

## Hydromodification Management Measures



The SWRCB, CCC, and other State agencies have identified eight management measures (MMs) to address hydromodification sources of nonpoint pollution affecting State waters. Hydromodification includes modification of stream and river channels, dams and water impoundments, and streambank/shoreline erosion.

Channel modification activities are undertaken in rivers or streams to straighten, enlarge, deepen or relocate the channel. These activities can affect water temperature, change the natural supply of fresh water to a water body, and alter rates and paths of sediment erosion, transport, and deposition. Hardening the banks of waterways with shoreline protection or armor also accelerates the movement of surface water and pollutants from the upper reaches of watersheds into coastal waters. Channelization can also reduce the suitability of instream and streamside habitat for fish and wildlife by depriving wetlands and estuarine shorelines of enriching sediments, affecting the ability of natural systems to filter pollutants, and interrupting the life stages of aquatic organisms (USEPA, 1993).

### California's MMs to address sources of nonpoint pollution related to hydromodification activities:

#### 5.1 Channelization/Channel Modification

- A. Physical & Chemical Characteristics of Surface Waters
- B. Instream & Riparian Habitat Restoration

#### 5.2 Dams

- A. Erosion & Sediment Control
- B. Chemical & Pollutant Control
- C. Protection of Surface Water Quality & Instream and Riparian Habitat

#### 5.3 Streambank & Shoreline Erosion

- A. Eroding Streambanks & Shorelines

#### 5.4 Education/Outreach

- A. Educational Programs

Dams can adversely impact hydrology and the quality of surface waters and riparian habitat in the waterways where the dams are located. A variety of impacts can result from the siting, construction, and operation of these facilities. For example, improper siting of dams can inundate both upstream and downstream areas of a waterway. Dams reduce downstream flows, thus depriving wetlands and riparian areas of water. During dam construction, removal of vegetation and disturbance of underlying sediments can increase turbidity and cause excessive sedimentation in the waterway.

The erosion of shorelines and streambanks is a natural process that can have either beneficial or adverse impacts on riparian habitat. Excessively high sediment loads resulting from erosion can smother submerged aquatic vegetation, cover shellfish beds and tidal flats, fill in riffle pools, and contribute to increased levels of turbidity and nutrients.

### Management Measures:

**Channelization/Channel Modification.** California's management measures for channelization and channel modification promote the evaluation of channelization and channel modification projects. Channels should be evaluated as a part of the watershed planning and design processes, including watershed changes from new development in urban areas, agricultural drainage, or forest clearing. The purpose of the evaluation is to determine whether resulting NPS changes to surface water quality or instream and riparian habitat can be expected and whether these changes will be good or bad. Existing channelization and channel modification projects can be evaluated

to determine the NPS impacts and benefits associated with the projects. Modifications to existing projects, including operation and maintenance or management, can also be evaluated to determine the possibility of improving some or all of the impacts without changing the existing benefits or creating additional problems. In both new and existing channelization and channel modification projects, evaluation of benefits and/or problems will be site-specific.

**Dams.** The second category of management measures address NPS pollution associated with dams. Dams are defined as constructed impoundments that are either (1) 25 feet or more in height *and* greater than 15 acre-feet in capacity, or (2) 6 feet or more in height *and* greater than 50 acre-feet in capacity. MMs 5.2A and 5.2B address two problems associated with dam construction: (1) increases in sediment delivery downstream resulting from construction and operation activities and (2) spillage of chemicals and other pollutants to the waterway during construction and operation. MM 5.2C addresses the impacts of reservoir releases on the quality of surface waters and instream and riparian habitat in downstream.

**Streambank and Shoreline Erosion.** The third category of hydromodification measures addresses the stabilization of eroding streambanks and shorelines in areas where streambank and shoreline erosion creates a polluted runoff problem. Bioengineering methods such as marsh creation and vegetative bank stabilization are preferred. Streambank and shoreline features that have the potential to reduce polluted runoff shall be protected from impacts, including erosion and sedimentation resulting from uses of uplands or adjacent surface waters. This MM does not imply that all shoreline and streambank erosion must be controlled; the measure applies to eroding shorelines and streambanks that constitute an NPS problem in surface waters.

