



# Grand Canyon and Monitoring and Research Center Partners with Grand Canyon Youth for Youth-In-Science Program

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## PRE-TRIP ORIENTATION at WILLOWBEND ENVIRONMENTAL EDUCATIONAL CENTER

At the pre-trip orientation, the data collection project is described, and the youth participate in an exercise simulating the field work to be completed on the river. The exercise introduces the youth to the tools and techniques needed to collect the field data for the Control Point Database project.



The exercise requires the youth to search for control points along the path using the above airphoto of the location (airphoto from City of Flagstaff). Control points, similar to the points they would find in the Canyon, were placed at the location of the colored points on the airphoto.

The youth practiced locating themselves and the control points on the airphoto, using the digital camera, measuring tape, compass, site description forms and learned techniques for writing detailed site descriptions.



Note two names associated with the GPS point. A site visit verified the existence of only one point at the GPS location, and verified the non-existence of the upstream point (681322.846 located at the bottom of the photo).



Site Description Form

Airphotos and the Site Description Form are important tools the youth use to complete this exercise. The youth learned to locate themselves and find the points using 1:1000 scale airphotos. The youth use the Site Description Form to document the pertinent information they need to collect for input into the database.

The youth also searched for archeology site control points using historic photographs, conducted maintenance at remote camera monitoring locations, documented sightings of big horn sheep, bald eagle, golden eagle and red-tail hawk for the National Park Service, and emptied sand traps from weather stations monitoring aeolian sand movement at archeology sites.

Photo by Dick Wharton

## COLLABORATION BENEFITS:

The partnership has enabled 80 high school students on 4 educational science based river trips in the Grand Canyon in the past two years where the students made a significant contribution to populating the Control Point Database.

Youth provide time and personnel to collect the field work while gaining experience collecting data for an important scientific project.

Youth from across Arizona, and the US, have the opportunity to experience Grand Canyon in a hands-on learning capacity and may be inspired to pursue higher education in the sciences.

As part of the project youth learn skills needed to accomplish the goals and learn to work together as a team, towards a common goal.

Youth learn in-depth about Grand Canyon, thereby creating the potential for a lasting feeling of environmental stewardship.

GCMRC and GCY cost-share logistic related expenses.



## INTRODUCTION

The Grand Canyon Monitoring and Research Center (GCMRC) measures the effects of Glen Canyon Dam operations on the resources along the Colorado River below Glen Canyon Dam. These activities support the Glen Canyon Dam Adaptive Management Program and their mandate to protect Colorado River resources based on data analysis by GCMRC. Monitoring physical, biologic, cultural and socio-economic resources are conducted using geo-referenced information from aerial photography, airborne lidar, topographic data, and bathymetric data. The accurate positioning of this data requires control points which are the foundation for integrating spatial data into a GIS for analysis. The survey department compiled the Control Point Database and the control point atlas which prove to be valuable tools for assisting researchers to locate control points to geo-reference collected field data and to plan field operations. To ensure the database provides accurate, high quality information for researchers, the existence of each control point in the database is verified, photo-documented, and a site description written. GCMRC turned this data collection effort into an educational exercise for the participants of the Grand Canyon Youth. Grand Canyon Youth is a non-profit organization providing experiential education for high school aged youth. GCMRC and Grand Canyon Youth formed a partnership where GCMRC provided the logistical support, equipment, and training to conduct the field work, and Grand Canyon Youth provided the time and personnel to complete the field work.

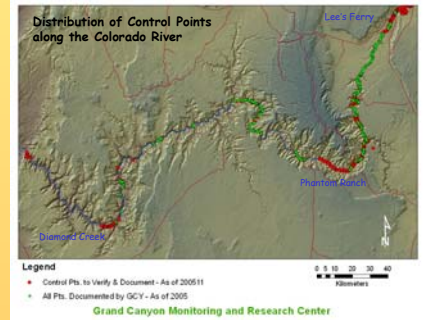


## GRAND CANYON YOUTH COLLECTING DATA

The survey department has compiled a list of 870 control points installed by various organizations for data collected at sites along the 240 mile stretch of Colorado River in the Grand Canyon. Youth visited and verified the existence (or non-existence) for 450 control points (52% of the total number), including photo-documenting the point and writing accurate site descriptions concisely describing the location of the point, how to reach the point, the specific point location and detailed bearings to visible and obvious land marks.

## SCOPE OF GRAND CANYON YOUTH CONTROL POINT DATABASE PROJECT:

- Verify existence of historical control points.
- Photograph historical and contemporary control points.
- Update site descriptions for historical and contemporary control points.
- Inventory types of control points.



## CONTROL POINTS



Various types of control points found along the Colorado River. Note the X's are difficult to see on light colored rock and hard rocks (metamorphic or granite), and the quality of incision varies.

## GEOREFERENCING CONTROL POINTS



GPS Technology or Conventional Survey methods are used to geo-reference Control Points.

## Topographic Data Collection



## Hydrographic Data Collection - channel mapping

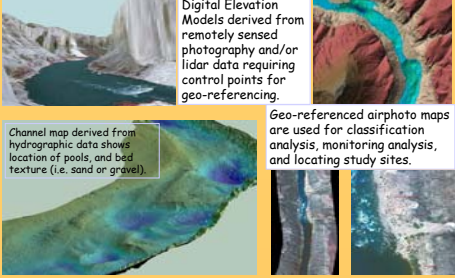


## Airborne Data Collection



Control Points are used to geo-reference a variety of data collected in the Canyon. The control network is the positional infrastructure for all surveying, mapping, and remote sensing operations in the Grand Canyon. These operations support monitoring and research for physical, biologic, cultural, and socio-economic resources.

## MAP PRODUCTS



Digital Elevation Models derived from remotely sensed photography and/or lidar data requiring control points for geo-referencing.

Channel map derived from hydrographic data shows location of pools, and bed texture (i.e. sand or gravel).

Geo-referenced airphotos maps are used for classification analysis, monitoring analysis, and locating study sites.

DATA COLLECTION



## Skills Learned

- Orient themselves, identify features, and locate control points on airphotos.
- Take bearings with a compass.
- Measure and estimate vertical and horizontal distances.
- Concisely describe their location and write detailed directions how to reach a control point.

