Toxicity Plan

Update!

2010 - State Toxicity Plan discussion starts

(will replace SIP Section 4)

2014

March 2014 – EPA issued "Alternative Test Procedure:"

- **2-concentration TST**

July 2014 – EPA Region 9 objection letter to two LACSD permits

Nov 2014 - LA Regional Water Board imposed numeric toxicity limits for LACSD: Whittier Narrows & Pomona Plants

- ***MMEL & MDEL numeric chronic toxicity limits***
- ***2-concentration TST evaluation recommended***
- ***No safe harbor during investigation***

Dec 2014 – LACSD, CASA, BACWA, & SCAP petitioned State Water Resources Control Board

Jan 2015 – EPA Region 9 submitted objection to Las Gallinas Valley Sewage Treatment Plant

- ***MMEL & MDEL numeric chronic toxicity limits***

2015

Feb 2015 – EPA withdraws "Alternative Test Procedure:"
- **2-concentration TST**

May 2015 – LACSD appealed 7 permits* to SWRCB – but put it in abeyance, pending cooperative solutions.

** SJC, WN, Valencia, Saugus, Pomona, Long Beach, Los Coyotes.*

May 2015 – SCAP, CASA & NACWA appeal SJ Creek permit
- ***CASA also challenged EPA objection to narrative objectives & triggers with District Court***
- ***Comment letter submitted by SCAP***

Jun 2015 – State Water Board memo: plan to re-file for the ATP

6 North Coast permits & SF Bay MS4 permit now mandate the TST

SWRCB Exec Director's Report – December 2015			
Toxicity Amendments to SIP	Summer 2012	**Feb 2016**	June 2016
Toxicity Amendments to "Inland Surface Waters, Enclosed Bays and Estuaries Plan" (SIP)	Draft received public comments	**New Draft for release to public**	Target Board Meeting Date

Toxicity Plan

One take-away
Two themes

Possible Draft Toxicity Plan in Spring 2016

1. **EPA requires numeric MDEL & AMEL limits If RP is present**

2. **Some regulators love the TST**

EPA Argument for numeric limits:

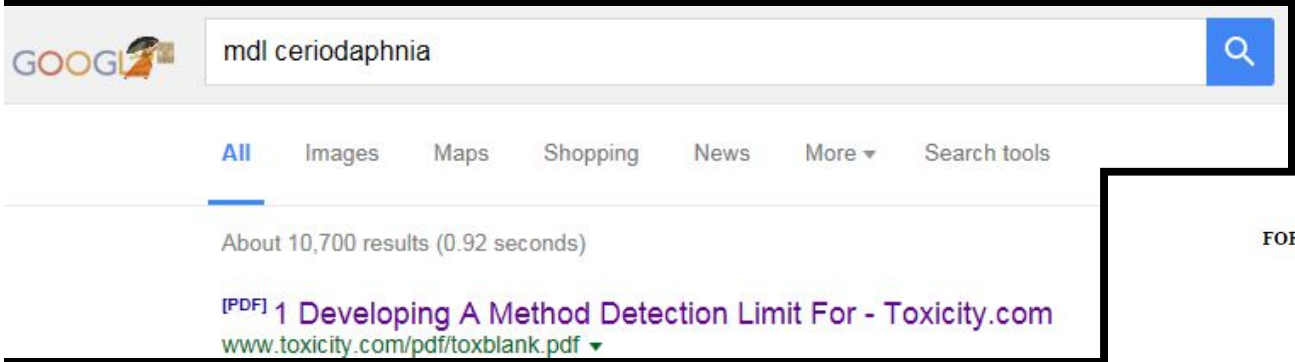
40 CFR 122.44(d)(1)(v): When a discharge causes, or has RP to cause an in-stream excursion above a narrative criterion, … the permit must contain effluent limits* for WET. [Except as noted in (d)(1)(ii)]

40 CFR 122.44(d)(1)(ii) … permitting authority shall use procedures which account for … variability of pollutant or parameter in effluent, [and] sensitivity of species to toxicity testing …

ceriodaphnia studies suggest MDL of 2 to 3 TUc

**** Does not say "NUMERIC"***

Developing a Method Detection Limit for Chronic Whole Effluent Toxicity Testing



Risk Sciences 2002

MDL = 2 to 3 TUc.

MDL is NOT a dilution factor!

DEVELOPING A METHOD DETECTION LIMIT FOR CHRONIC WHOLE EFFLUENT TOXICITY TESTING USING *CERIODAPHNIA DUBIA*

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Abstract - Chemical testing routinely uses 'blanks' to provide quality assurance. However, whole effluent toxicity (WET) testing relies, primarily, on the use of reference toxicants. As such, the intrinsic variability surrounding WET testing in the absence of toxicants is not well known. For this study, a number of municipal wastewater dischargers contracted 17 laboratories to conduct a total of 25 chronic WET tests using the standard test organism, *Ceriodaphnia dubia*. Unbeknownst to the labs, the samples they received from the wastewater dischargers were comprised only of "moderately hard water" made using U.S. EPA's standard formula. As such, these tests served as 'method blanks'. Of the 25 tests completed by the biomonitoring laboratories, 2 did not meet control performance criteria. Of the remaining 23 valid tests, 9 (39%) indicated toxicity in the test sample (i.e., NOEC or IC_{25} < 100% 'effluent'). This failure rate was unexpected, considering the water being testing was identical among labs and comprised simply of mod-hard water. Using techniques similar to those employed for traditional chemistry, reproducible 'method detection limits' (MDLs) were calculated for the chronic *Ceriodaphnia* test. This calculation indicates that based on a standard 0.5 dilution series starting with 100% 'effluent,' at least 3 TU_c would be necessary to ensure that any reported toxicity was greater than the variability associated with this method.

