

Chapter E

Federally Owned Coal and Federal Lands in the Colorado Plateau Region

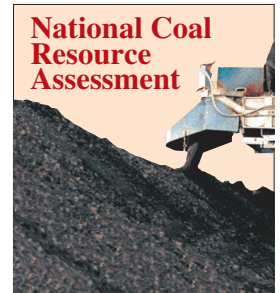
By Carol L. Molnia,¹ Laura N.R. Roberts,¹
Laura R.H. Biewick,¹ and Lee M. Osmonson¹

Chapter E of

Geologic Assessment of Coal in the Colorado Plateau: Arizona, Colorado, New Mexico, and Utah

Edited by M.A. Kirschbaum, L.N.R. Roberts, and L.R.H. Biewick

U.S. Geological Survey Professional Paper 1625–B*



[Click here to return to Disc 1
Volume Table of Contents](#)

¹ U.S. Geological Survey, Denver, Colorado 80225

* This report, although in the USGS Professional Paper series,
is available only on CD-ROM and is not available separately

Contents

Federal Coal—Its Value to the Nation.....	E1
Coal Production from Federal Lands, 1949–1997	2
Royalties Generated by Federal Coal Production	3
Colorado Plateau Region—Land Status and Coal Development.....	4
Surface Ownership of Coal-Bearing Areas.....	5
Coal and National Parks	6
Coal and National Forests	7
Estimated Federal Coal Resources, Colorado Plateau Region	8
Does Surface Ownership Include Coal Ownership?	9
How Much Coal is Federally Owned?	10
Federal Coal Resources—By Priority Assessment Unit	11
Danforth Hills	12
Yampa Coal Field	13
San Juan Basin	15
San Juan Basin Tribal Lands.....	17
Southern Piceance Basin.....	18
Deserado Priority Assessment Unit, Lower White River Coal Field	19
Southern Wasatch Plateau	20
Kaiparowits Plateau	21
Kaiparowits Plateau Query Results	22
Conclusions	23
References Cited	23

Figures

1. Coal fields and Federal lands of the conterminous United States	E1
2. Chart of coal production from Federal lands	2
3. Pie chart of royalty produced by State	3
4A. Index map of Colorado Plateau region showing study area, coal-bearing areas, major towns, and highways.....	4
4B. Generalized land ownership in the Colorado Plateau region	4
5. Pie chart showing surface ownership in the Colorado Plateau region	5
6A. Location of coal-bearing rocks and areas managed by the National Park Service in the Colorado Plateau region.....	6
6B. Photograph of Bryce Canyon National Park and coal-bearing Dakota Formation	6
7A. Location of coal-bearing rocks and National Forests in the Colorado Plateau region ...	7
7B. View of Convulsion Canyon, Manti-La Sal National Forest, southern Wasatch Plateau, Utah.....	7

7C.	Photograph of the SUFCO mine in Convulsion Canyon in the Manti-La Sal National Forest, southern Wasatch Plateau, Utah	7
8.	The seven priority assessment units discussed in this report.....	8
9.	Map depicting land status and mineral ownership for a hypothetical area	9
10.	Colorado Plateau assessment units—surface- and coal-ownership bar charts.....	10
11.	Table showing statistics for Colorado Plateau assessment units.....	11
12A.	Surface ownership in the Danforth Hills coal field	12
12B.	Coal ownership in the Danforth Hills coal field	12
13A.	Surface ownership in the Yampa assessment unit.....	13
13B.	Coal ownership in the Yampa assessment unit.....	14
14A.	Surface ownership in the San Juan Basin assessment unit	15
14B.	Coal ownership in the San Juan Basin assessment unit.....	16
15.	Index map of San Juan Basin Tribal areas.....	17
16.	Coal ownership in the southern part of the Piceance Basin, Colorado	18
17A.	Surface ownership in the Deserado coal assessment unit, Lower White River coal field	19
17B.	Coal ownership in the Deserado coal assessment unit, Lower White River coal field	19
18A.	Surface ownership in the Southern Wasatch Plateau assessment unit	20
18B.	Coal ownership in the Southern Wasatch Plateau assessment unit.....	20
19.	Coal ownership in the Kaiparowits Plateau assessment unit.....	21
20.	Computer-produced representation showing location of Federal coal resources that meet specified geologic criteria, Kaiparowits Plateau assessment unit.....	22
21.	Scenic view of Spring Canyon, southern Wasatch Plateau, Utah	23

Table

1.	1997 Federal coal production from States in the Colorado Plateau region	E2
----	---	----

Federally Owned Coal and Federal Lands in the Colorado Plateau Region

By Carol L. Molnia, Laura N.R. Roberts, Laura R.H. Biewick, and Lee M. Osmonson

Federal Coal— Its Value to the Nation

Coal fields are found throughout the United States. Large portions of the coal fields in the Western States occur on federally owned lands. In fact, the Federal Government owns and administers about one-third of the Nation's coal resources. These Federal resources are located on about 76 million acres, primarily in the Western United States (U.S. Department of the Interior, 1991).

Utah, Colorado, Arizona, and New Mexico—the four States in the Colorado Plateau region, the subject of this CD-ROM—are outlined on this map of coal fields and Federal lands of the conterminous United States.

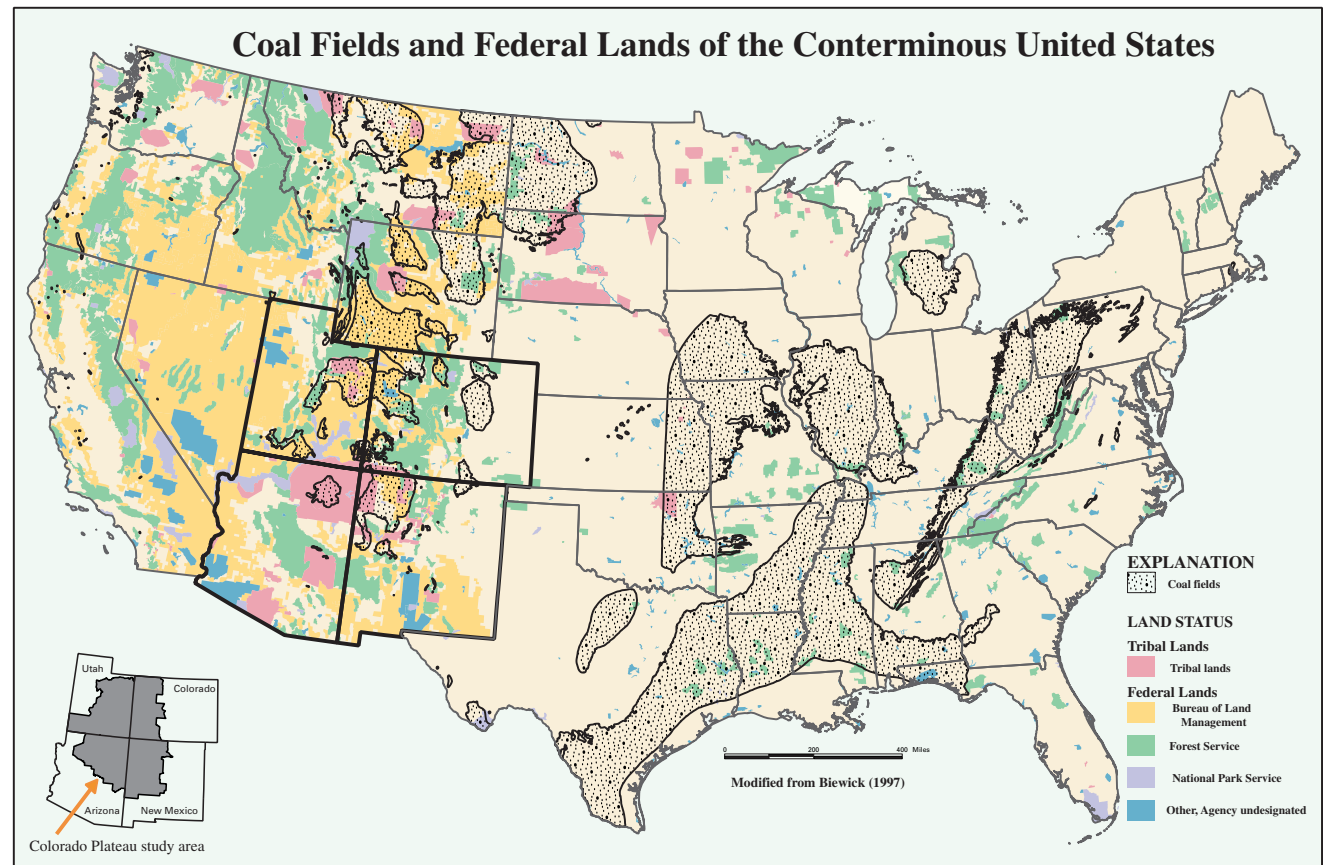


Figure 1. Coal fields and Federal lands of the conterminous United States.

Coal Production from Federal Lands, 1949–1997

Federally owned coal plays a major role in the energy supply of the United States. About 1.1 billion tons¹ of coal were produced in the United States in 1997. About 30.3 percent of that total (see fig. 2), or about 330 million tons, came from Federal lands (U.S. Department of Energy, 1998).

