

**University of Northern Colorado  
School of Social Sciences  
Office of Extended Studies  
Summer 2010**

**GEOG 392-624: Advanced Geographic Field Research**

**Instructor:** Dr. James Dunn                      **Phone:** 970-351-2834

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**Phone:** 720-283-0553; **Fax** 303-347-8296

**Credit:** 3 semester hours:

**Total Contact Hours:** 12.0 Lecture and 35 Field Hours

**Date course will be offered:** Lectures:

Friday May 14, 2010 9 am to noon and 1pm to 6 pm;

Friday May 21, 2010 2 pm to 6 pm;

Field Time is Friday May 28 until June 13, 2010

**Times:**

May 28-30: 7am to 8pm

June 11: 7:00 am to 8:00 pm;

June 12: 7:00 am to 8:00 pm

June 13: 7:00 am to 3 pm

**Target Audience:** Advanced undergraduate students in geography and related sciences who have completed Geography 392 with Professor Dunn in the past.

**Field Location: Western Colorado**

**Special Requirements:** Completion of Geography 392 or Instructor's Consent

**Other Information:** none

**Course Enrollment:** Maximum 8, Minimum 1

**Notice**

The Office of Extended Studies reserves the right to cancel or reschedule courses based upon enrollment. Enrolled students will be contacted with information of any change.

**Course Description and Prerequisites**

Students who have completed Geography 392 with the instructor take this class to organize and conduct original research in conjunction with ongoing research directed by the instructor. Students also act as team leaders in the systematic collection of field data associated with the introductory field course.

**Evaluation**

Letter Grades are determined by performance in these weighted elements:

Presentation of basal area measurements to Intro Geog 392 students prior to field trip: 15 %

Participation and performance in research project on basal area in Salt Cedar stands: 40%

Original Research Project: 30%

Final Exam: 15%

**Course Objectives:** at the end of the course, students will be able to:

1. Use and construct maps and other geographic tools to systematically collect appropriate field data to answer specific geographic questions.
2. Describe regional water budgets and connect plant transpiration rates to that model.

3. Describe the establishment and diffusion of Salt Cedar in western Colorado.
4. Demonstrate the ability to ask geographic questions.
5. Demonstrate the ability to apply the appropriate methods and research skills to analyze and solve geographic questions.
6. Organize and direct other students in the systematic collection of field data.
7. Store, organize, and transport field data to lab for subsequent data treatment.
8. Measure basal area, tree height, and tree age using appropriate tools and techniques.

## **Course Content**

### Plant Invasions in Western Colorado

1. Geographic questions
2. Water Budget models

### Transpiration Rates from Salt Cedar Stands in Western Colorado

1. Measuring transpiration
2. Basal Area: measurements and challenges
3. Hypotheses about water loss
4. Policy implications (Federal and State initiatives)

### Group Research with Introductory Class

1. Team leadership
2. Data collection
3. Data organization
4. Troubleshooting

### Original Research Project

1. Connection to Group Research
2. Field Measurements
3. Hypothesis Testing

## **Policies**

1. Each student is expected to attend all classes. If you'll miss a scheduled exam, quiz, or exercise due date because of illness, family problem, or other valid reason, it is your responsibility to contact me before class (351-2834). Make-ups on exams, quizzes, and exercises are only allowed for excused absences.
2. If you happen to miss an unscheduled in-class activity, you can make-up points only if you turn in the finished activity within two class meetings of the original assignment. Activities cannot be made up after that under any circumstances.
3. If you miss any other class (where no graded assignment or activity occurs), it is your responsibility to obtain notes from someone in class and/or schedule time with me in office hours to cover the missed material.
4. Note the scheduled date and time of the final exam. Final exams will not be offered at any other time. Make your holiday travel plans accordingly.

## **Disability Support Services**

Any student requesting disability accommodation for this class must inform the instructor giving appropriate notice. Students are encouraged to contact the Disability Support Services at (970) 351-2289 to certify documentation of disability and to ensure that accommodations are implemented in a timely manner.

## **Honor Code**

All members of the University of Northern Colorado community are entrusted with the responsibility to uphold and promote five fundamental values: Honesty, Trust, Respect, Fairness, and Responsibility. These core elements foster an atmosphere, inside and outside of the classroom, which serves as a foundation and guides the UNC community's academic, professional, and personal growth. Endorsement

of these core elements by students, faculty, administration, and trustees strengthens the integrity and value of our academic climate.

#### **UNC's Policies**

UNC's policies and recommendations for academic misconduct will be followed. For additional information, please see the Dean of Student's website, Student Handbook link

<http://www.unco.edu/dos/handbook/index.html>

#### **Required Readings**

**Bowser, S., Brower, A., Cooper, D., Eichinger, B., Prueger, J., Hipp, L., and Bawazir, S. 2006.** The ET Toolbox: A practical application of LIDAR saltcedar research (Poster). The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Dunn, J.M., Fonte, L., and Graffis, A. 2006.** Connecting Growth Rates of *Tamarix ramosissima* to River Discharge in Two Western Colorado Rivers (data from 1977-2002) The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Glenn, E., and Nagler, P. L. 2005.** Comparative ecophysiology of *Tamarix ramosissima* and native trees in western U.S. riparian zones. *Journal of Arid Environments* **61** (2005) 419–446.

