The California State University
COUNCIL ON OCEAN AFFAIRS, SCIENCE & TECHNOLOGY (COAST)

Dr. Kenneth H. Coale Graduate Scholar Awards
AY 2023-2024 Application Form
Application Deadline: Wednesday, January 24, 2024, 5:00 p.m. PST

Please read the information on Dr. Kenneth H. Coale Graduate Scholar Awards on the COAST Webpage Announcement for full details and instructions.

Submit this form (which includes the Advisor Sign-Off Form) as both a Word document and a PDF file named as follows: *LastName_FirstName_App.docx* and *LastName_FirstName_App.pdf*. Submit both files as attachments, along with your **Department Commitment Form** (if needed) in **ONE** email to graduate@share.calstate.edu. **Please note**: A signature is required from your advisor on the **Advisor Sign-Off Form** only in the PDF version of your application that you submit. Your Advisor must submit your LOR to gradletter@share.calstate.edu separately.

Student Applicant Information

First Name:	Casey	Last Name:	Pua
CSU Campus:	Cal Poly Pomona	Student ID#:	013797355
Email:	cbpua@cpp.edu	Phone:	(909) 226-0617
Degree Program:	Biological Sciences	Degree Sought (e.g., MS, PhD):	MS
Matriculation Date (mm/yy):	08/23	Anticipated graduation date (mm/yy):	12/25
GPA in Major Courses:	4.0	Thesis-based? (Y/N):	Y

Advisor Information

First Name:	Jeremy	Last Name:	Claisse
CSU Campus:	Cal Poly Pomona	Department:	Biological Sciences
Email:	jtclaisse@cpp.edu	Phone:	(909) 979-6487

Research Project Title:	How well do artificial reef habitat characteristics explain the abundance of two planktivores and one of their predators.
Project Keywords (5-7 keywords related to your project):	Artificial reefs, fish density, reef complexity, vertical relief, remote sensing, reef heterogeneity

Budget Summary (must add up to $4,000)

Award amount directly to awardee (through financial aid):	4000
Award amount to Department (DCF required for department funding):	0

The information on this page is for COAST use only and will not be shared with potential reviewers.

Have you previously received a COAST Graduate Student Research Award? (Y/N)	N
If yes, please provide year(s) of award(s):	

Committee Members (Required)

Name	Department	Campus
Jeremy Claisse	Biological Sciences	Cal Poly Pomona
Rachel Blakey	Biological Sciences	Cal Poly Pomona
Angel Valdés	Biological Sciences	Cal Poly Pomona

CSU Suggested Reviewers (Required): Suggested reviewers must be from the CSU. Do not suggest any reviewers from your campus or reviewers with a potential conflict of interest.

Name:	Matt Edwards	Danielle C. Zacherl
CSU Campus:	SDSU	CSUF
Department:	Biology	Biological Science
Email:	medwards@sdsu.edu	dzacherl@fullerton.edu

Intentional page break – please do not delete

Please refer to the **Award Announcement** for detailed instructions on the information required for each of the following sections. All the boxes below will expand as you type.

Project Description (65 points total): 1,500-word maximum; any text over this limit will be redacted

Artificial reefs (ARs) can be an effective resource management strategy that provides ecological and socioeconomic services (Chen et al., 2013; Granneman & Steele, 2015; Leitão et al., 2009; Paxton et al., 2020). ARs can produce similar to higher fish biomass than nearby natural reefs, with their fish assemblages being influenced by the reef's habitat characteristics (Granneman & Steele, 2015; Paxton et al., 2020). Taiwanese ARs provide tens of millions of dollars of yearly benefits through recreational activities (Chen et al., 2013). Also, ARs can reduce fishing pressure on surrounding natural reefs by spreading the fishing effort (Leitão et al., 2009). For ARs to be effective, the mechanisms that make them productive habitats must be understood (Pondella et al., 2022).

Resident planktivorous fishes can increase reef primary and secondary production through multiple benthopelagic coupling pathways (Cresson et al., 2014; Truong et al., 2017). Planktivores excrete large amounts of ammonium (Shrestha et al., 2023), a reduced form of nitrogen (Bray et al., 1986; Haines & Wheeler, 1978). Laboratory and field experiments suggest giant kelp can uptake large amounts of ammonium from Blacksmith (*Chromis punctipinnis*), a prominent reef zooplanktivore in southern California (Bray et al., 1986). Similarly, Blacksmith shelter nightly in crevices and deposit feces, transporting organic carbon that can be used by reef inhabitants (Bray et al., 1981). Planktivores are also key links connecting plankton food resources to the secondary production of higher trophic-level fish predators (Holland et al., 2021). An Australian study demonstrated this direct link of an AR resident Bluespotted Flathead (*Platycephalus caeruleopunctatus*) preying on a reef-associated zooplanktivore (Puckeridge et al., 2021). Therefore, large numbers of planktivores on ARs may be indicative of high localized production.