KEYWORDS: *Ceriodaphnia dubia*, whole effluent toxicity tests, MDL, NOEC, IC_{25}

22 years and counting - No answers, no clues

276 tests X $3000 = $828,000

Chronic Toxicity Summary 22 Years

Year	# Results Reported	# Results >1 but <2 TUc	# Results >2 TUc	TST
1994	12	0	0	
1995	11	0	0	
1996	13	1	1	Tox Tox
1997	12	2	0	Tox Tox
1998	12*	3	0	Tox Tox Tox
1999	14	0	2	Tox Tox
2000	12	0	0	
2001	12	0	0	
2002	12	0	0	
2003	12	0	0	
2004	12	0	1	Tox
2005	12	0	1	Tox
2006	11	0	0	
2007	13	0	1	Tox
2008	12	0	0	
2009	14*	1	2	Tox Tox Tox
2010	19*	3	2	T T T T T
2011	14	2	1	Tox Tox Tox
2012	13	1	1	Tox Tox
2013	14	4	3	T T T T T T T
2014	12	1	0	Tox
2015	13	3	0	Tox Tox Tox

* Some test tests in 1998 and 2009/10 were duplicate test events

How many were toxic?? -21 12-15 36

Chronic Test Results - 2013
(% Effluent)

TEST START DATE	SURVIVAL		REPRODUCTION				
	NOEC	LOEC	NOEC	LOEC	IC_{25}	TUc	TST
1/9/13	100	>100	25	50	58.1	1.7	Fail
2/4/13	100	>100	100	>100	>100	<1	Pass
3/4/13	100	>100	6.25	12.5	9.88	10.1	Fail
4/2/13	100	>100	100	>100	>100	<1	Pass
4/12/13	100	>100	100	>100	84.5	1.2	Fail
5/6/13	100	>100	50	100	42.7	2.3	Fail
6/10/13	100	>100	100	>100	>100	<1	Pass
7/12/13	100	>100	100	>100	>100	<1	Pass
8/1/13	100	>100	50	100	90.7	1.1	Fail
8/5/13	100	>100	100	>100	>100	<1	Pass
9/12/13	100	>100	25	50	34.6	2.9	Fail
10/4/13	100	>100	100	>100	>100	<1	Pass
11/19/13	100	>100	50	100	86.1	1.2	Fail
12/9/13	100	>100	100	>100	>100	<1	Pass

← 2013
Very Bad Year

2014
↓ Good Year

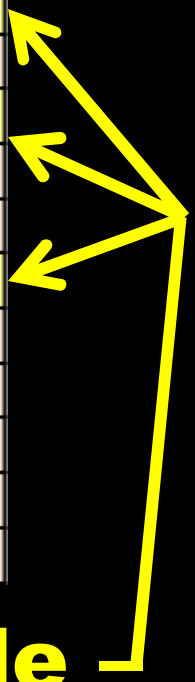
Chronic Test Results - 2014
(% Effluent)

ST START DATE	SURVIVAL		REPRODUCTION				
	NOEC	LOEC	NOEC	LOEC	IC_{25}	TUc	TST
1/10/14	100	>100	100	>100	>100	<1	Pass
2/3/14	100	>100	100	>100	>100	1.6	Fail
3/3/14	100	>100	100	>100	>100	<1	Pass
4/8/14	100	>100	100	>100	>100	<1	Pass
5/5/14	100	>100	100	>100	>100	<1	Pass
6/9/14	100	>100	100	>100	>100	<1	Pass
7/14/14	100	>100	100	>100	>100	<1	Pass
8/11/14	100	>100	100	>100	>100	<1	Pass
9/12/14	100	>100	100	>100	>100	<1	Pass
10/3/14	100	>100	100	>100	>100	<1	Pass
11/3/14	100	>100	100	>100	>100	<1	Pass
12/8/14	100	>100	100	>100	>100	<1	Pass

What changed?

2015 – So-So Year

Chronic Test Results - 2015 (% Effluent)							
TEST START DATE	SURVIVAL		REPRODUCTION				
	NOEC	LOEC	NOEC	LOEC	IC_{25}	TUc	TST
1/9/15	100	>100	100	>100	>100	<1	Pass
2/6/15	100	>100	100	>100	>100	<1	Pass
3/6/15	**100**	**>100**	**100**	**>100**	**59.3**	**1.7**	**Fail**
4/10/15	100	>100	100	>100	>100	<1	Pass
5/8/15	**100**	**>100**	**100**	**>100**	**59.9**	**1.7**	**Fail**
6/5/15	100	>100	100	>100	>100	<1	Pass
6/13/15	100	>100	100	>100	>100	<1	Pass
7/13/15	**100**	**>100**	**50**	**100**	**95.3**	**1.05**	**Fail**
8/7/15	100	>100	100	>100	>100	<1	Pass
9/15/15	100	>100	100	>100	>100	<1	Pass
10/2/15	100	>100	100	>100	>100	<1	Pass
11/2/15	100	>100	100	>100	>100	<1	Pass
12/11/15	100	>100	100	>100	>100	<1	Pass



TST does not show magnitude
another clue is lost

Concentration response & QA is too confusing!

