

STATE OF CALIFORNIA - DEPARTMENT OF GENERAL SERVICES

STANDARD AGREEMENT

STD 213 (Rev. 04/2020)

AGREEMENT NUMBER 21-C0044	PURCHASING AUTHORITY NUMBER (If Applicable)
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1. This Agreement is entered into between the Contracting Agency and the Contractor named below:

CONTRACTING AGENCY NAME

Department of Pesticide Regulation, hereinafter referred to as "State" or "DPR"

CONTRACTOR NAME

The Regents of the University of California Davis, hereinafter referred to as "University"

2. The term of this Agreement is:

START DATE

November 1, 2021

THROUGH END DATE

June 30, 2023

3. The maximum amount of this Agreement is:

\$200,001.00

4. The parties agree to comply with the terms and conditions of the following exhibits, which are by this reference made a part of the Agreement.

Exhibits	Title	Pages
Exhibit A	Scope of Work	18
Exhibit B	Budget Detail and Payment Provisions	4
Exhibit C *	General Terms and Conditions	1
+ - Exhibit G	Negotiated Alternate UTC Terms	1

Items shown with an asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto.

These documents can be viewed at <https://www.dgs.ca.gov/OLS/Resources>

IN WITNESS WHEREOF, THIS AGREEMENT HAS BEEN EXECUTED BY THE PARTIES HERETO.

CONTRACTOR

CONTRACTOR NAME (if other than an individual, state whether a corporation, partnership, etc.)

Regents of the University of California, Davis

CONTRACTOR BUSINESS ADDRESS

1850 Research Park Drive, Ste. 300

CITY

Davis

STATE

CA

ZIP

95618

PRINTED NAME OF PERSON SIGNING

Grace Liu

MB DC

TITLE

Associate Director

CONTRACTOR AUTHORIZED SIGNATURE

Grace Liu

Digitally signed by Grace Liu
Date: 2021.10.22 16:38:13 -07'00'

DATE SIGNED

STATE OF CALIFORNIA

CONTRACTING AGENCY NAME

Department of Pesticide Regulation

CONTRACTING AGENCY ADDRESS

1001 I Street 4th Floor

CITY

Sacramento

STATE

CA

ZIP

95814

PRINTED NAME OF PERSON SIGNING

Christina Bugai

TITLE

Assistant Director

CONTRACTING AGENCY AUTHORIZED SIGNATURE

Christina Bugai
Christina Bugai (Nov 4, 2021 17:47 PDT)

DATE SIGNED

Nov 4, 2021

CALIFORNIA DEPARTMENT OF GENERAL SERVICES APPROVAL



EXEMPTION (If Applicable)

Exhibit A – Scope of Work

Project Summary & Scope of Work

Contract Grant

Does this project include Research (as defined in the UTC)? Yes No

PI Name: Swee J Teh

Project Title: Evaluation of Pyrethroid Toxicity Removal in Agricultural Detention Basins using *Hyalella azteca*.

Project Summary/Abstract

Briefly describe the long-term objectives for achieving the stated goals of the project.

The objectives of this project are to: (i) determine pyrethroid toxicity in agricultural run-off samples, (ii) determine pyrethroid toxicity in supernatants and in various concentration combinations of supernatant and suspended particles, (iii) determine pyrethroid toxicity during the settling process of the suspended particles, and (iv) provide toxicity information for the pyrethroid removal process model.

If Third-Party Confidential Information is to be provided by the State:

- Performance of the Scope of Work is anticipated to involve use of third-party Confidential Information and is subject to the terms of this Agreement; **OR**
- A separate CNDA between the University and third-party is required by the third-party and is incorporated in this Agreement as Exhibit A7, Third Party Confidential Information.

Scope of Work

Describe the goals and specific objectives of the proposed project and summarize the expected outcomes. If applicable, describe the overall strategy, methodology, and analyses to be used. Include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate. Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the goals and objectives.

1. Background

Retention basins and other wetland-based management practices (e.g., Moore et al. 2009) have been shown to be effective in removing pyrethroid pesticides from surface water. This water treatment practice is likely to be successful in removing pyrethroids from agricultural runoff, however, research on pyrethroid removal and mitigation of pyrethroid toxicity has been limited. The Department of Pesticide Regulation (DPR) has contracted with Dr. Tom Young of UC Davis to determine the distribution and settling properties of particle suspensions of pyrethroids in field collected agricultural samples. This project will focus on quantifying pyrethroid toxicity removal in the process of sedimentation using pyrethroid sensitive testing organism *Hyalella azteca*.

2. Objectives

UC Davis Aquatic Health Program Laboratory (UCD AHPL) will conduct toxicity testing with *Hyalella azteca* (*H. azteca*), an epibenthic amphipod known for its sensitivity to pyrethroids (Werner et al. 2010; Deanovic et al. 2013, 2017). The objectives of this project are to: (i) determine pyrethroid toxicity in agricultural run-off samples, (ii) determine pyrethroid toxicity in supernatants and in various concentration combinations of supernatant and suspended particles, (iii) determine pyrethroid toxicity during the settling process of the suspended particles, (iv) provide toxicity information for the pyrethroid removal process model.

3. Tasks – Contractor’s Responsibilities

Task 1. Coordination of sample collection

Four agricultural sites in the Central Coast region will be selected by DPR to be sampled once during a time of pyrethroid application. The field team will use a flow-through centrifuge to collect concentrated samples of total suspended solids from four different irrigated plots at the edge of the field. Both concentrated suspended solids and subsamples of the clarified supernatant will be retained at each site.

- Collection of whole water samples from each of the four sites for use in acute 96-hr *H. azteca* toxicity testing (approx. 3L or suitable volume).
- Collection of additional subsets of clarified supernatant from each of the four sites for use in acute 96-hr *H. azteca* toxicity testing (volume to be determined based on Task 3 needs).

