



# CALIFORNIA STATE UNIVERSITY AGRICULTURAL RESEARCH INSTITUTE (ARI)

## CALL FOR PROPOSALS

## 2017-2018

Cal Poly, San Luis Obispo ■ Cal Poly, Pomona ■ Chico State ■ Fresno State  
Associates: Humboldt State ■ CSU Monterey Bay

Administrative Office

[dwstill@cpp.edu](mailto:dwstill@cpp.edu)

[ari.calstate.edu](http://ari.calstate.edu)

909.869.2138

July 2016

CSU



ARI

## TABLE OF CONTENTS

	<u>Page</u>
I. Program Information.....	2
A. Overview.....	2
B. Organization.....	2
C. Research Priorities .....	3
D. Funding Allocation .....	3
E. Eligibility .....	4
II. Proposal General Information.....	4
A. Online Proposal Submission .....	4
B. Match .....	5
C. Indirect Charges .....	8
D. Confidentiality of Proposals .....	8
E. Conflict of Interest .....	8
F. Indemnification .....	8
G. Intellectual Property.....	8
III. Proposal Preparation .....	8
A. Proposal Types.....	8
B. System Pre-Proposals.....	9
C. Pre-Proposal Guidelines.....	9
D. Full Proposal Guidelines.....	10
IV. Timelines.....	15
A. Submission and Processing.....	15
B. Project Director Orientation Meetings.....	16
C. Project Start Date .....	16
D. Match Receipt .....	16
E. No-Cost Extensions .....	16
V. Proposal Review .....	17
A. Proposal Review Process .....	17
B. Proposal Evaluation Criteria .....	17
VI. Reports .....	19
A. General Information.....	19
B. Annual Reports .....	19
C. Additional Annual Reports as a Result of a No-Cost Extension .....	19
D. Final Reports.....	19
VII. Allocation Process for Campuses .....	19
VIII. ARI Contacts.....	19
IX. Glossary .....	22
Appendix A – Dean’s Allocation Request and Certification Letter .....	26
Appendix B – Research Priority Areas and Definitions .....	29

For more information on administrative policies and procedures, please see the ARI Policies and Procedures Manual (PPM) at <https://ari.calstate.edu/> or contact the ARI Administrative office at (909) 869-2138.

## I. Program Information

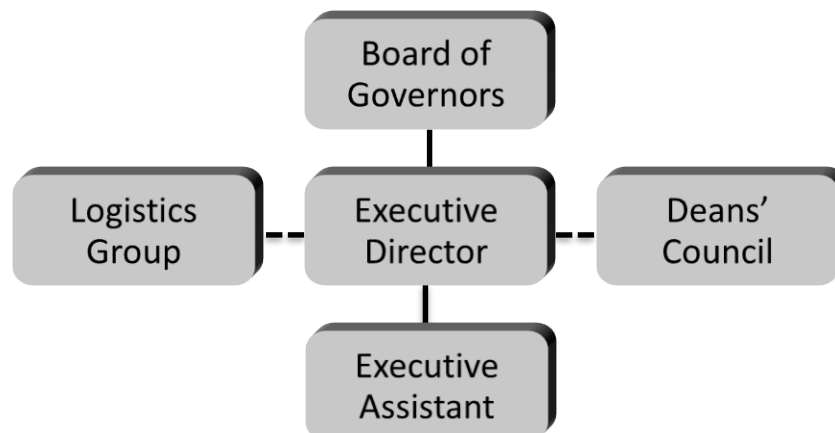
### A. Overview

The Agricultural Research Institute (ARI) exemplifies the California State University System (CSU) working for California through university-industry partnerships. ARI provides a diversified, multi-campus applied research program that annually matches \$4.37 million in State General Funds with at least one-to-one external support for research on high-priority issues facing California agriculture.

The ARI engages the collective expertise of the CSU's four colleges of agriculture at California State University, Fresno; California Polytechnic State University, San Luis Obispo; California State Polytechnic University, Pomona; and CSU, Chico along with CSU, Monterey Bay and Humboldt State collaboratively with faculty and research scientists from other CSU and University of California (UC) campuses, the USDA, and other State, Regional and Federal organizations. ARI's research and technology transfer activities complement the basic research conducted by the nation's land grant universities and aim to improve the economic viability and sustainability of California agriculture.

### B. Organization

A **Board of Governors** serves as the policy and funding authority for the ARI. It consists of the four CSU Presidents from member campuses, the UC Vice President of Agriculture and Natural Resources, and four industry representatives, one for each member campus. A **Deans' Council**, consisting of the four Deans of agriculture from member campuses, oversees the respective campus ARI operations, including annual budgets and matching fund certification, and reviews System proposals prior to Board review. **Campus Coordinators** are responsible for campus daily administration and research project oversight. A **Logistics Group** consists of **Campus Coordinators** and research administrators at both the college and university/auxiliary level who provide day-to-day support for the ARI. The **Executive Director** reports to the Board of Governors and is responsible for the overall performance of the CSU ARI.



For more information, please visit:

[www.ari.calstate.edu](http://www.ari.calstate.edu)

### **C. Research Priorities**

The ARI's State funding must be annually matched at least one-to-one with industry and/or other non-CSU State General Funds to support high-impact applied agricultural research. Priority is given to research conducted through university-industry and/or collaborative multi-college/university partnerships that demonstrate the potential to improve the economic efficiency, productivity, profitability, and sustainability of California agriculture and its allied industries. Project results dissemination and technology transfer should lead to increased consumer awareness and confidence in our environmentally sound and science-based food and agricultural systems. The ARI primarily focuses on finding immediate and practical solutions for high-priority challenges facing California agriculture in the following broad research categories that have the potential to affect the sustainability and profitability of California agriculture (for full descriptions of each research priority area please see Appendix B or the ARI website at <https://ari.calstate.edu>):

- Agricultural Business
- Biodiversity
- Biotechnology
- Food Science/Safety/Security
- Natural Resources
- Production and Cultural Practices
- Public Policy
- Water and Irrigation Technology

Based on State, national, and global challenges driven by environmental and regulatory concerns, new technology, and international competitiveness, California agricultural industry representatives, the ARI Board of Governors and the CSU's Agricultural Advisory Committee recommended that an additional priority be given to projects specifically addressing the following research topics in agriculture:

- Climate change, air quality, greenhouse gas emissions and carbon sequestering
- Food safety and security practices and technologies
- Water quality, infrastructure, and conveyance technologies
- Energy efficiencies and alternative energy/fuel technologies and production
- Environmental infrastructure improvement and restoration
- Invasive species monitoring, prevention and eradication
- Public health and safety priorities

### **D. Funding Allocation**

ARI funds are intended to encourage CSU system and individual campus excellence in applied agricultural research. Campus research funds are allocated through member campus colleges of agriculture and associate campus, while System research funds are allocated to campuses hosting the respective Project Director. Research funding opportunities are not exclusive to the colleges of agriculture and may support faculty and research scientist collaborators from many disciplines. Pending passage of the FY 2016-17 State budget with \$4.37M for the ARI, funds will be allocated as follows: \$220K for system administration; \$340K for campus administration; \$800K for System research projects; and \$3.01M for Campus research projects.

### **ARI Administration**

Cal Poly, Pomona has been charged by the CSU and the Legislature to provide for ARI central administration and is allocated \$220,000 annually for this purpose.

