Arroyo Seco Watershed Ecosystem Restoration Study

Watershed Breakfast
January 25, 2012
University Club of Pasadena
Feasibility Scoping Meeting Agenda

- Introductions
  - USACE South Pacific Division
  - USACE Los Angeles District
  - Los Angeles County Department of Public Works

- Opening Remarks

- Study Overview

- Findings and Recommendations

- Action Items

- Closing Remarks
Study Location

Arroyo Seco Watershed

Los Angeles County
Arroyo Seco Watershed
Ecosystem Restoration Study

❖ Purpose of Today’s Conference:
• Present existing and future-without project conditions
• Identify planning objectives and constraints
• Summarize preliminary plan formulation for ecosystem restoration in the watershed
• Present the course of action for study completion
Study Authority

This report is being prepared in response to the Senate Resolution approved on June 25, 1969, which reads as follows:

“Resolved by the Committee on Public Works of the United States Senate, that the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the report of the Chief of Engineers on the Los Angeles and San Gabriel Rivers and Ballona Creek, California, published as House Document Numbered 838, Seventy-sixth Congress, and other pertinent reports, with a view to determining whether any modifications contained herein are advisable at the present time, in the resources in the Los Angeles County Drainage Area.”
Study Area
2002 Reconnaissance Study

Determined that multiple water resources issues are present with a federal interest to proceed into a cost shared feasibility study

Potential Outputs Identified in Reconnaissance

- Environmental Restoration
- Water Quality
- Flood Risk Management
- Water Conservation
- Recreation
Study Timeline

**August 2005**  FCSA executed with Los Angeles County Department of Public Works

**October 2005**  F2 (public meeting) held

**May 2009**  Initiated preparation of draft F3 report

**April 2011**  Preliminary draft F3 report completed

**August 2011**  F3 Baseline Conditions and Future Without Project Report district quality control review and revisions completed
F2 Workshop
Public Concerns

- Urbanization of the watershed and engineered channels have reduced or eliminated aquatic habitat and restricted access for wildlife.
- Urban runoff has affected water quality and altered the hydrology of Arroyo Seco.
- Recreational opportunities and public access to Arroyo Seco are limited.
Problems and Opportunities

Problems
- Fragmented riparian habitat
- Disturbed hydrologic regime by impervious surfaces and engineered drainage
- Reduced ground-water recharge decreases base flow
- Hard stream bottom has eliminated habitat and disconnected the floodplain
- Debris flow and flood risk management issues
- Lack of open space and public access

Opportunities
- Link habitat fragments
- Provide for fish passage
- Invasive species eradication
- Create alternative stream channels (non-flood conveyance)
- Alter channel banks to accommodate habitat
- Improve water quality through wetland restoration
- Improve access and recreation features
Planning Objectives

- To reduce further ecosystem degradation by restoring water-related habitats
- Restore connectivity of habitats and provide wildlife corridors
- To restore water quality to support aquatic habitat and wildlife
- To design restoration features that mitigate or avoid increased risk of flood damages and channel erosion
- To provide recreational opportunities and aesthetics within the watershed
Planning Constraints/Considerations

- Maintenance of flood damage risk reduction
- Real estate considerations/existing land uses
- Availability of water to support habitat
- Maintain flood storage capacity behind Devil’s Gate Dam
- Existing recreational access and uses
- Avoidance of HTRW
- Avoidance of impacts to endangered species
- Public support and acceptability
- Avoidance of cultural resource impacts
Existing Conditions

Environment
Environmental Conditions

- Geologic Hazards and Land Use
- Hydrology and Hydraulics
- Water Quality
- Groundwater
- Vegetation
- Habitats
- Special Status Species
Hydrology

Channel Morphology Prior to LACDA (1938)
## Hydrology

(HEC-HMS Return Flows)