The gods are not pleased!

Magic bones say our water is toxic! We must pay!

What problem we are trying to solve?

Toxicity testing is a good diagnostic tool*
<u>BUT just one line of evidence</u>

**** TST endpoint renders the tool practically useless.***

Other lines of evidence

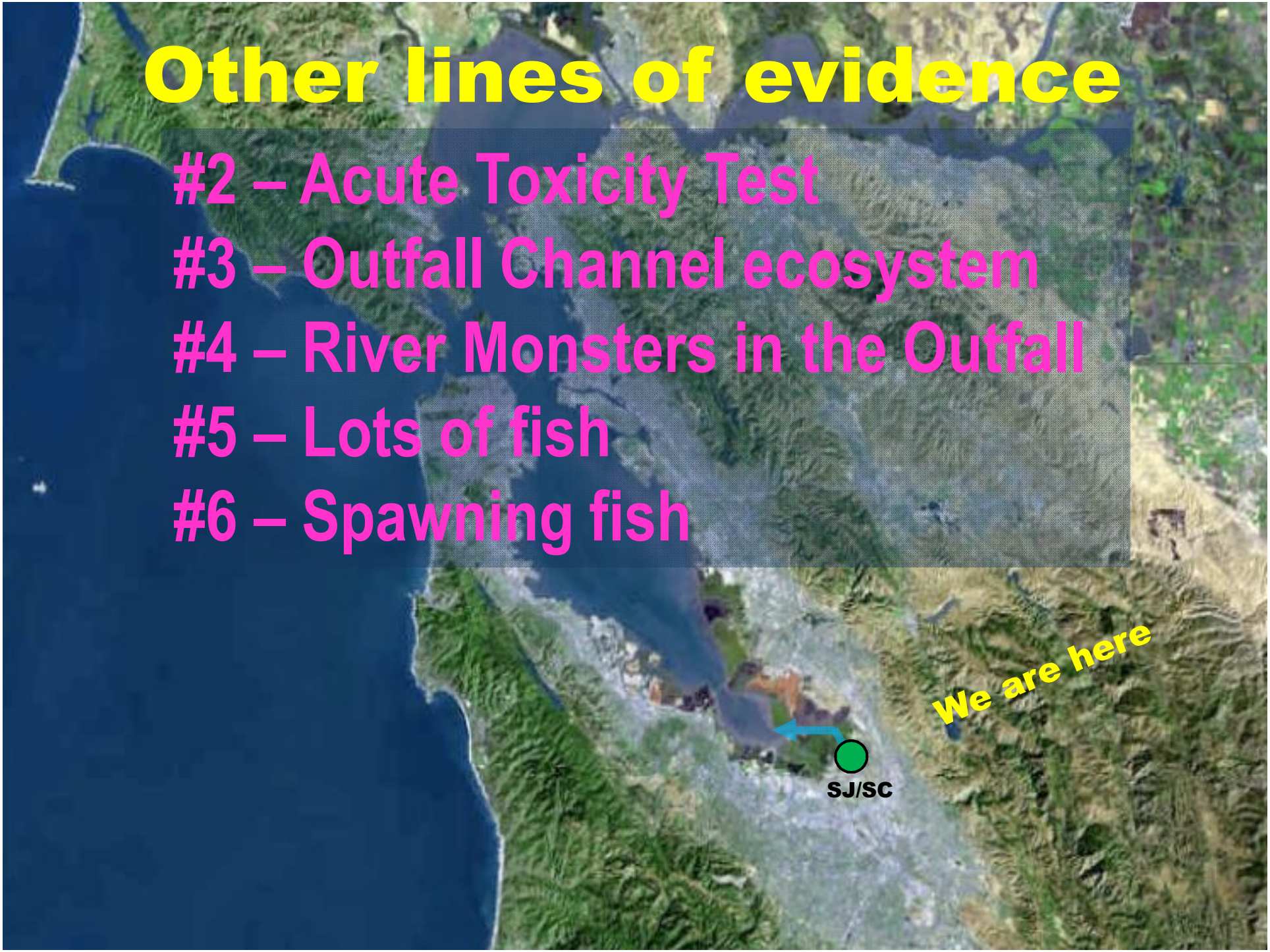
#2 – Acute Toxicity Test

#3 – Outfall Channel ecosystem

#4 – River Monsters in the Outfall

#5 – Lots of fish

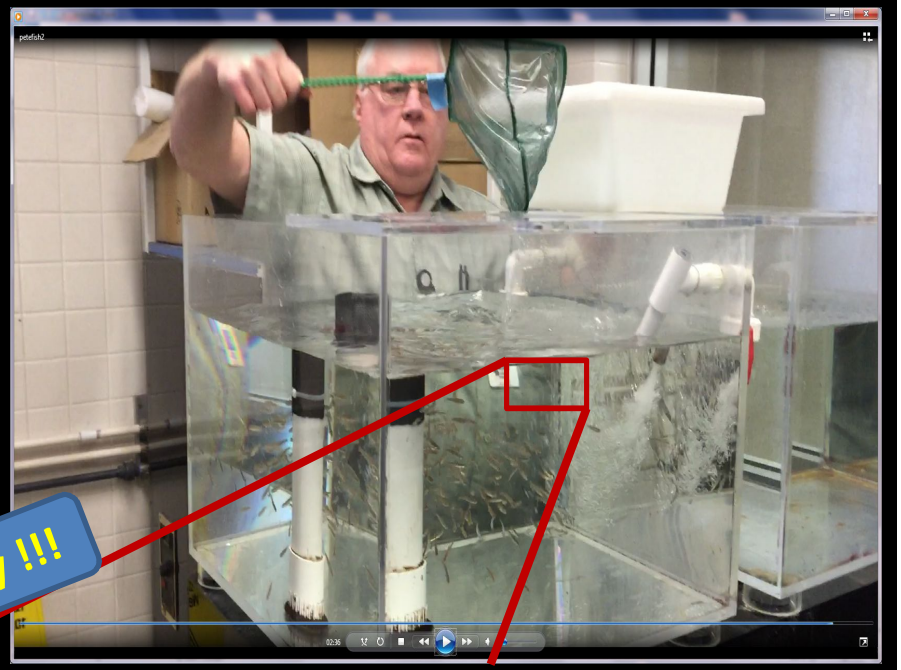
#6 – Spawning fish



Line of Evidence #2 – No Acute Toxicity

Acute Toxicity Test – Rainbow Trout – Never failed a test in 27 Years!

ENDING DATE	EFFLUENT SURVIVAL	CONTROL SURVIVAL
01/26/13	100	100
02/28/13	100	100
03/22/13	100	100
04/19/13	100	100
05/17/13	100	100
06/28/13	100	100
07/26/13	100	100
08/23/13	100	100
09/22/13	97.8	100
10/19/13	100	97.8
11/16/13	100	100
12/13/13	100	97.8
01/17/14	100	100
02/14/14	100	100
03/21/14	100	100
04/25/14	100	100
05/23/14	100	100
06/27/14	100	100
07/25/14	100	100
08/29/14	100	100
09/26/14	100	100
10/24/14	100	100
11/21/14	100	93.3
01/31/15	100	100
04/24/15	100	100
07/24/15	100	100
10/23/15	100	100

