CALIFORNIA STRATEGIC GROWTH COUNCIL

Climate Change Research Program

QUARTERLY PROGRESS REPORT

2020

QTR 1

Progress Report # 2 **For the reporting period:** January 1, 2020 **to** March 31, 2020

Grantee Institution: University of California, Irvine **Agreement #** CCR20021

Research Grant Title Innovation Center for Advancing Ecosystem Climate Solutions

Signature Line (authorized representative): Erika Blossom

RESEARCH GRANT PROGRESS SUMMARY

Provide information for each task in the research grant's scope of work, noting zero if work has not been started on a specific task:

TASK # OR DESCRIPTION	DESCRIPTION	PERCENT OF WORK COMPLETED FOR THIS PERIOD	PERCENT OF WORK COMPLETED TO DATE	REIMBURSEMENT AMOUNT CHARGED FOR THIS PERIOD	REIMBURSEMENT AMOUNT CHARGED TO DATE
1.1	Collect and homogenize data layers	10%	40%	$20,000.00	$156,052.50
1.2	Test, improve, and update data layers	15%	20%	$30,223.72	$57,623.72
2.1	Prepare data analysis	15%	35%	$25,000.00	$64,889.92
2.2	Analyze historical and current data	5%	10%	$10,000.00	$29,000.00
2.3	Extend data analysis via data science and machine learning	0%	0%	$0	$0
3.1	Actively engage stakeholders	8%	15%	$25,000.00	$51,244.11
3.2	Produce decision-making tools	5%	5%	$2,000.00	$2,000.00
3.3	Communication	10%	15%	$10,000.00	$17,000.00
4.1	Develop valuation framework	7%	10%	$4,000.00	$6,000.00
4.2	Develop and implement valuation tools	0%	0%	$0	$0
4.3	Develop financing strategies	0%	0%	$0	$0

PROVIDE A SUMMARY STATEMENT DESCRIBING THE MILESTONES (INCLUDE GO/NO GO MILESTONES), ACCOMPLISHMENTS, SUCCESSES, BARRIERS, AND OBSTACLES THAT HAVE OCCURRED WITHIN THE CURRENT REPORTING PERIOD:

We have made great strides in Q1 2020. Our Center for Ecosystem Climate Solutions project team, henceforth referred to as the CECS, started bi-weekly calls for subgroups working on Tasks 1, 2, and 3. Major progress has been made on refining historical management layers under Task 1 via running FRAP, CalFire, and NPS data through the Continuous Change Detection Algorithm (CCDC), and the differences between our refined layers and prior existing layers have been noted, and we have started to share this information with state agencies.

For Task 2, we have decided how to tackle the fire probability and severity piece, running 5 parallel analyses.

We have also hired on Max Eriksson as a Project Scientist at UC Merced to assist with our stakeholder engagement portion of the project. As part of Task 3, Max has developed a needs assessment survey, which is in a final draft form and almost ready to share with agencies. Planning has begun for how to engage agencies in a more formal way, and in the meantime several more informal agency calls have been hosted to get feedback on our progress to date and guidance as we move forward. As an additional component of our outreach and engagement, we launched the CECS project website in late January, and have garnered more traffic than anticipated. Furthermore, our "Beyond the Brink: California's Watersheds" film has received further acclaim and will be available to PBS stations nationwide via the National Educational Telecommunications Association starting May 16th. In addition, we have decided to continue forward with the summer undergraduate internship program despite COVID-19 and determined a way to do so remotely if needed, and are planning to provide opportunities for up to 12 students.

As part of Task 4, a perspective paper was initiated, and recruitment of postdoctoral researchers has begun.

The COVID-19 pandemic has caused some challenges for our project, as it has for nearly every facet of life. Some PI's have less availability as they rapidly prepare to teach courses online. Hiring has become an issue, especially for candidates coming from out of state, or even abroad, and there has been a slight slowing of our timeline due to not having key postdocs and outreach support staff yet onboard. Overall though, our team has stayed committed and determined to continue working toward achieving our goals and completing our deliverables, despite challenges that COVID-19 has posed. Aside from a slight delay in our timeline in some instances, significant progress continues to be made.

