

## Is SMARTs Making Us Smarter?

### Observations of Construction Sites Gleaned from the Public Access Portal to SMARTs

By

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## **Abstract**

The California State Water Resources Control Board (SWRCB) has developed and implemented a web-accessible database known as the “Storm Water Multiple Application and Report Tracking System” or SMARTS. The purpose of SMARTS is to assist the SWRCB with the regulation of storm water discharges under its General Permit program. SMARTS provides the SWRCB a nearly paperless mechanism for managing its General Permit program, from processing applications for coverage to processing applications to terminate coverage under a General Permit.

The SWRCB adopted Construction General Permit 2009-0009-DWQ (CGP) on September 2, 2009. Effective July 1, 2010, the CGP requires that dischargers seeking coverage under the CGP utilize SMARTS to: file Permit Registration Documents (PRDs) including a Notice of Intent (NOI), Risk Assessment, Site Map, Storm Water Pollution Prevention Plan (SWPPP), and Certifications; to submit discharge monitoring and receiving water monitoring data; to submit a Change of Information (COI); to submit Annual Reports; and to submit a Notice of Termination (NOT). In essence, communication between a discharger and the SWRCB is almost entirely electronic via SMARTS, with the exception being the payment of permit fees which still occurs using mail. A discharger’s access to SMARTS is obtained through a secure user account and password.

SMARTS includes significant Public Access provisions. From a web-accessible computer anywhere in the world, the public has access to the information contained in SMARTS with limited exceptions, such as access to Tax Payer Identification Numbers and Social Security Numbers.

This paper presents a summary of observations regarding construction sites in California gleaned from the examination of data available through the Public Access provisions of SMARTS. The observations are summarized statewide and by Regional Water Quality Control Board jurisdiction. Observations include but are not limited to number of sites by Risk Level, average site area by Risk Level, reported discharge turbidity and pH by Risk Level, and reported NAL exceedances for turbidity and pH by Risk Level. One goal of these observations is to determine whether the CGP’s Risk Assessment procedure which considers the unit sediment risk and receiving water risk of a site could be improved by also considering other factors such as the size of the project.

## **1.0 Analysis of Available SMARTs NOI Data**

### **1.1 Data Report Generation**

SMARTS data included for this evaluation was downloaded on September 5, 2012 following the deadline for the submittal of the 2011-2012 annual reports for projects covered under the CGP. The data inventory for this research is strictly based on projects registered in SMARTs during the 2011-2012 reporting year.

Base NOI data was accumulated by merging reports generated from two types of queries from the Storm Water Data Public Access portal to SMARTS. The first query was generated from “Download NOI Data By Regional Board”, in which historical NOI data was presented. The information from this query was filtered for data strictly pertaining to dischargers under the CGP. The filtered data included project size, but it did not include the project risk level. The second query was generated from “Storm Water Reports Construction - Download Construction NOI Risk Data by Regional Board”. This data did not require filtering. The data sets resulting from the first and second queries were then merged and aligned by a project’s WDID. This design allowed for the review of paired data; project size and combined risk determination. The resulting data set included historical data; therefore, it was filtered to include data strictly pertaining to dischargers active during the 2011-2012 year.

### **1.2 Data Report Limitations and Assumptions**

Data used for this investigation was limited to traditional Risk Level projects.

In review of the base NOI data from SMARTs it was observed that a large handful of projects were listed as having a project size greater than 1,000 acres, with one as high as 4,381,465 acres, which is not realistic. This is likely due to data entry error where the provided value is actually based on square footage rather than acreage. Spot checks were subsequently conducted by reviewing the acreage pursuant to the information available from the uploaded Permit Registration Documents, confirming the confused units for project size. Therefore, in conducting the evaluation of projects by risk determination and acreage, those listed as 1,000 acres or greater have been removed from the statistical representation. Data from 66 projects was removed from the analysis based on these criteria. This left 8,339 or 99.2 % of paired project data for observation.

Assumptions used regarding the SMARTs generated raw data included the following:

- For projects where the acreage was listed and the risk level was not listed, this data was excluded on the basis of incomplete data pair (approx. 60 projects).
- For projects where the acreage was not listed and the risk level was provided, this data was excluded on the basis of incomplete data pair (approx. 335 projects).
- The Project size listed in the NOI data is based on the total site size as the area of disturbance was not presented in the query results.

### **1.3 Regional NOI data**

The Regional Water Quality Control Boards are responsible for enforcement of the CGP within their respective jurisdictions. Tables 1, 2, and 3 summarize NOI data by region.

- Table 1 provides a summary of the number of projects within the jurisdiction of each Regional Board as categorized by Risk Level. This information is further illustrated in Figure 1.
- Table 2 presents the mean project acreage by Risk Level for each Regional Board. This information is shown in Figure 2.
- Table 3 presents the median project acreage by Risk Level for each Regional Board.

**Table 1. Regional Number of Projects by Risk Level**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1 (North Coast)	92	84	17
Region 2 (San Francisco Bay)	644	487	30
Region 3 (Central Coast)	258	191	19
Region 4 (Los Angeles)	948	457	17
Region 5F (Central Valley - Fresno)	628	22	1
Region 5R (Central Valley - Redding)	129	98	2
Region 5S (Central Valley - Sacramento)	839	381	5
Region 6A (Lahontan - Tahoe)	33	19	--
Region 6B (Lahontan - Victorville)	249	20	--
Region 7 (Colorado River Basin)	245	39	--
Region 8 (Santa Ana)	876	312	3
Region 9 (San Diego)	770	415	9

**Table 2. Mean Project Acreage by Risk Level by Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1 (North Coast)	33.01	40.89	79.64
Region 2 (San Francisco Bay)	23.65	33.04	31.08
Region 3 (Central Coast)	26.03	52.39	35.81
Region 4 (Los Angeles)	19.22	32.91	12.56
Region 5F (Central Valley - Fresno)	30.32	53.54	178.00
Region 5R (Central Valley - Redding)	32.09	34.50	41.60
Region 5S (Central Valley - Sacramento)	29.02	34.07	50.10
Region 6A (Lahontan - Tahoe)	48.08	51.98	--
Region 6B (Lahontan - Victorville)	35.58	37.74	--
Region 7 (Colorado River Basin)	70.18	65.85	--
Region 8 (Santa Ana)	25.69	37.34	7.96
Region 9 (San Diego)	22.28	31.69	31.46

Table 3. Median Project Acreage by Risk Level by Region

Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1 (North Coast)	8.00	6.25	20.21
Region 2 (San Francisco Bay)	4.89	7.00	11.56
Region 3 (Central Coast)	6.00	8.00	7.10
Region 4 (Los Angeles)	4.33	5.00	6.03
Region 5F (Central Valley - Fresno)	9.28	8.05	178.00
Region 5R (Central Valley - Redding)	9.85	6.50	41.60
Region 5S (Central Valley - Sacramento)	7.00	9.00	19.60
Region 6A (Lahontan - Tahoe)	9.80	5.40	--
Region 6B (Lahontan - Victorville)	11.00	23.40	--
Region 7 (Colorado River Basin)	12.90	7.00	--
Region 8 (Santa Ana)	7.04	8.30	2.24
Region 9 (San Diego)	6.50	9.09	19.22

