



Building Arizona's Wildfire Prevention Capacity through Geospatial Technology



Building Arizona's Wildfire Prevention Capacity through Geospatial Technology

Barron Orr, Dan Tuttle and Christine Mares

Tucson GIS Cooperative Meeting Park City, Utah

October 17, 2006



Sponsors

- Fire Prevention & Safety Grant, part of the Assistance to Firefighters Grant Program (DHS-FEMA)
- USDA-CSREES Special Needs Grant
- Partnerships with Arizona Firewise/Communities and the National Geospatial Technology Extension Network



Office for Domestic Preparedness

Assistance to Firefighters Grant Program

A collage of images showing firefighters in action, fire trucks, and fire scenes.

Fire Prevention & Safety Grants
Part of the Assistance to Firefighters Grant Program

2004 FPS Award Announcements Now Available
[Click Here To View](#)

Additional FP&S Information

- About FP&S Grants
- > [Program Guidance](#)
- > [Frequently Asked Questions](#)

Purpose of Grants

The purpose of these grants is to assist State, regional, national or local organizations to address fire prevention and safety. Our primary goal is to reach high-risk target groups including children, seniors and firefighters. Under our authorizing statute the emphasis for these grants is the prevention of fire related injuries to children.

★ Home
★ Staffing for Adequate Fire and Emergency Response (SAFER) NEW
★ Fire Prevention & Safety Grants
★ Press Releases
★ Guidance Documents
★ Award Announcements <ul style="list-style-type: none">↳ Assistance to Firefighters (AFG)↳ Fire Prevention (FPS)
★ E-Grant Application



Acknowledgements

The Communities

- With special thanks to Summerhaven, Oracle and Patagonia, who are teaching out techies what assessment is all about

The State of Arizona

- Arizona Forest Health Advisory Councils
- State Land Department, Forestry Division
- University of Arizona,
- Arizona Firewise Communities

School of Natural Resources

- Alix Rogstad and Christine Mares

Arizona Remote Sensing Center

- Barron Orr, John Moeller, Michelle Hertzfeld, Emiko Ariyasu, Yuta Torrey, Aaryn Olsson, Wolfgang Grunberg, Min-Seong Kang, Stuart Marsh, and Wim van Leeuwen

The National Geospatial Technology Extension Network (NGTEN)

- Phil Rasmussen, USU, who developed the “Geospatial Tool Kit”
- My counterparts in 12 other states who have helped develop an educational approach focused on the diffusion of innovation



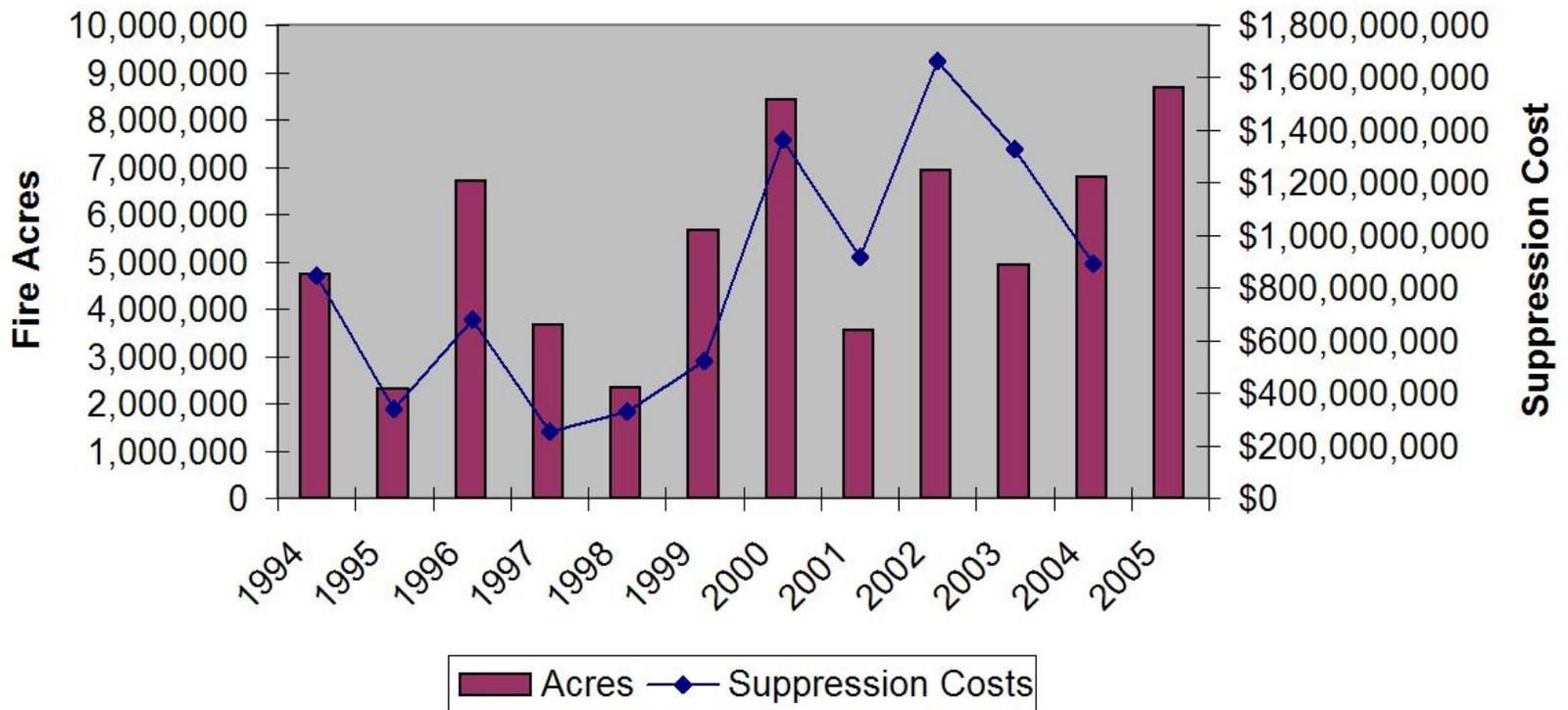
Objectives

- In collaboration with the Firewise Communities recognition process, work with Arizona communities officially declared to be at high risk of wildfire to overcome the technological barriers in support of a more sustainable approach to meeting the criteria of formal wildfire hazard assessments today and in the future.
- Build local capacity in geospatial technology and encourage cross-jurisdictional data sharing in support of interagency wildfire management.



The Problem

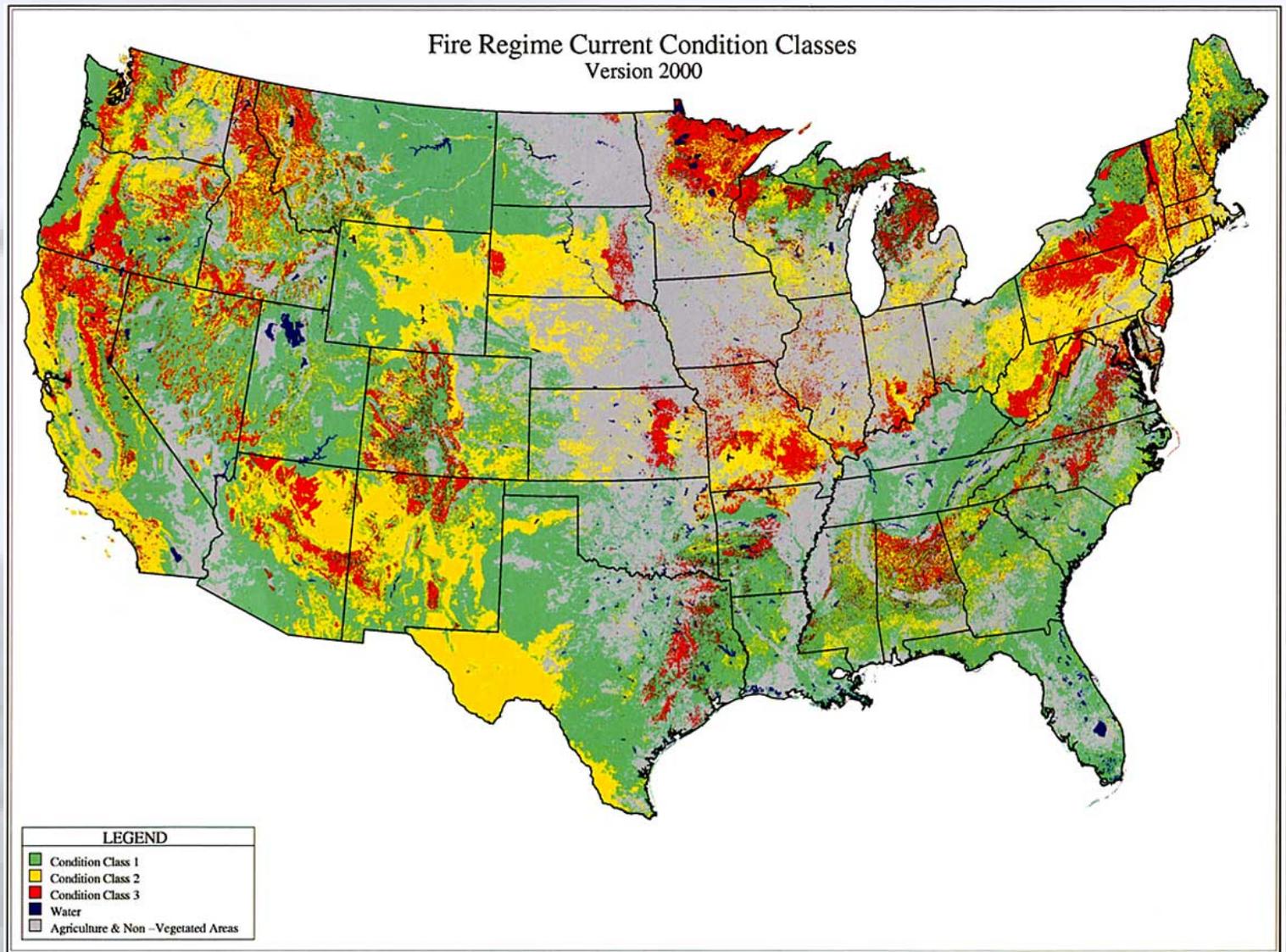
Total Fire Acres and Suppression Cost (1994 - 2005)



From NIFC Wildfire Statistics: http://www.nifc.gov/stats/fires_acres.html

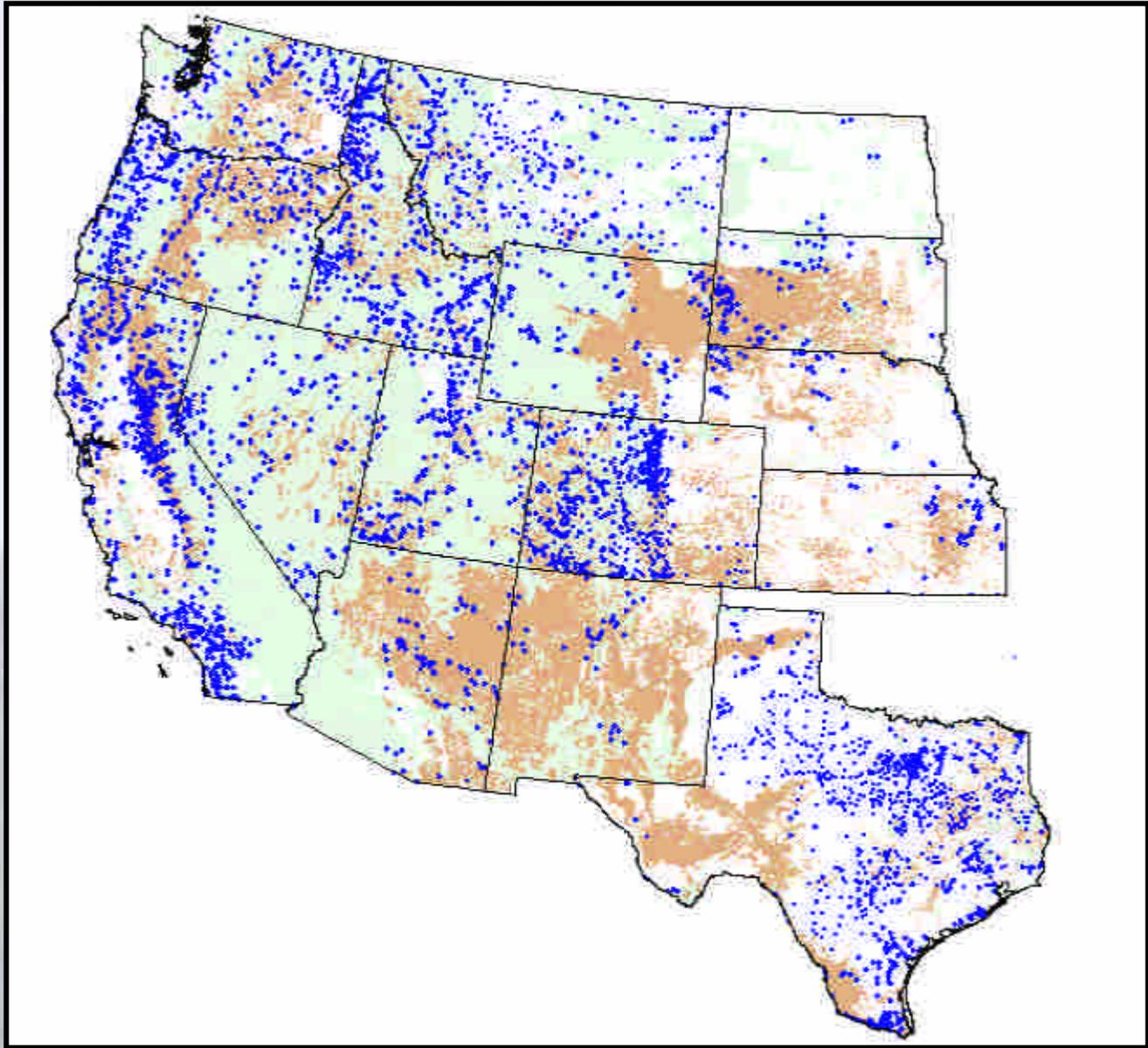


The Problem



Some estimates suggest 190 million acres have been significantly altered from traditional fire regime.