Multiple AR habitat characteristics are associated with increased fish density and production (Pondella et al., 2022). Vertical relief, the reef height above the sea floor, is positively related to fish density and biomass (Ambrose & Swarbrick, 1989; Granneman & Steele, 2015; Paxton et al., 2020; Pondella et al., 2019). Reef complexity, often quantified as the rugosity of the reef surface or the amount and variability of internal hole sizes or void spaces, provides foraging and sheltering areas for different fish species (Blount et al., 2021; Pondella et al., 2022). In southern California, complex natural and artificial reefs can have multiple times more fish density and biomass than comparable natural reefs (Granneman & Steele, 2015; Pondella et al., 2019). Heterogeneity, the variability of a habitat characteristic (Wedding & Yoklavich, 2015), can also affect fish production. Due to ontogenetic patterns of habitat use, increased reef heterogeneity can support fishes as they use different microhabitats during different life stages (Pondella et al., 2022). Investigating habitat characteristics related to high planktivore densities and their predators on pre-existing southern Californian ARs, may provide further insight into designing and assessing future AR projects that increase productivity.

My proposed project will be determining what AR habitat characteristics are most associated with high densities of planktivores and one of their predators. Data collection from existing southern Californian ARs built decades ago is being funded through the CSU COAST SSINP and includes collecting sonar data to quantify AR physical attributes and biological SCUBA surveys to quantify fish densities, size structure, and other *in situ* habitat metrics. The larger grant objectives include assessing the current physical and biological status of these existing reefs. The results will contribute to developing AR assessment metrics and design criteria and informing the California Department of Fish and Wildlife's ongoing update of their artificial reef management plan. I am currently processing sonar data to map the AR modules and quantify habitat metrics, and may also participate in some reef SCUBA surveys. My proposed project will make use of this data set to do more focused analyses to address the following questions:

Question 1: What AR habitat characteristics are most associated with higher densities of planktivores on AR modules in southern California?

Hypothesis 1: Planktivore densities will be higher on AR modules with higher vertical relief, complexity and heterogeneity. Vertical relief provides better access to feeding on zooplankton up in the water column (Holland et al., 2021). At Pendelton Artificial Reef, Blacksmith and Senorita (*Oxyjulus californica*) have high densities near high vertical slopes or crests (Anderson et al., 1989; Jessee et al., 1985). Higher planktivore densities were also observed on more complex Indonesian coral reefs (Santoso et al., 2022) and ARs in southern California (Granneman & Steele, 2015). Increased planktivore densities will be observed on AR modules with increased habitat heterogeneity through sheltering different life stages of the planktivores (Pondella et al., 2022).

Question 2: How well does planktivorous fish (prey) density and AR habitat characteristics explain the density of predatory Kelp Bass (Paralabrax clathratus) on AR modules in southern California?

Hypothesis 2: Kelp Bass density will be higher on AR modules with higher planktivore, Blacksmith and Senorita, densities. Also a Kelp Bass tracking study showed a higher time association with high vertical relief (Lowe et al., 2003). ARs containing high vertical relief can increase planktivore density and increase the predator-prey link between Kelp Bass and the planktivores. Complexity provides this same link since higher complexity supports higher planktivore density (Santoso et al., 2022). With a highly heterogenous AR, Kelp Bass density can be high as different size classes can use the varying AR microhabitats (Pondella et al., 2022).