Task 2. *Hyalella azteca* toxicity testing on whole water

As soon as practical after returning samples to the laboratory, whole water samples collected from Task 1 will be applied in 96-hour toxicity tests with *H. azteca*. Samples will be tested in a dilution series test, consisting of five (5) concentrations and a control, to determine the magnitude of toxicity (e.g., toxic units) of each location, prior to any separation of suspended solids and supernatant, to get baseline toxicity results. These whole water sample tests will provide toxicity information on the combination of freely dissolved, colloiddally associated, and suspended particle bound pyrethroid toxicity to *H. azteca*. Additional tests will consist of field-collected clarified supernatant from each location, tested in dilution.

Table 1. Summary of Task 2 tests

Location	Water Type	Experimental Design
Central Coast Location 1	Whole	5 concentrations + control
	Clarified Supernatant	5 concentrations + control
Central Coast Location 2	Whole	5 concentrations + control
	Clarified Supernatant	5 concentrations + control
Central Coast Location 3	Whole	5 concentrations + control
	Clarified Supernatant	5 concentrations + control
Central Coast Location 4	Whole	5 concentrations + control
	Clarified Supernatant	5 concentrations + control
Total number of test treatments:		48

Task 3. *Hyalella azteca* toxicity testing on settling column tests

Suspensions with varying suspended solids concentrations will be prepared by recombining the separated solids and the respective supernatants from the field sample collection in varying ratios by the lab. Subsets of these supernatant: suspended solids concentrations will be applied in acute 96-hr *H. azteca* toxicity tests, at three (3) selected time points, to be determined. With these settling column tests, University will evaluate the toxicity of each partition phase (free and bound) of the pyrethroid(s) present. University anticipate three selected time points of supernatant: suspended solid concentrations will be determined by the Lab; however, this number may be increased depending on the results.

3.1 Supernatant: suspended solids concentration tests

H. azteca 96-hr toxicity tests on the supernatant: suspended solid concentrations developed by the lab on three (3) time points per location. These tests will follow the standardized testing protocols as in Task 2 and will evaluate the biological toxicity of the supernatant: suspended solid concentrations that could potentially be present should detention basins be applied as a best management practice in the field. See Table 1.

3.2 Resuspended supernatant: suspended solids concentration tests

H. azteca 96-hr toxicity tests on the same supernatant: suspended solids concentrations as in Task 3.1, with the addition of constant aeration to the replicates, which will resuspend the solids into the water column. These tests will evaluate the biological toxicity of freely dissolved + colloidal bound + suspended phases of pyrethroids to *H. azteca*.

3.3 Separated supernatant: suspended solids concentration tests

H. azteca 96-hr toxicity tests on the same supernatant: suspended solids concentrations as in Task 3.1, but with the addition of a physical but permeable separation of *H. azteca* from the suspended solids. *H. azteca* will be caged within the test replicates to separate the testing organisms from the sediment particles which will settle on the bottom of the replicate chambers. These tests will evaluate the biological toxicity of freely- dissolved pyrethroids.

3.4 Post-test analytical chemistry for pyrethroids

At the end of each 96-hr test termination, water subsamples will be collected for pyrethroid concentration, to estimate the amount of pyrethroid(s) left in the water column and in suspended particles after test exposure and potential binding and/or degradation.

Table 2. Summary of Task 3 tests

Subtask	Description	# Sites	# Timepoints	# Treatments
3.1	Supernatant: suspended solids concentration tests	4	3	12 plus one control (13)
3.2	Resuspended supernatant: suspended solids concentration tests	4	3	12 plus one control (13)

3.3	Separated supernatant: suspended solids concentration tests	4	3	12 plus one control (13)
Total number of test treatments:				36

Task 4. Addition of toxicity information to mathematical model

UCD AHPL will provide all pertinent *H. azteca* toxicity data to include in the mathematical model describing suspended solid and pyrethroid removal processes, including any additional toxicity data that maybe required if acceptable model fits cannot be obtained by model refinement and additional settling column tests are needed.

Task 5. Apply model to field scale sites to predict design-performance relationships.

UCD AHPL will provide all pertinent *H. azteca* toxicity data to include in the mathematical model describing suspended solid and pyrethroid removal processes, including any additional toxicity data that maybe required if acceptable model fits cannot be obtained by model refinement and additional settling column tests are needed.

Task 6. Administration and Reporting

Quarterly reports on the progress of each task will be provided to the program manager by email. At the conclusion of the project, University will provide all toxicity data or inclusion in the project final report.

References:

Deanovic, LA., D. Markiewicz, M. Stillway, S. Fong, I. Werner. 2013. Comparing the effectiveness of chronic water column tests with the crustaceans *Hyalella azteca* (order: Amphipoda) and *Ceriodaphnia dubia* (order: Cladocera) in detecting toxicity of current-use insecticides. *Environ. Toxicol. Chem.* 32(3): 707-12.

Deanovic, L.A., M. Stillway, B. Hammock, S. Fong, I. Werner. 2017. Tracking pyrethroid toxicity in surfacewater samples: Exposure dynamics and toxicity identification tools for laboratory tests with *Hyalella azteca* (Amphipoda). *Environ. Toxicol. Chem.*, DOI: 10.1002/etc.3979.

Moore, M.T., Cooper, C.M., Smith, S., Cullum, R.F., Knight, S.S., Locke, M.A., Bennett, E.R., 2009. Mitigation of two pyrethroid insecticides in a Mississippi Delta constructed wetland. *Environmental Pollution* 157, 250-256.

Werner, I., LA. Deanovic, D. Markiewicz, M. Khamphanh, CK. Reece, M. Stillway, C. Reece. 2010. Monitoring acute and chronic water column toxicity in the Northern Sacramento-San Joaquin Estuary California, USA, using the euryhaline amphipod, *Hyalella azteca*: 2006 to 2007. *Environ. Toxicol. Chem.* 29(10): 2190-9.

4. DPR Responsibilities

DPR staff will manage the contract by guiding the project directions, provide technical advisories and reviewing deliverables.

Exhibit A2 – Key Personnel

KEY PERSONNEL

List Key Personnel as defined in the Agreement starting with the PI, by last name, first name followed by Co-PIs. Then list all other Key Personnel in alphabetical order by last name. For each individual listed include his/her name, institutional affiliation, and role on the proposed project. Use additional consecutively numbered pages as necessary.