**LeBlanc, J. W. (Website)** What Do We Own: Understanding Forest Inventory. Source:

<http://www.cnr.berkeley.edu/departments/espm/extension/INVENTOR.HTM>

**Owens, M.K., and Moore, G.W. 2007.** Saltcedar Water Use: Realistic and Unrealistic Expectations. *Rangeland Ecology Management* **60**:553–557, September 2007.

**Owens, M.K., and Moore, G.W. 2006.** How much water can a tree really use? (Poster)

The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Rosgen, D.L.** 1996. Field Survey Procedures for Characterization of River Morphology.

[http://www.wildlandhydrology.com/assets/Field\\_Survey\\_Procedures\\_for\\_Characterization\\_of\\_River\\_Morph.pdf](http://www.wildlandhydrology.com/assets/Field_Survey_Procedures_for_Characterization_of_River_Morph.pdf). (accessed April 20, 2009).

**Wilcox, A.C., and Shafroth, P.B. 2006.** Hydrogeomorphic effects of a controlled flood release on Tamarisk and *Salix*, Bill Williams River, AZ. Presentation abstract from the 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

#### **Original Research Assignment**

##### **Due Date**

Final Paper: One week after field work

##### **Tie Your Topic to Water Budget Model**

State and Federal Policy is taking action to remove invasives that are claimed to be responsible for the loss of water in western Colorado. The introductory class will attempt to measure transpiration rates using basal area/acre of stand as a predictor of water uptake. In that project, small plots are calculated and then with the use of inferential statistics, we will “scale up” to predict transpiration per acre of stand.

There are several related hypotheses worth testing to know if salt cedars are transpiring more water than native trees such as cottonwood and willow. Here are some to consider for your own research:

1. If tammies transpire more water, then the relative humidity inside the stand would be higher (more moisture in the air) than the RH in native tree stands. This would need to be tested using sling psychrometer measurements.
2. In the middle of a hot dry day, tammies would be cooler in the stands than in native tree stands because more evaporation is taking place.
3. Basal area of native trees/acre could be compared to the same values of tammies. If the basal area/acre is similar and sap flux rates discussed by Owens and Moore are comparable between species, then it would be hard to argue that tammies “lose” more water than cottonwood or other natives.
4. There are several newer studies suggesting that tammies are less able to handle DISTURBANCE (floods in particular) than native trees (especially willow). Flood events on the Gunnison and Colorado river would need to be known PRIOR to going into the field. Evidence of floods might be detectable. This would permit a qualitative study on the change in plant dominance in post-flooded areas to see whether the hypothesis is supported.
5. Fish habitat in regulated rivers (i.e., with flows controlled by dams) is endangered. Invasive species such as tamarisk add to the problem because they hold channel materials in place. The rearrangement of channel materials PROMOTES spawning, so it is important to know the potential of any river to provide this kind of environment for fish. Many of the tributary streams to the Gunnison and Colorado Rivers are natural (uncontrolled flow) and go through normal cycles of low flows, floods, and channel changes. A goal of a study in this topic would be to characterize a tributary stream, using Rosgen’s approach. Level I and Level II characterization will help assess the inventory of potential habitat for fish.

#### **Assignment:**

1. Select one of the topics above, but do not duplicate what another of your classmates is doing (IF they are NOT going on your trip, you can study the same hypothesis). This means that you will need to meet with your trip classmates.
2. Develop a plan that you would use to study the topic. This plan should include data collection methods, ways of treating the data, and a rationale that addresses how your plan will lead to solutions.

**Tools and Data Collection.** In your own field journal, bring all of the data you need in advance, make a list of the tools (I have sling psychrometers and thermometers) you need, design data recording pages, and print extra copies of maps you may use for base maps. **You must collect a sample that is appropriate for statistical treatment. Strict random sampling procedures must be followed.**

**Pre trip preparations:** Review any relevant literature to help support your project. Include all references in your final report. All data go in the appendix. Charts, graphs, maps, and photos go in the final report and are given figure numbers and descriptive captions. Give your study a title (check with me for a reaction to any drafts you have). For the discussion (i.e., not including references or figures), 4 pages minimum, 6 pages maximum, typed, double spaced with 1 inch margins all around. You must cite at least 10 references from relevant geography journals, but can add other references that are needed.

