



# I'm a Wolf Biologist!

Reading; Careers; Tracking; Technology

Time Frame: 2 hours or periods

Grade: 9-10

## Overview

Hands-on management of wildlife requires individuals with unique skills and experiences. In this activity, the students will learn about the daily life of wolf biologists while they analyze radio telemetry data to explore the habitats and home range of Mexican wolves.

Author: Eric Proctor

### Essential Questions

- What role does technology play in wildlife management?
- How do biologists study wildlife populations and movements?
- How can different professions contribute to conservation efforts?

### Objectives

- Identify three key characteristics necessary to be a wolf biologist.
- Explain how biologists are able to track and monitor wild wolves.
- Analyze location data to determine primary wolf habitats.

### Arizona Department of Education Standards

#### Science

- S1.C3.PO7
- S3.C2.PO5
- S4.C3.PO2

#### College and Career Ready – ELA

- 9-10.RST.1
- 9-10.RST.2

### Next Generation Science Standards

- HS-LS2-1
- HS-LS2-6

### Association of Fish and Wildlife Agencies Standards

- 1.8.4
- 1.9.2

### Materials and Resources

- "Telemetry, Tracking and Tools" article (one per student)
- *How to Track Wolves* worksheet (one per student)
- *Tracking the Mexican Wolves* worksheet (one per group)
- Set of four aerial maps (one per group)
- Set of four topographical maps (one per group)
- *Aerial Locations for Wolves with Radio Collars* map (one per group)
- Blank Arizona map (one per group)
- Computers with Internet access (one per student or group)

### Teacher Preparation

- Make a copy of the article and the *How to Track Wolves* worksheet for each student.
- Make a copy of the *Tracking the Mexican Wolves* worksheet and the blank Arizona map for each group.
- Make copies of the aerial and topographic maps. These should be printed on 11"x17" paper. They can be laminated for repeat use. However, if they are laminated, students will need wet erase markers to write on them.
- Preview the following websites to make sure they are accessible and appropriate for students:

- [http://www.azgfd.gov/w\\_c/es/wolf\\_reintroduction.shtml](http://www.azgfd.gov/w_c/es/wolf_reintroduction.shtml)
- <http://www.fws.gov/southwest/es/mexicanwolf/index.cfm>

## Background Information

To be a good field biologist, an individual needs more than just “book smarts.” Yes, a strong understanding of the biological sciences is essential. However, there are a number of other unique skills and experiences that are necessary to be involved in the day-to-day, hands-on management of wildlife.

In this lesson, students will read an article to learn about some of the unique skills that are required to work with the endangered Mexican wolves in Arizona. They will learn the details of tracking wolves using radio telemetry and then analyze tracking data to explore wolf habitat and home range.

Students are asked to use the tracking information to draw some conclusions about wolf habitat. However, they will need to recognize that the data provided is simply a snapshot in time. It provides information on one wolf. The questions in the worksheet will help them critically analyze the data to identify what conclusions can and cannot be drawn from this data.

In general, it should be noted that wolves are coursing predators that chase prey, look for weaknesses, and then attempt to kill the prey by exploiting those weaknesses. Although they occupy rough steep country, the presence of prey is the key factor. Their range may overlap with other predators like mountain lions. However, lions are stalking predators and may have more success in steep environments. Wolves, however, are adapted for endurance to withstand long chases. As a result, wolf territory is influenced by prey availability and vulnerability, which changes over the seasons. Wolves will move with their prey source.

Wolves are also social carnivores. They live in family groups called packs. Packs defend their territory from other wolves. Like habitat type, pack size is influenced by prey availability and vulnerability. If there are more wolves to feed, then there must be more prey available.

## Procedures

1. Ask students to think about the difference between the skills necessary to perform field science and those needed for laboratory science. What types of knowledge and skills would be necessary to be a successful field biologist? Discuss their answers as a class.
2. Inform the students that they will now have the opportunity to read about wolf biologists to understand the skills and knowledge they need to have.
3. Hand out the *How to Track Wolves* worksheet to each student.
4. Ask the students to answer the first three questions to the best of their ability. Provide the students a few minutes to complete their answers.
5. Discuss the questions as a class.
6. Assign each student one of the two websites listed in the Teacher Preparation section. Different students can have different websites. Instruct them to search through the site to define the terms listed in question 4. Provide them some time to work.
7. Discuss the definitions as a class. In general, students should understand that
  - The Inter-Agency Field Team is a group of people representing multiple agencies that carries out the day-to-day operations of the Mexican Wolf Reintroduction Program.
  - The Blue Range Area is a 6,000-square-mile section of the Mexican wolf’s historical range in Arizona and New Mexico that

- serves as the recovery area for their reintroduction.
- Telemetry is a technique to monitor and track wildlife using advanced technology tools such as GPS and radio waves.
8. Hand out the “Telemetry, Tracking and Tools” article to each student.
  9. Ask students to read the article and answer the questions from Part 2 on the *How to Track Wolves* worksheet.
  10. Provide time for students to read and complete the worksheet.
  11. Discuss their answers as a class.
  12. Inform the students that they will now have the opportunity to be a technician on the wolf reintroduction project. They will be provided with telemetry data and they must analyze the locations to learn about the wolves.
  13. Divide the class into groups of about four students.
  14. Hand out the sets of aerial and topographic maps to each group.
  15. Inform them that in order to be successful, they must first understand the different types of maps they will be using.
  16. Instruct the students to look at the aerial and topographic maps and determine the similarities and differences. Students should realize that the two sets of maps show the same area. The aerial maps show a picture of the area from the air, which allows you to see vegetation and major landscape features. The topographic maps are drawings that show how steep or flat the area is. The closer the contour lines are, the steeper the area.
  17. Hand out the *Tracking the Mexican Wolves* worksheet to each group.
  18. Explain that they are to read the information and then plot the data points on the aerial maps. Then, they should use the plotted locations to estimate the home range territory of this wolf and draw the outline. Finally, they can answer the questions as a group.
  19. Provide groups time to complete the assignment. Have the blank Arizona maps and the *Aerial Locations for Wolves with Radio Collars* map handouts ready to provide to groups.