**Education/Outreach.** MM 5.4A focuses on the development and implementation of pollution prevention and education programs for agency staffs and the public, as well as the promotion of assistance tools that emphasize restoration and low-impact development. Education, technical assistance, incentives, and other means can be used to promote projects that reduce NPS pollutants, which retain or re-establish natural hydrologic functions (e.g., channel restoration projects and low-impact development projects), and/or which prevent and restore adverse effects of hydromodification activities.

## **5. HYDROMODIFICATION**

### **IMPLEMENTATION AUTHORITIES**

#### **5.1 Channelization and Channel Modification**

- A. Physical and Chemical Characteristics of Surface Waters
- B. Instream and Riparian Habitat Restoration

#### **5.2 Dams**

- A. Erosion and Sediment Control
- B. Chemical and Pollutant Control
- C. Protection of Surface Water Quality and Instream and Riparian Habitat

#### **5.3 Streambank and Shoreline Erosion**

- A. Eroding Streambanks and Shorelines

#### **5.4 Education/Outreach**

- A. Educational Programs

**Hydromodification Management Measure 5.1A — Physical and Chemical Characteristics of Surface Waters**

1. Evaluate the potential effects of proposed channelization and channel modification on the physical and chemical characteristics of surface waters;
2. Plan and design channelization and channel modification to reduce undesirable impacts;
3. Develop an operation and maintenance program for existing modified channels that includes identification and implementation of opportunities to improve physical and chemical characteristics of surface waters in those channels.

**Hydromodification Management Measure 5.1B — Instream and Riparian Habitat Restoration**

1. Evaluate the potential effects of proposed channelization and channel modification on instream and riparian habitat;
2. Plan and design channelization and channel modification to reduce undesirable impacts;
3. Develop an operation and maintenance program with specific time tables for existing modified channels that includes identification of opportunities to restore instream and riparian habitat in those channels.

**Hydromodification Management Measure 5.3A — Eroding Streambanks and Shorelines**

1. Where streambank or shoreline erosion is a NPS problem, streambanks and shorelines should be stabilized. The use of vegetative stabilization methods is strongly preferred over the use of structural stabilization methods, if appropriate considering the climate, severity of wave and wind erosion, offshore bathymetry, and the potential adverse impact on other streambanks, shorelines and offshore areas.
2. Protect streambank and shoreline features with the potential to reduce NPS pollution.
3. Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

Agency	Authority	Programs	Implementing Area	Notes
<b>RWQCB</b>	CEQA (PRC §§21000 to 21177)	Environmental Review	Statewide	Comments on impacts of hydromodification
<b>SWRCB/RWQCB</b>	CWA §401	WQCrP	Statewide	<ul style="list-style-type: none"> <li>• Regulate impacts of hydromodification projects.</li> <li>• Develop relevant CEQA guidance</li> <li>• Establish interagency agreements</li> <li>• Develop technical assistance/guidance</li> <li>• Address activities which impact the physical characteristics of waters, e.g., gravel mining, floodplain encroachment.</li> </ul>