#### **Classroom Days**

##### **Geographic Questions about the Western US Rivers**

1. Types of questions
2. Tying questions to national geography standards

##### **Environmental Issues on US Western Rivers**

Ecosystem Disturbance

Salt Cedar: Introduced Plant at the Root of a Water Crisis

Agricultural Pollution  
Hydropower issues  
Habitat Loss/management  
Water supply issues: the Big Straw

### **Watersheds in the U. S. Intermontane**

Drainage of the west  
Streamflow characteristics  
Watershed issues in the west: water resource management

### **Water Quantity and the Colorado Regulations and Management of the Colorado River**

The Colorado River Compact  
Reservoirs of the Colorado  
Colorado River Water Allotment

### **Field Time**

The time on location will be spent on the following tasks:

1. Identify forest stands worthy of measurement.
2. Establish transects in different strata within each stand
3. Measure transect lengths
4. Use random number table to identify plot locations
5. Perform Fixed Radius Plots with 37.24 foot radii (1/10<sup>th</sup> acre plot size)
6. Perform stem census within each plot
7. Record data from systematic study.

### **Required Readings**

**Bowser, S., Brower, A., Cooper, D., Eichinger, B., Prueger, J., Hipp, L., and Bawazir, S. 2006.** The ET Toolbox: A practical application of LIDAR saltcedar research (Poster). The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Carrier, Jim.** 1992. *The Colorado, a river at risk*. Englewood, Colorado: Westcliffe Publishers, Inc.

**Dackombe, R.V. and Gardiner, V.** 1983. *Geomorphological Field Manual*. London: George Allen and Unwin.

**Dunn, J.M., Fonte, L., and Graffis, A. 2006.** Connecting Growth Rates of *Tamarix ramosissima* to River Discharge in Two Western Colorado Rivers (data from 1977-2002) The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Fleck, R.F., Ed.,** 2000. *A Colorado River Reader*. Salt Lake City: The University of Utah Press.

**Glenn, E., and Nagler, P. L. 2005.** Comparative ecophysiology of *Tamarix ramosissima* and native trees in western U.S. riparian zones. *Journal of Arid Environments* **61** (2005) 419–446.

**Goode's World Atlas, 21st Edition**, E. B. Espenshade, Jr., ed. (Rand McNally, 2005).

**Jacobson, Cliff** 1984. *Canoeing Wild Rivers*. Merrillville, Indiana: ICS Books.

**Lavender, David.** 1982. *Colorado River Country*. New York: E.P. Dutton, Inc.

**LeBlanc, J. W. (Website)** What Do We Own: Understanding Forest Inventory. Source:  
<http://www.cnr.berkeley.edu/departments/espm/extension/INVENTOR.HTM>

**Nagler, P.L., E.P. Glenn, O. Hinojosa-Huerta, F. Zamora, and K. Howard.** 2007. Riparian vegetation dynamics and evapotranspiration in the riparian corridor in the delta of the Colorado River, Mexico. *Journal of Environmental Management*. In Press.

**Nagler, P.L., Russell L. Scott, Craig Westenburg, James R. Cleverly, Edward P. Glenn, and Alfredo R. Huete.** 2005. Evapotranspiration on western U.S. rivers estimated using the Enhanced Vegetation Index from MODIS and data from eddy covariance and Bowen ratio flux towers. *Remote Sensing of the Environment* 97 (337-351).

**Owens, M.K., and Moore, G.W.** 2007. Saltcedar Water Use: Realistic and Unrealistic Expectations. *Rangeland Ecology Management* 60:553–557, September 2007.

**Owens, M.K., and Moore, G.W.** 2006. How much water can a tree really use? (Poster) The 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

**Public Law 109–320**—OCT. 11, 2006. Salt Cedar and Russian Olive Control Demonstration Act.

**Slaymaker, Olav, Ed.,** 1991. *Field Experiments and Measurement Programs in Geomorphology*. Vancouver: University of British Columbia Press.

**Wilcox, A.C., and Shafroth, P.B.** 2006. Hydrogeomorphic effects of a controlled flood release on Tamarisk and *Salix*, Bill Williams River, AZ. Presentation abstract from the 2006 Tamarisk Research Conference: Current Status and Future Directions October 3 & 4, 2006 Fort Collins, Colorado.

### **Student Satisfaction Evaluation**

Participants will be asked to evaluate the workshop for instructors' knowledge, interest and enthusiasm as well as providing additional information on classes or topics which you would like to see developed as a future offering from UNC.

### **Portable Electronic Devices**

Please extend courtesy to your instructor and fellow students by turning off your portable electronic devices such as: cell phones, pagers, and iPods. Although not an audio issue, text-messaging is a distraction to other students and prevents you from full participation in class. You should keep your portable electronic devices in your backpack or purse during class. Your personal electronic devices should not be on your desks. If you know that you may need to accept an emergency phone call during class or if you have children in childcare or school, please let the instructor know. If you need to take a phone call during class, please step out of the classroom while you complete your call. Thank you for your cooperation.

### **Course Withdrawal Information**

In accordance with University and Colorado Department of Higher Education policy, if you drop this class after April 30, 2010, you are legally responsible for payment of full tuition once 50% of this course has been concluded. In order to be eligible to receive any refund of tuition, you must contact the Office of Extended Studies (1-800-232-1749) to formally withdraw from your class. Your refund, if applicable, will be based on the date of contact with our office. Withdrawals received via telephone during non-business hours will be processed and dated on the next working day. Failure to notify us will result in UNC tuition being owed even though you do not attend or complete the coursework.