ACHIEVING PROGRAM GOALS

1. Briefly discuss any successes the research has achieved in furthering the Climate Change Research Program's Program Goals:

   At UCD, postdoctoral researcher, Bin Chen, used the maximum entropy model (MaxEnt) driven by both biophysical and anthropogenic variables to predict the spatial distribution of wildfire accurately. This model can be applied to reconstruct/predict historical and future wildfire occurrence in statewide California. He also identified that aspects of the climate, including vapor pressure deficit (VPD), temperature, and burning index, dominated the spatial patterns of fire occurrence across the full Sierra Nevada. These findings have implications for understanding the controls on contemporary wildfire distribution and collective fire management.

   Also at UCD, PhD candidate Yuhan Huang has been looking at burn severity in CA northern coastal mountains, and found a significant increasing trend in burned area and fire severity, especially when under dry and warm conditions. This supports the community fire adaptation activities under future

climate change. He also identified key drivers of severity to help the prioritization of ecological and wildfire management areas.

At Stanford, postdoctoral researcher Kyle Hemes has been working towards evaluating GHG impact of historical wildfires in California, specifically second order carbon cycle impacts.

At San Diego State University (SDSU), work in this quarter has produced estimates of carbon stock effects attributed to the construction of fire breaks around human/chaparral interfaces. GIS layers were created to depict the current age of chaparral habitats across California and target old-growth stands currently endangered by accidental ignition.

In addition, postdoctoral researcher Jon Wang at UC Irvine, and PhD candidate Clarke Knight at UC Berkeley have been working to develop the remote sensing and geospatial tools which will consistently quantify and integrate the effects of past and ongoing management.

At UC Irvine, Assistant Project Scientist Stijn Hantson had generated a daily fire growth dataset based on VIIRS satellite active fire detections. This allows us for the first time to study geospatial patterns in fire rate of spread across California and link these to fire severity and impact. He found that human caused fires expand on average double as fast compared to lightning caused fires. Importantly, he also found that tree mortality is non-linearly related to fire spread rate, with faster fires causing higher tree mortality rates. As a result, we see that human caused fires are characterized by higher tree mortality and hence have a disproportional impact on Californian ecosystems.

2. Describe any successes made in advancing the objectives of the applicable research focus area (i.e., carbon dioxide removal, methane reduction, or heating, cooling, and thermal storage):

Much progress has been made toward advancing objectives in our research focus areas this quarter.

As part of Tasks 1.1-2.2 Clarke Knight at UC Berkeley has been compiling, integrating, and refining California's historical management data layers. This includes timber harvest plans from both the federal database (FACTS) and the state-wide database from Cal-Fire. Both Cal-Fire's timber harvest plans and the FACTS database are extensive – over 150,000 records dating between 1850 to 2019 for management events in California. With input from state and federal users of these databases, Clarke has interpreted records, particularly the silviculture treatments, and documented their complexities and caveats. Along with UC Irvine postdoc Jon Wang, UC Berkeley Professor John Battles, and others, she is developing a preliminary methodology to integrate the refined written record with spatial information and aerial detection. So far, we have found overlap between documented management events and disturbance detected from Landsat data.

Nicole Hemming-Schroeder, a PhD student in Earth System Science at UCI, has been working on analyzing satellite-derived lidar waveforms over the Sierra Nevada to investigate the relationship between these products and measures of forest health. She is currently creating high-resolution gridded datasets of canopy height and tree mortality from a dataset of 1.8 million trees near the Soaproot NEON tower in the Sierra Nevada published by Stovall et al. (2019, *Nature Communications*). She will compare gridded measures of canopy height, tree mortality, and topography to gridded statistics of satellite-derived lidar waveforms from the GEDI and ICESat-2 satellite missions. Her work will soon be expanding over the Sierra Nevada ecoregion to investigate relationships between satellite-derived lidar and forest health measurements from the US Forest Inventory and Analysis Database.

