
Description
This project investigates (1) interest in and applicability of implementing temporary market platforms for water trusts to acquire water rights in drought years and (2) the complexity of developing appropriate market platforms, as influenced by geophysical and biological relationships.

Proposers & Clients
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Objectives
(1) Environmental Science: How do spatial and temporal variations in ecological needs for instream flows limit the applicability of trading systems for leasing water?
(2) Environmental Management: What is an appropriate business model for a drought-dependent market for water rights? In particular, how many transactions are needed to make implementation commercially viable?

Significance
Surface water rights in many parts of the western United States are over-allocated, meaning that in average years, not enough water is available to serve the combination of agricultural, industrial, municipal, and environmental needs. A growing number of local water trusts and environmental non-profits have been established to ensure healthier conditions for freshwater species, doing so through a variety of voluntary and market-based mechanisms (Landry, 1999; Sophocleous, 2007). One such market-based mechanism is the leasing of water rights, particularly in drought years when species are most at risk. However, water trusts have several obstacles in this process, which could be addressed through implementing trading platforms, such as the ones Mammoth Trading operates. Should this be a feasible solution, water trusts should be able to acquire more leases at better values, and with substantially less staff effort and transaction costs, than they would have with one-to-one bargaining, the process used today.

Two primary customers exist: parties interested in acquiring water rights (e.g., water trusts and environmental non-profits) and water rights holders (e.g., agricultural producers). Initial conversations with water trusts and producers indicate interest in streamlining the process of transferring water rights (see Appendix). Doing so would
reduce the time, cost, and overall effort to supplement instream flows. Healthy aquatic ecosystems are important not only to environmental groups and their donors, but broadly to indigenous, community, state, and national interests to preserve natural wildlife.

**Background**

A growing number of water trusts have been established in the western United States to promote healthy aquatic ecosystems. As part of their work, these water trusts work to lease surface water rights from landowners, thereby supplementing instream flows for fish survival. However, to obtain leases, water trusts spend significant staff time and effort, especially during drought years, to identify interested water rights holders and negotiate the price and other terms of the agreement. As a result, transaction costs are often larger than the price of the water itself (Beatie, 2014). Further, some water rights may be more valuable to the water trust than others because of localized flow conditions, biological importance, or other biophysical reasons. Such sensitive information is difficult for water trusts to keep confidential since many water rights holders communicate with one another about the terms of their individual agreements, giving them an advantage in the negotiating process. Many water rights holders also do not understand the spatial and temporal variability of water rights values to the trusts, potentially causing friction between the parties.

Automated trading platforms, or “smart markets,” can help to match interested parties with mutually competitive prices, all while providing privacy safeguards for customers. However, smart markets typically operate continuously with many participants on both the buying and selling sides.¹ For the purposes of this project, research and analysis will focus on a platform that would only operate in drought years with a single buyer, the local water trust.

The proposed project would study whether a business model² exists to provide a market as needed for the purpose of leasing water rights for instream flows. Water trusts and agricultural producers have expressed interest in such a market, but the project team must conduct thorough customer discovery to determine the commercial viability. This project would research how instream flow needs influence trading platform design and whether a viable business model exists.

**Available Data**

The data requirements for this project include (1) georeferenced hydrologic data, (2) streamflow records, (3) biological targets for streamflow, and (4) where available, historical transaction data. Hydrologic and streamflow records (items 1 and 2) are publicly available through state and local water resources boards, the U.S. Fish and Wildlife Survey, and the U.S. Geological Survey; biological targets for streamflow are

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¹ Mammoth Trading operates the only smart markets for water rights in the world. It uses algorithmic clearing to match parties within the regulatory framework and follows the legal process required for water rights transfers. For more information, see client letter.

² Customer discovery provides insight on the potential business models. This includes identifying potential buyers and sellers, understanding specific legal constraints, developing a pricing structure, and understanding environmental goals.
available in scientific literature or through local water trusts (item 3); historical transactions, including price, quantity, and estimates of staff effort (item 4) are available through water trusts directly (e.g., those shared at the Bren School’s Water Markets Design Workshop in November 2014). Alternatively, students could use valuation estimates from the environmental economics literature. The clients will work closely with the group on data assimilation and relationship building.