### **Campus Administrative Funding**

Each of the CSU's four colleges of agriculture is allocated \$85,000 annually in support of individual campus administration and coordination activities. Each campus is responsible for providing a Campus Coordinator and for working cooperatively with the ARI Executive Director and the ARI administrative office.

### **System Competitive Research Funding**

The ARI annually allocates \$800,000 in support of a multi-campus shared pool of competitive research funding for research of statewide significance. This funding is restricted to public domain projects.

### **Campus Competitive Research Funding**

The ARI annually allocates \$2.66 million to be dispersed by ARI Administration among the four CSU colleges of agriculture in support of individual intra-campus competitive applied agricultural research. Individual campus funding allocations are made specifically for addressing unique local and/or regional project activities. This funding is restricted to public domain projects.

Associate campus funding is provided through a separate allocation via the Chancellor's Office. In FY 16-17 years in the annual amounts of \$100,000 for CSU Monterey Bay and \$250,000 for Humboldt State University. Up to 10% of the associate campus allocation may be used for administration purposes with 100% of the allocation requiring 1:1 match.

### **E. Eligibility**

Project Directors for Campus (and Seed) ARI projects must be faculty (tenure-track or adjunct), lecturers or research scientists with campus-defined eligibility from the member or associate campus (CSU Monterey Bay and Humboldt State University) which receives the ARI allocation.

For System projects, Project Directors may be faculty (tenure-track or adjunct), lecturers or research scientists with campus-defined eligibility from member or associate campuses. If from an associate campus, Project Directors must collaborate with member campus personnel.

## **II. Proposal General Information**

### **A. Online Proposal Submission**

All ARI system and campus pre-proposals and full proposals must be submitted through the ARI Online Project Management (OPM) web-based proposal submission and routing system. The OPM is accessible on the ARI website at [www.ari.calstate.edu](http://www.ari.calstate.edu). No hardcopy pre-proposal or full proposal submissions will be accepted.

The application guidelines included herein and on the website are designed to assist in the preparation, submission, and management of ARI pre-proposals, full proposals and projects funded in FY 2017-18. Additional assistance is available by first consulting with the appropriate Campus Coordinator(s) and/or thereafter by contacting the ARI technical and/or system administrative office at (909) 869-2138.

## **B. Match**

### **1. Requirement**

Per ARI policy, all member campuses must obtain both a) match for each individual project (excluding seed funded projects) and b) aggregate match for their *Campus* research funds each year (allocation minus administrative funds). Each *System* research project is required to individually obtain 1:1 match to ARI funds provided.

ARI external match funding goals and objectives are intended to:

- Augment and extend CSU research faculty's capacity to conduct priority applied research, information dissemination, and technology transfer activities
- Help identify priority applied agricultural research projects and activities
- Facilitate CSU and ARI industry partnerships and community engagement
- Provide "real world" student experiential learning and science and technology based workforce development opportunities
- Keep ARI State funding actively committed to on-going research activities

### **2. Definitions**

Matching funds must be project-related and be fully explained in the respective proposal. Care must be taken to demonstrate the scope of work completed under each form of support (ARI and match) and the relationships between/among these funding sources. Both the narrative and the budget sections must reflect this support. As an example, if support has already been received to perform objectives 1, 2 and 3, please explain that the ARI funding will be used to support additional new objectives 2a, 2b, 2c, 4 and 5. Proposals that do not contain all of the required sections and proper documentation of in-hand matching funds will not be considered (see section II.B.5). Researchers are advised to review the "Proposal Rating Sheet" in the website forms page to determine how their respective proposals will be evaluated ([2 CFR 200](#) guidelines will be followed unless otherwise specified in this document).

#### **Cash Match**

Cash match is defined as any cash, check and/or other negotiable United States currency contribution made by non-CSU State General Fund sources that directly benefits and is specifically pertinent to an ARI or ARI master grant funded project. An allowable match directly benefits and is specifically pertinent to an ARI or ARI master grant funded project and must be received by the ARI project PD or Co-PD. For system projects, cash match from both the PI and Co-PI CSU campuses will be counted and the cash must reside on one of the two CSU campuses.

### **In-kind Match**

An in-kind match is the portion of project costs not paid by ARI funds. In-kind match includes any contributions, other than cash (see cash definition above), donated or pledged, that originates from the gifting of the value of time, goods, services, equipment or other expendable property of verifiable financial “fair market value” other than that originating from a CSU State General Fund allocation and/or cash and in-kind contributions which have been previously utilized as ARI or ARI master grant match.

### **Fair Market Value**

Fair market value is defined as the generally acceptable commercial value of a donation. For example: the value of consultant and/or staff time will be determined based on what the individuals involved are actually paid by other clients for similar work. The “fair market value” equivalent for non-reimbursed contributions of professional, technical, and/or clerical staff time by other universities, agencies, and/or organizations may be used as in-kind match provided that the respective ARI Dean has verified its authenticity.

### **Match Allowability**

Cash or in-kind match originating from any CSU State General Fund allocation, any other ARI funded program, previously funded ARI projects or other donations which have been previously utilized as match for other projects is specifically prohibited from being used as external match. ARI and ARI master grant funding do not qualify as reciprocating match.

CSU Project personnel are not allowed to count their volunteer time on ARI projects as in-kind match.

### **3. Match Priority**

The type of match further stratifies projects of equal ranking. Priority will be given to those proposals that document 100% cash match. Proposals with a combination of cash and in-kind match are prioritized in order of highest percentage of cash match relative to the ARI funding request.

### **4. Match Acquisition Timeframe**

Project match must be documented and verified between six months prior and six months post either the start of the fiscal year (July 1) or notification by the ARI Executive Director of ARI fund availability, depending on campus policies and procedures.

For match arriving prior to six months before the project start date, only the available balance at the six months prior date is allowable as project match.

### **5. Documentation**

Awarded ARI funding will not be released until match is received. Match is considered received if it is documented and verified on an ARI match verification form (see website), or applicable campus authorization form, which indicates that it is “in-hand”. The Project Director and/or campus or auxiliary official must sign the form.

Pending match may be submitted with proposals but must be received prior to release of project funds. The only exception is pending in-kind service which needs to be documented as both “committed” at the beginning and periodically, but no later than yearly, as “completed”.

## **6. Award Reductions and Cancellations**

### **a. Partial Project Setup**

Projects may be set up with partial ARI funds released as soon as minimum match requirements have been met (and the campus is able to open projects). This allows Project Directors the flexibility to start work while still confirming the rest of the project match through the deadline of the match acquisition timeframe.

### **b. Reductions**

Reductions in award amounts will be proportionate to the reduced received match by the deadline for the funding year, whether original year or subsequent years, for all projects requiring match.

Reductions will be pro-rated based on the percentage of the cash requirement met or the percentage of the total match requirement received, whichever is the more limiting factor.

Reductions cannot be recovered in subsequent years.

### **c. Project Cancellations**

Proposals for which no external match can be documented within the approved match acquisition timeframe will be immediately cancelled. Awarded funds will be reallocated to the next year’s funding pool.

Project Directors may appeal an ARI campus administrative decision to cancel tentatively approved project funding based on delinquent external match funding verification to the ARI Executive Director. Appeals must be dated and accompanied by a written justification within 30 days of a written funding cancellation notice. All appeal notices submitted to the Executive Director must be copied to the respective ARI Campus Coordinator and College Dean. The Executive Director shall have 30 days from receipt of an appeal to render a final decision.