<b>Various State and Local</b>	<ul style="list-style-type: none"> <li>• CEQA (PRC §§ 21000 et seq.)</li> <li>• CEQA Guidelines (Title 14 CCR §§ 15000 et seq.)</li> </ul>	Environmental review of “projects” using Initial Study (Environmental Checklists), EIR, or Negative Declaration	Statewide	<ul style="list-style-type: none"> <li>• Environmental Checklists help to identify potential NPS impacts.</li> <li>• EIR or Negative Declaration may identify mitigation measures to address potential adverse impacts.</li> </ul>
<b>Cities/Counties</b> (CA contains 58 counties and approximately 468 incorporated cities.)	<ul style="list-style-type: none"> <li>• PZL (Gov. Code §§ 65000 et seq.)</li> <li>• SbMA (Gov. Code §§ 66410 et seq.)</li> <li>• CCA § 30500</li> </ul>	<ul style="list-style-type: none"> <li>• General Plans/GP updates</li> <li>• LCPs/LCP amendments</li> <li>• Zoning ordinances</li> <li>• Subdivision ordinances</li> <li>• Permits pursuant to above</li> <li>• Enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Statewide</li> <li>• LCP policies/ordinances apply in coastal zone</li> </ul>	<ul style="list-style-type: none"> <li>• Cities/counties adopt policies/ordinances; make land-use decisions consistent with State law.</li> <li>• Enforcement tools include: inspections; fines; infractions; misdemeanors; stop work orders; and general police powers to protect public health, safety and welfare and declare, prohibit, abate nuisances.</li> </ul>
<b>CCC</b>	<ul style="list-style-type: none"> <li>• CCA (PRC §§ 30000 et seq.)</li> <li>• CCC Administrative Regulations (Title 14 CCR §§ 13000 et seq.)</li> <li>• CCMP pursuant to CZMA (16 USC §§ 1451 et seq.)</li> </ul>	<ul style="list-style-type: none"> <li>• Coastal development permits</li> <li>• LCP certification/amendments</li> <li>• Federal consistency: review of federal actions affecting land or water uses or natural resources of the coastal zone</li> <li>• Enforcement</li> </ul>	Coastal zone (includes tidelands, submerged lands, public trust lands).	<ul style="list-style-type: none"> <li>• CCC certifies LCPs prepared by coastal cities/counties.</li> <li>• Federal projects, permits and licenses must be found consistent with the CCMP before they are implemented.</li> <li>• Enforcement tools include: issue cease and desist/ restoration orders; file complaint for civil penalties.</li> </ul>
<b>SFBCDC</b>	<ul style="list-style-type: none"> <li>• MPA (Gov. Code §§ 66600 et seq.), including SFB Plan</li> <li>• SMPA (PRC §§ 29000 et seq.)</li> <li>• CCMP pursuant to CZMA (16 USC §§ 1451 et seq.)</li> </ul>	<ul style="list-style-type: none"> <li>• Designation of priority uses adjacent to Bay</li> <li>• Permitting: development permits and marsh development permits</li> <li>• Federal consistency authority</li> <li>• Enforcement</li> </ul>	SFB (shoreline areas within 100 ft. of Bay; tidal areas and specified tributaries; Suisun Marsh)	<ul style="list-style-type: none"> <li>• SFBCDC has regulatory authority over channelization/channel modification projects involving dredge and fill activities within its jurisdiction.</li> <li>• Enforcement/federal consistency authorities similar to CCC.</li> </ul>

<b>DFG</b>	FGC §§ 1 et seq. <ul style="list-style-type: none"> <li>• FGC §§ 1600-1607</li> </ul>	<ul style="list-style-type: none"> <li>• Streambed alteration permits for grading, filling, dredging activities in State waters or stream beds</li> <li>• MOU between DFG, DWR Cal/RA, and State Reclamation Board (SRB) to implement habitat protection provisions</li> </ul>	Statewide: State waters or stream beds	<ul style="list-style-type: none"> <li>• FGC focuses on problems including control of erosion and sedimentation (e.g., from grading, construction sites, golf courses, road cuts, etc.).</li> </ul>
<b>SLC</b>	<ul style="list-style-type: none"> <li>• PRC §§ 6000 et seq. (includes lease authority)</li> </ul>	<ul style="list-style-type: none"> <li>• SLC leases (PRC §6303) Maintenance dredging</li> <li>• SLC leases (PRC §6890) Sand and gravel extraction leasing</li> </ul>	<ul style="list-style-type: none"> <li>• Granted Lands with minerals reserved and ungranted State sovereign lands</li> </ul>	<ul style="list-style-type: none"> <li>• Dredging lease activity is contingent upon applicant's compliance with permits, recommendations, or limitations issued by federal, State, and local governments including compliance with CEQA.</li> <li>• Commercial extraction of hard minerals, excluding oil, gas, and geothermal, is contingent upon applicant's compliance with permits, recommendation, or limitations issued by federal, State, and local governments including compliance with CEQA,</li> </ul>
<b>SCC</b>	PRC Chapter 6, Div 21	CREP	Coastal zone and coastal watersheds, statewide	Through its watershed and wetland enhancement plans, the SCC stabilizes streambanks and shorelines, using vegetative methods, and protects streambanks and shorelines from erosion by acquiring properties to prevent future alteration of native vegetative cover.