### Differentiated Instruction

#### *Extensions:*

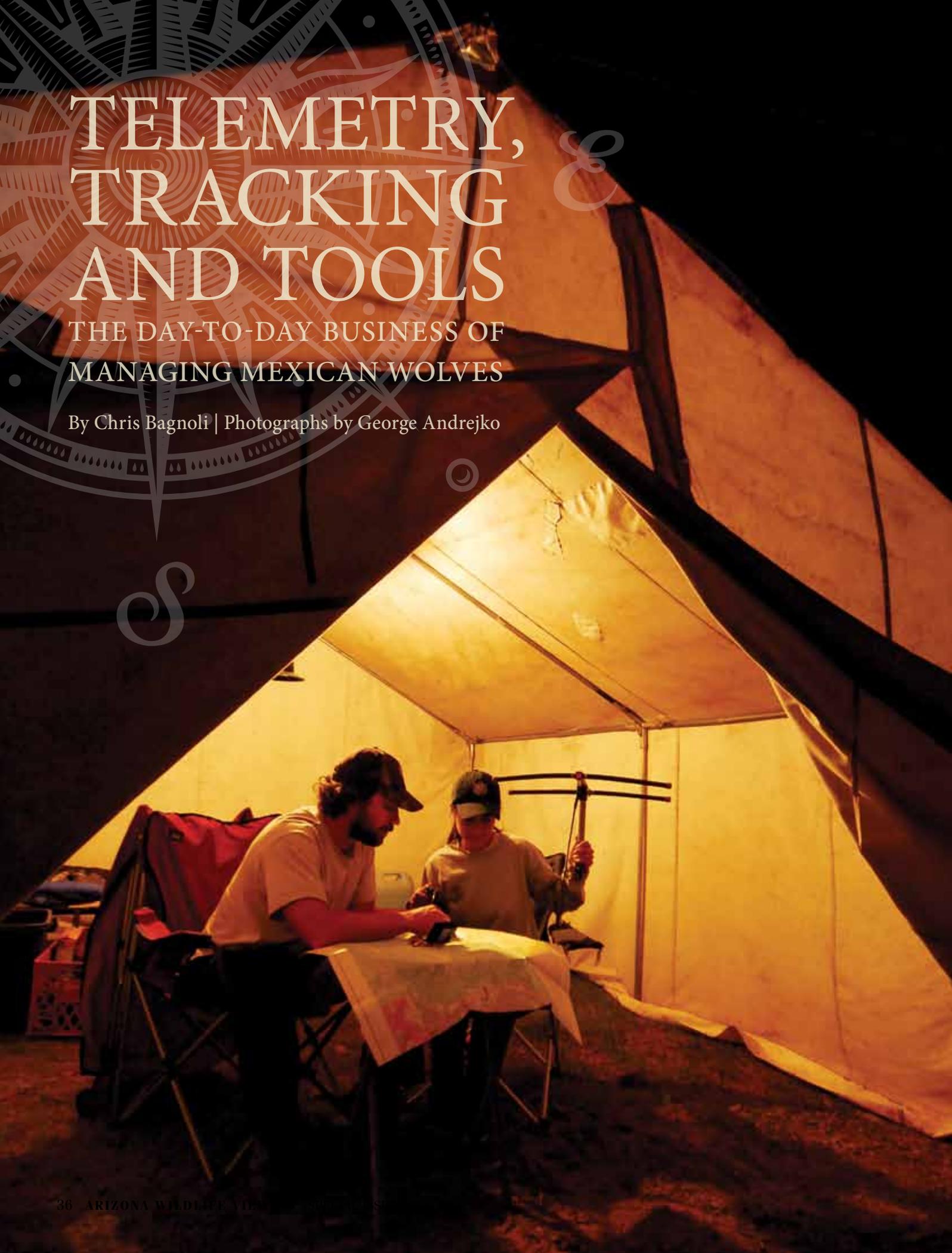
- Have the students visit <http://www.habimap.org>. They can then use the “Draw Polygon” feature to mark the approximate location of the wolf home range they plotted on the aerial maps. Then, they can use the various analysis tools on the site to learn more about the wolf habitat and the threats to their recovery.

#### *Modifications:*

- Use “popcorn” reading and other strategies to read the articles as a class. Students can also work in small groups to complete the worksheet.
- Plot the data points in Google Earth and project the map in the classroom. Determine the home range size as a class.

### Reflection

Use the space below to reflect on the success of the lesson. What worked? What didn't? What changes would you make? These notes can be used to help the next time you teach the lesson. In addition, the Department would appreciate any feedback. Please send your comments to [focuswild@azgfd.gov](mailto:focuswild@azgfd.gov).



# TELEMETRY, TRACKING AND TOOLS

THE DAY-TO-DAY BUSINESS OF  
MANAGING MEXICAN WOLVES

By Chris Bagnoli | Photographs by George Andrejko



MANAGING ANY THREATENED OR ENDANGERED WILDLIFE SPECIES REQUIRES DEDICATED PROFESSIONALS, WHO POSSESS UNIQUE SKILLS, EXPERIENCE AND TRAINING, TO PERFORM SPECIALIZED FIELD ACTIVITIES.

**T**he Interagency Field Team (IFT) for the Mexican Wolf Reintroduction Project (project) is responsible for the day-to-day management of wolves.

The IFT consists of full-time and seasonal staff from the five agencies included in a special Memorandum of Understanding that governs how the project is implemented in the field. Those five entities are the U.S. Fish and Wildlife Service (FWS), Arizona Game and Fish Department (department), U.S.D.A. Forest Service (USFS), U.S.D.A. Animal and Plant Health Inspection Service — Wildlife Services (WS), and the White Mountain Apache Tribe (WMAT).

The department has been involved with the reintroduction of Mexican wolves into the Blue Range Area's primary recovery zone in Arizona even before the first wolves were released in 1998. The FWS originally outlined the concept of an IFT in the 1998 Interagency Mexican Wolf Management Plan. The original IFT was comprised of a team leader from the FWS, a wolf biologist from the department, and a wolf management specialist from WS. In 1999, New Mexico joined the IFT, adding a wolf biologist to the team. As the project evolved further, USFS and WMAT members were added to the team. Currently, the department provides five full-time biologists, including the team leader, to the IFT.

A key provision of the IFT approach involves having an operations base for on-the-ground wolf management that is within the recovery area. The Mexican wolf field office is located in Alpine, Ariz. IFT members live within the local community, which helps them cultivate relationships with community members and local project stakeholders, and better understand the issues. This is not always an easy undertaking. Reintroducing wolves into portions of their historical range is not an effort supported by many area residents. It takes dedicated individuals with "thick skin" to successfully accomplish the various field tasks amid conflicting attitudes and perceptions.

While each individual IFT member may represent one of the five participating agencies, the most effective team members understand the balance between having a professional commitment to manage wolves and the importance of understanding the perspectives of the people who share the land with wolves. It is not easy, and not all personnel selected for these positions understand the unique challenges involved with this work. The ability to seek progress on contentious issues with people who have diverse perspectives is as important as having appropriate field skills.

IFT members are required to monitor telemetry signals from the ground using a radio receiver, map and compass. IFT members must learn the local terrain and each wolf's habits. Team members also apply the same techniques while circling a collared wolf a thousand feet overhead from an airplane.

When wolves are captured for collaring, their vitals and measurements are recorded. Telemetry collars put on wolves capture data such as: home range, denning locations, predation and depredation behaviors and dispersal patterns.