The Problem



...and many Western communities are at risk

Photo Essay-Changes in Forest Condition

Pre-1900 Forest Conditions

This 1895 photo shows forest stand conditions that evolved from regularly occurring, low-intensity, surface burning. The forest was open & dominated by fire-tolerant, fire-adapted ponderosa pine.

Unmanaged Forest

This 1980 photo (from the same place) shows how the forest has changed dramatically since 1895. Over the years small trees have established into dense thickets. These fire-intolerant tree species now crowd the forest, pre-disposing the area to insect infestations, disease outbreaks, and catastrophic wildfires.

Catastrophic Wildfire

In this 2001 photo (again, from same place) no "forest" and only a few trees survived the severe fire. Note the beginning of erosion in the stream channel. (The house had been moved prior to the fire however, this is seldom an option for residents.)



The Urban-Wildland Interface Has Expanded



Photo of post-Cerro Grande Fire by J. Miller

**Raising Ignition Risk and Influencing
Societal Values Placed on the Landscape**

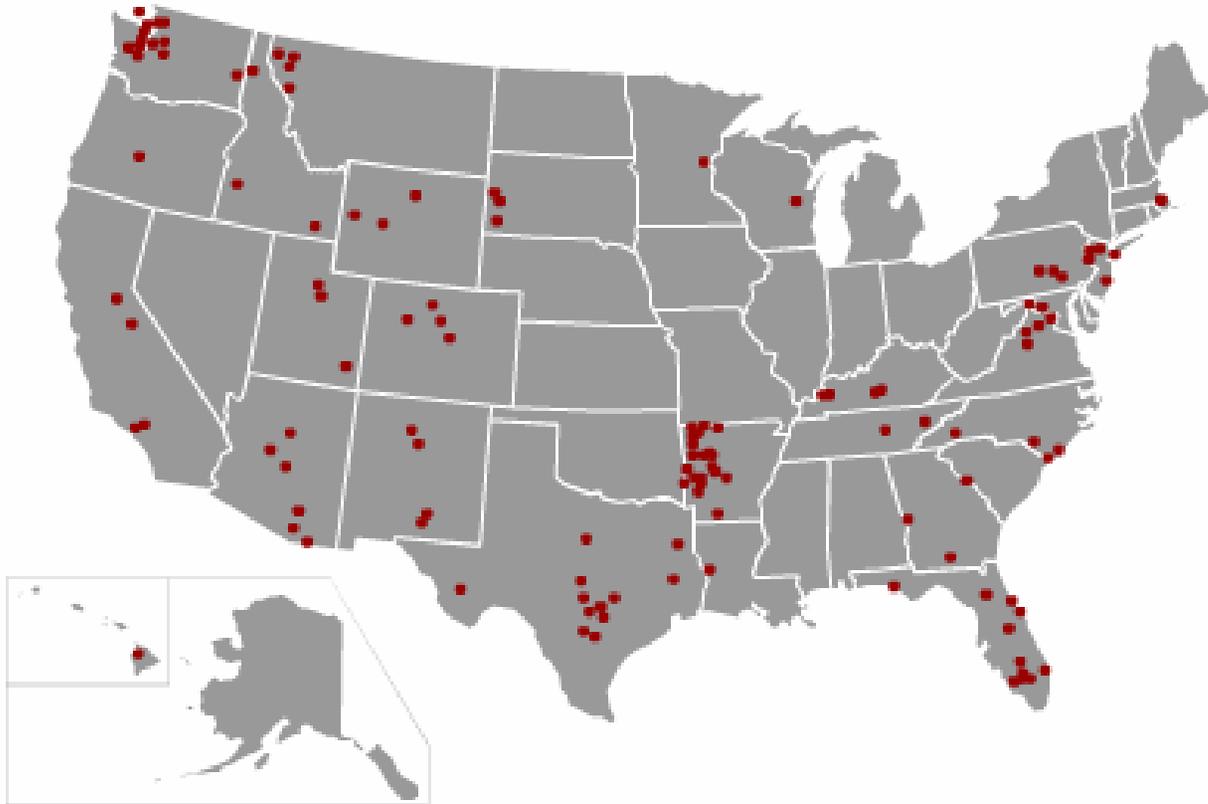
What can be done?

- **Firewise Recognition Status**
 - create a permanent local Firewise organization
 - describe the community
 - **complete a community hazard assessment**
 - establish objectives and action plans
 - make financial commitment (\$2 per capita annually)
 - observe Firewise Day
 - complete annual report (Firewise Plan) & renewal application
- **Community Wildfire Protection Plan (CWPP)**
 - determine the current and desired fire regime
 - **describe the wildland-urban interface (WUI) and associated community(s) at-risk**
 - **complete a community assessment, including fire regime condition class, fuels hazard, ignition risk, and fire history**
 - determine values-at-risk, local preparedness and protection
 - conduct a cumulative risk analysis
 - develop a community mitigation & monitoring plan (fuels reduction, oversight, education, etc.), with prioritized actions
 - provide an opportunity for all local entities and stakeholders to agree and concur formally with the overall plan



Firewise is a Community Approach

Firewise Communities/USA Sites



<http://www.firewise.org/>



Arizona Forestry Division - Wildfire and Natural Resource Management - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.azstatefire.org/



Forestry Division
Arizona State Land Department
2901 W. Pinnacle Peak Road
Phoenix, Arizona 85027

Phone 602.255.4059
For Wildland Fire Emergency - 1.800.309.7081
Kirk Rowdabaugh, State Forester

Site optimized for 800x600 screen resolution. Please scroll down for more menu options.

- Home
- News & Fire Intell.
- Prevention
- Firewise for Arizona
- Communities at Risk
- Mapping and Assessment
- Training
- Business Mgmt.
- Grant Info.
- Links
- About Us



ARIZONA'S CURRENTLY
Format)

For the convenience of interested individuals who may be willing to a of their Firewise Communities asse purposes only and does not constit approval of any service by the Ariz who may be suitable. It is up to ea them and to negotiate terms of con

Mike Brandt Pine/Strawberry F.D. P.O. Box 441 Pine, AZ 85544 928-476-2313 mjbrandt@theriver.com	Steve Lomba Crown King I P.O. Box 397 Crown King, 928-632-7163 ckfire@comu
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Firewise Communities - Arizona - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://cals.arizona.edu/firewise/

The University of Arizona - Cooperative Extension

home	family recovery
why be firewise?	wildfire recovery
am I at risk?	workshops
how to be firewise	cooperators
surviving a wildfire	links
resource library	for more information

Arizona Firewise Communities is a product of the Arizona Interagency Coordinating Group (AICG), a partnership of federal and state organizations in Arizona, in affiliation with the national Firewise Communities/USA program.

Cooperators

Arizona Fire Chiefs Association, Arizona Fire Districts Association, Arizona Emergency Services Association, Arizona Planning Association, Arizona State Land Department, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Inter-Tribal Council of Arizona, National Park Service, Northern Arizona University, University of Arizona, USDA Forest Service, USDA Natural Resources Conservation Service, US Fish and Wildlife Service.



Firewise Program Goal: Proactive Management

Homes and adjacent properties should be designed, built, and maintained to withstand a wildfire WITHOUT the intervention of the fire department.

The Fire Environment



FUEL

Fuel is required for any fire to burn. In regard to wildland fire, fuels consist of live and dead vegetation, such as trees, shrubs, grasses and their debris. Structures also become a potential source of fuel when they are in the vicinity of a wildfire. The amount of fuel, its moisture content, arrangement and other characteristics influence fire behavior.



WEATHER

Dry, hot and windy weather increases the likelihood of a major wildfire to occur. These conditions make ignition easier, allow fuels to burn more rapidly, and increase fire intensity. High wind speeds, in particular, can transform a small, easily controllable fire into a catastrophic event in a matter of minutes.



TOPOGRAPHY

Since heat rises, steepness of slope greatly influences fire behavior and rate of fire spread. Slopes with south and southwest aspects tend to be drier and more prone to ignition. Steep, narrow drainages and canyons act like chimneys when wildfires occur.



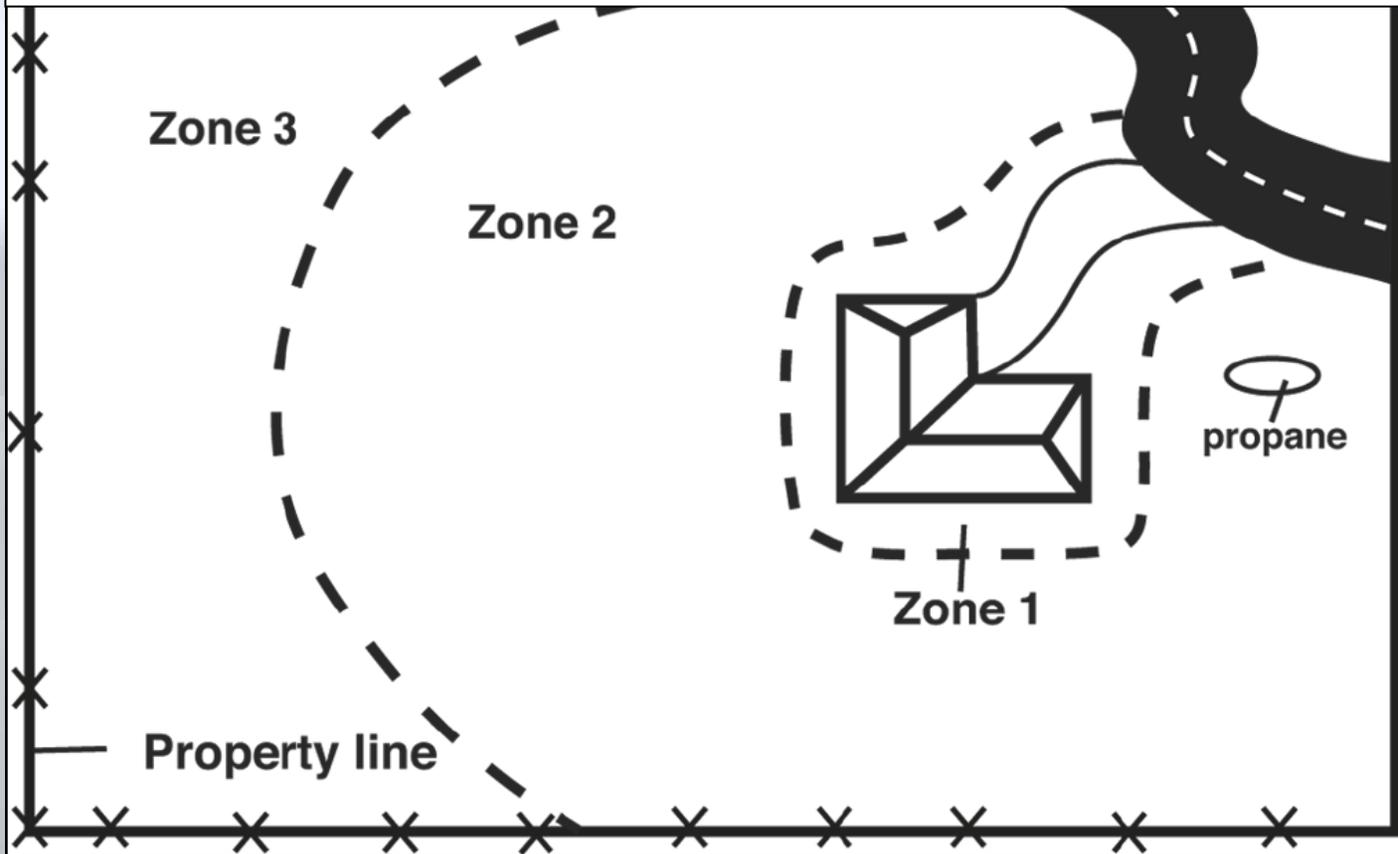
HUMAN

When people choose to build or buy homes in high-hazard fire areas their homes are potential fuel. Untreated wood shake and shingle roofs, narrow roads, limited access, lack of firewise landscaping, inadequate water supplies and inadequately planned subdivisions increase the risk of wildfire to people and their property.

Goal: Survivable Space Zones

We cannot change topography or weather, but fuels can be modified

Survivable Space is the modification of landscape design, fuels, and building materials that would make a home ignition caused by wildfire unlikely, even without direct firefighter intervention.