Almost all of the Federal coal production is from Wyoming, Montana, and three States in the Colorado Plateau region—Utah, Colorado, and New Mexico (see table 1). (Arizona coal production is not from federally owned coal resources and thus is not included in this discussion.) This great increase in coal production from Western Federal lands began in the 1970’s to meet the increasing demand for low-sulfur coal, which is more prevalent in Western States.

Table 1. 1997 Federal coal production from States in the Colorado Plateau region.

[From U.S. Department of Energy (1998, p. 21). Arizona not included because coal production there is not from federally owned resources]

State	Coal production (thousands of short tons)
Utah	23,887
Colorado	22,264
New Mexico	6,029
TOTAL for region	52,180

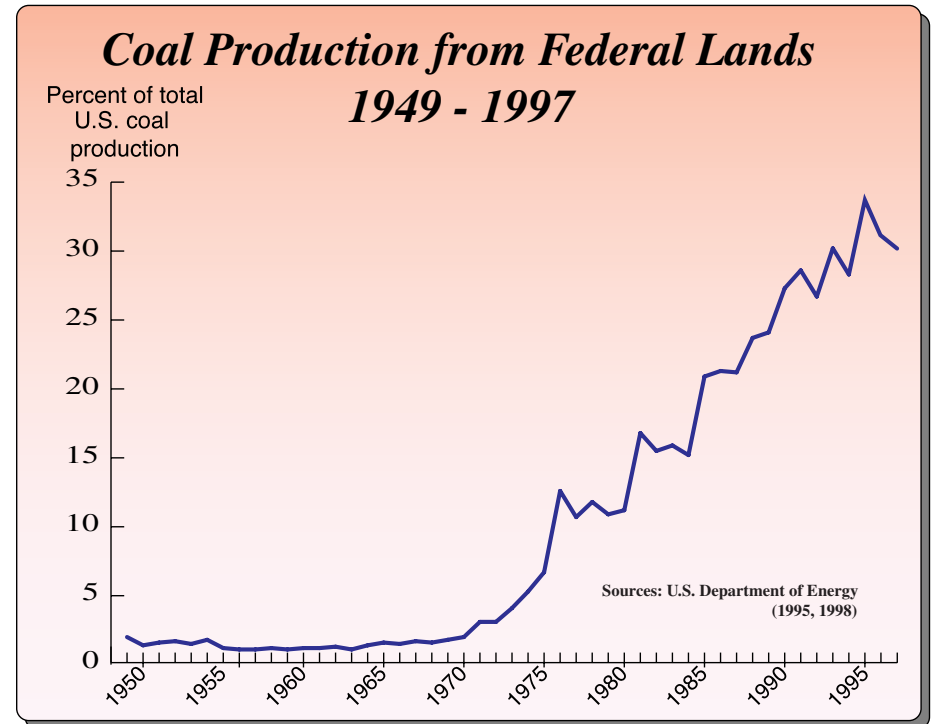


Figure 2. Chart of coal production from Federal lands.

¹ All tonnage figures in this chapter are in short tons.

Royalties Generated by Federal Coal Production

Federally owned coal also plays an important part in the economy of our Nation. More than a quarter of a billion dollars in royalties (more than \$285 million in 1997) is generated annually from the production of Federal coal. Of that amount, about half is disbursed to the States in which the coal was produced; most of the remaining royalties are placed in the Federal Reclamation Fund for water projects in the West.

As this pie chart shows, Federal coal production in Utah, Colorado, and New Mexico generated \$90.3 million in royalties in 1997 (U.S. Department of the Interior, 1998).

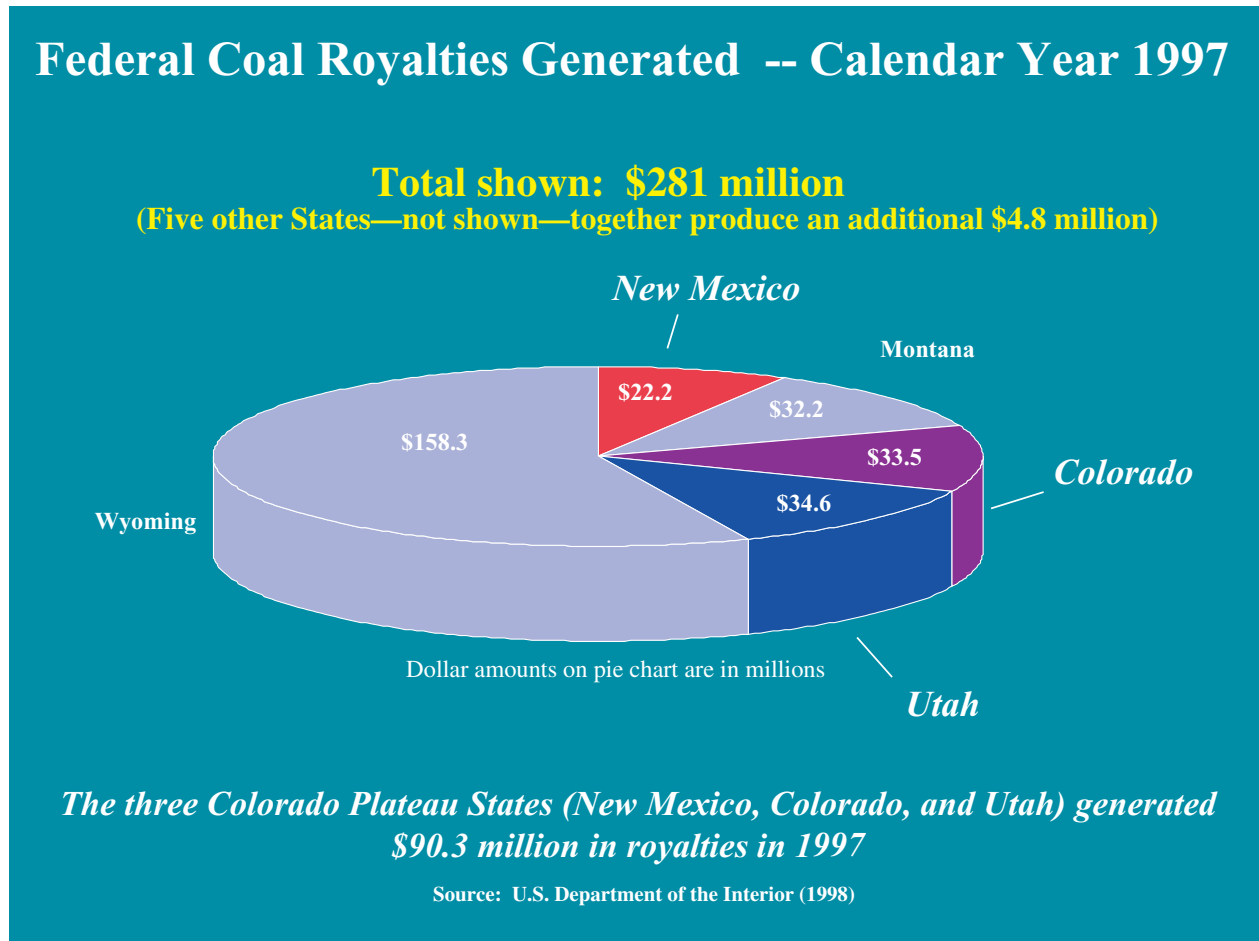


Figure 3. Pie chart of royalty produced by State; Colorado Plateau States highlighted.

Colorado Plateau Region—Land Status and Coal Development

Map 4A shows coal-bearing areas, major towns, and roads in the Colorado Plateau region. The Colorado Plateau region has extensive coal-bearing areas and approximately 40 active coal mines that supply fuel for many of the region’s electrical power plants. Map 4B shows generalized land surface ownership in the Colorado