**C. Indirect Charges**

Pursuant to ARI policy adopted by the Board of Governors regarding indirect charges, the ARI does not allow the imposition of any indirect charges to ARI State General Fund funded projects, contracts, subcontracts, and/or the transfer of portions of a project budget between colleges, centers, campuses, university systems, or other public or private agencies. Administrative fees and/or indirect charges cannot be built into individual projects, this includes transaction fees charged by the campus Foundation or other auxiliary.

**D. Confidentiality of Proposals**

The ARI receives research proposals in confidence and is responsible for protecting the confidentiality of their submission and contents. Proposals and accompanying attachments made accessible for administrative and review purposes may contain privileged and/or confidential information only for use by the intended recipient(s) for the express purpose of financial, technical, and/or scientific review and evaluation. Recipients of these materials are also charged with maintaining the confidentiality of their contents. If you have received a hardcopy proposal and/or electronic proposal access in error, please immediately notify the appropriate ARI system and/or campus administrator (ARI Executive Director or Campus Coordinator) listed in the contact page of this Call for Proposals (see section VIII). Recipients of a hardcopy proposal and/or electronic proposal access **MAY NOT** copy, quote, distribute, or otherwise use material from an ARI proposal submission without the expressed written consent of its author(s), unless required by law.

**E. Conflict of Interest**

See Section II.F. of the ARI Policies and Procedures Manual.

**F. Indemnification**

See Section II.G. of the ARI Policies and Procedures Manual.

**G. Intellectual Property Policy**

ARI project funding is restricted to public domain endeavors, therefore all intellectual property which is created or developed with ARI funding shall be subject to federal and state laws, all California State University applicable collective bargaining agreements, and individual campus policy.

**III. Proposal Preparation**

**A. Proposal Types**

For all types of funding, additional information is available in the appropriate section of this document. For Seed and Campus Competitive Funding, please contact your Campus Coordinator for additional requirements, conditions and/or restrictions.

**System**

*System Competitive Research Funding*

(Online funding type: System)

Length of Award	Maximum of 3 years
Funding	Minimum of \$75,000; maximum of \$150,000 per year

Collaboration	Required
Number of Awards Avail.	The number of awards is dependent on available funding each year
Matching Funding Required	Minimum of 100% total with 50% being cash
Timeline	System – Timelines in Section IV.A.

### **Campus**

#### *Campus Competitive Research Funding*

(Online funding type: Campus)

Length of Award	Maximum of 3 years
Funding	No minimum; maximum of \$150,000 per year
Collaboration	Not required
Number of Awards Avail.	The number of awards is dependent on available funding each year
Matching Funding Required	Minimum of 100% total with 25% being cash
Timeline	Campus – Timelines in Section IV.A.

#### *Seed Funding*

(Online funding type: Seed)

Length of Award	1 year ( <i>although all options are displayed, you may only enter 1 year</i> )
Funding	Up to \$10,000 <i>at the discretion of the Campus Coordinator</i>
Collaboration	Not required
Number of Awards Available	At the discretion of the Campus Coordinator
Matching Funding Required	None
Timeline	Special – see Timelines in Section IV.A.

### **B. System Pre-Proposals**

Pre-proposals are required for System competitive research funding. Requests for full proposals will be based on a pre-proposal evaluation and ranking by the Deans' Council and the Executive Director.

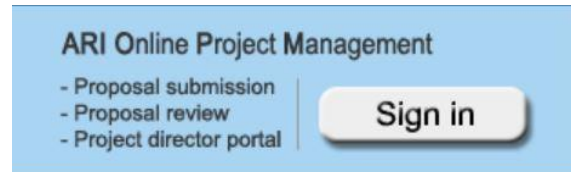
### **C. Pre-Proposal Guidelines**

Pre-proposals require completion of the information fields/attachments listed below. A complete definition and/or explanation of the information being requested is provided in each web page subsection.

- Project Director
- Project Information
- Project Personnel [Co-investigator(s), Collaborator(s), and Cooperator(s)]
- Funding Request
- External Match
- Anticipated Outcomes (checkboxes)
- Estimated Faculty/Research Staff Release and/or Additional Employment Pay
- Pre-Proposal Narrative
  - Narratives are limited to five single-spaced pages, not including references
  - File type: Adobe PDF
  - Font: Times New Roman

- Font Size: 12 point
- Margins: One inch – top and bottom, left and right
- Headings: Double-spaced and boldface
- Miscellaneous Supportive Documents
- Appropriate Campus Signature, *if required by individual campuses*

To start a pre-proposal, the Project Director signs in to the OPM by clicking the “Sign in” button on the ARI website (see screenshot to right). The pre-proposal submission system will walk you through each step of creating and submitting a



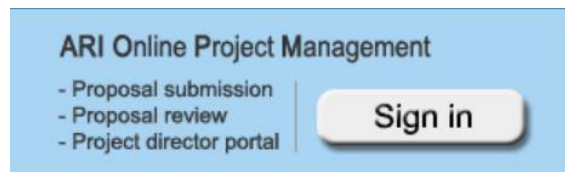
pre-proposal. Data entry in most information fields is mandatory. Failure to include the required information or the entry of inconsistent information will generate a program prompt requesting an appropriate correction. Pre-proposal development will not be allowed to advance further until the program prompt has been successfully addressed.

Once a pre-proposal is complete and ready for submission, a printable version of it will be generated for you to review. Project Directors are highly encouraged, at this time, to carefully review all pre-proposal information, making any necessary modifications, corrections, additions and/or deletions. After a final review, Project Directors should consult with their Campus Coordinator or his/her appointed designee(s) to insure proper completion of campus signature routing prior to completing the OPM submission process.

It is highly recommended that Project Directors print and retain a copy of the completed pre-proposal submission for their records. ***Once a pre-proposal has been submitted and accepted into the OPM system, it cannot be modified.*** Pre-proposals will be date/time recorded in the system to verify when they are originally submitted.

#### D. Full Proposal Guidelines – System and Campus

To start a proposal, sign into the OPM by clicking the “Sign in” button on the ARI website (see screenshot to right). The OPM system will walk you through each step of creating and submitting a complete proposal. ***Specific instructions regarding completion of each section are provided in the section description.***



Data entry in most information fields is mandatory. Failure to include the required information or the entry of inconsistent information will generate a program prompt requesting an appropriate correction. Proposal development will not be allowed to advance further until the program prompt has been successfully addressed. Once a proposal is complete and ready for submission, a printable version of it will be generated for you to review. Please review the proposal information, making any necessary modifications, corrections, additions and/or deletions prior to completing the submission process. It is highly

recommended that you print and retain a copy of your completed proposal for your records.

**Initial submission and acceptance of a proposal into the OPM system for routing DOES NOT constitute final submission or acceptance of a proposal for peer review or funding consideration. This action only sends your proposal to your Campus Point Person for checking.** Proposals will be date and time recorded at this point to verify when they were submitted for routing. Because they automatically go to the Campus Point Person there is no need for that inclusion as a signatory. If all sections are present, complete and internally consistent, the proposal will be forwarded for routing to all signatories. If one or more of the above conditions are not met, the proposal will be electronically returned to the Project Director to be remedied.