Many think that IFT work involves following Mexican wolves around day and night in backcountry forests. If it were only that simple! Managing wolves involves a variety of duties like developing and implementing wolf release and translocation proposals; monitoring wolf locations from the ground and air, and, trapping animals to affix radio telemetry collars for monitoring movements. The IFT also investigates wolf-sighting reports, conducts depredation investigations, removes wolves for management purposes and analyzes wolf predation on native prey. The list of duties continues with responding to nuisance wolf reports, coordinating with stakeholders on proactive management efforts, conducting annual population counts, writing project reports, and coordinating with local governments and land management agencies. Basically, the team is responsible for almost every aspect of on-the-ground wolf management.

One very important activity the IFT undertakes is capturing wolves to affix telemetry collars. The monitoring data obtained from the collars assists in understanding basic wolf life history, including home range size, territory location, seasonal use patterns, denning locations, predation and depredation behaviors, and dispersal patterns. Wolf captures are accomplished primarily by the use of humane, padded leg-hold traps. Trapping wolves requires patience and perseverance from team members, along with a willingness to pass along their knowledge of trapping techniques as new members are recruited.

Team members also must understand and learn the art and science of wolf handling. Mexican wolves are an endangered



subspecies that require specialized handling procedures. Biologists must know how to administer capture drugs, monitor vital signs, obtain biological information, attach the collar correctly, reverse the effect of capture drugs (if used), and release the wolf safely. Once the collar is attached and the wolf is released, an IFT member is then required to monitor the telemetry signal from the ground using a radio receiver, map and compass. IFT members must learn the local terrain and each wolf's habits.

Aerial monitoring is another important component of wolf management. Once a team member has mastered tracking wolves on the ground, he applies the same techniques while circling a collared wolf a thousand feet overhead from an airplane. He must be able to accurately place that location on a map. This allows biologists to more quickly obtain an animal's location. The IFT repeats this exercise over thousands of square miles of rugged, forested terrain to complete the weekly telemetry monitoring flight assignment.



The IFT member is then responsible for updating a flight location document on the department's website that serves as a resource for local stakeholders.

Often, when an IFT member's day seems to be winding down, he may receive a call from a member of the public reporting a wolf sighting. After gathering information and entering it into the project database, the IFT member will try to verify the sighting. If he does not recall locating any collared wolves in the vicinity of the report, and if there is snow on the ground for tracking, an investigation may show the reported animal was a wolf or simply a large coyote. Responding quickly helps ensure that possible signs



may still present when the IFT member arrives. So, with the last bit of daylight, off goes the IFT member to investigate the sighting. Welcome to the day-to-day business of an IFT member managing Mexican wolves. Working conditions may not be ideal, and there is never a dull moment when working on the project, but team members are rewarded knowing they contributed to restoring a key component of Arizona's diverse wildlife heritage. 🌿

■ Chris Bagnoli is the regional supervisor for Game and Fish's Pinetop office. Prior to this position, he was the Mexican Wolf Interagency Field Team leader.

## COUNTING WOLVES

One of the most important operations the Interagency Field Team (IFT) conducts is end-of-year Mexican wolf population counts that coincide with the wolves' breeding season. The goal is to develop a minimum estimate of wolf numbers in Arizona and New Mexico, and report on the size, productivity, and extent of the Mexican wolf population. The data are used to assess the overall progress of the Mexican Wolf Reintroduction Project (project).

The process to develop a minimum population estimate occurs over several months. The IFT follows a procedure for deriving this estimate that was formed in consultation with leading wolf biologists from around the country. Starting in November, project personnel begin to closely monitor wolves with radio telemetry collars to document how wolves are using their territories and which wolves may be dispersing to locate new mates, and establish new territories and packs.

The effort to search for wolf sign in areas outside of established territories is critical because biologists know that only a portion of the population wears telemetry collars and accounting for the uncollared portion is an important task. In any given year, the uncollared portion of the population (not associated with known wolf packs) may be as high as a quarter of all the wolves.

The visual wolf population count occurs during a 10-day period in January and is conducted by helicopter. Specially trained IFT personnel fly over every radio-collared wolf and visually document each animal present. Usually there are uncollared wolves traveling with collared animals, and these sightings assist the IFT with determining pup recruitment and pack dynamics.

The helicopter team also consists of experts trained to capture wolves using capture drugs fired from dart guns. This allows the IFT to replace old telemetry collars that may have non-functioning batteries, attach new collars, and treat injured wolves.

While this may sound exciting, remember this operation occurs in winter in the White Mountains in a helicopter with no doors. Exciting? Yes ... but bone-chillingly cold!



# How to Track Wolves

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***Part 1: Before reading the article, answer the following questions.***

1. How do you think biologists monitor the locations of individual wolves?
  2. How do you think biologists count wolves in the wild?
  3. What traits do you think are important for a wolf biologist?
  4. Visit the website assigned by your teacher. Use the information on the site to answer the following questions related to the wolf recovery program in Arizona:
    - a. What is the Inter-Agency Field Team (IFT)?
    - b. What is the Blue Range Area?
    - c. What is telemetry?
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***Part 2: Read "Telemetry, Tracking and Tools: The Day-to-Day Business of Managing Mexican Wolves" and then answer the following questions.***

1. Briefly summarize how biologists monitor the locations of wolves.
2. What information can we gain by monitoring wolf locations?
3. Briefly summarize how biologists count wolves in the wild.
4. What characteristic of wolf biology allows biologists to put a collar on only a few wolves rather than the entire population?
5. You are the IFT leader for the Mexican Wolf Reintroduction Project. You need to hire another member for your field team. What are the three most important characteristics that you would look for in a potential employee? Be sure to cite evidence from the article to support your answer.



# Tracking the Mexican Wolves

The alpha male from the Hawks Nest pack was fitted with a radio collar before being released back into the wilds of Arizona. Approximately every two weeks, researchers used radio telemetry to locate the wolf. The table below shows this data from April through December 1998. *Please note that coordinates have been shifted slightly to not reveal high use activity areas.*

You are the technician responsible for analyzing this data. Familiarize yourself with the table and then follow the procedures at the bottom.

## Mexican Wolf Radio Telemetry Locations

Male #131, Hawks Nest Pack  
March 31, 1998 – December 27, 1998

Date	UTM North	UTM East
31-Mar	3733800	664400
17-Apr	3733200	664800
30-Apr	3733400	663400
15-May	3733000	664100
3-Jun	3733700	662500
14-Jun	3733200	663500
9-Jul	3733300	665000
24-Jul	3733100	663300
5-Aug	3734958	667575
16-Aug	3734475	667645
31-Aug	3736600	669300
12-Sep	3735400	668800
26-Sep	3734500	661300
11-Oct	3737000	666300
28-Oct	3737500	663300
6-Nov	3734000	667700
16-Nov	3736900	665200
12-Dec	3734105	672700
27-Dec	3732900	666300

### Procedures

1. Plot the data on the maps provided.
2. Based on the data, draw an outline that could represent the home range for this wolf.
3. Answer the questions on the next page.

