

**Changes in the Distribution and Abundance of
Culturally-Important Plants in the Colorado
River Ecosystem: A Pilot Study to Explore
Relationships between Vegetation Change and
Traditional Cultural Values**

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Why do this study?

- Plants have cultural value, as well as biological and scientific values
- Native Americans traditionally used (and still rely on) plants for food, medicine, ceremonies, and utilitarian items (i.e., plants are *cultural* resources)
- Cultural values influence why we study plants
- Cultural values influence how we study plants
- Plants contribute to the value of many Traditional Cultural Properties (TCPs)
- Changes in culturally-important plants may affect TCPs . . . as well as biodiversity, wildlife habitat quality, ecosystem function, etc.

Desired Future Conditions: Riparian Domain

- Stakeholders have said they want:
 - Native riparian systems, in various stages of maturity, that are diverse, healthy, productive, self sustaining, and ecologically appropriate.
 - Native, self-sustaining riverine wetlands, and riparian vegetation and habitat, with appropriate mixture of age classes.
 - Habitat for sensitive species
 - Habitat for neotropical migratory birds, waterfowl, and other native bird species.
 - Healthy, self-sustaining populations of native riparian fauna (both resident and migratory).

DFCs: Recreation

- A river corridor landscape that matches natural conditions as closely as possible
- A river corridor ecosystem that matches the natural conditions as closely as possible, including a biotic community dominated in most instances by native species.
- A dynamic river ecosystem characterized by ecological patterns and processes within their range of natural variability
- Management of Glen Canyon Dam that is significantly driven by concern for the cultural values and ecological integrity of the river corridor through the Grand Canyon, with preservation and protection considered over the long term (multiple generations).



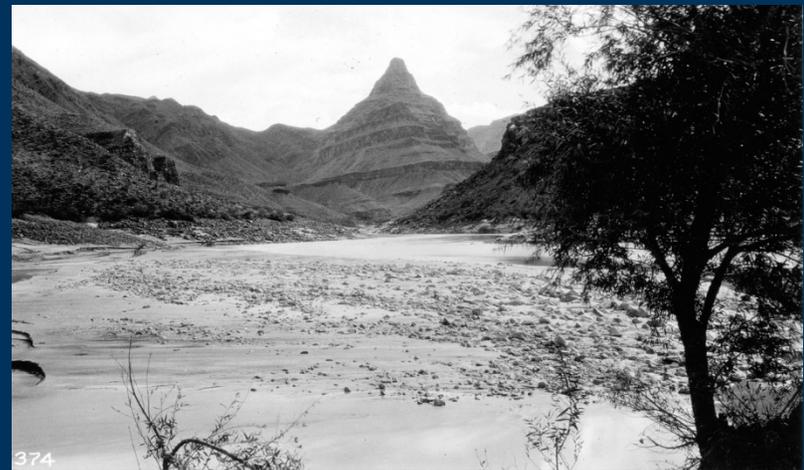
Former camp
at 171.4 mile



Traditional Cultural Properties

The 2012 DFC document recognizes TCPs to include:

- Archaeological sites
- Traditional resource use areas (e.g., plant gathering)
- Sacred sites
- Culturally-significant landmarks/geographic features
- Ethno-ecological resources
- Significant event locations
- Springs
- The Colorado River
- The entire Grand Canyon



River mile 222, looking downstream.
Photo by E. La Rue Oct. 1, 1923

Desired Future Conditions: TCPs

- Attributes are maintained such that National Register eligibility is not compromised. . . .
- Attributes may include aspects of the location or physical integrity, as well as intangible elements that link the resource to ongoing traditional practices
- Culturally appropriate conditions of the resource are maintained based on traditional ecological knowledge
- integration of the desired condition is included in relevant monitoring and management programs
- Maintain ongoing consultation with the groups for whom the resource has traditional value