**The following BACKUP AUTHORITIES/PROGRAMS pertain to MMs 5.1A, 5.1B, and 5.3A**

<p><b>SWRCB/RWQCBs</b></p>	<ul style="list-style-type: none"> <li>• PCWQCA (WC §§ 13000 et seq.)</li> <li>• CWA (33 USC § 1251 et seq.)</li> </ul>	<ul style="list-style-type: none"> <li>• NPSMP pursuant to CWA § 319 and other NPS planning efforts (CWA § 208, CZARA)</li> <li>• TMDL Program pursuant to CWA § 303(d)</li> <li>• Storm Water Management Plan (SWMP) and SWDP/NPDES Permits pursuant to WC § 13377 and CWA § 402</li> <li>• WDRs (WC § 13263)</li> <li>• Water Quality Standards pursuant to WC § 13170 and CWA § 303(c)(1)</li> <li>• Basin Plan</li> <li>• WMI</li> <li>• Water Quality Certification (WQCr) under CWA §401</li> </ul>	<ul style="list-style-type: none"> <li>• Statewide</li> <li>• Stormwater Discharge Program applies to municipalities &gt; 100,000 population</li> </ul>	<ul style="list-style-type: none"> <li>• Enforcement tools: cleanup and abatement/cease and desist orders; admin. civil liability</li> <li>• Under CWA § 401, SWRCB can regulate through certification any proposed <u>federally</u>-permitted activity which may impact water quality.</li> <li>• RWQCBs have primary responsibility for individual permitting, inspection and enforcement: may impose discharge prohibitions, and other limits on characteristics, volume, area, or timing of discharge.</li> </ul>
<p><b>DPR</b></p>	<p>Div. 1, Chapter 1.25, Div. V, PRC §5000 et seq.</p>		<p>SPS</p>	<p>DPR operates and maintains units of the SPS that has hydromodification activities.</p>
<p><b>DHS</b></p>	<p>HSC §§ 116275 et seq.</p>	<p>Drinking water source assessment and protection; drinking water sampling and analysis; regulation of public drinking water systems</p>	<p>Watersheds associated with drinking water sources</p>	<p>Assessment of potential contaminating activities in watershed; self-determined protection programs by drinking water systems and communities; collection of data on contaminants in drinking water supplies for the evaluation of water quality.</p>

Other Efforts that pertain to MMs 5.1A, 5.1B, and 5.3A				
<b>DWR</b>		<ul style="list-style-type: none"> <li>• Urban Streams Restoration Project (USRP)</li> <li>• MOU between DWR, DFG Cal/RA, and SRB to implement habitat protection provisions</li> </ul>	Statewide	DWR works with citizens and local government agencies to address water-related problems of urban streams (including modified channels) such as bank erosion and sedimentation, and offers grants for projects that solve urban creek problems and restore natural environmental values.
<b>SCC</b>	<ul style="list-style-type: none"> <li>• PRC §§ 31000 et seq.</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire interest in land (PRC §§ 32204.1, 31105)</li> <li>• Conduct resource enhancement projects (PRC § 31251)</li> </ul>	Coastal zone and coastal watershed areas outside coastal zone (PRC § 31251.2)	SCC addresses channelization/ channel modification MMs through its resource enhancement program.

