



**US Army Corps  
of Engineers®**

## **Virgin River and Tributaries Utah, Arizona, and Nevada**

### **Floodplain Management Strategy**

August 14, 2007  
St. George, Utah

## **Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy**



### **PRESENTATION OUTLINE**

- ✓ **Floodplain Management Strategy Update**
  - Data / Information Collection Overview
  - Flood Hazard / Risk Identification
  
- ✓ **Floodplain Management Strategy Workshop**
  - Floodplain Management Goal Formulation
  - Mitigation Action Identification
  
- ✓ **Wrap Up**
  - Draft and Final Floodplain Strategy
  - Schedule
  - Next Meeting

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### PRESENTATION OUTLINE

- ✓ Floodplain Management Strategy Update
  - Data / Information Collection Overview
  - Flood Hazard / Risk Identification
  
- ✓ Floodplain Management Strategy Workshop
  - Floodplain Management Goal Formulation
  - Mitigation Action Identification
  
- ✓ Wrap Up
  - Draft and Final Floodplain Strategy
  - Schedule
  - Next Meeting

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### OBJECTIVE

Formulate a Floodplain Management Strategy for implementation by stakeholders in the Virgin River watershed.

#### Key Characteristics

- ✓ Comprehensive
- ✓ Watershed-based
- ✓ Coordinated
- ✓ Consensus-driven
- ✓ Non-structural
- ✓ Implementable



# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



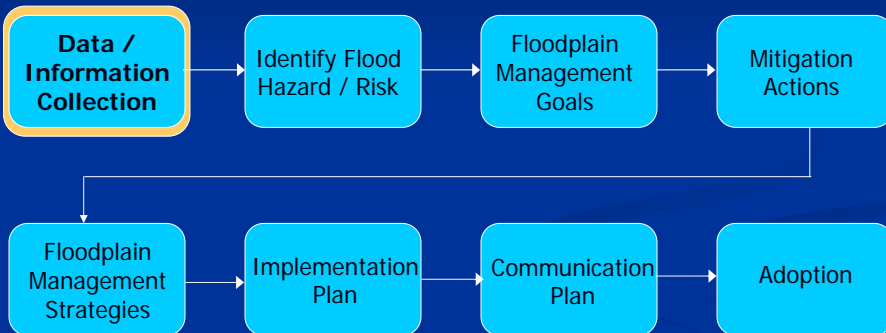
## WORK PLAN



# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



## WORK PLAN



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**DATA / INFORMATION COLLECTION**

Stakeholder Interviews

- ✓ Roles & Responsibilities
- ✓ Resources
- ✓ Regulations
- ✓ Capabilities
- ✓ Experience
- ✓ Communications
- ✓ Needs

Review & Summary

- ✓ 2005 Flooding Data
- ✓ Post-Flood Reports
- ✓ Technical Data & Reports
- ✓ Digital Data



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**DATA / INFORMATION COLLECTION**

Desired Outcome (Analysis)

- ✓ Understand Problems, Opportunities, Constraints
- ✓ Identify Connects/Disconnects Between Resources, Capabilities, & Needs
- ✓ Understand Policies/Regulations Consistencies & Inconsistencies
- ✓ Understand Institutional/Jurisdictional Challenges

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



DATA / INFORMATION COLLECTION

Stakeholder Interviews Statistics

22	Federal	12	Arizona
5	Tribal	13	Nevada
7	State	<u>26</u>	Utah
8	County	51	Total Contacted
<u>9</u>	Local		
51	Total Contacted		

~50% Response



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



DATA / INFORMATION COLLECTION

Interview Key Points – Challenges

- ✓ Multiple flood hazards exist – Inundation, Erosion, Aggradation/degradation, Debris blockage
- ✓ Changes in watershed conditions directly impact floodplain management – Invasive species impacts, Vegetation changes in response to wildfire
- ✓ Land use planning/development directly impact floodplain management – Response to urbanization, Floodplain encroachment, Imperviousness of watershed cover



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



DATA / INFORMATION COLLECTION

Interview Key Points – Challenges (cont'd.)