Bin Chen's work at UC Davis elucidates the spatial patterns of fire in the Sierra Nevada, and has implications for understanding the controls on wildfire distribution and possibly also targeting forest

management to limit further increases in wildfire. Also at UC Davis, Yuhan Huang has developed a random forest statistical model predicting probability of different severity burns for CA northern coastal mountains, as part of Task 2.2. The model has the potential to be applied to other ecoregions and is able to depict effects of warming and drying on burn severity.

Stanford's work relates primarily to carbon dioxide removal. Professor Chris Field, and postdoc Kyle Hemes are working generally on understanding the carbon implications of wildfire and forest management across California. This will help us understand the importance of management in avoiding catastrophic wildfires and keeping carbon stored in California's forests.

At SDSU, carbon flux measurements of microsite soil respiration, species-specific primary productivity, and net ecosystem exchange have improved our understanding of chaparral uptake dynamics under current climate conditions. Work completed in this quarter enables future mechanistic and machine-learning models of chaparral under Task 2.3. This modeling provides the basis for distinguishing the effects of fuel-load treatment in chaparral from those in forest systems.

3. Summarize efforts taken during this report period to conduct Meaningful Engagement:

A variety of forms of engagement have occurred this quarter, with most project PI's attending or presenting at several meetings. Several agency teleconferences were also hosted. All of this quarter's meaningful engagement activities are listed below:

Roger Bales & Martha Conklin attended the Wild & Scenic Film Festival in Nevada City for the showing of "Beyond the Brink: California's Watershed" and served on Q/A panel about forest restoration after the film. They also engaged with Yuba watershed and Tahoe National Forest leaders and stakeholders during the 2-day event. They additionally met with film maker Jim Thebaut to plan nationwide distribution of film to PBS stations, and a follow-up solutions-focused film for PBS.

Roger Bales also had a phone meeting on January 27 with Sequoia and Kings Canyon National Parks (SEKI), engaging Christy Bingham and her staff. It was determined on this call that SEKI staff are very interested in our data refinement and decision support tool, and want to continue to engage with us as the project progresses.

As part of UC Davis Professor Toby O'Geen's UC Master Gardener training sessions, he presented the project to trainees in Amador, Calaveras and Tuolumne Counties, totaling 8 hours of training, reaching 71 trainees. In turn, Master Gardeners train the public on sustainable gardening and landscaping practices. Toby covered concepts related to carbon sequestration in soils and the tradeoffs of vegetation management and its effects on soils and wildfire risk.

Kyle Hemes presented recent project work to the Burney Lab Group at UC San Diego, as well as joined the lab meeting of the Oechel Group at SDSU. Additionally, Kyle introduced some of the project's work to Michael Wara, Director of the Climate and Energy Policy Program at the Woods Institute. Meanwhile, Stanford Professor Chris Field hosted the Trillion Trees panel discussion on behalf of the Woods Institute, which engaged over 300 attendees in discussing the role of forests and other working lands in climate change mitigation.

On February 2, UC Irvine Professor Mike Goulden, postdoc Jon Wang, project coordinator, Raiven Greenberg, GIS specialist Mahnoor Kahn, UC Berkeley Professor John Battles, and UC Davis Professor Yufang Jin met with Loretta Moreno of the California Natural Resources Agency. We discussed the goals of the CECS project, and our plans to refine historical management layers. Loretta shared about her work with AB1492 and how she needs to determine environmental performance measures for her

Timber Management Program. We shared our CECS Data Drive with her for ongoing access, and she shared her past public meeting notes with us to better inform our outreach efforts for the stakeholder needs assessment piece. Since this call Loretta has also joined two other biweekly Task 1 calls to hear our continued updates, and to provide additional information and perspectives from CNRA.

On February 14, UC Irvine Professor Mike Goulden presented about the CECS project at the American Association for the Advancement of Science Annual Meeting in Seattle, WA. He gave a presentation on the overarching goals and methods of our project, talked about mining geospatial data layers and cleaning up mgmt. layers. As part of the meeting, Mike also presented with Ben Houlton and his SGC-funded Working Lands Innovation Center.