Once forwarded by the Campus Point Person, the process of electronic routing will automatically begin. ***However, it remains the Project Director's responsibility to ensure that all required signatures are obtained and that all signatories have been provided adequate review time prior to the final proposal submission deadline.*** Signatories who have not been provided adequate review time may reject a proposal solely for this reason. Once all appropriate signatures have been secured and a proposal has been successfully submitted and accepted into the system, it will again be date and time recorded to verify when it was submitted and accepted for peer review and funding consideration. ***This date and time recording will officially verify a proposal's final submission and acceptance into the OPM system for review and funding consideration.*** Proposals may not be modified beyond this submission date.

System and campus full proposals require completion of the information fields listed below. A complete definition and/or explanation of the information being requested is provided in each web page subsection description.

- Project Director
- Project Information
  - Member Campus
  - Title
  - Funding Type
  - Duration
  - Primary Focus Area
  - Secondary Focus Area
  - Primary Research Category
  - Secondary Research Category
  - Abstract/Impact/Statement - Provide a summary (350 words or less, written for a layman to understand) that describes the research, its significance, and its benefit to society and/or the industry that can also be used for promotional purposes. The abstract/impact/summary statement is not part of the narrative. (This pastes as plain text so please do not use symbols, italics or special formatting.)
- Project Personnel
- Funding Request - MUST match the budget

- External Match
- Anticipated Outcomes (checkboxes)
- Faculty/Research Staff Release and Additional Employment Pay - MUST match the budget
- Attachments - attached PDF documents.
  - Narrative
  - Budget
  - Timeline - use the Timeline from the ari.calstate.edu website; timelines for 1-, 2- and 3- year projects are available.
  - Curriculum Vitae/Resume - brief versions (no longer than six pages each) and ARI Presentations & Publications (for non-first-time requestors) should be HIGHLIGHTED.
  - Miscellaneous - examples: ARI match documentation forms; award letters; equipment specifications; etc.
- Signatories
  - Required Signatories
    - ✓ Department Chair/Head
    - ✓ Campus Coordinator
    - ✓ Dean of the College of Agriculture
  - Additional Signatories (if applicable) - Please check with your Campus Coordinator or Point Person for individual campus policies and procedures.
    - ✓ Center Directors
    - ✓ Farm Manager/Director of Operations
    - ✓ Sponsored Programs Office
    - ✓ Dean of the Project Director's college (if other than college of agriculture)

### **1. Narrative Requirements**

- Narratives are limited to ten single-spaced pages, not including references or appendices.
- File type: Adobe PDF
- Font: Times New Roman
- Font Size: 12 point
- Margins: One inch – top and bottom, left and right
- Text: Single-spaced
- Headings: Double-spaced and boldface
- Footer: Essential on each page (document name, date and page number)

Narratives will be reviewed and scored according to the criteria listed in Section V. The Proposal Rating Sheet is available on the website.

Proposal narratives should include the following information:

#### **Approach to the Problem/Issue (20 points)**

Briefly describe the problem or issue being addressed and explain why it is a high priority for California agriculture; include the anticipated economic impact of

addressing the issue as proposed. Describe the work of other investigators relevant to this problem and the proposed methods for solving it. Describe how this project with its matching funds is unique or supports the research of others and the short- and long-term benefits of the anticipated research outcomes.

### **Statement of Methodology (25 points)**

Provide a statement of the purpose of the research, a list of the research goals and objectives as well as a description of research activities. Describe which aspects of the project are to be covered by ARI and which by matching funds. Include the experimental design and the method of data collection and analysis, including statistics. A timeline of major activities should outline the start and the end date of each activity. (See Timelines on p. 15 and at [www.ari.calstate.edu/forms.aspx](http://www.ari.calstate.edu/forms.aspx))

### **Dissemination Plan (10 points)**

Each plan must contain a detailed account of the actions that will be taken to disseminate project results to the California agricultural industry and consumers. *In any news release or public conference initiated by the issuance of a news release, during the conduct of any public conference, and/or within the release of any publication, newsletter and/or project summary, the following statement must be included: “Partial funding for this project has been provided by the California State University Agricultural Research Institute (ARI).”* It is also highly recommended that external donors be acknowledged and recognized for their contributions to the success of a project. The following list includes, but is not limited to, examples of approved ARI dissemination activities:

#### Events

- Conferences, seminars, workshops, or field days
- Continuing education professional programs

#### Publications

- California State University Agricultural Research Institute (ARI) website
- CSU system and campus newsletters and articles
- Other newsletter articles
- Technical reports, research bulletins, circulars, or fact sheets
- Interim and/or annual reports of research in progress
- Articles in popular trade journals and/or other publications
- Articles in refereed journals
- Books
- Monographs

#### Presentations

- Posters
- Video/PowerPoint/photographic materials
- Industry meetings
- Internet

The ARI requires that a major effort be made to provide relevant information to California farmers, ranchers, agribusiness concerns and other relevant consumer and stakeholder groups. While professional journal publications, attendance and presentations at professional meetings, and other service to one's discipline are strongly encouraged, involvement in these activities alone does not constitute a complete ARI dissemination plan, since California farmers, ranchers, consumers, and agribusiness concerns typically do not receive such publications or participate in such activities.

**Evidence of Economic Impact (15 points)**

Describe the value of the proposed research to California agriculture and its related industries. Provide a brief economic analysis of the expected benefits of this work to the relevant sector of agriculture. If industry has been able to provide financial support for this project, provide reference to this here on the **budget** and **match documentation forms**. If industry has NOT been able to provide financial support, please provide justification why this high-priority work has failed to attract industry support and what steps will be taken to develop such support for the duration of the research.

**Outcomes Evaluation Plan (5 points)**

If it is important to California agriculture to fund this project, then it is important to show how the project will be evaluated in terms of success. Describe the project outcomes from the stated objectives and the methods to be used to measure them. Describe the deliverables for this project.

USDA-NIFA considers the terms **outcome** and **accomplishment** to be synonymous. They can represent a change in knowledge, action and/or condition. Almost all research projects have an outcome with a change in knowledge, but many ARI projects also have other outcomes because of their applied nature.

Examples:

Increase in profits for XXXX growers by using YYYYYY technique for last year.

Decrease the percent of obese children entering kindergarten in WWWW at-risk population.

**The following items must be included as separate appendices and do not count towards the ten page limit for the narrative:**

**Staffing (10 points)**

Provide the following information for all key project personnel [Project Director, Co-investigator(s), and Collaborator(s)]

1. Detailed statement of each key individual's roles and responsibilities

**Budget Narrative (15 points)**

Budget narratives and budget spreadsheets must be consistent. Provide a complete budget narrative justification for each major budget expenditure, such as, but not limited to, salaries, wages and benefits, equipment purchases, subcontracts,

service agreements, consulting services, and travel expenses, as well as other applicable expenditures such as printing, postage, telephone, supplies, etc.

Please use the Budget Spreadsheets available through your Campus Coordinator/OPM Point Person to communicate your detailed funding needs and the use of your matching funds. If a multi-year project is being proposed, provide a complete budget for each fiscal year and a consolidated project budget.

