

APPENDIX 2: SUMMARY OF EVALUATION OF POSSIBLE CONDITIONS TRIGGERING SUSPENSION OF REC USE(S)

The Regional Board proposes to suspend the REC-1 beneficial uses for those water bodies where high velocities and deep water create unsafe conditions that preclude individuals from partaking in REC-1 activities. Various implementation options were evaluated with respect to this action.

Water Bodies to be Covered

Water bodies to be covered by a high-flow suspension could include any of the following criteria:

- a) inland water bodies
- b) flowing water bodies (not lakes)
- c) engineered channels
- d) water bodies where access is restricted or prohibited (through fencing/signs)

Criteria (a) and (b) must be met for water bodies to be covered by this suspension, but alone they are not enough. Inland water bodies include those that may not be subject to the unsafe conditions that occur in engineered channels. For example, clearly lakes are not subject to high velocities that would cause unsafe conditions. Additionally, access to many lakes cannot be restricted during storm events. Flowing water bodies also could include those that flow more slowly (e.g. due to natural meanders and vegetation). Slow flowing water bodies do not necessarily have the conditions of an engineered channel that make recreation inherently dangerous during storm events.

Therefore, in addition to criteria (a) and (b), criteria (c) and (d) must also be met. Engineered channels are designed to convey water rapidly out to a discharge point, making conditions unusually unsafe for recreation. Therefore, engineered channels (criterion c) should be categorically exempt. Restricted or prohibited access to the engineered channels (criterion d) should also be a complementary prerequisite for employing the suspension because only then is there an assurance that people cannot access a water body in order to engage in recreational activities. See Appendix 1 for a list of engineered water bodies in the region to which access is restricted or prohibited.

The Los Angeles Regional Water Quality Control Board's "Basin Plan" contains a list of inland surface water bodies where access is restricted or prohibited in Los Angeles and Ventura Counties. Staff conducted a search for readily available flow data for each of the inland flowing water bodies where access is restricted or prohibited.

The Los Angeles County Department of Public Works maintains comprehensive information on facilities by channel type. This enabled Regional Board staff to confirm our list of candidate water bodies with the County's to isolate those water bodies to which this amendment would apply.

The Ventura County Flood Control District (VCFCD) does not have a comprehensive list of facilities by channel type. The County currently has a GIS coverage showing channel location and length with basic information (drawing number, project name, year of construction, etc.) of all VCFCD facilities. The County is currently developing a database that would break the list of channels down by channel type and dimensions, but it was not available for use in developing the proposed amendment. There is no

APPENDIX 2: SUMMARY OF EVALUATION OF POSSIBLE CONDITIONS TRIGGERING SUSPENSION OF REC USE(S)

record provided by the VCFCD as to which channels are engineered or have restricted access. Therefore, Regional Board staff cannot confirm our list with the County's to isolate those water bodies to which this amendment would apply.

Conditions Triggering Suspension

The possible triggers for a suspension include:

- 1) Velocity-basis (requires flow and area data) (e.g., "swift water" conditions).

Velocity can be calculated by dividing the flow by the area ($V=Q/A$).

Area can be calculated by multiplying the depth by the cross-sectional area ($A=D*(\text{Cross-Sectional Area})$).

- 2) Depth Basis

- 3) Rainfall-basis (e.g., total daily rainfall).

The following section analyzes the feasibility of each of these three options for Ventura County and Los Angeles County, given readily available data.

Ventura County

- 1). Velocity Data (flow and area)

- a). Flow Data

The Ventura County Flood Control District (VCFCD) provides peak flow data over the most current 24-hour period at <http://www.ventura.org/vcpwa/fc/fws/> for a limited number of water bodies. Real-time data is recorded at the county offices. Ventura County is in the process of developing Internet access to historical rainfall and hydrologic data. Also the USGS web-site (<http://water.usgs.gov>) is helpful for gages in Ventura County as it has real-time as well as historical flow data.

Of the list of 61 water bodies to be covered by this amendment, none are in Ventura County. There may be other water bodies that should be on the list. However, Ventura County's effort to break the list of channels down by channel type and dimensions was not available at the time of writing. There is no record provided by the VCFCD as to which channels are engineered or have restricted access. Therefore, Regional Board staff cannot confirm our list of candidate water bodies with Ventura County's inventory.

- b). Area Data (Depth and Cross-Sectional Area)

The VCFCD web-site (listed above) provides peak depth data for the most current 24-hour period. The USGS web-site (listed above) provides annual maximum instantaneous peak stream flow and gage heights. Ventura County is in the process of developing Internet access to historical rainfall and hydrologic data. Cross-sectional area data can be found on as-built plans via request from VCFCD.

- 2). Depth Data

Depth data is described above.

APPENDIX 2: SUMMARY OF EVALUATION OF POSSIBLE CONDITIONS TRIGGERING SUSPENSION OF REC USE(S)

3). Rainfall Data

The VCFCD web-site (listed above) provides rainfall totals over various time intervals, i.e. last hour, last 3 hours, last 6 hours, last 12 hours, last day and last 2 days. Ventura County is in the process of developing Internet access to historical rainfall and hydrologic data. Historical data was obtained for three representative gages in the county.