<u>Methods and Data Analysis:</u>
The Vantuna Research Group (VRG) at Occidental College is collecting high resolution sonar geophysical data (30 cm cell size, bathymetry and acoustic backscatter) for modules within the funded AR complexes in Santa Monica Bay and off northern Orange County (Table 1). Using CRANE SCUBA-based rocky reef monitoring protocols, also widely used for MPA monitoring, each AR module will be surveyed by the VRG with aid of CPP Claisse Lab students, to collect fish density and size structure data, and some *in situ* habitat metrics (Pondella et al., 2019). Along with other students in the Claisse Lab, I am currently using ArcGIS Pro and MulitscaleDTM R package functions to perform habitat classification of the sonar data to map the AR module extents within each AR complex. We then use the MultiscaleDTM R package to calculate a variety of remotely sensed habitat metrics for each AR module based on the bathymetry data (e.g., depth, slope, rugosity, BPI) (Ilich et al., 2023). Other *in situ* habitat variables will be calculated from the SCUBA-based survey data (e.g., relief, substrate) (Pondella et al., 2019). The means of these metrics (across all module cells or transects) will be used as vertical relief or complexity indexes, while the standard deviations of metrics will represent habitat heterogeneity (Pondella et al., 2019; Wedding & Yoklavich, 2015).

Table 1. Artificial reef complexes where both geophysical sonar and biological SCUBA survey data is being collected, funded by a grant to the Claisse Lab through the CSU COAST SSINP. A total of 49 modules will be included in my analyses as replicates. Information is from Appendix 1 in Lewis and McKee (1989) (link).

AR Complex Name	**Depth (ft)**	**Size (ac)**	**Construction Material**	**Module Count**
Santa Monica Bay	42-72	7	20,000 tons quarry rock	10
Santa Monica	60	0.1	330 tons quarry rock/100 tons pier piling	4
Marina Del Rey 1	65	3.2	2,000 tons quarry rock/4000 tons concrete rubble	4
Marina Del Rey 2	65	6.9	10,000 tons quarry rock	6
Hermosa Beach	60	0.5	330 tons quarry rock	5
Redondo Beach	72	1.6	1,000 tons quarry rock	6
Huntington Beach A	60	3.7	1,000 tons quarry rock each	4
Huntington Beach B	60	3.7	1,000 tons quarry rock each	3
Huntington Beach C	60	3.7	1,000 tons quarry rock each	3
Huntington Beach D	60	3.7	1,000 tons quarry rock each	4
			Total	**49**

I plan to follow the Pondella et al. (2019) analysis procedure, using a generalized least-squares approach (GLS) to model the relationships between a given species' fish density and explanatory habitat metric variables (AR module as replicate). The GLS approach can account for spatial autocorrelation among AR module locations (Beguería & Pueyo, 2009; Zuur et al., 2019), and can be incorporated with an AICc-based model selection approach to assess the relative importance of the explanatory variables. Many of the explanatory variables are likely to be correlated with each other, and therefore I will also assess and account for the potential collinearity among explanatory variables in the models. Individual analyses will first be performed with (Question 1) Senorita or Blacksmith density as the response variable. Then (Question 2) Kelp Bass density will be the response variable, while also including planktivore density in the explanatory variable set. While it may be difficult to interpret whether Kelp Bass are responding directly to certain habitat characteristic preferences or the preferences of their planktivorous fish prey, which could be associated with similar habitat characteristics, the application of the results in terms of designing or assessing ARs should be the same if the objective is to maximize abundance of Kelp Bass.

References (0 points): no limit

Ambrose, R. F., & Swarbrick, S. L. (1989). Comparison of Fish Assemblages on Artificial and Natural Reefs off the Coast of Southern California. *Bulletin of Marine Science*, *44*(2), 718–733.
Anderson, T. W., DeMartini, E. E., & Roberts, D. A. (1989). The Relationship Between Habitat Structure, Body Size and Distribution of Fishes at a Temperate Artificial Reef. *Bulletin of Marine Science*, *44*(2), 681–697.

Beguería, S., & Pueyo, Y. (2009). A comparison of simultaneous autoregressive and generalized least squares models for dealing with spatial autocorrelation. *Global Ecology and Biogeography*, *18*(3), 273–279. https://doi.org/10.1111/j.1466-8238.2009.00446.x

Blount, C., Komyakova, V., Barnes, L., Smith, M. L., Zhang, D., Reeds, K., McPhee, D., Taylor, M. D., Macbeth, W., & Needham, E. (2021). Using ecological evidence to refine approaches to deploying offshore artificial reefs for recreational fisheries. *Bulletin of Marine Science*, *97*(4), 665–698. https://doi.org/10.5343/bms.2020.0059

Braun, C. D., Lezama-Ochoa, N., Farchadi, N., Arostegui, M. C., Alexander, M., Allyn, A., Bograd, S. J., Brodie, S., Crear, D. P., Curtis, T. H., Hazen, E. L., Kerney, A., Mills, K. E., Pugh, D., Scott, J. D., Welch, H., Young-Morse, R., & Lewison, R. L. (2023). Widespread habitat loss and redistribution of marine top predators in a changing ocean. *Science Advances*, *9*(32), eadi2718. https://doi.org/10.1126/sciadv.adi2718

