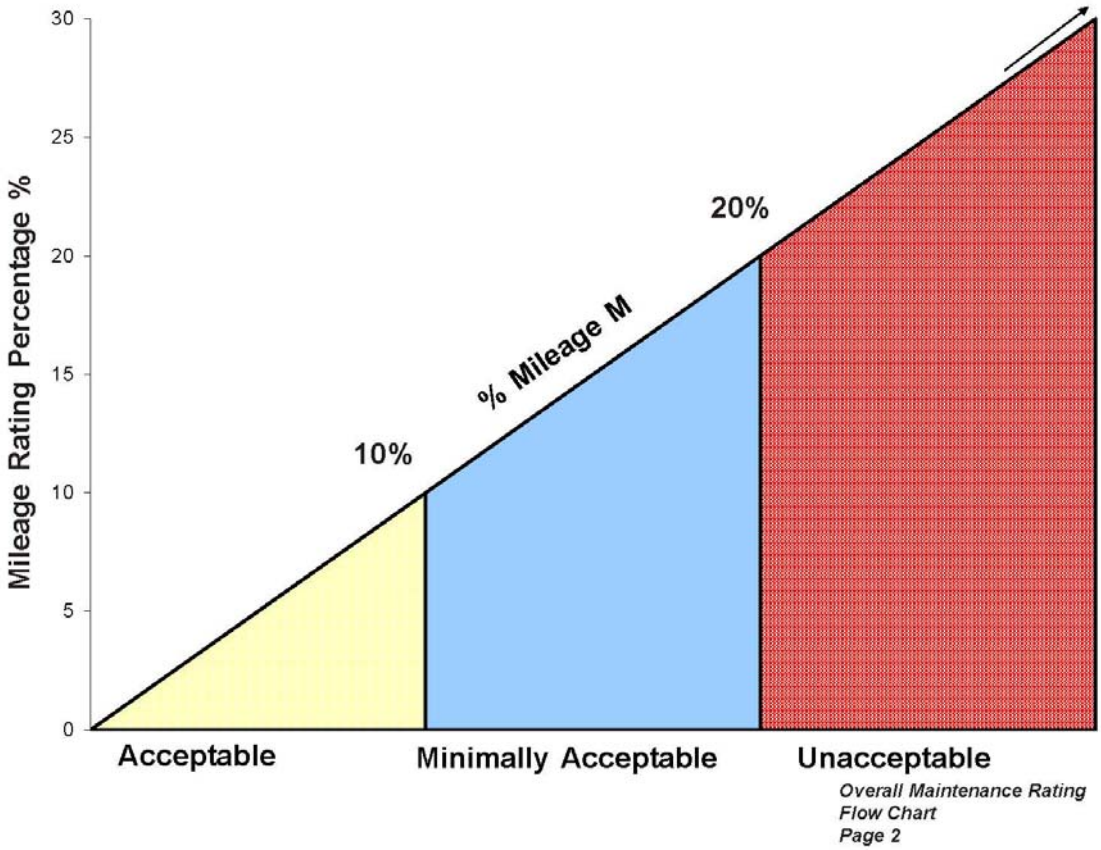


Figure 2.4

OVERALL MAINTENANCE RATING FLOW CHART

Unit or LMA has only (U) Unacceptable ratings:

The total length of all Unacceptable entries in a unit is calculated and divided by the length of the unit to obtain a percentage of total unit miles rated as **U,** which we refer to as a *mileage rating percentage*. These total percentages are then compared to thresholds established by DWR to determine the unit's overall rating. This process is repeated for all LMA ratings. The calculations are as follows:

From 0.01% to 4.99% U rating results in rating of M.

≥ 5.00% rating of U results in rating of U.

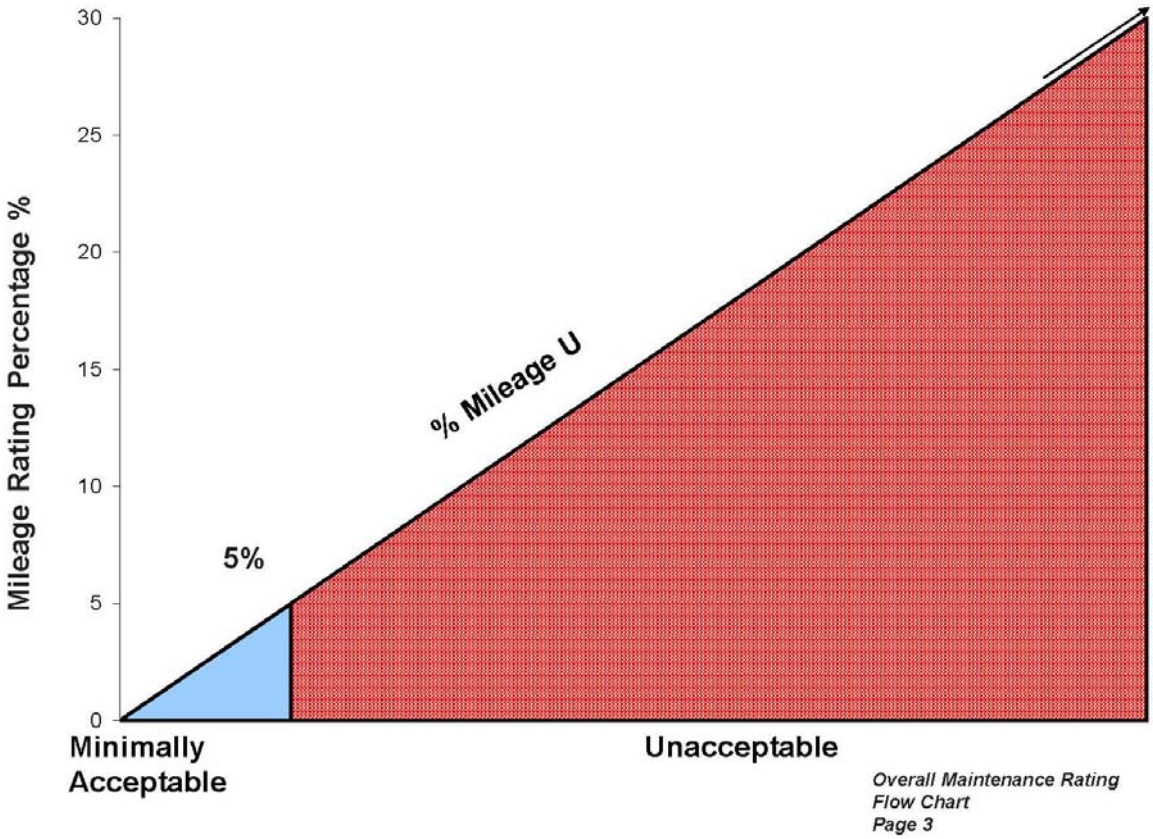


Figure 2.5

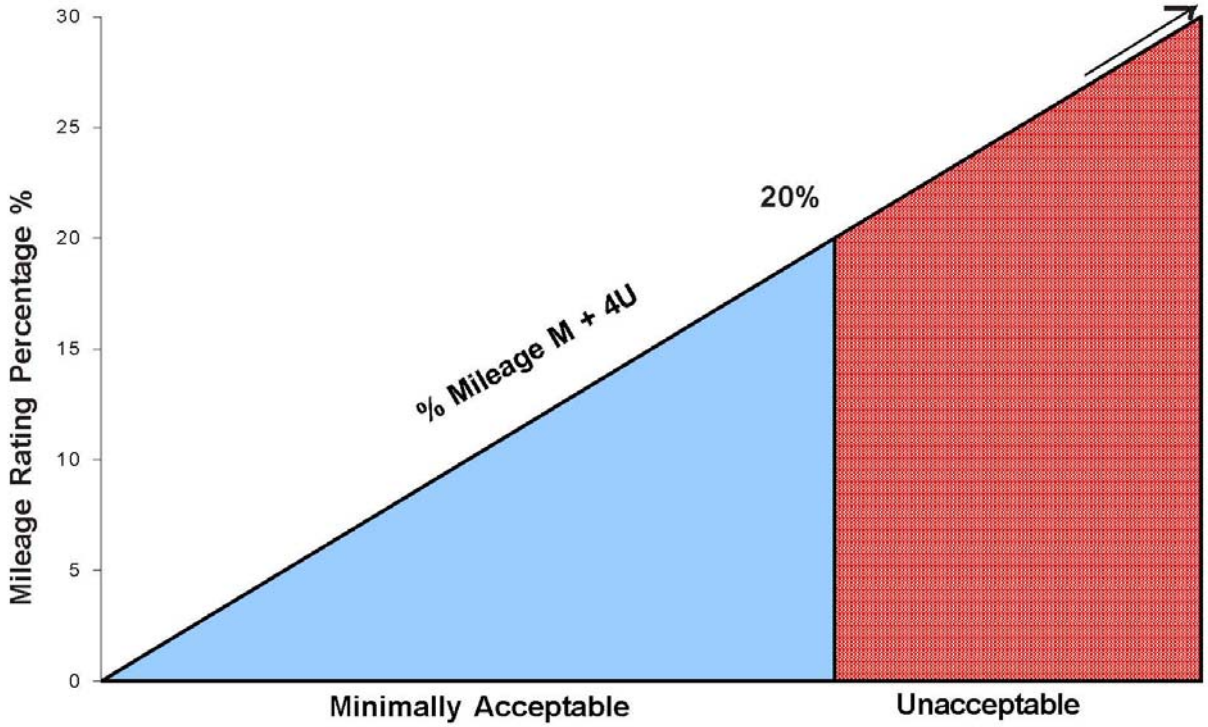
OVERALL MAINTENANCE RATING FLOW CHART

Unit or LMA has both (M + U) Minimally Acceptable & Unacceptable ratings:

The total length of all Minimally Acceptable and Unacceptable entries in a group is calculated and divided by the length of the unit to obtain a percentage of total unit miles rated as **M + 4U,** which we refer to as a *mileage rating percentage*. These total percentages are then compared to thresholds established by DWR to determine the unit's overall rating. This process is repeated for all LMA ratings. The calculations are as follows:

0.01% to 19.99% total of (M + 4U) results in rating of M.

≥ 20.00% rating of (M + 4U) results in rating of U.



Overall Maintenance Rating Flow Chart Page 4

Figure 2.6

2.6 Inspection Reporting

Individual levee mile inspection reports that summarize findings and identify deficiencies are distributed to each LMA after the spring and fall DWR inspection cycles. These reports are to be used by LMAs to scope and prioritize maintenance and improvement efforts, and the LMAs have been instructed to use these reports as a baseline for their summer and winter inspections. When requested, DWR levee inspectors may accompany LMAs on joint summer or winter inspections to discuss non-compliance and needed improvements. Spring and fall reports are submitted to USACE and the Board. Monthly updates and an annual report are also submitted to the Board.

2.7 Levee Maintenance Guidelines

When applying the ratings described above, a number of factors pertaining to levee maintenance are considered.

Readiness for Flood Emergency

Each district shall have an organized plan to effectively combat a flood situation. This should include the appointment of a Superintendent to supervise and execute the plan, maintain a stockpile of standard flood-fighting equipment and materials, and have a network of handheld radios or cellular telephones for communication available while patrolling during a flood emergency.

Adequate Levee Section and Grade

Each district must perform the work necessary to maintain levee side-slopes, grade, and crown width to meet the standards for its particular reach of the levee system. Levee design standards are summarized on Plate 5.

Adequate Encroachment Control

Each LMA is held responsible for preventing the construction of, or requiring the removal of, any illegally encroaching structures on the levee or within the ten-foot regulatory easement at the landward toe of the levee. Also, the maintaining agency must stop any unauthorized modifications or alterations to the levee. If any person or organization deems any construction or modification necessary within the levee regulatory easement, that person or organization must apply for an encroachment permit. The permit may only be issued by the Board. Failure of the LMA to control unauthorized encroachments can threaten the integrity of the levee, interfere with levee patrol visibility, hamper a flood fight and, therefore, be cause for downgrading the district's annual rating in this report. The presence of 129 miles of PO encroachments and 7 miles of CO encroachments indicates the difficulty in controlling encroachments. LMAs are generally very reluctant to attempt to force the removal of illegal encroachments.

Vegetation

Each district shall have a program to selectively control vegetation on the levee slopes and in rock revetments. This requirement provides visibility for inspection and patrol and prevents interference with flood-fighting activities. Some vegetation on oversized levees is permitted in accordance with standards as set forth in CCR, Title 23. However, present DWR interim vegetation inspection criteria allow vegetation on standard-sized levees as well, provided that visibility and flood fight capabilities are maintained. Both Water-Side and Land-Side slopes are rated for vegetation and obstructions. An un-maintained band of vegetation is allowed anywhere beyond 20 feet from the waterside hinge (intersection of levee slope and crown – see Figures 2.1 and 2.2).

Rodent and Animal Control

It is imperative that each district have a rodent control program. Diligent efforts to eradicate burrowing animals are a necessity, and eliminating them from an infested levee is extremely difficult. Control of these animals must be pursued frequently and persistently to ensure safety of the levee during high water events. Effective filling of the burrows is necessary to maintain the integrity of the levee. This category also includes effective control of grazing animals on the levee or easement.

Seepage/Boils

Seepage under or through the levee can cause boils, leading to erosion and possible piping failure of the foundation or structure of the levee. Seepage and boils must be identified, monitored, controlled, and corrected as quickly and effectively as possible.

Slope Stability and Repair of Cracks, Erosion, and Caving

Each district shall maintain slope stability and repair cracks, flow current or wave wash erosion, and caving or other structural problems. Timely repair of these problems is critical. Failure to address slope stability problems and repair cracks, erosion, or caving could lead to levee failure.

The Superintendent is required to report to the Board's Chief Engineer any suspected or known structural abnormalities found during his inspections. Such un-repaired structural problems are also cause for downgrading of the district rating.

Condition of Rock Revetment

Each district shall make all repairs to scour, wash, settlement, or failure of any portion of rock revetments. Rock revetments have been installed at locations where stream flow conditions indicate the need for such protection. Early detection and prompt repair will result in a minimum of effort and reduce the cost to restore the revetment.

Condition of Levee Crown and Roadway

Each district is required to keep crown roadways shaped and graded to provide proper drainage and all-weather access. Repair of ruts and addition of gravel ensures a serviceable road under adverse conditions.

Condition of Pipes and Interior Drainage System

Each district must examine all structures situated through, in, or on the levee for stability and structural soundness and record its observations twice annually. All component parts must be examined for proper operation and reliability before the start of each flood season. New structures should be installed or older structures repaired only in accordance with adopted Board standards and under the supervision of qualified Board personnel. Defective structures must be repaired, replaced, or removed immediately. Although maintenance and repair of pipes and other structures passing through a levee are the responsibility of the owner (e.g., a farmer owning an irrigation pipe), the LMA is responsible for inspecting the pipes for corrosion, collapse, valve integrity, seepage, and any other condition that could threaten the integrity of the levee. Because of its full-time presence, the LMA is most able to discover and identify actual and potential problems and should make all efforts to immediately notify DWR of any problems found and thereafter include the problems on their inspection reports until they are resolved. DWR works with the Board to require the timely repair or removal of the pipes or other structures that threaten the levee integrity.

Concrete Floodwalls / Closure Structures

In some instances, a portion of a levee is not built to the design height of the rest of the levee. A floodwall, usually either concrete or driven piling, is built to provide necessary hydraulic capacity. In some cases, due to space constraints, a floodwall may be constructed in lieu of a levee. Where a roadway or railroad passes through a levee or floodwall, a closure structure is built on either side of the roadway to hold gates or barriers to be installed before high water events. Floodwalls, closure structures, gates, and barriers must be properly maintained, structurally sound, and of proper height and design. Gates and barriers and installation paths must be readily accessible for timely installation and dependable performance.

Overall Rating and District Maintenance Program

Each inspector documents location, length, type, and rating of each maintenance deficiency in accordance with established criteria. While some variability in ratings occurs due to the different personalities and experiences of the various inspectors, training, use of new inspection hardware and software, and inclusion of ratings criteria on the inspectors' field computers have led to more accurate and consistent ratings. The new methodology of determining overall unit and LMA ratings determined by the percentage of overall miles with less-than-acceptable ratings has resulted in much more consistent and objective overall ratings.

3 2007 LEVEE WATERSIDE EROSION SURVEYS

Waterside erosion surveys of the Sacramento River system have been conducted since 1998 by Ayres Associates under USACE contract and DWR sponsorship. The primary purpose of these surveys is to: (a) monitor and document the condition of previously identified erosion sites; (b) inventory any new erosion sites; and (c) identify critical erosion sites that appear to be an imminent threat to the structural integrity of the State Flood System.

The FPIIB began conducting waterside erosion surveys of the San Joaquin river portion of the State Flood System Project levees in September 2006 to create an inventory of erosion sites and identify critical erosion sites that appear to be an imminent threat to the structural integrity of the State Flood System. Typical levee inspections occur from the crown of the levee but erosion on the slope and beyond is sometimes not visible from that vantage point. Surveys were completed by boat in the areas that were navigable. In areas that were not navigable or where wide berms obstructed visibility, surveys were completed on land.