On February 25, twenty of our team members joined a teleconference with Dave Sapsis and Tadashi Moody from the Resource Management Group at Cal-Fire to discuss the CECS project, learn about Cal-Fire's mission and data needs, and get direction on our project while still in its earlier stages. Cal-Fire will be an important partner going forward. We are continuing to nurture this relationship by sharing data layers, and will reach out to them again once a beta version of our product is ready for testing.

UC Merced Professor and ANR staff member, Safeeq Khan, presented the CECS's work in the French Meadows as a watershed management framework in a webinar organized as a part of UC ANR series "silver solutions" on February 11, 2020. He also presented the project at the UC ANR annual water team meeting on March 12, 2020, Davis, CA.

On March 3, Mike Goulden, Roger Bales, John Battles, and Raiven Greenberg hosted a call with three other projects focuses on fire data and modeling in CA, including Salo, headed by Christopher Anderson and David Marvin, Spatial Informatics Group, headed by David Saah, and the UCLA Cal Eco Futures project, headed by Alex Hall. This was a collaborative call to share information about fire data and foster ideas for collaboration amongst project. We will be hosting calls with these three groups quarterly to continue to share progress and resources.

SDSU Professor Walter Oechel and his PhD students spoke with Greg Stangl of Phoenix Energy, and are looking for ways to implement their biochar generator systems in this project, particularly the chaparral analysis. Additionally, Walt and team met with NEOS LTD To look for possible remote-sensing cooperation. NEOS LTD uses high-resolution multispectral imagery for fire risk detection. They created a joint-listing for students at Palomar Community College interested in drone-based work. The SDSU team also met with coordinators and team members from the Climate Science Alliance, another current recipient of Strategic Growth Council funding, discussing ways to cooperate within each project and to avoid unneeded overlap in the developed tools.

Three UC Irvine PhD candidates involved with this project, Shane Coffield, Nicole Hemming-Schroeder, and Carl Norlen, are involved with the nonprofit organization CLEAN (Climate, Literacy, Empowerment, And iNquiry). They are beginning to brainstorm ways to develop lessons for middle school students in the Orange County, CA area based on the CECS project.

CURRENT STATUS OF THE RESEARCH

4. Summarize the efforts taken during this report period to accomplish the task objectives for each project in the grant:

For Tasks 1.2, 2.1, and 2.2, Jon Wang at UC Irvine has continued refining the historical data records of fires and forest management by fusing the existing vector-based databases with estimates of land

change and disturbance from time series remote sensing. He performed several small experiments to compare change detection algorithms (LandTrendr and Continuous Change Detection) and explored how they might be effectively compared and implemented on the Google Earth Engine analytics platform. He concluded that the Continuous Change Detection algorithm (CCDC), which analyzes all available remote sensing data rather than just annual values, is the most likely to generate accurate estimates of disturbance due to harvest, fire, and drought across a range of conditions. Jon created a workflow to run CCDC across all of California for 1984-2019. He is now working to merge the Landsat CCD-based data with data from the historical records of fire (from FRAP) and harvest (from both FACTS and Cal-Fire) to generate refined estimates of sub-perimeter heterogeneity in the incidence of fire and harvest across California from 1984 through 2019.

Jon worked closely with Kyle Hemes at Stanford and Carl Norlen, a PhD student at UC Irvine, to develop controls pixels that will be used to characterize the temporal and spatial trajectories of ecosystem function. These control pixels are stratified by land cover, elevation, and latitude, and feature just areas that experience no disturbance (as estimated by CCD). We are working on generating land cover-specific estimates of remote sensing-based time series of ecosystem function.

Additionally, as part of Task 1 Kyle developed a “small table”, which will be the precursor to the “grand table” data architecture by which we can systematically assess the chronosequence carbon and water implications of CA’s multi-decadal historical fire and management events. Kyle also developed and shared a Google Earth Engine repository to house and organize the Grand Table code.

For Tasks 2.1-2.3, Bin Chen at UC Davis examined the spatial patterns of wildfires in Sierra Nevada from 1984 to 2017, using multi-source geospatial datasets of fire occurrence, and human, climatic and biophysical variables. A machine learning approach was applied to estimate fire risk and analyze the importance of drivers controlling the historical spatial patterns of fires. He also investigated the fire ignition patterns and developed random forest machine learning models to estimate the monthly ignition frequency and ignition probability in California.