Last Name, First Name	Institutional Affiliation	Role on Project
PI:		
<i>Teh, Swee J.</i>	<i>University of California, Davis</i>	<i>PI</i>
Co-PI(s) – if applicable:		
<i>Last name, First name</i>	<i>Institutional affiliation</i>	<i>Role on the project</i>
Other Key Personnel (if applicable):		
<i>Stillway, Marie</i>	<i>University of California, Davis</i>	<i>Project Manager</i>
<i>Krause, James</i>	<i>University of California, Davis</i>	<i>Lead Analyst</i>

Exhibit A3 – Authorized Representatives

AUTHORIZED REPRESENTATIVES AND NOTICES

The following individuals are the authorized representatives for the State and the University under this Agreement. Any official Notices issued under the terms of this Agreement shall be addressed to the Authorized Official identified below, unless otherwise identified in the Agreement.

<p align="center">State Agency Contacts</p>	<p align="center">University Contacts</p>
<p>Agency Name: Department of Pesticide Regulation</p> <p><i>Contract Project Manager (Technical)</i></p> <p>Name: Xin Deng Sr. Environmental Scientist (Specialist)</p> <p>Address: Environmental Monitoring Branch 1001 I street Sacramento, CA,95812</p> <p>Telephone: 916-445-2506 Fax: Email: xin.deng@cdpr.ca.gov</p>	<p>University Name: The Regents of the University of California Davis</p> <p><i>Principal Investigator</i></p> <p>Name: Swee J. Teh Adjunct Professor</p> <p>Address: School of Veterinary Medicine, Dept of Anatomy, Physiology, Cell Biology UC Davis, One Shields Avenue Davis, CA 95616</p> <p>Telephone: 530-754-8183 Fax: 530-752-7650 Email: sjteh@ucdavis.edu</p> <p>Designees to certify invoices under Section 14 of Exhibit C on behalf of PI:</p> <ol style="list-style-type: none"> Fatima M. Garcia, Financial Analyst, ftmgarcia@ucdavis.edu
<p><i>Authorized Official (contract officer)</i></p> <p>Name: Christina Bugai Assistant Director</p> <p>Address: Department of Pesticide Regulation 1001 I Street, 4th Floor Sacramento, CA. 95814</p> <p><i>Send notices to (if different):</i></p> <p>Name: Kim Bateman Contract Analyst</p> <p>Address: Department of Pesticide Regulation 1001 I Street, MS 4-A Sacramento, CA. 95814</p> <p>Telephone: 916-445-2512 Email: kim.bateman@cdpr.ca.gov</p>	<p><i>Authorized Official</i></p> <p>Name: Grace I. Liu, J.D. Associate Director</p> <p>Address: Office of Research 1850 Research Park Dr, Suite 300 Davis, CA 95618</p> <p>Telephone: 530-754-8266 Fax: 530-754-8229 Email: awards@ucdavis.edu</p> <p><i>Send notices to (if different):</i></p>

<p><i>Administrative Contact</i></p> <p>Name: Kim Bateman Contract Analyst</p> <p>Address: Department of Pesticide Regulation 1001 I Street, MS 4-A Sacramento, CA. 95814</p> <p>Telephone: 916-445-2512</p> <p>Email: kim.bateman@cdpr.ca.gov</p>	<p><i>Administrative Contact</i></p> <p>Name: Daniel Cordes Contracts & Grants Analyst</p> <p>Address: 1850 Research Park Drive, Suite 300 One Shields Ave. Davis, CA 95618</p> <p>Telephone: 530-754-8266</p> <p>Fax: 530-754-8229</p> <p>Email: awards@ucdavis.edu</p>
<p><i>Financial Contact/Accounting</i></p> <p>Name: Department of Pesticide Regulation Accounts Payable</p> <p>Address: Department of Pesticide Regulation Accounts Payable P.O. Box 4015 Sacramento, CA 95812-4015</p> <p>Email: Accounts_Payable@cdpr.ca.gov</p>	<p><i>Authorized Financial Contact/Invoicing</i></p> <p>Name: James Ringo, Francisco Andrade, Lenora Bruce Division Manager</p> <p>Address: Contracts & Grants Accounting1441 Research Park Drive Davis, CA 95618</p> <p>Telephone: 530-757-8523</p> <p>Fax: 530-757-8721</p> <p>Email: efa@ucdavis.edu</p>

Exhibit A4 – Use of Intellectual Property & Data

USE OF INTELLECTUAL PROPERTY & DATA

If either Party will be using any third-party or pre-existing intellectual property (including, but not limited to copyrighted works, known patents, trademarks, service marks and trade secrets) "IP" and/or Data with restriction on use, then list all such IP/Data and the nature of the restriction below. If no third-party or pre-existing IP/Data will be used, check "none" in this section.

A. State: Preexisting IP/Data to be provided to the University from the State or a third party for use in the performance in the Scope of Work.

None or List:

Owner (Name of State Agency or 3 rd Party)	Description	Nature of restriction:

B. University: Restrictions in Preexisting IP/Data included in Deliverables identified in Exhibit A1, Deliverables.

None or List:

Owner (Name of University or 3 rd Party)	Description	Nature of restriction:

C. Anticipated restrictions on use of Project Data.

If the University PI anticipates that any of the Project Data generated during the performance of the Scope of Work will have a restriction on use (such as subject identifying information in a data set) then list all such anticipated restrictions below. If there are no restrictions anticipated in the Project Data, then check "None" in this section.

None or List:

Owner (University or 3 rd Party)	Description	Nature of Restriction:

Exhibit A5 - RÉSUMÉ/BIOSKETCH

Attach 2-3 page Resume/Biosketch for the PI and other Key Personnel listed in Exhibit A2, Key Personnel.