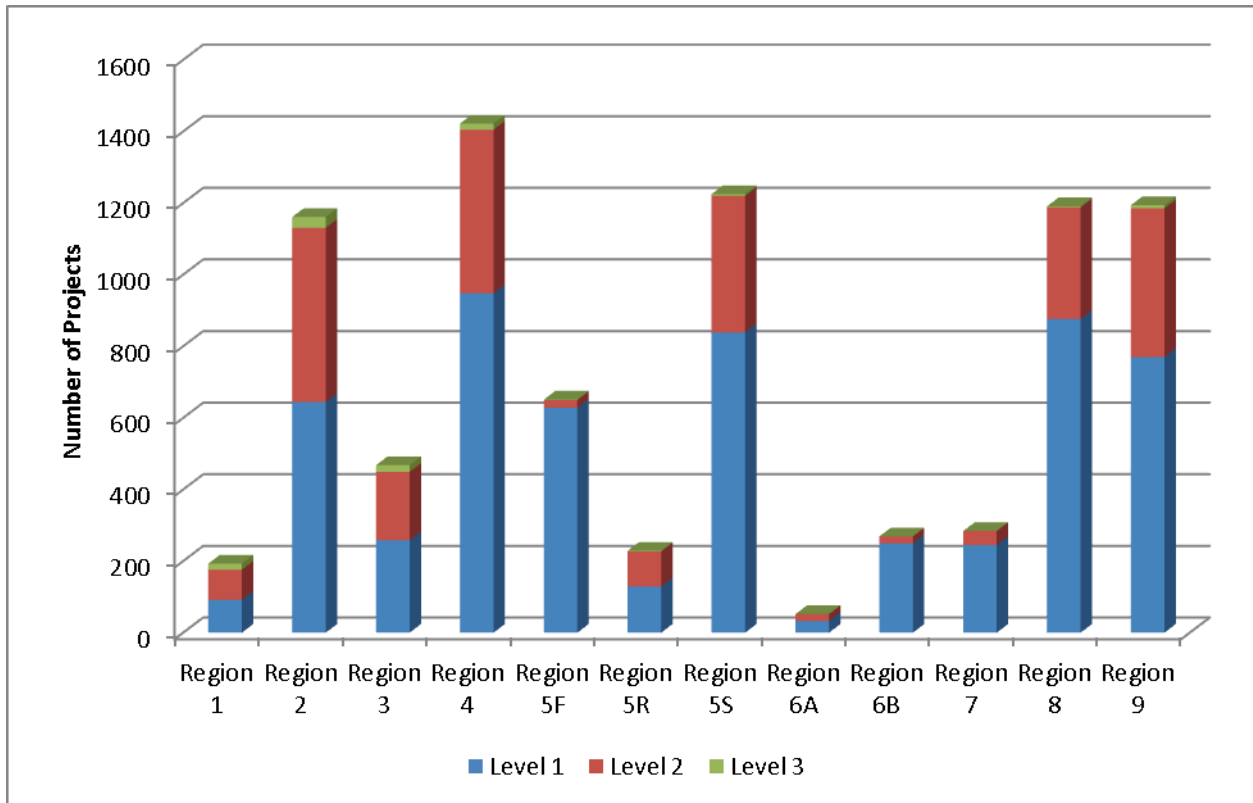
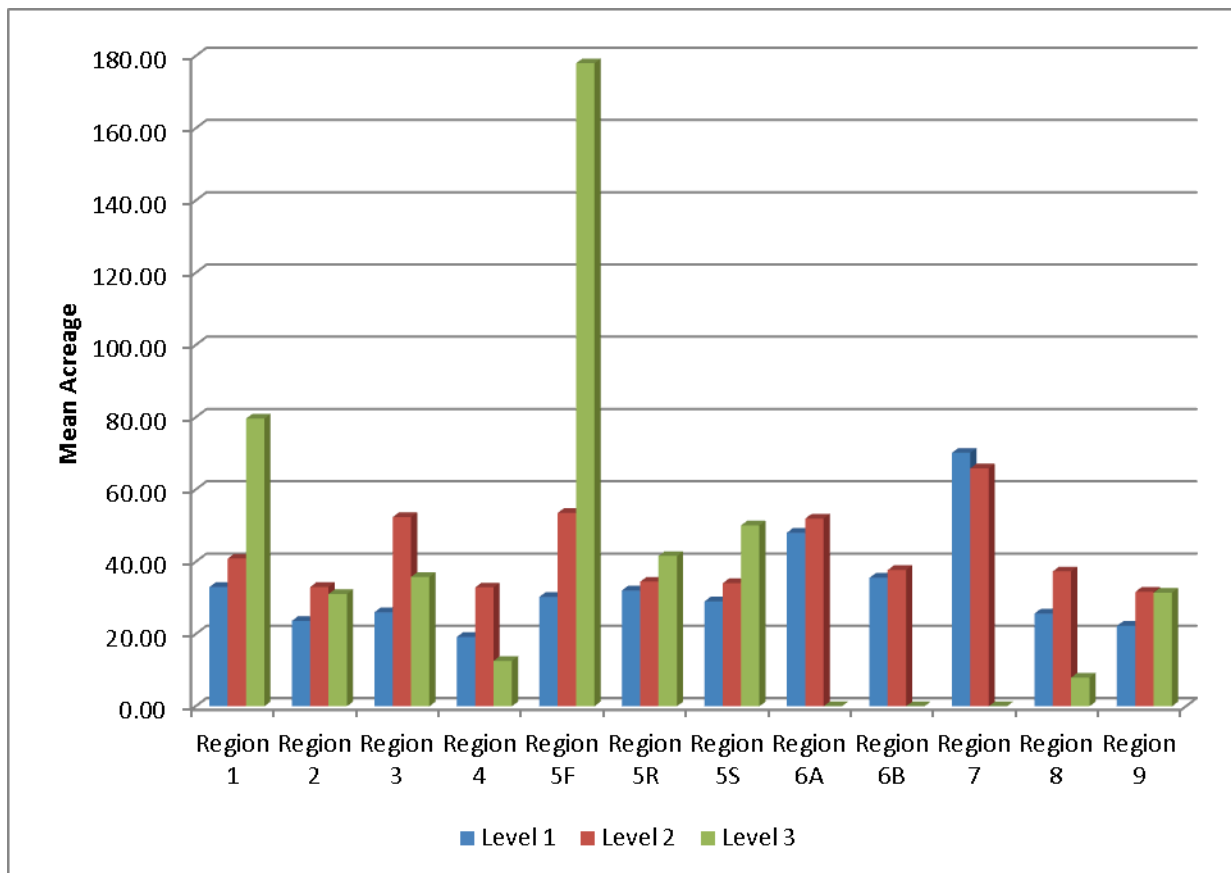


Figure 1. Regional Number of Projects by Risk Level



**Figure 2. Regional Mean Acreage of Projects by Risk Level**

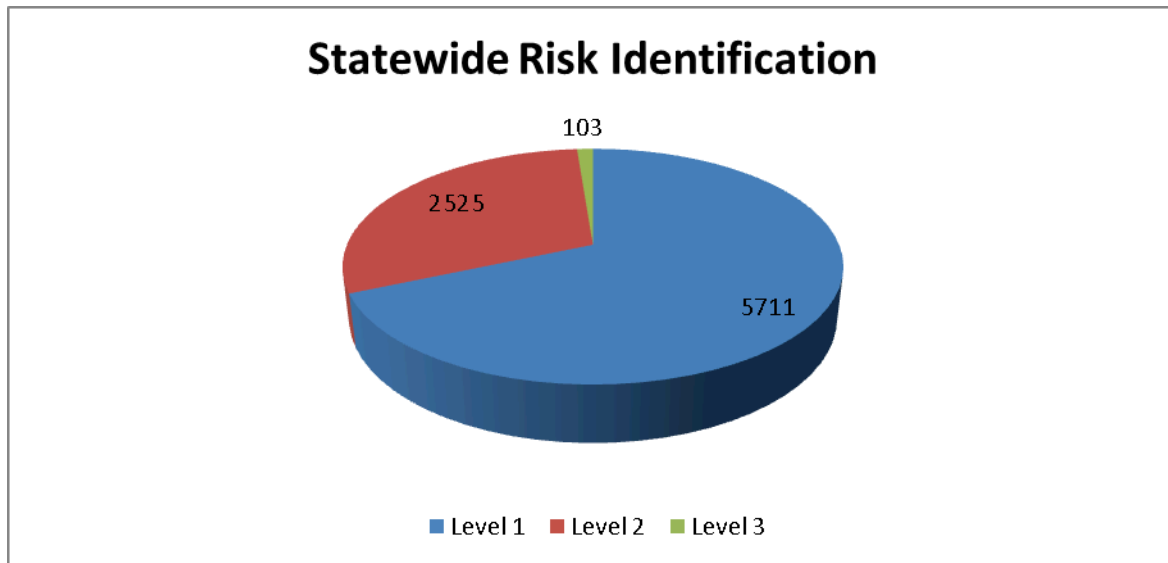
## 1.4 Statewide NOI data

During workshops leading up to adoption of the CGP, public comments were made suggesting that the Risk Assessment procedure in the CGP would result in higher Risk Levels being the norm. The data in SMARTS shows that approximately 69% of traditional projects qualify as Risk Level 1, 30% as Risk Level 2, and 1% as Risk Level 3. This means that a majority of projects in California can take advantage of the reduced requirements associated with Risk Level 1 projects. The review of SMARTs data shows that the CGP Risk Assessment procedure has not resulted in higher Risk Levels being norm. Table 4 and Figure 3 present a summary of the statewide NOI data.