Bray, R., Miller, A., & Geesey, G. (1981). The Fish Connection: A Trophic Link Between Planktonic and Rocky Reef Communities? *Science (New York, N.Y.)*, *214*, 204–205. https://doi.org/10.1126/science.214.4517.204

Bray, R. N., Purcell, L. J., & Miller, A. C. (1986). Ammonium excretion in a temperate-reef community by a planktivorous fish, Chromis punctipinnis (Pomacentridae), and potential uptake by young giant kelp, Macrocystis pyrifera (Laminariales). *Marine Biology*, *90*(3), 327–334. https://doi.org/10.1007/BF00428556

Chen, J.-L., Chuang, C.-T., Jan, R.-Q., Liu, L.-C., & Jan, M.-S. (2013). Recreational Benefits of Ecosystem Services on and around Artificial Reefs: A Case Study in Penghu, Taiwan. *Ocean & Coastal Management*, *85*, 58–64. https://doi.org/10.1016/j.ocecoaman.2013.09.005
Cresson, P., Ruitton, S., & Harmelin-Vivien, M. (2014). Artificial reefs do increase secondary biomass production: Mechanisms evidenced by stable isotopes. *Marine Ecology Progress Series*, *509*, 15–26. https://doi.org/10.3354/meps10866

Granneman, J. E., & Steele, M. A. (2015). Effects of reef attributes on fish assemblage similarity between artificial and natural reefs. *ICES Journal of Marine Science*, *72*(8), 2385–2397. https://doi.org/10.1093/icesjms/fsv094

Haines, K. C., & Wheeler, P. A. (1978). Ammoniun and Nitrate Uptake by the Marine Macrophytes Hypnea Musvuformis (rhodophyta) and Macrocystis Pyrifera (phaeophyta)1, 2. *Journal of Phycology*, *14*(3), 319–324. https://doi.org/10.1111/j.1529-8817.1978.tb00305.x

Holland, M. M., Becker, A., Smith, J. A., Everett, J. D., & Suthers, I. M. (2021). Fine-scale spatial and diel dynamics of zooplanktivorous fish on temperate rocky and artificial reefs. *Marine Ecology Progress Series*, *674*, 221–239. https://doi.org/10.3354/meps13831

Ilich, A. R., Misiuk, B., Lecours, V., & Murawski, S. A. (2023). MultiscaleDTM: An open-source R package for multiscale geomorphometric analysis. *Transactions in GIS*, *27*(4), 1164–1204. https://doi.org/10.1111/tgis.13067

Jessee, W. N., Carpenter, A. L., & Carter, J. W. (1985). Distribution Patterns and Density Estimates of Fishes on a Southern California Artificial Reef with Comparisons to Natural Kelp-Reef Habitats. *Bulletin of Marine Science*, *37*(1), 214–226.

Johnson, T. D., Barnett, A. M., DeMartini, E., Craft, L. L., Ambrose, R., & Purcell, L. J. (1994). Fish Production and Habitat Utilization on a Southern California Artificial Reef. *Bulletin of Marine Science*, *55*, 709–723.

Leitão, F., Santos, M. N., Erzini, K., & Monteiro, C. C. (2009). Diplodus spp. assemblages on artificial reefs: Importance for near shore fisheries. *Fisheries Management and Ecology*, *16*(2), 88–99. https://doi.org/10.1111/j.1365-2400.2008.00646.x

Lowe, C. G., Topping, D. T., Cartamil, D. P., & Papastamatiou, Y. P. (2003). Movement patterns, home range, and habitat utilization of adult kelp bass Paralabrax clathratus in a temperate no-take marine reserve. *Marine Ecology Progress Series*, *256*, 205–216. https://doi.org/10.3354/meps256205

Morris, R., Porter, A., Figueira, W., Coleman, R., Fobert, E., & Ferrari Legorreta, R. (2018). Fish-smart seawalls: A decision tool for adaptive management of marine infrastructure. *Frontiers in Ecology and the Environment*, *16*. https://doi.org/10.1002/fee.1809

Paxton, A. B., Shertzer, K. W., Bacheler, N. M., Kellison, G. T., Riley, K. L., & Taylor, J. C. (2020). Meta-Analysis Reveals Artificial Reefs Can Be Effective Tools for Fish Community Enhancement but Are Not One-Size-Fits-All. *Frontiers in Marine Science*, *7*. https://www.frontiersin.org/articles/10.3389/fmars.2020.00282