BIOGRAPHICAL SKETCH

NAME Swee J. Teh	POSITION TITLE Adjunct Professor & Director Aquatic Health Program		
eRA COMMONS USER NAME (credential, e.g., agency login) SWEE TEH			
EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable.)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
West Virginia University, Morgantown	B.Sc.	1985	Medical Technology
West Virginia University, Morgantown	M.Sc.	1987	Human Anatomy
University of California, Davis	Ph.D.	1996	Comparative Pathology

A. Personal Statement

As a comparative toxicologist/pathologist with over 20 years of extensive field and laboratory research experience in aquatic toxicology, carcinogenesis, ecotoxicology, endocrine disruption, and biomarker studies, I have a long standing interest in defining the nutritional and toxicological mechanisms by which natural and anthropogenic environmental stressors can interfere with survival, development, growth, and reproduction in aquatic organisms. I have developed a research program that centers on the study of aquatic ecosystem health with a special interest in understanding the consequences of environmental degradation in the survival and reproduction of aquatic organisms, and ultimately linking individual health to population decline.

B. Positions and Honors

Positions and Employment

- 1985-1987 Graduate Research Assistant, Human Anatomy, West Virginia University
- 1987-2001 Staff Research Associate II-IV, Laboratory Director of Aquatic Toxicology Program, University of California-Davis
- 2001-2004 Assistant Research Toxicologist/Pathologist IV, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis
- 2004-2008 Associate Research Toxicologist/Pathologist III, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis
- 2009-2010 Research Toxicologist/Pathologist I, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis
- 2011-Present Director, Aquatic Health Program, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis

C. Selected Publications

- Teh, S.J.**, and Hinton, D.E. 1993. Detection of enzyme histochemical markers of hepatic preneoplasia and neoplasia in medaka (*Oryzias latipes*). *Aquat. Toxicol.* 24:163-182.
- Teh, S.J.**, Adams, S.M., and Hinton, D.E. 1997. Histopathologic biomarkers in feral freshwater fish populations exposed to different types of contaminant stress. *Aquat. Toxicol.* 37:51-70.
- Teh, S.J.**, and Hinton, D.E. 1998. Gender-specific growth and hepatic neoplasia in medaka (*Oryzias latipes*). *Aquat. Toxicol.* 41:141-159.
- Teh, S.J.**, Clark, S.L., Brown, C., Luoma, S.N. and Hinton, D.E. 1999. Enzymatic and histopathologic biomarkers as indicator of environmental contaminant exposure and effect in Asian clam

(*Potamocorbula amurensis*).Biomarker. 4:497-509.

Teh, S.J., Miller,C.E., and Hinton, D.E. 2000. Hermaphroditism in laboratory cultured albino western mosquitofish(*Gambusia affinis affinis*). J. Aquat. Anim. Health. 12: 78-80, 2000.

BIOGRAPHICAL SKETCH - Marie Stillway

Education

University of California, Davis, MSc. in Animal Biology, March 2020

University of California, Davis, BA in English, 2004

ADDITIONAL TRAINING & CERTIFICATIONS:

- Supervisory Certificate Series, 2017
- Environmental Health and Safety Certificate Series, 2012

Experience

UC DAVIS AQUATIC HEALTH PROGRAM LABORATORY

SCHOOL OF VETERINARY MEDICINE, DEPT. ANATOMY, PHYSIOLOGY AND
CELL BIOLOGY UNIVERSITY OF CA, DAVIS — DAVIS, CA 95616

Lab Research Supervisor I, Laboratory Manager, July 2016-Present

Staff Research Associate II, Quality Assurance Officer and Safety Officer, June 2004 – July 2016

Student Assistant IV, February 2001- May 2004

- Develop, write, and supervise the execution and interpretation of all grants and contracts.
- Develop and implement technical training programs and ensure conformance to United States Environmental Protection Agency and California State specifications to maintain certification with the State Water Resources Control Board in the Environmental Laboratory Accreditation Program.
- Develop, project, and track budgets from multiple funding agencies and sources.
- Prepare final reports, grant proposals, presentations and publications of associated research.
- Supervise, train, and manage all research personnel involved in ecosystem health research.
- Resolve problems and make independent decisions regarding laboratory management.
- Develop new methodologies for indigenous species monitoring, including animal husbandry methods, toxicity testing protocols, and Toxicity Identification Evaluation procedures specific to these species.
- Knowledgeable of computer programs such as CETIS, R, Excel, Word, and PowerPoint.

Publications

Huynh, K.H., T. Kurobe, **M. Stillway**, C.H.Y. Lam, S.J. Teh. 2021. What does not kill can weaken you: how herbicides impact fish in the San Francisco Estuary. *Front. Young Minds*. Accepted July 30, 2021.

Cossaboon, J.M, S. Acuna, B.G. Hammock, T. Kurobe, **M. Stillway**, S.J. Teh. 2021. Toxic meals for seabirds and seals: Monitoring for mercury in the San Francisco Bay. *Front. Young Minds*. 9:611288. doi: 10.3389/frym.2021.611288.

Stillway, M.E. and S.J. Teh. **2020**. The effect of herbicide formulations and herbicide-adjuvant mixtures on aquatic food web species of the Sacramento-San Joaquin Delta, California, USA. *Environ. Toxicol. Chem.* DOI:10.1002/etc.4725.

Lam, C., T. Kurobe, P. Lehman, M. Berg, B.G. Hammock, **M.E. Stillway**, P.K. Pandey, S.J. Teh. **2019**. Toxicity of herbicides to cyanobacteria and phytoplankton species of the San Francisco Estuary and Sacramento-San Joaquin River Delta, California, USA. *J Envi Sci Health. Part A*. DOI: 10.1080/10934529.2019.1672458.

Stillway, M.E., B.G. Hammock, S.J. Teh. **2019**. Effectiveness of Constructed Water Quality Treatment Systems for Mitigating Pesticide Runoff and Aquatic Organism Toxicity. In *Pesticides in Surface Water: Monitoring, Modeling, Risk Assessment, and Management*. ACS Symposium Series, Vol. 1308. DOI: 10.1021/bk-2019-1308.ch022. Chapter 22, pp 435-449.

Pandey, P., J. Caudill, S. Lesmeister, Y. Zhang, **M. Stillway**, K.C. Hoffmann, P. Gilbert, M.

Kwong, L. Conrad, and S.J. Teh. **2019**. Assessing Glyphosate and Fluridone Concentrations in Water Column and Sediment Leachate. *Front. Environ. Sci.* 7:22. DOI: 10.3389/fenvs.2019.00022.