LMAs were informed by FPIIB through a letter in November 2007 that DWR is rating erosion sites but is excluding erosion sites repaired or planned for repair under PL 84-99 or critical repairs programs. Agencies were requested to inform FPIIB if they had repaired any sites other than the PL 84-99 or critical sites by December 7, 2007. Sites reported as being repaired were not included in overall rating determinations.

3.1 Erosion Survey Procedures

The San Joaquin River erosion surveys were conducted in two phases and are documented in separate reports, 'San Joaquin River System Waterside Erosion Surveys, April 2006' and 'San Joaquin River System Waterside Erosion Surveys –Phase II, October 2007.' Results of these surveys are incorporated into the inspection report. Figures 3.1 and 3.2 show San Joaquin River System Erosion sites identified in Phases I and II. In addition to these reports, a 'San Joaquin Erosion Surveys Aerial Atlas' was created. These are all available online after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/.

The fall 2006 levee inspection sheets were reviewed to determine districts where erosion was documented and land surveys were prioritized and completed accordingly.

Of the over 490 total project levee miles in the San Joaquin River system, about 380 miles of erosion surveys were completed in Phase I. Of these, 57 miles were surveyed by boat. The remaining 53 miles were surveyed by land in Phase II.

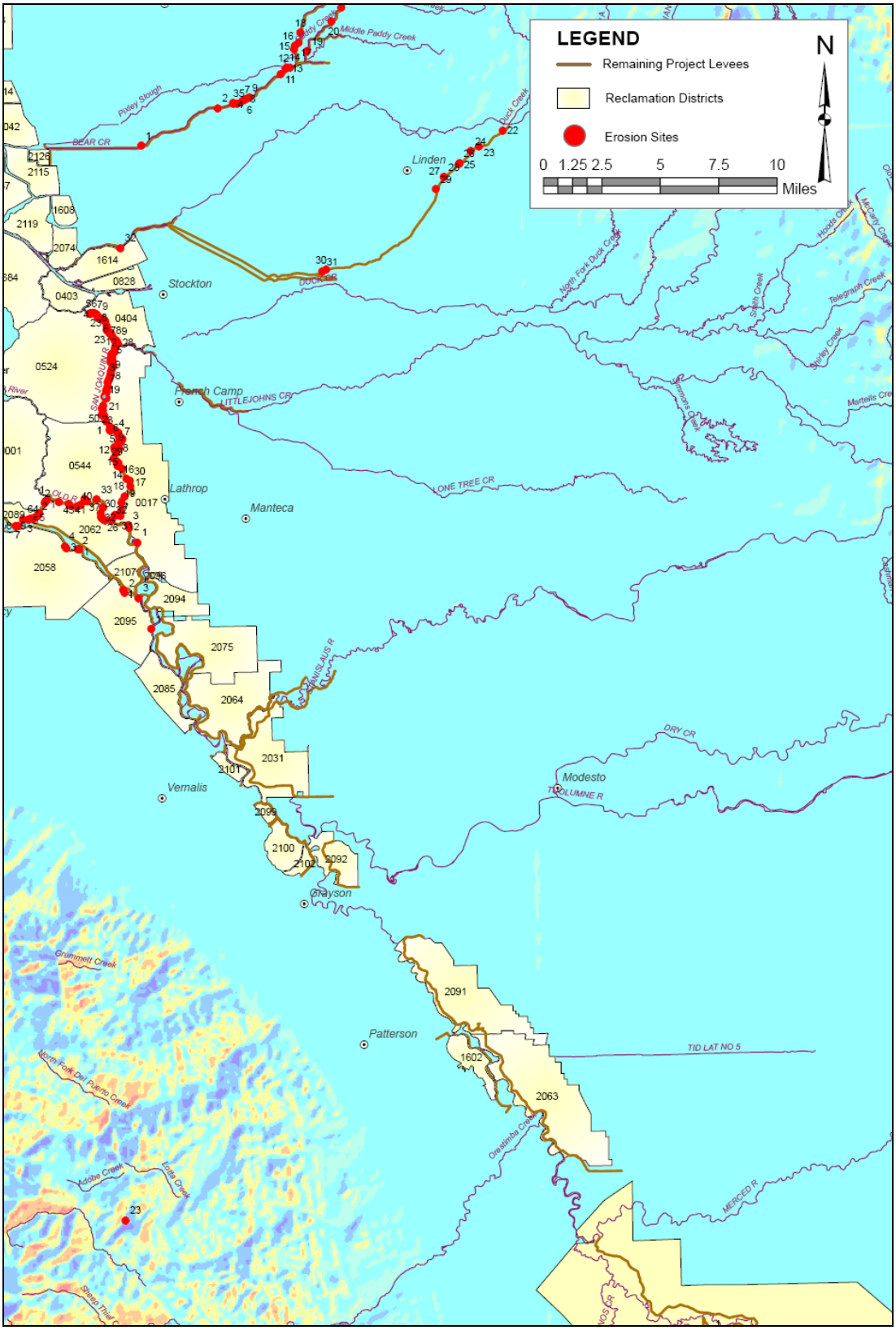

LEGEND
Remaining Project Levees
Reclamation Districts
Erosion Sites
N
0 1.25 2.5 5 7.5 10
Miles
Middle Paddy Creek
Paddy Creek
Pixley Slough
BEAR CR
Duck Creek
Linden
Stockton
DUCK CR
North Fork Duck Creek
Hoods Creek
McCarty Creek
Smith Creek
Telegraph Creek
Mormon Creek
Martells Creek
Simmons Creek
SAN JOAQUIN R
French Camp
LITTLE JOHNS CR
LONE TREE CR
Lathrop
Manteca
CLO R
STANISLAUS R
DRY CR
Modesto
TUOLUMNE R
Vernalis
Grayson
Grummett Creek
Patterson
TID LAT NO 5
North Fork Del Puerto Creek
Adobe Creek
Ortigalita Creek
Orestimba Creek
MERCED R
Sheep Thief Creek
2115
2126
1608
2119
2074
1614
0828
0403
0404
0524
0544
0017
2062
2058
2107
2096
2094
2095
2075
2085
2064
2031
2101
2099
2100
2102
2092
2091
1602
2063
23

Figure 3.1

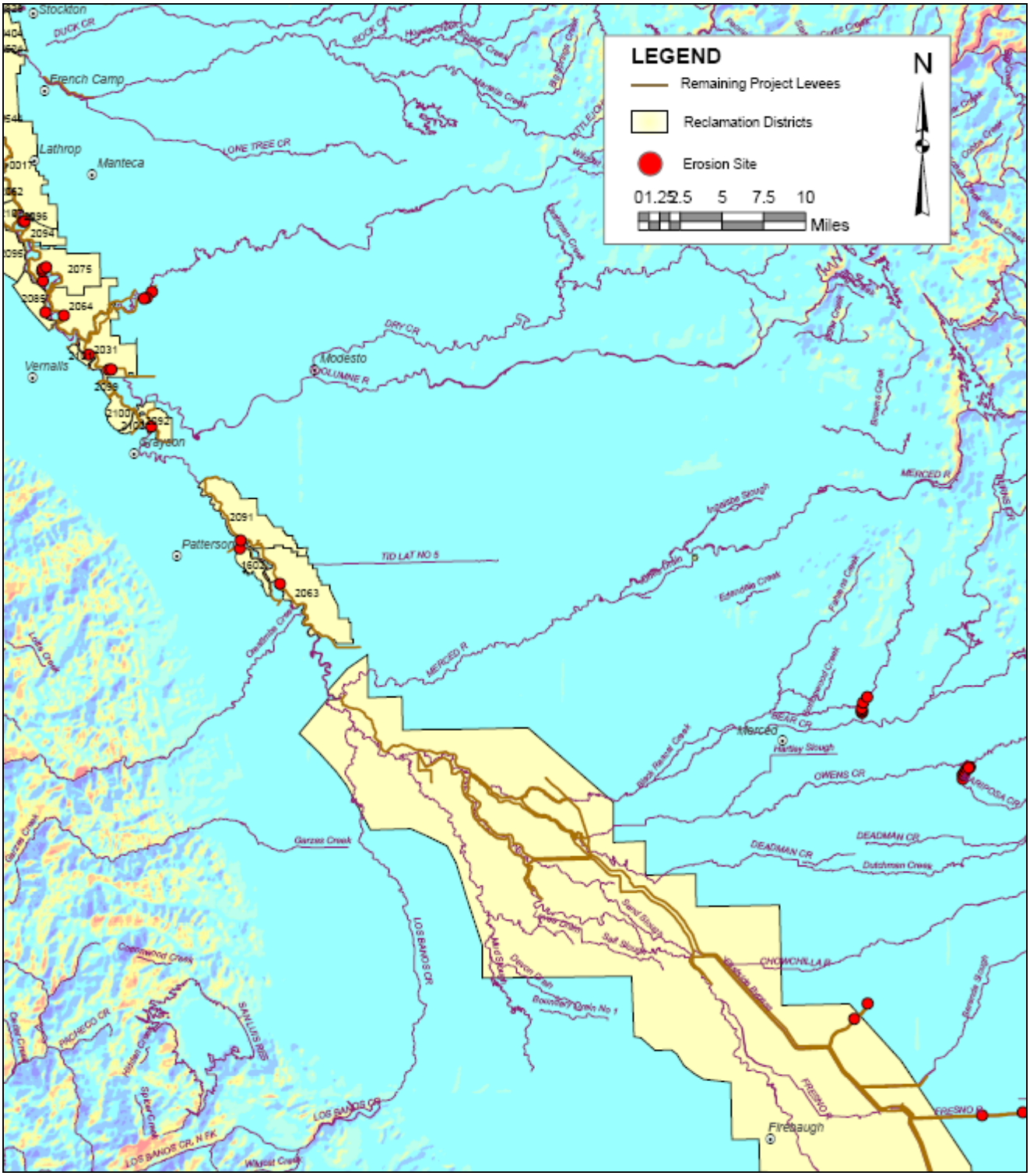

LEGEND
Remaining Project Levees
Reclamation Districts
Erosion Site
0 1.25 2.5 5 7.5 10
Miles
N
Stockton
French Camp
Lathrop
Manteca
Vernalis
Modesto
Grayson
Patterson
Merced
Firebaugh
DUCK CR
LONE TREE CR
DRY CR
TID LAT NO 5
MERCED R
BEAR CR
OWENS CR
DEADMAN CR
CHOWCHILLA R
FRESNO R
LOS BANOS CR
SAN LUIS RR
PACHECO CR
Garzas Creek
2075
2064
2031
2091
2063

Figure 3.2

3.2 Erosion Survey Criteria and Site Data Collected

The surveys were conducted as closely as possible to Ayres Associates' criteria used for the Sacramento River system. Sites were included in this erosion survey if they met one or more of the following three criteria:

a) Bank erosion into the projection of the levee slope.
b) Berm width of less than 35 feet.
c) The site was submitted by the LMA for PL 84-99 assistance from the April 2006 high water event.

Several creeks or sloughs in the San Joaquin system include stretches where one bank is on high ground. The high ground could be an orchard or golf course that is filled to the height of the levee crown. Also, some stretches are oversized levees that have landside stability berms built up to levee crown elevation. The stability berm might be thirty or more feet wide. Erosion on these stretches was not noted in this survey.

Specific data collected at each erosion site included:

- Approximate river mile as per 1984 USACE Aerial Atlas
- Right or left bank
- Levee mile start/end (optional)
- Local maintaining agency
- GPS begin/end
- Estimated height of erosion (ft)
- Estimated site length (ft)
- Erosion location on the bank (toe, lower slope, mid bank, upper slope)
- Existing revetment type, if any
- Proximity of erosion to the levee slope
- Remaining berm width
- Any comments or field notes
- Photo of site

3.3 Erosion Survey Ratings

The FPIIB developed the erosion rating criteria partially based upon the Ayres Associates 'Priority Site Ranking for Critical Erosion Sites on the Sacramento River Flood Control Levees Using Multiple Ranking Methodologies" dated January 16, 2006. The criteria were partially modified and new criteria added to account for site conditions and to suit the type of data collected from the San Joaquin River System erosion surveys.

Following are the criteria used to rate erosion sites:

- Berm Width
- Length of Erosion
- Location of Erosion
- Severity of Erosion

- Burrow Holes
- Radius of Curvature
- Site Relative to Bend
- Vegetation Cover
- Seepage Potential

Each factor is given a point rating as defined in Table 3-1. The severity of erosion criteria is multiplied by a factor of two to account for its importance. All factors are evaluated at each site and given a score. The values for each site are combined arithmetically.

Table 3-1: Score Sheet of Erosion Criteria

Criteria	Score Definition
Berm Width	0 - Berm width of 30 ft or greater; 1 - 20 to 29 ft of berm; 2- 10 to 19 ft of berm; 3 - 5 to 9 ft of berm; 4 - 1 to 4 ft of berm; 5 - No berm width
Length of Erosion	0 - Less than 10 ft; 1 - 10 ft to 100 ft; 2 - 101 ft to 500 ft; 3 - 501 ft to 1000 ft; 4 - 1001 ft to 1500 ft; 5 - Greater than 1500 ft
Location of Erosion	0 - Upper slope; 1 - Middle slope; 2 - Lower slope; 3 - Toe; 4 - Toe & slope
Severity of Erosion(*2)	0 - Scarp height less than 1 ft; 1 - Scarp height between 1 to 2 ft ; 2 - Scarp height between 2 ft to 3 ft; 3 - Scarp height between 3 to 4 ft; 4 - Scarp height between 4 to 5 ft; 5 - Scarp height greater than 5 ft
Burrow Holes	0 - No holes; 1 - Holes within slope; 2 - Holes at toe
Radius of Curvature	0 - Greater than 5 or no curve; 1 - 4 to 5 range; 2 - 3 to 4 range; 3 - 2 to 3 range; 4 - 2 to 1 range; 5 - Less than 1. Radius of Curvature = radius of meander bend divided by top width of channel flowing full.
Site Relative to Bend	0 - Inside of bend; 1 - Straight reach; 2 - Just downstream of a bend; 3 - Outside of bend (greater than 90 degree interior angle); 4 - Outside of bend (90 degree turn); 5 - Outside of tight bend (less than 90 degree interior angle)

Criteria	Score Definition
Vegetation Cover	0 - Dense vegetation (80-100% cover); 1 - Medium to dense vegetation (60-80% cover); 2 - Medium vegetation (40-60% cover); 3 - Slight to medium vegetation (20-40% cover); 4 - Slight vegetation (up to 20% cover); 5 - No vegetation
Seepage Potential	0 - No seepage history; 5 - Seepage or sinkhole history

The scores from the above chart are totaled for each erosion site and the site is given a rating:

In Berm (Not Rated)
Less than 22 points = Minimally Acceptable
Greater than 22 points = Unacceptable
22 points exactly = Rater decides

A similar method was used by Ayres Associates in determining ratings for the Sacramento River system. The rating and length of each erosion site in both systems were included in the fall 2007 LMA inspection reports and were included in the calculations of overall LMA ratings.

The complete package of documents used in arriving at these erosion ratings can be found after July 1, 2008 at the following website: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/.

4 2007 LEVEE MAINTENANCE INSPECTION RESULTS

Although the number of LMAs receiving an overall Unacceptable rating increased from 4 LMAs in 2006 to 64 LMAs in 2007, it appeared to DWR inspectors that overall project maintenance actually improved during that year. FEMA Memo 43 and the possibility of losing PL 84-99 rehabilitation eligibility encouraged a stronger commitment to maintenance by many of the LMAs. Those improvements were obscured by DWR's more rigorous application of inspection criteria and especially by the methodology used to determine overall ratings.

As a result of our somewhat more rigorous application of USACE non-vegetation inspection criteria and of DWR's interim vegetation criteria, and especially the new overall rating method (Table 2-1), a total of 64 of the 107 LMAs received Unacceptable annual maintenance ratings (25 were Acceptable, 18 were Minimally Acceptable) compared to four Unacceptable ratings in 2006. Had USACE's criteria (in effect, only short grass allowed on levees and easements) been applied, we estimate that 103 of the 107 LMAs would likely have received Unacceptable ratings for fall 2007.

Figures 4.1 and 4.2 summarize the annual 2007 overall levee maintenance ratings for the 107 LMAs inspected by DWR. The results reflect implementation of the October 2007 interim vegetation criteria, which are aimed at improving public safety by providing visibility for inspections, eliminating vegetation conflicts that could hamper flood fight activities, and improving access for overall maintenance. Deficiencies in vegetation maintenance, trimming, and thinning of trees, encroachments, animal control, and levee crown surface conditions were most prominent in the makeup of the Unacceptable ratings (see Figure 4.2).