Pondella, Claisse, J. T., & Williams, C. M. (2022). Theory, practice, and design criteria for utilizing artificial reefs to increase production of marine fishes. *Frontiers in Marine Science*, *9*. https://www.frontiersin.org/articles/10.3389/fmars.2022.983253

Pondella, D., Piacenza, S., Claisse, J., Williams, C., Williams, J., Zellmer, A., & Caselle, J. (2019). Assessing drivers of rocky reef fish biomass density from the Southern California Bight. *Marine Ecology Progress Series*. https://doi.org/10.3354/meps13103

Puckeridge, A., Becker, A., Taylor, M., Lowry, M., McLeod, J., Schilling, H., & Suthers, I. (2021). Foraging behaviour and movements of an ambush predator reveal benthopelagic coupling on artificial reefs. *Marine Ecology Progress Series*, *666*, 171–182. https://doi.org/10.3354/meps13691
Reed, D. C., Schroeter, S. C., Huang, D., Anderson, T. W., & Ambrose, R. F. (2006). Quantitative assessment of different artificial reef designs in mitigating losses to kelp forest fishes. *Bulletin of Marine Science*, *78*(1), 133–150.

Santoso, P., Setiawan, F., Subhan, B., Arafat, D., Bengen, D. G., Iqbal Sani, L. M., Humphries, A. T., & Madduppa, H. (2022). Influence of Coral Reef Rugosity on Fish Communities in Marine

Reserves Around Lombok Island, Indonesia. *Environmental Biology of Fishes*, *105*(1), 105–117. https://doi.org/10.1007/s10641-021-01198-1

Shrestha, J., Coale, K. H., & Hamilton, S. L. (2023). Empirical measurements of ammonium excretion in kelp forest fishes: Effects of body size, taxonomy and trophic guild. *Journal of Experimental Marine Biology and Ecology*, *569*, 151956. https://doi.org/10.1016/j.jembe.2023.151956

Truong, L., Suthers, I. M., Cruz, D. O., & Smith, J. A. (2017). Plankton supports the majority of fish biomass on temperate rocky reefs. *Marine Biology*, *164*(4), 73. https://doi.org/10.1007/s00227-017-3101-5

Wedding, L., & Yoklavich, M. M. (2015). Habitat-based predictive mapping of rockfish density and biomass off the central California coast. *Marine Ecology Progress Series*, *540*, 235–250. https://doi.org/10.3354/meps11442

Whitmarsh, D., Santos, M. N., Ramos, J., & Monteiro, C. C. (2008). Marine habitat modification through artificial reefs off the Algarve (southern Portugal): An economic analysis of the fisheries and the prospects for management. *Ocean & Coastal Management*, *51*(6), 463–468. https://doi.org/10.1016/j.ocecoaman.2008.04.004

Williams, J., Williams, C., Pondella, D., & Scholz, Z. (2022). Rebirth of a reef: As-built description and rapid returns from the Palos Verdes Reef Restoration Project. *Frontiers in Marine Science*, *9*. https://doi.org/10.3389/fmars.2022.1010303

Zuur, A. F., Ieno, E. N., Savel′ev, A. A., & Zuur, A. F. (2019). *GAM and zero-inflated Models*. Highland Statistics Ltd.

Timeline (10 points total): 250-word maximum; any text over this limit will be redacted.
Please note: If you reference activities occurring prior to May 15, 2024, for context, be sure to clearly identify the activities an award would fund. **Requests for funds for expenses or work done prior to start date will result in your application being returned without review.**

Spring – Fall 2024: Analysis of AR sonar data provided by Vantuna Research Group to quantify habitat metrics. Complete collection of biological SCUBA survey data of AR modules.

Fall 2024: Thesis proposal presentation and defense.

Fall 2024 – Spring 2025: Write R code for analyses of fish-habitat relationships. Present preliminary results at conferences (e.g., Western Society of Naturalists).

Fall 2025: Complete writing and defend thesis. Present results at conferences (e.g., Western Society of Naturalists).