Jin, J., T. Kurobe, W.F. Ramirez-Duarte, M.B. Bolotaolo, C.H. Lam, P.K. Pandey, T.C. Hung, **M.E. Stillway**, L. Zweig, J. Caudill, L. Lin, S.J. Teh. **2018**. Sub-lethal effects of herbicides penoxsulam, imazamox, fluridone, and

glyphosate on Delta Smelt (*Hypomesus transpacificus*). *Aquatic Toxicol.* 197, 79-88. DOI:10.1016/j.aquatox.2018.01.019. Epub 2018 Feb 1. PMID: 29448126

Deanovic, L.A., **M. Stillway**, B. Hammock, S. Fong, I. Werner. **2017**. Tracking pyrethroid toxicity in surfacewater samples: Exposure dynamics and toxicity identification tools for laboratory tests with *Hyalella azteca* (Amphipoda). *Environ. Toxicol. Chem.*, DOI: 10.1002/etc.3979.

Hoffmann, K.C., L.A. Deanovic, I. Werner, **M. Stillway**, S. Fong, S.J. Teh. **2016**. An Analysis of Lethal and Sublethal Interactions Among Type I and Type II Pyrethroid Pesticide Mixtures Using Standard *Hyalella azteca* Water Column Toxicity Tests. *Environ. Toxicol. Chem.* DOI 10.1002/etc.3422.

Deanovic, L.A., D. Markiewicz, **M. Stillway**, S. Fong, I. Werner. **2013**. Comparing the effectiveness of chronic water column tests with the crustaceans *Hyalella azteca* (order: Amphipoda) and *Ceriodaphnia dubia* (order: Cladocera) in detecting toxicity of current-use insecticides. *Environ. Toxicol. Chem.* 32(3): 707-12.

Werner, I., L.A. Deanovic, D. Markiewicz, M. Khamphanh, C.K. Reece, **M. Stillway**, C. Reece. **2010**. Monitoring acute and chronic water column toxicity in the Northern Sacramento-San Joaquin Estuary California, USA, using the euryhaline amphipod, *Hyalella azteca*: 2006 to 2007. *Environ. Toxicol. Chem.* 29(10): 2190-9.

Oral Presentations

"Delta Smelt (*Hypomesus transpacificus*) health and condition: evaluating the hypothesized benefits of Delta outflow across multiple water years". **M. Stillway***, W.F. Duarte-Ramirez, P.A. Triana Garcia, F. Tran, T. Kurobe, S. Acuna, A. Schultz, S.J. Teh. Invited speaker at Interagency Ecological Program 2020 Annual Workshop. September 22, 2020.

"Water Quality Monitoring at a Delta Integrator Site: Fish Health and Behavior", given at IEP Contaminants Workteam Meeting. Sacramento, CA. May 28, 2019.

"*Ceriodaphnia dubia* reproduction impairment in low conductivity culture water", given at SETAC North America 39th Annual Meeting, Sacramento, CA. November 8, 2018.

"Toxicity Evaluation of the Effects of Fluridone Formulations on Delta Phytoplankton", given at Bay-Delta Science Conference, Sacramento, CA. September 10, 2018.

"Sub-lethal effects of herbicides and their adjuvants on Delta Smelt (*Hypomesus transpacificus*)", Brown Bag Seminar, given at the Office of Information Management and Analysis (SWRCB), Sacramento, CA. September 28, 2017.

"Sub-lethal effects of herbicides and their adjuvants on Delta Smelt (*Hypomesus transpacificus*)", given at NorCal SETAC Annual Conference, Sacramento CA. May 4, 2017.

"Food web impacts of invasive aquatic weed control in the Sacramento-San Joaquin Delta", given at Bay-Delta Science Conference, Sacramento CA. November 16, 2016.

"Toxicity comparison of new and current-use herbicides on early life stages of Delta Smelt

(*Hypomesus transpacificus*) and its prey *Eurytemora affinis*", given at NorCal SETAC Annual Conference, Oakland CA. April 27, 2016.

"DPR Surface Water Protection Program", given at California Department of Pesticide Regulation annual meeting, Davis CA. January 10, 2014.

"Sacramento River Project", given at the Pelagic Organism Decline Contaminants Workteam Meeting, Sacramento CA. March 20, 2012.

Poster Presentations

M. Stillway, A. Chorazyczewski, M.P. Rooney, W.F. Ramirez-Duarte, and S.J. Teh. "Water Quality Monitoring at a Delta Integrator Site". NorCal SETAC Annual Conference Meeting. May 3, 2019.

M. Stillway and S.J. Teh. "Herbicide Effects on the Lower Food Web: Toxicity Comparison of Penoxsulam, Imazamox, and Agridex to *Eurytemora affinis* and *Thalassiosira pseudonana*" Animal Biology Graduate Group Fall Colloquium. Davis, CA. October 2018.

M. Stillway, I. Flores, C.F. Teh, A. Cruz, D. Hernandez, B.G. Hammock, K.C. Hoffmann, and S.J. Teh. "Toxicity comparison of new and current-use herbicides on early life stages of Delta Smelt (*Hypomesus transpacificus*) and the calanoid copepod *Eurytemora affinis*". Interagency Ecological Program Workshop Meeting, Folsom CA. 2016.

M. Stillway, K.C. Hoffmann, L.A. Deanovic, G.B. Merrill, D. Lee, T.B. Diamond, S.J. Teh. "The Toxic Effects of Two New Herbicides on Early Life Stages of Delta Smelt (*Hypomesus transpacificus*)". Bay-Delta Science Conference, Sacramento, CA. 2015.

Awards

- Graduate Fellowship, UC Davis Animal Biology Graduate Group. Summer 2018; Award: \$1,800.
- Educational Opportunity Program, Building Community and Strengthening Our Roots, Recognition Celebration. UC Davis. May 18, 2017.
- 2nd place, Student Platform Presentation. "Sub-lethal effects of herbicides and their adjuvants on Delta Smelt (*Hypomesus transpacificus*)" NorCal SETAC Annual Conference, May 4, 2017.