Also at UC Davis, Yuhan Huang examined the trend and structural changes of wildfire characteristics in California’s northern coastal mountains and how wildfire severity was influenced by warm droughts, as part of task 2.2. The findings also provide data-driven information for management strategies to reduce fire risk and for the communities to better adapt to future fires in Task 3.2.

As part of both Task 1 and 2, SDSU collected modeling parameters for upscaling chaparral carbon fluxes to the broader Southwest United States. At the Sky Oaks Field station, three eddy-covariance systems continued to collect data through the Winter season, long-term soil chambers were installed to measure the effects of precipitation on soil respiration, and twenty-six biomass samples were processed across an old- and new-growth stands of chaparral. Species-specific photosynthetic activity was correlated with hydrologic conditions for primary productivity partitioning. Funding also supported the construction of a portable eddy covariance tower for model validation in future quarters.

For Tasks 2.2 and 2.3, UC Irvine PhD candidate Shane Coffield collaborated with others in the UC Irvine Computer Science and Engineering departments to develop and evaluate machine learning approaches, specifically convolutional neural networks (CNNs), to model fire spread through time on the landscape. While currently in the early developmental phases, we are preliminary finding that CNNs are able to learn some spatial patterns and propagate active fire pixels probabilistically through

space and time. Shane and others are working on comparing this machine learning approach to the currently existing dynamic/process-based fire models via FlamMap and FSIM.

Max Eriksson joined the project at beginning of Q1 2020 as a project scientist at UC Merced, and his work has revolved around the design of a stakeholder needs assessment for Task 3. He has developed a three-stage mix methods design comprising of a survey, workshops, and interviews with key stakeholders. Adaptive management is contingent on recurring collaboration between a large number of different stakeholder groups, a process that requires trust and understanding among stakeholder groups. The main propose of the survey instrument is to identify what needs and barriers the involved stakeholder groups perceive as barriers preventing the adoption of adaptive management. In addition to this, the survey will also identify differences in perceptions between stakeholders, which might prevent efficient collaboration. Building on the results of this survey we will then engage stakeholder representatives in focus groups, to get in-depth information, followed by interviews with key individuals within each stakeholder group.

So far Max and team have designed a survey draft, which has been approved by the IRB. They have also identified relevant stakeholder interests, outlined the structure of the workshops, and begun to work on an interview guide. They have also undertaken a number of in person and online networking efforts in order to identify the needs of members of the project.

Moving forward we will pilot test the survey, finalize workshop design, and develop the interview guide. The survey will be distributed in early summer, and focus groups and interviews will be conducted in early fall.

As part of Task 4.1, Roger Bales wrapped up analysis of drought vulnerability in Yuba/American River basins (relatively low) and water benefits from biomass removal for forest restoration (relatively high), and submitted a paper to *Frontiers in Forests and Global Change*. The main focus of this research was to document our method for quantifying water benefits of forest treatments, to help enable a revenue stream. The paper is under review at the journal. Roger also initiated work on a framework paper aimed at a stakeholder audience outlining approaches to valuing and monetizing ecosystem services to help pay for forest restoration. This is being done in collaboration with CECS partner Blue Forest Conservation, a nonprofit organization arranging financing strategies for projects in the Sierra Nevada, and a user of CECS products.

5. Summarize by task any deliverable or outcome completed during the current reporting period:

Per Task 1, Kyle Hemes, Jon Wong, and Clarke Knight have been actively involved in collecting and homogenizing existing data layers, developing workflow, and preparing structure to produce Version 1 C and H20 results. The Version 1 product should be complete in Q2 2020.

Additionally, the SDSU team used CalFire's "FRAPS" and "fVeg" databases to create a chronosequence of chaparral stand age across California, as part of Task 1. Additional resources from San Diego and Riverside counties were used to refine vegetation maps. In addition, biomass samples were taken from young (17-year) and old (>100-year) stands of chaparral. Collections were separated into live/dead biomass to produce biochar generator estimates.