<table>
<thead>
<tr>
<th>Location</th>
<th>Drainage Area (sq mi)</th>
<th>2-year flow (CFS)</th>
<th>100-year flow (CFS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Devil’s Gate Dam</td>
<td>31.6</td>
<td>399</td>
<td>10,100</td>
</tr>
<tr>
<td>2. Brookside Park</td>
<td>36.8</td>
<td>678</td>
<td>11,200</td>
</tr>
<tr>
<td>3. Lower Arroyo Seco Park</td>
<td>37.5</td>
<td>791</td>
<td>11,800</td>
</tr>
<tr>
<td>4. South Pasadena Island</td>
<td>39.4</td>
<td>1,060</td>
<td>13,200</td>
</tr>
<tr>
<td>5. Sycamore Creek Park</td>
<td>44.5</td>
<td>2,110</td>
<td>17,800</td>
</tr>
<tr>
<td>6. Upstream of LA River Confluence</td>
<td>46.2</td>
<td>2,430</td>
<td>19,200</td>
</tr>
</tbody>
</table>
Hydraulics
Hydraulics
Water Quality

303(d) Impaired Waters
Groundwater
Habitats

Riversidian Alluvial Fan Sage Scrub
(in Hahamongna)

Coastal Scrub
(upstream of J PL)
Habitats

Southern Sycamore Alder
Riverine Woodland
(downstream of Devil’s Gate Dam)

Mulefat Scrub
(edge of Hahamongna reach)
Habitats

Southern Willow Scrub
(confluence of Arroyo Seco and Flint Wash)

Landscaped Vegetation
(at Sycamore Grove Park)
Habitats

Coast Live Oak Forest And Woodland
(Oak Grove area of Hahamongna)

Streambed
(between Devil’s Gate and Highway 134)
## Special Status Species

<table>
<thead>
<tr>
<th>COMMON NAME (Scientific Name)</th>
<th>FEDERAL STATUS</th>
<th>CA STATE STATUS</th>
<th>CNPS STATUS</th>
<th>POTENTIAL FOR OCCURRENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nevin's barberry (<em>Berberis nevinii</em>)</td>
<td>Endangered</td>
<td>Endangered</td>
<td>1B.1</td>
<td>Present</td>
</tr>
<tr>
<td>Slender-horned spineflower (<em>Dodecahema leptoceras</em>)</td>
<td>Endangered</td>
<td>Endangered</td>
<td>1B.1</td>
<td>Unlikely</td>
</tr>
<tr>
<td><strong>Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arroyo toad (<em>Bufo californicus</em>)</td>
<td>Endangered</td>
<td>None</td>
<td>NA</td>
<td>Possible</td>
</tr>
<tr>
<td>California red-legged frog (<em>Rana aurora draytonii</em>)</td>
<td>Threatened</td>
<td>None</td>
<td>NA</td>
<td>Unlikely</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coastal California gnatcatcher (<em>Polioptila californica californica</em>)</td>
<td>Threatened</td>
<td>None</td>
<td>NA</td>
<td>Unlikely</td>
</tr>
<tr>
<td>Least Bell's vireo (<em>Vireo bellii pusillus</em>)</td>
<td>Endangered</td>
<td>Endangered</td>
<td>NA</td>
<td>Possible</td>
</tr>
<tr>
<td>Southwestern willow flycatcher (<em>Empidonax traillii extimus</em>)</td>
<td>Endangered</td>
<td>Endangered</td>
<td>NA</td>
<td>Possible</td>
</tr>
</tbody>
</table>
Existing Conditions

Socioeconomics
## Socioeconomic Conditions

### Population Change and Density

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>2001</th>
<th>2010</th>
<th>CHANGE (%)</th>
<th>AREA (sq. mi.)</th>
<th>POPULATION DENSITY (sq. mi.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasadena</td>
<td>135,587</td>
<td>151,576</td>
<td>11.79</td>
<td>23.2</td>
<td>6,533</td>
</tr>
<tr>
<td>La Cañada</td>
<td>20,621</td>
<td>21,261</td>
<td>3.10</td>
<td>8.65</td>
<td>2,457</td>
</tr>
<tr>
<td>Flintridge</td>
<td>43,887</td>
<td>NA 1</td>
<td>NA</td>
<td>8.70</td>
<td>5,044</td>
</tr>
<tr>
<td>Altadena</td>
<td>24,676</td>
<td>25,881</td>
<td>4.88</td>
<td>3.44</td>
<td>7,523</td>
</tr>
<tr>
<td>South Pasadena</td>
<td>3,748,362</td>
<td>4,094,764</td>
<td>9.24</td>
<td>498.3</td>
<td>8,217</td>
</tr>
<tr>
<td>City of Los Angeles</td>
<td>9,656,730</td>
<td>10,514,663</td>
<td>8.88</td>
<td>4,752</td>
<td>2,212</td>
</tr>
<tr>
<td>County of Los Angeles</td>
<td>31</td>
<td>31</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: U.S. Census
## Socioeconomic Conditions