Service

Graduate Alumni Mentor; UC Davis Graduate Alumni Mentoring Program. Pilot Program, March - June 2021. Peer Reviewer: Journal of Environmental Toxicology and Chemistry. March, 2013

Memberships

- Surface Water Ambient Monitoring Program (SWAMP) Toxicity Work Group
- Interagency Ecological Program (IEP) Contaminants Work Team
- Society of Environmental Toxicology and Chemistry (SETAC)
- IEP Contaminant Work Team Water Quality Resiliency Strategy Work Team

Teaching

California State University, Sacramento. Bio 260. Advanced Ecology. "Water Quality Regulation in California" and "Mitigation of Urban Toxicity Runoff in a Constructed Water Quality Treatment Pond: A Case Study". Spring Semester, 2016. Seminar Series.

(530) 574-3332 jakrause@ucdavis.edu

James A. Krause

- | | | | |
|-------------------|-------------------|-------------------|-----------|
| Experience | 04/2019 - Present | UC Davis, AHP Lab | Davis, CA |
|-------------------|-------------------|-------------------|-----------|
- Lab Assistant II
- Set up through takedown of water toxicology tests involving *Hyalella azteca*, *Pimephales promelas*, *Ceriodaphnia dubia*, *Chironomus dilutus*, *Hypomesus transpacificus*, and *Oncorhynchus mykiss*.
 - Take water parameters (including: dissolved oxygen, salinity, pH, temperature, water hardness, alkalinity, nitrite, nitrate, and ammonia)
 - Worked with hazardous and/or toxic chemicals and water
 - Dispose of testing waters after running 96 hour acute toxicity tests at the UC Davis waste water treatment plant.
 - Wash Glassware (scrubbing with soap, acid bath, acetone rinse, and autoclaving)
 - Maintain and calibrate meters, pipettes, and thermometers to manufacturers specifications.
 - Purchasing and receiving of lab supplies to ensure there is no stoppage in work flow
 - Train and supervise student employees and graduate students.
 - Create and optimize protocols for hatching and raising testing organism and live food
 - Lead technician for the husbandry of all organisms in lab
- | | | | |
|--|-------------------|---------------|-----------|
| | 08/2012 – 12/2018 | Rives to Reef | Davis, CA |
|--|-------------------|---------------|-----------|
- Owner, Biologist, Marketing, Janitor
- Maintain freshwater/saltwater aquaria including all support systems
 - Interact with clients and diagnose disease and aquarium equipment malfunctions
 - Test water parameters including: ammonia, nitrite, nitrate, pH, calcium, magnesium and more.
 - Advertising and marketing for business including social media
 - Balance books and order live and dry goods for business
 - Manage, train, and coordinate employees and volunteers
 - Sweeping, vacuuming, taking out garbage.

07/2011 – 08/2012 Ace Hardware Davis, CA

Sales Associate

- Ring up customers efficiently and without error
- Provide customer service by showing product locations and answering questions.
- Maintain and order fish for aquarium section
- Discuss water quality and help customers build their aquarium
- Stocking shelves and maintained a clean department

07/2010 – 12/2010 Floating Islands West Mokelumne Hill, CA

Biologist, Sales, Marketing

- Arrange and give presentations to regulatory agencies as well as other customers
- Work with customers to build a floating island to suit their needs
- Manage social media and participate in marketing meetings
- Answer questions about the islands and increase awareness of the product

09/2008 – 05/2010 UC Davis Davis, CA

Junior Specialist

- Construct a tilapia (*O. mossambicus*) breeding and grow out system from top to bottom (Produced 1,000's of tilapia a month to ensure uninterrupted stock for experiments)
- Maintenance of tilapia and their life support systems
- Maintain rigorous logs to ensure compliance with IACUC standards
- Train undergrad and graduate students on fish care
- Design and implement other experiments with graduate students
- Troubleshoot breeding issues and conduct salinity stress tests

02/2007 – 09/2009 UC Davis Davis, CA

Lab Assistant II

- Set up through takedown of water toxicology tests involving *Hyalella azteca*, *Pimephales promelas*, *Ceriodaphnia dubia*, *Hypomesus transpacificus*, and *Oncorhynchus mykiss*.
- Take water parameters (including: dissolved oxygen, salinity, pH, temperature, water hardness, alkalinity, and ammonia)
- Worked with hazardous and/or toxic chemicals and water
- Collect water bi-weekly from the Sacramento and San Joaquin rivers, as well as the Suisun Marsh area
- Dispose of testing waters after running 96 hour acute toxicity tests at the UC Davis waste water treatment plant.
- Wash Glassware (scrubbing with soap, acid bath, acetone rinse, and autoclaving)

Other Pertinent Experience 09/2001 – 06/2006 (While attending UC Davis):

Maintained experimental fish and kept rigorous logs to keep with IACUC standards. Dissection, clearing and staining of fish. Sort inverts from benthic samples. Collect benthic samples with dredging, collect fish samples with otter trawl, collect zooplankton with net tows, collect chloroplasts samples with filtering, take and record water quality readings, and driving the boat.

Education 09/2001 – 06/2006 University of CA, Davis Davis, CA
Bachelors of Science

- Degree in Biology, emphasis Marine Biology
- Minor in Animal Science, emphasis Aquaculture

References References are available on request.

Exhibit A6 – Current & Pending Support

CURRENT & PENDING SUPPORT

University will provide current & pending support information for Key Personnel identified in Exhibit A2 at time of proposal and upon request from State agency. The “Proposed Project” is this application that is submitted to the State. Add pages as needed.