Faculty may claim academic release time and/or additional employment pay (summer salary and/or overload) on ARI projects. Generally, preference will be given to proposals for which release time, rather than additional pay, is requested for academic year duties. When claiming faculty release and/or additional pay, technical/other staff, and/or student salary funding, an appropriate university/auxiliary payroll tax/benefit expense must be included in the project budget. To determine the appropriate benefit rate, consult with your respective Campus Coordinator or Point Person.

Identify the anticipated sources of required professional, technical, and other project staffing. ARI strongly encourages collaborative working relationships among departments, other colleges, other CSU campuses, the University of California, industry partners, and other agricultural research agencies. The participation of graduate and undergraduate students in project activities is also strongly encouraged and valued.

Budgets will be evaluated based on the relationship between resources requested and work proposed (i.e., level of funding requested relative to work performed, appropriateness for proposed work, and efficient use of funds). While Campus Coordinators and/or their respective designee(s) will make every reasonable effort to assist Project Directors in budget development, monitoring, and tracking, Project Directors are responsible for budget development and accountability.

#### **IV. Timelines**

##### **A. Submission and Processing**

*System*

June 2016	Call for Proposals released
August 22, 2016	System pre-proposals due
September 12, 2016	System pre-proposal review by Deans' Council (conference call)
September 14, 2016 (or earlier)	Request for system full proposals
December 13, 2016	System full proposal submission deadline into OPM system
January 23, 2017	System full proposal submission to reviewers
February 28, 2017	System full proposal due from reviewers
March 13, 2017	Deans' Council system full proposal review



	(conference call)
April 3, 2017	Board of Governors system full proposal review and tentative awards
May 10, 2017	Tentative system award notification

*Campus*

June 2016	Call for Proposals released
February 2017	Check with your Campus Coordinator/Point Person for internal deadlines to allow for checking and routing
March 13, 2017	Campus full proposal submission deadline into OPM system
Spring 2017	Review by campus Technical Review Committees
May 1 to July 3, 2017	Campus awards notification (may vary by campus)

Campus proposals may be considered for funding **after** the above deadlines at the discretion of the Campus Coordinator/Dean and when match is in-hand.

**B. Project Director Orientation Meetings**

Campus Coordinators are responsible to ensure that new Project Directors are provided an ARI orientation prior to the project start date.

**C. Project Start Date**

A project's start date is either 1) the start of the fiscal year or 2) the date of notification by the ARI Executive Director of ARI fund availability, depending on campus policies and procedures. Single and multi-year project anniversary dates are observed in 12-month intervals commencing on each project's start date.

**D. Match Receipt**

See section II.B.4. Match Acquisition Timeframe.

**E. No-Cost Extensions**

For Member Campus funded projects, the Executive Director and/or Campus Coordinators or other authorized designee(s), in consultation with the respective campus Dean, may approve up to two separately requested, one-year, no-cost extensions when requested by a Project Director and accompanied with an appropriate written justification. Requests for no-cost extensions related to Member Campus funded projects must be submitted to the Campus Coordinator via email with an appropriate technical justification. No-cost extension requests must be submitted at least 30 days prior to the current project expiration date.

Associate Campus funded projects may request a no-cost extension in consultation with the Executive Director. The Executive Director may approve up to two separately requested, one-year, no-cost extensions when requested by a Project Director and accompanied with an appropriate written justification. Requests for no-cost extensions related to Associate Campus funded projects must be submitted to the Executive Director via email with an appropriate technical justification. No-cost extension requests must be submitted at least 30 days prior to the current project expiration date.

## **V. Proposal Review**

### **A. Proposal Review Process**

System pre-proposals will be collaboratively evaluated and ranked by the Deans' Council and the Executive Director in accordance with the criteria identified below prior to the requests for full proposals to determine 1) alignment with one or more of the ARI research priority areas, 2) statewide significance of the proposed research, and 3) appropriate level of collaboration. System proposals involving multiple CSU campuses will receive priority.

System full proposals are first reviewed by Subject Matter Experts (SME) identified by the ARI Executive Director. Reviewer comments are then considered during a second review by the Executive Director and ARI Deans' Council, who collectively recommend the top proposal(s) to the ARI Board for final approval.

Campus proposals are reviewed by technical review committees comprised of campus and other subject matter experts chosen by the campus ARI personnel.

**All reviewer copies of proposals should be destroyed at the conclusion of the review process to ensure confidentiality.**

### **B. Proposal Evaluation Criteria**

**Reviewer Notice:** Proposals are confidential as per section II.D.

Full proposals will be evaluated by peer reviewers using the criteria listed below. In addition to asking reviewers to numerically score each of the proposal subsections listed, they are asked to provide comments and/or suggestions that they believe may enhance the proposal goals and/or outcomes.

If you believe that a colleague can make a substantive contribution to the review of a proposal and/or its attachment(s), which you have agreed to review, please consult the appropriate ARI system or campus administrator (ARI Executive Director or Campus Coordinator) before contacting your colleague. When you complete the review process, destroy any proposal documents or bring them with you to the panel review meeting, if convened, and leave them with the appropriate designated system or campus administrator at the conclusion of the meeting.

**Approach to the Problem/Issue (20 points):**

Determine whether the problem is addressed clearly and presented convincingly. The Project Director should demonstrate a clear understanding of the significance of the problem, which should be solvable. Determine whether other researchers are addressing this problem, and whether the Project Director possesses a thorough understanding of related work that has been reported by others.

**Statement of Methodology (25 points):**

Determine whether the proposed methodology is sound and whether there are any significant limitations associated with the proposal design. Determine whether the proposal indicates data will be collected and analyzed, whether the major objectives and milestones of the proposal have been identified, and whether they are appropriate. Evaluate whether the timeline of proposed activities is realistic and appropriate to the work proposed, and whether the objectives can be achieved using the approach identified. If matching funds were required, has the relevance of those funds been addressed, including non-overlap of objectives except in the case of direct cost-share?

**Dissemination Plan (10 points):**

Determine whether the information dissemination activities proposed are adequate, that they primarily address California farmers', ranchers', and/or agribusiness concerns (a requirement for all ARI funded proposals), and that they are well thought out.

**Evidence of Economic Impact to the California Industry and Consumer (15 points):**

Evaluate the value of the work proposed relative to California agriculture, agribusiness, food and natural resources. Determine whether the agricultural industry's recognition of this problem as being high priority was economically accurate. Establish that industry has provided adequate support for this project or justified why it cannot.

**Staff Needs/Researcher Qualifications and Collaboration (10 points):**

Determine whether the proposal clearly describes the qualifications of the Project Director and other key personnel to solve the identified proposal problem (training, education, demonstrated awareness of the issue) and whether the level of staffing is appropriate. Determine whether the roles of all the key personnel have been clearly defined. Student involvement is strongly encouraged.

**Proposal Outcomes Evaluation Plan (5 Points):**

Evaluate whether the methods proposed to assess the final project outcomes will determine whether or not objectives stated in the original proposal have been achieved.

**Budget Appropriateness (15 points):**

Evaluate whether the resources requested are appropriate to the work proposed and whether there are more efficient ways to conduct the project. Determine whether there is a clear relationship between the resources requested and the work proposed.

## **VI. Reports**

### **A. General Information**

While Campus Coordinators, their respective designee(s), and other appropriate administrative staff will make every reasonable effort to assist Project Directors in completing progress reporting obligations, Project Directors are responsible for timely and accurate financial and programmatic progress reporting. Future funding and proposal submission approval may be withheld from Project Directors with progress reporting delinquencies or poor project management.