Possible Approaches
The clients will train students in “customer discovery,” a methodology adopted from the National Science Foundation’s Innovation Corps Program for interviewing customers, identifying their needs, and crafting appropriate solutions (Robinson, 2012; Guerra et al., 2014). Importantly, while customer discovery is not data collection per se, it does provide crucial insights for developing a new market. For example, it will indicate the level of complexity that customers (e.g., water trusts) consider in the decision-making process for leasing surface water rights. While there may be much biophysical complexity in a particular river basin, it is conceivable that that complexity is to some extent ignored. This understanding of customer needs will inform the scientific analysis and the requirements for developing an appropriate trading platform (Objective 1). Together, customer discovery findings will lead to the development of potential business models and an analysis of their commercial viability (Objective 2). For complete analysis, the group will develop and calculate indicators for biophysical and customer characteristics, requiring integration of statistics, interview findings, geographic information systems, and hydrological, biological, and climatological data (see client letter for project timeline).

Deliverables
Ideally, the report will take the form of a manuscript to be submitted to a peer-reviewed journal, working in collaboration with the clients. Further, the students will present to a joint DWFI/ Mammoth Trading audience at the conclusion of their internships. In addition to the report, brief, and presentations, the students will work with the clients to develop and implement simulations of lease markets for instream flow management. The simulations will be based on the best available data. Additionally, the students will develop and simulate various potential business models for the lease market.

The project will provide a “go” or “no-go” decision by the group to indicate whether the developed business model is worthwhile to implement. Should there be a “no-go” decision, the group will discuss in the report the factors that might change this decision in the future, such as climate change, increased funding for instream flows, etc.

Participation in the project will provide the students involved an opportunity to understand how new kinds of water markets may be developed and tested. The clients have unique expertise in implementing smart market systems for natural resources trading, and will provide active mentorship, technical training, and other professional development for the students.

Internships
Unpaid internships are available for the student team at the Daugherty Water for Food Institute at the University of Nebraska. For additional information, see client letter.
Citations


Budget and Justification

The Daugherty Water for Food Institute at the University of Nebraska has allocated up to $10,000 to supplement the Bren School funding support of $1,300 to cover related research costs such as airfare, car hire, fuel, and accommodations.

Appendix

Colorado Water Trust
The Nature Conservancy, Shasta River
The Nature Conservancy, Verde River
Pajaro Valley Irrigation District
Santa Cruz County Resource Conservation District
Scott River Water Trust
Trout Unlimited, Montana
January 23, 2015

Dear Group Project Committee:

This letter is to confirm support of the proposed project titled “Development and Testing of Drought-Year Lease Markets for Instream Flows” submitted to the Bren School Group Project Proposals.

Mammoth Trading operates the only smart markets for water rights in the world. Our team has the technical, legal, and economic expertise necessary for the task. We not only develop algorithmic clearing, but also engage with stakeholders to create user-friendly platforms and to obtain regulatory approval. Because each market is unique, Mammoth Trading develops customized trading platforms. We believe that it’s possible to grow local economies today while sustaining natural resources for future generations, and we use the power of markets to do so. We combine geophysical relationships, business acumen, and an understanding of governing regulations in a way never been done before to move natural resources their most productive use.

We are excited to partner with the Daugherty Water for Food Institute (DWFI) to submit this proposal, which will undertake research and policy analysis associated with developing a market for water trusts to purchase water rights. I am committed to providing research support and mentorship to the Bren students for the duration of the project.

Data: All data required for this project are publicly available.

Funding: DWFI has allocated up to $10,000 to supplement the Bren School’s funding and support the research and analysis that this project requires (see DWFI support letter).

Internships: DWFI is offering two unpaid internships and will also provide registration for two students to attend the USDA-EPA Water Quality Trading Conference that DWFI will host in the summer of 2015 (see DWFI support letter).
**Timeline:**

**Spring 2015**
- Review literature, develop work plan
- Conduct initial interviews (by phone or in person) in California, Oregon, and Washington
- Begin collecting relevant hydrologic data

**Summer 2015**
- Two students travel to Nebraska, Colorado, and Kansas to conduct in-person interviews (4 weeks)
- Two students intern at DWFI, working on the group project as well as other programs (6 weeks); present initial findings of customer discovery to DWFI-Mammoth Trading audience
- Assimilate hydrologic and customer data
- Two students attend the USDA-EPA Water Quality Trading Conference (3 days)

**Fall 2015**
- Develop possible business models
- Write and run simulations

**Winter & Spring 2016**
- Write research manuscript with recommendations
- Present findings and deliver policy brief and poster

I am pleased to join DWFI in submitting this proposal, coauthored by Sustainable Water Markets Fellows Karen Askeland and Martin Merz. Should the committee have any questions regarding my or Mammoth Trading’s commitment, please do not hesitate to contact me.