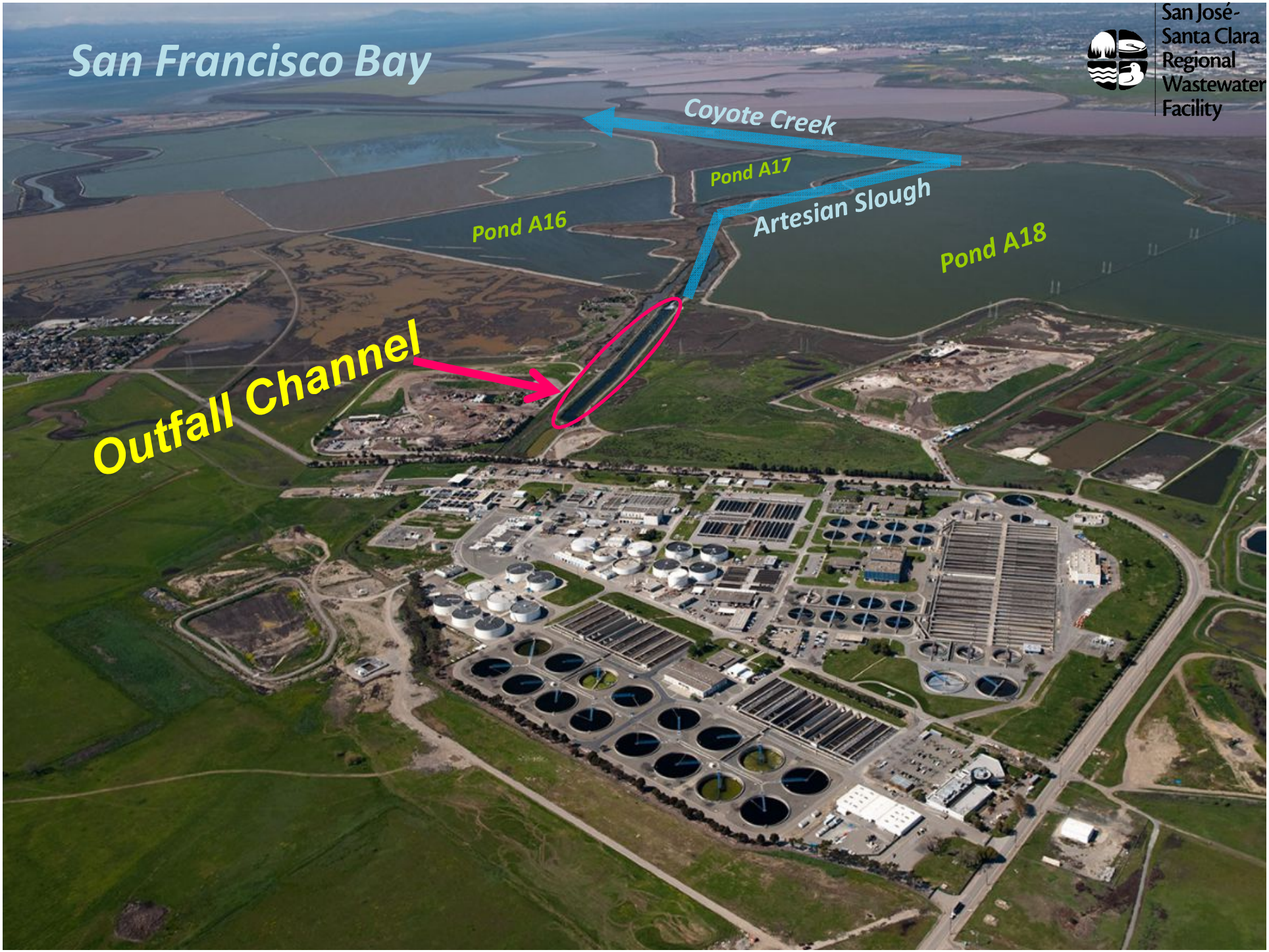


Swim Away !!!

150 fish used per test:

(45 test, 45 control, 60 REFTOX)

4050 trout sacrificed to toxicity gods!


San Francisco Bay
San José-
Santa Clara
Regional
Wastewater
Facility
Coyote Creek
Pond A17
Artesian Slough
Pond A16
Pond A18
Outfall Channel

Outfall Weir

San José-
Santa Clara
Regional
Wastewater