Figure 4.1 shows the annual 2007 overall levee maintenance rating for 107 LMAs inspected by DWR and compares it with the annual levee maintenance ratings since 1998. Note that vegetation (non-trees) and trees are presented separately in Figure 4.2. Total vegetation deficiency percentage would be the total of both of these categories. As shown in Figure 4.2, vegetation deficiency is the largest category reflecting a more comprehensive application of inspection criteria for vegetation. A total of 893.2 miles (56.8%) of levee were found to be Minimally Acceptable and 100.8 miles (6.4%) were found to be Unacceptable out of the total 1,571.1 miles of system levee that were inspected in fall 2007 (rock sites and inactive levees were not included in these totals).

The increase in Unacceptable overall maintenance ratings for 2007 is attributed to the following:

- DWR has aggressively increased its inspection and maintenance practices over the past 2 ½ years. Improved overall maintenance is a high priority for DWR and DWR's short-term goals are to identify critical deficiencies threatening the system and encourage maintainers to do a better job maintaining the system's levees.
- USACE's national levee safety initiatives, including recent USACE policies on vegetation and encroachments, have emphasized the need for more stringent

application of long-standing levee maintenance criteria. These criteria include the thinning and trimming of trees and wild growth, rather than their wholesale removal.

- DWR has implemented efforts to improve consistency in applying overall maintenance ratings to all levee systems, such as:
    - Improving training provided to levee inspectors
    - Incorporating engineering oversight into the overall inspection program
    - Developing better tools for documenting levee inspections
    - Mathematically computing percentage of rated deficiencies and applying thresholds to determine overall ratings

2007 Annual Levee Inspection Results

Chart 1

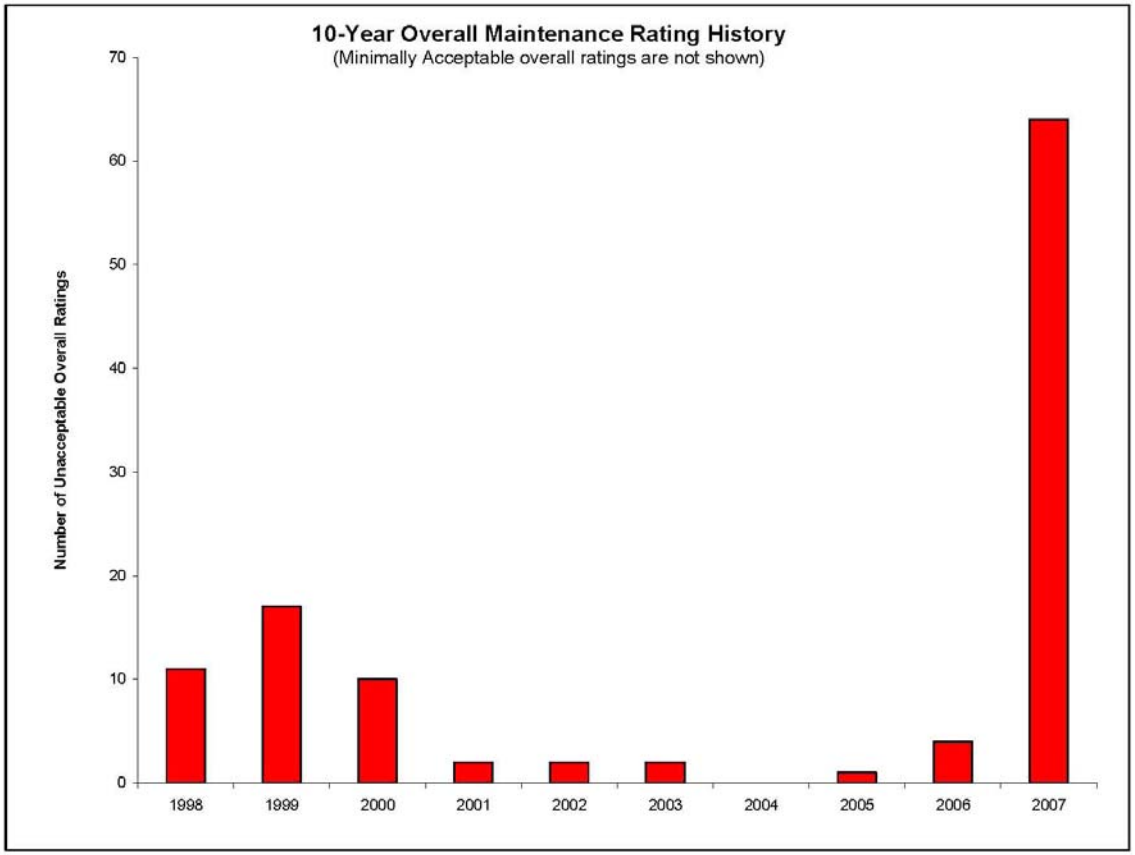


Figure 4.1

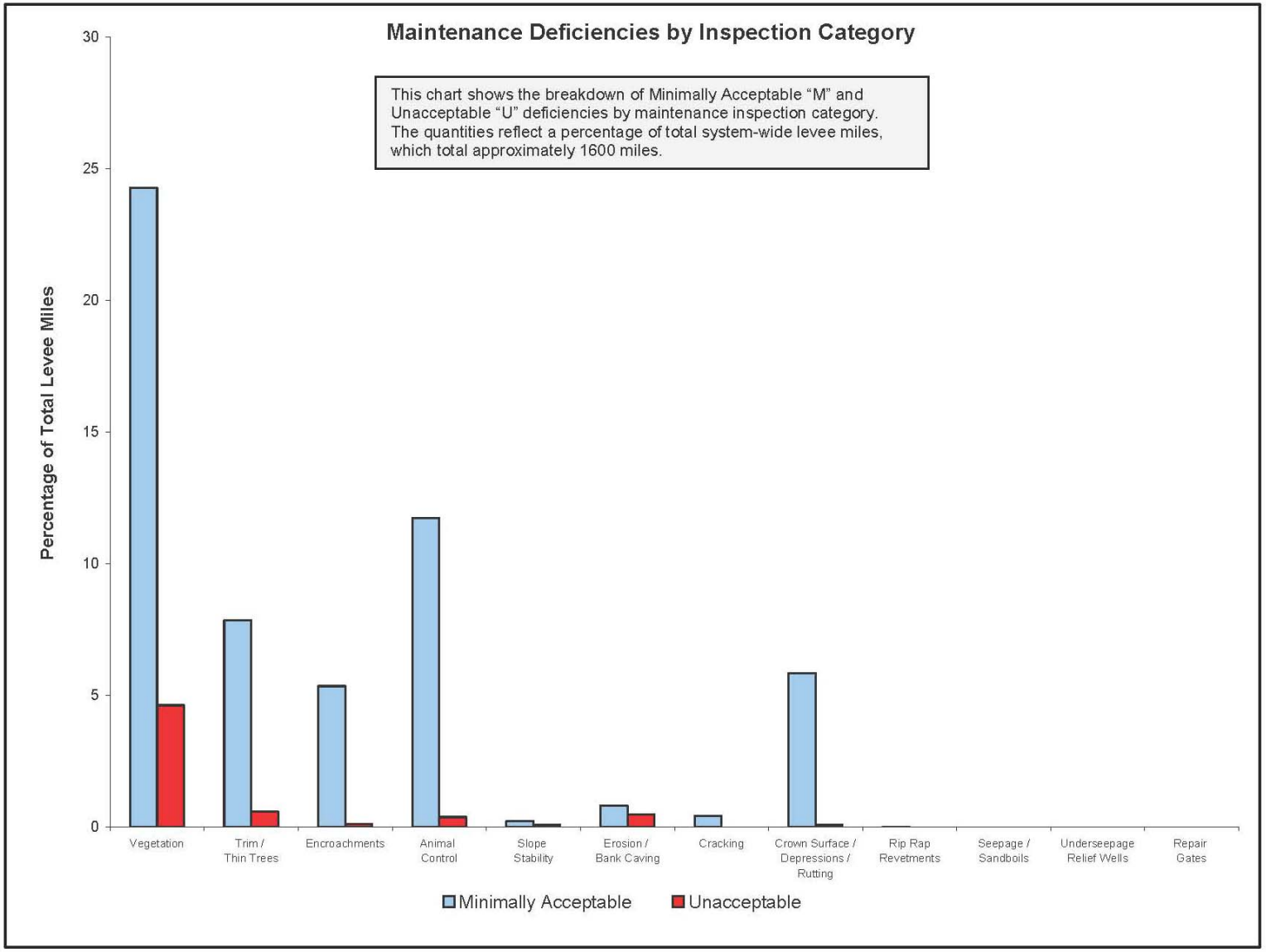

Maintenance Deficiencies by Inspection Category
This chart shows the breakdown of Minimally Acceptable "M" and Unacceptable "U" deficiencies by maintenance inspection category. The quantities reflect a percentage of total system-wide levee miles, which total approximately 1600 miles.
Percentage of Total Levee Miles
30
25
20
15
10
5
0
Vegetation
Trim / Thin Trees
Encroachments
Animal Control
Slope Stability
Erosion / Bank Caving
Cracking
Crown Surface / Depressions / Rutting
Rip Rap Revetments
Seepage / Sandboils
Underseepage Relief Wells
Repair Gates
Minimally Acceptable
Unacceptable

Figure 4.2

Figure 4.3, *2007 Overall Maintenance Rating Summary* contains the overall ratings for each LMA in the project system, listed by District Short Name.

Figures 4.4 and 4.5, *Local Maintaining Agency Rating*, are maps of the Sacramento and San Joaquin systems, showing the location and rating of each LMA. Note that due to space constraints, only LMAs with Unacceptable ratings are identified by name on the map. To find the general location of a district, refer to Plates 1 and 1A at the end of this report. All plates can also be found on the DWR website after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/ and can be expanded for easier reading.

Figure 4.6, *2007 Unit & LMA Deficiency Percentages and Ratings* shows the Fall 2007 Inspection Overall Results, which contain the following information for each unit and each LMA: Name; Length; Miles and percentage of total miles rated Minimally Acceptable (M) and Unacceptable (U); and Overall Unit and LMA rating using thresholds described in Section 2.3 and Figures 2.3.1-2.3.4. Unit and LMA ratings will be the same for single-unit LMAs. For multi-unit LMAs, overall LMA information appears in the first line, following the first unit information.

Figure 4.7, *Ten-Year Maintenance Record 1998-2007,* shows the ten-year overall maintenance rating history of all 107 LMAs in the system. Additional Information is available on the DWR Website.

Additional information regarding the fall 2007 inspections can be found after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/ and includes the following:

*LMA Summary Sheet by Categor*y is a spreadsheet containing a tab for each LMA. Within each tab, detailed information for each unit is given on the number and percentage of miles with M or U ratings for each category (Vegetation, Encroachments, Animal Control, etc.).

Fall 2007 LMA Inspection Reports contains the most detail of all available documents. It contains the LMA and unit cover sheets and the Levee Mile Report for the fall 2007 inspection for each unit in the system. The Levee Mile Report lists by Levee Mile each deficiency noted in the inspection and includes its location, category, rating, action code, and other information.

LMA-Short-Names contains the names of all LMAs arranged in the order of their short names, by which they are identified in the Fall 2007 LMA Inspection Reports.

Erosion Reports contain the survey and ratings information for the 2006/2007 erosion surveys of the Sacramento and San Joaquin systems.

2007 Overall Maintenance Rating Summary

The Table below summarizes the 2007 overall maintenance ratings for the 107 Levee Maintaining Agencies (LMAs). The overall rating codes and totals:

"A" = Acceptable	Total of 25 "A" ratings
"M" = Minimally Acceptable	Total of 18 "M" ratings
"U" = Unacceptable	Total of 64 "U" ratings

District Short Name	District Name	Overall District Rating
LD0001G	Levee District No. 0001(Glenn)	U
LD0001S	Levee District No. 0001(Sutter)	M
LD0002	Levee District No. 0002	A
LD0003	Levee District No. 0003	A
LD0009	Levee District No. 0009	A
MA0001	Maintenance Area No. 0001	M
MA0003	Maintenance Area No. 0003	A
MA0004	Maintenance Area No. 0004	A
MA0005	Maintenance Area No. 0005	M
MA0007	Maintenance Area No. 0007	U
MA0009	Maintenance Area No. 0009	M
MA0012	Maintenance Area No. 0012	A
MA0013	Maintenance Area No. 0013	A
MA0015	Murphy Slough @ M&T Ranch	U
MA0016	Maintenance Area No. 0016	M
MA0017	Maintenance Area No. 0017	U
NA0001	American River Flood Control District	M
NA0002	Brannan Andrus Levee Maintenance District	U
NA0003	Butte County	A
NA0004	City of Marysville	M
NA0005	City of Sacramento	U
NA0006	East Honcut Creek	U
NA0008	Knights Landing Ridge Drainage District	U
NA0009	Lake County	M
NA0010	Lower San Joaquin L.D.	M
NA0011	Madera County	U
NA0012	Melin Levee	U
NA0013	Merced Stream Group	U
NA0014	See MA0015	
NA0015	Plumas County	U
NA0016	Sacramento River West Side Levee District	U
NA0017	San Joaquin F.C.D.	U
NA0018	Shea Levee	A
NA0019	Tehama County	U
NA0020	West Interceptor	U
NA0021	Yolo County Cache Creek	U
NA0022	Yolo Service Area 6	U

Figure 4.3

District Short Name	District Name	Overall District Rating
NA0023	Turlock Irrigation District - Gomes Lake (Formerly Unit 2, RD2091)	A
RD0001	Reclamation District No. 0001	M
RD0003	Reclamation District No. 0003	U
RD0010	Reclamation District No. 0010	U
RD0017	Reclamation District No. 0017	U
RD0070	Reclamation District No. 0070	M
RD0108	Reclamation District No. 0108	A
RD0150	Reclamation District No. 0150	U
RD0307	Reclamation District No. 0307	U
RD0341	Reclamation District No. 0341	U
RD0349	Reclamation District No. 0349	U
RD0369	Reclamation District No. 0369	U
RD0404	Reclamation District No. 0404	U
RD0501	Reclamation District No. 0501	U
RD0524	Reclamation District No. 0524	U
RD0536	Reclamation District No. 0536	U
RD0537	Reclamation District No. 0537	U
RD0544	Reclamation District No. 0544	U
RD0551	Reclamation District No. 0551	U
RD0554	Reclamation District No. 0554	U
RD0556	Reclamation District No. 0556	U
RD0563	Reclamation District No. 0563	U
RD0755	Reclamation District No. 0755	U
RD0765	Reclamation District No. 0765	U
RD0784	Reclamation District No. 0784	M
RD0785	Reclamation District No. 0785	U
RD0787	Reclamation District No. 0787	A
RD0817	Reclamation District No. 0817	U
RD0827	Reclamation District No. 0827	U
RD0900	Reclamation District No. 0900	U
RD0999	Reclamation District No. 0999	U
RD1000	Reclamation District No. 1000	A
RD1001	Reclamation District No. 1001	U
RD1500	Reclamation District No. 1500	M
RD1600	Reclamation District No. 1600	U
RD1601	Reclamation District No. 1601	A
RD1602	Reclamation District No. 1602	U
RD1660	Reclamation District No. 1660	A
RD2031	Reclamation District No. 2031	U
RD2035	Reclamation District No. 2035	U
RD2058	Reclamation District No. 2058	U
RD2060	Reclamation District No. 2060	U
RD2062	Reclamation District No. 2062	U
RD2063	Reclamation District No. 2063	U
RD2064	Reclamation District No. 2064	U
RD2068	Reclamation District No. 2068	A
RD2075	Reclamation District No. 2075	U
RD2085	Reclamation District No. 2085	U
RD2089	Reclamation District No. 2089	U

Figure 4.3, Cont.

District Short Name	District Name	Overall District Rating
RD2091	Reclamation District No. 2091	A
RD2092	Reclamation District No. 2092	A
RD2094	Reclamation District No. 2094	U
RD2095	Reclamation District No. 2095	U
RD2096	Reclamation District No. 2096	A
RD2098	Reclamation District No. 2098	M
RD2101	Reclamation District No. 2101	U
RD2103	Reclamation District No. 2103	A
RD2104	Reclamation District No. 2104	U
RD2107	Reclamation District No. 2107	M
RS0001	Glenn County (Sacramento River Rock Revement Site)	
RS0002	Solano County Yolo Bypass	
RS0003	Tehama County Flood Control District	
RS0004	Tehama County Flood Control District and Water Conservation District	
ST0001	Cache Creek	M
ST0002	East Levee S.B.P.	M
ST0003	East Levee Sac River	A
ST0004	East Levee Yolo Bypass	U
ST0005	Hamilton Bend (Feather River West Levee)	U
ST0006	Nelson Bend (Feather River West Levee)	U
ST0007	Putah Creek	M
ST0008	Sacramento Bypass	A
ST0009	Tisdale Bypass	A
ST0010	Wadsworth Canal	A
ST0011	West Levee Yolo Bypass	U
ST0012	Willow Slough	A

Total	107
A = Acceptable	25
M = Minimally Acceptable	18
U = Unacceptable	64

Figure 4.3, Cont.