Goal: Survivable Space Zones

Zones 1 & 2 Fuel Reduction Zones



Zone 3 Managed Wildland Zone



Goal: Survivable Space Zones

Zone 3 Managed Wildland Zone



Zone 4 Community Ignition Zone



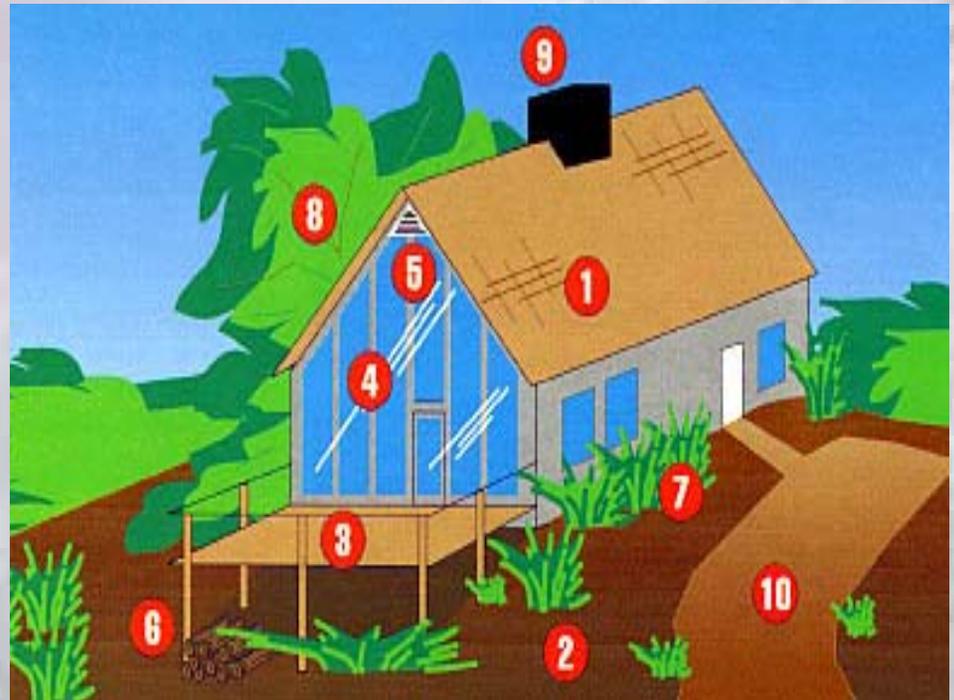
Hazard Assessment

A home hazard assessment can suggest what mitigation measures are needed to reduce risks.

Rating Components

- Access
- Vegetation
- Structure
- Utilities
- Other

Considerations



All these **attributes** need to be **mapped**, preferably at the parcel level!

Community Wildfire Protection Plan

Step Four: Establish a community wildfire protection plan

The team's first objective is to create a **map** using geographic information system (GIS) technology and access to technical resource specialists. County government and Federal agencies that can be useful for planning are an **important part of the CWP** for the community, which will include wildland areas (forests, grasslands), human infrastructures, and areas at risk of disturbance. The community knowledge and experience will be a key reference for the working team to identify priorities.



Southwest Community Wildfire Protection Plan Guide



Firewise Recognition



Assessment & Evaluation

The WUI specialist will complete the community assessment and evaluation.

The assessment will be presented to the Firewise board for review and acceptance.

If the Board rejects the assessment and evaluation, the Firewise process will terminate.



Step 4: Assessment & Evaluation

Upon completion of the **site assessment** and evaluation of the community's readiness to withstand a WUI fire, the WUI specialist schedules a meeting with the local Firewise board. The assessment and evaluation are presented for review and acceptance. If the site assessment and evaluation are accepted, the process continues. If they are rejected, it terminates.

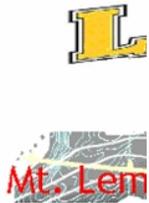
Accomplishments in AZ: Firewise

District	Community/Fire Dept. Name	Activity Assessment (Training, Fuels, Mitigation, etc.)	Acres/Structures Affected		Population or # Trained	Fire Depts & Agencies	Recognition Date
Phoenix	Timber Ridge	Assessment/FWC-USA Plan		250	625	1	12/2002
Tucson	Mt. Lemmon	Fuels Mitigation/CWPP	27	85	212	1	12/16/2004
Flagstaff	Forest Highlands	Assessment/FWC-USA Plan	160	390	975	1	12/16/2004
Tucson	Palominas	Assessment/FWC-USA Plan/Firebreak/CWPP	~15,360	300	750	1	2/8/2005
Phoenix	Highland Pines	Assessment/FWC-USA Plan	792	413	1032	1	8/1/2005
Phoenix	Groom Creek	Assessment/FWC-USA Plan, Fuels Hazard Reduction	388	408	1,020	1	8/10/2005
Flagstaff	Retreat at Walnut Creek - Pinetop	New Community Development Plan	22	49	122	1	10/1/2005
Tucson	Oracle	Assessment/FWC-USA Plan, Fuels Hazard Reduction	8,320	1,700	3,700	4	
Phoenix	Kohl's Tonto Creek Subdivision Inc.	Assessment/FWC-USA Plan, Fuels Hazard Reduction. (Approximately 86% of the residents are seasonal.)	50	120	360	1	4/28/2006
Statewide	Assessment Training	Assessment/Planning Training	N/A	N/A	26	10	N/A
TOTALS			25,119	3,715	8,822	22	N/A

*Population: Population affected by FWC activities @ 2.5 persons per residence or Number of persons qualified to conduct assessments/Fire Departments represented

In progress: Oracle (almost complete), Pine (Portal IV Subdivision), Patagonia, Bisbee (Banning Creek Canyon), and Elgin area (Audubon and Babocomari Ranches)

AZ: CWPPs



MOUNTAIN FIREWISE

- Apache County
- Coconino County
- Navajo County
- Town of Pinetop-Lakeside
- City of Show Low
- Pinetop Fire District
- Lakeside Fire District
- Show Low Fire District
- Linden Fire District
- Clay Springs-Pinedale Volunteer Fire District
- Heber-Overgaard Fire District
- Forest Lakes Volunteer Fire District
- White Mountain Apache Tribe, Fire and Rescue
- Apache-Sitgreaves National Forests
- Arizona State Land Department, Deputy State Forester, Fire Management Division
- White Mountain-Apache Tribe
- Bureau of Indian Affairs Fort Apache Agency

PALOMINAS COMMUNITY

WHAT

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The Firewise Community Program in the wild land/urban interface development is a community-based effort by local governments, fire management agencies, and developed areas. This plan and its implementation in the Palominas area, the University of Arizona, and the Palominas area. This plan and its implementation in the Palominas area, the University of Arizona, and the Palominas area.

Commu



COMMUNITY WILDFIRE PROTECTION PLAN

for
Flagstaff and Surrounding Communities
in the Coconino and Kaibab National Forests
of Coconino County, Arizona

January 2005

A collaborative planning and implementation effort coordinated by:

Greater Flagstaff Forests Partnership
&
Ponderosa Fire Advisory Council

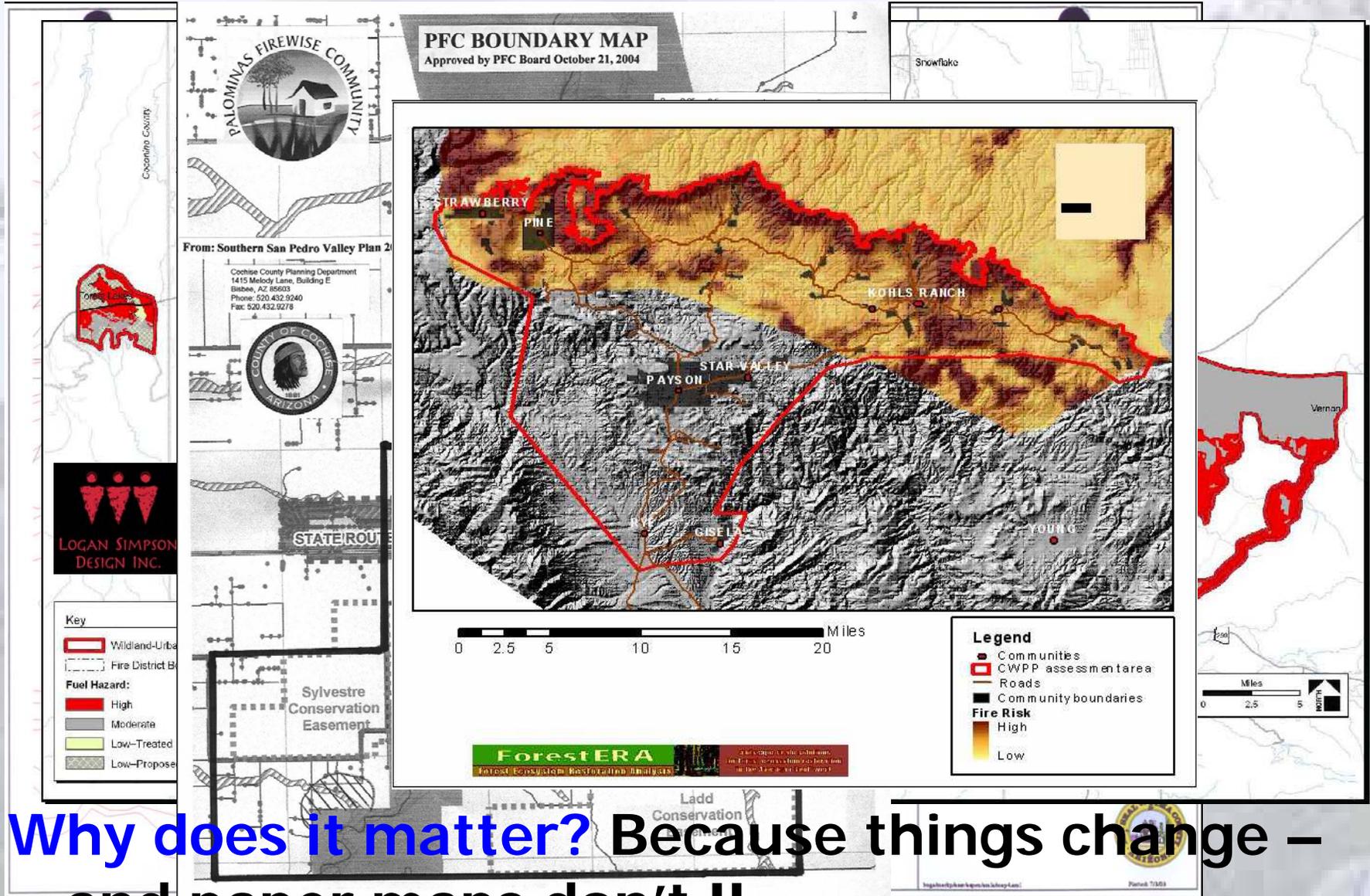
Y
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In
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Gila County
October 2005



But is our current approach sustainable?



Why does it matter? Because things change –
...and paper maps don't !!

Our goal is to help people like the “Rim Country” team in Gila County Arizona build the local capacity to use (and in some cases, manage) **digital, spatially explicit wildfire assessment data...**