Sincerely,

Richael K. Young
President & Co-Founder
richael@mammothtrading.com
Group Project Committee  
Bren School of Environmental Science and Management  
Bren Hall 4025, University of California  
Santa Barbara, CA 93106-5131  

January 23, 2015  

Dear Group Project Committee:  

This letter is to confirm support of the proposed project titled “Development and Testing of Drought-Year Lease Markets for Instream Flows” submitted to the Bren School Group Project Proposals.  

The Robert B. Daugherty Water for Food Institute at the University of Nebraska (DWFI) strives for a water and food secure world without compromising the use of water for other human and environmental needs. DWFI works to achieve this goal through a blend of research, policy, and education programs.  

We are excited to partner with Mammoth Trading to submit this proposal, which will undertake research and policy analysis associated with developing a market for water trusts to purchase water rights. I am committed to providing research support and mentorship to the Bren students for the duration of the project.  

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Internships: DWFI is offering two unpaid internships and will also provide registration for two students to attend the USDA-EPA Water Quality Trading Conference that DWFI will host in the summer of 2015. This conference will bring together policymakers from around the country to discuss the barriers to water quality transactions and ideas to overcome them. Attending this conference will be a unique opportunity for the students to understand the challenges of implementing environmental markets and to network with practitioners.
Timeline:
Spring 2015
- Review literature, develop work plan
- Conduct initial interviews (by phone or in person) in California, Oregon, and Washington
- Begin collecting relevant hydrologic data
Summer 2015
- Two students travel to Nebraska, Colorado, and Kansas to conduct in-person interviews (4 weeks)
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I am pleased to join Mammoth Trading in submitting this proposal, coauthored by Sustainable Water Markets Fellows Karen Askeland and Martin Merz. Should the committee have any questions regarding my or DWFI’s commitment, please do not hesitate to contact me.

Sincerely,

Nicholas Brozović
Director of Policy
Daugherty Water for Food Institute
University of Nebraska
nbrozovic@nebraska.edu
(402) 472-5398
Bren Group Project Review Committee  
Bren School of Environmental Science & Management  
Bren Hall, University of California,  
Santa Barbara, CA 93106-5131


Dear Bren Group Project Reviewers,

On behalf of the Resource Conservation District of Santa Cruz County (RCDSCC), I am pleased to write in support of the project “Development and Testing of Drought-Year Lease Markets for Instream Flows”, proposed by students Karen Askeland and Martin Merz, Sustainable Water Markets Fellows at the Bren School of Environmental Science & Management, UC Santa Barbara. Our agency is heavily invested in advancing community-based efforts and innovative partnerships to address threats to a reliable water supply and promote sustainable use of limited water resources in our region.

RCDSCC actively works with specialty crop producers, agricultural industry and a number of public and private partner agencies on the central coast of California, to help advance sustainable agriculture practices, climate change preparedness, and conservation of soil and water resources in both organic and conventional systems. In conversations with one of the student authors of this proposal, our staff identified several interests in common and specific ways in which this research could complement work RCDSCC is doing on promoting incentive-driven adoption of water conservation practices in the region.

The RCDSCC also plays a coordinating role in a local stakeholder process called the Pajaro Valley Community Water Dialogue (CWD). CWD is a community-based “think tank” that began in 2010 to address pressing concerns of water supply (aquifer overdraft) and water quality in the Pajaro Valley. The CWD is comprised of members of the agricultural industry, Natural Resource Conservation Service, UC Cooperative Extension, technical service providers, the Resource Conservation District of Santa Cruz County, land conservation organizations, water management agencies, local government, and nongovernmental organizations. In addition to providing a multi-stakeholder forum for discussion and planning, the CWD has taken actions to secure a sustainable water supply in Santa Cruz County. While the current regulatory framework in the Pajaro Valley groundwater basin does not limit or allocate water rights among users, this situation could change in light of new regulations, and the CWD would certainly benefit from learning about opportunities and barriers to adopting a market-based mechanism to efficiently cap and distribute water use in the basin. As a collaborator on this project, RCDSCC can assist the research team to contact CWD stakeholders, provide background information, and share lessons learned from the study among CWD participants.

I believe this project is timely and relevant to critical resource conservation issues in our region, and its outcomes have the potential to benefit California’s Central Coast farmers, the agriculture industry and the community at large. For all the above reasons, I strongly recommend providing support to this research.

Sincerely,

Sacha Lozano  
Agriculture and Conservation Program Manager