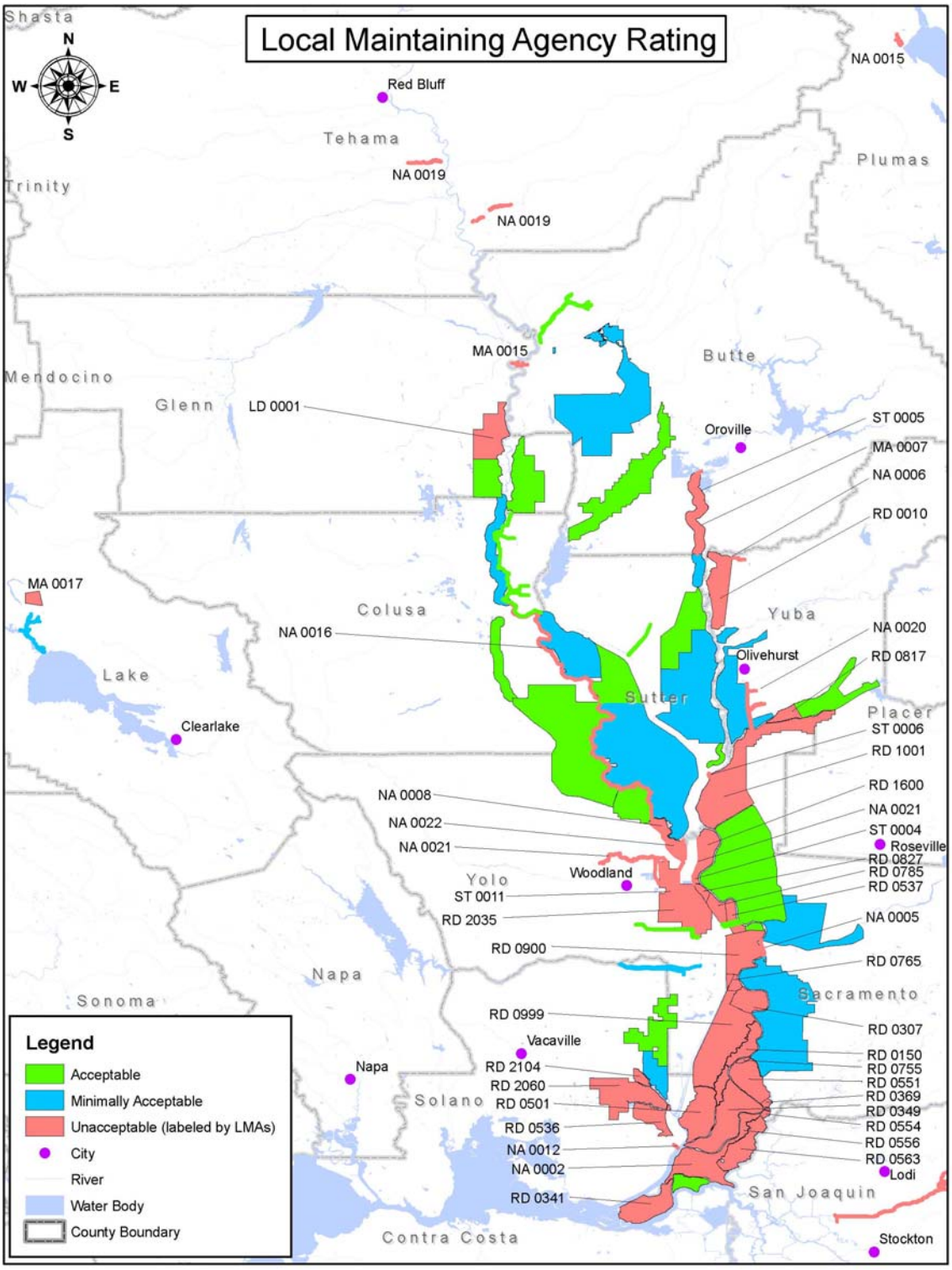

Local Maintaining Agency Rating
N
W
E
S
Shasta
Red Bluff
Tehama
NA 0019
NA 0019
NA 0015
Plumas
Trinity
Mendocino
Glenn
LD 0001
MA 0015
Butte
Oroville
ST 0005
MA 0007
NA 0006
RD 0010
MA 0017
Colusa
NA 0016
Yuba
NA 0020
RD 0817
Olivehurst
Lake
Clearlake
Sutter
Placer
ST 0006
RD 1001
RD 1600
NA 0021
ST 0004
Roseville
RD 0827
RD 0785
RD 0537
NA 0005
RD 0765
NA 0008
NA 0022
NA 0021
Woodland
Yolo
ST 0011
RD 2035
RD 0900
Napa
Sonoma
Sacramento
RD 0999
Vacaville
RD 2104
RD 2060
RD 0501
RD 0536
NA 0012
NA 0002
RD 0341
Napa
Solano
RD 0307
RD 0150
RD 0755
RD 0551
RD 0369
RD 0349
RD 0554
RD 0556
RD 0563
Lodi
San Joaquin
Stockton
Contra Costa
Legend
Acceptable
Minimally Acceptable
Unacceptable (labeled by LMAs)
City
River
Water Body
County Boundary

Figure 4.4

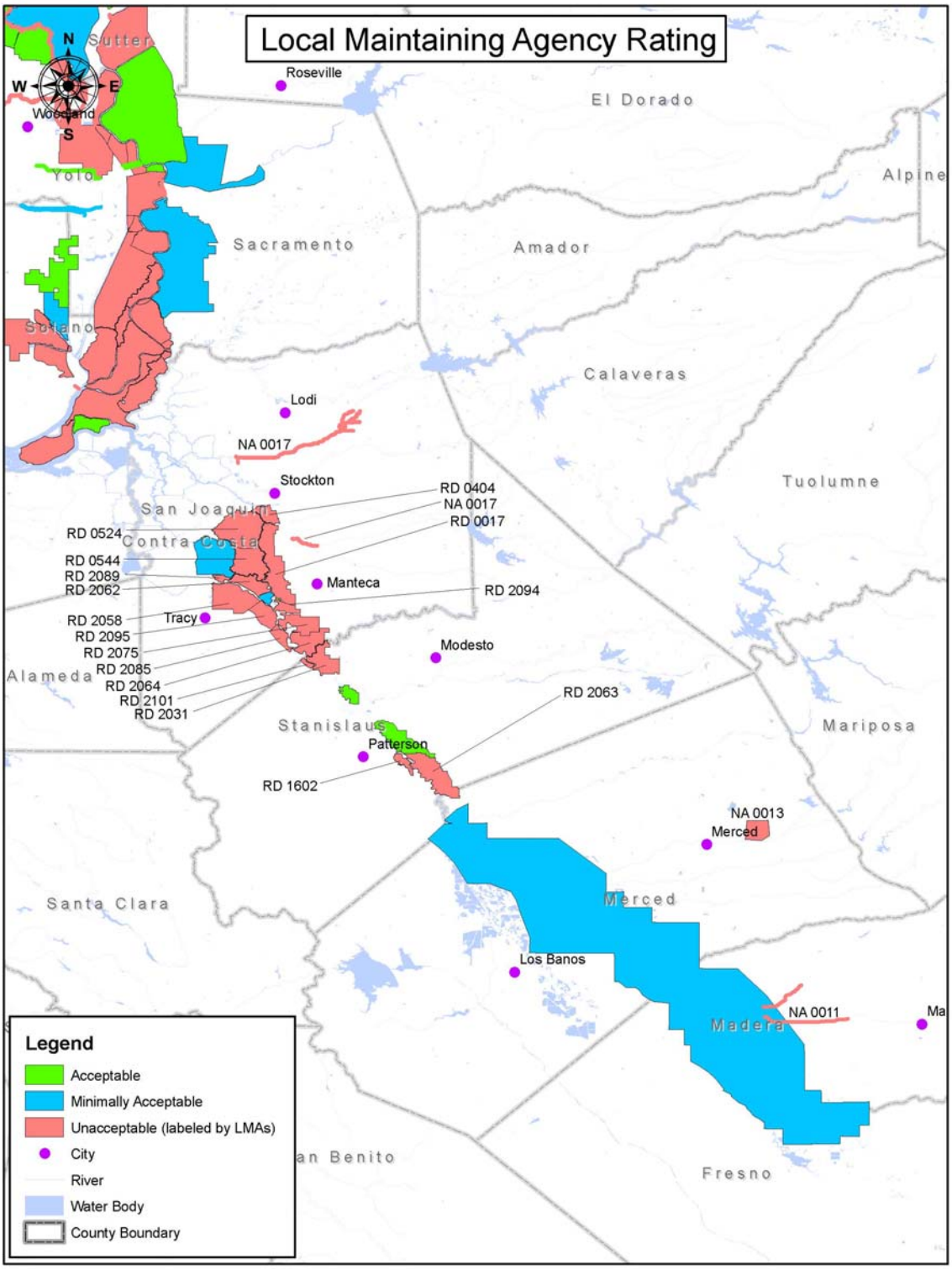

Local Maintaining Agency Rating
N
W
E
S
Sutter
Roseville
El Dorado
Woodland
Yolo
Alpine
Sacramento
Amador
Solano
Calaveras
Lodi
NA 0017
Stockton
RD 0404
NA 0017
RD 0017
Tuolumne
San Joaquin
RD 0524
Contra Costa
RD 0544
RD 2089
RD 2062
Manteca
RD 2094
RD 2058
Tracy
RD 2095
RD 2075
RD 2085
RD 2064
RD 2101
RD 2031
Modesto
Alameda
RD 2063
Stanislaus
Mariposa
Patterson
RD 1602
NA 0013
Merced
Santa Clara
Merced
Los Banos
NA 0011
Madera
Ma
an Benito
Fresno
Legend
Acceptable
Minimally Acceptable
Unacceptable (labeled by LMAs)
City
River
Water Body
County Boundary

Figure 4.5

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments					Overall District Ratings Exclude PO & CO Encroachments					Watershed
						M (mile)	M (%)	U (mile)	U (%)	Overall Unit	M (mile)	M (%)	U (mile)	U (%)	Overall Unit	
LD0001G	Levee District No. 0001(Glenn)	0		Right Bank Sacramento River	12.45	3.89	31.24%	0.19	1.53%	U	3.89	31.24%	0.19	1.53%	U	Sac
LD0001S	Levee District No. 0001(Sutter)	0	X	Right Bank Feather River	16.65	1.69	10.15%	0.23	1.38%	M	1.69	10.15%	0.23	1.38%	M	Sac
LD0002	Levee District No. 0002	0		Right Bank Sacramento River	4.89	0.17	3.48%	0	0.00%	A	0.17	3.48%	0	0.00%	A	Sac
LD0003	Levee District No. 0003	0		Left Bank Sacramento River	12.24	0.58	4.74%	0	0.00%	A	0.58	4.74%	0	0.00%	A	Sac
LD0009	Levee District No. 0009	0		Right Bank Feather River	6.24	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	Sac
MA0001	Maintenance Area No. 0001	0		Right Bank Sacramento River	17.12	1.83	10.69%	0	0.00%	M	1.83	10.69%	0	0.00%	M	Sac
MA0003	Maintenance Area No. 0003	0		Right Bank Feather River	5.19	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	Sac
MA0004	Maintenance Area No. 0004	0	X	Right Bank Sacramento River	3.40	0.21	6.18%	0	0.00%	A	0.21	6.18%	0	0.00%	A	Sac
MA0005	Maintenance Area No. 0005	1		Left Bank Butte Creek	15.29	1.68	10.99%	0	0.00%	M	4.53	13.60%	0	0.00%	M	Sac
MA0005	Maintenance Area No. 0005	2		Right Bank Butte Creek	16.53	1.35	8.17%	0	0.00%	A						Sac
MA0005	Maintenance Area No. 0005	3		Left Bank Little Chico Creek Diversion	1.50	1.5	100.00%	0	0.00%	U						Sac
MA0007	Maintenance Area No. 0007	0	X	Right Bank Feather River	12.07	2.4	19.88%	0.18	1.49%	U	2.4	19.88%	0.18	1.49%	U	Sac
MA0009	Maintenance Area No. 0009	0	X	Left Bank Sacramento River	19.61	0.8	4.08%	0.29	1.48%	M	0.8	4.08%	0.29	1.48%	M	Sac
MA0012	Maintenance Area No. 0012	0		Left Bank Colusa Basin Drain	11.31	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	Sac
MA0013	Maintenance Area No. 0013	1		Right Bank Cherokee Canal	18.87	0.2	1.06%	0	0.00%	A	0.57	1.36%	0	0.00%	A	Sac
MA0013	Maintenance Area No. 0013	2		Left Bank Cherokee Canal	23.10	0.37	1.60%	0	0.00%	A						Sac
MA0015	Murphy Slough @ M&T Ranch	0		Left Bank Murphy Slough	0.85	0.31	36.47%	0.82	96.47%	U	0.31	36.47%	0.82	96.47%	U	Sac
MA0016	Maintenance Area No. 0016	0	X	Right Bank Feather River	4.09	0.58	14.18%	0	0.00%	M	0.58	14.18%	0	0.00%	M	Sac
MA0017	Maintenance Area No. 0017	0		Left Bank Middle Creek	3.90	3.38	86.67%	0	0.00%	U	3.38	86.67%	0	0.00%	U	Misc
NA0001	American River Flood Control District	1	X	Left Bank Arcade Creek	2.10	0	0.00%	0	0.00%	A	1.53	4.60%	0.12	0.36%	M	Misc
NA0001	American River Flood Control District	2	X	Left Bank Natomas East Canal	3.95	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	3A	X	Right Bank American River	1.85	0.15	8.11%	0	0.00%	A						Sac
NA0001	American River Flood Control District	3B	X	Right Bank American River	0.93	0.01	1.08%	0	0.00%	A						Sac
NA0001	American River Flood Control District	4	X	Left Bank American River	10.97	1.37	12.49%	0.12	1.09%	M						Sac
NA0001	American River Flood Control District	5	X	Left Bank Sacramento River	0.40	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	6	X	Left Bank Linda Creek	1.30	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	7	X	Right Bank Arcade Creek	1.92	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	8		Left Bank Magpie Creek Diversion	1.48	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	9	X	Right Bank American River	4.32	0	0.00%	0	0.00%	A						Sac
NA0001	American River Flood Control District	10	X	Right Bank American River	4.04	0	0.00%	0	0.00%	A						Sac
NA0002	Brannan Andrus Levee Maintenance District	1		Right Bank Georgiana Slough	6.02	2.32	38.54%	0	0.00%	U	27.3	141.30%	14.1	72.98%	U	Sac
NA0002	Brannan Andrus Levee Maintenance District	2		Left Bank Sacramento River	13.30	24.98	187.82%	14.1	106.02%	U						Sac
NA0003	Butte County	1		Right Bank Mud Creek	7.29	0	0.00%	0	0.00%	A	0.57	2.02%	0	0.00%	A	Sac
NA0003	Butte County	2		Left Bank Mud Creek	8.20	0.46	5.61%	0	0.00%	A						Sac
NA0003	Butte County	2A		Left Bank Channel Slough	0.30	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	3		Right Bank Sycamore Creek and Both Banks Sheep Hollow Creek	4.16	0.03	0.72%	0	0.00%	A						Sac
NA0003	Butte County	4		Left Bank Sycamore Creek and Both Banks Dry Creek	2.94	0.07	2.38%	0	0.00%	A						Sac
NA0003	Butte County	5		Left Bank Big Chico Diversion	1.85	0.01	0.54%	0	0.00%	A						Sac
NA0003	Butte County	6		Left Bank Sacramento River	0.40	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	7		Left Bank Sacramento River	0.32	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	8		Left Bank Sacramento River	0.83	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	9		Left Bank Sacramento River	0.50	0	0.00%	0	0.00%	A						Sac