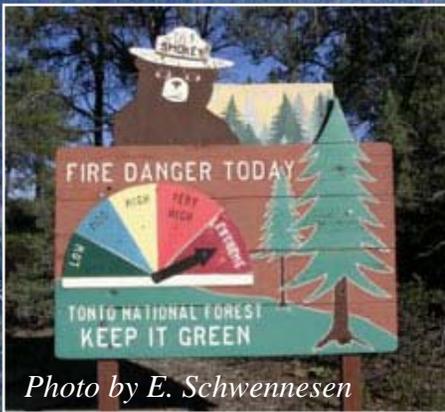


Photo by E. Schwennesen

From “Rim Country CWPP”
Gila County, Arizona
October 2004

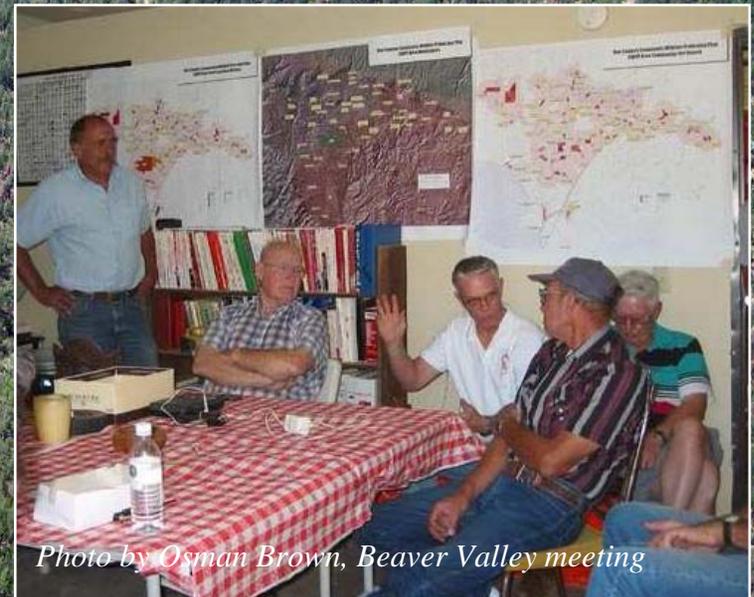


Photo by Osman Brown, Beaver Valley meeting

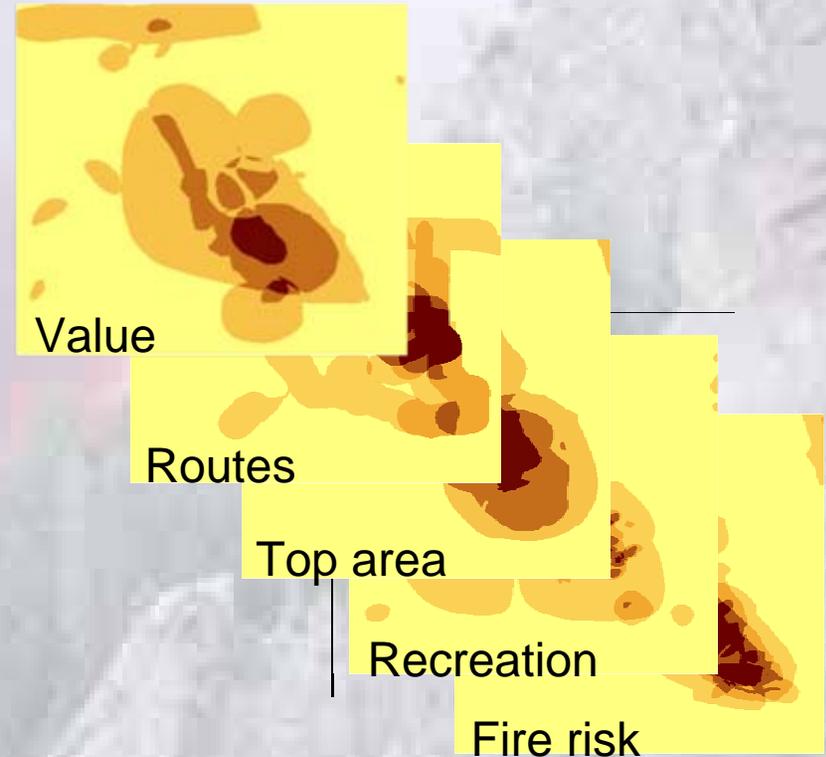
Photo by Gary Hatch, Community of Strawberry, Arizona

**...ultimately,
to reduce risk
today &
tomorrow**



Photo (July 7, 2004)
of the Willow Fire,
by Sgt. Craig Smith,
Gila County
Sheriff's Department

Geospatial technology is challenging – even to experts!



So how are we going to bridge this proverbial digital divide?

Establish Partnerships

- Arizona Firewise Communities
- Other Cooperative Extension-influenced programs (e.g., Master Watershed Stewards)
- Other grass-roots data collection initiatives (e.g. Cooperative Weed Management Areas)
- Governor's Forest Health Advisory Councils & Mapping & Assessment Subcommittee
- Arizona Interagency Coordinating Group
- Integrated data repositories and decision support systems: ALRIS, Arizona FIREMAP, ForestERA, Wildfire Alternatives (WALTER)
- ...and all those interested in capacity building and data sharing



Arizona Forest Health Advisory Councils

- created the Mapping & Assessment Subcommittee (M&A)
 - Overall mandate: advise the FH Council's on mapping and assessment issues associated with forest health
 - Initial focus: A more coordinated data sharing and reporting effort for fuels treatments statewide.

The screenshot shows the homepage of the Governor's Forest Health Council. The header features a banner with a portrait of Governor Janet Napolitano and the text "GOVERNOR'S FOREST HEALTH COUNCILS". A navigation menu on the left includes links for "FHC Home", "Forest Health Advisory Council", "Members", "Agendas / Minutes", "Presentations", "Governor's Forest Health Oversight Council", "Subcommittee Info", "Meeting Dates", "Policy", "Resources", "Contacts", and "Related Links". The main content area displays a "New!" announcement: "Governor Prepares Arizona Communities For Fire Season" dated April 26, 2005, and "Forest Health Oversight Council 2005 Recommendations" dated March 18, 2005. A "Joint Council Meeting" section lists a meeting on June 9, 2005, at 10:00 a.m. at the Russell Auditorium, 5636 East McDowell, Phoenix, AZ 85007. A search bar and "State Government Resources" link are also visible.

The screenshot shows the "Mapping & Assessment Subcommittee" page. The header is identical to the homepage. The navigation menu on the left is the same. The main content area features a sub-header "Mapping & Assessment Subcommittee ~ Education Subcommittee" and a link "What is M&A". Below this, there are two columns of links for "2005 Agendas" and "2005 Minutes". The "2005 Agendas" column lists links for "05-10-05 M&A Subcommittee Agenda", "03-08-05 M&A Subcommittee Agenda", "02-08-05 M&A Subcommittee Agenda", and "01-04-05 M&A Subcommittee Agenda". The "2005 Minutes" column lists links for "03-08-05 M&A Subcommittee Minutes", "02-08-05 M&A Subcommittee Minutes", and "01-04-05 M&A Subcommittee Minutes". A "2004 Agendas" section lists links for "10-08-04 M&A Subcommittee Agenda" and "10-08-04 M&A Subcommittee Agenda". A "2004 Minutes" section lists a link for "11-17-04 M&A Subcommittee Minutes". A "Joint Council Meeting" section lists a meeting on June 9, 2005, at 10:00 a.m. at the Russell Auditorium, 5636 East McDowell, Phoenix, AZ 85007. A search bar and "State Government Resources" link are also visible.

<http://www.governor.state.az.us/FHC/>

ForestERA
 Forest Ecosystem Restoration Analysis
 Landscape-scale solutions for forest ecosystem restoration in the American Southwest

Overview Tools Data and Maps Workshops Updates Search

Seeing the Big Picture

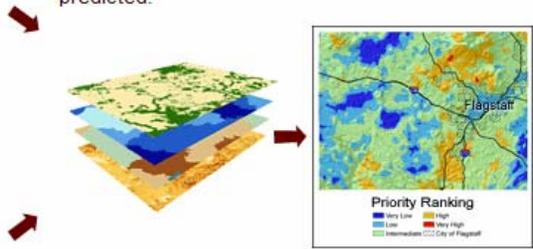
ForestERA is a collaborative process that views forest ecosystems from a landscape perspective to discover better ways to restore their health and protect our communities. Stakeholders representing diverse backgrounds, priorities, needs and points of view work together in small groups using the best scientific information and tools available.



ForestERA has study areas in Arizona and New Mexico. Click on study area for project details.



Participants view data in map form to weigh various fire, community, wildlife, watershed and other factors important in decision-making. Areas of high value and high risk are prioritized, management actions proposed, and effects predicted.



A detailed action plan results that reflects multiple inputs, values and points of view. (Read more...)

NEWS

Sign up for our e-newsletter

- 02/21/06 *White Mountains Landscape Assessment Data Atlas* revised (7 MB PDF)
- 9/05/05 "A landscape perspective for Forest Restoration" published in *Journal of Forestry* (112 KB PDF)
- 7/19/05 U.S. Forest Service *2005 Wildland Fire Use Guide* includes ForestERA risk assessment methods (1.7 MB PDF).
- 6/28/05 *White Mountains Project Stakeholder Needs Assessment* complete (7 MB PDF).
- 6/2/05 *North-central New Mexico Project Stakeholder Needs Assessment* complete (274 KB PDF).

<http://www.forestera.nau.edu/>
ForestERA

Arizona FIREMAP Home - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

http://www.azfiremap.org/azfiremap/

Arizona FIREMAP

Arizona Fuels, Information, Restoration, & Education Mapping & Assessment Program

The Arizona FIREMAP (Fuels, Information, Restoration, and Education Mapping and Assessment Program), a project being developed by the State Forester's Office and the State Cartographer's Office, includes a number of potential tools to help track, plan, and prioritize fuel treatment and other forest activities throughout Arizona. The first phase of this project involves creation of an interactive Internet map viewer ([Fuels Treatment Module](#)) that will be a spatially dynamic web application focused on providing access to the geographic location of statewide fuel treatments.

Arizona Fuels Treatment Module - BETA release
Last Build: Jan 31, 2006, 5:16 PM (GMT-07:00)

The Fuels Treatment Module enables users to locate and access information about specific fuels treatment projects, and groups of projects, based on treatment characteristics or location.

Powerful interactive maps enable users to visualize the project and treatment locations in relation to various ground features, political boundaries, transportation routes, communities, and other fuels treatment projects.

Simple-to-use reporting tools allow quick creation of local and regional maps and reports for non-technical users, while advanced query tools allow more in-depth analysis for advanced users.

Data Upload Module - ALPHA release

The Arizona FIREMAP Data Upload Module enables treatment data providers with a tool to upload, edit and delete their fuel treatment and project points and polygons.

This module is currently in its late Alpha stage and requires power user access privileges.

Arizona FIREMAP

- [About Arizona FIREMAP](#)
- [FIREMAP Development](#)
- [Contact Us](#)

[Fuels Treatment Module](#)
BETA release

Arizona Fire Links

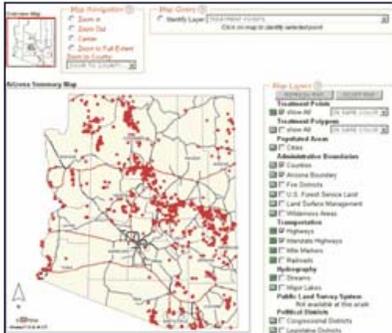
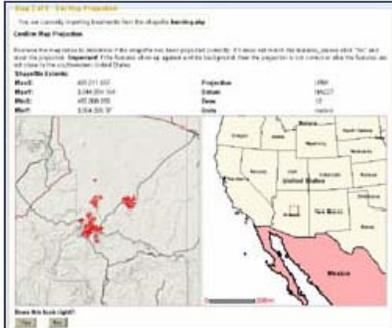
- [Arizona State Forestry](#)
- [National Interagency Fire Center](#)
- [Southwest Coordination Center](#)
- [Firewise Arizona](#)

Arizona's National Forests

- [Apache-Sitgreaves](#)
- [Coconino](#)
- [Coronado](#)
- [Kaibab](#)
- [Prescott](#)
- [Tonto](#)

Current Wildfire Maps

- [National Maps](#)
- [SW Area MODIS Map](#)

Arizona FIREMAP
http://azfiremap.org/





http://walter.arizona.edu/

- Overview
- Fire
- Climate
- Society
- Tools
- Search

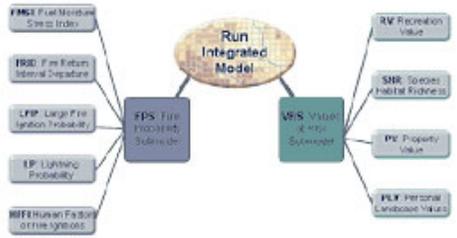
Wildfire Alternatives (WALTER), located at the University of Arizona, is an interdisciplinary research initiative aimed at improving our understanding of the processes and consequences of interactions among wildfire, climate and society. WALTER seeks to capitalize on advances in geospatial, analytical, and web delivery technology to provide access to scientific research activities and findings, educational materials, and decision support tools, such as FCS-1.

Right: The four project study areas, which can be found in the FCS-1 model



Catalina/Rincon | Chiricahua | Huachuca | Jemez

Featuring the Fire-Climate-Society Strategic Fire Model



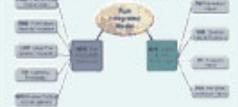
Decision makers, managers, and scientists all recognize the power of mechanistic spatial models for tactical management of wildland fire and have expressed a need for strategic planning tools that also include climate and human factors.

Fire-Climate-Society (FCS-1) is a prototype online model designed to be used in strategic planning for wildfire management. The model provides spatially explicit maps for any of four study areas (see map above), based on information users enter online. The

resulting maps show spatially explicit information about the geographical distribution of fire probability and values at risk for the selected study area.

What's News

The FCS-1 model is now operational!



The National Fire Plan and the Healthy Forests Restoration Act have been added to the Policy page

Mark your calendar!

- December 6-9, 2005**
- 4th USGS Wildland Fire Science Workshop

Search the Site:

Search [Advanced Search](#)



Stakeholders

Site Status:

[View site log for all changes](#)

HOT SPOT: Have you seen this page?

Tools: [Dynamic Vegetation Greenness Animation](#)
[check it out...](#)

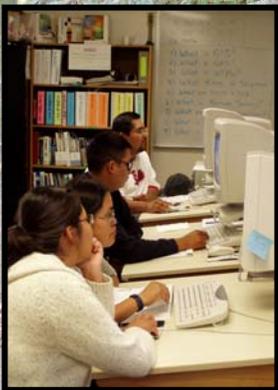
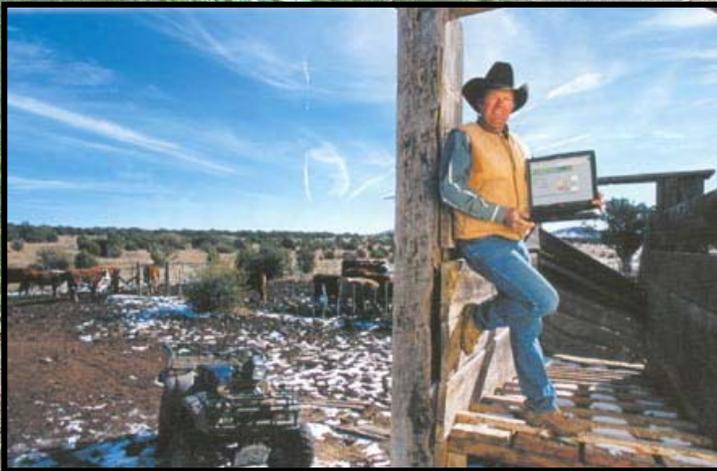




The Geospatial Extension Program in Arizona



Bringing people and geospatial technology together



Facilitate practical use...