PI: Swee J. Teh					
Status (currently active or pending approval)	Award # (if available)	Source (name of the sponsor)	Project Title	Start Date	End Date
Proposed Project	21-C0044	Department of Pesticide Regulation	Evaluation of Pyrethroid Toxicity Removal in Agricultural Detention Basins using <i>Hyalella azteca</i>	11/01/2021	06/30/2023
Current	19-C0029	Department of Pesticide Regulation	96-Hour water column toxicity testing of water samples collected by DPR	03/04/2020	12/31/2022
Current	C1370030	Department of Boating and waterways	Acute and Chronic Toxicity Testing of New Herbicides and Adjuvants on Delta Smelt, <i>Hypomesus Transpacificus</i>	5/30/2014	12/30/2024
Current	R17AC00129	US Bureau of Reclamation	Drivers of Delta Smelt (<i>Hypomesus transpacificus</i>) health condition and reproduction	5/1/2017	4/30/2022
Current	21-13	State Water Contractors	Evaluation of spring outflow to larval Delta Smelt (<i>Hypomesus transpacificus</i>) health and condition	1/1/2021	12/31/2021

**Exhibit B - Budget
 Budget for Project Period**

Principal Investigator (Last, First):

Teh, Swee J.

Exhibit B

**COMPOSITE BUDGET FOR ENTIRE PROPOSED PROJECT PERIOD
 11/01/2021 to 6/30/2023**

	From: To:	11/1/2021 6/30/2022	7/1/2022 6/30/2023	
BUDGET CATEGORY		Year 1	Year 2	
			TOTAL	
PERSONNEL: <i>Salary and fringe benefits.</i>		\$64,281	\$49,945	\$114,226
TRAVEL		\$11,000	\$0	\$11,000
MATERIAL & SUPPLIES		\$21,200	\$13,575	\$34,775
EQUIPMENT		\$0	\$0	\$0
CONSULTANT		\$0	\$0	\$0
SUBRECIPIENT		\$0	\$0	\$0
OTHER DIRECT COSTS (ODC)	<i>Subject to IDC Calc</i>	\$0	\$0	\$0
ODC #1	Y	\$0	\$0	\$0
ODC #2	Y	\$0	\$0	\$0
ODC #3	Y	\$0	\$0	\$0
TOTAL DIRECT COSTS		\$96,481	\$63,520	\$160,001
Indirect (F&A) Costs	F&A Base 25% MTDC *	\$0	\$0	\$0
		\$24,120	\$15,880	\$40,000
TOTAL COSTS PER YEAR		\$120,601	\$79,400	
TOTAL COSTS FOR PROPOSED PROJECT PERIOD				\$200,001

* MTDC = Modified Total Direct Cost

JUSTIFICATION. See Exhibit B1 - Follow the budget justification instructions.

Funds Reversion Dates: Unless otherwise specified, fund reversion dates are three years from fiscal year end of year funded

Annual Budget Flexibility (lesser of % or Amount)

Prior approval required for budget changes between approved budget categories above the thresholds identified.

10.00% Or Amount \$10,000

Exhibit B1

Budget Justification

The Budget Justification will include the following items in this format.

Personnel

Name. Starting with the Principal Investigator list the names of all known personnel who will be involved on the project for each year of the proposed project period. Include all collaborating investigators, individuals in training, technical and support staff or include as “to be determined” (TBD).

Swee J. Teh (Principal Investigator), Marie Stillway, James Krause, and Matt Rooney.

Role on Project. For all personnel by name, position, function, and a percentage level of effort (as appropriate), including “to-be-determined” positions.

Swee J. Teh, PhD (5% time, years 1 and 2) is the Principal Investigator (PI) and will be responsible for details of contract management and execution, as well as ensuring coordination among all tasks. Marie Stillway (10% time, years 1 and 2) will oversee the execution of sample coordination, water toxicity tests and perform general project management duties. TBN Lab Assistant II (50% time, years 1 and 2), will conduct water quality tests, manage the day-to-day activities in the laboratory, and perform quality assurance checks on data. A student Assistant (20% time years 1 and 2) will assist with organism exposures, water quality measurements, and glassware preparation. Swee Teh and Marie Stillway will oversee the timely completion of tasks, including toxicity tests, data analysis, data management, and preparation of reports.

Fringe Benefits.

In accordance with University policy, explain the costs included in the budgeted fringe benefit percentages used, which could include tuition/fee remission for qualifying personnel to the extent that such costs are provided for by University policy, to estimate the fringe benefit expenses on Exhibit B.

Fringe Benefits have been calculated using the Proposed UC Davis Fringe Benefit Rates for Fiscal Years 2017-2020. These rates range from 1.9 to 54.7%, depending on the job classification of each individual.

Travel

Itemize all travel requests separately by trip and justify in Exhibit B1, in accordance with University travel guidelines. Provide the purpose, destination, travelers (name or position/role), and duration of each trip. Include detail on airfare, lodging and mileage expenses, if applicable. Should the application include a request for travel outside of the state of California, justify the need for those out-of-state trips separately and completely.

Travel will be \$11,000 in year one only. Travel funding will cover the costs of travel to the central coast agricultural fields, where whole water and sediment will be collected. On-row fields require collections to occur over the course of several days, so travel costs will include overnight accommodations. Other travel will include the costs of Fleet Services vehicle rental, gas, and the procurement of ice to keep water samples cold during transport.

Materials and Supplies

Itemize materials supplies in separate categories. Include a complete justification of the project's need for these items. Theft sensitive equipment (under \$5,000) must be justified and tracked separately in accordance with State Contracting Manual Section 7.29.

Total supply costs are \$34,775. Laboratory glassware (\$2,000 in year 1 and \$1,175 in year 2) includes glass beakers ranging from 250 mL to 2000 mL in size, 250 mL Erlenmeyer flasks, miscellaneous graduated cylinders, and miscellaneous volumetric flasks. Sample bottles (\$1,700 in year 1 and \$1000 in year 2). Disposable supplies (\$1,500 in year 1 and \$1,200 in year 2) include inorganic salts, pipettes, pipet tips, nitric acid, pesticide grade solvents, food for test organisms, inorganic salts for making control waters and nutrient media, purified water, reagent kits for some water quality measurements, nitrile gloves, filters, weigh pans, paper towels, syringes, and turkey basters. Test organisms (\$8,000 in year 1 and \$4,000 in year 2) are required for the toxicity tests. Water quality meters and probes (\$1,000 in year 1 and \$800 in year 2) include funds for replacement dissolved oxygen meters, pH meters, conductivity meters and associated probes. Printing and duplicating

costs (\$1,000 in year 1 and \$600 in year 2) cover expenses related to producing raw data sheets, quality assurance reports, binding log books, data summaries and reports. Analytical Chemistry (\$6,000 in year 1 and \$4,800 in year 2) includes sample analysis for pyrethroids after each subtask under Task 3.