Facility

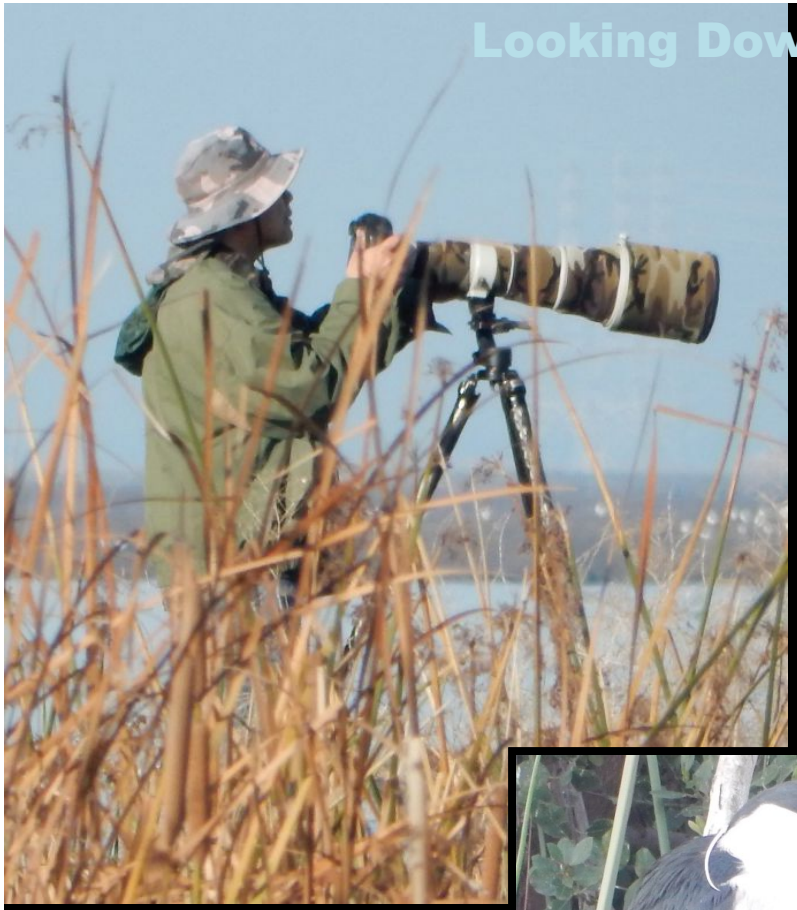

Line of Evidence #3 – Outfall Channel ecosystem
The Weir
Point of compliance for pH, DO, Chlorine Residual
•2200 ft X 50 ft
•Capacity ~ 16 MG
•Retention time ~ 4 - 6 hours
Outfall Channel
SJ-SC
Regional Wastewater Facility

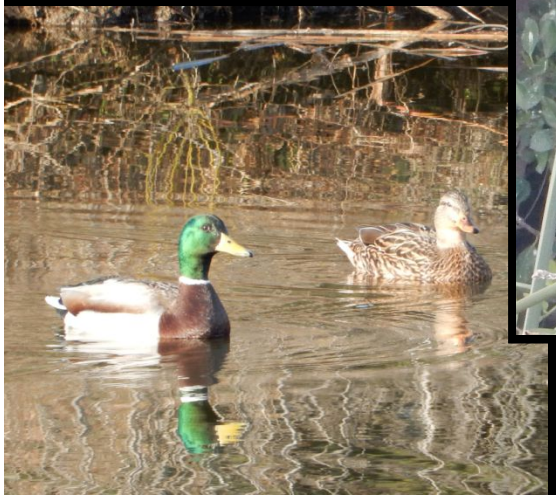
16 MG Outfall Channel Upstream – 12 Jan 2016