ARI reports must be completed in the following formats using the appropriate printable interactive Annual or Final Report Templates available in the (Post-award) Forms section of the ARI website at [www.ari.calstate.edu](http://www.ari.calstate.edu). Project Directors should submit all reports directly to their respective Campus Coordinator or their designee, per campus guidelines.

### **B. Annual Reports**

Yearly submission of an annual report to the Campus Coordinator is required for all multi-year projects within 60 days of each anniversary of the project start date, except in the year when the project is completed, in which case a final report is due within 90 days after a project's scheduled completion date.

### **C. Additional Annual Reports as a Result of a No-Cost Extension**

If no-cost extensions are approved, additional annual reports will be required within 60 days of each anniversary of the project start date, except for the final year when the project is completed, in which case a final report is due within 90 days after project completion.

### **D. Final Reports**

Final reports for all projects are due within 90 days after a project's scheduled completion date.

It is essential that ARI research is understandable and relevant to our stakeholders, including the agricultural community and general public. To this end, Project Directors may be contacted by the ARI Executive Director or administrative staff to assist in preparation of public impact statements that describe the project's findings and justify the use of ARI funds. Executive Summaries of Final Reports should be written with this in mind.

## **VII. Allocation Process for Campuses**

See Section VIII of the ARI Policies and Procedures Manual.

## **VIII. ARI Contacts**

### **CSU ARI Executive Director**

David Still, **Professor, Department of Plant Sciences**

(909) 869-2138

[dwstill@cpp.edu](mailto:dwstill@cpp.edu)

California State Polytechnic University, Pomona

Building 30  
3801 W. Temple Avenue  
Pomona, CA 91768

California Polytechnic State University, San Luis Obispo  
Andrew J. Thulin, **Dean**  
[athulin@calpoly.edu](mailto:athulin@calpoly.edu)  
Chris Dicus, **Campus Coordinator, Interim Associate Dean**  
[cdicus@calpoly.edu](mailto:cdicus@calpoly.edu)  
(805) 756-3269 (805) 756-6577 Fax  
Sue Tonik, Grants Analyst/Campus Point Person  
[stonik@calpoly.edu](mailto:stonik@calpoly.edu)  
(805) 756-7241  
California Polytechnic State University, San Luis Obispo  
College of Agriculture, Food & Environmental Sciences  
1 Grand Avenue  
San Luis Obispo, CA 93407

California State Polytechnic University, Pomona  
Mary Holz-Clause, **Dean**  
[msholzclause@cpp.edu](mailto:msholzclause@cpp.edu)  
Shelton Murinda, **Campus Coordinator, Professor**  
(909) 869-2089 (909) 869-2099 Fax  
[semurinda@cpp.edu](mailto:semurinda@cpp.edu)  
Wei Bidlack, Campus Point Person  
(909) 869-2188  
[wwbidlack@cpp.edu](mailto:wwbidlack@cpp.edu)  
California State Polytechnic University, Pomona  
College of Agriculture  
3801 W. Temple Avenue, Bldg. 2  
Pomona, CA 91768

California State University, Chico  
David Daley, **Interim Dean**  
(530) 898-5844 (530) 898-5845 Fax  
[ddaley@csuchico.edu](mailto:ddaley@csuchico.edu)  
Patrick Doyle, **Campus Coordinator, Professor**  
(530) 898-6586 (530) 898-5845 Fax  
[pdoyle@csuchico.edu](mailto:pdoyle@csuchico.edu)  
Karen Hansen, Grants Specialist II/Campus Point Person  
(530) 898-6286  
[kthansen@csuchico.edu](mailto:kthansen@csuchico.edu)  
California State University, Chico  
College of Agriculture  
400 W. First Street  
Chico, CA 95929-0310

California State University, Fresno

Sandra Witte, **Dean**

[sandraw@csufresno.edu](mailto:sandraw@csufresno.edu)

(559) 278-2061 (559) 278-4496 (Fax)

Bill Erysian, **Campus Coordinator**

(559) 278-5115 (559) 278-6032 (Fax)

[bille@csufresno.edu](mailto:bille@csufresno.edu)

Linda Lopez-Atkins, Office Manager/Campus Point Person

(559) 278-2601

[lindaa@csufresno.edu](mailto:lindaa@csufresno.edu)

California State University, Fresno

Jordan College of Agriculture Sciences and Technology

2910 E. San Ramon M/S AS49

Fresno, CA 93740

California State University, Monterey Bay

Sharon Anderson, **Interim Dean**

(831) 582-3915 (831) 582-3311 Fax

[shanderson@csumb.edu](mailto:shanderson@csumb.edu)

Cindy Lopez, Sponsored Programs Director/Campus Point Person

(831) 582-3089

[clopez@csumb.edu](mailto:clopez@csumb.edu)

California State University, Monterey Bay

College of Science

100 Campus Center

Seaside, CA 93955-8001

Humboldt State University

Steve Smith, **Dean**

(707) 826-5475 (707) 826-3562 Fax

[ss7006@humboldt.edu](mailto:ss7006@humboldt.edu)

Anthony Johnson, Lead Grants Analyst/Campus Point Person

(707) 826-5164

[aj27@humboldt.edu](mailto:aj27@humboldt.edu)

Humboldt State University

College of Natural Resources and Sciences

1 Harpst Street

Arcata, CA 95521

See website for Board of Governors and Logistics Group membership at [www.ari.calstate.edu](http://www.ari.calstate.edu).

## VIII. Glossary

### **Additional Employment (pay)**

For faculty, additional employment is sometimes referred to as “overload”. The CSU policy for faculty allows additional employment of up to 25% of a full-time position in excess of a full-time workload, or when appropriate, in excess of a full-time timebase. These policies, limitations and calculations are based on time, not salary (CSU Policy HR 2002-05 <http://www.calstate.edu/HRAdm/Policies/HR2002-05.pdf>).

For non-faculty state employees, no additional employment or overload pay is allowed as part of CSU-ARI funding per the State of California Public Contract Code section 10831 (<http://www.leginfo.ca.gov/cgi-bin/displaycode?section=pcc&group=10001-11000&file=10830-10833>).

### **ARI**

The California State University Agricultural Research Institute.

### **Associate Campuses**

CSU Monterey Bay and Humboldt State University.

### **Campus Coordinator**

Campus Coordinators are the individuals at each ARI member campus responsible for ARI campus administration, local program oversight and collaboration with the ARI Executive Director.

### **Campus Funding**

Campus funding is ARI funding disbursed directly to member and associate campuses in support of intra-campus competitive agricultural and natural resources applied research.

### **Campus Point Person**

The individual on member and associate campuses with primary oversight of the campus’ entries into the Online Proposal Management (OPM) system. This individual has the responsibility to ensure completeness, accuracy and compliance with the Call for Proposals in the pre-award phase and proper data entry for the project/post-award phase.

### **Cash Match**

Cash match is defined as any cash, check and/or other negotiable United States currency contribution made by non-CSU State General Fund sources that directly benefits and is specifically pertinent to an ARI or ARI master grant funded project. An allowable match directly benefits and is specifically pertinent to an ARI or ARI master grant funded project and must be received by the ARI project PD or Co-PD. For system projects, cash match from both the PI and Co-PI CSU campuses will be counted and the cash must reside on one of the two CSU campuses.