**Table 4. Number of Projects Statewide by Risk Level**

	Level 1	Level 2	Level 3
Projects Statewide	5,711 (69%)	2,525 (30%)	103 (1%)





**Figure 3. Number of Projects Statewide by Risk Level**

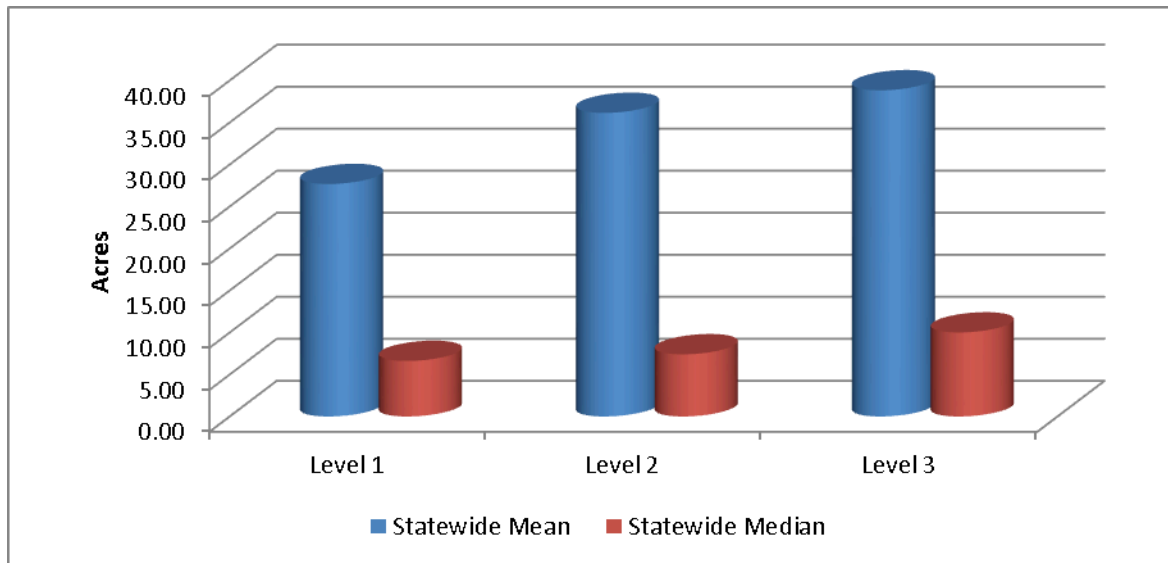
Table 5 and Figure 4 present results of the analysis of statewide NOI data based on project acreage. Statewide, across all Risk Levels, the mean project size is greater than the median project size. This indicates that there are many more small projects under the CGP coverage than there are large projects. Throughout all Regional Board jurisdictions, the mean project size is likewise greater than the median project size for all Risk Levels, with the exception being in the Central Valley – Fresno Region (5F) and the Central Valley – Redding Region (5R) for Risk Level 3 projects where the mean and median project size are equal.

**Table 5. Statewide Mean and Median Acreage of Projects by Risk Level**

Project Acreage	Level 1	Level 2	Level 3
Mean	27.67	36.14	38.83
Median	6.61	7.40	10.00

A hypothesis going into this review of SMARTs data was that the CGP Risk Assessment procedure could result in many small projects being assessed as Risk Level 3 and thereby subjecting these small projects to the stringent Risk Level 3 requirements. The hypothesis included the position that a small project with a high sediment risk per acre would pose less environmental risk than a large project with similar sediment risk per acre when potential sediment loadings for the entire project were considered.

As illustrated in Figure 4 below, the data in SMARTS shows that both the mean and median project size increases with Risk Level. This suggests that CGP Risk Assessment procedure is not resulting in numerous small projects being assessed at the highest Risk Level.



**Figure 4. Statewide Mean and Median Acreage of Projects by Risk Level**

## 1.5 Observations

As shown on a regional basis and statewide basis in Tables 1 and 4, Risk Level 1 and Risk Level 2 projects dominate the projects having coverage under the CGP, with Risk Level 1 in the lead.

In review of the regional NOI data there seems to be a trend of increasing acreage as Risk Level increases as evidenced by the mean acreage and median acreage for each region, with the exception of a handful highlighted in yellow in Tables 2 and 3.

When reviewing the data from a statewide standpoint, the same trend of increasing acreage with increasing Risk Level is clearly illustrated in Figure 4, and confirmed in the numbers shown in Table 5.

The current method of risk determination only considers the sediment risk and receiving water risk of a project, with sediment risk being considered on a per acre basis rather than from a project total size basis. Thus the apparent trend of smaller projects having the lower risk determination, compared to the larger projects is interesting.

As the sediment risk increases, so will the combined risk determination. A general observation can be made that larger, more complex projects typically have longer project duration; therefore the duration is a reflection of the size. Since sediment risk determination is influenced by a project's duration, the resulting combined risk already indirectly takes into account the project size, as evidenced by the trend seen herein.

## **2.0 Analysis of Available SMARTs pH and Turbidity Data**

### **2.1 Data Report Generation**

SMARTS data included for this evaluation was downloaded on September 5, 2012 following the deadline for the submittal of the 2011-2012 annual reports for projects covered under the CGP. The data inventory for this research is strictly based on projects registered in SMARTs during the 2011-2012 reporting year. Available constituent data is based on self-reported field measurements for Risk Level 1, 2, and 3 projects.

Constituent data was collected from reports generated from running queries for 2011-2012 for each region under the “Storm Water Reports Construction - Raw Data Parameter Results” from the Storm Water Data Public Access portal to SMARTs. This information was compared with the previously generated NOI data queries in order to confirm the risk level listed for the projects’ reporting parameters. This design allowed for the review of paired data; parameter results and combined risk determination.

### **2.2 Data Report Limitations and Assumptions**

As detailed in Section 1.2, some projects appear to have incorrectly reported project size information in SMARTs. In order to see the bigger picture of the overall constituent results for the State during the 2011-2012 year, constituent data included in the pH and turbidity data analysis included all available paired data and did not exclude that of projects suspected to have inaccurately reported project size.

Additional assumptions used regarding the SMARTs generated raw data included the following:

- For projects where the results were listed and the risk determination was not listed, this data was excluded on the basis of incomplete data pair.
- For projects where the results appear to have been mistakenly entered as 0, instead of “none”, this data was excluded on the following basis:
  - pH is only reported in units between 1-14, and
  - Turbidity is not likely to be 0 for so many occurrences for construction site discharges, when units are reported to the second decimal place.
- For projects where the results appear to have been mistakenly entered as greater than 14, this data was excluded on the following basis that pH is only reported in units between 1-14.

The following procedure was used to calculate the average pH:

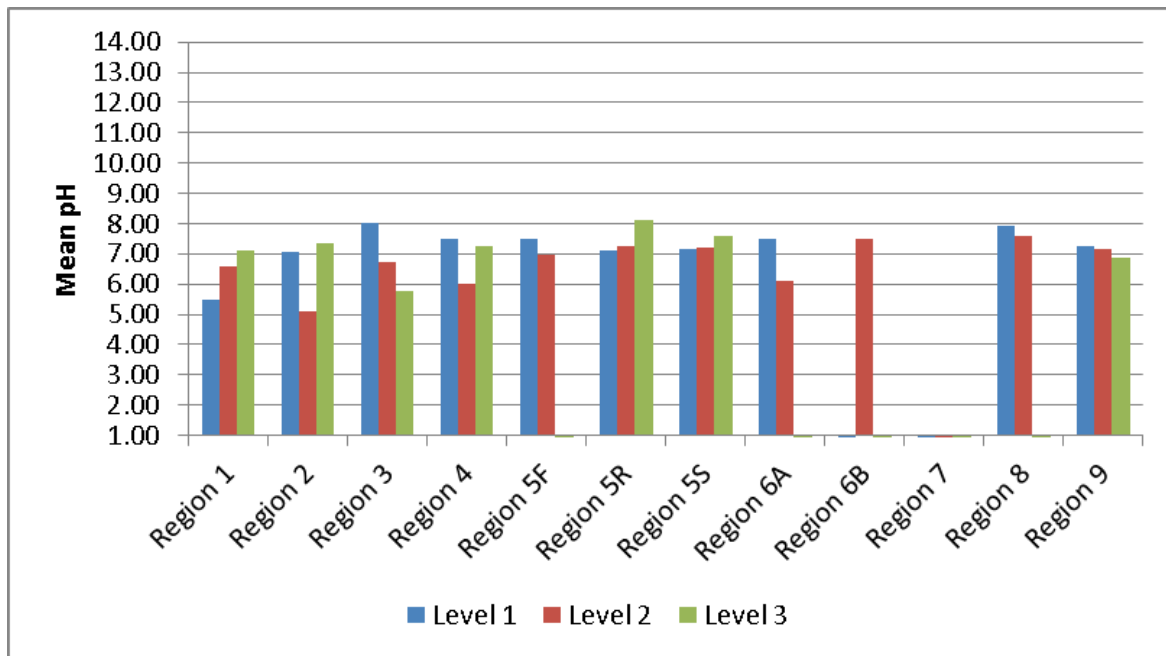
1. For each pH point, the hydronium ion concentration was calculated as follows:  $\text{InvLog}[-1](\text{pH})$
2. The average hydronium ion concentration was calculated by adding up the hydronium ion concentrations determined in Step 1 and dividing by the number of pH data points.
3. The average hydronium ion concentration determined in Step 2 was then converted to a pH value as follows:  $\text{Average pH} = (-1)\text{Log}(\text{average hydronium ion concentration})$ . This value is the average pH.