[1] Source: DWR Urban Levee Evaluations Program

-1

Figure 4.6

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments					Overall District Ratings Exclude PO & CO Encroachments					Watershed
						M (mile)	M (%)	U (mile)	U (%)	Overall Unit	M (mile)	M (%)	U (mile)	U (%)	Overall Unit	
NA0003	Butte County	10		Left Bank Sacramento River	0.26	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	11		Left Bank Sacramento River	0.38	0	0.00%	0	0.00%	A						Sac
NA0003	Butte County	12		Left Bank Sacramento River	0.76	0	0.00%	0	0.00%	A						Sac
NA0004	City of Marysville	1	X	Left Bank Simmerly Slough	3.25	0	0.00%	0	0.00%	A	1.16	10.19%	0	0.00%	M	Sac
NA0004	City of Marysville	2	X	Left Bank Feather River	1.27	0	0.00%	0	0.00%	A						Sac
NA0004	City of Marysville	3	X	Right Bank Yuba River	6.86	1.16	16.91%	0	0.00%	M						Sac
NA0005	City of Sacramento	0	X	Left Bank Sacramento River	3.63	1.66	45.73%	0	0.00%	U	1.66	45.73%	0	0.00%	U	Sac
NA0006	East Honcut Creek	0		Left Bank Honcut Creek	1.50	3.46	230.67%	0	0.00%	U	3.46	230.67%	0	0.00%	U	Sac
NA0008	Knights Landing Ridge Drainage District	1		Right Bank Knights Landing Ridge Cut	6.43	3.76	58.48%	0	0.00%	U	9.87	78.52%	0	0.00%	U	Sac
NA0008	Knights Landing Ridge Drainage District	2		Left Bank Knights Landing Ridge Cut	6.14	6.11	99.51%	0	0.00%	U						Sac
NA0009	Lake County	1		Left Bank Middle Creek	3.42	0.62	18.13%	0	0.00%	M	1.11	10.54%	0	0.00%	M	Misc
NA0009	Lake County	2		Right Bank Middle Creek	3.15	0.07	2.22%	0	0.00%	A						Misc
NA0009	Lake County	3		Left Bank Scotts Creek	1.39	0.2	14.39%	0	0.00%	M						Misc
NA0009	Lake County	4		Right Bank Poge, Alley and Clover Creek Diversion	1.53	0.22	14.38%	0	0.00%	M						Misc
NA0009	Lake County	5		Left Bank Clover Creek and Clover Creek Diversion	1.04	0	0.00%	0	0.00%	A						Misc
NA0010	Lower San Joaquin L.D.	1		Right Bank San Joaquin River	22.58	1.72	7.62%	0	0.00%	A	27.05	14.13%	0.01	0.01%	M	SJR
NA0010	Lower San Joaquin L.D.	2A		Left Bank San Joaquin River	7.87	0.01	0.13%	0.01	0.13%	M						SJR
NA0010	Lower San Joaquin L.D.	2B		Left Bank San Joaquin River	5.92	0.17	2.87%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	3		Right Bank San Joaquin River	2.16	0	0.00%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	4		Left Bank San Joaquin River	1.58	0.72	45.57%	0	0.00%	U						SJR
NA0010	Lower San Joaquin L.D.	5		Right Bank East Side Bypass	34.75	7.33	21.09%	0	0.00%	U						SJR
NA0010	Lower San Joaquin L.D.	6		Left Bank East Side Bypass	36.38	6.36	17.48%	0	0.00%	M						SJR
NA0010	Lower San Joaquin L.D.	7		Right Bank Bear Creek Bypass	3.62	0.04	1.10%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	8		Left Bank Bear Creek Bypass	3.63	0.01	0.28%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	9		Right Bank Owens Creek Bypass	0.88	0	0.00%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	10		Left Bank Owens Creek Bypass	0.82	0	0.00%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	11		Right Bank Mariposa Bypass	3.33	0	0.00%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	12		Left Bank Mariposa Bypass	3.36	0.01	0.30%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	13		Right Bank Ash Slough	1.27	2.54	200.00%	0	0.00%	U						SJR
NA0010	Lower San Joaquin L.D.	14		Left Bank Ash Slough	1.28	2.57	200.78%	0	0.00%	U						SJR
NA0010	Lower San Joaquin L.D.	15		Right Bank Berenda Slough	2.03	4.07	200.49%	0	0.00%	U						SJR
NA0010	Lower San Joaquin L.D.	16		Left Bank Berenda Slough	1.98	0.01	0.51%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	17		Right Bank Chowchilla Canal Bypass	16.09	0.02	0.12%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	18		Left Bank Chowchilla Canal Bypass	15.33	0.91	5.94%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	22		Left Bank East Side Canal	5.50	0.05	0.91%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	23		Right Bank San Joaquin River	10.25	0.11	1.07%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	24		Left Bank San Joaquin River	8.34	0.4	4.80%	0	0.00%	A						SJR
NA0010	Lower San Joaquin L.D.	25		Right Bank Salt Slough	2.47	0	0.00%	0	0.00%	A						SJR
NA0011	Madera County	1		Right Bank Ash Slough	2.41	4.26	176.76%	0.09	3.73%	U	56.662	212.62%	6.16	23.11%	U	SJR
NA0011	Madera County	2		Left Bank Ash Slough	2.07	3.15	152.17%	0	0.00%	U						SJR
NA0011	Madera County	3		Right Bank Berenda Slough	1.55	4.8	309.68%	0	0.00%	U						SJR
NA0011	Madera County	4		Left Bank Berenda Slough	2.28	7.84	343.86%	0	0.00%	U						SJR
NA0011	Madera County	5		Right Bank Fresno River	9.20	13.492	146.65%	0.12	1.30%	U						SJR
NA0011	Madera County	6		Left Bank Fresno River	9.14	23.12	252.95%	5.95	65.10%	U						SJR
NA0012	Melin Levee	0			0.59	0.43	72.88%	0	0.00%	U	0.43	72.88%	0	0.00%	U	Sac

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Overall District Ratings Exclude PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Watershed
NA0013	Merced Stream Group	1		Right Bank Black Rascal Diversion Channel	1.64	0.51	31.10%	0	0.00%	U	1.87	29.22%	0.14	2.19%	U	SJR
NA0013	Merced Stream Group	2		Left Bank Black Rascal Diversion Channel	1.88	0	0.00%	0	0.00%	A						SJR
NA0013	Merced Stream Group	3		Right Bank Owens Creek Diversion Channel	1.44	0.96	66.67%	0.01	0.69%	U						SJR
NA0013	Merced Stream Group	4		Left Bank Owens Creek Diversion Channel	1.44	0.4	27.78%	0.13	9.03%	U						SJR
NA0015	Plumas County	1		Left Bank Diversion Channel	1.89	3.78	200.00%	0	0.00%	U	6.46	200.62%	0	0.00%	U	Misc
NA0015	Plumas County	2		Right Bank Diversion Channel	1.33	2.68	201.50%	0	0.00%	U						Misc
NA0016	Sacramento River West Side Levee District	0		Right Bank Sacramento River	50.24	109.2	217.36%	0	0.00%	U	109.2	217.36%	0	0.00%	U	Sac
NA0017	San Joaquin F.C.D.	1		Left Bank South Branch of South Little John Creek	2.87	2.85	99.30%	0	0.00%	U	23.19	22.97%	1.49	1.48%	U	SJR
NA0017	San Joaquin F.C.D.	2	X	Right Bank North Branch of South Little John Creek	3.47	1.56	44.96%	0	0.00%	U						SJR
NA0017	San Joaquin F.C.D.	6		Left Bank Southern Pacific Railroad Drain	0.50	0	0.00%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	7	X	Right Bank Bear Creek	16.69	0.69	4.13%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	8	X	Left Bank Bear Creek	13.05	0.7	5.36%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	9	X	Left Bank Paddy Creek	1.54	0	0.00%	0.07	4.55%	M						SJR
NA0017	San Joaquin F.C.D.	10	X	Right Bank Paddy Creek	1.42	0	0.00%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	11	X	Right Bank North Paddy Creek	3.56	0.12	3.37%	0.03	0.84%	M						SJR
NA0017	San Joaquin F.C.D.	12	X	Left Bank North Paddy Creek	3.92	0.01	0.26%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	13	X	Left Bank Middle Paddy Creek	1.40	0	0.00%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	14	X	Right Bank Middle Paddy Creek	1.40	0.83	59.29%	0	0.00%	U						SJR
NA0017	San Joaquin F.C.D.	15	X	Right Bank Mormon Slough	25.62	6.84	26.70%	1.39	5.43%	U						SJR
NA0017	San Joaquin F.C.D.	16	X	Left Bank Mormon Slough	23.70	9.56	40.34%	0	0.00%	U						SJR
NA0017	San Joaquin F.C.D.	17	X	Right Bank Potter Creek	0.88	0.02	2.27%	0	0.00%	A						SJR
NA0017	San Joaquin F.C.D.	18	X	Left Bank Potter Creek	0.92	0.01	1.09%	0	0.00%	A						SJR
NA0018	Shea Levee	0		Left Bank Sacramento River	0.30	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	Sac
NA0019	Tehama County	1		Left Bank Deer Creek	4.11	0.38	9.25%	0	0.00%	A	6.287	46.09%	0.05	0.37%	U	Sac
NA0019	Tehama County	2		Right Bank Deer Creek	1.50	0.3	20.00%	0.05	3.33%	U						Sac
NA0019	Tehama County	4		Left Bank Elder Creek	4.07	3.14	77.15%	0	0.00%	U						Sac
NA0019	Tehama County	5		Right Bank Elder Creek	3.96	2.467	62.30%	0	0.00%	U						Sac
NA0020	West Interceptor	1		Right Bank West Interceptor Canal or South Levee	1.75	0.58	33.14%	0	0.00%	U	3.71	77.94%	0	0.00%	U	Sac
NA0020	West Interceptor	2		Left Bank East Interceptor Canal or South Levee	3.01	3.13	103.99%	0	0.00%	U						Sac
NA0021	Yolo County Cache Creek	0		Right Bank Cache Creek	0.29	1.214	418.62%	0	0.00%	U	1.214	418.62%	0	0.00%	U	Sac
NA0022	Yolo Service Area 6	0		Right Bank Sacramento River	5.97	10.307	172.65%	0	0.00%	U	10.307	172.65%	0	0.00%	U	Sac
NA0023	Turlock Irrigation District - Gomes Lake (Formerly Unit 2, RD2091)	0		Spur Levee Gomes Lake (Formerly Unit 2, RD2091)	0.33	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	SJR
RD0001	Reclamation District No. 0001	0		Right Bank Old River	1.15	0.18	15.65%	0	0.00%	M	0.18	15.65%	0	0.00%	M	SJR
RD0003	Reclamation District No. 0003	1		Left Bank Steamboat Slough	11.03	3.37	30.55%	0	0.00%	U	29.16	101.78%	0.01	0.03%	U	Sac
RD0003	Reclamation District No. 0003	2		Right Bank Sacramento River	17.62	25.79	146.37%	0.01	0.06%	U						Sac
RD0010	Reclamation District No. 0010	1		Right Bank Simmerly Slough	7.68	7.78	101.30%	0	0.00%	U	17.54	79.98%	0	0.00%	U	Sac
RD0010	Reclamation District No. 0010	2		Left Bank Feather River	11.24	7.8	69.40%	0	0.00%	U						Sac
RD0010	Reclamation District No. 0010	3		Left Bank Honcut Creek	3.01	1.96	65.12%	0	0.00%	U						Sac
RD0017	Reclamation District No. 0017	1	X	Left Bank French Camp Slough	1.81	1.81	100.00%	1.91	105.52%	U	30.99	191.53%	16.38	101.24%	U	SJR

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Overall District Ratings Exclude PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Watershed
RD0017	Reclamation District No. 0017	2	X	Right Bank San Joaquin River	14.37	29.18	203.06%	14.47	100.70%	U						SJR
RD0070	Reclamation District No. 0070	1		Right Bank Sutter Bypass / Butte Slough	8.00	0	0.00%	0	0.00%	A	0.11	0.47%	0.36	1.53%	M	Sac
RD0070	Reclamation District No. 0070	2		Left Bank Sacramento River	15.57	0.11	0.71%	0.36	2.31%	M						Sac
RD0108	Reclamation District No. 0108	0		Left Bank Colusa Basin Drain	20.59	0.86	4.18%	0	0.00%	A	0.86	4.18%	0	0.00%	A	Sac
RD0150	Reclamation District No. 0150	1		Left Bank Sutter Slough	0.54	0.97	179.63%	0	0.00%	U	27.85	154.12%	1.49	8.25%	U	Sac
RD0150	Reclamation District No. 0150	2		Right Bank Sacramento River	7.95	17.16	215.85%	0.25	3.14%	U						Sac
RD0150	Reclamation District No. 0150	3		Left Bank Elk Slough	9.58	9.72	101.46%	1.24	12.94%	U						Sac
RD0307	Reclamation District No. 0307	0	X	Right Bank Sacramento River	6.65	22.854	343.67%	10.85	163.16%	U	22.854	343.67%	10.85	163.16%	U	Sac
RD0341	Reclamation District No. 0341	1		Right Bank Threemile Slough	3.34	1.17	35.03%	0	0.00%	U	12.06	92.20%	2.59	19.80%	U	Sac
RD0341	Reclamation District No. 0341	2		Left Bank Sacramento River	9.74	10.89	111.81%	2.59	26.59%	U						Sac
RD0349	Reclamation District No. 0349	1		Right Bank Sacramento River	1.59	3.92	246.54%	0	0.00%	U	32.279	258.44%	0.26	2.08%	U	Sac
RD0349	Reclamation District No. 0349	2		Right Bank Steamboat Slough	4.35	15.023	345.36%	0.15	3.45%	U						Sac
RD0349	Reclamation District No. 0349	3		Left Bank Sutter Slough	6.55	13.336	203.60%	0.11	1.68%	U						Sac
RD0369	Reclamation District No. 0369	0		Left Bank Sacramento River	0.80	2.24	280.00%	0	0.00%	U	2.24	280.00%	0	0.00%	U	Sac
RD0404	Reclamation District No. 0404	1	X	Right Bank San Joaquin River	2.30	0.95	41.30%	0.11	4.78%	U	2.05	50.49%	0.39	9.61%	U	SJR
RD0404	Reclamation District No. 0404	2	X	Right Bank French Camp Slough	1.76	1.1	62.50%	0.28	15.91%	U						SJR
RD0501	Reclamation District No. 0501	1		Right Bank Steamboat Slough	6.85	16.76	244.67%	0	0.00%	U	53.708	260.85%	0.55	2.67%	U	Sac
RD0501	Reclamation District No. 0501	2		Left Bank Cache Slough	3.57	6.11	171.15%	0.04	1.12%	U						Sac
RD0501	Reclamation District No. 0501	3		Left Bank Miner Slough	7.84	27.32	348.47%	0.51	6.51%	U						Sac
RD0501	Reclamation District No. 0501	4		Right Bank Sutter Slough	2.33	3.518	150.99%	0	0.00%	U						Sac
RD0524	Reclamation District No. 0524	0		Left Bank San Joaquin River	6.26	3.39	54.15%	0.34	5.43%	U	3.39	54.15%	0.34	5.43%	U	SJR
RD0536	Reclamation District No. 0536	1		Right Bank Lindsey Slough	5.66	2	35.34%	1.49	26.33%	U	17.72	166.70%	1.49	14.02%	U	Sac
RD0536	Reclamation District No. 0536	2		Right Bank Yolo Bypass	4.97	15.72	316.30%	0	0.00%	U						Sac
RD0537	Reclamation District No. 0537	1	X	Right Bank Sacramento River	4.76	7.314	153.66%	0	0.00%	U	7.354	121.75%	0	0.00%	U	Sac
RD0537	Reclamation District No. 0537	2	X	Left Bank Yolo Bypass	1.28	0.04	3.13%	0	0.00%	A						Sac
RD0544	Reclamation District No. 0544	1		Left Bank San Joaquin River	6.11	3.79	62.03%	0.24	3.93%	U	5.77	55.86%	0.25	2.42%	U	SJR
RD0544	Reclamation District No. 0544	2		Right Bank Old River	4.22	1.98	46.92%	0.01	0.24%	U						SJR
RD0551	Reclamation District No. 0551	0		Left Bank Sacramento River	6.84	4.04	59.06%	0.62	9.06%	U	4.04	59.06%	0.62	9.06%	U	Sac
RD0554	Reclamation District No. 0554	0		Left Bank Sacramento River	1.15	1.82	158.26%	0	0.00%	U	1.82	158.26%	0	0.00%	U	Sac
RD0556	Reclamation District No. 0556	1		Right Bank Georgiana Slough	5.47	3.21	58.68%	0.13	2.38%	U	12.28	109.74%	0.92	8.22%	U	Sac
RD0556	Reclamation District No. 0556	2		Left Bank Sacramento River	5.72	9.07	158.57%	0.79	13.81%	U						Sac
RD0563	Reclamation District No. 0563	0		Left Bank Georgiana Slough (Tyler Island)	12.38	22.51	181.83%	14.94	120.68%	U	22.51	181.83%	14.94	120.68%	U	Sac
RD0755	Reclamation District No. 0755	0		Left Bank Sacramento River	1.86	1.93	103.76%	0.09	4.84%	U	1.93	103.76%	0.09	4.84%	U	Sac
RD0765	Reclamation District No. 0765	0	X	Right Bank Sacramento River	1.74	0.83	47.70%	0.53	30.46%	U	0.83	47.70%	0.53	30.46%	U	Sac
RD0784	Reclamation District No. 0784	1	X	Left Bank Yuba River	2.22	0	0.00%	0	0.00%	A	3.44	9.75%	0.49	1.39%	M	Sac
RD0784	Reclamation District No. 0784	2	X	Left Bank Feather River	13.64	0.02	0.15%	0	0.00%	A						Sac
RD0784	Reclamation District No. 0784	3	X	Right Bank Bear River	4.73	0	0.00%	0	0.00%	A						Sac
RD0784	Reclamation District No. 0784	4	X	Right Bank Western Pacific Interceptor Canal	6.34	0	0.00%	0	0.00%	A						Sac
RD0784	Reclamation District No. 0784	5		Left Bank Western Pacific Interceptor Canal	4.21	2.97	70.55%	0	0.00%	U						Sac
RD0784	Reclamation District No. 0784	6		Right Bank South Dry Creek	0.25	0	0.00%	0	0.00%	A						Sac
RD0784	Reclamation District No. 0784	7		Left Bank Yuba River or South Levee	3.91	0.45	11.51%	0.49	12.53%	U						Sac
RD0785	Reclamation District No. 0785	1		Right Bank Sacramento River	2.37	2.66	112.24%	0	0.00%	U	3.14	55.38%	0	0.00%	U	Sac
RD0785	Reclamation District No. 0785	2		Left Bank Yolo Bypass	3.30	0.48	14.55%	0	0.00%	M						Sac