<b>Collaborator</b>	Collaborators are scientifically and/or practically qualified individuals with key expertise and responsibility for completion of a significant portion of a project’s goals and objectives.
<b>Cooperator</b>	Cooperators are scientifically and/or practically qualified individuals with specific expertise in project topics that provide advice, guidance and consultation to the Project Director and Co-investigators.
<b>Co-investigator</b>	Co-investigators are scientifically qualified individuals with specific project-related expertise who work collaboratively with Project Directors to undertake key research activities, perform industry outreach, information dissemination and technology transfer activities.
<b>Equipment</b>	Any single item with total cost of \$5,000 or greater.
<b>Executive Director</b>	The Executive Director is the individual responsible for the ARI’s overall administration, day-to-day operational management and oversight, promotion, and program and financial accountability.
<b>External Match</b>	External match is donated or pledged cash and/or in-kind goods, services or equipment of verifiable financial value other than that originating from the CSU State General Fund allocation, any other ARI funded program, previously funded ARI projects or other donations which have been previously utilized as match for other projects.
<b>Faculty Release</b>	Faculty release is an ARI project budgeted reduction in the academic teaching workload of a specific faculty member(s) for the expressed purpose of conducting competitively funded applied agricultural and/or natural resources research, information dissemination and technology transfer activities that benefit California agriculture, the environment or society.
<b>Fair Market Value</b>	Fair market value is defined as the generally acceptable commercial value of a donation. For example: the value of consultant and/or staff time will be determined based on what the individuals involved are actually paid by other clients for similar work. The “fair market value” equivalent for non-reimbursed contributions of professional, technical, and/or clerical staff time by other universities, agencies, and/or organizations may be used as in-kind match provided that the respective ARI Dean has verified its authenticity.
<b>Full Proposal</b>	A full proposal is a detailed scientific research, information dissemination and technology transfer strategic plan that identifies an agricultural or natural resources problem or issue, the specific applied



research to be performed and the methodology to be followed, the research's impact on California agriculture, the environment or society, a detailed budget and timeline, staffing requirements, and a comprehensive dissemination and technology transfer plan.

**In-kind Match**

An in-kind match is the portion of project costs not paid by ARI funds. The in-kind match includes any contributions, other than cash (see Cash Match definition), donated or pledged, that originates from the gifting of the value of time, goods, services, equipment or other expendable property of verifiable financial "fair market value" other than that originating from a CSU State General Fund allocation and/or cash and in-kind contributions which have been previously utilized as ARI or ARI master grant match.

**Key Personnel**

Key personnel are project personnel with significant identified project-related responsibilities (Project Directors, Co-investigators and Collaborators).

**Match Allowability**

Cash or in-kind match originating from any CSU State General Fund allocation, any other ARI funded program, previously funded ARI projects or other donations which have been previously utilized as match for other projects is specifically prohibited from being used as external match. ARI and ARI master grant funding do not qualify as reciprocating match. CSU Project Personnel are not allowed to count their volunteer time on ARI projects as in-kind match. An allowable match directly benefits and is specifically pertinent to an ARI project or ARI master grant and must be received by the ARI project PD or Co-PD.

**Member Campus**

Member campuses are those CSU campuses with colleges of agriculture: California State University, Fresno (Fresno State); California Polytechnic State University, San Luis Obispo (Cal Poly, SLO); California State Polytechnic University, Pomona (Cal Poly, Pomona); and California State University, Chico (Chico State).

**Pending Match**

Pending match is any ARI project-related cash or in-kind external funding request that has been submitted to an industry, governmental entity and/or foundation prior to the submission of the ARI funding request that is awaiting final funding notification.

**Pre-proposal**

A pre-proposal is a one-to-five page preliminary proposal that generally identifies the specific research being proposed and its significance to California agriculture, the environment or society; the anticipated level of collaboration and key personnel required as well as any faculty release and/or additional employment pay anticipated; an estimated budget, timeline and alignment with one or more of the

ARI research focus areas; an estimated ARI funding request; and potential external match funding sources.

**Project Director**

The Project Director is the individual ultimately responsible for all pre-award and post-award proposal and project management including, but not limited to, proposal preparation and submission, securing and verifying appropriate external match, budget management, coordination of research and personnel activities, timely submission of research and financial reports, information dissemination, and relevant technology transfer.

**System  
Collaboration**

System collaboration requires a research team including at least one qualified ARI member campus faculty or research scientist collaborating with another CSU campus faculty or research scientist or UC, industry and/or other qualified research organization's faculty or research scientists. System proposals must document the research collaboration in terms of financial support and scope of work, through subcontracts, standard agreements, and/or transfer of matching funds from the Collaborator(s) to the Project Director's campus. System proposals involving multiple CSU campuses will receive priority.

**System Funding**

System funding is ARI funding which supports collaborative research partnerships addressing issues of statewide or regional importance.

**Technical Review  
Committees**

Technical review committees are comprised of campus and outside subject matter experts who review campus proposals for technical merit and make funding recommendations to the agriculture college Dean. See Section II.F. of the ARI Policies and Procedures Manual for the conflict of interest guiding the technical review committee.

**APPENDIX A**  
**Dean's Allocation Request and Certification Letter**

Date

California State Polytechnic University  
Attn: Dr. David Still, Executive Director  
Professor, Department of Plant Sciences  
Building 30  
3801 W. Temple Avenue  
Pomona, CA 91768

Re: *[fiscal year]* ARI Allocation Request

Dear David,

As decided by the Board of Governors for the Agricultural Research Institute, the funds allocated for each campus and its projects are to be transferred directly from Cal Poly, Pomona. In return for this transfer, the Deans of the Colleges of Agriculture on each of the four principal campuses or applicable Associate Campus designee assume administrative responsibility.

**[Full Allocation Request]**

In accordance with this policy, I am requesting that a total of \$*[funding amount]* of the *[fiscal year]* ARI funds be transferred immediately to our campus as per the attached spreadsheet. This money represents the third year of funding for projects initiated in *[fiscal year]*, the second year of funding for the projects initiated in *[fiscal year]* and the first year funding for projects which began in *[fiscal year]* for both our campus-funded projects and our system-wide projects. Please have this amount transferred to our CMS chartfield: \_\_\_\_\_.

**[Partial Allocation Request]**

In accordance with this policy, I am requesting that a total of \$*[funding amount]* of the *[fiscal year]* ARI funds be transferred immediately to our campus per the attached spreadsheet. This money is a partial allocation request and represents the third year of funding for *[number of projects]* projects initiated in *[fiscal year]*, the second year of funding for *[number of projects]* projects initiated in *[fiscal year]* and the first year funding for *[number of projects]* projects which began in *[fiscal year]* for both our campus-funded projects and our system-wide projects. Should sufficient match be secured for the *[number of projects]* outstanding projects, an additional allocation request will be submitted within the appropriate timeframes. Please have this amount transferred to our CMS chartfield: \_\_\_\_\_.

**[Rollover Request for Unallocated Funds]**

In accordance with this policy, I am requesting that a total of \$*[funding amount]* of the *[fiscal year]* ARI funds be transferred immediately to our campus per the attached spreadsheet. This money represents the unallocated project funds for *[fiscal year]* which resulted from a combination of *[new/ongoing]* projects *[not receiving as much match as planned/old projects closing with higher than anticipated balances]*. Please have this amount transferred to our CMS chartfield: \_\_\_\_\_.