### 2.3 Regional pH Data

Table 6 and Figure 5 present the mean pH reported by Risk Level for each Regional Board. Table 7 and Figure 6 present the median pH reported by Risk Level for each Regional Board. Table 8 presents the sample size of the pH data reported by Risk Level for each Regional Board.

**Table 6. Mean pH by Risk Level for each Region**

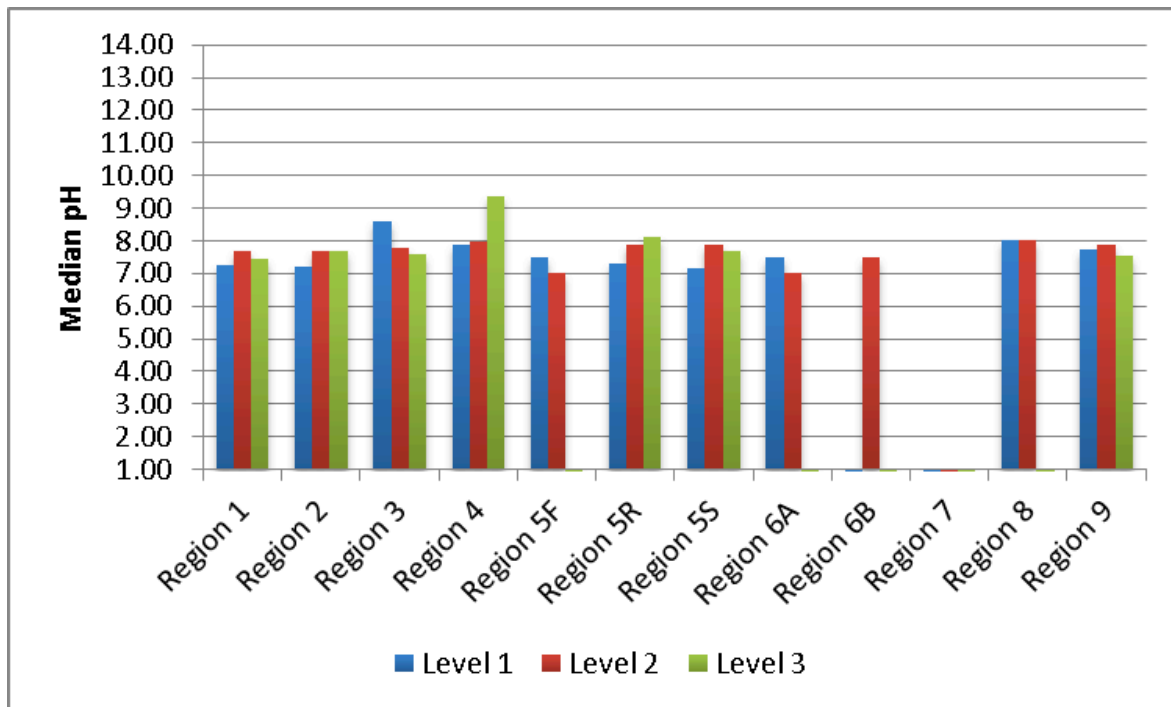
Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1 (North Coast)	5.47	6.57	7.09
Region 2 (San Francisco Bay)	7.04	5.11	7.33
Region 3 (Central Coast)	8.04	6.73	5.79
Region 4 (Los Angeles)	7.51	6.01	7.24
Region 5F (Central Valley - Fresno)	7.50	6.96	--
Region 5R (Central Valley - Redding)	7.10	7.26	8.10
Region 5S (Central Valley - Sacramento)	7.14	7.21	7.57
Region 6A (Lahontan - Tahoe)	7.48	6.09	--
Region 6B (Lahontan - Victorville)	--	7.49	--
Region 7 (Colorado River Basin)	--	--	--
Region 8 (Santa Ana)	7.91	7.59	--
Region 9 (San Diego)	7.28	7.17	6.89



**Figure 5. Mean pH by Risk Level for each Region**

**Table 7. Median pH by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	7.25	7.70	7.45
Region 2	7.20	7.70	7.70
Region 3	8.60	7.80	7.58
Region 4	7.90	7.99	9.35
Region 5F	7.50	7.00	--
Region 5R	7.30	7.90	8.10
Region 5S	7.15	7.90	7.70
Region 6A	7.51	7.00	--
Region 6B	--	7.49	--
Region 7	--	--	--
Region 8	8.00	8.00	--
Region 9	7.75	7.90	7.57



**Figure 6. Median pH by Risk Level for each Region**

**Table 8. Sample size (*n*) of pH data by Risk Level for each Region**

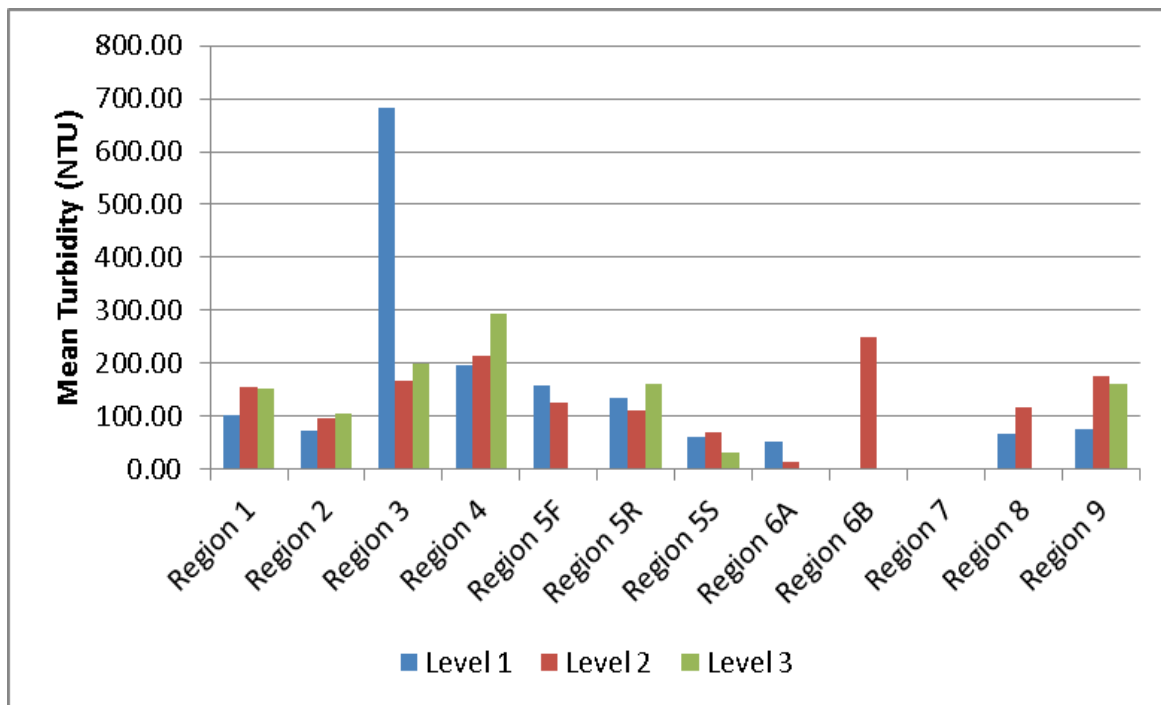
<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	59	306	502
Region 2	73	4,535	629
Region 3	11	412	61
Region 4	67	690	28
Region 5F	1	207	--
Region 5R	128	461	1
Region 5S	506	5,820	152
Region 6A	6	22	--
Region 6B	--	1	--
Region 7	--	--	--
Region 8	64	659	--
Region 9	99	1,477	38

## 2.4 Regional Turbidity Data

Table 9 and Figure 7 present the mean turbidity reported by risk level for each Regional Board. Table 10 and Figure 8 present the median turbidity reported by risk level for each Regional Board. Table 11 presents the sample size of the turbidity data reported by risk level for each Regional Board.