### ***Part 1: Home Range Size***

1. Based on your outline, calculate the area of the wolf's range in square miles.
2. Do you believe this is an accurate representation of the size of the wolf's territory? Why or why not?
3. What could you do if you wanted to get a more accurate measurement of this wolf's range?
4. Is it accurate to track the location of one wolf and draw conclusions about the pack as a whole? Why or why not?

### ***Part 2: Habitat Preferences***

1. Get a set of topographic maps from your teacher. Using the information provided in both the aerial and topographic maps, describe the habitat preferences of your wolf. Be sure to focus on vegetation, the ruggedness of the terrain, and any seasonal differences.
2. Wolves are considered coursing predators, which means they chase prey, look for weaknesses, and then attempt to kill. Mountain lions, on the other hand, are stalking predators, which means they rely on ambush and stealth to surprise their prey.
  - a. Which type of predatory behavior do you believe is more dependent on specific habitat requirements? Why?
  - b. Which one is more likely to have a varied habitat as long as prey is available? Why?
  - c. How could you determine whether your hypotheses above are correct?

### ***Part 3: Comparing through Time***

1. On the blank Arizona map, draw in the approximate location for the Hawks Nest pack.
2. Get the *Aerial Locations for Wolves with Radio Collars* map from your teacher. How does the location of the Hawks Nest pack compare, from your 1998 data and the new 2007 data?
3. Estimate the size of the pack's territory in 2007.
4. What might explain any differences in territory location and size from 1998 to 2007?
5. Look at the 2007 map. What might explain the different home range sizes for the different packs?

### ***Part 4: Future Studies***

1. Based on your data, what is a question for future study that you could now ask? What additional data would you need to collect to answer this question?

USGS 262 km E of Phoenix, Arizona, United States 22 May 1998

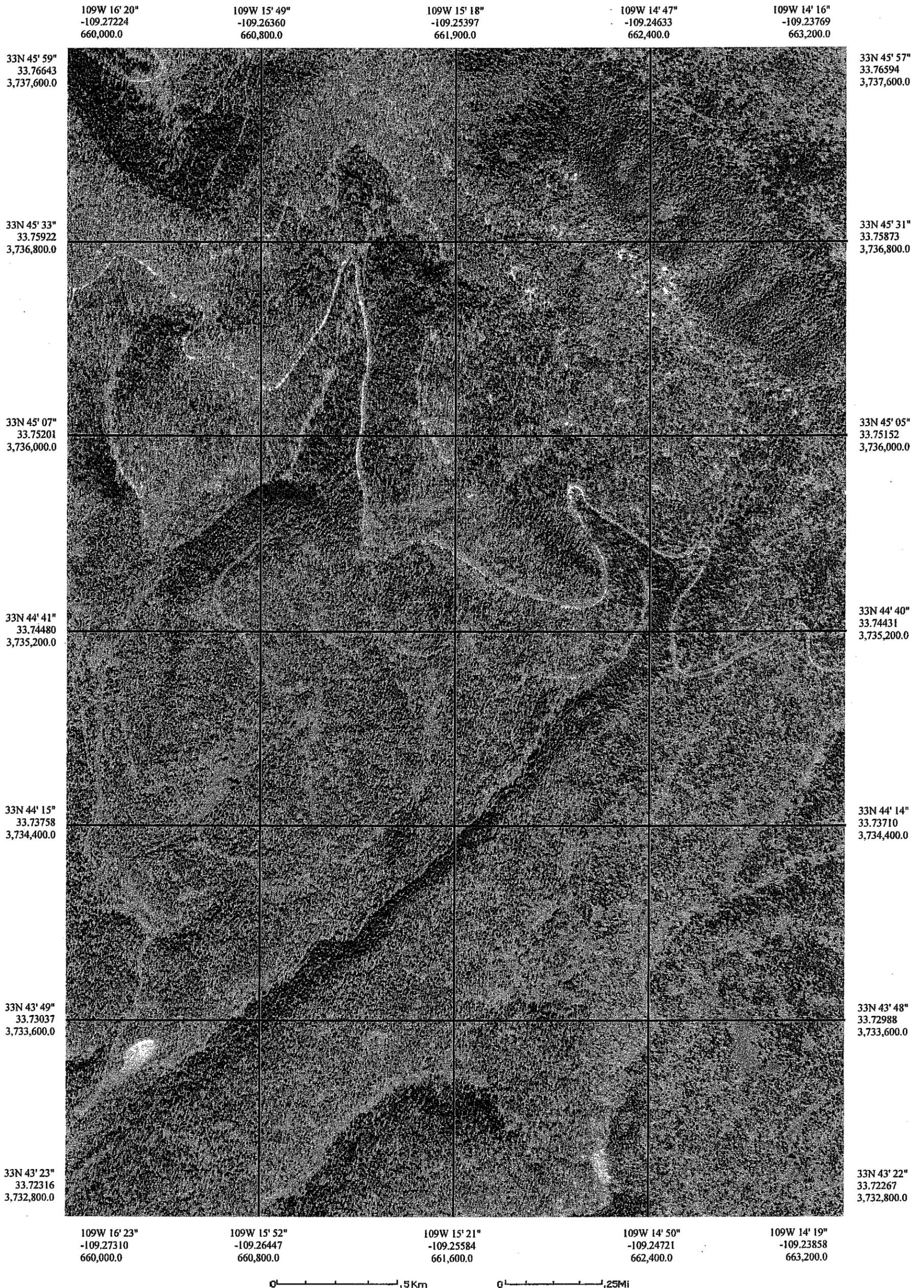


Image courtesy of the U.S. Geological Survey

Downloaded from Terraserver-USA <http://terraserver.microsoft.com> © 2004 Microsoft Corporation