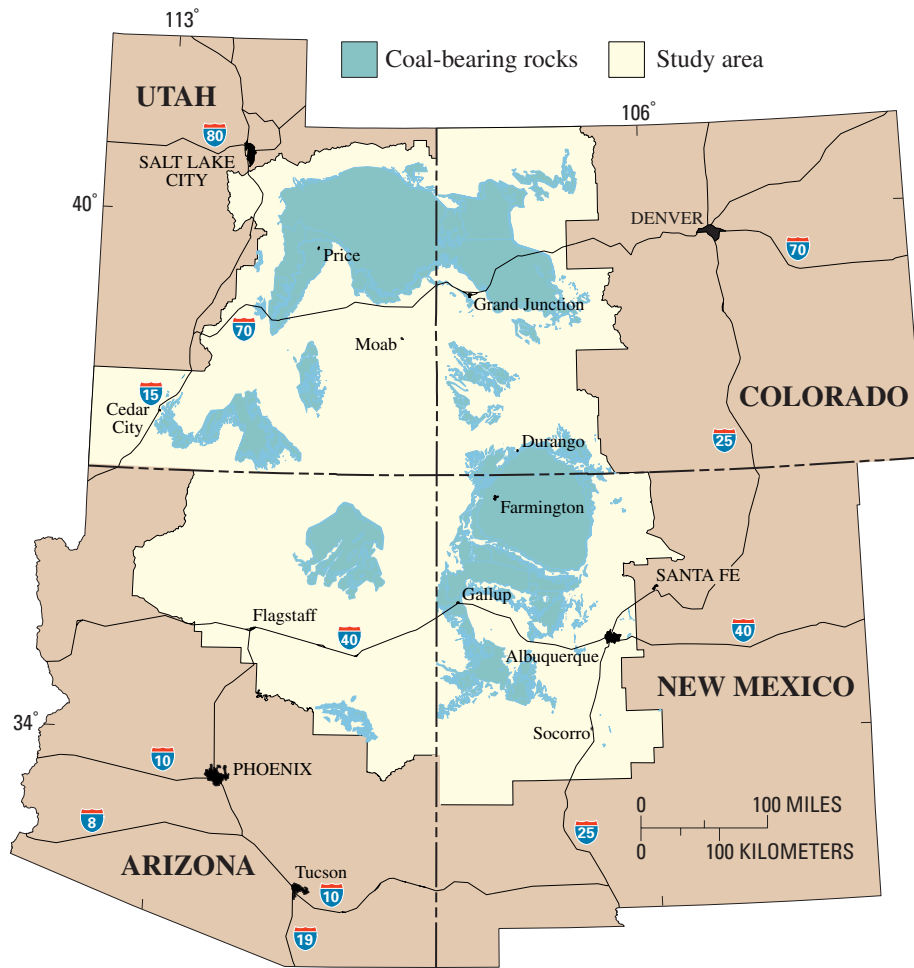


Figure 4A. Index map of Colorado Plateau region, showing study area, coal-bearing areas, major towns, and highways.

Plateau region. The U.S. Bureau of Land Management and the U.S. Forest Service are the major Federal land management agencies in the region; other Federal agencies manage a small percent of the land. The remainder of the land is under Tribal, State, or private ownership.

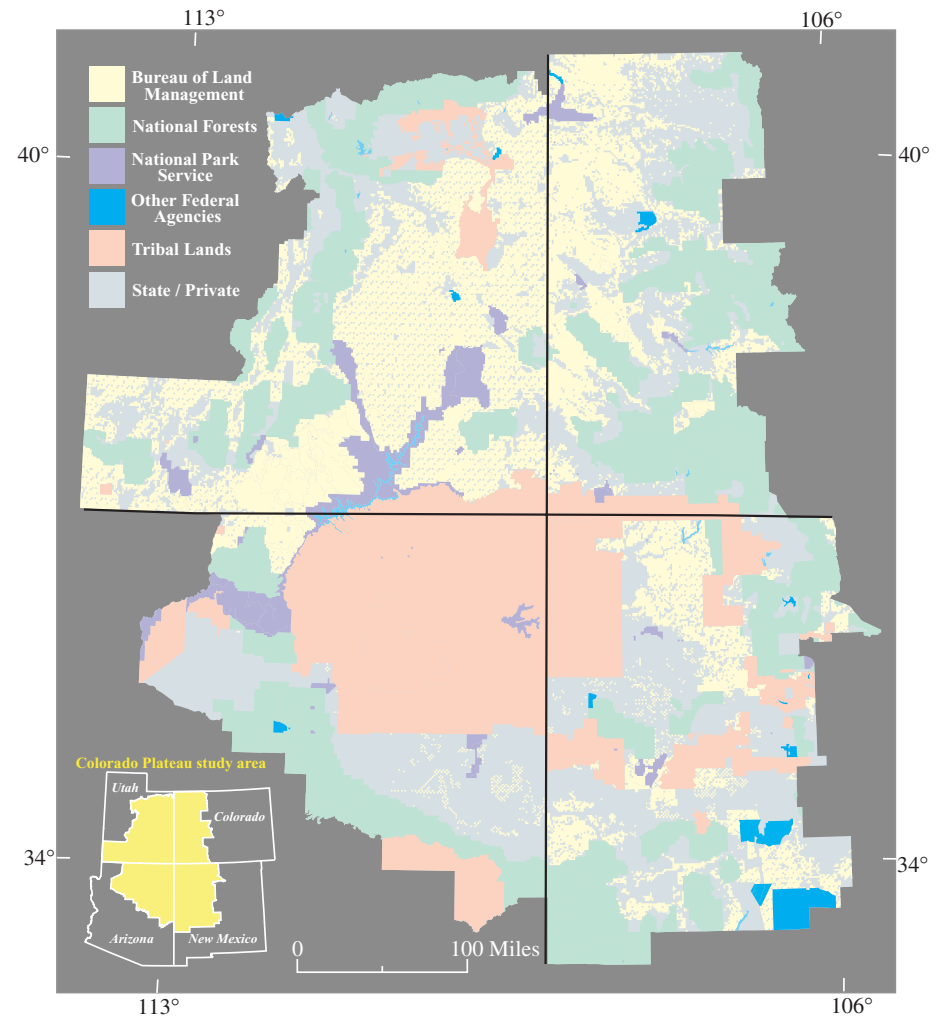


Figure 4B. Generalized land ownership in the Colorado Plateau region.

Surface Ownership of Coal-Bearing Areas

This pie chart shows land surface ownership specifically for areas underlain by coal-bearing rocks in the region. About 50 percent of the surface is federally administered by the Bureau of Land Management or the U.S. Forest Service. About 23 percent of the surface consists of Tribal and Indian lands (lands owned by Tribes

or Indian individuals); those lands are held in trust by the U.S. Government and administered through the Bureau of Indian Affairs. About 26 percent of the surface is administered by State agencies or is privately owned, and one percent is managed by the National Park Service and miscellaneous Federal agencies.

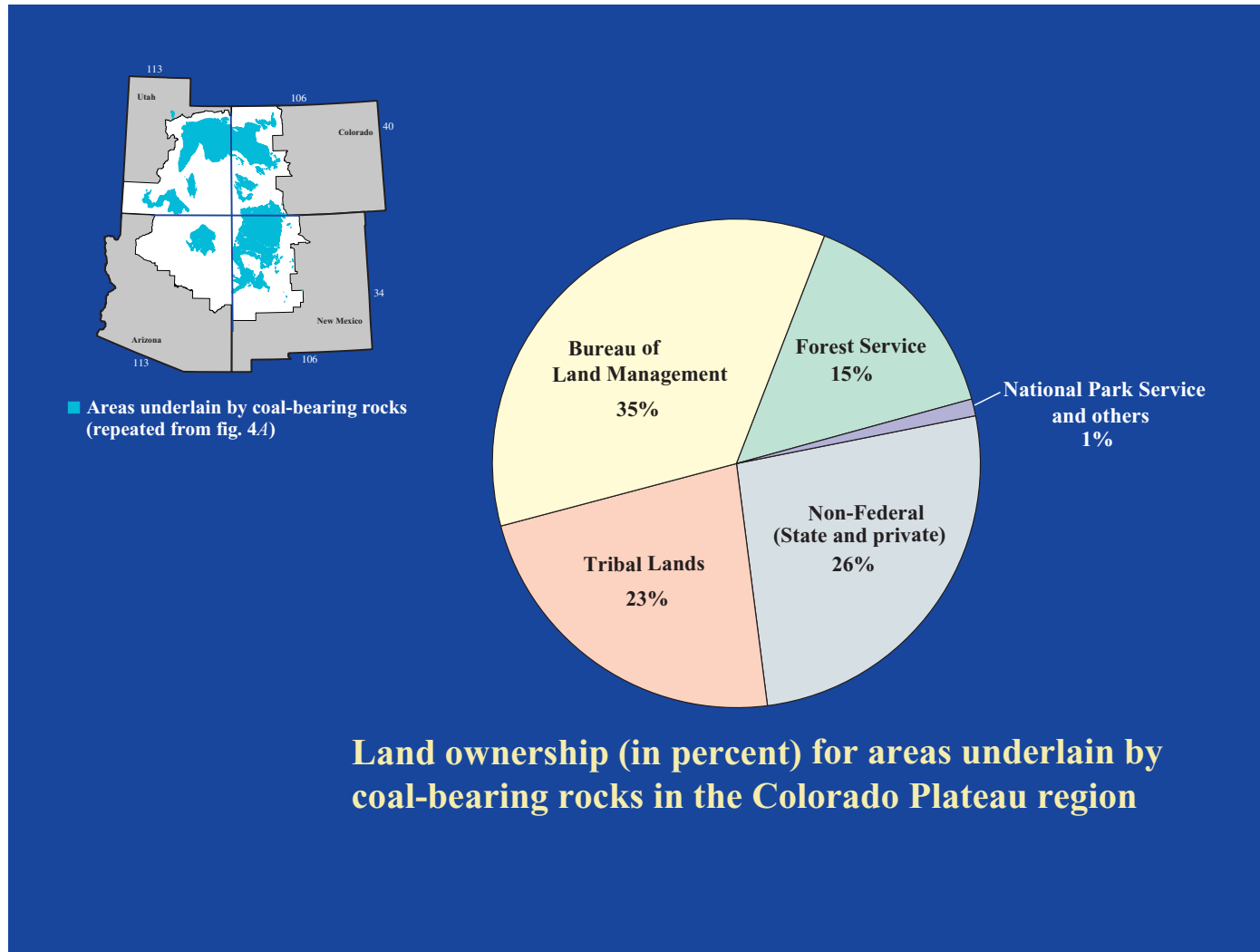


Figure 5. Pie chart showing surface ownership for areas underlain by coal-bearing rocks in the Colorado Plateau region.