Per Task 2, Bin Chen at UC Davis produced a monthly human- and lightning-caused ignition product (version 1.0) from 1992 to 2015. He also submitted a manuscript entitled "Climate, fuel, and land use controls on the spatial pattern of wildfire in California's Sierra Nevada" to Journal of Geophysical Research: Biogeosciences. Also at UC Davis, Yuhan Huang submitted a manuscript entitled 'Intensified

burn severity in California's northern coastal mountains by drier climatic condition' to Environmental Research Letters.

The group focused on Task 3 met twice per week to develop the stakeholder survey. A draft survey has been completed and questions are currently being refined.

6. If applicable, what short-term value, interim findings or success stories can you produce as a result of your work?

The Center for Ecosystem Climate Solutions website went live in late January, and can be viewed at: https://california-ecosystem-climate.solutions. Between its launch and the end of Q1, we received more than 2,300 views. The website will continue to be updated and will start to serve as a resource for those wanting to connect with and/or learn more about the CECS.

At UCI, PhD candidate Shane Coffield has been compiling and comparing three different carbon stock datasets: LEMMA forest biomass, ESA CCI total land carbon, and LandFire total land carbon. He has found that temperature and precipitation can explain 70% of the spatial variance in forest biomass at a 4km resolution, suggesting that future climate changes under RCP8.5 could result in approximately 30% losses of forest biomass by 2100. He's developing and comparing several other statistical models of future biomass. In another approach, where he estimated future biomass based on present biomass of the nearest climate analogues, he found biomass losses of approximately 15%. He will continue developing and evaluating these statistical and machine learning models of biomass, with special focus on areas of interest such as forest carbon offset projects and timber harvest locations.

Clarke Knight at UC Berkeley had several insights from her review of the FACTS and Cal-Fire databases. She found that the FACTS database has become more rigorous, as mapping standards have improved since 2004. However, before 1995, many silviculture activities were generalized and the agency allowed discretion in record keeping on some activities like group selection. For Cal-Fire timber harvest plans, some silviculture treatments like "alternative prescription" or "sanitation salvage" have varying on-the-ground management intensities, which makes them hard to reconcile with a neat high/medium/low management intensity gradient. Furthermore, Cal-Fire timber harvest plans can be amended after the fact in major or minor ways according to the Forest Practice Rules. Thus, our current focus is on refining our understanding of management intensity and creating a comprehensive intensity gradient of silviculture treatments that bridges state and federal categories. This should be completed in Q2 2020.

All four Task subgroups have completed a draft implementation plan which include a summary of tasks and allocation of duties, and also denote how these intersect with other team members' work on the project. This has fostered better collaboration and understanding amongst our large team.

Additionally, the film "Beyond the Brink: California's Watershed", which the CECS helped produce, will be available to PBS stations nationally beginning May 16th. A goal is to get every station in CA to show it, and the producer, Jim Thebaut, and his team at the Chronicles Group are working diligently to make this happen. A sequel, funded in part by this grant, is currently in the early stages of production.

Finally, despite the COVID-19 pandemic, we decided as a team to continue on with hosting undergraduate interns this summer and developed a plan to host them remotely if need be. We received 34 applications over the 3 weeks that the application was open. Interviews and candidate selection will happen in late April to early May. We plan to take on up to 12 undergraduate interns across 4 of our group's institutions (UC Irvine, UC Davis, UC Merced, and SDSU) and are looking forward to having students join our team and contribute to this project, while simultaneously getting

great practical experience, as well as exposure to myriad topic in land management and California's ecosystems.

7. Describe any challenges and/or opportunities encountered when accomplishing this portion of the Scope of Work:

Our main challenges have been on the hiring front, as the height of the COVID-19 pandemic hit just as we started to advertise for a few positions. Postdoc recruitment for the ecosystem valuation piece (Task 4) has slowed owing to uncertainty over hiring international candidates. Advertising continues, and we hope to interview candidates in Q2 2020. Additionally, Safeeq Khan developed a position description for the engagement coordinator position (for Task 3) and is leading the search. However, the applicant pool is rather weak due to COVID-19 and, as a result, we have had to extend the closing date twice so far.