National Geospatial Technology Extension Network

Our mission is to facilitate the practical use of Earth systems science and technology, and help meet the growing demand for a spatially literate workforce. This is made possible through seeds sown by NASA, USDA and NOAA, and the science and education networks provided by Land Grant (Cooperative Extension), Space Grant, Sea Grant and other local partners.

Mission

About Geospatial Extension | **Outcomes and Impacts** | **Resources** | **Geospatial Technology** | **Applications**



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- New Hampshire
- North Dakota
- Ohio
- Oklahoma
- Rhode Island
- Texas
- Utah
- Virginia



From Our Archives



Courtesy of Sandy Prisloe
University of Connecticut

Upcoming Events

AUTO-CARTO 2006
June 26-28, 2006
Vancouver, WA
[Website](#) • [More Info](#)

Soil and Water Conservation Society's Annual Meeting
July 22-26, 2006
Keystone, CO
[Website](#) • [More Info](#)

[Full Calendar](#)



In each participating state, a Geospatial Extension Specialist (GES) acts as a knowledge broker, or the two-way conduit between research, applications development and practice. We build on existing Earth science capabilities, which include Earth observations from space, modeling and systems engineering, geographic information systems (GIS), the global positioning system (GPS) and spatial decision support systems (SDSS).

Factoid NASA Earth system science: from missions to measurements to models and decision making. Search the [on-line database](#) for your needs.

Last updated: 1 April 2006 • [Send comments or questions](#) • [Log in](#)

NGTEN: <http://geospatialextension.org/>

How?

The Geospatial Toolkit – Home - Mozilla Firefox

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http://geospatialextension.org/resources/cool-tools/the-geospatial-toolkit

 **National Geospatial Technology Extension Network**

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Calendar

The Geospatial Tool Kit

One of the key innovations resulting from On-Target which we now use in all field-based geospatial activities is a surprisingly simple set of tools that bring imagery, GPS and GIS together into one turn-key, field-based, decision support solution, a Geospatial Tool Kit (a Pocket-PC PDA, an inexpensive WAAS-GPS, NASA satellite imagery and/or USGS air photos and topography maps through  TerraServer-USA, and simple GIS software) that end users can both obtain and use with relative ease. This entire system costs under \$1,000, a cost so low that it can be retained by a workshop participant or their sponsoring agency. This has allowed participants to immediately reinforce the critical cognitive-hardware-software linkages, upon arrival at their homes following a training event.



[Training Materials for the Geospatial Tool Kit](#)

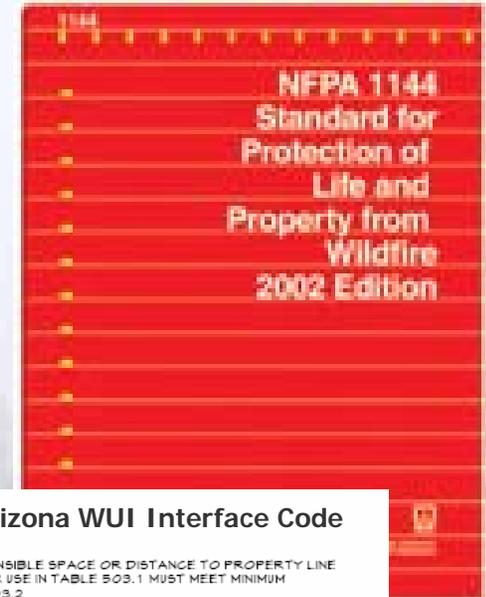
A Ground Up Approach: the GTK

Protecting Life and Property from Wildfire

Guidelines

NFPA 1144 WILDFIRE CHECKLIST- EXAMPLE

Wildfire Hazard Severity Checklist			
Place an X in the appropriate gray box for the desired choice unless noted otherwise. The table will automatically tabulate your total.			
A. Subdivision Design		E. Roofing Material	
1. Ingress and egress (pick one only)		1. Construction material (pick one only)	
a. Two or more roads in/out	0 0	Class A roof	0 0
b. One road in/out	7 0	Class B roof	3 0
2. Road Width (pick one only)		Class C roof	15 0
a. >7.3 M (24 ft)	0 0	Not rated	25 0
b. >6.1 M (20 ft) and <7.3 M (24 ft)	2 0	F. Building Construction	
c. <6.1 M (20 ft)	4 0	1. Materials (predominate) (pick one only)	
3. All Season Road Condition (pick one only)		a. Non-combustible/fire-resistant siding, eaves, & deck (see Chapter 8)	
a. Surfaced Road, grade <5%	0 0		0 0
b. Surfaced Road, grade >5%	2 0	b. Non-combustible/fire-resistant siding, eaves, & deck	
c. Non-Surfaced Road, grade <5%	2 0		5 0
d. Non-Surfaced Road, grade >5%	5 0	c. Combustible siding & deck	
e. Other than all season	7 0		10 0
4. Fire Service Access (pick one only)		2. Building setback relative to slopes of 30% or more (pick one only)	
a. <91.4 M (300 ft) with turnaround	0 0	a. > 9.14 M (30 ft) to slope	
b. > 91.4 M (300 ft) with turnaround	2 0	b. < 9.14 M (30 ft) to slope	
c. <91.4 M (300 ft) w/o turnaround	4 0	G. Available	
d. >91.4 M (300 ft) w/o turnaround	5 0	1. Water source available	
5. Street Signs (pick one only)		a. Pressurized water source	
a. Present [10.2 (4 in) in size and reflectorized	0 0	1892 L/min (500gpm) hydrant	
b. Not Present	5 0	(1000ft apt)	
B. Vegetation (Fuel Models)		b. Nonpressurized water source (off site)	
1. Characteristics of predominate vegetation (pick one only) within 91.4 M (300 ft)		≥ 945.4 L/min (250gpm) code	
a. Light (Grasses, Forbs, Sawgrass, Tundra NFDRS Fuel Models A, C, L, N, E, & T	5 0	≥ 945.4 L/min (250gpm) code	
b. Medium (light brush & small trees) NFDRS Fuel Models D, E, F, H, P, Q, & U	10 0	c. Water unavailable	
c. Heavy (dense brush, timber & hardwoods NFDRS Fuel Models B, G, & O	20 0	2. Organized response	
d. Slash (timber harvesting residue) NFDRS Fuel Models J, K, & L	25 0	a. Station < 8km (5 mi) from	
2. Defensible space (pick one only)		b. Station ≥ 8km (5mi) from	
a. More than 30.48 M (100 ft) of vegetation treatment from structure	1 0	3. Fixed Fire Protection	
b. 21.6 M to 30.48 M (71 to 100 ft) of vegetation treatment from structure	3 0	a. NFPA 13, 13R, 13D sprinkler	
c. 9.14 M to 21.3 M (30 to 70 ft) of vegetation treatment from structure	10 0	b. None	
d. 9.14 M (30 ft) of vegetation treatment from structure	25 0	H. Utilities (if applicable)	
C. Topography within 91.4 M (300 ft) of structure		1. Placement	
slope < 5%	1 0	All underground utilities	
slope 10% to 20%	4 0	One underground, one above	
slope 21% to 30%	7 0	All aboveground	
slope 31% to 40%	8 0	I. Totals by hazard level	
slope > 40%	10 0	(check-point totals)	
D. Additional Rating Factors (rate all that apply)		1. Low hazard:	
e. Place a number from 0-5 in the appropriate yellow box.		2. Moderate hazard:	
Topographical features that adversely affect fire and fire behavior		3. High hazard:	
0-5	0	4. Extreme hazard:	
Areas with history of higher fire occurrence surrounding areas due to special situations (lightning, railroads, escaped debris burning, areas that are periodically exposed to daily severe fire weather and strong dry winds separation of adjacent structures that can contribute to fire spread		DEVELOPMENT	
0-5	0	LAT:	
0-5	0		
0-5	0		



Pima County, Arizona WUI Interface Code

- DEFENSIBLE SPACE
- 15 FOOT MINIMUM DEFENSIBLE SPACE OR DISTANCE TO PROPERTY LINE
 - DEFENSIBLE SPACE FOR USE IN TABLE 603.1 MUST MEET MINIMUM DISTANCES IN TABLE 603.2
 - ANY OF THESE REQUIREMENTS CAN BE MODIFIED BY THE FIRE DISTRICT

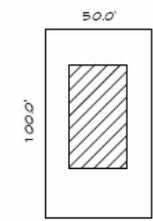
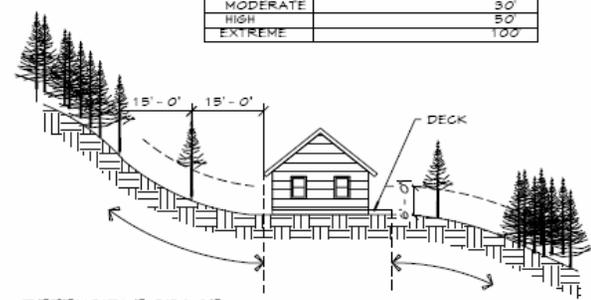


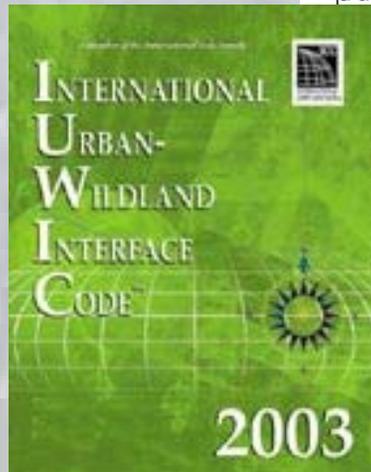
TABLE 603.2 REQUIRED DEFENSIBLE SPACE

WUI AREA	FUEL MODIFICATION DISTANCE
MODERATE	30'
HIGH	50'
EXTREME	100'