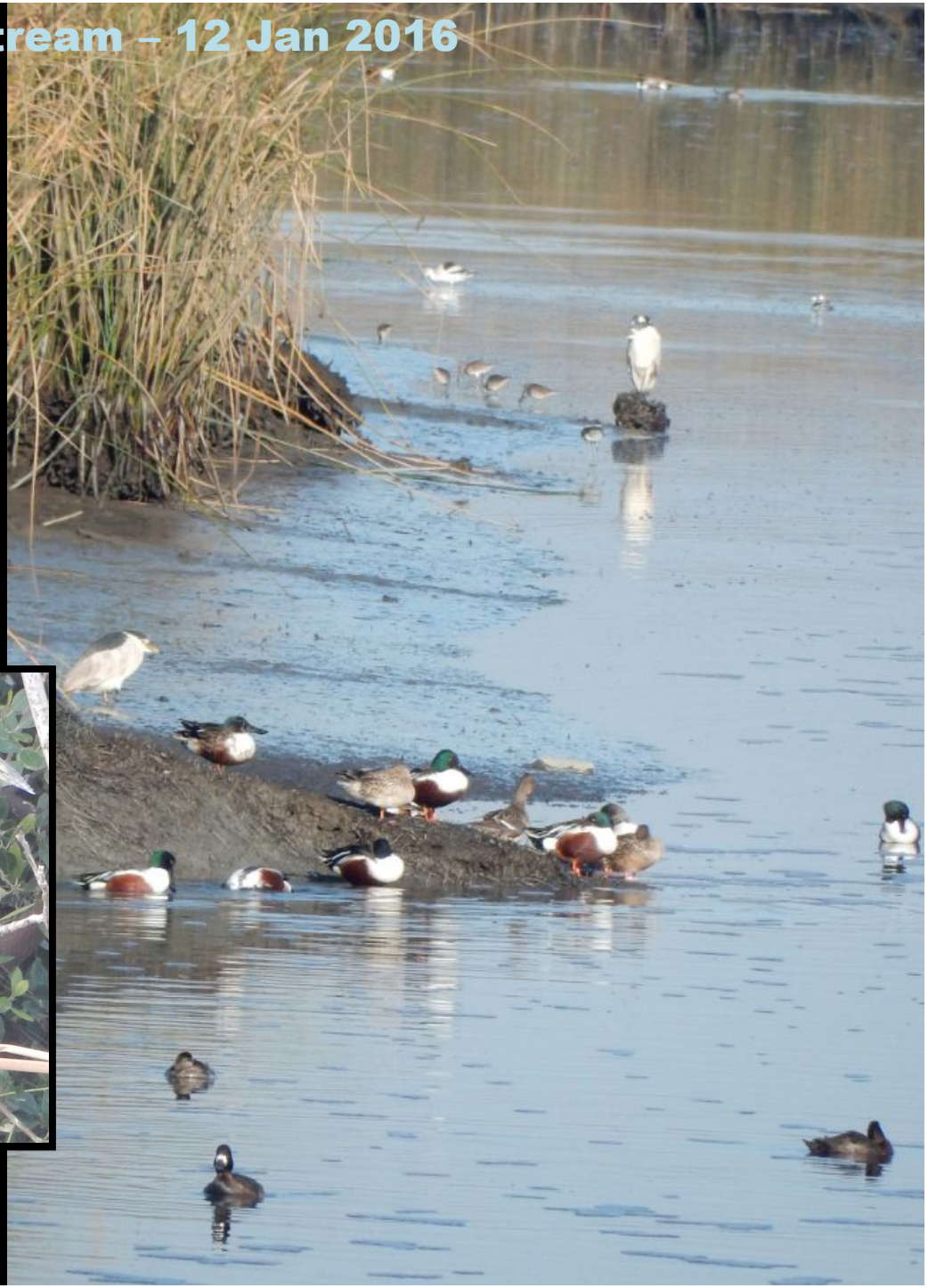
Outfall Channel Downstream – 12 Jan 2016