Need for Research (7 points total): 250-word maximum; any text over this limit will be redacted

Better understanding restoration practices can improve mitigation outcomes. ARs can be used as a tool to mitigate anthropogenic activities (e.g., fishing, dredging, waste disposal, fisheries). Understanding how the habitat characteristics of existing ARs result in high planktivore density, is important as they are beneficial for various forms of production. Studies have shown a positive relationship between planktivores and primary production (Bray et al., 1981; Bray et al., 1986; Haines & Wheeler, 1978). Similarly, planktivore density could improve piscivore fish production by increasing their prey density (Puckeridge et al., 2021). Therefore, we can use existing ARs in southern California to identify habitat characteristics, construction materials, and design elements that increase reef production. ARs have been shown to increase fish production, some by nine times that of the surrounding softbottom areas (Johnson et al., 1994). This in turn could provide more socioeconomic benefits, as elsewhere a large scale AR project demonstrated increased regional fish production, CPUE and associated revenues (Whitmarsh et al., 2008). In all, this research can be used to inform ways to establish more highly productive ARs that provide beneficial ecosystem services that support local increases in biodiversity, recreational opportunities (e.g. SCUBA diving, fisheries), and local to regional subsistence and commercial fisheries (Chen et al., 2013; Granneman & Steele, 2015; Leitão et al., 2009; Paxton et al., 2020).

Relevance to state of California (3 points total): 100-word maximum; any text over this limit will be redacted

In southern California, traditionally most ARs were built to enhance fishing opportunities, but now are being considered for adaptation to sea level rise (Morris et al., 2018), compensatory mitigation (Reed et al., 2006), and habitat restoration (Williams et al., 2022). The results of my proposed research will provide important information from existing reef designs regarding habitat characteristics that provide habitat for planktivorous fishes (Blacksmith and Senorita) and important piscivores (Kelp Bass). Results can be used to inform CDFW's process of updating their AR management plan and evaluation and design of future reefing projects in California.

Budget and Justification (15 points total)
<u>Example</u> Budget (to use this format, erase the content below and add additional rows as necessary; alternatively, you are welcome to create your own table):
Please note: Funds can only be requested for costs incurred ON or AFTER the project start date (May 15, 2024). Award funds may not be used for activities that occur prior to this date. **<u>Requests for funds for expenses or work done prior to start date will result in your application being returned without review.</u>**

Item/Description	Unit Price	Quantity	Amount to Awardee (via Financial Aid)	Amount to Department
Tuition	-	-	-	-
		Subtotals:	*$4,000.00*	*$0.00*
		Grand Total	**$4,000.00**	

Justification (250-word maximum; any text over this limit will be redacted):

The $4,000 award will allow me to offset my tuition and give me more time to work on my thesis. I am currently working multiple part-time jobs to pay for apartment rent and tuition. Having this award will allow me to work less hours, and better focus my energy on completing my thesis and participate in other activities that will better prepare me for the next step in my career.

Application Deadline: Wednesday, January 24, 2024, 5:00 p.m. PST
Save as both a Word document and a PDF file named as follows:
***LastName_FirstName_App.docx* and *LastName_FirstName_App.pdf*.**
Submit both files as email attachments in ONE email (with other required forms) to graduate@share.calstate.edu.

Within 24 hours of application submission, you will receive a confirmation email from COAST. Please save this confirmation email for future reference. If you do not receive a confirmation email, please contact Kimberly Jassowski (kjassowski@csumb.edu) to ensure your application was received.

The California State University
COUNCIL ON OCEAN AFFAIRS, SCIENCE & TECHNOLOGY (COAST)

Dr. Kenneth H. Coale Graduate Scholar Awards
AY 2023-2024 Advisor Sign-Off Form

To encourage you to engage with your CSU Advisor as you develop your application, **we require this form for <u>all</u> applications submitted to the Dr. Kenneth H. Coale Graduate Scholar Awards Program**. By signing this form, your advisor indicates that they have reviewed your application, provided guidance and input, and approved it for submission. All information except signatures must be typed. Electronic signatures are acceptable. **Please note:** A signature is required from your advisor on this **Advisor Sign-Off Form** in the **PDF version** of your application that you submit (the word document does NOT need to be submitted with a signature)

Please note: this form is NOT a substitute for a letter of recommendation (LOR). Your Advisor must submit your LOR to gradletter@share.calstate.edu separately.

Applicant Name:

Casey Brian Pua

CSU Advisor Information:

Name:	Jeremy Claisse	Phone:	(909) 979-6487
Department:	Biological Sciences	Email:	jtclaisse@cpp.edu

I have reviewed my student's application and provided guidance and input. My signature below indicates my approval of the application.

CSU Advisor Signature: ______________________ Date: **17 Jan 2024**