- ✓Standardization/consistency issues exist – Technical design standards/guidelines, Floodplain regulations/ordinances, Permitting processes/outcomes
- ✓Coordination/communication need improvement – Cross-jurisdictional agencies, Upper/lower watershed communities, Emergency response/non-emergency protocols
- ✓Communities lack sufficient resources to address floodplain management issues at local level – Need coordination to pool/leverage available resources and take advantage of available existing programs/products

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



DATA / INFORMATION COLLECTION

Interview Key Points – Opportunities

- ✓Functional natural river reaches exist – Opportunities for reach preservation
- ✓River restoration/maintenance activities on-going – Opportunities to apply non-conventional flood hazard assessment methods, to refine/implement mitigation actions, to inform design/regulatory standards formulation
- ✓Regulatory floodplain management tools available – Opportunities to prepare floodplain delineations and to provide draft floodplain regulations, drainage/erosion hazard ordinances to communities

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### DATA / INFORMATION COLLECTION

#### Interview Key Points – Opportunities (cont'd.)

- ✓ **Joint venture funding** – Opportunities to combine resources/ programs to fund vegetation management in conjunction with structural flood control
- ✓ **Educational outreach to communities** – Opportunities to use existing products or to develop new databases/informational materials/ and/or presentations for agencies, decision makers, and the public
- ✓ **Communication Plan** – Opportunities to streamline communication protocols through the use existing products or new database

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### DATA / INFORMATION COLLECTION

#### Interview Key Points – Needs

- ✓ **Technical**
  - Floodplain/Erosion hazard zone delineations
  - Design standards/guidelines
- ✓ **Regulatory**
  - Floodplain Regulations, Drainage/Erosion hazard ordinances
  - Permitting/Regulatory consistency
  - Land use planning
- ✓ **Environmental**
  - Watershed/Habitat Management
  - Fire Management
  - Invasive Species Control
  - Environmental compliance – Regional EA/EIS

# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



## DATA / INFORMATION COLLECTION

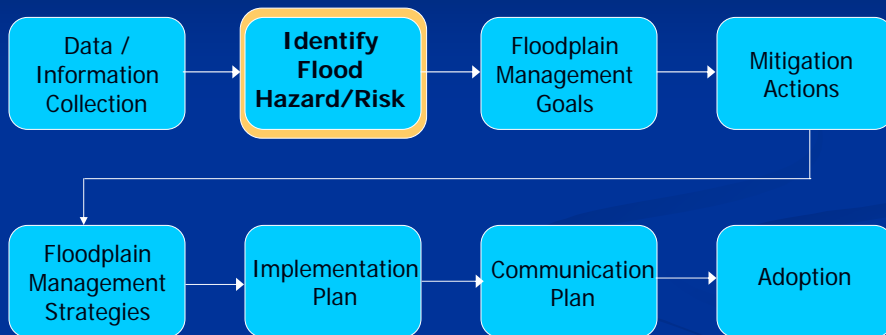
### Interview Key Points – Needs (cont'd.)

- ✓Communication
  - Contacts/GIS database
  - Communication protocols/tools
  - Flood response plans
- ✓Education
  - GIS database
  - Public education informational materials
  - Community outreach presentations
- ✓Funding

# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



## WORK PLAN





Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**

**Identify Issues – What's the Problem?**

- ✓ Inundation
- ✓ Erosion Hazard Areas / Delineations
- ✓ Sedimentation & Debris / Trends in Channel Change / Maintenance
- ✓ Response to Urbanization / Encroachment / Watershed Cover
- ✓ Response to Wildfire / Vegetation Changes
- ✓ Invasive Species Impacts / Tamarisk / Cheat Grass
- ✓ Flood Warning / Flood Response

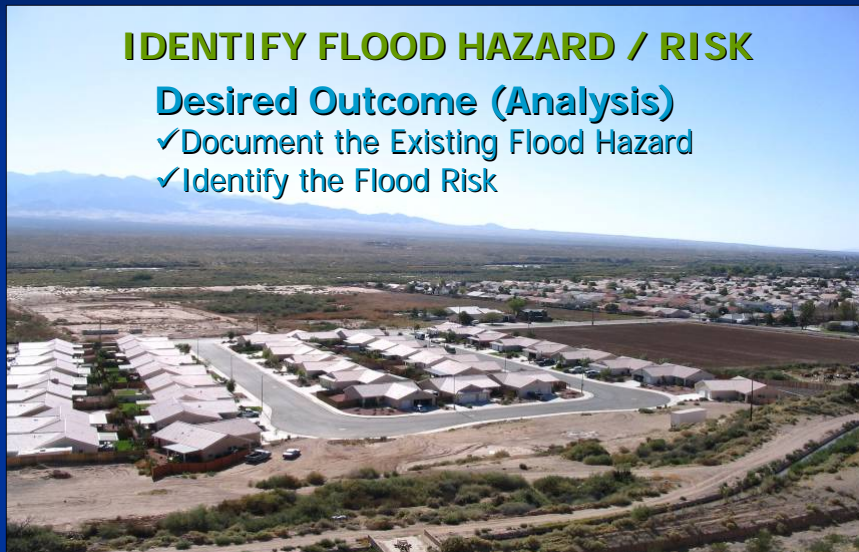
Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