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments					Overall District Ratings Exclude PO & CO Encroachments					Watershed
						M (mile)	M (%)	U (mile)	U (%)	Overall Unit	M (mile)	M (%)	U (mile)	U (%)	Overall Unit	
RD0787	Reclamation District No. 0787	0		Left Bank Colusa Basin Drain	4.40	0.163	3.70%	0	0.00%	A	0.163	3.70%	0	0.00%	A	Sac
RD0817	Reclamation District No. 0817	1		Left Bank South Dry Creek	3.82	2.34	61.26%	0	0.00%	U	4.66	52.13%	0	0.00%	U	Sac
RD0817	Reclamation District No. 0817	2		Right Bank Bear River	3.87	0.86	22.22%	0	0.00%	U						Sac
RD0817	Reclamation District No. 0817	3		Right Bank South Dry Creek	1.25	1.46	116.80%	0	0.00%	U						Sac
RD0827	Reclamation District No. 0827	1		Right Bank Sacramento River	1.45	2.783	191.93%	0	0.00%	U	5.382	125.45%	0	0.00%	U	Sac
RD0827	Reclamation District No. 0827	2		Left Bank Yolo Bypass	2.84	2.599	91.51%	0	0.00%	U						Sac
RD0900	Reclamation District No. 0900	1	X	Right Bank Sacramento River	7.84	3.24	41.33%	0.09	1.15%	U	5.51	40.60%	0.09	0.66%	U	Sac
RD0900	Reclamation District No. 0900	2	X	Left Bank Yolo Bypass	5.73	2.27	39.62%	0	0.00%	U						Sac
RD0999	Reclamation District No. 0999	1		Left Bank Yolo Bypass	15.43	1.09	7.06%	0	0.00%	A	13.28	41.03%	17.33	53.54%	U	Sac
RD0999	Reclamation District No. 0999	2		Right Bank Miner Slough	2.32	0.69	29.74%	0	0.00%	U						Sac
RD0999	Reclamation District No. 0999	3		Right Bank Sutter Slough	3.74	1.77	47.33%	0	0.00%	U						Sac
RD0999	Reclamation District No. 0999	4		Right Bank Sacramento River	1.22	0.17	13.93%	0.27	22.13%	U						Sac
RD0999	Reclamation District No. 0999	5		Right Bank Elk Slough	9.66	9.56	98.96%	17.06	176.60%	U						Sac
RD1000	Reclamation District No. 1000	1	X	Left Bank Sacramento River	18.60	0.23	1.24%	0	0.00%	A	2.27	5.33%	0	0.00%	A	Sac
RD1000	Reclamation District No. 1000	2	X	Right Bank American River	2.33	0	0.00%	0	0.00%	A						Sac
RD1000	Reclamation District No. 1000	3	X	Right Bank Natomas East Canal	17.30	2.01	11.62%	0	0.00%	M						Sac
RD1000	Reclamation District No. 1000	4	X	Left Bank Natomas Cross Canal	4.38	0.03	0.68%	0	0.00%	A						Sac
RD1001	Reclamation District No. 1001	1		Right Bank Yankee Slough	4.17	2.24	53.72%	0	0.00%	U	32.17	73.06%	1.28	2.91%	U	Sac
RD1001	Reclamation District No. 1001	2		Left Bank Yankee Slough	3.66	3.553	97.08%	0	0.00%	U						Sac
RD1001	Reclamation District No. 1001	3		Left Bank Bear River	12.60	4.077	32.36%	0.04	0.32%	U						Sac
RD1001	Reclamation District No. 1001	4		Left Bank Feather River	13.36	11.614	86.93%	1.24	9.28%	U						Sac
RD1001	Reclamation District No. 1001	5		Right Bank Natomas Cross Canal	5.44	0.02	0.37%	0	0.00%	A						Sac
RD1001	Reclamation District No. 1001	6		Right Bank East Side Canal	4.80	10.666	222.21%	0	0.00%	U						Sac
RD1500	Reclamation District No. 1500	1		Left Bank Sacramento River	33.58	2.31	6.88%	0.68	2.03%	M	4.58	8.43%	0.68	1.25%	M	Sac
RD1500	Reclamation District No. 1500	2		Right Bank Sutter Bypass	20.77	2.27	10.93%	0	0.00%	M						Sac
RD1600	Reclamation District No. 1600	1		Right Bank Sacramento River	10.51	4.708	44.80%	0	0.00%	U	10.536	71.82%	0	0.00%	U	Sac
RD1600	Reclamation District No. 1600	2		Left Bank Yolo Bypass	4.16	5.828	140.10%	0	0.00%	U						Sac
RD1601	Reclamation District No. 1601	0		Left Bank Threemile Slough	2.47	0.02	0.81%	0	0.00%	A	0.02	0.81%	0	0.00%	A	Sac
RD1602	Reclamation District No. 1602	0		Left Bank San Joaquin River	6.29	6.99	111.13%	0.01	0.16%	U	6.99	111.13%	0.01	0.16%	U	SJR
RD1660	Reclamation District No. 1660	1		Left Bank Sacramento River	3.00	0.08	2.67%	0	0.00%	A	0.08	0.66%	0	0.00%	A	Sac
RD1660	Reclamation District No. 1660	2		Right Bank Sutter Bypass	9.14	0	0.00%	0	0.00%	A						Sac
RD2031	Reclamation District No. 2031	1		Left Bank Stanislaus River	7.15	2.91	40.70%	1.81	25.31%	U	9.16	69.45%	1.89	14.33%	U	SJR
RD2031	Reclamation District No. 2031	2		Right Bank San Joaquin River	6.04	6.25	103.48%	0.08	1.32%	U						SJR
RD2035	Reclamation District No. 2035	1	X	Right Bank Cache Creek Settling Basin or South Levee	1.98	3.96	200.00%	0	0.00%	U	4.69	38.89%	0	0.00%	U	Sac
RD2035	Reclamation District No. 2035	2	X	Right Bank Yolo Bypass or West Levee	7.57	0.44	5.81%	0	0.00%	A						Sac
RD2035	Reclamation District No. 2035	3		Left Bank Willow Slough or North Levee	2.51	0.29	11.55%	0	0.00%	M						Sac
RD2058	Reclamation District No. 2058	0		Left Bank Paradise Cut	6.71	31.29	466.32%	0.662	9.87%	U	31.29	466.32%	0.662	9.87%	U	SJR
RD2060	Reclamation District No. 2060	1		Left Bank Lindsey & Barker Sloughs	7.21	1.07	14.84%	0	0.00%	M	3.72	23.34%	0	0.00%	U	Sac
RD2060	Reclamation District No. 2060	2		Right Bank Ulatis Creek	3.70	2.47	66.76%	0	0.00%	U						Sac
RD2060	Reclamation District No. 2060	3		Right Bank Cache Slough	5.03	0.18	3.58%	0	0.00%	A						Sac
RD2062	Reclamation District No. 2062	1		Left Bank San Joaquin River	2.69	0.03	1.12%	0.01	0.37%	M	6.01	48.66%	0.08	0.65%	U	SJR
RD2062	Reclamation District No. 2062	2		Right Bank Paradise Cut	4.03	0.3	7.44%	0	0.00%	A						SJR
RD2062	Reclamation District No. 2062	3		Left Bank Old River	5.63	5.68	100.89%	0.07	1.24%	U						SJR
RD2063	Reclamation District No. 2063	0		Right Bank San Joaquin River	10.63	27.69	260.49%	0.61	5.74%	U	27.69	260.49%	0.61	5.74%	U	SJR

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments					Overall District Ratings Exclude PO & CO Encroachments					Watershed
						M (mile)	M (%)	U (mile)	U (%)	Overall Unit	M (mile)	M (%)	U (mile)	U (%)	Overall Unit	
RD2064	Reclamation District No. 2064	1		Right Bank San Joaquin River	5.70	13.69	240.18%	0	0.00%	U	26.25	220.59%	0	0.00%	U	SJR
RD2064	Reclamation District No. 2064	2		Right Bank Stanislaus River	6.20	12.56	202.58%	0	0.00%	U						SJR
RD2068	Reclamation District No. 2068	1		Right Bank Yolo Bypass	5.50	0.77	14.00%	0	0.00%	M	0.77	8.82%	0	0.00%	A	Sac
RD2068	Reclamation District No. 2068	2		Left Bank Back or West Levee	3.23	0	0.00%	0	0.00%	A						Sac
RD2075	Reclamation District No. 2075	0		Right Bank San Joaquin River	7.52	4.09	54.39%	0.21	2.79%	U	4.09	54.39%	0.21	2.79%	U	SJR
RD2085	Reclamation District No. 2085	1		Left Bank San Joaquin River	5.20	13.71	263.65%	0	0.00%	U	14	226.54%	0	0.00%	U	SJR
RD2085	Reclamation District No. 2085	2		Spur Levee San Joaquin River	0.69	0	0.00%	0	0.00%	A						SJR
RD2085	Reclamation District No. 2085	3		Spur Levee San Joaquin River	0.29	0.29	100.00%	0	0.00%	U						SJR
RD2089	Reclamation District No. 2089	1		Right Bank Old River	1.53	1.08	70.59%	0.02	1.31%	U	2.07	71.38%	0.03	1.03%	U	SJR
RD2089	Reclamation District No. 2089	2		Right Bank Salmon Slough	1.37	0.99	72.26%	0.01	0.73%	U						SJR
RD2091	Reclamation District No. 2091	0		Right Bank San Joaquin River	7.59	0.01	0.13%	0	0.00%	A	0.01	0.13%	0	0.00%	A	SJR
RD2092	Reclamation District No. 2092	0		Right Bank San Joaquin River	3.76	0.14	3.72%	0	0.00%	A	0.14	3.72%	0	0.00%	A	SJR
RD2094	Reclamation District No. 2094	1		Right Bank San Joaquin River	2.82	4.49	159.22%	0	0.00%	U	5.41	164.94%	0	0.00%	U	SJR
RD2094	Reclamation District No. 2094	2		Spur Levee San Joaquin River	0.46	0.92	200.00%	0	0.00%	U						SJR
RD2095	Reclamation District No. 2095	1		Left Bank Paradise Cut	1.45	1.45	100.00%	0.02	1.38%	U	5.09	105.38%	0.03	0.62%	U	SJR
RD2095	Reclamation District No. 2095	2		Left Bank San Joaquin River	3.38	3.64	107.69%	0.01	0.30%	U						SJR
RD2096	Reclamation District No. 2096	0		Right Bank San Joaquin River	0.17	0	0.00%	0	0.00%	A	0	0.00%	0	0.00%	A	SJR
RD2098	Reclamation District No. 2098	1		Right Bank Yolo Bypass	3.60	0	0.00%	0	0.00%	A	1.51	13.75%	0	0.00%	M	Sac
RD2098	Reclamation District No. 2098	1A		Right Bank Cross Canal	0.55	0	0.00%	0	0.00%	A						Sac
RD2098	Reclamation District No. 2098	2		Left Bank Cache Slough	2.01	0.93	46.27%	0	0.00%	U						Sac
RD2098	Reclamation District No. 2098	3		Left Bank Haas Slough	1.89	0.58	30.69%	0	0.00%	U						Sac
RD2098	Reclamation District No. 2098	4		Left Bank Back Levee	2.93	0	0.00%	0	0.00%	A						Sac
RD2101	Reclamation District No. 2101	1		Left Bank San Joaquin River	3.20	5.08	158.75%	0.09	2.81%	U	5.09	145.01%	0.09	2.56%	U	SJR
RD2101	Reclamation District No. 2101	2		Spur Levee San Joaquin River	0.31	0.01	3.23%	0	0.00%	A						SJR
RD2103	Reclamation District No. 2103	1		Left Bank South Dry Creek	4.77	0.36	7.55%	0	0.00%	A	0.5	5.12%	0	0.00%	A	Sac
RD2103	Reclamation District No. 2103	2		Right Bank Bear River	5.00	0.14	2.80%	0	0.00%	A						Sac
RD2104	Reclamation District No. 2104	1		Left Bank Cache Slough	2.60	2.35	90.38%	0.1	3.85%	U	4.56	61.62%	0.1	1.35%	U	Sac
RD2104	Reclamation District No. 2104	2		Right Bank Haas Slough	4.80	2.21	46.04%	0	0.00%	U						Sac
RD2107	Reclamation District No. 2107	1		Left Bank San Joaquin River	2.37	0.83	35.02%	0	0.00%	U	0.84	19.95%	0	0.00%	M	SJR
RD2107	Reclamation District No. 2107	2		Right Bank Paradise Cut	1.84	0.01	0.54%	0	0.00%	A						SJR
ST0001	Cache Creek	1		Left Bank Cache Creek or North Levee	11.81	0.36	3.05%	0.28	2.37%	M	0.89	3.63%	0.28	1.14%	M	SJR
ST0001	Cache Creek	2	X	Right Bank Cache Creek or South Levee	6.94	0.53	7.64%	0	0.00%	A						Sac
ST0001	Cache Creek	3		West Training Levee of Cache Creek Settling Basin	0.00	0	0.00%	0	0.00%	A						Sac
ST0001	Cache Creek	4		East Training Levee of Cache Creek Settling Basin	2.61	0	0.00%	0	0.00%	A						Sac
ST0001	Cache Creek	5	X	Cache Creek Settling Basin Extension Levee	3.17	0	0.00%	0	0.00%	A						Sac
ST0002	East Levee S.B.P.	0	X	Left Bank Sutter Bypass	22.12	0	0.00%	0.02	0.09%	M	0	0.00%	0.02	0.09%	M	Sac
ST0003	East Levee Sac River	1		Left Bank Sacramento River	20.39	1.47	7.21%	0	0.00%	A	1.74	6.38%	0	0.00%	A	Sac
ST0003	East Levee Sac River	2		Right Bank Colusa Bypass	2.25	0.13	5.78%	0	0.00%	A						Sac
ST0003	East Levee Sac River	3		Left Bank Colusa Bypass	2.33	0.03	1.29%	0	0.00%	A						Sac
ST0003	East Levee Sac River	4		Right Bank Moulton Bypass	0.30	0.01	3.33%	0	0.00%	A						Sac
ST0003	East Levee Sac River	5		Left Bank Moulton Bypass	2.00	0.1	5.00%	0	0.00%	A						Sac
ST0004	East Levee Yolo Bypass	0		Left Bank Yolo Bypass	2.00	0.764	38.20%	0	0.00%	U	0.764	38.20%	0	0.00%	U	Sac

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

2007 Unit and LMA Deficiency Percentages and Ratings

District Short Name	District Name	Unit	Urban Levee[1]	Waterway	Length	Unit Ratings EXCLUDE PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Overall District Ratings Exclude PO & CO Encroachments: M (mile)	M (%)	U (mile)	U (%)	Overall Unit	Watershed
ST0005	Hamilton Bend (Feather River West Levee)	0		Right Bank Feather River or West Levee	3.38	16.35	483.73%	0	0.00%	U	16.35	483.73%	0	0.00%	U	Sac
ST0006	Nelson Bend (Feather River West Levee)	0		Right Bank Feather River or West Levee	0.50	0.74	148.00%	1	200.00%	U	0.74	148.00%	1	200.00%	U	Sac
ST0007	Putah Creek	1	X	Left Bank Putah Creek or North Levee	8.99	0.74	8.23%	0	0.00%	A	1.646	10.10%	0	0.00%	M	Sac
ST0007	Putah Creek	2		Right Bank Putah Creek or South Levee	7.30	0.906	12.41%	0	0.00%	M						Sac
ST0008	Sacramento Bypass	1		Right Bank Sacramento Bypass or North Levee	1.79	0.03	1.68%	0	0.00%	A	0.03	0.84%	0	0.00%	A	Sac
ST0008	Sacramento Bypass	2	X	Left Bank Sacramento Bypass or South Levee	1.77	0	0.00%	0	0.00%	A						Sac
ST0009	Tisdale Bypass	1		Left Bank Tisdale Bypass	4.50	0.01	0.22%	0	0.00%	A	0.01	0.11%	0	0.00%	A	Sac
ST0009	Tisdale Bypass	2		Right Bank Tisdale Bypass	4.50	0	0.00%	0	0.00%	A						Sac
ST0010	Wadsworth Canal	1	X	Left Bank Wadsworth Canal	4.66	0.05	1.07%	0	0.00%	A	0.06	0.64%	0	0.00%	A	Sac
ST0010	Wadsworth Canal	2		Right Bank Wadsworth Canal	4.66	0.01	0.21%	0	0.00%	A						Sac
ST0011	West Levee Yolo Bypass	1		Right Bank Yolo Bypass or West Levee	2.72	1.771	65.11%	0.05	1.84%	U	1.781	19.05%	0.05	0.53%	U	Sac
ST0011	West Levee Yolo Bypass	2		Right Bank Yolo Bypass or West Levee	1.52	0	0.00%	0	0.00%	A						Sac
ST0011	West Levee Yolo Bypass	3		Right Bank Yolo Bypass or West Levee	1.50	0	0.00%	0	0.00%	A						Sac
ST0011	West Levee Yolo Bypass	4	X	Right Bank Yolo Bypass or West Levee	3.61	0.01	0.28%	0	0.00%	A						Sac
ST0012	Willow Slough	1		Left Bank Willow Slough Bypass or North Levee	5.09	0.4	7.86%	0	0.00%	A	0.54	4.33%	0	0.00%	A	Sac
ST0012	Willow Slough	2	X	Right Bank Willow Slough Bypass or South Levee	7.37	0.14	1.90%	0	0.00%	A						Sac

1571.13

Total	271	893.17	100.77	Total	107
A	117	56.8%	6.4%	A	25
M	27			M	18
U	127			U	64

M	U	M & U
0% A	0% A	0% A
10% M	0.01% M	0.01% M
20% U	5% U	20% U
5000% U	5000% U	5000% U

[1] Source: DWR Urban Levee Evaluations Program

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Figure 4.6, Cont.