Coal and National Parks

Coal located beneath sites managed by the National Park Service is currently not available for development. In the Colorado Plateau region (see fig. 6A), coal deposits are present beneath Bryce Canyon National Park (fig. 6B), Mesa Verde National Park,

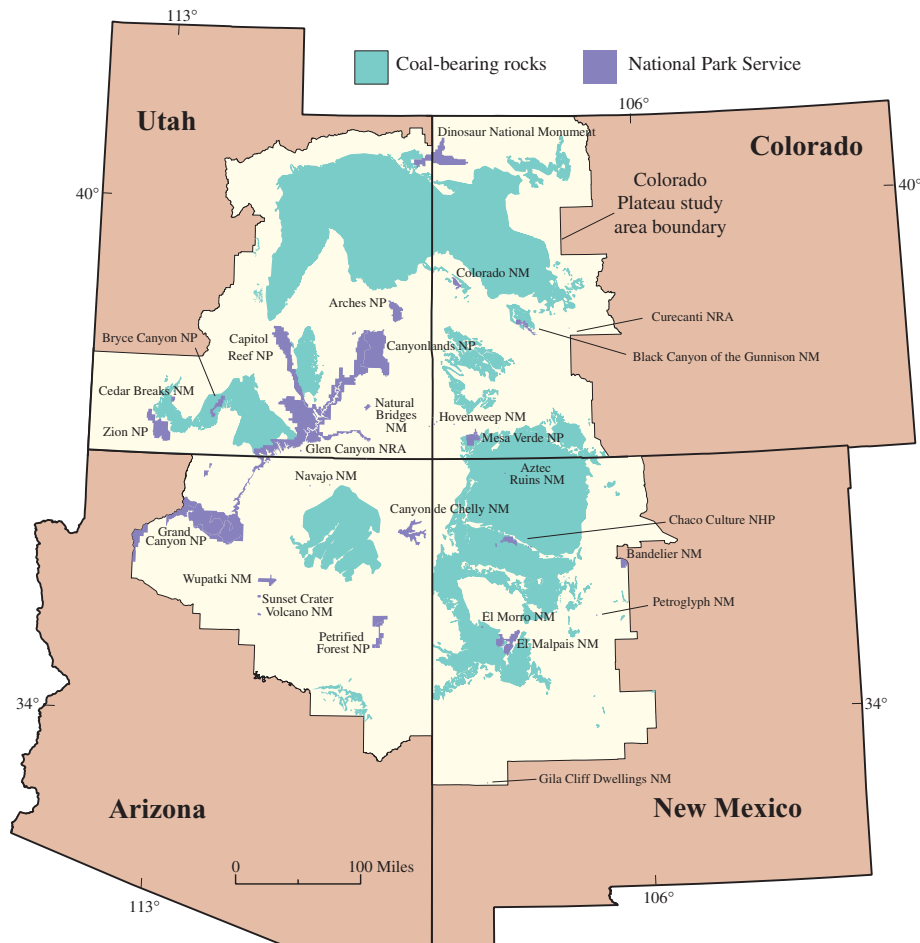


Figure 6A. Location of coal-bearing rocks and areas managed by the National Park Service in the Colorado Plateau region.

and Chaco Culture National Historical Park. In addition, coal deposits exist in the vicinities of Zion National Park, Capitol Reef National Park, Glen Canyon National Recreation Area, Dinosaur National Monument, and many smaller areas managed by the National Park Service in the Colorado Plateau region.

Substantial coal deposits are present beneath the Grand Staircase–Escalante National Monument in southern Utah (see Hettinger and others, chap. T, this CD-ROM, for location of this monument). This new National Monument is administered by the Bureau of Land Management and is not available for coal development.



Figure 6B. Photograph of Bryce Canyon National Park (pink colors in distance) and coal-bearing Dakota Formation (in middle of photograph, above white Entrada Sandstone). Photo by M. Kirschbaum, U.S. Geological Survey.

Coal and National Forests

As this map (fig. 7A) shows, large deposits of coal are present beneath several of the National Forests (fig. 7B) in the Colorado Plateau region. In general, coal mining is permitted in National Forests after the approval of land-use and reclamation plans. The Bureau of Land Management is responsible for leasing all coal on National Forests, even though the U.S. Forest Service has primary jurisdiction over the land surface. Underground coal mines (see fig. 7C) are in operation beneath the Manti-La Sal National Forest in the southern Wasatch Plateau, Utah, and beneath the Gunnison National Forest in the Southern Piceance Basin, Colorado.

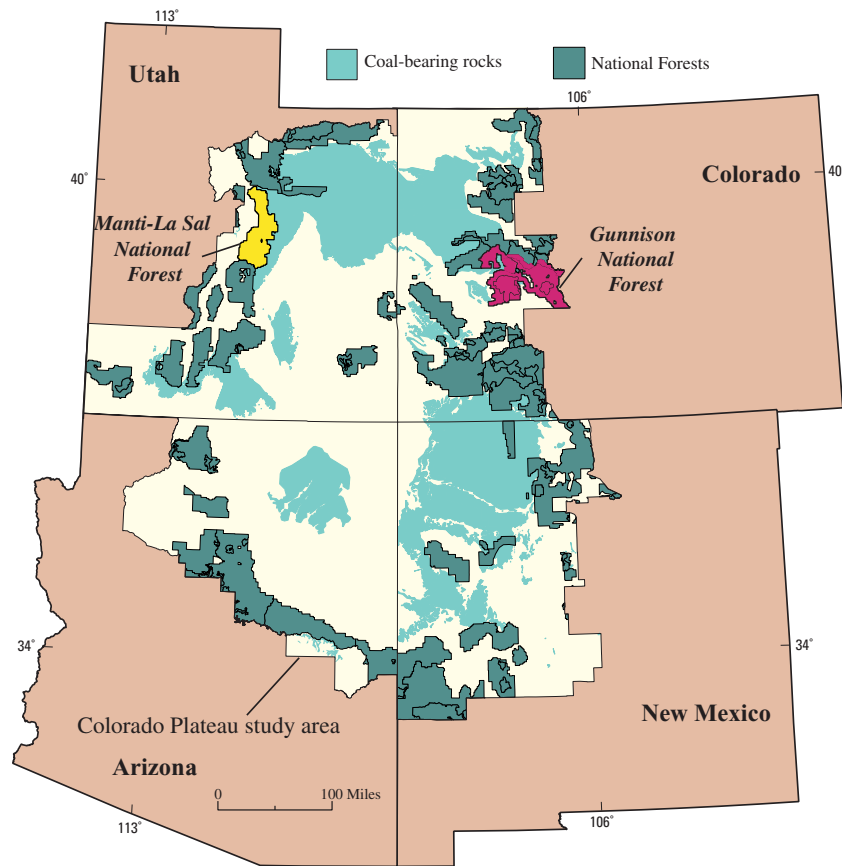


Figure 7A. Location of coal-bearing rocks and National Forests in the Colorado Plateau region.



Figure 7B. View of Convulsion Canyon, Manti-La Sal National Forest, southern Wasatch Plateau, Utah. Red color (at arrow) is caused by natural burning of underlying coal beds. Photo by R. Dubiel, U.S. Geological Survey.



Figure 7C. The SUFCO mine, owned by Canyon Fuel Company, operates in Convulsion Canyon in the Manti-La Sal National Forest, southern Wasatch Plateau, Utah. Photo by R. Dubiel, U.S. Geological Survey.

Estimated Federal Coal Resources, Colorado Plateau Region

For the seven priority assessment units (detailed study areas discussed elsewhere on this CD-ROM), we identified Federal and non-Federal surface ownership and coal ownership, and we calculated Federal coal resources.

It is important for land managers, planners, and mineral developers to know where the Federal coal is located, and how much Federal coal exists, to assist in their land-use decisions. These ownership and resource data become the basis for answering complex spatial queries when these data are combined with information on coal quality, coal thickness, structure, and other parameters generated from geologic investigations. Integrating information on Federal land status, Federal mineral status, and geology can aid management decisions concerning specific lands.

The maps shown in the rest of this chapter are part of the U.S. Geological Survey's digital database of surface and coal ownership for Western States. Sources for the ownership data included the Bureau of Land Management, U.S. Bureau of Mines, and other Federal agencies.