**Hydromodification Management Measure 5.2A — Dams: Erosion and Sediment Control**

1. Reduce erosion and, to the extent practicable, retain sediment onsite during and after construction, and
2. Prior to land disturbance, prepare and implement an approved erosion and sediment control plan or similar administrative document that contains erosion and sediment control provisions.

**Hydromodification Management Measure 5.2B — Dams: Chemical and Pollutant Control**

1. Limit application, generation, and migration of toxic substances;
2. Ensure the proper storage and disposal of toxic materials; and
3. Apply nutrients at rates necessary to establish and maintain vegetation without causing significant nutrient runoff to surface waters.

**Hydromodification Management Measure 5.2C — Dams: Protection of Surface Water Quality and Instream and Riparian Habitat**

Develop and implement a program to manage the operation of dams in coastal areas that includes an assessment of:

1. Surface water quality and instream and riparian habitat and potential for improvement and
2. Significant nonpoint source pollution problems that result from excessive surface water withdrawals.

Agency	Authority	Programs	Implementing Area	Notes
SWRCB/RWQCB	CWA § 401	WQCP	Statewide	
SWRCB/RWQCB	PCWQCA	WDRs	Statewide	
SWRCB/RWQCB	PRC §§ 20000 et seq.	CEQA	Statewide	
SWRCB/RWQCB	WC §§ 1-12000	Water Right Permit	Statewide	
DFG	FGC §§ 1601-1603	Permit to work in a stream	Statewide	

The following are BACKUP AUTHORITIES that pertain to MMs 5.2A, 5.2B, and 5.2C.

Agency	Authority	Programs	Implementing Area	Notes
DWR, SRB, DFG, CA Cal/RA	SB 34	Delta Flood Protection Plan of 1998 (DFPP)	Statewide	
Wildlife Conservation Board (WCB)	FGC §§ 1300 et seq.	Wildlife Conservation Law of 1947 (WCL)	Statewide	
<b>DHS</b>	HSC § 116275 et seq.	Drinking water source assessment and protection; drinking water sampling and analysis; regulation of public drinking water systems	Watersheds associated with drinking water sources	Assessment of potential contaminating activities in watershed; self-determined protection programs by drinking water systems and communities; collection of data on contaminants in drinking water supplies for the evaluation of water quality.

**Hydromodification Management Measure 5.4A. Educational Programs**

Implement educational programs to provide greater understanding of watersheds, to raise awareness and increase the use of applicable hydromodification management measures and practices where needed to control and prevent adverse impacts to surface and ground water, and to promote projects which retain or re-establish natural hydrologic functions (e.g., channel restoration projects). Public education, outreach, and training programs should involve applicable user groups and the community.

[Refer to the Hydromodification Management Measures 5.1 – 5.3 listed in this document.]

Agency	Authority	Programs	Implementing Area	Notes
<b>Local Governments (Cities and Counties)</b>			Varies Statewide	Some local governments maintain planning, community liaison, and public education/ information staff to organize special projects (e.g., BMP handbooks)
<b>SWRCB/RWQCBs</b>	<ul style="list-style-type: none"> <li>PCWQCA [WC §§ 13000 et seq.]</li> </ul>	<ul style="list-style-type: none"> <li>Education</li> </ul>	Statewide	PCWQCA establishes comprehensive programs for the protection of water quality and beneficial uses of water
<b>CCC</b>	<ul style="list-style-type: none"> <li>CCA (PRC §§ 30000 et seq.), particularly §§ 30012 and 30006.5</li> </ul>	<ul style="list-style-type: none"> <li>Education</li> <li>Technical Assistance</li> </ul>	Coastal zone	The CCC has prepared several Procedural Guidance Manuals and reports that address activities related to hydromodification, instream and riparian habitat areas, and eroding shoreline/streambanks
<b>DFG</b>	<ul style="list-style-type: none"> <li>FGC §§ 1600 et seq.</li> </ul>	<ul style="list-style-type: none"> <li>Education and Technical/ Financial Assistance</li> </ul>	Statewide	
<b>DWR</b>		<ul style="list-style-type: none"> <li>USRP</li> <li>Water Education Program</li> <li>Model Water Efficient Landscape Ordinance (MWELO)</li> </ul>	Statewide	<ul style="list-style-type: none"> <li>DWR works with citizens and local government agencies to address water-related problems of urban streams (including modified channels) such as bank erosion and sedimentation, and offers grants for projects that solve urban creek problems and restore natural environmental values.</li> <li>DWR provides technical assistance to local water districts in planning, organizing and implementing water education and conservation programs for schools and the general public.</li> </ul>