**Table 9. Mean Turbidity (NTU) by Risk Level for each Region**

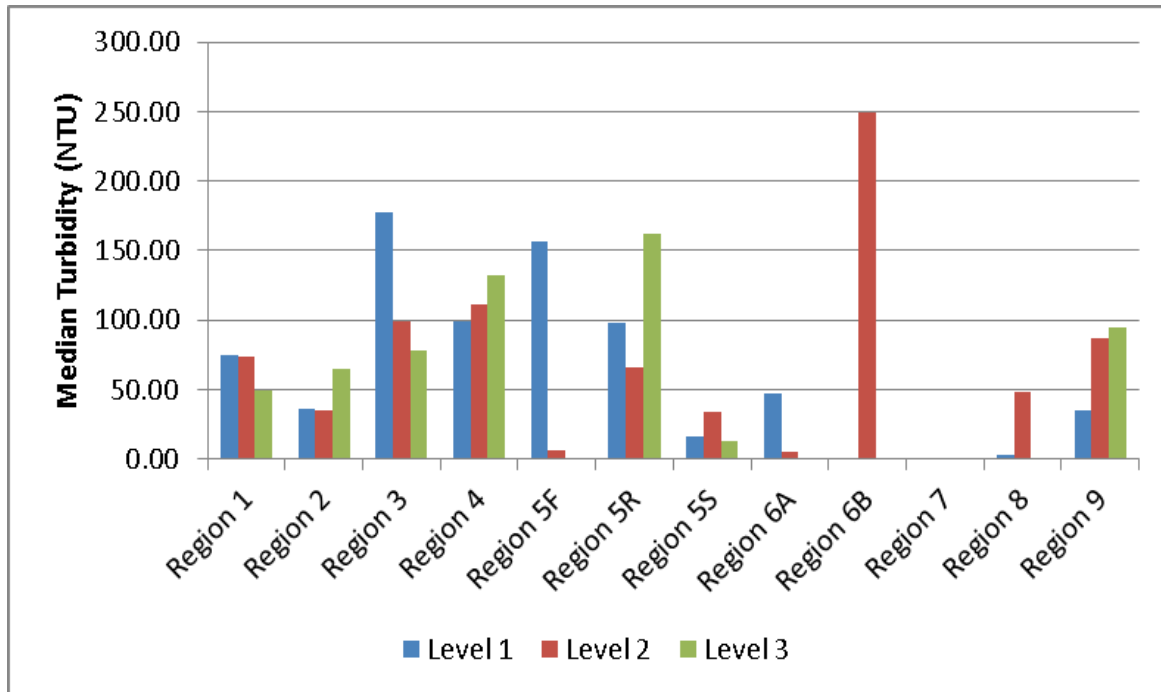
Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	101.58	154.94	152.86
Region 2	71.14	96.68	104.25
Region 3	683.87	167.77	200.18
Region 4	196.77	213.52	294.10
Region 5F	157.00	126.58	--
Region 5R	135.50	110.01	162.00
Region 5S	60.84	69.31	32.57
Region 6A	52.63	15.01	--
Region 6B	--	249.00	--
Region 7	--	--	--
Region 8	65.33	115.57	--
Region 9	74.69	175.35	160.98



**Figure 7. Mean Turbidity (NTU) by Risk Level for each Region**

**Table 10. Median Turbidity (NTU) by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	74.68	73.60	49.65
Region 2	36.00	34.60	65.00
Region 3	178.00	99.05	78.00
Region 4	98.90	111.00	132.50
Region 5F	157.00	5.90	--
Region 5R	98.35	65.40	162.00
Region 5S	15.61	34.20	13.20
Region 6A	46.85	5.54	--
Region 6B	--	249.00	--
Region 7	--	--	--
Region 8	3.11	48.58	--
Region 9	35.00	86.60	95.00



**Figure 8. Median Turbidity (NTU) by Risk Level for each Region**



**Table 11. Sample size (*n*) of Turbidity data by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	59	373	762
Region 2	203	4,591	413
Region 3	11	418	61
Region 4	67	691	28
Region 5F	1	208	--
Region 5R	128	499	1
Region 5S	259	2,977	152
Region 6A	6	52	--
Region 6B	--	1	--
Region 7	--	--	--
Region 8	64	664	--
Region 9	100	1,509	38

## 2.5 Observations

The CGP requires pH and turbidity monitoring for Risk Level 2 and 3 projects. The data in SMARTS clearly shows that as project Risk Level increases; there is a corresponding increase in pH and turbidity sampling. When reviewed on the basis of number of samples reported by number of projects by Risk Level (Tables 8 and 11), it is clear that the intensity of sampling increases with Risk Level for both pH and turbidity sampling, with Risk Level 3 projects taking 2 to 3 times more pH and turbidity samples than Risk Level 2 projects. Surprisingly, SMARTS includes numerous sampling reports from Risk Level 1 projects that do not have routine sampling requirements, with sampling reports for pH and turbidity at 3% to 4% of the number of sampling reports submitted by Risk Level 2 projects.

The mean number of sampling results per site by Risk Level for pH and turbidity are similar, which suggests that sites that sample tend to sample and report both pH and turbidity.

The number of turbidity sampling results being reported varies significantly between Regional Boards, and there does not appear to be strong correlation between the number of sites in a Regional Board's jurisdiction and the number of sampling results reported. To rule out rainfall as a factor in this difference, the number of reported samples between Regional Boards with generally comparable climates was compared, and these comparisons did not indicate that sampling frequency correlates with climate. Risk Level 2 sites in Region 2 submitted about 4 times more samples per site than sites in Region 3. Risk Level 2 sites in Region 4 and Region 8 submitted about the same number of samples per site, but only about half the number of samples per site as submitted in Region 9. Region 5 was particularly interesting: For Risk Level 2 sites, with sub regions 5F, 5R, and 5S submitting an average of 9.4, 5.1, and 7.8 samples per site, respectively, which is a much higher rate than the other Regional Boards with the exception of Region 2 where the average is 9.4 samples per site.

The data in SMARTS suggests that the rate of pH and turbidity sampling and reporting is most strongly tied to the Risk Level of a project, with projects having a higher Risk Level clearly sampling and reporting more often than projects at lower Risk Levels. The data also shows that the rate of pH and turbidity sampling and reporting is highly variable among Regional Board jurisdictions and that this difference is likely influenced by factors other than location. Potential factors for future consideration and evaluation should include level of emphasis on sampling by the Regional Board, level of training, and the timing of rain events.

As seen in Table 11 there are a surprising number of reports of pH and turbidity for Risk Level 1 projects. This was not expected since the CGP does not require sampling for Risk Level 1, with the exception of a leak, breach, or malfunction of a BMP.

Comparison of Table 1 with Tables 14 and 17 demonstrate that the number of projects in a region has no real bearing on the sample size in a given region, since it is so variable across the board. This is because the parameter sample size is influenced by the number of sampling locations reported for a single project, and the number of reporting events; either due to a storm, non-stormwater discharge, or leak, breach, or malfunction at site, variables that are circumstantial. For example, with a similar number of Risk Level 2 projects, San Francisco Region (2) and Los Angeles Region (4) have extremely different sample sizes for pH and turbidity; 6.5 times as many samples for Region 2.

In taking a closer look at turbidity data for the Risk Level 2 projects, which dominate in sample size compared to Risk Level 1 and 3, the following observations were made when comparing regional data for areas of similar climate, using Tables 1 and 11:

- The San Francisco Bay Region (2) had 2.5 times more Risk Level 2 projects than the Central Coast Region (3), and yielded approximately 11 times more turbidity samples.
- The Los Angeles Region (4) had a similar number of Risk Level 2 projects compared with the San Diego Region (9), and only 1.5 times as many as the Santa Ana Region (8). However, the turbidity sample size for the Los Angeles Region (4) and the Santa Ana Region (8) were close to equal, while the San Diego Region (9) yielded more than twice the data as the other two water boards.
- The Lahontan-Victorville Region (6B) had half of the number of Risk Level 2 projects compared with the Colorado River Basin Region (7), and yielded only 1 sample, while Region 7 yielded no samples.

## 3.0 Analysis of pH and Turbidity Exceedance Data

### 3.1 Data Report Generation

Constituent data was collected as described in Section 2.1; however, this data was further filtered by results to determine the number of exceedances reported in SMARTs during the 2011-2012 year. It is important to acknowledge that this information is not actually based on the submittal of formal NAL exceedance reports, rather it was derived from filtering the collective parameter data for each region.

### 3.2 Data Report Limitations and Assumptions

Data report assumptions and limitations are as described in Section 2.2.

### 3.3 Regional pH Numeric Action Level (NAL) Exceedance data

#### 3.3.1 Regional pH NAL Exceedance data (Lower Limit)

Table 12 and Figure 9 present the mean pH NAL exceedance (pH < 6.5) reported by risk level for each Regional Board. Table 13 and Figure 10 present the median pH NAL exceedance (pH < 6.5) reported by Risk Level for each Regional Board. Table 14 presents the sample size of the pH NAL exceedance (pH < 6.5) reported by risk level for each Regional Board.