### Income Data

<table>
<thead>
<tr>
<th>AREA</th>
<th>MEDIAN FAMILY INCOME</th>
<th>MEDIAN PER CAPITA INCOME</th>
<th>PERCENTAGE OF FAMILIES BELOW POVERTY LINE</th>
<th>PERCENTAGE OF INDIVIDUALS BELOW POVERTY LINE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasadena</td>
<td>78,600</td>
<td>39,190</td>
<td>10.5</td>
<td>13.6</td>
</tr>
<tr>
<td>La Cañada Flintridge</td>
<td>157,511</td>
<td>71,221</td>
<td>2.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Altadena</td>
<td>93,277</td>
<td>37,880</td>
<td>5.5</td>
<td>8.1</td>
</tr>
<tr>
<td>South Pasadena</td>
<td>97,437</td>
<td>49,691</td>
<td>4.5</td>
<td>5.6</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>39,942</td>
<td>20,671</td>
<td>18.3</td>
<td>22.1</td>
</tr>
<tr>
<td>Los Angeles County</td>
<td>46,452</td>
<td>20,683</td>
<td>14.4</td>
<td>17.9</td>
</tr>
<tr>
<td>California</td>
<td>53,025</td>
<td>22,711</td>
<td>10.6</td>
<td>14.4</td>
</tr>
</tbody>
</table>
Future Without Project Conditions
Expected Future Conditions

- Future land use is expected be similar to current conditions:
  - Extensive urbanization means little new development or ground disturbance
  - Open land is publicly held or restricted from development

- Climate change will contribute to more variable conditions
  - Increased intensity of storm events
  - Increased duration of droughts and fire risk in the upper watershed
Plan Formulation
Study Focus

- Initial PMP preparation in 2005 focused on the comprehensive watershed approach: identify potential projects and management strategies.

- LACDPW and supporting agencies requested the study to focus on identifying ecosystem restoration projects that could be implemented within a watershed framework.
Management Measures

- Habitat Restoration
  - In-channel vegetation
  - Riparian-fringe vegetation
  - In-stream habitat improvement
  - Invasive species eradication
  - Low-flow channel modification
  - Flow pattern modification (including dam operation)
  - Fish ladder or passage structures
  - Wetland restoration, including open water
  - Terracing
  - Island creation
  - Concrete removal
  - Stream daylighting of existing culverts
  - Sediment redistribution
Management Measures

- Flood Risk Management and Erosion Control (ancillary to ecosystem restoration)
  - Stream meanders
  - Bank stabilization
  - Modification of existing channel banks
  - Drop structures/weirs
  - Grade control structures
  - Storm water retention upstream of channels
Management Measures

- Recreation
  - Recreational Corridor/Trails
  - Access Points
- Water Quality and Water Conservation (ancillary to ecosystem restoration)
  - Stormwater best management practices
  - Treatment wetlands
  - Retention/infiltration basins
  - Riparian buffers
Management Measures

Non-structural Measures

- Coordination of policies and strategies with CASA stakeholders
- Stormwater-sensitive site planning and design
- Watershed education plan
- Street sweeping
- Citizen monitoring program
- Local government ordinances and policies
- Reduce areas of impervious surfaces
- Storm drain disconnections
- Open land acquisition
Alternatives For Consideration

❖ No Action

• Continued operation and maintenance of flood damage risk reduction project for Arroyo Seco

• Basis for future without conditions for period of analysis
Alternatives For Consideration

- **Floodplain Reconnection**
  - Diversion of water from Arroyo Seco into previously established side channels.
  - Allow sediment to pass beyond the dam and accumulate in the channel.
  - Excavation of off-stream channels or backwaters and removing non-native plant species.
  - Creating terraces above the existing channel invert and revegetating with native plant species.
  - Restoring wetlands in the floodplains to enhance off-channel habitat.
  - Stream daylighting of tributaries.
  - Modifying bank slopes for establishment of riparian buffers.
Alternatives For Consideration