Equipment

List each item of equipment (greater than or equal to \$5,000 with a useful life of more than one year) with amount requested separately and justify each.

NA

Consultant Costs

Consultants are individuals/organizations who provide expert advisory or other services for brief or limited periods and do not provide a percentage of effort to the project or program. Consultants are not involved in the scientific or technical direction of the project as a whole.

Provide the names and organizational affiliations of all consultants. Describe the services to be performed, and include the number of days of anticipated consultation, the expected rate of compensation, travel, per diem, and other related costs.

NA

Subawardee (Consortium/Subrecipient) Costs

Each participating consortium organization must submit a separate detailed budget for every year in the project period in Exhibit B2 Subcontracts. Include a complete justification for the need for any subawardee listed in the application.

NA

Other Direct Costs

Itemize any other expenses by category and cost. Specifically justify costs that may typically be treated as indirect costs. For example, if insurance, telecommunication, or IT costs are charged as a direct expense, explain reason and methodology.

NA

Rent

If the scope of work will be performed in an off-campus facility rented from a third party for a specific project or projects, then rent may be charged as a direct expense to the award.

NA

Indirect (F&A) Cost

Indirect costs are calculated in accordance with the University budgeted indirect cost rate in Exhibit B.

Indirect costs of 25% are required.

Exhibit B3 – Invoice Elements

Invoice and Detailed Transaction Ledger Elements

In accordance with Section 14 of Exhibit C – Payment and Invoicing, the invoice, summary report and/or transaction/payroll ledger shall be certified by the University’s Financial Contact and the PI (or their respective designees).

Invoicing frequency

Quarterly Monthly

Invoicing signature format

Ink Facsimile/Electronic Approval

Summary Invoice – includes either on the invoice or in a separate summary document – by approved budget category (Exhibit B) – expenditures for the invoice period, approved budget, cumulative expenditures and budget balance available¹

- Personnel
- Equipment
- Travel
- Subawardee – Consultants
- Subawardee – Subcontract/Subrecipients
- Materials & Supplies
- Other Direct Costs
 - TOTAL DIRECT COSTS (if available from system)
- Indirect Costs
- TOTAL

Detailed transaction ledger and/or payroll ledger for the invoice period ²

- University Fund OR Agency Award # (to connect to invoice summary)
- Invoice/Report Period (matching invoice summary)
- GL Account/Object Code
- Doc Type (or subledger reference)
- Transaction Reference#
- Transaction Description, Vendor and/or Employee Name
- Transaction Posting Date
- Time Worked
- Transaction Amount

¹ If this information is not on the invoice or summary attachment, it may be included in a detailed transaction ledger.

² For salaries and wages, these elements are anticipated to be included in the detailed transaction ledger. If all elements are not contained in the transaction ledger, then a separate payroll ledger may be provided with the required elements.

Exhibit C – University Terms and Conditions

CMA (AB20) State/University Model Agreement Terms & Conditions UTC-319
<http://www.dgs.ca.gov/ols/Resources/ModelContractLanguageUniversities.aspx>

Exhibit D- Additional Requirements Associated with Funding Sources
(if applicable)

If the Agreement is subject to any additional requirements imposed on the funding State agency by applicable law (including, but not limited to, bond, proposition and federal funding), then these additional requirements will be set forth in Exhibit D. If the University is a subrecipient, as defined in 2 CFR 200 (Uniform Guidance on Administrative Requirements, Audit Requirements and Cost Principles for Federal Financial Assistance), and the external funding entity is the federal government, the below table must be completed by the State agency. (Please see sections 10.A and 10.B of the Exhibit C.)

State Agency to Complete (Required for Federal Funding Source):

Federal Agency	
Federal Award Identification Number	
Federal Award Date	
Catalog of Federal Domestic Assistance (CFDA) Number and Name	
Amount Awarded to State Agency	
Effective Dates for State Agency	
Federal Award to State Agency is Research & Development (Yes/No)	

University to Complete:

Research and Development (R&D) means all research activities, both basic and applied, and all development activities that are performed by non-Federal entities. The term research also includes activities involving the training of individuals in research techniques where such activities utilize the same facilities as other R&D activities and where such activities are not included in the instruction function.

This award does does not support Research & Development.

Exhibit G – Negotiated Alternate UTC Terms (if applicable)

An alternate provision in Exhibit G must clearly identify whether it is replacing, deleting or modifying a provision of Exhibit C. The Order of Precedence incorporated in Exhibit C clearly identifies that the provisions on Exhibit G take precedence over those in Exhibit C.

*While every effort has been made to keep the UTC as universal in its application as possible, there may be unique projects where a given term in the UTC may be inappropriate or inadequate, or additional terms may be necessary. California Education Code §67327(b) allows for terms to be changed or added, but only through the mutual agreement and negotiation of the State agency and the University campus. If a given term in the UTC is to be changed, the change should **not** be noted in Exhibit C, but rather noted separately in Exhibit G.*

1. Harassment Free Workplace

The Department of Pesticide Regulation (DPR) is committed to providing a safe, secure environment, free from sexual misconduct. It is policy of the Department that employees have the right to work in an environment that is free from all forms of discrimination, including sexual harassment. This policy specifically speaks to freedom from a sexually harassing act that results in the creation of an intimidating, hostile or offensive work environment or that otherwise interferes with an individual's employment or work performance. As a Contractor with DPR, you and your staff are expected to comply with a standard of conduct that is respectful and courteous to DPR employees and all other persons contacted during the performance of this Agreement. Sexual harassment is unacceptable, will not be tolerated; and may be cause for prohibiting some or all of the Contractor's staff from performing work under this Agreement.

2. Rights in Data

The Parties agree that all data, plans, drawings, specifications, reports, computer programs, operating manuals, notes, and other written or graphic work submitted under Exhibit A in the performance of this Contract shall be in the public domain.

3. Indirect Costs

Overhead/Indirect Costs may not exceed 25% of the Modified Total Direct Cost.