USGS 265 km E of Phoenix, Arizona, United States 13 Oct 1997

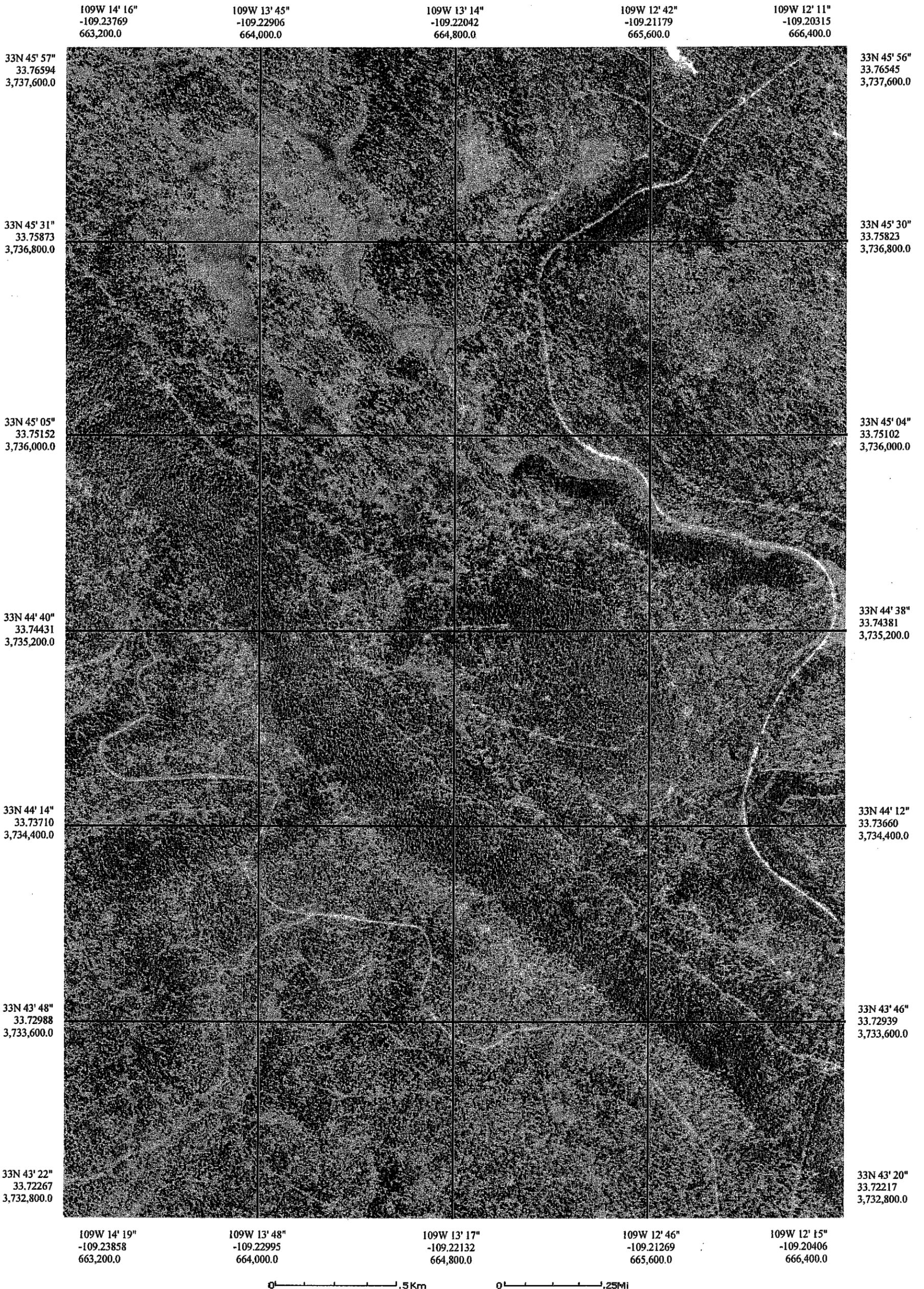


Image courtesy of the U.S. Geological Survey

USGS 268 km E of Phoenix, Arizona, United States 13 Oct 1997

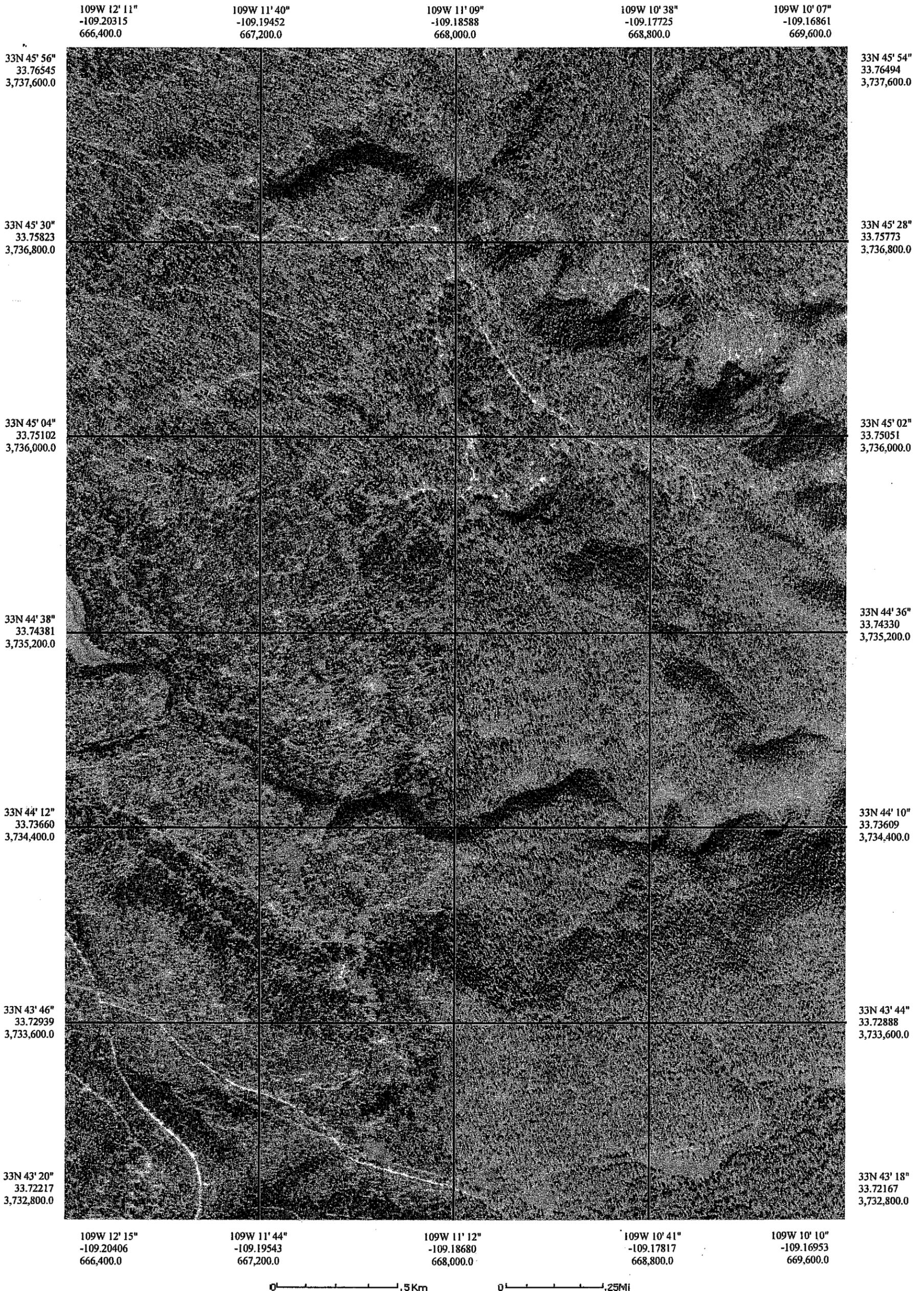
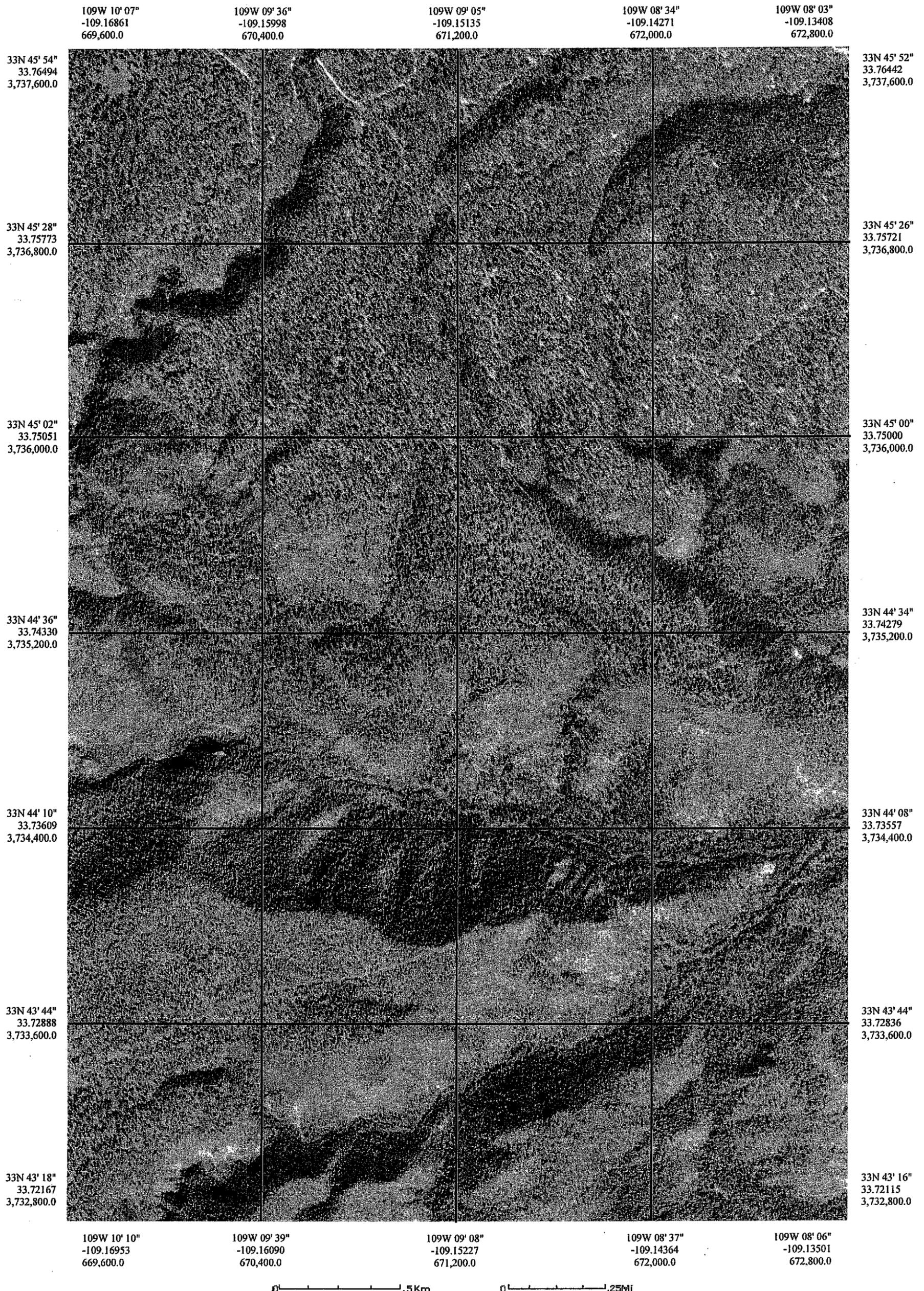