**Table 12. Mean pH Lower Limit NAL Exceedance (pH < 6.5) by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1 (North Coast)	4.88	5.06	6.16
Region 2 (San Francisco Bay)	6.15	3.80	6.22
Region 3 (Central Coast)	--	4.80	4.32
Region 4 (Los Angeles)	--	4.03	6.24
Region 5F (Central Valley - Fresno)	--	6.39	--
Region 5R (Central Valley - Redding)	6.48	6.11	--
Region 5S (Central Valley - Sacramento)	--	5.61	--
Region 6A (Lahontan - Tahoe)	--	5.78	--
Region 6B (Lahontan - Victorville)	--	--	--
Region 7 (Colorado River Basin)	--	--	--
Region 8 (Santa Ana)	--	6.40	--
Region 9 (San Diego)	--	1.05	6.19

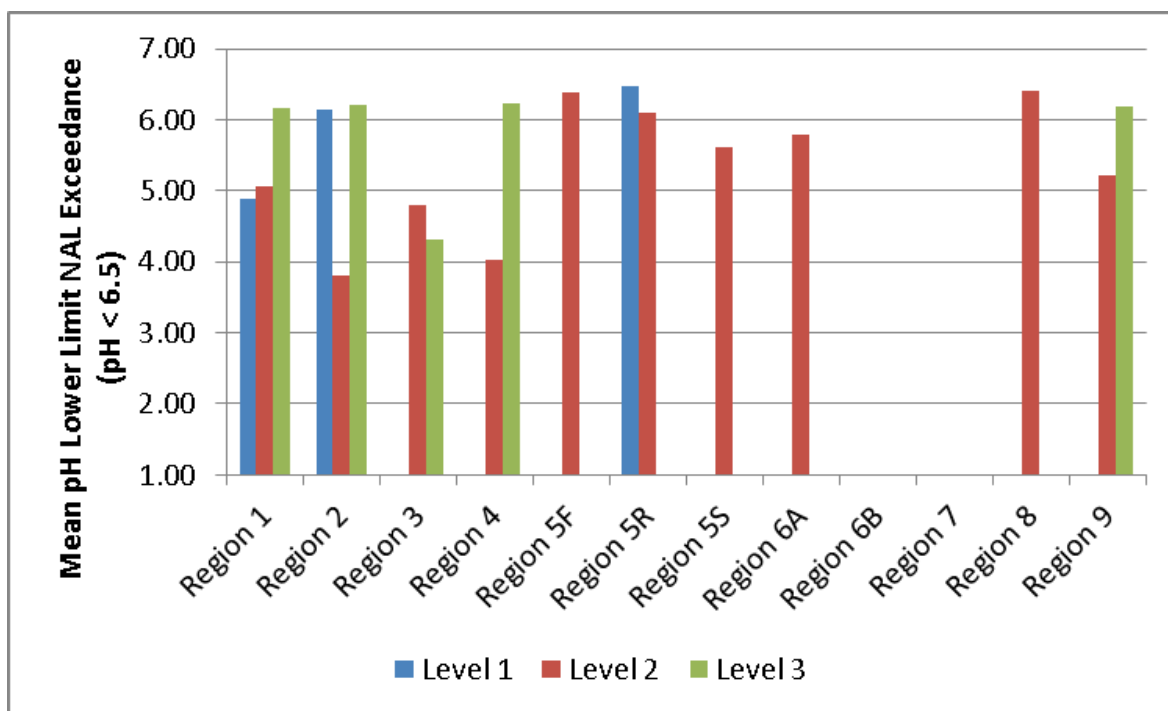


Figure 9. Mean pH Lower Limit NAL Exceedance (pH < 6.5) by Risk Level for each Region

Table 13. Median pH Lower Limit NAL Exceedance (pH < 6.5) by Risk Level for each Region

Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	5.90	6.35	6.20
Region 2	6.18	4.15	6.20
Region 3	--	4.91	4.33
Region 4	--	6.00	6.25
Region 5F	--	6.40	--
Region 5R	6.47	6.20	--
Region 5S	--	6.18	--
Region 6A	--	6.00	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	--	6.40	--
Region 9	--	6.00	6.31

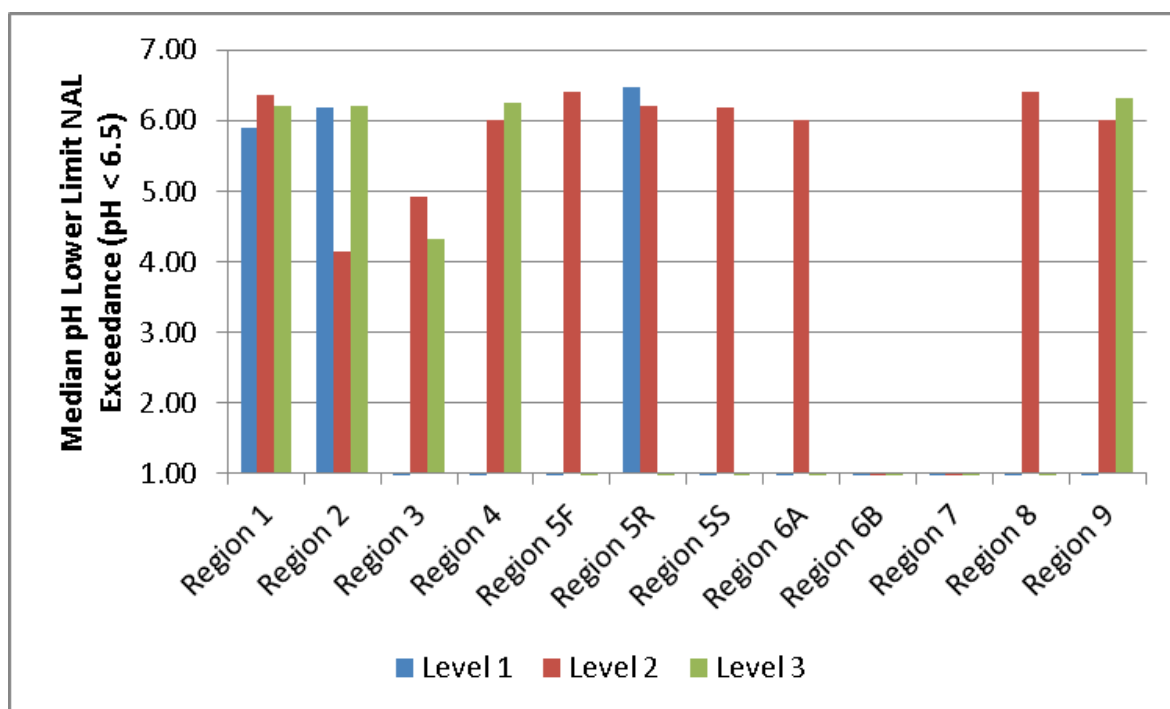


Figure 10. Median pH Lower Limit NAL Exceedance (pH < 6.5) by Risk Level for each Region

Table 14. Sample size (*n*) of pH Lower Limit NAL Exceedance (pH < 6.5) data by Risk Level for each Region

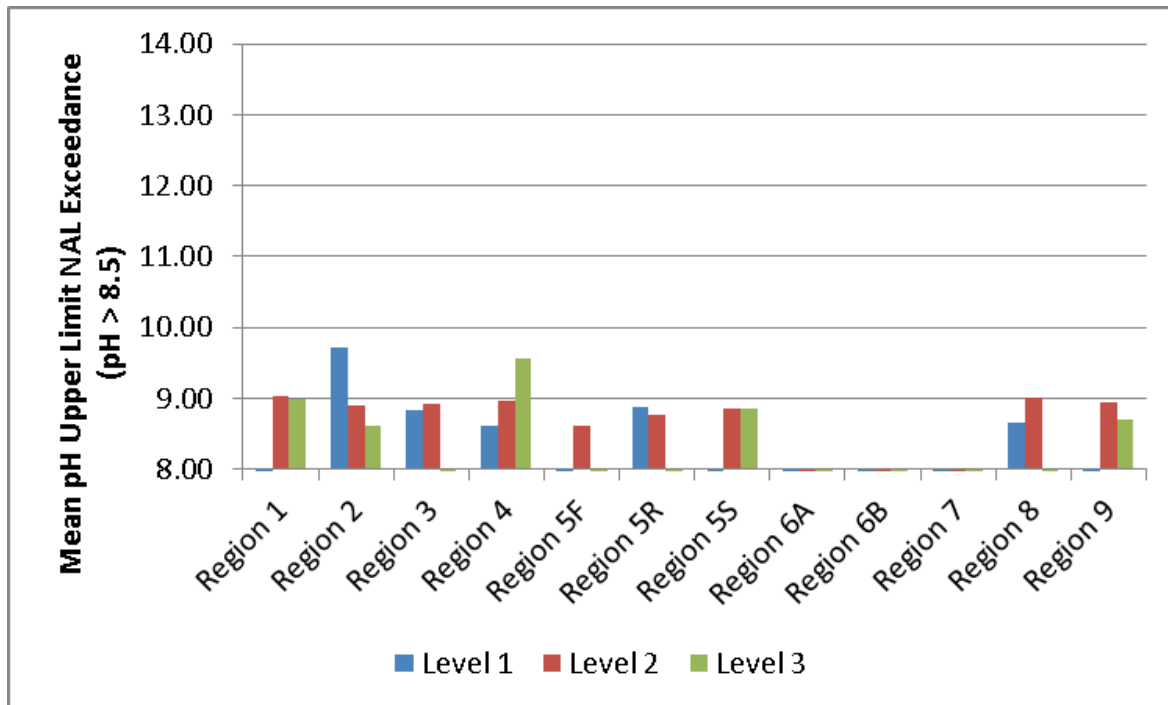
Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	15	8	22
Region 2	3	223	18
Region 3	--	4	2
Region 4	--	7	2
Region 5F	--	5	--
Region 5R	3	15	--
Region 5S	--	76	--
Region 6A	--	10	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	--	3	--
Region 9	--	6	6