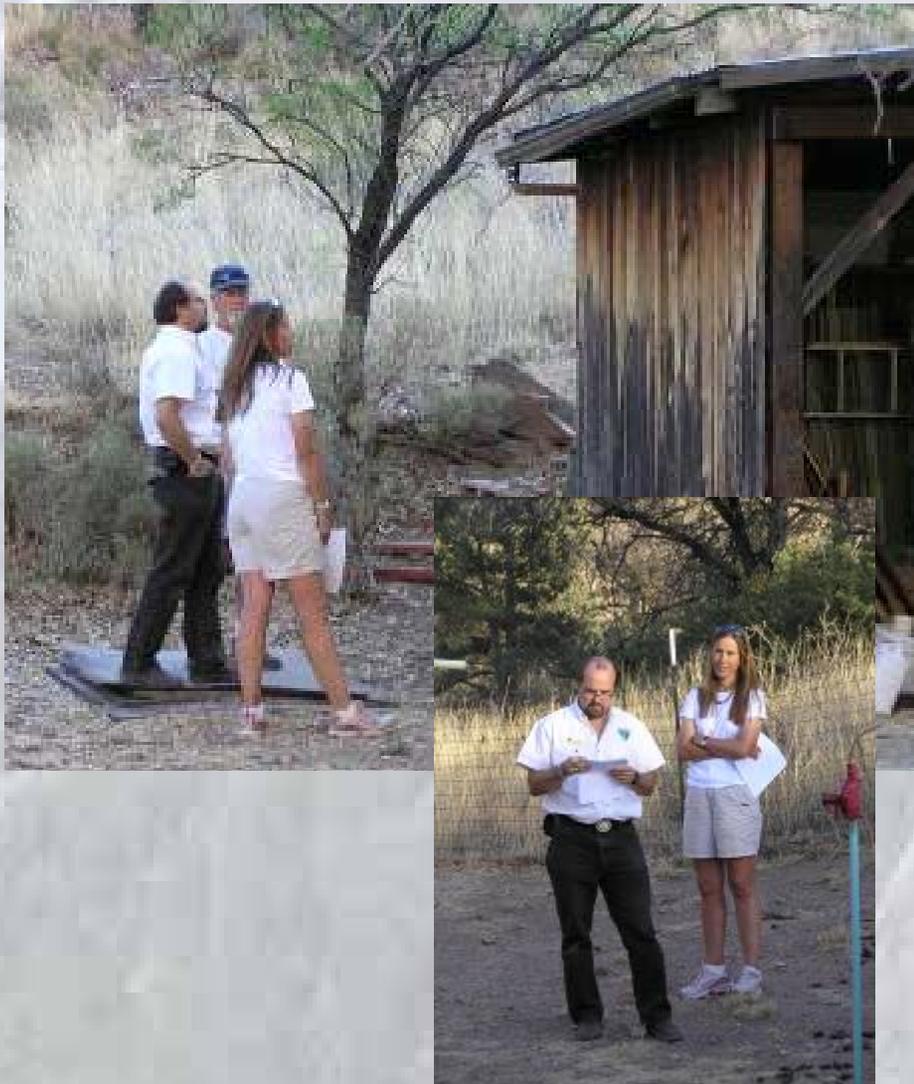


DEFENSIBLE SPACE

NTS



Data flow: from field to database



NFPA 1144 WILDFIRE CHECKLIST- EXAMPLE

Wildfire Hazard Severity Checklist			
Place an X in the appropriate gray box for the desired choice unless noted otherwise. The table will automatically tabulate your total.			
A. Subdivision Design		E. Roofing Material	
1. Ingress and egress (pick one only)		1. Construction material (pick one only)	
a. Two or more roads in/out	0 0	Class A roof	0 0
b. One road in/out	7 0	Class B roof	3 0
2. Road Width (pick one only)		Class C roof	15 0
a. >7.3 M (24 ft)	0 0	Not rated	25 0
b. >6.1 M (20 ft) and <7.3 M (24 ft)	2 0	F. Building Construction	
c. <6.1 M (20 ft)	4 0	1. Materials (predominate) (pick one only)	
3. All Season Road Condition (pick one only)		a. Non-combustible/fire-resistive siding, eaves, & deck (see Chapter 8)	0 0
a. Surfaced Road, grade <5%	0 0	b. Non-combustible/fire-resistive siding, eaves, & deck	5 0
b. Surfaced Road, grade >5%	2 0	c. Combustible siding & deck	10 0
c. Non-Surfaced Road, grade <5%	2 0	2. Building setback relative to slopes of 30% or more (pick one only)	
d. Non-Surfaced Road, grade >5%	5 0	a. > 9.14 M (30 ft) to slope	1 0
e. Other than all season	7 0	b. < 9.14 M (30 ft) to slope	5 0
4. Fire Service Access (pick one only)		G. Available Fire Protection	
a. <9.14 M (300 ft) with turnaround	0 0	1. Water source availability (pick one only)	
b. > 9.14 M (300 ft) with turnaround	2 0	a. Pressurized water source availability (1892L/min (500gpm) hydrants < 304.8 m (1000ft apt)	0 0
c. <9.14 M (300 ft) w/o turnaround	4 0	946.4 L/min (250gpm) hydrants < 304.8 m (1000ft apt)	1 0
d. >9.14 M (300 ft) w/o turnaround	5 0	b. Nonpressurized water source availability (off site)	
5. Street Signs (pick one only)		> 946.4 L/min (250gpm) continuous for 2 hrs	3 0
a. Present (10.2 (4 in) in size and reflectorized	0 0	< 946.4 L/min (250gpm) continuous for 2 hrs	5 0
b. Not Present	5 0	c. Water unavailable	10 0
B. Vegetation (Fuel Models)		2. Organized response resources (pick one only)	
1. Characteristics of predominate vegetation (pick one only) within 91.4 M (300 ft)		a. Station < 8km (5 mi) from structure	1 0
a. Light (Grasses, Forbs, Sawgrass, Tundra NFDRS Fuel Models A, C, L,N,S, & T)	5 0	b. Station > 8km (5mi) from structure	3 0
b. Medium (light bush & small trees) NFDRS Fuel Models D,E,F,H,P,Q,& U	10 0	3. Fixed Fire Protection (pick one only)	
c. Heavy (dense brush, timber & hardwoods NFDRS Fuel Models B, G, & O)	20 0	a. NFPA 13, 13R, 13D sprinkler system	0 0
d. Slash (timber harvesting residue) NFDRS Fuel Models J, K, & L	25 0	b. None	5 0
2. Defensible space (pick one only)		H. Utilities (Gas and Electric)	
a. More than 30.48 M (100 ft) of vegetation treatment from structure	1 0	1. Placement (pick one only)	
b. 21.6 M to 30.48 M (71 to 100 ft) of vegetation treatment from structure	3 0	All underground utilities	0 0
c. 9.14 M to 21.3 M (30 to 70 ft) of vegetation treatment from structure	10 0	One underground, one aboveground	3 0
d. < 9.14 M (30 ft) of vegetation treatment from structure	25 0	All aboveground	5 0
C. Topography within 91.4 M (300 ft) of Structure		I. Totals for Subdivision	
1. Slope < 5%	1 0	(check-point totals) - Hazard assessment	
2. Slope 10% to 20%	4 0	1. Low hazard:	< 40 points
3. Slope 21% to 30%	7 0	2. Moderate hazard:	40-65points
4. Slope 31% to 40%	5 0	3. High hazard:	70-112 points
5. Slope > 40%	10 0	4. Extreme hazard:	> 112 points
D. Additional Rating Factors (rate all that apply)		DEVELOPMENT COMMENTS	
Note: Place a number from 0-5 in the appropriate yellow box:		LAT: _____ LONG: _____	
1. Topographical features that adversely affect fire/wildland fire behavior	0-5 0		
2. Areas with history of higher fire occurrence than surrounding areas due to special situations (heavy lightning, railroads, escaped debris burning)	0-5 0		
3. Areas that are periodically exposed to unusually severe fire weather and strong dry winds	0-5 0		
4. Separation of adjacent structures that can contribute to fire spread	0-5 0		

Analog...

Data flow: the field to database



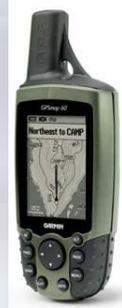
Or digital...

Diné College student Nora Jeli trains NPS staff on GTKs



The Geospatial Tool Kit (GTK)

- Aerial photos/topos in background
 - TerraServer-USA.com
- GPS Receiver
 - Garmin GPSmap 60
- Handheld Computer
 - Hp iPAQ 2400 PocketPC
- GIS on the handheld
 - StarPal HGIS, ESRI ArcPad
- GIS on the desktop or laptop
 - HGIS and ESRI ArcView



Original concept for the GTK was developed by USU's Phil Rasmussen

Pocket_PC10 File Zoom Tools Help

Start 3:58

Thursday, February 03, 2005

Owner: Barron Orr
(520) 626-8063

No upcoming appointments

No unread messages

No tasks

Microsoft

Pocket_PC10 File Zoom Tools Help

Start 4:00

03, 2005

Today

Calculator

File Explorer

HGIS_ARM

iPAQ Image Viewer

Notes

Windows Media

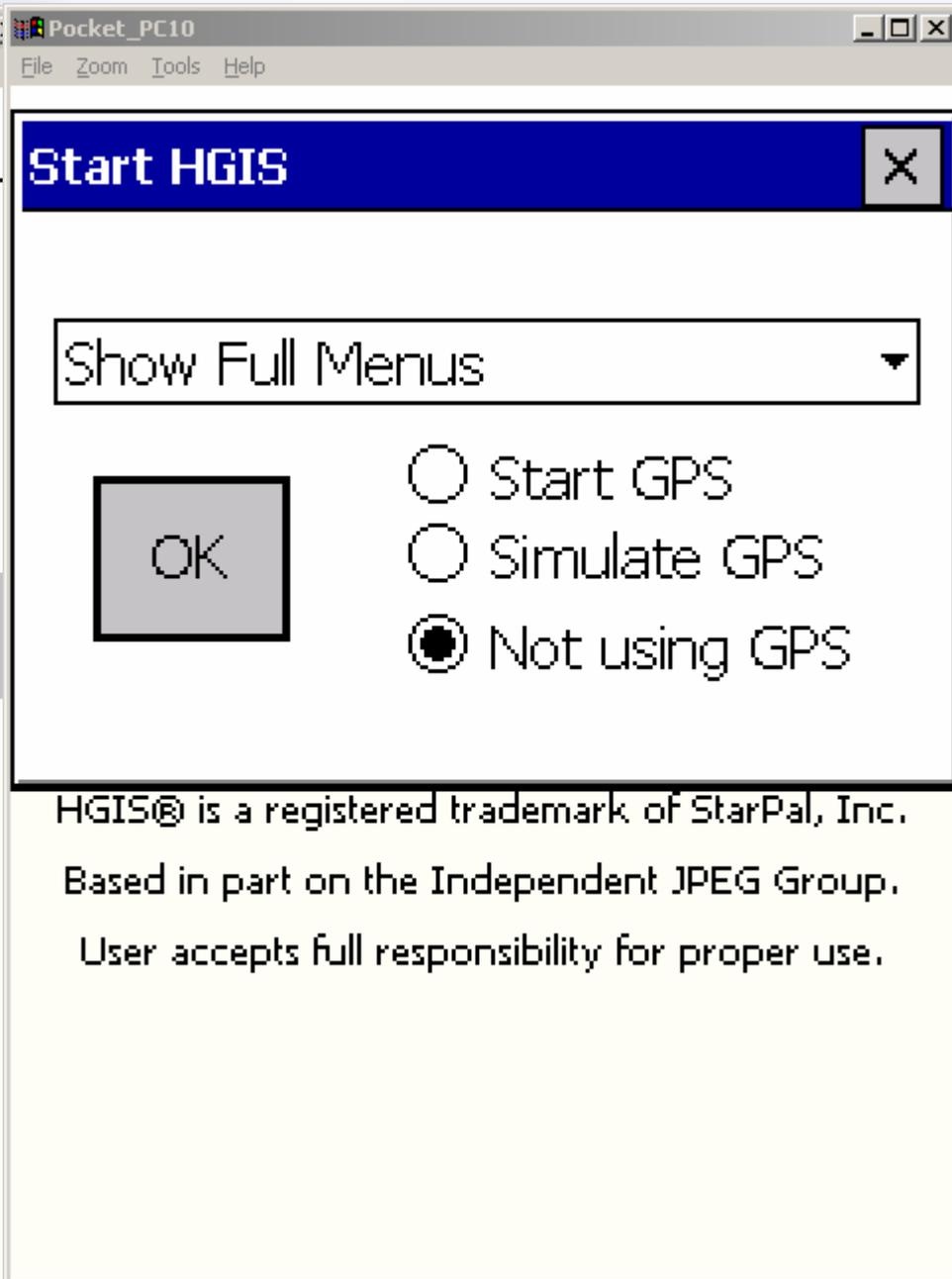
Programs

Settings

Find

Help

Microsoft



Pocket_PC10

File Zoom Tools Help

File Edit Map GPS Help OFF

- New from Template
- Open Layer ...
- Define Layer ...
- Save Layer ...
- Save Layer As ...
- Close Layer ...
- Layer Structure ...

10 m

Pocket_PC10

File Zoom Tools Help

SELECT MAP FILE

Open

Folder: All Folders

Type: Image: JPG+JGC

Name ▲	Folder	Date
 NampaCivic1m...	Nampa	2/2 8:20
 NampaCivic2m...	Nampa	2/3 10:5