TEN-YEAR-MAINTENANCE RECORD 1998 - 2007
Overall Maintenance Rating, By Year (Composite Ratings of Multi-Unit Districts)

A: Acceptable	S: Satisfactory	C: Compliant
M: Minimally Acceptable	M: Marginally Satisfactory	I: Improvement Needed
U: Unacceptable	U: Unsatisfactory	N: Non-Compliant

Short Name	Agency	Miles	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
LD0001G	LD0001 Glenn County, Sacramento River	12.40	C	C	C	C	C	C	C	C	M	U
LD0001S	LD0001 Sutter County, Feather River	16.70	C	C	C	C	C	C	C	C	S	M
LD0002	LD0002 Glenn County, Sacramento River	4.90	C	C	C	C	C	C	C	I	M	A
LD0003	LD0003 Glenn County, Sacramento River	12.20	I	C	C	C	C	C	C	C	M	A
LD0009	LD0009 Sutter County, Feather River	6.20	C	C	C	C	C	C	C	C	S	A
MA0001	MA-0001 Reclamation District 2047	17.10	C	C	C	C	C	C	C	C	M	M
MA0003	MA-0003 Reclamation District 803 - 823	5.20	C	C	C	C	C	C	C	C	S	A
MA0004	MA-0004 Reclamation District 81/Washington Levee District	3.40	C	C	C	C	C	C	C	C	S	A
MA0005	MA-0005 Butte Creek	33.40	C	C	C	C	C	C	C	C	S	M
MA0007	MA-0007 Drainage District 1 and Unorganized	12.10	C	C	C	C	C	C	C	C	M	U
MA0009	MA-0009 East Levee Sacramento River	19.60	C	C	C	C	C	C	C	C	S	M
MA0012	MA-0012 Colusa Basin Drain	11.30	C	C	C	C	C	C	C	C	S	A
MA0013	MA-0013 Cherokee Canal	42.00	C	C	C	C	C	C	C	C	M	A
MA0015	MA-0015 Murphy Slough at M&T Ranch	0.80	I	C	I	C	C	C	C	C	S	U
MA0016	MA-0016 Reclamation District 777	4.10	C	C	C	C	C	C	C	C	S	M
MA0017	MA-0017	3.90	-	-	-	C	I	I	I	I	M	U
NA0001	American River Flood District	34.20	C	C	C	C	C	C	C	C	S	M
NA0002	Brannan-Andrus Levee Maintenance District	19.30	C	C	C	C	C	C	I	C	M	U
NA0003	Butte County Chico, Mud and Sandy Creeks	24.70	C	C	C	C	C	C	C	C	S	A
NA0004	Marysville Levee District	11.40	C	C	C	C	C	C	C	C	S	M
NA0005	City of Sacramento	3.60	C	C	C	C	C	C	C	C	S	U
NA0006	Eastern Honcut Creek Area (Unorganized)	1.50	C	C	C	C	C	C	C	C	S	U
NA0008	Knights Landing Ridge Drainage District	12.60	C	C	C	C	C	C	C	C	S	U
NA0009	Lake County Flood Control District	14.30	C	C	C	C	C	C	C	C	S	M
NA0010	Lower San Joaquin Levee District	200.90	C	C	C	C	C	C	C	C	S	M
NA0011	Madera County Flood Control and Water Conservation Agency	26.70	C	C	C	C	C	C	C	C	S	U
NA0012	Solano County, Mellin Levee	0.60	N	C	C	C	C	C	C	C	S	U
NA0013	Merced County Stream Group (Merced Irrigation District)	6.30	I	I	I	I	I	I	I	N	M	U
NA0015	Plumas County	3.20	C	C	C	C	C	C	C	C	S	U
NA0016	Sacramento River West Side Levee District	50.20	C	C	C	C	C	C	C	C	M	U

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Figure 4.7

TEN-YEAR-MAINTENANCE RECORD 1998 - 2007
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Short Name	Agency	Miles	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
NA0017	San Joaquin County Flood Control District - Mormon Slough, Stockton Diverting Canal and Calaveras River	51.60	I	N	N	I	C	C	C	C	M	U
NA0017	San Joaquin County Flood Control District - Bear Creek	46.50	C	C	C	C	C	C	C	C	S	U
NA0018	Fish and Game (Shea Levee)	0.30	C	C	C	C	C	C	C	C	S	A
NA0019	Tehama County, Elder Creek	8.00	C	C	C	C	C	C	C	C	M	U
NA0020	East Interceptor Canal South Levee	3.00	C	C	C	C	N	N	C	C	S	U
NA0021	Yolo County Cache Creek	0.30	C	C	C	C	C	C	C	C	S	U
NA0022	Yolo County Service Area 6	6.00	N	N	I	C	C	C	C	C	M	U
NA0023	Turlock Irrigation District	0.30	-	-	-	C	C	C	C	C	S	A
RD0001	RD 0001-Union Island	1.20	C	C	C	C	C	C	C	C	S	M
RD0003	RD 0003-Grand Island	28.60	C	C	C	C	C	C	C	C	S	U
RD0010	RD 0010-Simmerly	21.90	C	C	C	C	C	C	C	C	S	U
RD0017	RD 0017-Mossdale	16.20	C	C	C	C	C	C	C	C	M	U
RD0070	RD 0070-Meridian	23.60	C	C	C	C	C	C	C	C	S	M
RD0108	RD 0108-River Farm	20.60	C	C	C	C	C	C	C	C	S	A
RD0150	RD 0150-Merritt Landing	18.10	N	N	I	I	I	I	I	I	M	U
RD0307	RD 0307-Lisbon	6.70	N	N	N	I	I	I	I	I	S	U
RD0341	RD 0341-Sherman Island	9.70	I	C	C	C	C	C	C	C	S	U
RD0349	RD 0349-Sutter Island	12.60	I	I	C	C	I	I	C	I	S	U
RD0369	RD 0369-Libby-McNeil	0.80	I	N	N	I	I	I	C	I	S	U
RD0404	RD 0404-Boggs	4.10	C	I	I	I	C	C	C	I	M	U
RD0501	RD 0501-Ryer Island	20.50	C	C	C	C	I	I	C	I	S	U
RD0524	RD 0524-Middle Roberts Island	6.30	I	I	I	I	I	I	I	I	M	U
RD0536	RD 0536-Egbert Tract	10.70	I	I	I	C	C	C	C	C	S	U
RD0537	RD 0537-Lovdal	6.00	I	C	C	C	C	C	C	C	S	U
RD0544	RD 0544-Upper Roberts Island	10.30	C	C	C	C	C	C	C	I	M	U
RD0551	RD 0551-Pearson District	6.80	N	N	N	I	I	I	I	I	S	U
RD0554	RD 0554-Walnut Grove	1.20	I	N	N	I	I	I	I	I	S	U
RD0556	RD 0556-Upper Andrus	11.20	N	N	N	N	N	N	I	I	M	U
RD0563	RD 0563-Tyler Island	12.40	N	N	I	I	I	I	I	I	M	U
RD0755	RD 0755-Randall	1.90	N	N	N	C	C	C	I	C	S	U
RD0765	RD 0765-Glide	1.70	C	C	C	C	C	C	C	C	S	U
RD0784	RD 0784-Plumas Lake	35.20	C	C	C	C	C	C	C	C	S	M

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Figure 4.7, Cont.

TEN-YEAR-MAINTENANCE RECORD 1998 - 2007
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M: Minimally Acceptable	M: Marginally Satisfactory	I: Improvement Needed
U: Unacceptable	U: Unsatisfactory	N: Non-Compliant

Short Name	Agency	Miles	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
RD0785	RD 0785-Driver	5.60	I	N	I	C	C	C	C	C	S	U
RD0787	RD 0787-Fair	4.40	C	C	C	C	C	C	C	C	S	A
RD0817	RD 0817-Carlin	9.00	I	N	N	C	C	C	C	C	S	U
RD0827	RD 0827-Elkhorn	4.20	N	N	N	C	C	C	C	C	S	U
RD0900	RD 0900-West Sacramento	13.60	C	C	C	C	C	C	C	C	S	U
RD0999	RD 0999-Holland Land	32.40	C	C	C	C	C	C	C	C	S	U
RD1000	RD 1000-Natomas	42.60	C	C	C	C	C	C	C	C	S	A
RD1001	RD 1001-Nicolaus	44.00	C	C	C	C	C	C	C	C	S	U
RD1500	RD 1500-Sutter Basin	54.40	C	C	C	C	C	C	C	C	S	M
RD1600	RD 1600-Mull	14.70	N	N	I	C	C	C	C	C	S	U
RD1601	RD 1601-Twitchell	2.50	C	C	C	C	C	C	C	C	S	A
RD1602	RD 1602-Del Puerto	6.30	C	N	I	I	I	I	C	C	S	U
RD1660	RD 1660-Tisdale	12.10	C	C	C	C	C	C	C	C	S	A
RD2031	RD 2031-Elliot	13.20	C	C	C	C	C	C	C	C	S	U
RD2035	RD 2035-Conway Ranch	12.10	C	C	C	C	C	C	C	C	S	U
RD2058	RD 2058-Pescadero	6.70	C	C	C	C	C	C	I	I	S	U
RD2060	RD 2060-Hastings Island	16.00	C	C	C	C	C	C	C	C	S	U
RD2062	RD 2062-Stewart Tract	12.30	C	C	C	C	C	C	C	C	S	U
RD2063	RD 2063-Crows Landing	10.60	I	N	C	C	C	C	C	C	S	U
RD2064	RD 2064-River Junction	11.90	I	I	C	C	C	C	C	I	S	U
RD2068	RD 2068-Yolano	8.70	C	C	C	C	C	C	C	C	S	A
RD2075	RD 2075-McMullin	7.50	C	I	C	C	C	C	C	C	S	U
RD2085	RD 2085-Kasson	6.20	C	C	C	C	C	C	C	C	S	U
RD2089	RD 2089-Stark Grove	2.90	C	C	C	C	C	C	C	C	M	U
RD2091	RD 2091-Chase	7.90	C	C	C	C	C	C	C	C	S	A
RD2092	RD 2092-Dos Rios	3.80	C	C	C	C	C	C	C	C	S	A
RD2094	RD 2094-Walthall	3.30	C	C	C	C	C	C	C	C	S	U
RD2095	RD 2095-Paradise Junction	4.90	C	C	C	C	C	C	C	C	S	U
RD2096	RD 2096-Wetherbee Lake	0.20	C	C	C	C	C	C	C	C	S	A
RD2098	RD 2098-Cache Haas Area	11.30	I	I	I	I	I	I	I	I	M	M
RD2099	RD 2099 El Soya Ranch	2.40	-	-	-	-	-	-	-	-	-	-
RD2100	RD 2100 White Lake Ranch	2.70	-	-	-	-	-	-	-	-	-	-
RD2101	RD 2101-Blewett	3.50	C	C	I	I	C	C	C	C	S	U

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Figure 4.7, Cont.

TEN-YEAR-MAINTENANCE RECORD 1998 - 2007
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M: Minimally Acceptable	M: Marginally Satisfactory	I: Improvement Needed
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Short Name	Agency	Miles	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
RD2102	RD 2102-Lara Ranch	1.80	-	-	-	-	-	-	-	-	-	-
RD2103	RD 2103-Wheatland	9.80	C	C	C	C	C	C	C	C	S	A
RD2104	RD 2104-Peters Pocket	7.40	I	C	I	I	C	I	C	C	M	U
RD2107	RD 2107-Mossdale Landing	4.20	C	C	C	C	C	C	C	C	S	M
ST0001	Cache Creek and Settling Basin	25.10	C	C	C	C	C	C	C	C	S	M
ST0002	East Levee Sutter Bypass	22.10	C	C	C	C	C	C	C	C	S	M
ST0003	East Levee Sacramento River	27.30	C	C	C	C	C	C	C	C	S	A
ST0004	East Levee Yolo Bypass	2.00	C	C	C	C	C	C	C	C	S	U
ST0005	West Levee Feather River at Hamilton Bend	1.20	C	C	C	C	C	C	C	C	S	U
ST0006	West Levee Feather River at Nelson Bend	0.50	C	I	N	N	C	C	C	C	S	U
ST0007	Putah Creek	16.30	C	C	C	C	C	C	C	C	S	M
ST0008	Sacramento Bypass	3.60	C	C	C	C	C	C	C	C	S	A
ST0009	Tisdale Bypass	9.00	C	C	C	C	C	C	C	C	S	A
ST0010	Wadsworth Canal	9.40	C	C	C	C	C	C	C	C	S	A
ST0011	West Levee Yolo Bypass	9.30	C	C	C	C	C	C	C	C	S	U
ST0012	Willow Slough Bypass	12.50	C	C	C	C	C	C	C	C	S	A

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Figure 4.7, Cont.

5 LEVEE MANAGEMENT ISSUES

As outlined in California's *Public Law 84-99 Eligibility Retention and Flood System Improvements Framework*, there are five main threats to California's flood systems that must be considered together when looking for ways to reduce the risk of flooding.

- Channel capacity – The flood channels, and adjacent levees, must have capacity to carry the design flood flows that vary throughout the system.
- Seepage – Water seepage through or under a levee embankment can lower the integrity of a levee.
- Erosion – High velocity flows can erode levee material, making a levee unstable and subject to failure.
- Encroachments – A levee should generally be clear of inappropriate structures or debris that cause problems with inspections, maintenance, or even the stability of levees.
- Vegetation – Growth of some vegetation, especially large trees, on levees may weaken levees and lower public safety. Growth of overly dense vegetation obstructs visibility to inspect overall maintenance and to identify levee distress.

Ongoing activities in this framework are focused on reducing all of these threats to improve public safety in flood-prone areas in the short term. No single threat should be given priority in the short term, but all of these threats will be reduced during the short term. For example, for vegetation, the intent is to strategically remove levee vegetation to provide visibility for levee inspections, access for flood fight efforts, and access for all types of maintenance. Monitoring of remaining vegetation and rapid response to developing problems during high water will improve public safety until the long-term plan is implemented.

5.1 Channel Maintenance

Design channel capacities are maintained by removing obstructions such as sediments and vegetation from the channels. Hydraulic analyses are performed to determine actual channel capacities, although nonuniform conditions make highly accurate calculations very difficult. Most critical choke points occur at narrow sections, such as bridges, so the need for channel maintenance is often determined by the presence of obstructions in such choke points. Those channels that are susceptible to loss of capacity from obstructions are maintained by removing those obstructions as necessary. Figure 5.1, *Channel Clearance and Condition - 2007* summarizes the status of channel clearance maintenance activities for the Sacramento River basin, San Joaquin River basin, and miscellaneous stream basins as reported by LMA. Missing information indicates that the requested information was not submitted in writing to DWR by the district.