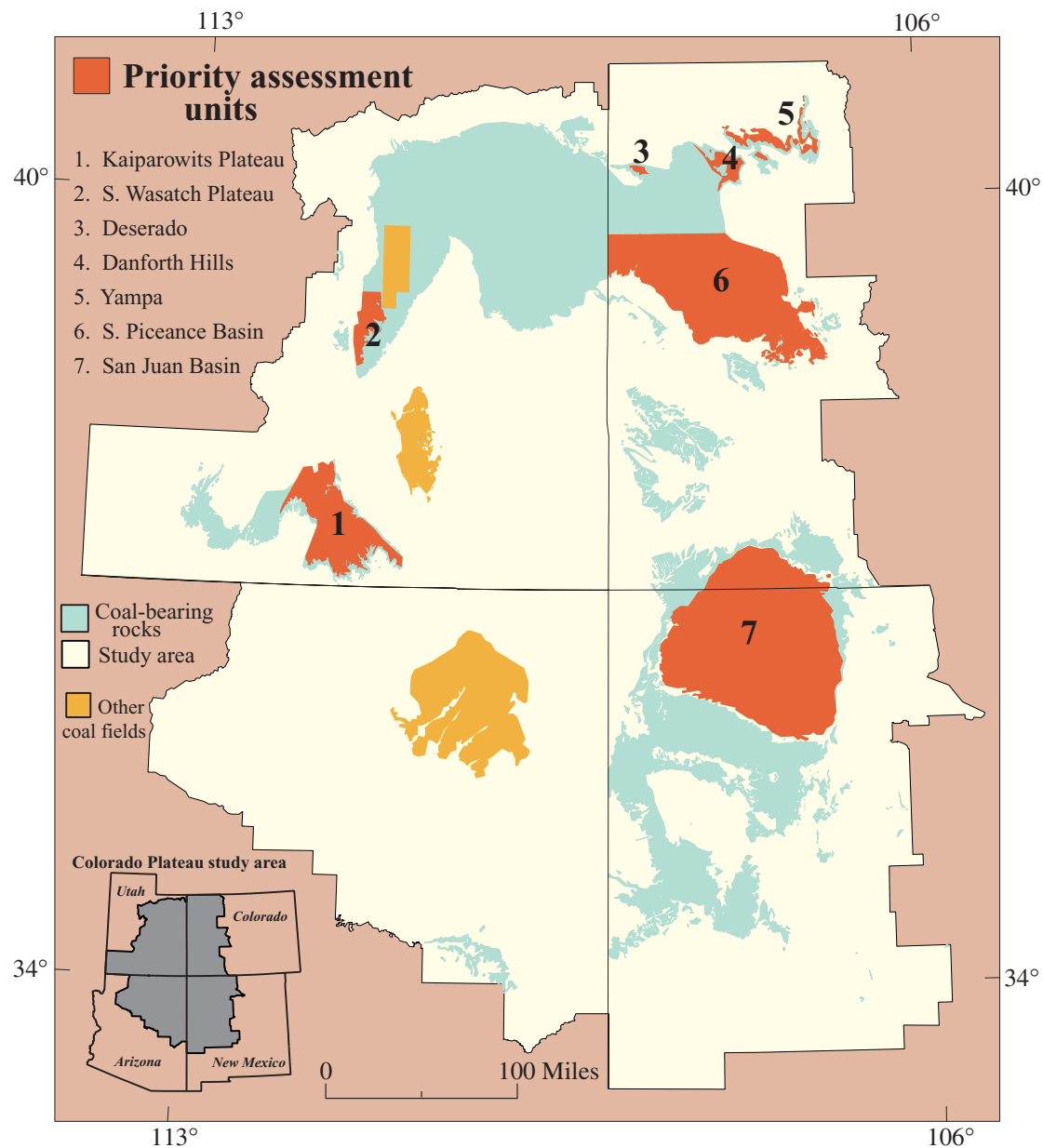


Figure 8. The seven priority assessment units discussed in this report.

Does Surface Ownership Include Coal Ownership?

This figure shows a hypothetical township in the Western United States. The complex combinations of colors and patterns portray land-ownership status together with mineral-ownership status.

Surface ownership can differ from coal ownership for the same piece of land. For example, all coal may be federally owned, but the surface may be under the

jurisdiction or management of State, Tribal, or private interests. This separation of jurisdiction may become a legal issue that can result in federally owned coal resources not being developed because surface-owner consent is a factor in the development of these resources.

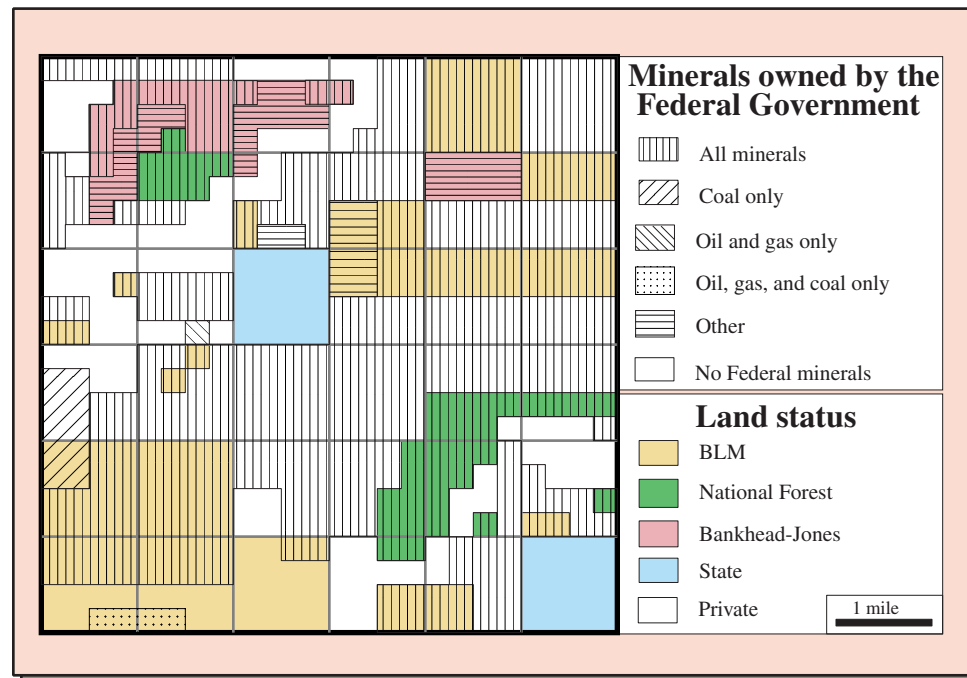


Figure 9. Map depicting land status and mineral ownership for a hypothetical area.

How Much Coal is Federally Owned?

This bar graph and table show that about 71 percent (360 billion short tons) of the total 510 billion short tons of coal in the seven combined Colorado Plateau assessment units is federally owned. About 48 percent of the total 510 billion short tons of coal in the assessment units occurs beneath federally managed land surface; the rest of the coal occurs beneath State, Tribal, or privately owned land.

If we consider federally owned coal only, approximately two-thirds occurs beneath Federal land; the other third occurs beneath State, Tribal, or privately owned land.