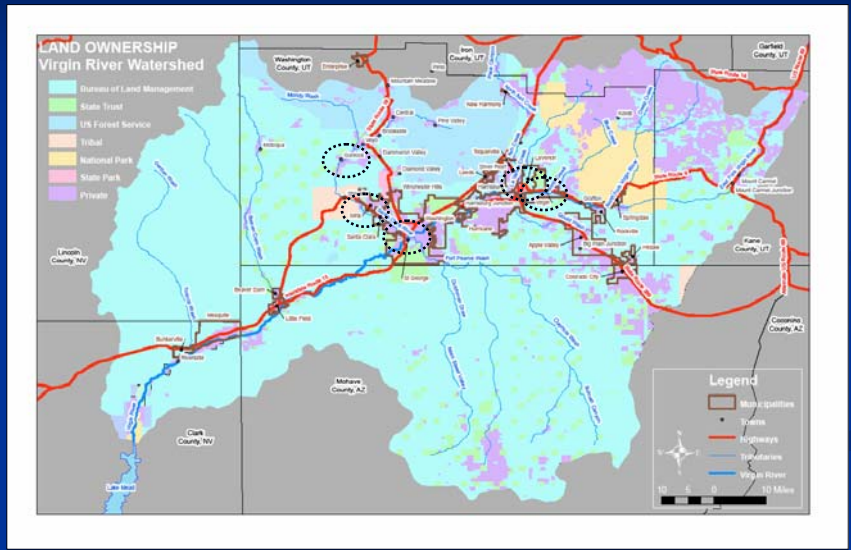
**IDENTIFY FLOOD HAZARD / RISK**

**Desired Outcome (Analysis)**

- ✓ Document the Existing Flood Hazard
- ✓ Identify the Flood Risk



# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



# Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



## IDENTIFY FLOOD HAZARD / RISK Santa Clara River upstream of Gunlock



<http://www.thespectrum.com>

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
Virgin River near Hurricane/La Verkin bridge



<http://www.thespectrum.com>

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
North Creek near Virgin



<http://www.thespectrum.com>

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
**Inundation**



<http://www.thespectrum.com>

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
**Erosion**



<http://www.thespectrum.com>



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
**Sedimentation**



<http://www.thespectrum.com>

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**IDENTIFY FLOOD HAZARD / RISK**  
**Debris Blockage**



<http://www.thespectrum.com>

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### BREAK



<http://www.thespectrum.com>

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



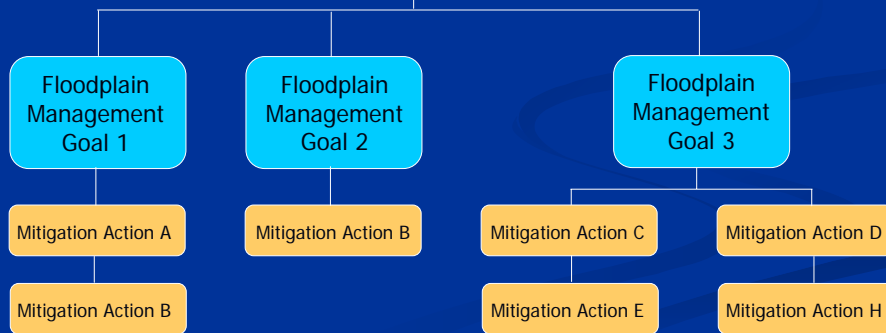
### PRESENTATION OUTLINE

- ✓ Floodplain Management Strategy Update
  - Data / Information Collection Overview
  - Flood Hazard / Risk Identification
- ✓ Floodplain Management Strategy Workshop
  - Floodplain Management Goal Formulation
  - Mitigation Action Identification
- ✓ Wrap Up
  - Draft and Final Floodplain Strategy
  - Schedule
  - Next Meeting