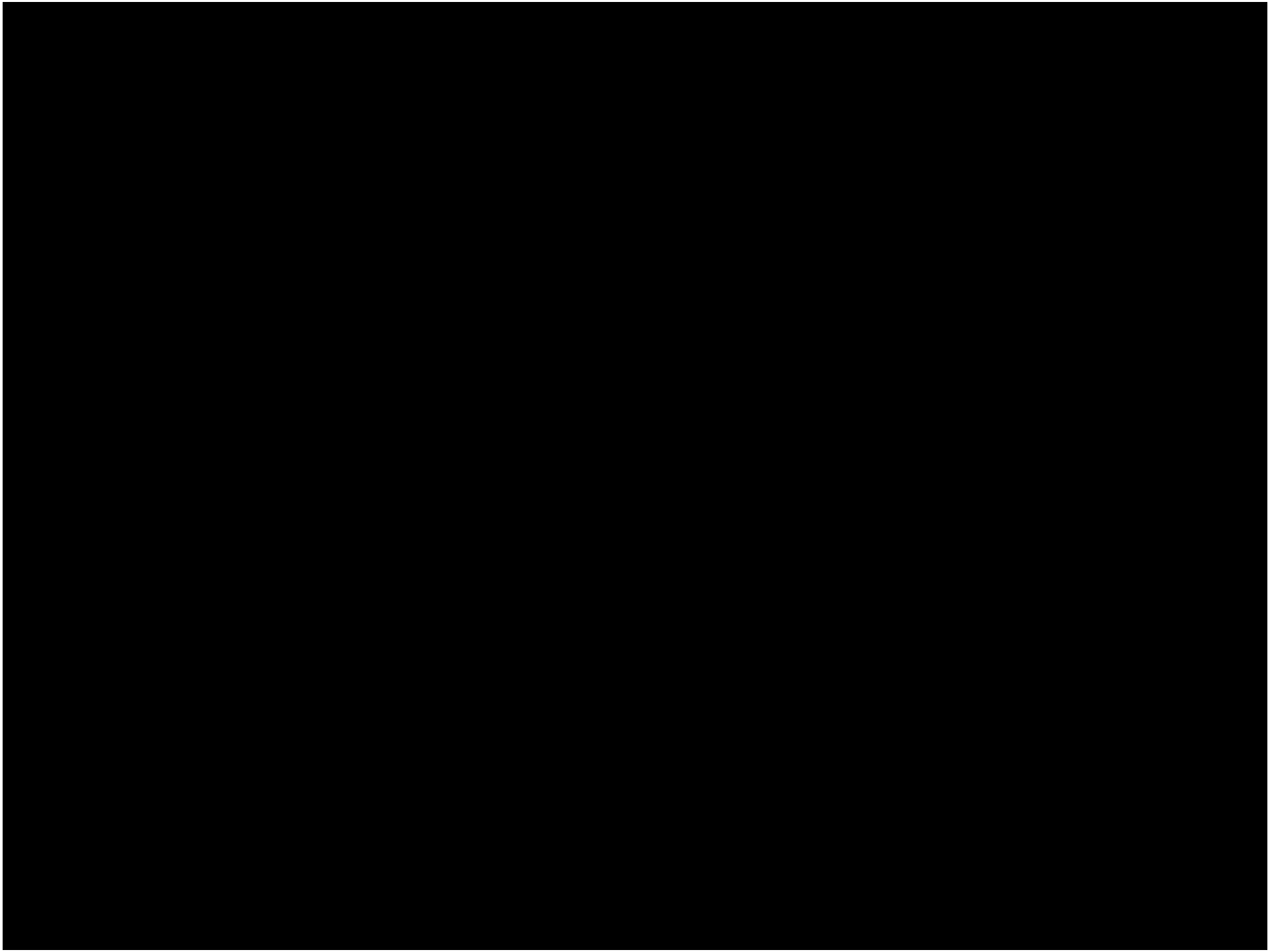

Outfall Channel, midway – 12 Jan 2016

Looking Downstream – 12 Jan 2016









Line of Evidence #4 – River Monsters in the Outfall

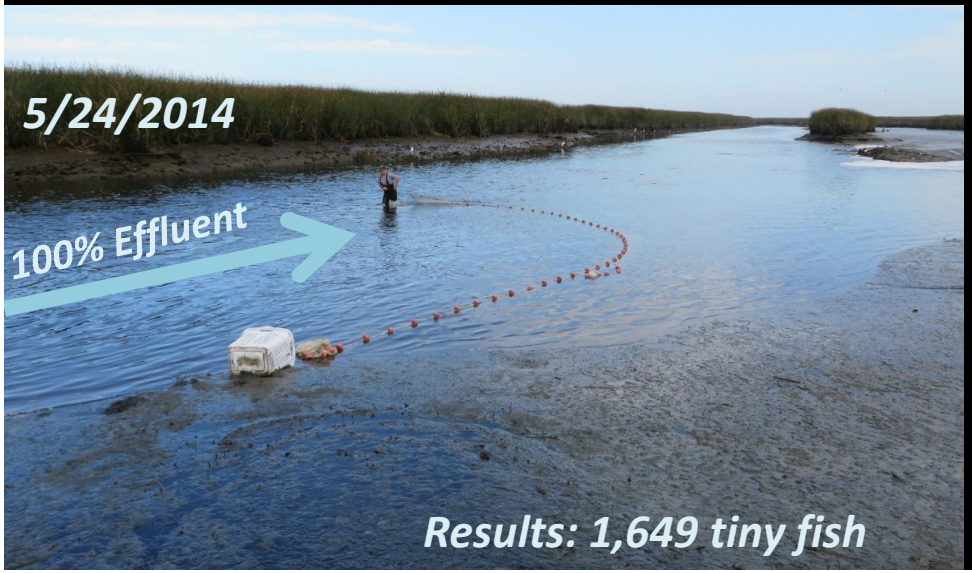
River Monsters from the Outfall Channel

June 2015

More sacrifice!