On the science side, we ironing out minor challenges regarding how best to set up a multi-decadal, multi-disturbance analysis, and include both spatial and temporal controls, though a few innovative ideas have surfaced and will be explored in Q2 2020.

We have interestingly seen the start of the COVID-19 pandemic as a way to start to bring our project team together in a more cohesive way. The idea for weekly team coffee hours came about at the end of the quarter, and we are starting to implement these as a way for team members to build empathy and connection, as well as find innovative ways to collaborate to further the goals of this project.

8. Is the research grant on budget and on schedule (Please refer to the Work Plan/Schedule for Implementation)? Please indicate here if a go/no-go milestone was reached this quarter, if it is behind schedule, and/or will not be met, and provide explanation. If other items are off budget and/or behind schedule, what issues need to be addressed and what steps are being taken to ensure that the grant is completed on time and on budget?

For the project overall, the COVID-19 pandemic may cause delays in research, up to 6 months or more out. For Task 4 specifically, slowing of Postdoc recruitment at both UC Irvine and UC Merced has imposed a 3-month delay. This trend will likely be the same for other postdoc and support staff positions. Budget is also being spent at a much slower rate than planned, partially due to the later kickoff of the project, but partially because there has been a delay in invoicing on several fronts as some sub-awardees have recently experienced turnover in their respective grant management offices. However, spending will likely increase in Q2 and/or Q3 2020 as certain individuals devote much more time and effort to this project. Unspent Year 1 budget will be carried over in the same line items in the Year 2 budget.

ADMINISTRATIVE/FISCAL OVERVIEW

9. Provide a brief narrative explaining the grant's financial expenditures and budgeted amounts for this period that includes cash and/or in-kind items.

At UCI, budget was spent mainly on salaries and benefits for the Project Specialist, Project Coordinator, and graduate student assistance. $56,680.18 was spent in Q1 2020 at UCI, with the vast majority of this being spend on personnel and fringe benefits. Year 1 budget has been 65% spent, leaving and excess of $134,425.23. These unspent Year 1 funds will be carried over in the same budget categories, and added to the Year 2 budget.

UCM has not yet invoiced for their work on this project, though work has been completed. Thus, we expect a much larger invoice from them in the beginning of Q2 2020. Their account administrator has been contacted and reminded that an invoice is needed for their work.

UCD spent $32,346.75 in Q1. Year 1 budget was only 16% spent, leaving an excess of $182,729.14 in Year 1 funding, which will be carried over into Year 2.

UCB did not yet invoice for work performed in Q1 2020, and thus, we expect their charges for Q2 to be slightly higher than planned. They spent 31% of Year 1 funding, leaving $61,571.69 in carryover for Year 2.

SDSU has spent $19,522.94 this quarter on PI salary and materials. They spent 40% of their Year 1 budget, leaving an excess of $36,964.73 for Year 1, which will be carried over into Year 2 budget.

At Stanford $17,673.96 was spent for PI effort and postdoctoral support of Kyle Hemes, who is actively engaged on the project. This spending is on track with what was originally budgeted, and they only have $5,580.45 of carryover into Year 2.

Total project spending to date amounts to $126,223.72 for Q1 2020, and $383,812.41 in Year 1, or 30% of the budget allocated for Year 1. This is primarily due to a late start on the project, as well as the fact that UC Merced has not yet billed for their work on the project.

10. Do you anticipate major modifications to the grant's budget or work plan in the next quarter?

There is the potential that work in Q2 2020 will be greatly affected due to the COVID-19 pandemic and uncertainty about the timeline of stay at home orders. There is the potential that this could negatively affect our project's timeline, and potentially necessitate a change to the work plan's timeline, and/or a budget modification request to account for potentially slower rate of expenses and changing staffing needs.

ADDITIONAL COMMENTS

We appreciate the continued support of the SGC and all of our partners during this trying time. Our project is moving forward as best as we can given the circumstances, and we have even seen an increase in engagement at the start of the pandemic, as people find their work on this project continually meaningful and engaging.