Image courtesy of the U.S. Geological Survey

USGS 272 km E of Phoenix, Arizona, United States 13 Oct 1997



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Image courtesy of the U.S. Geological Survey

USGS 262 km E of Phoenix, Arizona, United States 01 Jul 1991

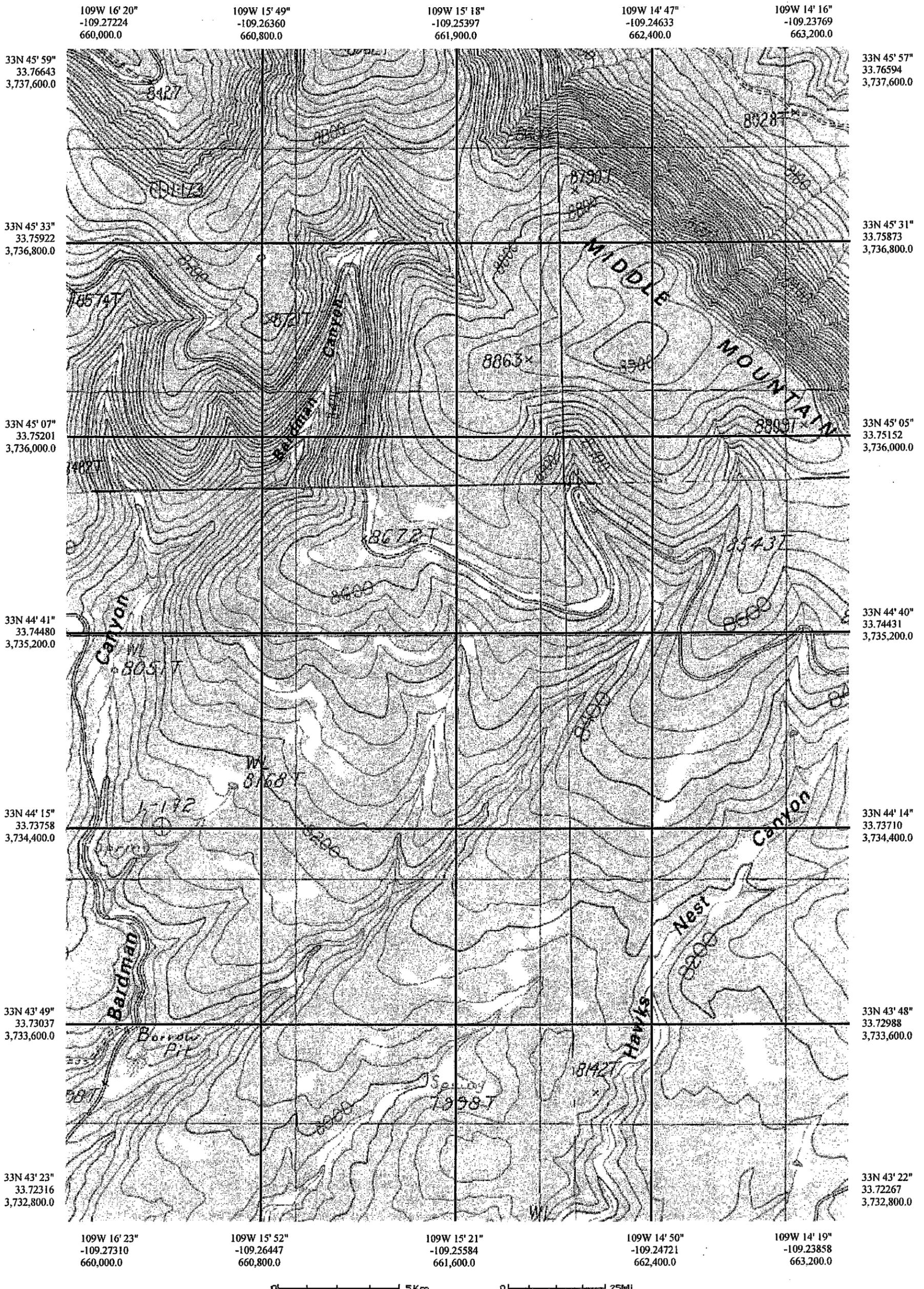


Image courtesy of the U.S. Geological Survey





USGS 272 km E of Phoenix, Arizona, United States 01 Jul 1991

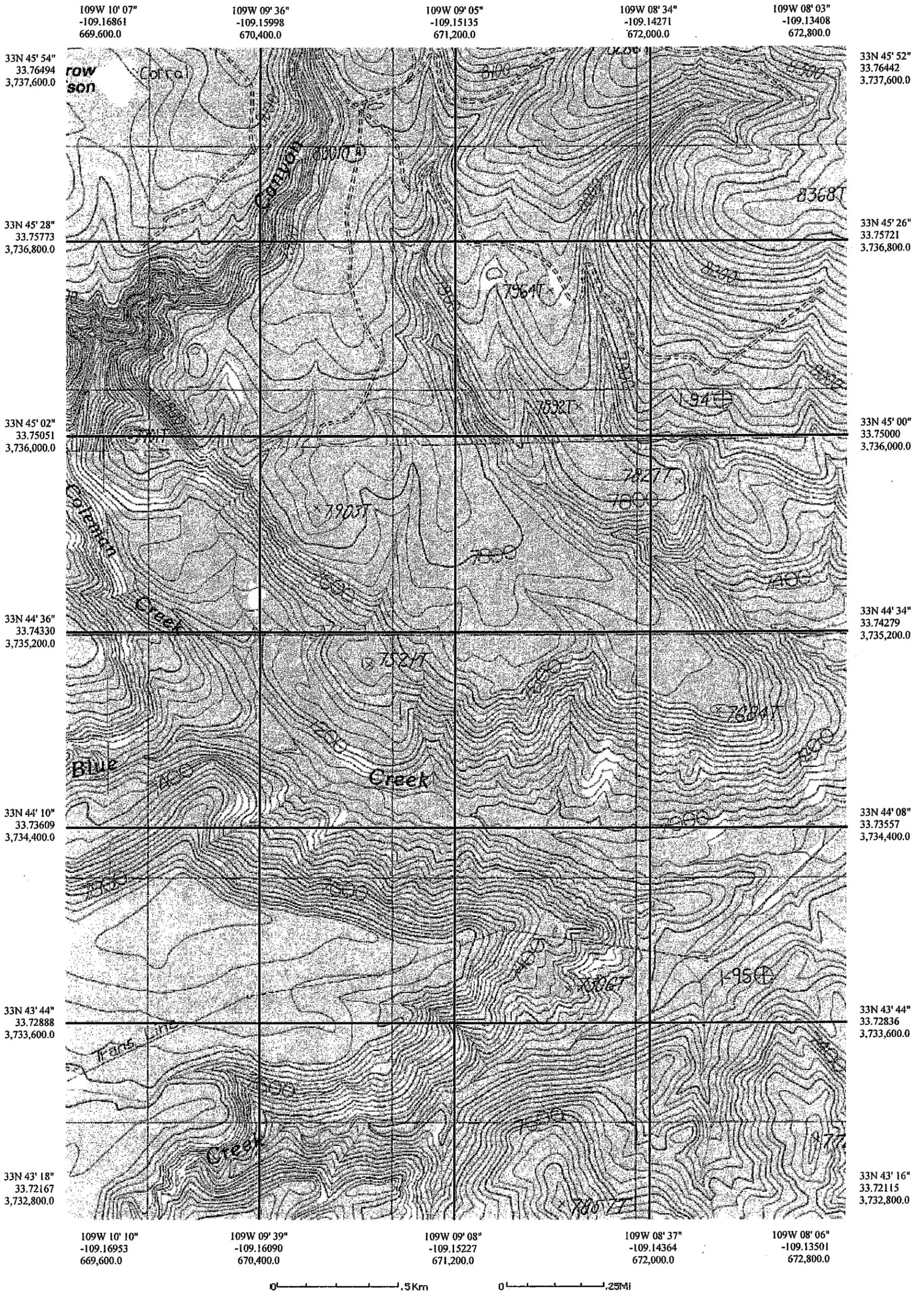
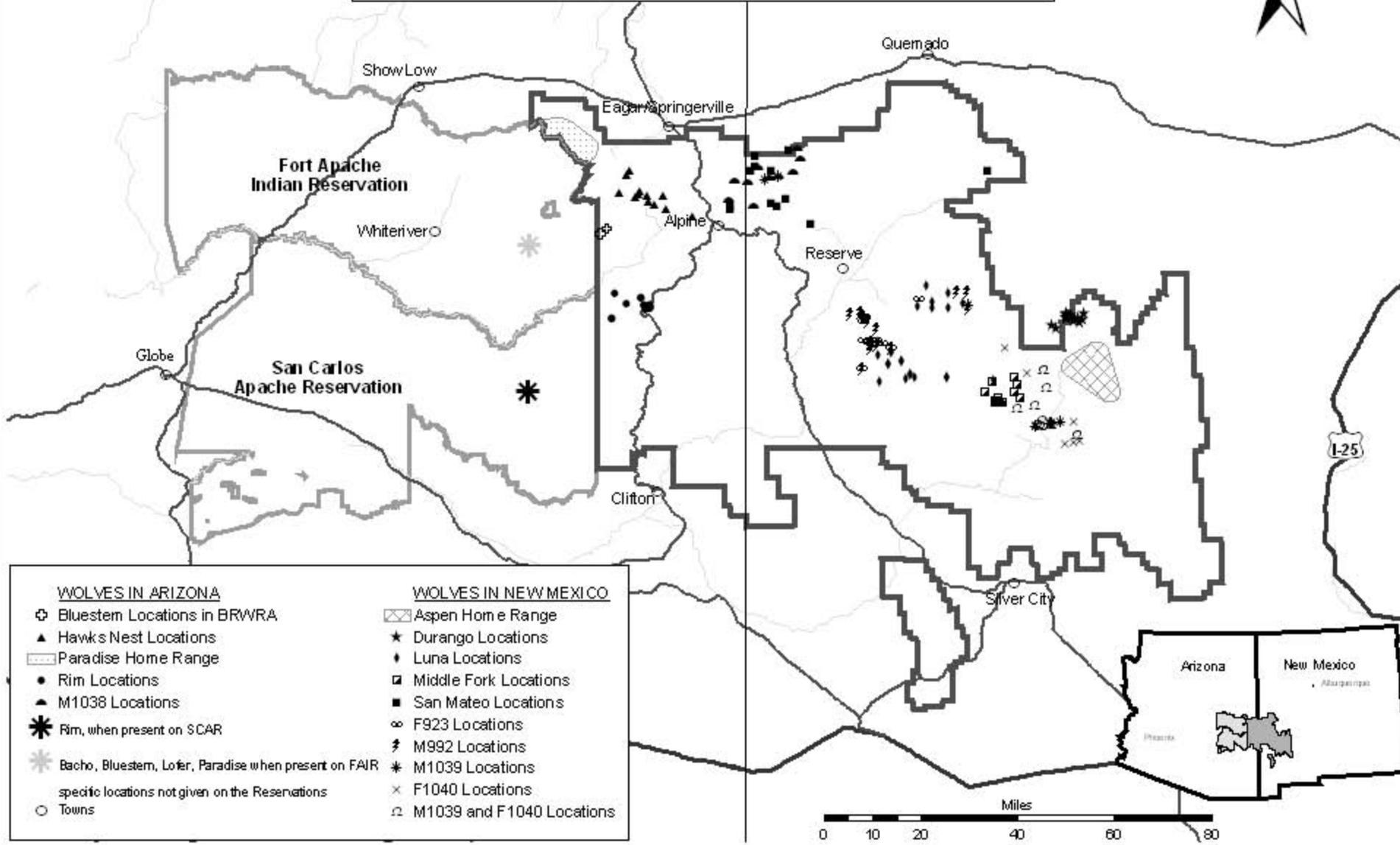