SCC	<ul style="list-style-type: none"> <li>• PRC §§ 31000 et seq.</li> </ul>	<ul style="list-style-type: none"> <li>• Education and Technical/ Financial Assistance</li> </ul>	Coastal zone and coastal watershed areas outside coastal zone (PRC § 31251.2)	<ul style="list-style-type: none"> <li>• SCC protects wetlands by funding wetland, stream and riparian restoration projects.</li> </ul>
SLC	<ul style="list-style-type: none"> <li>• PRC §§ 6000 et seq.</li> </ul>	<ul style="list-style-type: none"> <li>• Education</li> </ul>	State tidelands and submerged lands	<ul style="list-style-type: none"> <li>•</li> </ul>
<b>State/local/federal agency participation in CA's NMSs, NERRs, and NEPs</b>	<ul style="list-style-type: none"> <li>• MPRSA (16 USC § 1431 et seq.)</li> <li>• CZMA § 315</li> <li>• CWA § 320 (33 USC § 1330)</li> </ul>	<ul style="list-style-type: none"> <li>• MBNMS WQPPP</li> <li>• SMBRP</li> <li>• SFEP</li> </ul>	<ul style="list-style-type: none"> <li>• <u>NMSs</u>:</li> <li>• Monterey Bay</li> <li>• Channel Islands</li> <li>• Cordell Bank/ Gulf of the Farallones</li> <li>• <u>NERRs</u>:</li> <li>• Elkhorn Slough</li> <li>• Tijuana River</li> <li>• <u>NEPs</u>:</li> <li>• SMB, SFB and Morro Bay</li> </ul>	<ul style="list-style-type: none"> <li>• The MBNMS WQPP is a collaborative effort of federal, State and local agencies and public and private groups to address NPS pollution in the region's watersheds. An MOA has been signed by: NOAA; USEPA, Region 9; Cal/EPA; SWRCB; RWQCB 2 (SFB); RWQCB 3 (Central Coast); CCC; and AMBAG.</li> <li>• Overall goal of management activities on NMSs and NERRs is to preserve, restore, and enhance functions and values attributable to riparian areas and wetlands [including receiving waters detoxification, flood water retention, research, recreation, and provision of habitat].</li> <li>• NEP provides impetus, funding, and technical assistance for the management of nationally significant estuaries.</li> </ul>
<b>The following are BACKUP AUTHORITIES that pertain to MM 5.4A.</b>				
DHS	<ul style="list-style-type: none"> <li>• HSC § 116275 et seq.</li> </ul>	<ul style="list-style-type: none"> <li>• Drinking water source assessment and protection; drinking water sampling and analysis; regulation of public drinking water systems</li> </ul>	<ul style="list-style-type: none"> <li>• Watersheds associated with drinking water sources</li> </ul>	<ul style="list-style-type: none"> <li>• Assessment of potential contaminating activities in watershed; self-determined protection programs by drinking water systems and communities; collection of data on contaminants in drinking water supplies for the evaluation of water quality.</li> </ul>