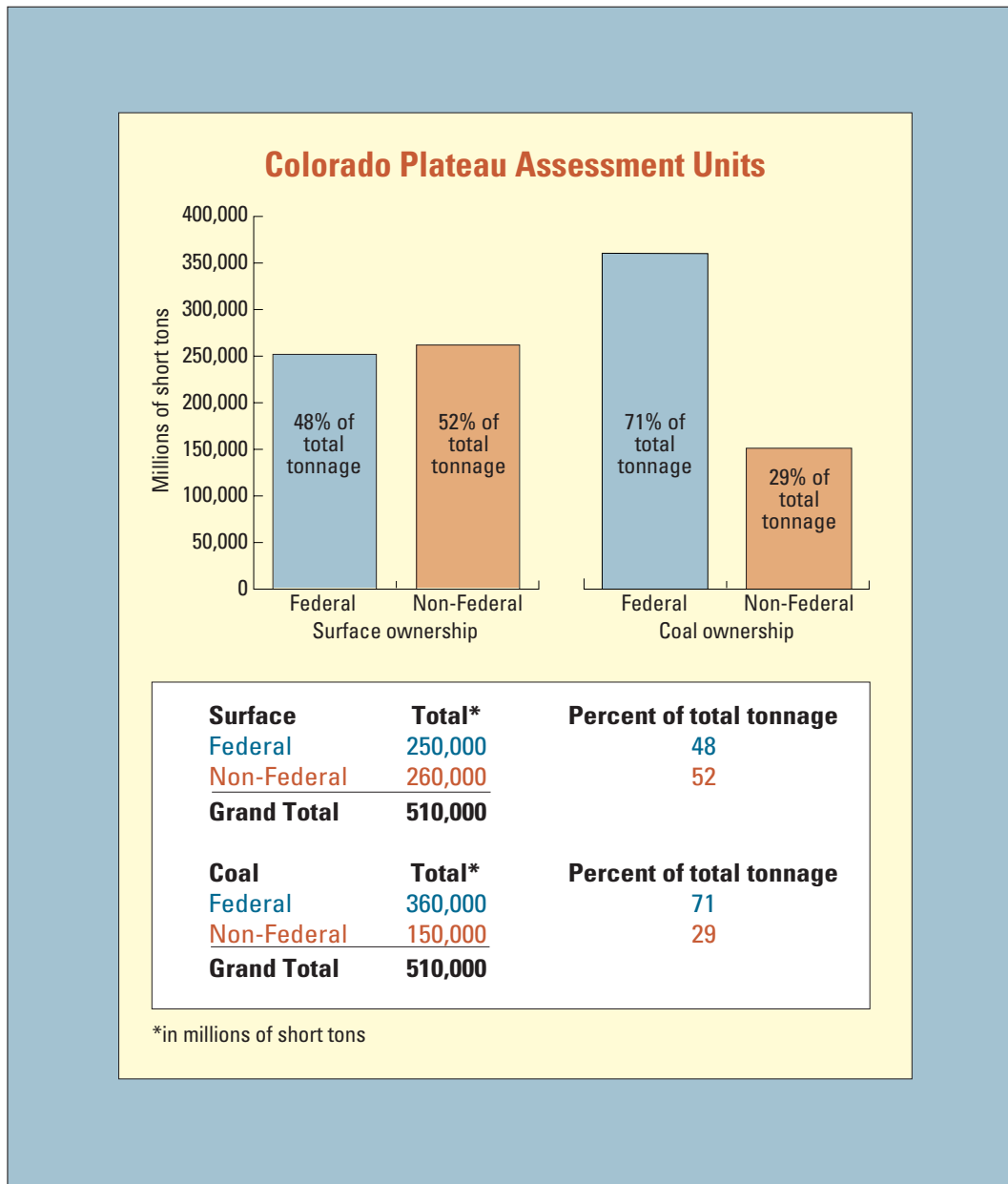


Figure 10. Colorado Plateau assessment units—surface- and coal-ownership bar charts.

Federal Coal Resources—By Priority Assessment Unit

The table on this screen (fig. 11) shows statistics concerning Federal land and Federal coal in each of the seven priority assessment units of the Colorado Plateau. In these seven assessment units, federally owned coal tonnage was calculated for the first time as part of this study. Among the seven units, the percent of land area that is federally administered ranges from 7 to 99; the percent of area underlain by Federal coal ranges from 54 to 99; and the percent of coal tonnage that is federally owned ranges from 58 to 99.

For the resources reported in this table, overburden thickness is 6,000 ft or less;

all coal is bituminous in rank; and coal beds included are 1.2 ft thick or greater. Areas currently under Federal or State leases and areas being mined were excluded from our resource calculations because of confidentiality situations.

Detailed information about the geology and coal resources of each of these seven priority assessment units can be found in separate chapters elsewhere on this CD-ROM.

On the following screens, we show maps of surface ownership, coal ownership, or both, for these seven priority assessment units.

PRIORITY ASSESSMENT UNITS	FEDERAL LAND AREA (Percent of the surface that is administered by the Federal Government)	FEDERAL COAL AREA (Percent underlain by federally owned coal)	FEDERAL COAL PERCENTAGE (Tonnage that is federally owned)	FEDERAL COAL TONNAGE (In millions of short tons rounded to two significant figures)
Danforth Hills	25	89	86	18,000
Yampa	7	65	69	52,000
San Juan Basin	41	54	58	130,000
Southern Piceance Basin	64	74	79	94,000
Deserado	94	99	98	360
Southern Wasatch Plateau	94	96	96	6,500
Kaiparowits	99	99	99	61,000

Figure 11. Table showing statistics concerning Federal land and Federal coal for Colorado Plateau assessment units.

Danforth Hills

Of the seven coal regions studied in this assessment of the Colorado Plateau, the Danforth Hills coal field, northwestern Colorado, has the biggest difference between percent surface area administered by the Federal Government and percent area underlain by federally owned coal. Only 25 percent of the land surface is administered by the Federal Government, but 89 percent of the assessment unit is underlain by federally owned coal. These illustrations show surface ownership and

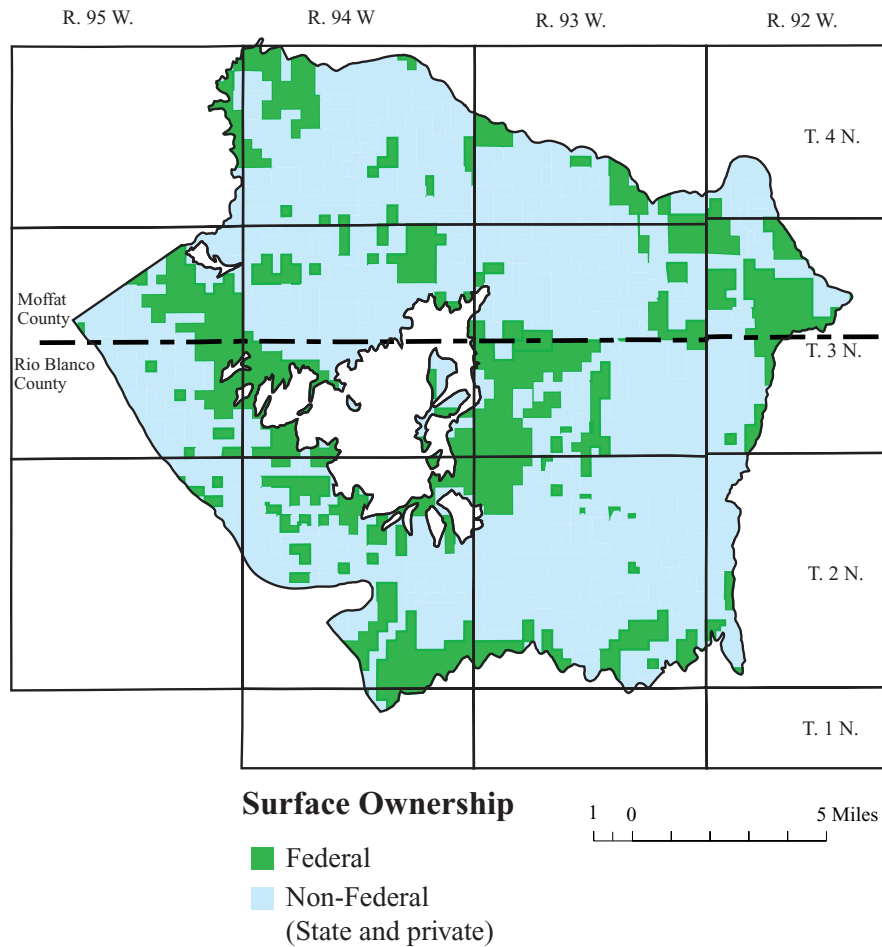


Figure 12A. Surface ownership in the Danforth Hills coal field (after Brownfield and others, chap. M, this CD-ROM).

coal ownership in the Danforth Hills assessment unit. The federally owned coal tonnage in the Danforth Hills assessment unit is approximately 18 billion short tons, which is 86 percent of the total coal tonnage in this study area.

For a detailed discussion of the geology and coal resources of the Danforth Hills assessment unit, see Brownfield and others (chap. M, this CD-ROM).

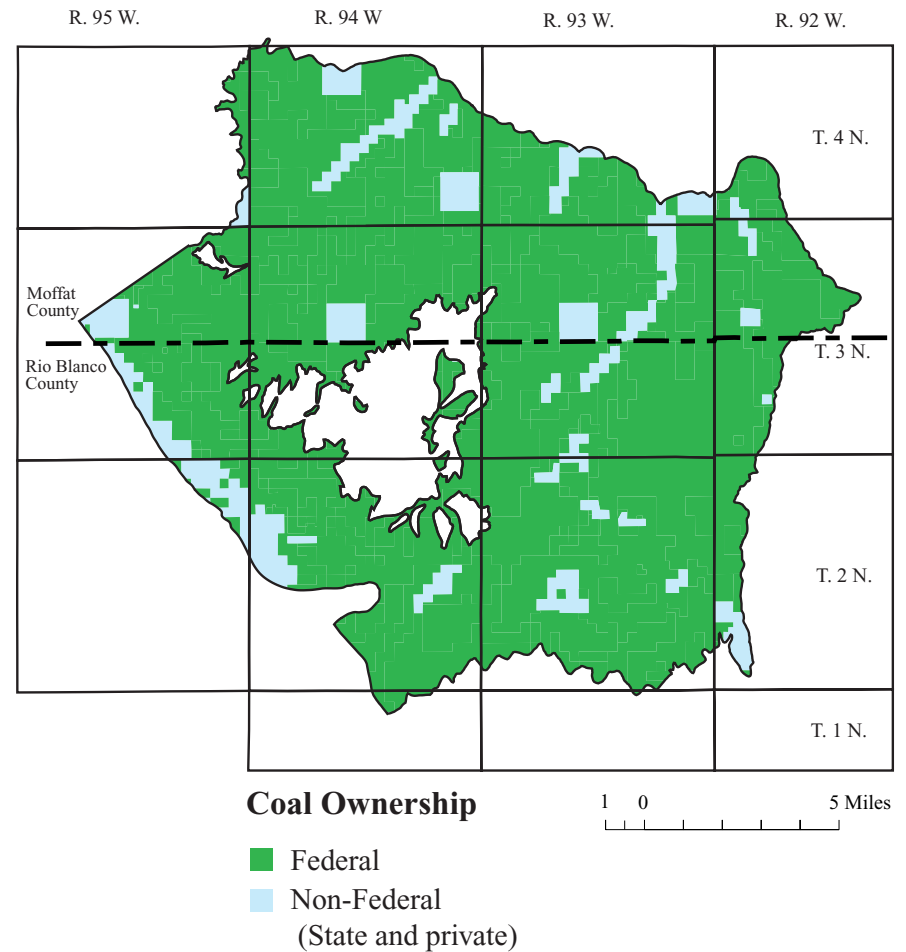


Figure 12B. Coal ownership in the Danforth Hills coal field (after Brownfield and others, chap. M, this CD-ROM).