Image courtesy of the U.S. Geological Survey

# Aerial Locations for Wolves with Radio Collars June 1, 2007 - August 31, 2007

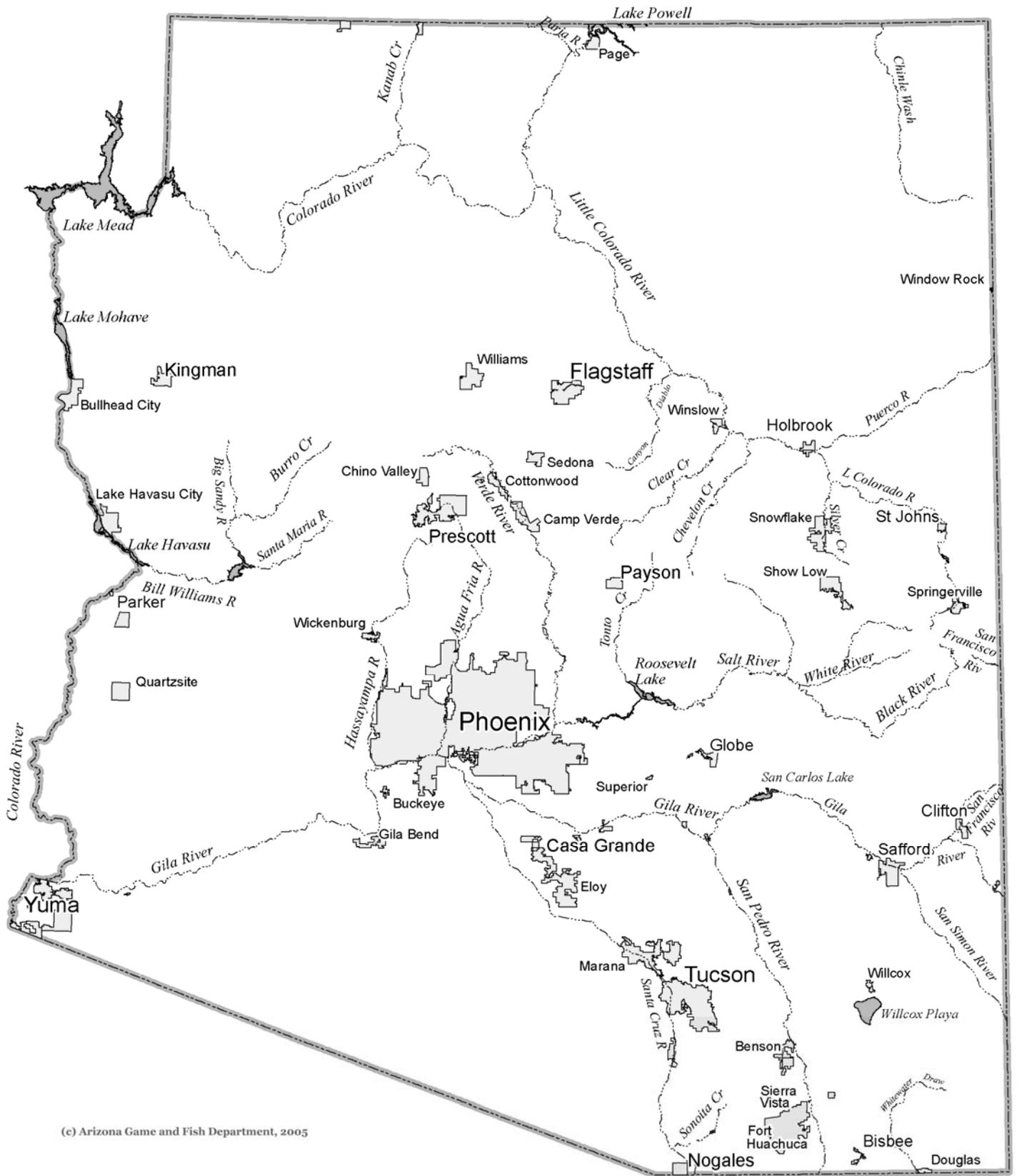


- | <u>WOLVES IN ARIZONA</u>                                | <u>WOLVES IN NEW MEXICO</u> |
|---|-----------------------------|
| ⊕ Bluestem Locations in BRWRA                           | ⊠ Aspen Home Range          |
| ▲ Hawk's Nest Locations                                 | ★ Durango Locations         |
| ⊠ Paradise Home Range                                   | † Luna Locations            |
| ● Rim Locations   | ▣ Middle Fork Locations     |
| ▲ M1038 Locations                                       | ■ San Mateo Locations       |
| ✱ Rim, when present on SCAR                             | ∞ F923 Locations            |
| ✱ Bacho, Bluestem, Lofer, Paradise when present on FAIR | ‡ M992 Locations            |
| specific locations not given on the Reservations        | ✱ M1039 Locations           |
| ○ Towns   | × F1040 Locations           |
|   | ⊠ M1039 and F1040 Locations |

**RELEASES/TRANSLOCATIONS:** June - None; July - None; August - None  
**REMOVALS:** June - F1028; July - None; August - M1043  
**MORTALITIES:** June - None; July - None; August - None

\* Home Ranges are depicted for wolves whose locations continue to show denning and rendezvous behavior.

Information regarding wolf locations on FAIR & SCAR is proprietary and therefore not displayed.



(c) Arizona Game and Fish Department, 2005