River mile 178.2,
looking downstream.
Photo by E. La Rue
Sept. 18, 1923



Traditional Ecological Knowledge

- **TEK:** “all types of knowledge about the environment derived from the experience and traditions of a particular group of people.” (Usher 2000)
- **Emphasis on maintaining relationships with other life forms--** mutual reciprocity, respect, sustainable use
- **Holistic perspective--** all life is interdependent



Photo by M. Yeatts

TEK implies participatory engagement

- Active management for sustainable use
- Stewardship for past, present, and future generations



Its not really ‘knowledge’ at all,
it’s a way of life.” (Nadasdy, 2003)

Project 12

Project 12 attempts to link TEK with western science through compiling a variety of existing information that documents changes in the abundance and distribution of culturally-valued riparian plants of mutual interest to tribes and scientists, then assesses how those changes affects TCPs and other cultural values.

Information sources:

- ethnobotanical inventories
- historical photographs
- historical journals
- scientific articles
- project 11 data

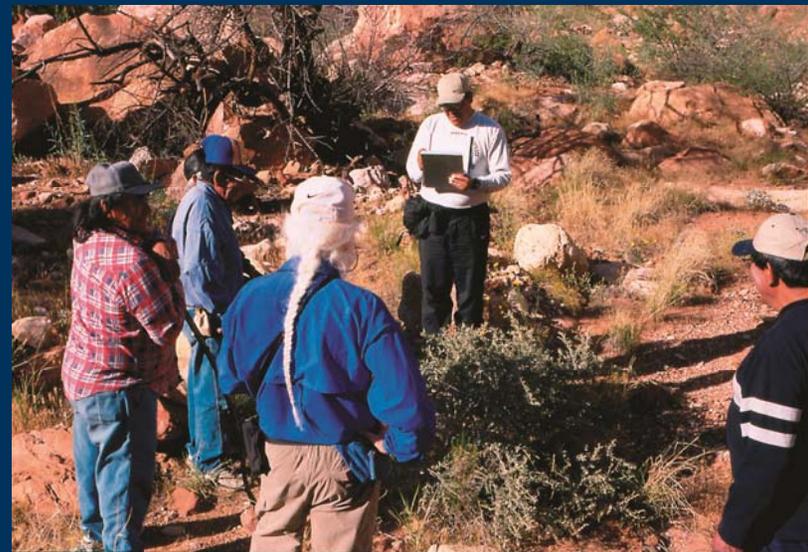


Photo by M. Yeatts

Drivers of Vegetation Change

- Regional climate change (drought, frosts)
- Specific weather events (e.g. debris flows) →
- Diseases, pathogens
- Non-native invasions ↘
- Human-induced changes to natural disturbance regimes (e.g., fire, grazing, visitation impacts, dam operations)



Project 11: Riparian Vegetation Monitoring and Analysis of Landform Change and Aquatic-Terrestrial Linkages

- Focus is on studying how riparian vegetation affects and is affected by physical processes and biological interactions
- Project 11 monitors change in vegetation within a hydro-geomorphic context



Project 12

Focus on culturally-important plants in the riparian zone of the river corridor

- Question 1: How have culturally-valued vegetation attributes* changed since closure of Glen Canyon Dam?
- Question 2: How have changes in abundance and distribution of culturally-important plants affected cultural resource values that are important to GCDAMP Tribes?

* Abundance, distribution, density, diversity, size, etc.

Stanton Photo, 1890



RH Webb Photo, 2010



Project 12 Plan

- Element 12.1 (Year 1) – Data Compilation
 - First workshop to review information sources and identify focal species of cultural importance to multiple tribes
 - Historical imagery analysis and literature reviews to identify changes in distribution & abundance of focal species
 - Identify changes associated with specific areas of cultural importance to individual tribes
- Element 12.2 (Year 2) – Tribal monitoring
 - Second workshop to review Year 1 results; discuss applications for tribal monitoring
 - Pilot use of historical photographs & data to elicit tribal perspectives on landscape changes