### 3.3.2 Regional pH NAL Exceedance data (Upper Limit)

Table 15 and Figure 11 present the mean pH NAL exceedance (pH > 8.5) reported by risk level for each Regional Board. Table 16 and Figure 12 present the median pH NAL exceedance (pH > 8.5) reported by risk level for each Regional Board. Table 17 presents the sample size of the pH NAL exceedance (pH > 8.5) reported by risk level for Regional Board.

**Table 15. Mean pH Upper Limit NAL Exceedance (pH > 8.5) by Risk Level for each Region**

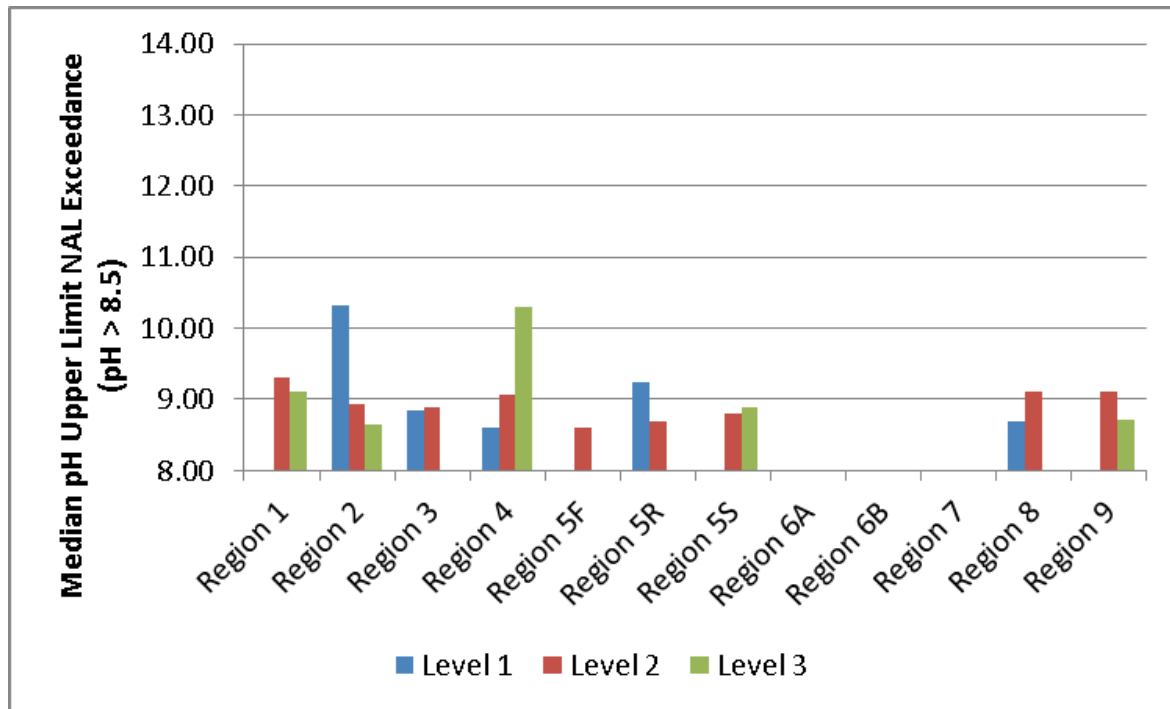
Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1 (North Coast)	--	9.04	8.99
Region 2 (San Francisco Bay)	9.71	8.89	8.62
Region 3 (Central Coast)	8.84	8.92	--
Region 4 (Los Angeles)	8.60	8.97	9.56
Region 5F (Central Valley - Fresno)	--	8.60	--
Region 5R (Central Valley - Redding)	8.88	8.76	--
Region 5S (Central Valley - Sacramento)	--	8.85	8.86
Region 6A (Lahontan - Tahoe)	--	--	--
Region 6B (Lahontan - Victorville)	--	--	--
Region 7 (Colorado River Basin)	--	--	--
Region 8 (Santa Ana)	8.66	9.01	--
Region 9 (San Diego)	--	8.95	8.70



**Figure 11. Mean pH Upper Limit NAL Exceedance (pH > 8.5) by Risk Level for each Region**

**Table 16. Median pH Upper Limit NAL Exceedance (pH > 8.5) by Risk Level for each Region**

Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	--	9.30	9.10
Region 2	10.32	8.94	8.64
Region 3	8.85	8.90	--
Region 4	8.60	9.08	10.30
Region 5F	--	8.60	--
Region 5R	9.25	8.70	--
Region 5S	--	8.80	8.90
Region 6A	--	--	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	8.70	9.10	--
Region 9	--	9.10	8.72



**Figure 12. Median pH Upper Limit NAL Exceedance (pH > 8.5) by Risk Level for each Region**

**Table 17. Sample size (*n*) of pH Upper Limit NAL Exceedance (pH > 8.5) data by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	--	32	36
Region 2	5	331	6
Region 3	6	35	--
Region 4	1	96	17
Region 5F	--	3	--
Region 5R	2	24	--
Region 5S	--	264	4
Region 6A	--	--	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	6	118	--
Region 9	--	122	2

### 3.4 Regional Turbidity NAL Exceedance data

Table 18 and Figure 13 present the mean turbidity NAL exceedance (> 250 NTU) reported by Risk Level for each Regional Board. Table 19 and Figure 14 present the median turbidity NAL exceedance (> 250 NTU) reported by Risk Level for each Regional Board. Table 20 presents the sample size of the turbidity NAL exceedance data reported by Risk Level for each Regional Board.

**Table 18. Mean Turbidity NAL Exceedance by Risk Level for each Region**

<b>Regional Water Quality Control Board</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Region 1	397.00	603.13	767.25
Region 2	637.00	657.15	569.60
Region 3	1,414.80	807.88	835.90
Region 4	516.35	719.14	683.44
Region 5F	--	1,422.87	--
Region 5R	440.28	491.71	--
Region 5S	629.95	555.75	--
Region 6A	--	--	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	3,163.00	679.16	--
Region 9	539.56	659.11	1,000.00