10 m

Pocket_PC10

File Zoom Tools Help

Image Projection

World WGS84 (default) ▼

Lon Lat
 UTM

Zone

Northern Hemisphere

Pocket_PC10

File Zoom Tools Help

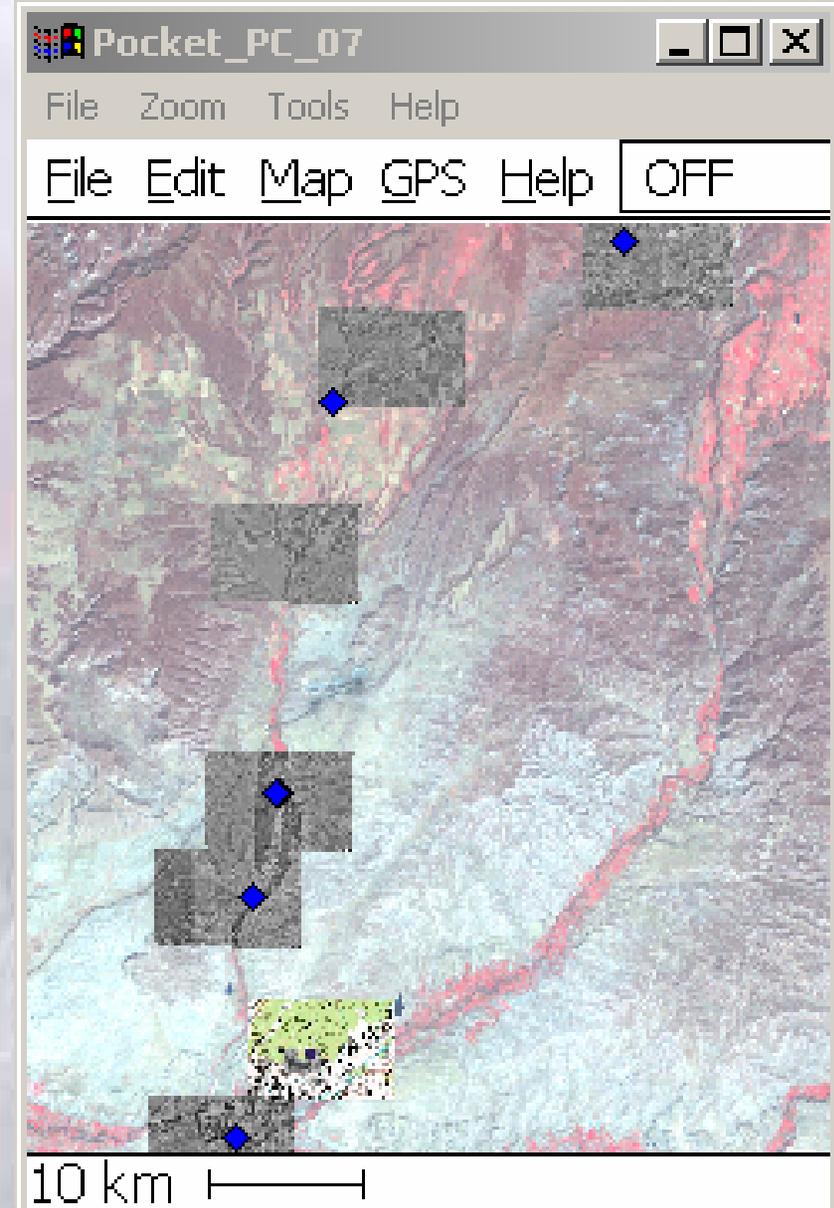
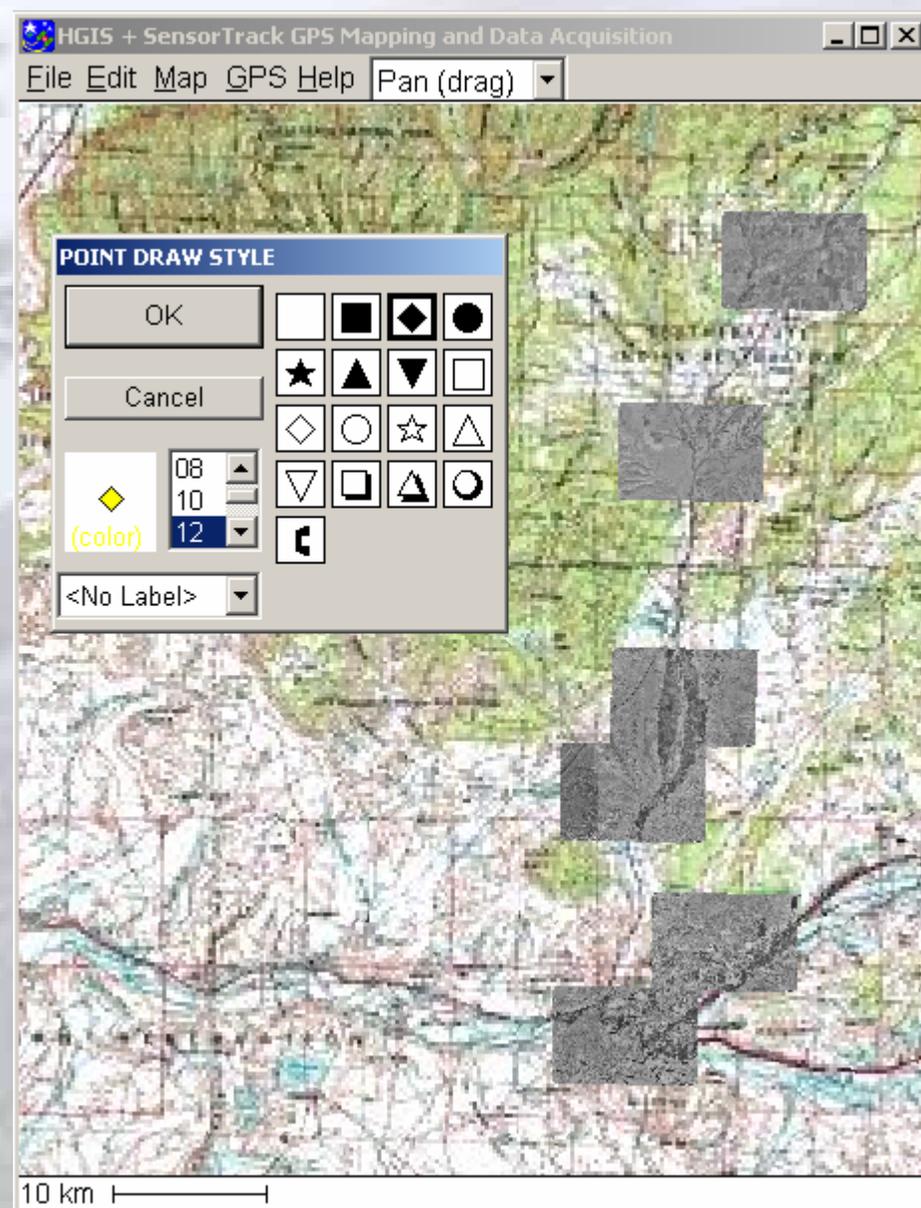
File Edit Map GPS Help OFF



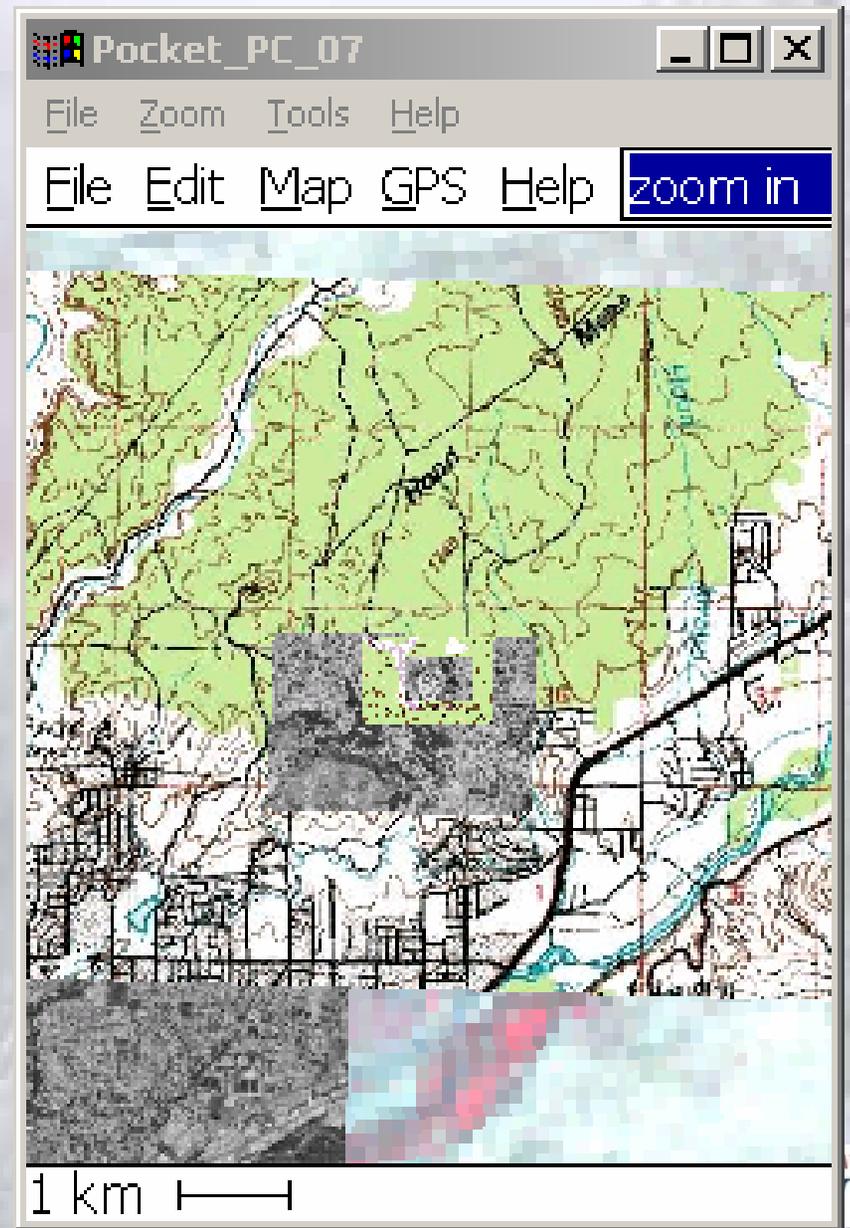
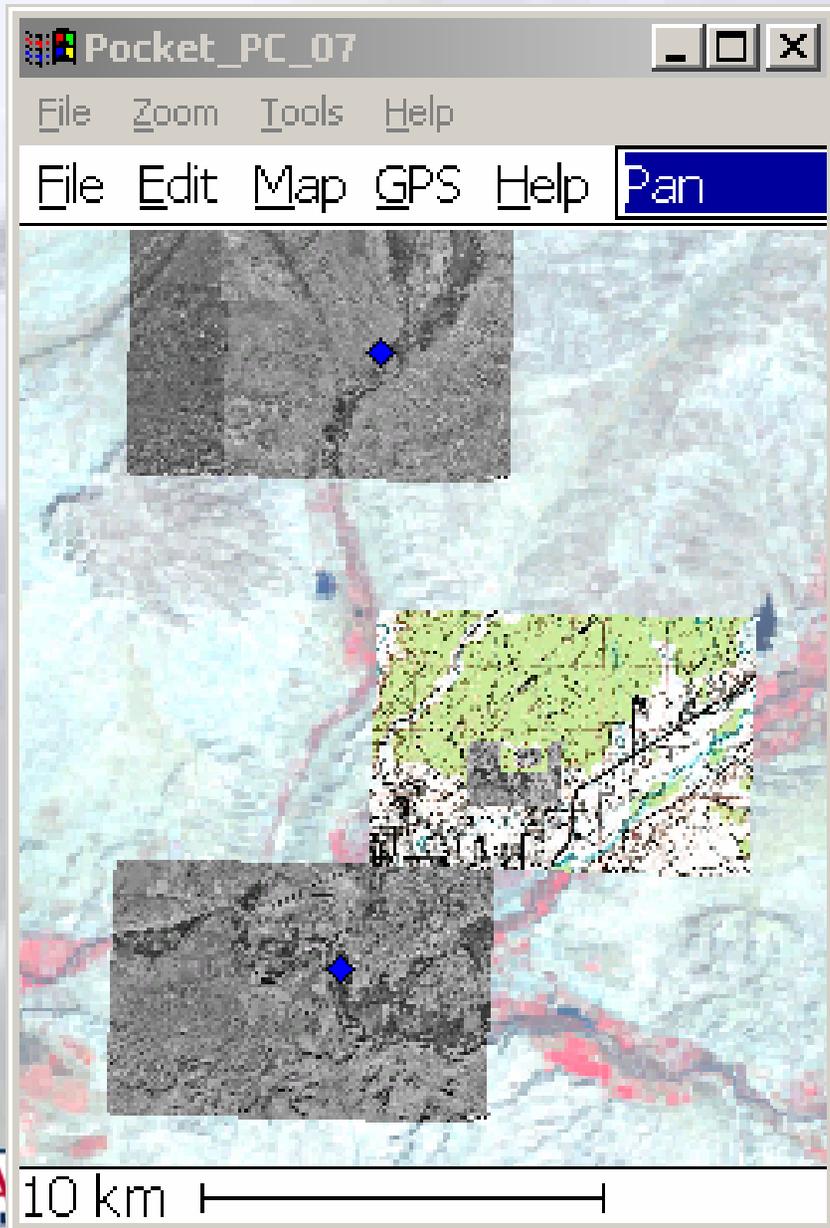
123	1	2	3	4	5	6	7	8	9	0	-	=	←			
Tab	q	w	e	r	t	y	u	i	o	p	[]				
CAP	a	s	d	f	g	h	j	k	l	;	'					
Shift	z	x	c	v	b	n	m	,	.	/			←			
Ctl	áü	`	\										↓	↑	←	→