February 2015 Workshop

- February 18-19, 2015 in Flagstaff
- Presentations by C.Bullets, P.Bungart, D.Sarr, E.Palmquist, B.Ralston, L.Stevens, H.Fairley
- Lots of Q&A and interactive discussion
- We agreed to focus on a dozen species for the pilot study:
 - Riparian and beach zone plants (changes most likely linked to dam operations)
 - Valued-species common to multiple tribes
 - Species potentially targeted for restoration

Sources of Information

- Ethnobotanical inventories (1998-2000)
- Tribal monitoring programs & TEK (1994 -->)
- Historical photography: matches by RH Webb and others (Stanton, Birdseye, Weeden, etc.)
- Historical journals (Clover, Nevills, etc.)
- Terrestrial Ecosystem Monitoring Project (2001-2004) and current Project 11
- Many other GCES-era and non-AMP studies contain info about culturally-valued plants in the CRE (botanical, archaeological, etc.)

Focal species for pilot study

- Trees: Gooding Willow, Cottonwood, Netleaf Hackberry, Honey Mesquite
- Shrubs: Coyote willow, Seep willow, Apache Plume, Prince's Plume
- Reeds: Phragmites, Cattail, Horsetail, Arrowweed?
- Bunch Grasses: Sporobolus sp., Indian Rice Grass

How to Document & Quantify Long-term Changes in Vegetation?

- Photo matching
 - Limitations:
 - quality of imagery
 - ability to identify species
 - seasonal differences
 - methods for quantifying changes, etc.
- Project 12 will rely on existing photo matches as much as possible

Stanton Photo, 1890



RH Webb Photo, 2010



Journal data can complement photos



Elwyn Blake, September 24, 1923: “Black willows are beginning to appear along the banks of the river that afford shade which is very welcome now that there are not high walls close to the river to answer the purpose.”

Nevills' journals (and his clients')

- Norm Nevills, July 29, 1947. "Mile 213 LEFT. A cove and willow tree make this out to be a very wonderful camping spot."
- Nevills, July 28, 1948. "Mile 213. Left. Cove with willow tree. Spotted it last year. Beaver have almost ruined the willow tree, but we get some good ledge shade for lunch."
- Nancy Streator, client, July 27, 1948: "Lunch was scheduled at a cove with a large willow tree. The cove was there but thanks to the beaver, no willow tree."
- N. Streator, July 29, 1948 (at Diamond Creek) "the remainder of the day was spent following the shade around the willow trees."

How to elicit cultural meaning of the documented changes?

- Choice experiments using photo comparison
 - “Which of the matched photo do prefer and why?”
- Semi-structured interviews
- Structured “opinion surveys”
- Other methods?

Former camp at Mile 74.7 →
Top photo:1973; bottom 2008



Former Camp at 118.8 Mile



1973

2007



Frank Masland journal, July 29, 1948

“I spent a good deal of time at Diamond [Creek] under the shade of a large willow tree.... I sat there ... watching the life in the tree. . . . Where there is water there is plant life. Where there is plant life there is insect life. Where there is insect life there is bird life and animal life. I sat under the shade of that great willow tree and looked into it. Soon I saw flies crawling around the stems and on the leaves. Then I saw dragon flies preying on the smaller insects, and lizards wandering all through the tree.... In the tree were a pair of Desert Wrens and a pair of Fly Catchers, I do not know what kind.... I could spend many more hours under that willow in Diamond Creek. That tree is a world in itself, a world inhabited by a diversity of life which completes the cycle without leaving the tree.”

A photograph of a riverbank with dense green vegetation and a body of water in the foreground. The vegetation consists of tall grasses and shrubs. The water is dark green and reflects the surrounding environment. The sky is not visible.

Questions?

Former Camp at Mile 122.6



Former camp at Mile 126.2



Former Camp at Mile 171.4



Mile 222 Upstream (1890)



Mile 222 Upstream (1991)



Mile 222 Upstream (2010)



Stanton Photo Matches