Virgin River and Tributaries – UT, AZ, & NV  
**Floodplain Management Strategy**



**FLOODPLAIN MANAGEMENT STRATEGY**



Virgin River and Tributaries – UT, AZ, & NV  
**Floodplain Management Strategy**



**WORK PLAN**



Virgin River and Tributaries – UT, AZ, & NV  
**Floodplain Management Strategy**



**FLOODPLAIN MANAGEMENT GOALS**

**Identify Goals – What's the Solution?**

- ✓ Identify Natural & Beneficial Functions of Floodplains
- ✓ Update or Improve Existing Knowledge / Conditions
- ✓ Facilitate / Enhance Multi-Jurisdictional Communication & Cooperation
- ✓ Address Interrelationship of Flooding, Erosion, & Sedimentation

**Desired Outcome (Synthesis)**

Evaluate Stakeholder Goals / Compatibility for Opportunities to Collaborate



Virgin River and Tributaries – UT, AZ, & NV  
**Floodplain Management Strategy**



**FLOODPLAIN MANAGEMENT GOALS**

**River Function**

Establish and maintain a functional river system basin-wide, including geomorphic, biotic, and hydrologic components

- ✓ Identify areas for potential nonstructural approaches to flood protection.
- ✓ Identify areas for potential habitat enhancement and restoration.
- ✓ Develop a streamlined permitting process for river maintenance and restoration.



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**FLOODPLAIN MANAGEMENT GOALS**

**River Function (cont'd.)**

- ✓ Improve coordination of invasive species removal and restoration efforts.
- ✓ Improve communication between planners/stakeholders.
- ✓ Maintain natural river channel and floodplain dynamics where feasible.

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**FLOODPLAIN MANAGEMENT GOALS**

**River Function (cont'd.)**

- ✓ Integrate conservation planning for sensitive species.
- ✓ Provide technical resources for decision makers/municipalities.
- ✓ Evaluate flood risk from Ft. Pearce and Beaver Dam Washes and consider mitigation measures.

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### FLOODPLAIN MANAGEMENT GOALS

#### Land Use Planning

- ✓Develop a planning toolbox for use by local entities to use in land use planning efforts.
- ✓Improve communication among and between agencies and stakeholders at all levels.
- ✓Incorporate non-point source pollution efforts into land use planning and education.

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### WORK PLAN



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**MITIGATION ACTIONS**

**Identify & Evaluate Mitigation Actions**

- ✓Technically Feasible / Cost Effective
- ✓Floodplain Delineation / Floodplain Regulations
- ✓Floodplain Management Guidelines
- ✓Erosion Hazard Delineation / Erosion Hazard Guidelines
- ✓Land Use Planning Recommendations / Impacts to Watershed & Floodplains

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



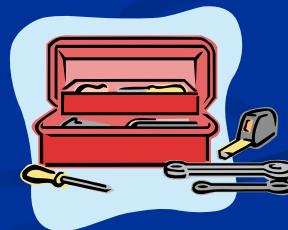
**MITIGATION ACTIONS**

**Identify & Evaluate Mitigation Actions (cont'd.)**

- ✓Best Management Practices Recommendations
- ✓Flood Risk Management
- ✓Permitting
- ✓Flood Response Planning
- ✓Public Education & Awareness Programs
- ✓Web-based Information Delivery

**Desired Outcome**

Compile the Mitigation Action Toolbox



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**MITIGATION ACTIONS – Candidates**

✓ **Technical**

- Floodplain delineations
- Erosion hazard zone delineations
- Design standards/guidelines

✓ **Regulatory**

- Floodplain Regulations, Drainage/Erosion hazard ordinances
- Permitting/Regulatory streamlined processes
- Land use planning

✓ **Communication**

- Contacts database
- GIS database
- Communication protocols/tools
- Flood response plans

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**MITIGATION ACTIONS – Candidates (cont'd.)**

✓ **Environmental**

- Watershed/Habitat Management
- Fire Management
- Invasive Species Control
- Environmental compliance – Regional EA/EIS

✓ **Education**

- GIS database
- Public education informational materials
- Community outreach presentations