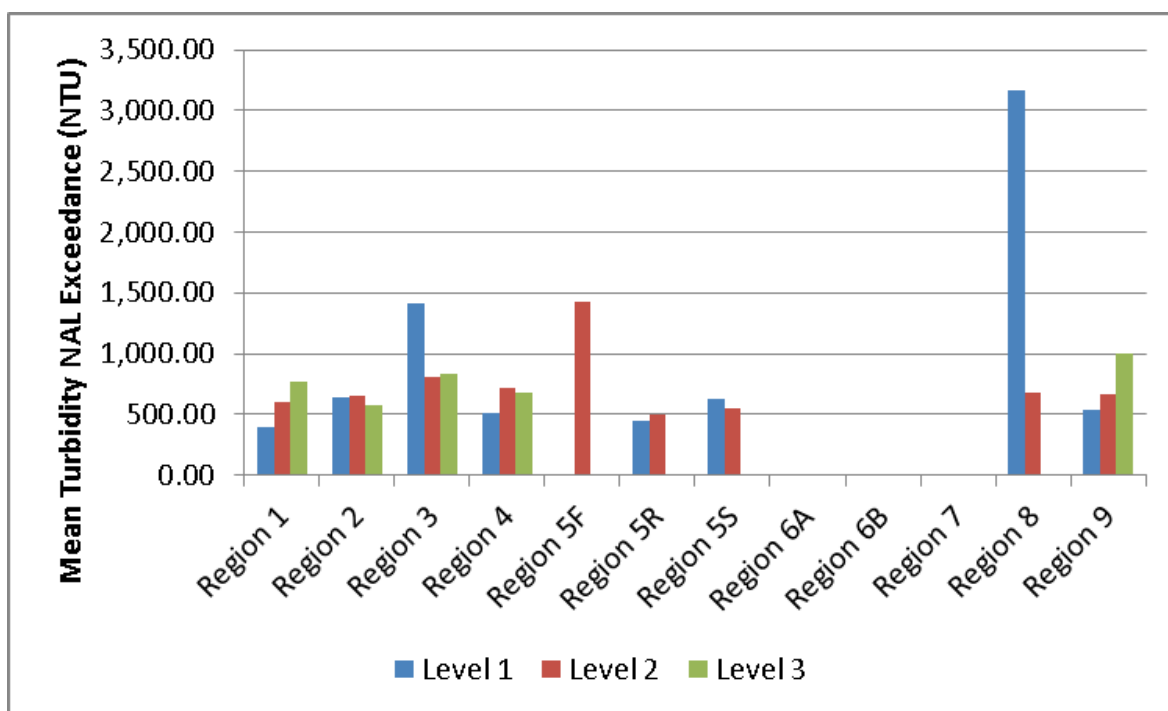


Figure 13. Mean Turbidity NAL Exceedance (NTU) by Risk Level for each Region

Table 19. Median Turbidity NAL Exceedance by Risk Level for each Region

Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	342.00	484.00	463.00
Region 2	581.00	515.00	552.00
Region 3	1,370.00	857.00	698.00
Region 4	492.00	750.00	703.00
Region 5F	--	481.00	--
Region 5R	370.50	351.00	--
Region 5S	629.20	432.00	--
Region 6A	--	--	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	3,163.00	678.00	--
Region 9	572.00	622.00	1,000.00

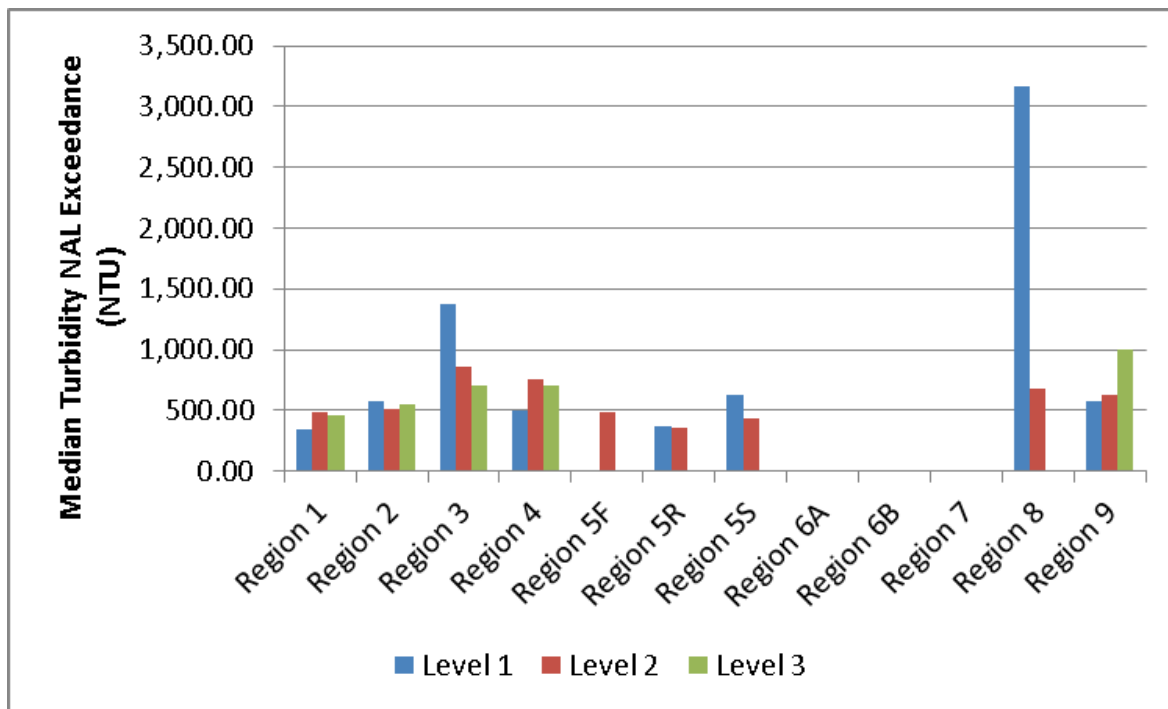


Figure 14. Median Turbidity NAL Exceedance (NTU) by Risk Level for each Region

Table 20. Sample size (*n*) of Turbidity NAL Exceedance data by Risk Level for each Region

Regional Water Quality Control Board	Level 1	Level 2	Level 3
Region 1	4	54	95
Region 2	9	306	26
Region 3	5	41	10
Region 4	17	133	9
Region 5F	--	15	--
Region 5R	18	37	--
Region 5S	12	115	--
Region 6A	--	--	--
Region 6B	--	--	--
Region 7	--	--	--
Region 8	1	50	--
Region 9	5	235	3

### 3.5 Observations

It's important to recognize that the sample size for parameter reporting is based on the number of instances of entry into SMARTs, which for some regions consisted of only a handful or fewer projects making the reports. High sampling size can then be an indication that entries were made from only a few projects, or in some cases under a single project. For example, this was the case for the San Francisco Bay Region (2) which yielded 244 pH exceedances with 172 coming from a single project for over 10 events, while the Central Valley - Fresno Region (5F) yielded only 15 turbidity exceedance entries under a single project from 2 events. Additionally, the reports were not used to distinguish storm event vs. non-

stormwater discharge (authorized or unauthorized) vs. required sampling in relation to a breach, leak, or malfunction at a site. Therefore future reporting years will likely present even more data that is extremely variable. Sampling size may not necessarily be comparable across reporting years.

As seen in Table 14 Risk Level 1 and Risk Level 2 projects reporting pH sampling data showed similar rates of sampling falling outside the lower pH NAL limit (2% of samples), whereas Risk Level 3 projects showed samples falling outside the lower pH NAL limit about 50% more often (3% of samples). For the upper pH NAL (Table 17), the exceedance rates were 2%, 7%, and 5% of samples for Risk Level 1, 2, and 3 projects, respectively. The higher incidence rate for pH exceeding the upper NAL limit suggests that SWPPPs should focus on control of activities, materials, and wastes involving Portland cement, a common source for high pH discharges.

Risk Level 1 and Risk Level 2 projects reporting turbidity sampling data (Table 20) showed similar rates of samples exceeding the NAL for turbidity (8% of samples), whereas Risk Level 3 projects shows samples exceeding the NAL for turbidity about 25% more often (10% of samples). The result suggests that erosion and sediment controls are important on all sites, but especially important on Risk Level 3 projects.

## **4.0 Summary of Observations, Recommendations, and Conclusions**

### **4.1 Summary of Observations**

On a regional and statewide level there is a trend of increasing acreage with increasing Risk Level. As expected Risk Level 2 projects dominate the sampling data input into SMARTs. The parameter data provides the public an indication of the magnitude of sampling and reporting that occurred for each region.

The sample size of the pH and turbidity data that exceeds the NAL also provides an illustration to the public of the additional monitoring and implementation requirements for high risk projects.

### **4.2 Recommendations**

Based on the SMARTS query process and review of the generated data, the following are recommendations for improving the quality of future public reports:

- Include the project size within the data generated from the Raw Data Parameter Results. This will allow the public to readily identify project details associated with parameter reports.
- Include an option in the NOI to identify the reporting units of the project size; prompting SMARTs to calculate any necessary conversion from square feet to acreage to reduce error in data entry.
- Conduct QA/QC of results generated from queries to determine why some projects active during the 2011-2012 reporting year do not yield a corresponding combined risk determination in the NOI data.
- Conduct QA/QC of results generated from queries to determine why some projects active during the 2011-2012 reporting year do not yield a corresponding combined risk determination in the parameter data.
- Set controls in the Adhoc reports preventing SMARTs users from entering pH data outside of the 1-14 range.
- Set conditioning standards in the parameter queries to prevent the generation of reports where sampling results of 0 (designating no sampling result) were entered in the Adhoc reports. Include a NR = No Report option that won't be evaluated as Null or zero.
- Provide an indicator of the type of sample event (i.e. Storm event, non-stormwater discharge, or leak, breach, or malfunction of BMP) reported from the raw parameter data query.

### **4.3 Conclusions**

The hypothesis that an adequate risk assessment should include a project size factor is not supported by the data currently reported in SMARTS. In conclusion, the CGP risk assessment procedure that considers sediment risk per acre and receiving water risk appears to be adequate for assessing project Risk Levels.