CHANNEL CLEARANCE AND CONDITION - 2007

DWR S.M.Y = DWR Sacramento Maintenance Yard, DWR S.Y. = DWR Sutter Maintenance Yard
LSJLD = Lower San Joaquin Levee District, MID = Merced Irrigation District
SJCFCD = San Joaquin County Flood Control District

Stream	Maintaining Agency	Basin	Brush Mechanically Cleared (acres)	Brush Hand Cleared (acres)	Brush Chemically Controlled (acres)	Sediment Removed (cubic yards)
American River	DWR-S.M.Y	SR	*	*	*	*
Arcade Creek	DWR-S.M.Y	SR	0	0	4	0
Cache Creek	DWR-S.M.Y	SR	40	0	24	0
Cache Creek Settling Basin	DWR-S.M.Y	SR	*	*	*	*
Knights Landing Ridge Cut	DWR-S.M.Y	SR	71	0	8	0
Linda Creek	DWR-S.M.Y	SR	*	*	*	*
Magpie Creek	DWR-S.M.Y	SR	0	0	4	0
Natomas Cross Canal	DWR-S.M.Y	SR	0	0	6	0
Natomas East Main Drain	DWR-S.M.Y	SR	8	0	10	0
Putah Creek	DWR-S.M.Y	SR	0	0	6	0
Sacramento Bypass	DWR-S.M.Y	SR	0	0	10	0
Willow Slough	DWR-S.M.Y	SR	0	0	8	0
Yolo Bypass (Freemont Weir)	DWR-S.M.Y	SR	475	0	5	0
Yolo Bypass	DWR-S.M.Y	SR	0	0	6	0
Schriener	DWR-S.M.Y	SR	60	0	2	0
Bear River	DWR-S.Y.	SR	125	0	5	0
Big Chico Creek	DWR-S.Y.	SR	0	2	0	0
Big Chico Creek (Diversion)	DWR-S.Y.	SR	0	0	0	0
Butte Creek	DWR-S.Y.	SR	0	30	0	0
Butte Slough (to Mawson Bridge)	DWR-S.Y.	SR	0	0	0	0
Cherokee Canal	DWR-S.Y.	SR	700	60	0	2,000
Colusa Basin Drain	DWR-S.Y.	SR	0	0	0	0
Colusa Bypass	DWR-S.Y.	SR	10	0	0	0
Deer Creek	DWR-S.Y. (Maintenance performed by Tehama County)	SR	0	0	0	0
Dry Creek (Bear River)	DWR-S.Y.	SR	2.5	0	0	0
East and West Interceptor Canal	DWR-S.Y.	SR	0	4	2	0
Elder Creek	DWR-S.Y. (Maintenance performed by Tehama County)	SR	0	5	5	0
Feather River	DWR-S.Y.	SR	300	10	15	0
Honcut Creek	DWR-S.Y.	SR	0	0	0	0
Lindo Channel	DWR-S.Y.	SR	0	0	0	0
Little Chico Creek	DWR-S.Y.	SR	0	5	7	1500
Mud Creek	DWR-S.Y.	SR	0	8	0	0
Sacramento River	DWR-S.Y.	SR	0	10	0	0
Sutter Bypass (Mawson Bridge-South)	DWR-S.Y.	SR	285	50	50	0
Sycamore Creek	DWR-S.Y.	SR	20	5	5	0
Tisdale Bypass	DWR-S.Y.	SR	450	10	0	1.8 miles
Wadsworth Canal	DWR-S.Y.	SR	0	0	0	0
Western Pacific Interceptor	DWR-S.Y.	SR	0	0	0	0
Yuba River	DWR-S.Y.	SR	50	25	0	0
McClure Creek	Tehama	SR	0	2	0	4
Salt Creek	Tehama	SR	0	2	0	4

Note: Missing information was not provided by Local Maintaining Agency

Figure 5.1

CHANNEL CLEARANCE AND CONDITION - 2007

DWR S.M.Y = DWR Sacramento Maintenance Yard, DWR S.Y. = DWR Sutter Maintenance Yard
LSJLD = Lower San Joaquin Levee District, MID = Merced Irrigation District
SJCFCD = San Joaquin County Flood Control District

Stream	Maintaining Agency	Basin	Brush Mechanically Cleared (acres)	Brush Hand Cleared (acres)	Brush Chemically Controlled (acres)	Sediment Removed (cubic yards)
Ash Slough	LSJLD	SJR	0	*	1	0
Berenda Slough	LSJLD	SJR	0	*	2	0
Eastside Bypass	LSJLD	SJR	0	*	10	3,400
Mariposa Bypass	LSJLD	SJR	0	*	3	0
Owens Creek	LSJLD	SJR	0	*	0	0
San Joaquin River (Chowchilla Canal Bypass to Gravelly Ford)	LSJLD	SJR	12.5	*	0	20,000
San Joaquin River (Merced River to Mendota Dam)	LSJLD	SJR	6	*	0	5,000
Bear Creek (Merced County)	LSJLD	SJR	0	*	0	0
Chowchilla Canal Bypass	LSJLD	SJR	12.5	*	10	40,613
Ash Slough	Madera County	SJR	*	*	*	*
Berenda Slough	Madera County	SJR	*	*	*	*
Chowchilla River	Madera County	SJR	*	*	*	*
Fresno River*	Madera County	SJR	*	*	*	*
Black Rascal Creek	MID	SJR	*	*	*	*
Burns Creek	MID	SJR	*	*	*	*
Mariposa Creek	MID	SJR	*	*	*	*
Miles Creek	MID	SJR	*	*	*	*
Owens Creek	MID	SJR	*	*	*	*
Owens Creek Diversion	MID	SJR	*	*	*	*
Bear Creek (Merced County)	MID	SJR	*	*	*	*
Black Rascal Creek Diversion	MID	SJR	*	*	*	*
Canal Creek	MID	SJR	*	*	*	*
French Camp Slough	None	SJR	*	*	*	*
Paradise Cut	None	SJR	*	*	*	*
San Joaquin River (Mendota Dam to Chowchilla Canal Bypass)	None	SJR	*	*	*	*
San Joaquin River (Merced River to Mossdale)	None	SJR	*	*	*	*
Stanislaus River	None	SJR	*	*	*	*
Littlejohn Creek, Unit 3,4,5	SJCFCD	SJR	*	*	*	*
Mormon Slough	SJCFCD	SJR	*	*	*	*
North Littlejohn Creek	SJCFCD	SJR	*	*	*	*
Paddy Creek Group	SJCFCD	SJR	*	*	*	*
Bear Creek (San Joaquin County)	SJCFCD	SJR	*	*	*	*
Duck Creek Diversion, Unit 5	SJCFCD	SJR	*	*	*	*
Ash Creek	Adin CSD	MISC	2	0	0	0
Dry Creek	Adin CSD	MISC	0	0	0	15
Alonzo Drain	Fairfield-Suisun Sewer District	MISC	*	*	*	*
Laurel Creek Diversion	Fairfield-Suisun Sewer District	MISC	*	*	*	*
Ledgewood Creek	Fairfield-Suisun Sewer District	MISC	*	*	*	*
McCoy Creek	Fairfield-Suisun Sewer District	MISC	*	*	*	*
Union Avenue Diversion	Fairfield-Suisun Sewer District	MISC	*	*	*	*
Alley Creek	Lake County FCD	MISC	0	0.91	0	0
Clover Creek	Lake County FCD	MISC	0	0	0	300
Clover Creek Diversion	Lake County FCD	MISC	0	6.8	0	0
Middle Creek	Lake County FCD	MISC	0	0	0	1,000
Page Creek	Lake County FCD	MISC	0	0.18	0	0
Scotts Creek	Lake County FCD	MISC	0	0	0	0
Truckee River	Placer County	MISC				

Note: Missing information was not provided by Local Maintaining Agency

Figure 5.1, Cont.

5.2 Rodent Control and Effects on Seepage

The presence of rodents on levees is a historic and ongoing problem that poses a threat to levee integrity due to increased seepage penetration into the levee via the burrows the rodents create. Adequate rodent control is a two-part maintenance process of eradicating the rodents and properly filling their burrows.

The more rodents in an area and the longer they have been there, the greater the threat due to greater loss of levee material. Environmental laws and regulations limit the periods during which poison bait can be placed. Complete eradication of rodents is difficult. However, a well managed eradication program vigorously applied every year can keep populations and concentrations of rodents under reasonable control.

To eliminate the seepage threat, the burrows must be properly filled. Rodent holes are properly filled if they are completely excavated and then backfilled and compacted all the way up to the levee surface or if grout is pumped into the burrows to fill all of the voids. Dragging the levee is a common practice to smooth the surface of the levee and remove or knock down dead or dry vegetation, all of which benefits visibility. However, dragging also fills in the openings of rodent holes, hiding their existence and creating a false sense of security. Dragging the levee should not be done in areas of rodent burrows until all burrows have been properly filled.

5.3 Erosion Prevention and Repair

Erosion of the levee degrades it by removing material, which weakens the levee structurally, by shortening the flow path of seepage under or through the levee, and by exposing the unprotected body of the levee to more rapid erosion. Erosion damage caused by high water events may be eligible for rehabilitation assistance under PL 84-99. Repair of other erosion damage is the responsibility of the LMA. Erosion generally occurs at the concurrence of strong water and a weak levee point (recurring or ongoing conditions) and can progress rapidly if not repaired. It is very important that the worst erosion sites be identified and adequately repaired as soon as possible.

5.4 Encroachment Management

Many miles of encroachments exist in the project system. Over 18,000 encroachment permits have been issued by the Board since its inception and the majority of the open encroachment permits are properly maintained. However, there are hundreds of permitted encroachments that are not properly maintained and hundreds of unpermitted encroachments. It is apparent from the results of the USACE inspections made in response to Memo 43 that USACE is serious about documenting and requiring the proper maintenance or removal of encroachments that do not satisfy levee maintenance criteria. DWR documented, without researching their permit status, those encroachments that would likely fail a USACE inspection. The inspections found 129 miles of PO and 7 miles of CO encroachments. The Board, USACE, the LMAs, and DWR will have to determine how to address these encroachments.

5.5 Vegetation Management

USACE's April 2007 draft white paper, *Treatment of Vegetation within Local Flood Damage Reduction Systems*, called for the removal of nearly all vegetation other than short grasses from the project. USACE has not required its implementation provided that DWR makes acceptable progress in its overall system analysis that will identify all of the threats to the system, their corrective actions, and the optimum solutions with the resources available. The positive and negative impacts of vegetation will be identified and evaluated as part of the process.

Interim vegetation criteria shown in Section 2.4.1 require that open visibility and access be maintained on those levee portions most subject to distress. Long-term vegetation criteria will be determined as part of DWR's overall system analysis.

6 MAINTENANCE COMPLIANCE

6.1 Maintenance Compliance Process

6.1.1 Enforcement

During the spring and fall inspection cycles, DWR will identify and document inspection items as Acceptable (A), Minimally Acceptable (M), or Unacceptable (U) considering USACE's inspection rating criteria, and will identify vegetation maintenance items in accordance with the DWR interim inspection criteria dated October 2007.

In the short-term, the Board, in conjunction with DWR, will require that LMAs address deficient items including:

- Critical items impacting the structural integrity of the levee including threatening vegetation
- Vegetation not in compliance with interim inspection criteria
- Critical erosion issues
- Unacceptable rodent control and damage repair programs
- Encroachments affecting flood fighting activities or levee integrity

To ensure these inspection deficiencies are addressed, DWR will:

- Notify the USACE and the Board of the inspection findings
- Request submittal of an LMA Corrective Action Plan
- Identify a time period required to correct deficiencies

Other deficiencies require a more long-term process to resolve. These include deficiencies that may be related to items such as residential encroachments, heritage oaks, and/or critical or endangered species habitat that will require:

- Further State Flood System evaluations
- Extensive environmental, right-of-way, and/or legal action
- Significant process and/or policy development and implementation
- Notification letters be sent to appropriate land use agencies indicating the inspection status, maintenance history, and impacts on PL 84-99 eligibility

To enforce compliance of deficiencies that do not require additional compliance time, the State will rate items that are minimally acceptable as unacceptable if they are not corrected within two years. This may lead to an overall rating of unacceptable, resulting in loss of PL 84-99 eligibility.

If an LMA has the same items rated unacceptable for two years and is not making progress toward correcting deficiencies, the LMA will be considered for Maintenance Area (MA) formation.

If maintenance obligations are not met in a reasonable time frame, the MA formation process may be initiated. Criteria to prioritize deficient Projects include:

- Severity
    - Protection Type: Rural or Urban
    - Nature of Deficiencies
- Magnitude/Scale of Project
    - Size of the LMA
    - Cost to restore the levee to adequate maintenance standards and annual maintenance cost thereafter compared to the annual benefit received by the protected area
    - Ability and willingness of the LMA to pay for levee restoration and maintenance thereafter
    - Financial effects for the levee not being eligible under PL84-99
- History of maintenance deficiencies not being addressed by the LMA
- Complexity
    - Unresolved or extensive legal or policy issues
- Environmental or Right-of-Way Issues
    - Reason for deferred maintenance – do environmental regulations (related to brush and vegetation clearing), encroachment enforcement issues, or access issues affect ability to perform maintenance?

The following outlines the MA formation process:

- An event occurs to initiate the procedure. This event can be one of the following:
    - The LMA has determined that it no longer desires to operate and maintain a unit of a project, and has provided a resolution to that effect to DWR.
    - DWR has determined that a unit of a project is not being operated or maintained in accordance with the standards established by federal regulations.
- Develop a Statement of Necessary Work, including the first two years' operational budget – Approximate time to complete is 3 months.
- Begin the public hearing process, which allows an adjoining LMA or public entity to provide maintenance services – Approximate time to complete is 6 months.
- Develop the regional MA boundary and hold public hearing to discuss benefit zones. This usually requires surveying and hydraulic modeling – Approximate time to complete is 1 year.

- Create the assessment district to fund the maintenance activities and formalize the MA by way of Resolution and file with the County recorder – Approximate time to complete is 3 months.

The total time to complete the formation of a State MA is approximately 2 years. At this point in time, DWR will have legal authority and funding in place to begin operating and maintaining project levees including obtaining any needed environmental permits.

DWR and the Board will comply with Article 4, Enforcement Proceedings, CCR Title 23, Waters. Unauthorized encroachments that pose an immediate threat to the integrity of the State Flood System will be addressed first.

Some deficiencies will require a more long-term process to resolve. These include deficiencies that may be related to items such as residential encroachments, heritage oaks and/or critical habitat, or endangered species, which will require:

- Further State Flood System evaluations
- Extensive environmental, right-of-way, and/or legal action
- Significant process and/or policy development and implementation

6.2 Roles and Responsibilities

We expect that the new Board Memorandum of Understanding will clarify the roles and responsibilities of the Board and DWR in addressing many of the flood management issues.

7 OTHER FLOOD SYSTEM INSPECTION ACTIVITIES

In addition to the spring and fall levee inspections, summer inspections by DWR inspectors focus on structures, pumping plants, project channels, and designated floodways. The designated floodways are not currently inspected at consistent intervals. Some designated floodways are inspected once every year and others are not. These inspections may include physical on-the-ground inspections or may use aerial photography as a means to inspect the floodways. The Flood Protection Board and DWR are moving toward a more consistent program to cover these inspections and report on the status of the floodways pending authorization of new positions to hire additional staff to perform this work.

Inspections of the State Flood System, designated floodways, project channels, and other major flood control works consist of visual inspections by DWR's levee inspectors and, in some cases, by the LMA.

In addition to the field inspections for deficiencies in levees, structures, floodways, and channels, the State Flood System is inspected for unauthorized encroachments and permitted construction projects on flood control facilities for compliance with the Board permit conditions.

7.1 Flood Control Structures

The 42 project structures were inspected in 2007 using USACE criteria. Twenty-nine structures had good maintenance, 11 had fair maintenance, 1 had poor maintenance, and 1 (Paradise Dam) has issues of ownership and responsibility for maintenance. The Structures Report can be found online after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/.

7.2 Flood Control Project Pumping Plants

Utilizing the USACE inspection criteria 7 additional inspection items were added to the current DWR Pump Station rated items list: Pumps Station Operating Log, O&M Manual or a posted operating instruction guide, Communications, Operator Safety, Security Fencing, Power, and Metallic features condition. All 13 Project facilities were inspected under the revised inspection criteria - 12 were rated satisfactory based upon flood readiness and 1 was rated marginally satisfactory due to a pipe outlet condition. The Pumping Plants report is incorporated within the Structures Report, which can be found online at: http://cdec.water.ca.gov/cfis/piib/indes.html (click on Inspection Reports).

7.3 Project Channels

A total of 87 channels, streams, and tributaries are under the Board's inspection jurisdiction. The Sacramento River project totals 40, the San Joaquin project totals 33, and 14 are from small miscellaneous projects. The annual Channels Report can be found online after July 1, 2008 at: http://www.water.ca.gov/dfm/hafoo/fpiib/fpinss/.

Reports on channel clearance activities and overall conditions have been submitted to DWR by several LMAs and are summarized in Figure 5.1.