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



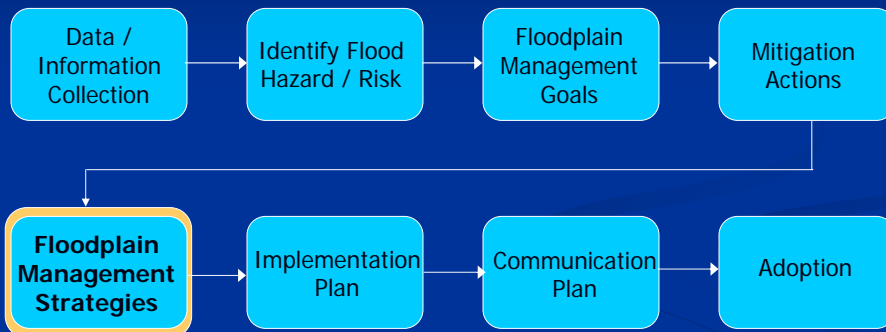
### PRESENTATION OUTLINE

- ✓ Floodplain Management Strategy Update
  - Data / Information Collection Overview
  - Flood Hazard / Risk Identification
- ✓ Floodplain Management Strategy Workshop
  - Floodplain Management Goal Formulation
  - Mitigation Action Identification
- ✓ Wrap Up
  - Draft and Final Floodplain Strategy
  - Schedule
  - Next Meeting

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### WORK PLAN



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



FLOODPLAIN MANAGEMENT STRATEGY



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



FLOODPLAIN MANAGEMENT STRATEGIES

**Content** – Mitigation Actions or Categories of Actions (e.g., Administrative, Operational, Regulatory)

**Organization** – Virgin River Watershed Group / Technical Advisory Group / Other Work Groups

**Timeline** – Combination of Sequential and Parallel Work Tracks / Short-, Mid-, Long-Term Priorities

**Scale** – Combination of Local, Regional, & Watershed-wide Mitigation Actions

**Means** – Funding Sources / Mechanisms for Sustainable Funding

## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### FLOODPLAIN MANAGEMENT STRATEGIES

#### Desired Outcome

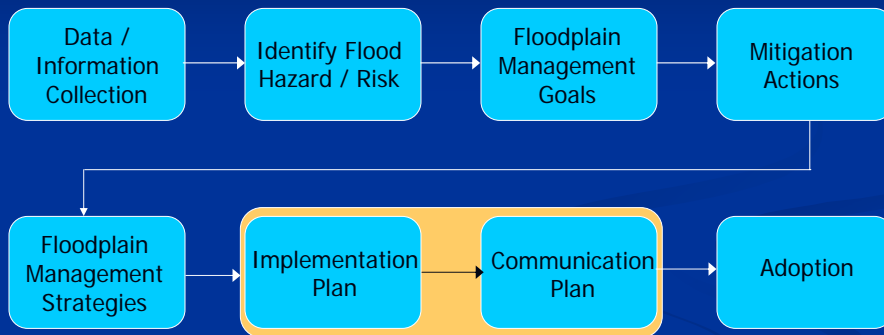
Create the **Floodplain Management Strategy** addressing common goals, reducing flood risk, compliant with the NFIP, consisting of various Mitigation Actions, organized in a cohesive framework, and with relative priorities and funding sources identified.



## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### WORK PLAN



Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**WORK PRODUCTS**

**Floodplain Management Strategy Report**

- ✓ Introduction
- ✓ Floodplain Management Strategies
- ✓ Overview of Floodplain Management in the Virgin River Watershed
- ✓ Overview of On-Going River Management Activities
- ✓ Floodplain Management Issues in the Virgin River Watershed
- ✓ Floodplain Management in Action: January 2005 Floods
- ✓ Needs Analysis – Future Activities
- ✓ Implementation Plan
- ✓ Communication Plan
- ✓ Recommendations

Virgin River and Tributaries – UT, AZ, & NV  
Floodplain Management Strategy



**WORK PRODUCTS**



**Databases**

- ✓ Stakeholder Contact Database
- ✓ Resource Catalog Database
- ✓ GIS Database



## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### SCHEDULE

#### Next Work Tasks

- ⌚ Week of September 24, 2007
  - ✓ Draft Floodplain Management Strategy
  
- ⌚ Week of October 29, 2007
  - ✓ Next Meeting
    - Strategy Overview
    - Implementation Plan
    - Communication Plan
    - Database



## Virgin River and Tributaries – UT, AZ, & NV Floodplain Management Strategy



### SCHEDULE

#### Next Work Tasks

- ⌚ Week of November 26, 2007
  - ✓ Final Floodplain Management Strategy
  
- ⌚ January, 2008
  - ✓ Virgin River Comprehensive Watershed Analysis



**Virgin River and Tributaries – UT, AZ, & NV**  
**Floodplain Management Strategy**