Yampa Coal Field

The Yampa assessment unit, northwestern Colorado, also has a big difference between the percent surface area administered by the Federal Government and the percent area underlain by federally owned coal. Only 7 percent of the land surface is administered by the Federal Government, but 65 percent of the Yampa assessment unit is underlain by federally owned coal. These illustrations show surface ownership

and coal ownership in the Yampa assessment unit. The Federal coal tonnage in the Yampa coal field is approximately 52 billion short tons, which is 69 percent of the total coal tonnage in this study area.

For a detailed discussion of the geology and coal resources of the Yampa assessment unit, see Johnson and others (chap. P, this CD-ROM).

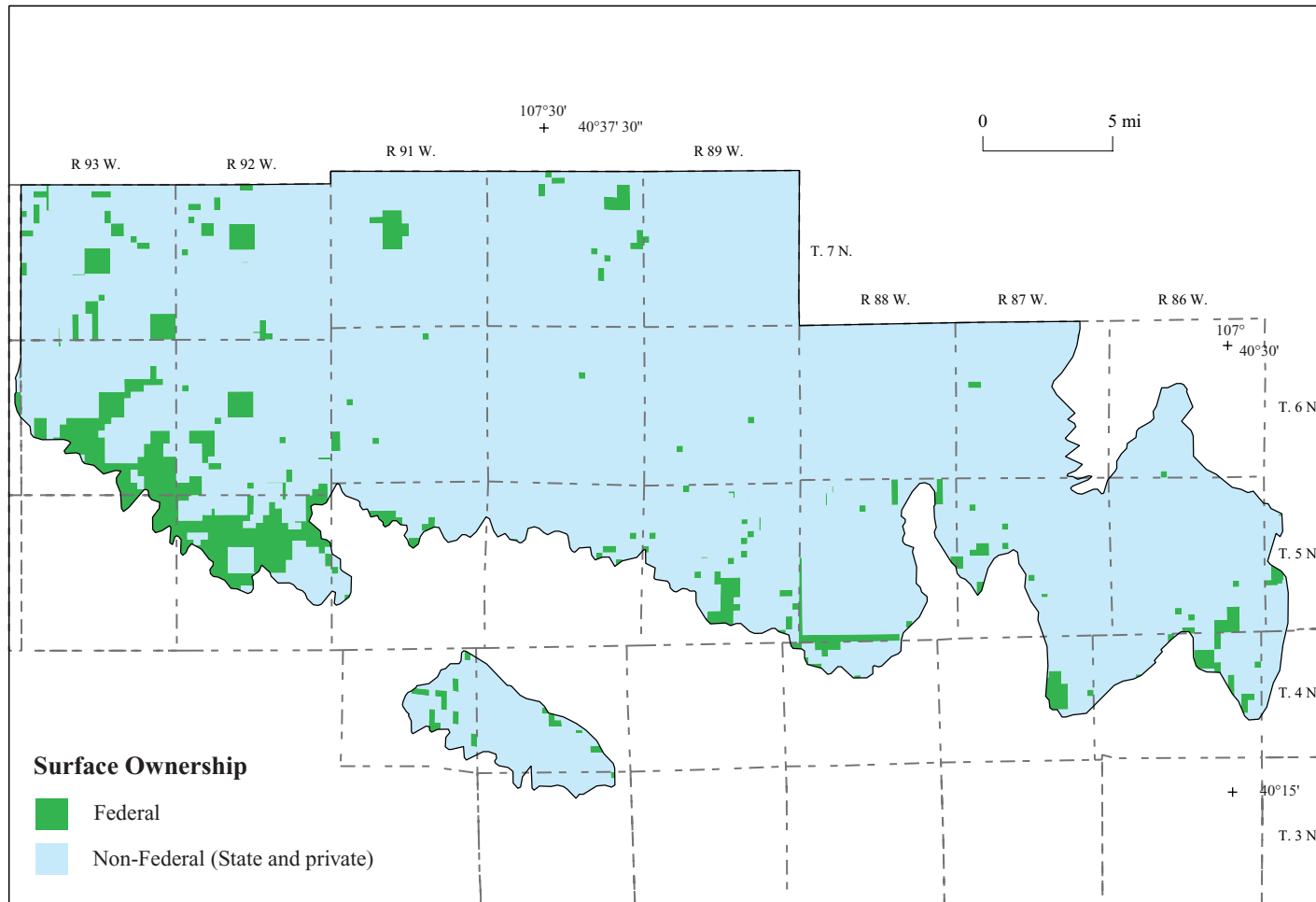


Figure 13A. Surface ownership in the Yampa assessment unit (after Johnson and others, chap. P, this CD-ROM).

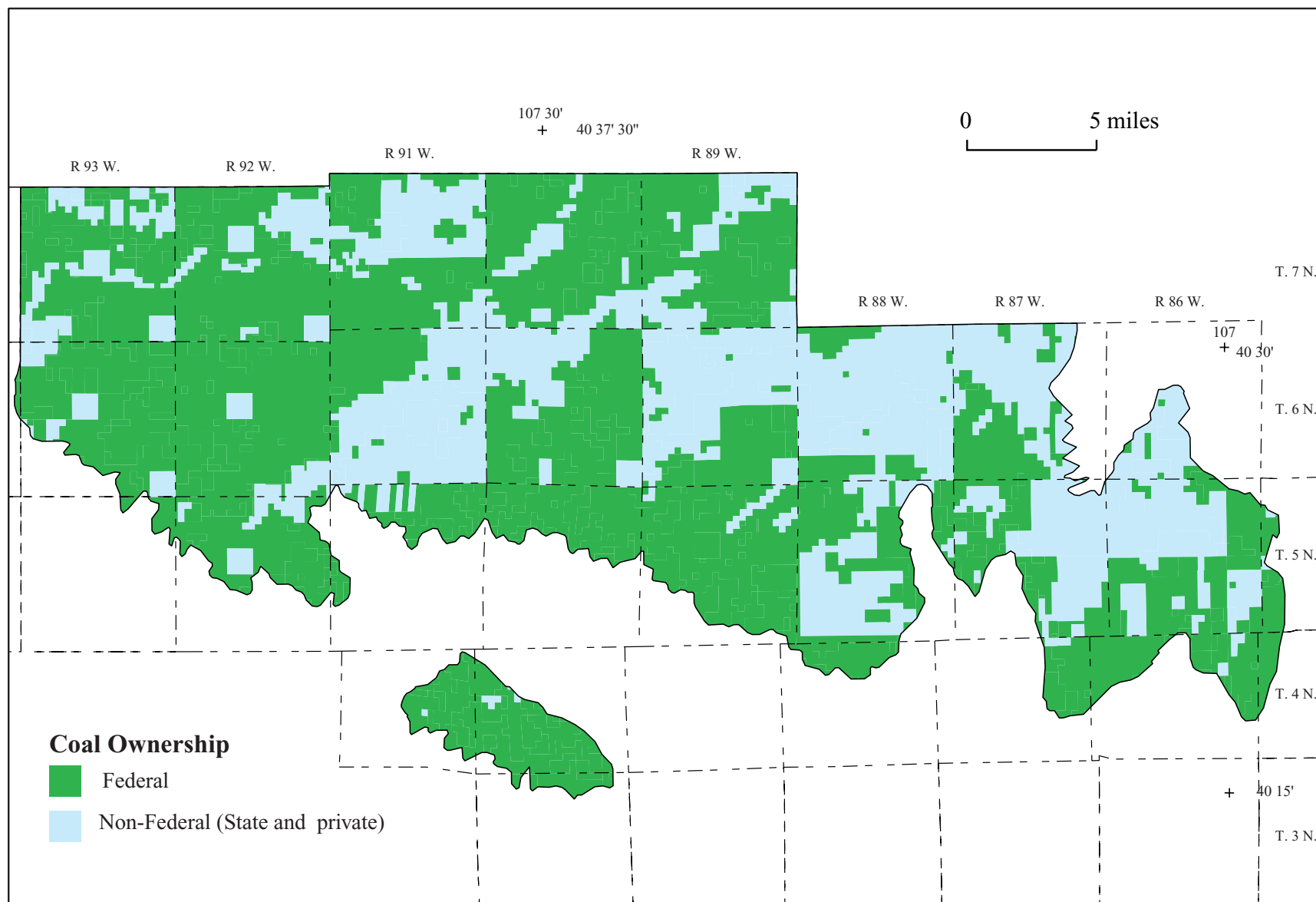


Figure 13B. Coal ownership in the Yampa assessment unit (after Johnson and others, chap. P, this CD-ROM).