100 m

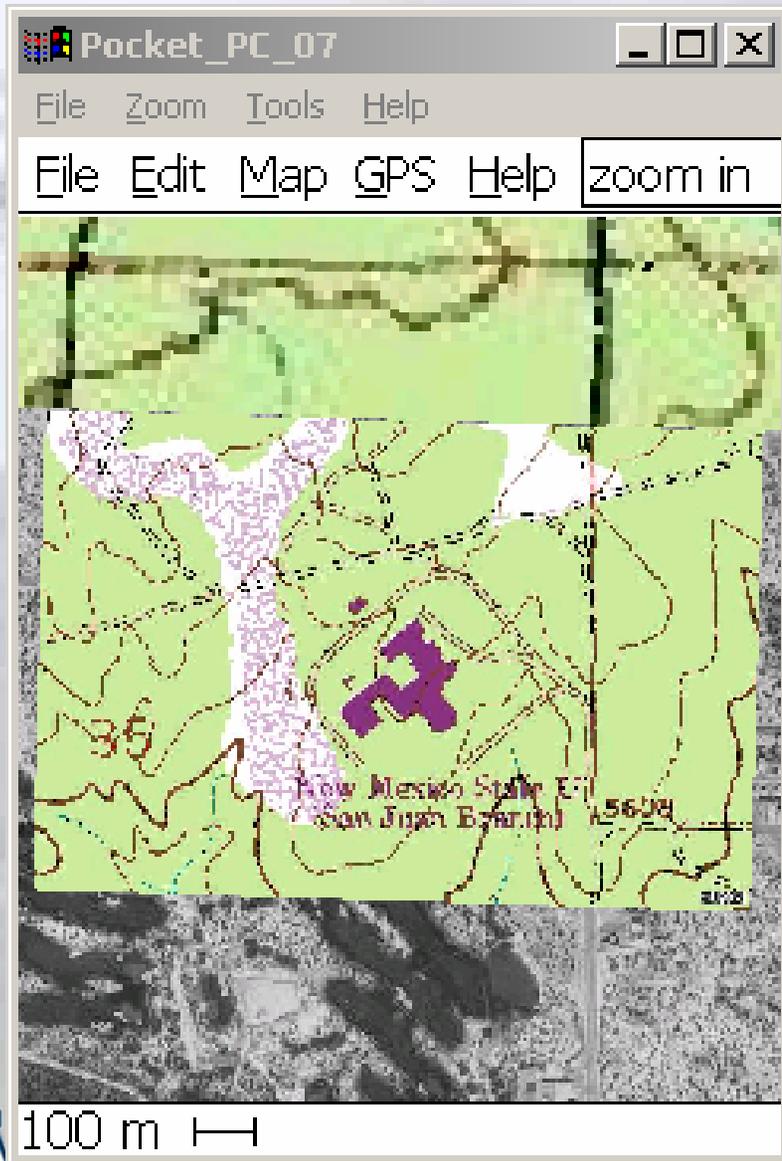
Farmington-Durango Example



Zooming in on San Juan College



Zooming in on San Juan College



1st Stop in Farmington

Pocket_PC_07

File Zoom Tools Help

File Edit Map GPS Help zoom in



Stop 1: Russian Knapweed
Acroptilon repens

100 m

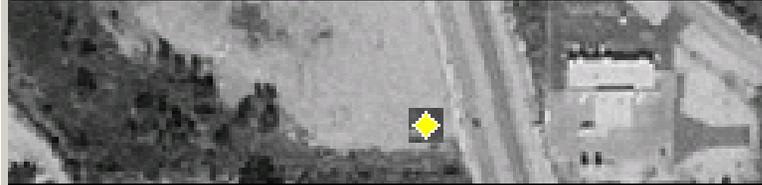
Pocket_PC_07

File Zoom Tools Help

...nts\FD_IPAQ\FD_Gar07.SHP

◆ info < > kbd Rsz

▲ WGS84_LAT	36.7234050	▼
WGS84_ALT	1598.90	▼
AREA_ACRE	0.0000	▼
DIST_METER	0.00	▼
GPS_DATE	40721	▼
GPS_TIME	165304	▼
SCINAME1	Acroptilon repen	▼
PCTCOV1	25-50%	▼
COMMON1	Russian knapwe	▼



100 m

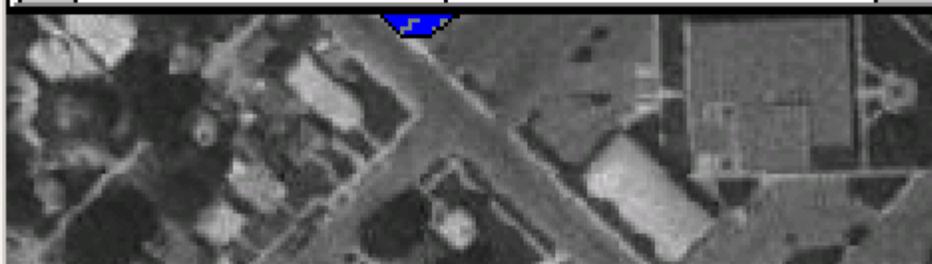
Pocket_PC10

File Zoom Tools Help

...uments\Nampa\nampa_2.SHP

info < > kbd Rsz

▲	SCINAME1		▼
	PCTCOV1	<Set As Default>	▲
	COMMON1	Acroptilon repens	≡
	GPS_ID	Aegilops cylindrica	
≡	WAYPOINT	Alhagi maurorum	
	STOP_NUM	Cardaria draba	
	LANDTYPE	Carduus nutans	▼
	BIOAGENT	Centaurea bieber	▼
▼	BIOANAME		▼



100 m

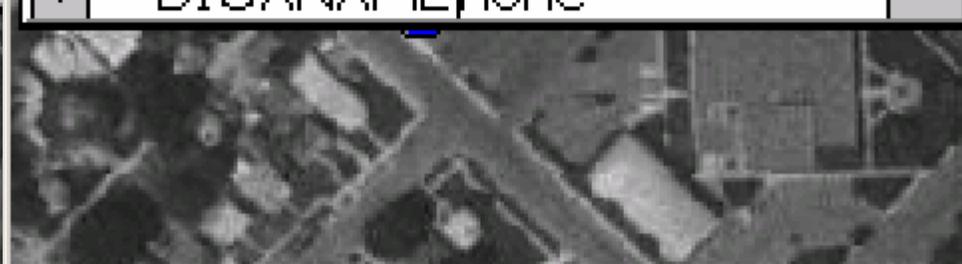
Pocket_PC10

File Zoom Tools Help

...uments\Nampa\nampa_2.SHP

info < > kbd Rsz

▲	SCINAME1	Cirsium arvense	▼
	PCTCOV1	1-5%	▼
	COMMON1	Canada thistle	▼
	GPS_ID	Garmin 03	▼
≡	WAYPOINT	003	▼
	STOP_NUM	3rd	▼
	LANDTYPE	parking lot	▼
	BIOAGENT	no	▼
▼	BIOANAME	none	▼



100 m

Field Application: 1st Colorado Stop

Pocket_PC_07

File Zoom Tools Help

File Edit Map GPS Help **Select**

100 m

Pocket_PC_07

File Zoom Tools Help

...nts\FD_IPAQ\FD_Gar07.SHP

◆ info < > kbd Rsz

▲ WGS84_LAT	37.1515846	▼
WGS84_ALT	2067.70	▼
AREA_ACRE	0.0000	▼
DIST_METER	0.00	▼
GPS_DATE	40721	▼
GPS_TIME	190358	▼
SCINAME1	Linaria vulgaris	▼
PCTCOV1	<1%	▼
COMMON1	yellow toadflax	▼

100 m



Home Software

Home

News Events Partners

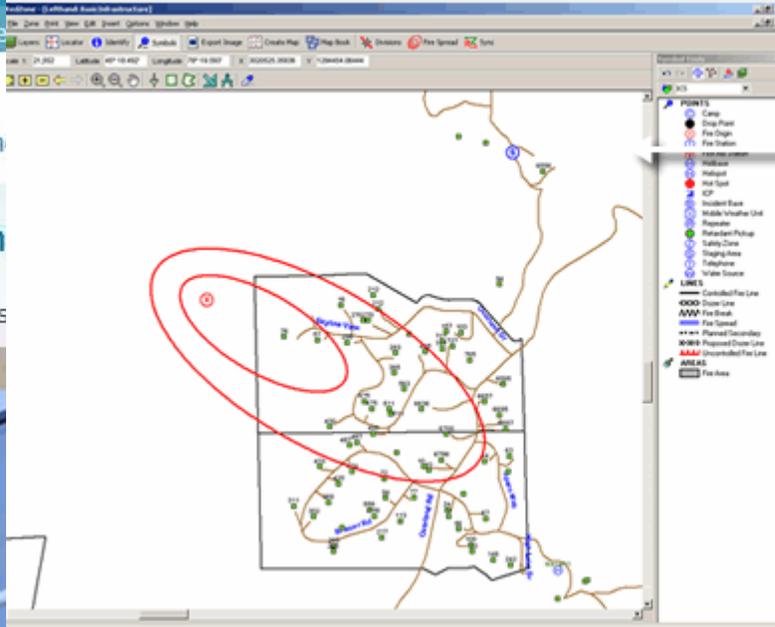
All-Hazard Mapping

Assets, hazards, and res



Touchscreen Friendly

Large buttons and a friendly interface make RZ3 Atlas great for engines and light users



Calculate Fire Spread

Create fire spread ellipses from spread rate and the number of time steps. Great for initial attack and community education.



- Create surveys
- Load to Palm or Pocket PC handhelds
- User friendly interface means less time training

of RZ3, our new incident response and planning software.

we worked hard to respond to feature requests and provide the software possible.

[Load an evaluation copy now!](#)

Back and forth from the field: Interoperable Systems

The screenshot shows the Arizona Fuels Treatment Module web application running in a Mozilla Firefox browser. The browser's address bar displays the URL: <http://www.azfiremap.org/azfiremap/map.azfiremap?refresh=refresh&>. The application header includes the title "Arizona Fuels Treatment Module" and "Treatments Map Machine Beta", along with a "Logout -barron- Data last updated 4/1/2005" link. The main navigation bar contains tabs for "Summary", "Resources", "Search Wizard", "Maps", "Help", and "Add Data".

The interface is divided into several functional areas:

- Map Navigation:** Includes buttons for "Zoom in", "Zoom Out", "Center", and "Zoom to Full Extent". A "Zoom to County:" dropdown menu is set to "ZOOM TO COUNTY...".
- Map Query:** Features a "Map Query" section with a radio button for "Identify Layer" and a dropdown menu currently showing "TREATMENT POINTS". Below it, it says "Click on map to identify selected point". The "Identify Results" section displays "No matching features found".
- Arizona Summary Map:** A large map showing the state of Arizona with various treatment points (red dots) and polygons (yellow and orange shaded areas). Labels for "Cococino", "Apache-Sitgreaves", "PAYSON", and "Tonto" are visible. A scale bar indicates 10 miles.
- Map Layers:** A list of layers on the right side of the map, each with a checkbox and a dropdown menu for styling. Layers include:
 - Treatment Points: show All IN SAME COLOR
 - Treatment Polygons: show All BY STATUS
 - Topography: Hillshade
 - Populated Areas: Cities
 - Administrative Boundaries: Counties, Arizona Boundary, Fire Districts, U.S. Forest Service Land
 - Land Surface Management: Wilderness Areas
 - Transportation: Highways, Interstate Highways, Mile Markers, Railroads
 - Hydrography: Streams, Major Lakes
 - Public Land Survey System: *Not available at this scale*
 - Political Districts: Congressional Districts, Legislative Districts
 - Fire Related Layers: Communities at Risk (January 2005)
- Map Legend:** Located at the bottom left, it defines symbols for Treatment Points, Treatment Polygons by Status (Planned, In Progress, Completed), Cities, U.S. Forest Service Land, and Arizona Boundary.

Arizona FIRMAP
Fuels Treatments Module
<http://azfiremap.org/>

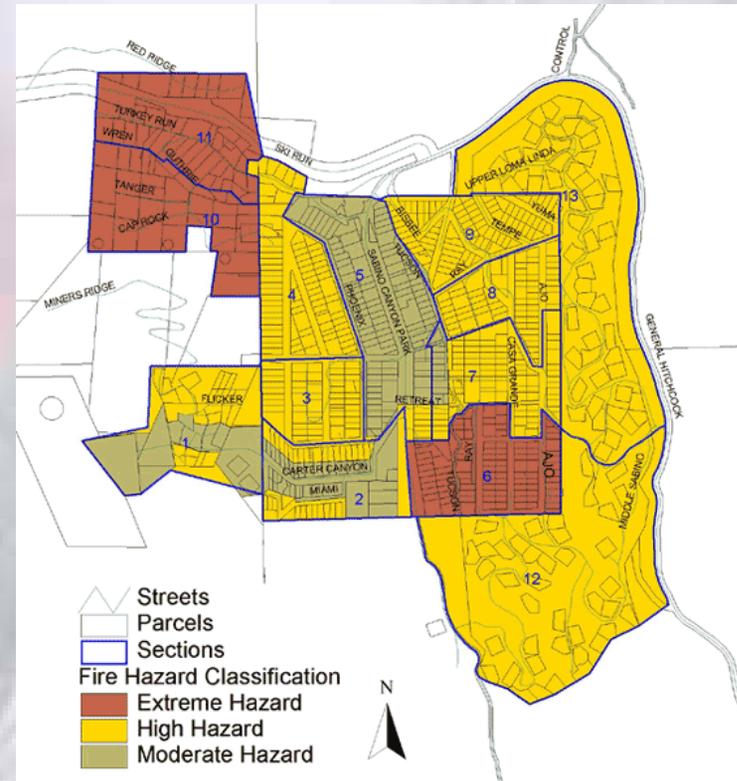


Arizona Firewise Communities

Future of Firewise in Arizona

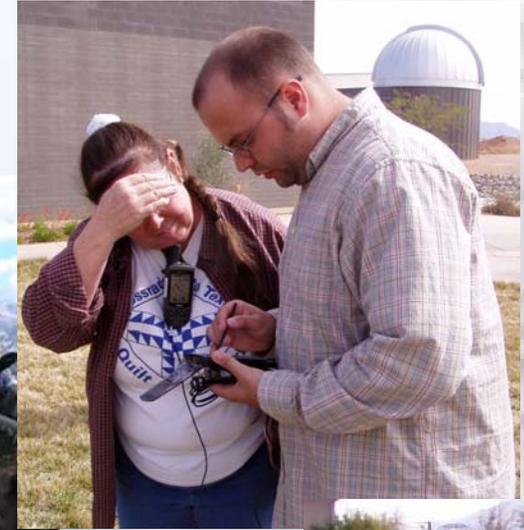
Community-based data collection and data management can allow assessments to be updated.

Impetus to other hazard plans, e.g. community evacuation plan.



Summerhaven on Mt. Lemmon

Everyone



is trying it!





**Thomas Litson,
Grazing Committee Chair,
Tsaile-Wheatfields Chapter,
Navajo Nation**

**Laura Baker,
NASA Space Grant
Undergraduate Intern**

Thank You!