Line of Evidence #5 – Lots of Fish

Beach Seines



UCDAVIS AGGIES


Sunday, 19 July 2015
52,000 in a single beach seine!
46,000 Rainwater Killifish
6,000 Inland Silversides
1 Yellowfin Goby
3 Top Smelt
World Record??
Pond A18
Pond A16
The Weir
UCDAVIS
AGGIES

Line of Evidence #6 – Spawning fish

Fish Spawning

San José-Santa Clara Regional Wastewater Facility

Shiner Surfperch

Larval gobies & anchovies

Inland Silversides & Rainwater Killifish

Inland Silversides with eggs

☑ Fish Spawning (SPWN)

Other lines of evidence

Chronic Toxicity Test = Toxic

#2 – Acute Toxicity Test	No
#3 – Outfall Channel ecosystem	Nope
#4 – River Monsters in the Outfall	Nada
#5 – Lots of fish	Zero
#6 – Spawning fish	Zilch

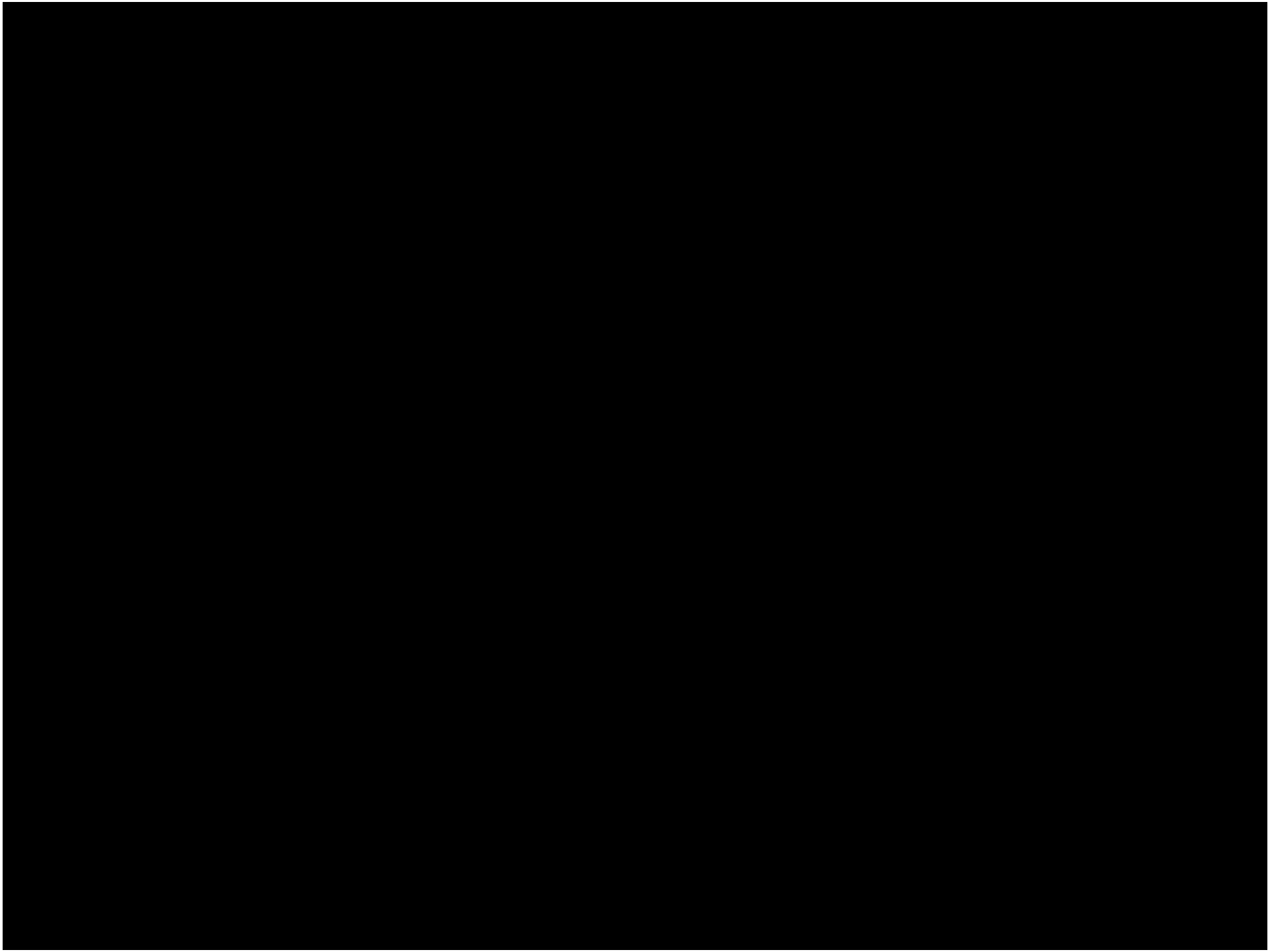
Conclusion

Chronic toxicity test in absence of an MDL is a poor indicator of toxicity.

Removing concentration response & Quality Assurance from the chronic test does not make it a better test.

Toxicity Plan

Update!



24 hits – 17 years

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1996					1.07 **28.7%**							17.6 **23.9%**
1997	1.3 **32%**	1.2 **Pass**										
1998	1.4 **16.2%**	1.3 **Pass**	1.03 **26.0%**		1.3 **Pass**							
1999	2.0 **Pass**										10.4 **92.1%**	
2000												
2001												
2002												
2003												
2004				0 **24.0%**							3.4 **34.9%**	
2005									**5.9** **34.5%**			
2006												
2007					**2.4** **32.8%**							
2008												
2009							33.5 **67.7%**	1.82 **36/25%**				<3.39
2010		6.9 / 7.5		**<1.27** **24%**					**10.4** **84.8%**			
2011					**5.5** **51.8%**	**1.4** **34.6%**						
2012	**1.6** **61.7%**									**4.1** **24.5%**		

Effects Levels & TUC do not Agree