I certify that the projects submitted for campus funding are complete and in compliance with the prescribed ARI format, are complete and up-to-date in the ARI Online Project Management System, meet and/or exceed all appropriate ARI campus funding requirements and that prospective project directors are in compliance with all previous ARI awarded project reporting requirements. By signing this letter I also agree to abide by ARI terms and conditions.

Thank you for your prompt attention. If you have any questions on this matter, please contact

\_\_\_\_\_.

Sincerely,

Attachment

Cc:

-- SAMPLE --

Campus procedures for ensuring that match is documented and uploaded into the ARI-OPM system

- Project award notification sent out to PI's, center reps and center directors.
- Timeline identified for documenting match.
- Match completed and approved on the ARI match form.
- Match forms forwarded to Dean/Campus Coordinator for approval.
- When approved email is sent to PI, Center Rep and foundation grant analyst to initiate a project meeting to review and finalize budget.
- During the project meeting the Final Budget Approval form is completed and approved. This form is a recap of project that is forwarded along with the approved budget to Dean/Campus Coordinator for 'final approval'.
- Email sent to PI when project is fully approved for expending funds.
- Project info is updated in the OPM system and then checked by a second individual to ensure project information has been updated and scanned documents can be opened.

## **APPENDIX B**

### **Research Priority Areas and Definitions**

#### **Agricultural Business**

Historians will identify the current agricultural period as the second agricultural revolution. Mechanization, hybrid seeds, synthetic fertilizers and chemical pesticides highlighted the first revolution starting in the 19th century. Information management and changing consumer demands are driving 21st century agribusiness and agricultural production. Global positioning satellites and geographic information systems are now making possible "precision farming". The Internet is making possible everything from services and supply purchasing to commodity trading and marketing in an increasingly global marketplace. As technology continues to develop, we see more farmers managing their operations each day from their mobile devices, instead of from a pickup truck. Consumers are increasingly interested in food and health and are driving the market for nutritious, locally-produced, organic, environmentally responsible and humanely-produced products.

#### **Biodiversity**

California's impressive biodiversity is most readily demonstrated by the number of native species found within its borders: 750 vertebrates, 6,800 plant species, and 25,000 insect species – more than any other state in the continental United States. Almost one-third of California's plant and fish species, and many of its natural communities, are found nowhere else on earth. At times, tensions may arise between agricultural interests and society's desire to preserve nature. For agriculture, including forestry and range management, to thrive in California, research is needed on best practices to ensure sustainably managed and natural ecosystems.

#### **Biotechnology**

The world's population is forecast to exceed 9 billion by the year 2050, while its arable land will rapidly be depleted. California's expanding urban growth has consistently reduced prime agricultural land and competes with food production for the state's limited developed natural resources, especially water. If California agriculture is to provide food and fiber for the state's burgeoning population as well as for a positive agricultural export trade balance, development of new technologies to produce more nutritious and higher value food and fiber products is essential. Today's agriculture depends on the tools of modern science and engineering, from genomics and molecular biology to robotics and chemical engineering. Agricultural biotechnology is the new laboratory proving ground for advanced sustainable agricultural systems to meet these demands.

#### **Food Science/Safety/Security**

Agriculture's need to produce more nutritious and higher value food products, the consumer's demand for convenience, and industry's increased awareness of consumer safety concerns continue to drive industry's product development, processing practices, and marketing strategies. According to the Food Marketing Institute, an average grocery store now contains more than 26,000 items, with more than 10,000 new products needed each year to keep the shelves filled. Food safety and the "ready to eat" convenience of meals and snacks are expectations of the modern food shopper. Recent increases in foodborne illness and food product recalls have heightened consumer awareness and increased regulatory agencies' efforts to scrutinize the food production chain, from farm to fork. Applied research is needed to ensure a safe, nutritious and value-added food supply that meets consumer expectations.

#### **Natural Resources**

California's climate and its abundance of high quality natural resources is the basis for its population growth and agricultural/economic development. California is unusually rich in minerals, timber, fertile soil and watersheds, supporting some of the best farmland, forests, grazing land and watersheds in the world. Competing urban, agricultural and environmental interests have sparred for decades over ownership, allocation, and utilization of the state's natural resources. Recently, the Association of Public and Land-grant Universities Boards on Natural Resources and Oceans, Atmosphere and Climate identified six grand challenges in their Roadmap for Natural Resources (2014): 1) Sustainability; 2) Water; 3) Climate Change; 4) Agriculture; 5) Energy; and 6) Education. The CSU colleges of agriculture have a collective wealth of shared knowledge, experience and access to natural resources to support successful applied research to investigate and develop conservation and restoration techniques, compatible and sustainable multiple use systems, and environmentally sound management practices.

### **Production and Cultural Practices**

California continues to be the leading farm state with 400 agricultural commodities valued at over \$45 billion in farm gate. High quality and quantity output remains the backbone of any agricultural production system. Exponential advances in increasing both were achieved during the 20th century, in large part due to the development of hybrid seeds, synthetic fertilizers and chemical pesticides. While continued increases in quality and production are anticipated during the 21st century, they will most likely result from the application of precision information systems (GPS, GIS, etc.), biotechnology, new production systems, and improved management practices. Agricultural producers will need to be highly efficient in water use, while facing the ongoing pressures of exotic pests and diseases, increasing regulations on plant protection materials, and conflicts at the ag-urban interface. Applied high tech production research and technology transfer in layman's terminology and industry continuing education is more important now than at any time in history. The CSU agricultural colleges are well positioned to provide these critical services.

### **Public Policy**

California's future prosperity relies on hard and sometimes controversial policy choices about emerging technologies and utilization of the state's natural resources. The CSU colleges of agriculture, together with their research collaborators are well positioned to serve as non-partisan, scientifically-based resources for policy makers. Choices regarding land use, water cost, quality and allocation, air quality standards, farm worker safety, environmental protection and restoration, and agricultural and municipal waste management will heavily influence agriculture's future profitability, competitiveness, and sustainability. As fewer Americans are directly involved in farming, ranching and timber production, agricultural policy formation increasingly involves a diverse set of stakeholders. In 2010, the California Agricultural Vision: Strategies for Sustainability (Ag Vision) report identified 12 strategies to ensure a vibrant future for California agriculture. Public policy research is needed to address the Ag Vision strategies, including reducing malnutrition, easing regulatory burdens on agriculture while maintaining health, safety and environmental standards, securing adequate water and labor for agriculture, adapting to climate change, and promoting regional markets for California producers.

### **Water and Irrigation Technology**

Demands upon California's water resources and its aging conveyance infrastructure have reached the crisis stage. California faces a continuing challenge to balance its finite water supplies against the needs of agriculture, the environment, and a growing population, and to make timely deliveries from watersheds to diversion points. In large part because of California's limited developed surface water supply and its extensively over-drafted groundwater basins, agricultural and urban water districts and their users are required to implement water efficiency technologies and conservation practices. The CSU colleges of agriculture have been instrumental in the development, testing and evaluation of urban and agricultural irrigation equipment and systems for both public agencies and private business. Additionally, they have

provided consumer education, industry training courses, and consulting services to irrigation and drainage personnel throughout California.