- **Invasive Plant Eradication/Revegetation**
  - In-channel vegetation plantings.
  - Flow modification to favor native species over non-native species.
  - Sediment redistribution to enhance substrate conditions for revegetation.
  - Invasive non-native species removal.
  - Establishment of riparian-fringe vegetation and riparian buffers.
Alternatives For Consideration

- **Wetland Restoration/Enhancement**
  - Modify flow to support off-channel habitat
  - Provide low-flow channels to divert water to the lower reach
  - Construct stormwater treatment wetlands to support habitat in the floodplain and downstream water quality
  - Install retention basins to reduce bed and bank erosion
  - Include recreational and educational features at wetland areas.
Alternatives For Consideration

- **Fish Passage, Rearing and Forage**
  - Fish ladder/passage systems
  - Reconnection of the main channel to small tributaries
  - Reestablishing riparian forest at the stream’s edge to provide organic input and shade
  - Implementing stormwater management BMPs to reduce turbidity
  - In-channel restoration to provide habitat and complexity.
Identification of Candidate Restoration Sites

- Start with a consideration of the entire watershed
- Focus on major restoration opportunities and potential benefits
- Consider potential for connectivity and sustainability
- Avoid conflicts with planning constraints
- Consider input of the public and local agencies (incorporate outside expertise)
Restoration Site 1
Hahamongna (Devil’s Gate Basin)
Restoration Site 3
210 Freeway Near Oak Grove
Restoration Site 4 Brookside Area
Restoration Site 5
Lower Arroyo Seco Park
Restoration Site 7
Arroyo Seco - Los Angeles
Restoration Sites 8 and 9
Sycamore Grove and Rainbow Canyon
What’s Next

- Model Certification (CHAP: for multiple projects)
- Alternatives Analyses
- Recommendations: Specific restoration projects within the watershed
- Partnership for next phase (project-specific feasibility evaluations)
Plan Formulation
Integration of Alternatives
And Restoration Sites
(Next Steps)

1. Determine Compatibility of Alternatives and Restoration Site Opportunities
2. Determine Benefits and Costs of Site Restoration (Survey Level of Detail)
3. Assess Requirements and Contributions to the Watershed
4. Recommend Specific Restoration Sites for Further Study
Plan Formulation
Integration of Alternatives
And Restoration Sites
(Next Steps)

F3 (Today)

Evaluation of Alternatives
• Site 1
• Site 2
• Site 3
• Site 4
• …

F4

Project-Specific Studies Proceed
with LADPW and Co-Sponsors

Proceed with Project-Specific Study of Site 1

Proceed with Project-Specific Study of Site 2

Proceed with Project-Specific Study of Site 3

Proceed with Project-Specific Study of Site…
<table>
<thead>
<tr>
<th>Activity Name</th>
<th>Baseline Schedule</th>
<th>Current Schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Initiation</td>
<td>28-Jul-05</td>
<td>Complete</td>
</tr>
<tr>
<td>Public Workshop (F2)</td>
<td>26-Oct-05</td>
<td>Complete</td>
</tr>
<tr>
<td>Baseline Conditions (F3)</td>
<td>31-May-11</td>
<td>23-Sep-11</td>
</tr>
<tr>
<td>Alternatives Analysis (F4)</td>
<td>25-Oct-13</td>
<td>TBD</td>
</tr>
<tr>
<td>Alternative Formulation Briefing (F4A)</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Draft Feasibility Report (F5)</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Final Public Meeting (F6)</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Feasibility Report with NEPA to SPD (F8)</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>MSC Commander’s Report Notice (F9)</td>
<td>TBD</td>
<td>TBD</td>
</tr>
<tr>
<td>Chief's Report</td>
<td>TBD</td>
<td>TBD</td>
</tr>
</tbody>
</table>
An array of viable management measures have been developed and combined into preliminary alternatives.

Candidate restoration sites have been identified throughout the study area.

Identify individual projects for study based on their cost-effectiveness and contribution to the watershed.
Arroyo Seco
Feasibility Scoping Meeting
Future Actions

- Complete formulation and evaluation of alternatives under the watershed approach
- Selection of projects for feasibility study
- Pathway for future study efforts
  - Reformulate study to proceed with specific projects upon completion of F4 with participation of co-sponsors
Arroyo Seco
Feasibility Scoping Meeting

>Closing Remarks