Los Angeles County

1). Velocity Data (flow and area)

a). Flow Data

Regional Board Staff has a list of facilities by channel type for Los Angeles County. Staff conducted a search for available flow data for each of the inland flowing water bodies where access is restricted or prohibited. Flow data is available from the Los Angeles County Department of Public Works (LACDPW) web site at: <http://www.ladpw.com/wrd/report/9899/runoff/discharge.cfm>. In looking at this web-site, staff concluded that less than ½ of the 61 candidate water bodies in Los Angeles County where access is restricted or prohibited have corresponding flow data. Therefore, it is not feasible to rely upon this data as a trigger to determine when to begin the suspension.

b). Area Data (Depth and Cross-Sectional Area)

In most cases depth data is used to determine the flow rate. Therefore, in most channels where a county has flow data, depth data also exists. Cross-sectional area data can be found from looking at particular as-built plans via request from LACDPW.

2). Depth Data

Depth data is described above.

3). Rainfall Data

Los Angeles County displays real-time data for 62 rain gages located throughout the county for 1, 3, 6, 12, 24, 36, and 48-hour increments and for the last 30 days on their web-site. The web-site is updated every 10 minutes. This rain data can be viewed at: <http://ladpw.org/wrd/precip/>.

Existing Protocol for Restricting Access

In Ventura County, there are no water rescue pre-deployment criteria that result in the closing of flood control access gates. All access gates to flood control channels and access roads are always locked. There are a few exceptions, where Ventura County Flood Control District (VCFCD) has a specific written agreement with a city for joint use of a VCFCD right-of-way. For these few areas where the public has access (most often, bike paths), the access road is not in an area that is at risk for flooding.

In Los Angeles County, the Los Angeles County, California Multi-Agency Swift Water Rescue Committee has published an "Operational Standards and Guidelines Document" (dated December 10, 1999). This guidance provides a framework for the City of Los

APPENDIX 2: SUMMARY OF EVALUATION OF POSSIBLE CONDITIONS TRIGGERING SUSPENSION OF REC USE(S)

Angeles Fire Department, County of Los Angeles Fire Department, Sheriff's Department, Lifeguards and Department of Public Works to provide water rescue. Under the "Water Rescue Pre-Deployment Section" (Sec. 6.00 on page 13), three storm levels are defined (Levels 1-3) based on storm warnings with an 80% prediction of certain quantities of rain over 24-hours. The following are the three alert levels:

Level 1	1 inch of rain (unsaturated ground) or ½ inch (saturated ground)
Level 2	1 ½ inch of rain (unsaturated ground) or 1 inch (saturated ground)
Level 3	Rainfall/saturation levels exceeding those listed for Level 2 Generalized flash floods, urban flooding and/or mud and debris flows Urban flooding with possible life hazards.

Other factors LA County considers when determining deployment levels include:

- 1) The effect of major wildland and interface burn areas. Large burn areas result in increased runoff and high potential for mud and debris flows and flash floods.
- 2) Flood Watches and Flood Warnings.
- 3) Real time effects of the storm (may differ from weather forecasts, resulting in severe conditions in particular geographic areas).
- 4) Releases in the Flood Control Channels.

Rainfall as Most Practical Trigger for Suspension

Velocity is probably the best direct measure, followed by depth, of unsafe conditions. However, from a practical standpoint, rainfall is the easiest to implement in a region-wide manner and is an adequate proxy for flow as indicated by the reliance on rainfall prediction by the Swift Water Rescue Committee. Rainfall is the factor that determines when Los Angeles County closes its access gates to many engineered channels. Ventura County has its access gates closed at all times, precluding access to channels. Rainfall data is readily available to county personnel and is measured by the county agencies among others. Los Angeles County has staff allocated and funded to close the gates that are county property using rainfall prediction as the basis for closure. In addition, as discussed earlier, flow meters or depth gages are not available for all engineered channels with restricted or prohibited access. Finally, based on our analysis, rainfall appears to correlate well with unsafe conditions as further described in Appendix 3.

Appendix 3 provides a description of the analysis staff conducted to determine that rain was an adequate proxy for unsafe conditions. In sum, unsafe conditions were estimated using a "rule of thumb" employed by USGS and also adopted by Orange County personnel, where if peak velocity * peak depth ≥ 10 , then it is "unsafe." Unsafe days were compared to the preceding day's rainfall (i.e. rain >0.5 or >1.0 inch) to determine whether rainfall was an appropriate implementation trigger.

APPENDIX 2: SUMMARY OF EVALUATION OF POSSIBLE CONDITIONS TRIGGERING SUSPENSION OF REC USE(S)

Rainfall Estimation Methods

There are multiple methods for determining the amount of rainfall at any particular location. All are based on using rain gage data. Three methods are as follows:

- 1) Use of one centrally located gage per county.
- 2) Use of one centrally located gage per watershed (one gage per watershed with location within watershed to be determined based on availability of automatically recording rain gages and other factors).
- 3) Use of the nearest rain gage.

Staff analysis indicated that rainfall is highly variable and that the nearest rain gage should be used to estimate rainfall for particular water body segments.