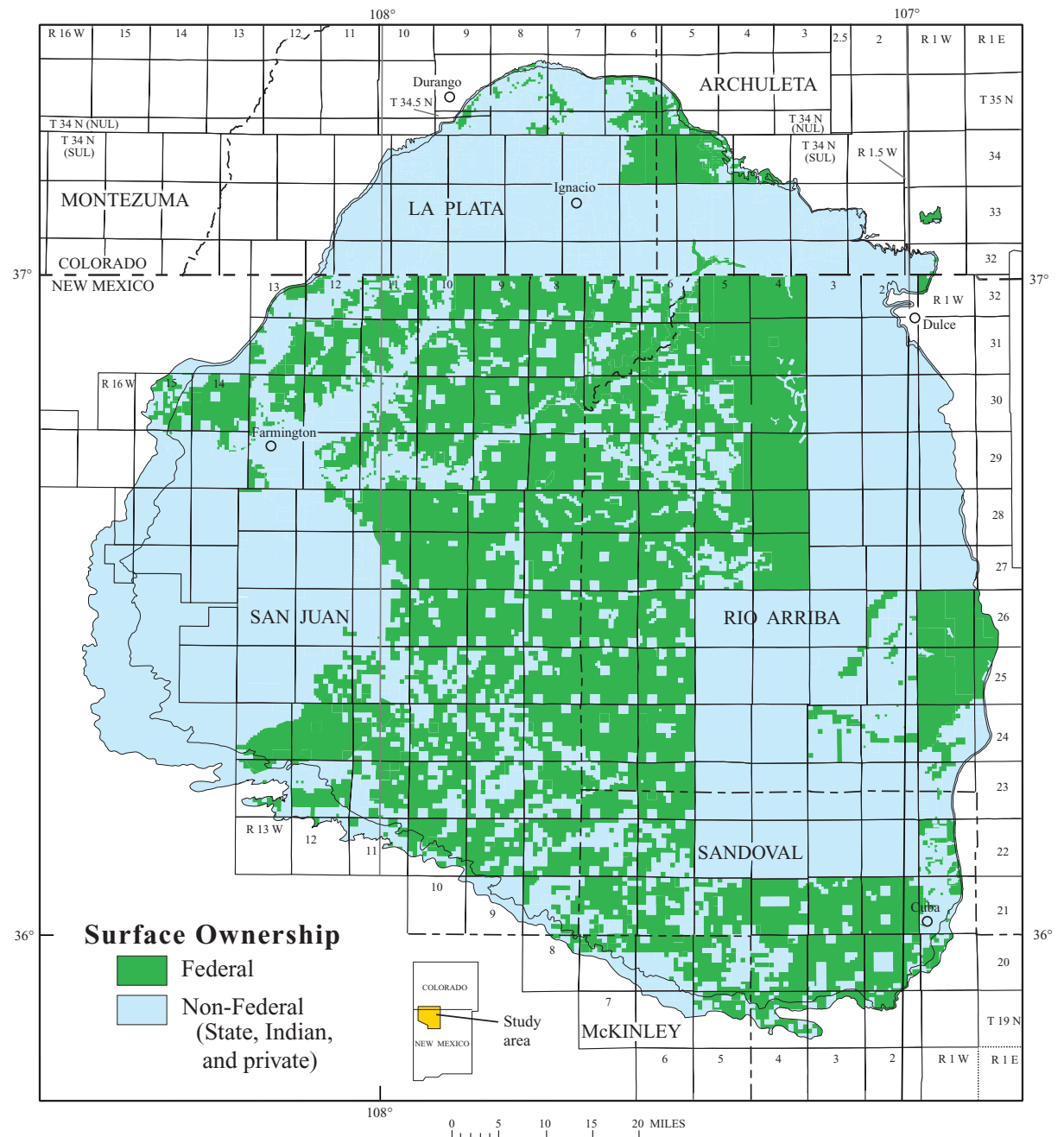
San Juan Basin

In other coal assessment units of the Colorado Plateau, the difference between federally owned coal and federally managed surface is not as great. In the San Juan Basin, New Mexico and Colorado, 41 percent of the land surface is managed by the Federal Government and 54 percent of the assessment unit is underlain by federally owned coal. These illustrations show the distribution of Federal surface and Federal coal ownership in the San Juan Basin. The Federal coal tonnage in the San Juan Basin is approximately 130 billion short tons, which is 58 percent of the total coal tonnage in this assessment unit.

For a detailed discussion of the geology and coal resources of the San Juan Basin assessment unit, see Fassett (chap. Q, this CD-ROM).

Note (fig. 15) that large, contiguous areas of land surface that is not federally administered in the San Juan Basin are Tribal lands, which are included in the percentage of State and private surface area.

Figure 14A. Surface ownership in the San Juan Basin assessment unit (after Fassett, chap. Q, this CD-ROM).



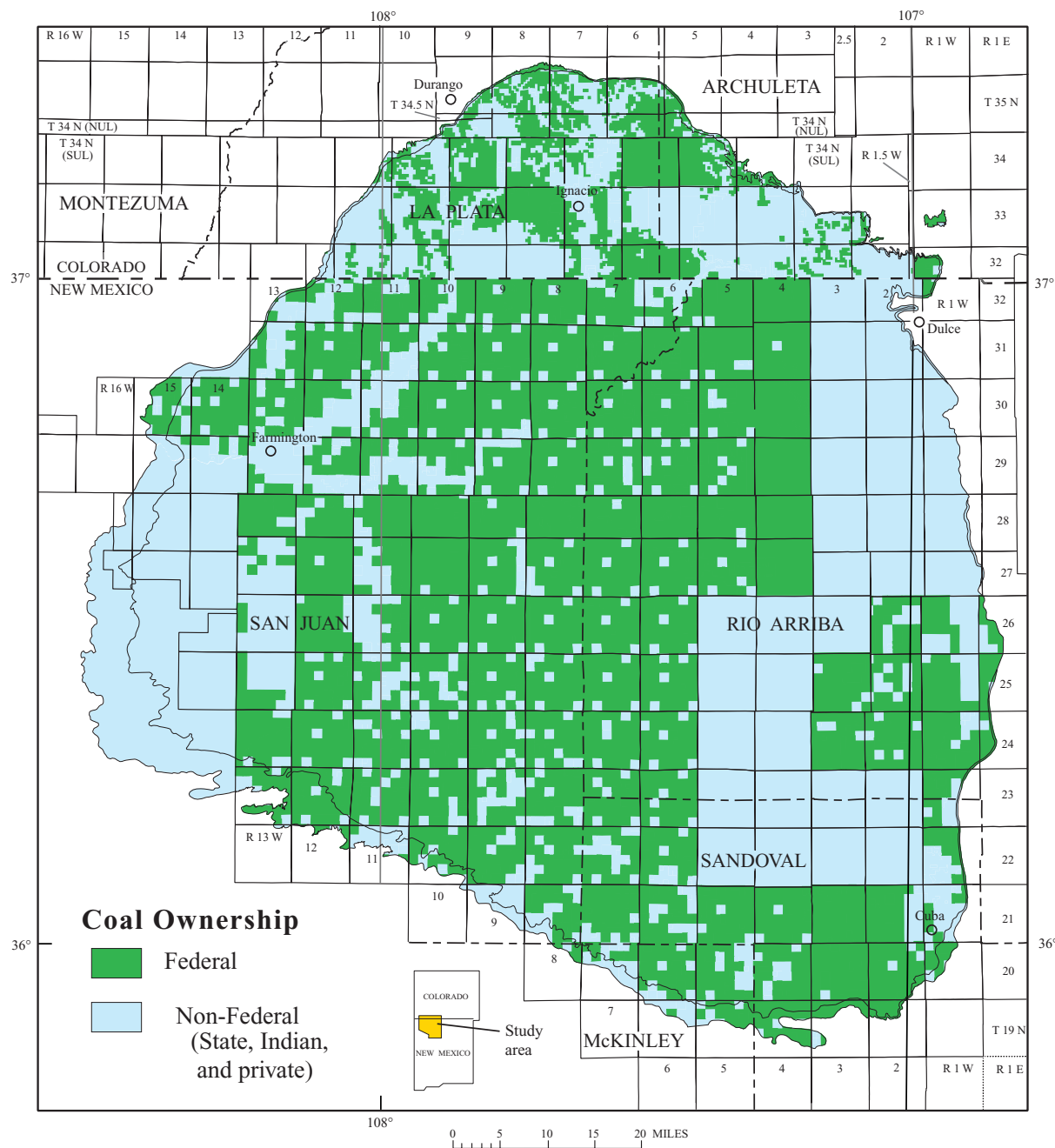


Figure 14B. Coal ownership in the San Juan Basin assessment unit (after Fassett, chap. Q, this CD-ROM).

San Juan Basin Tribal Lands

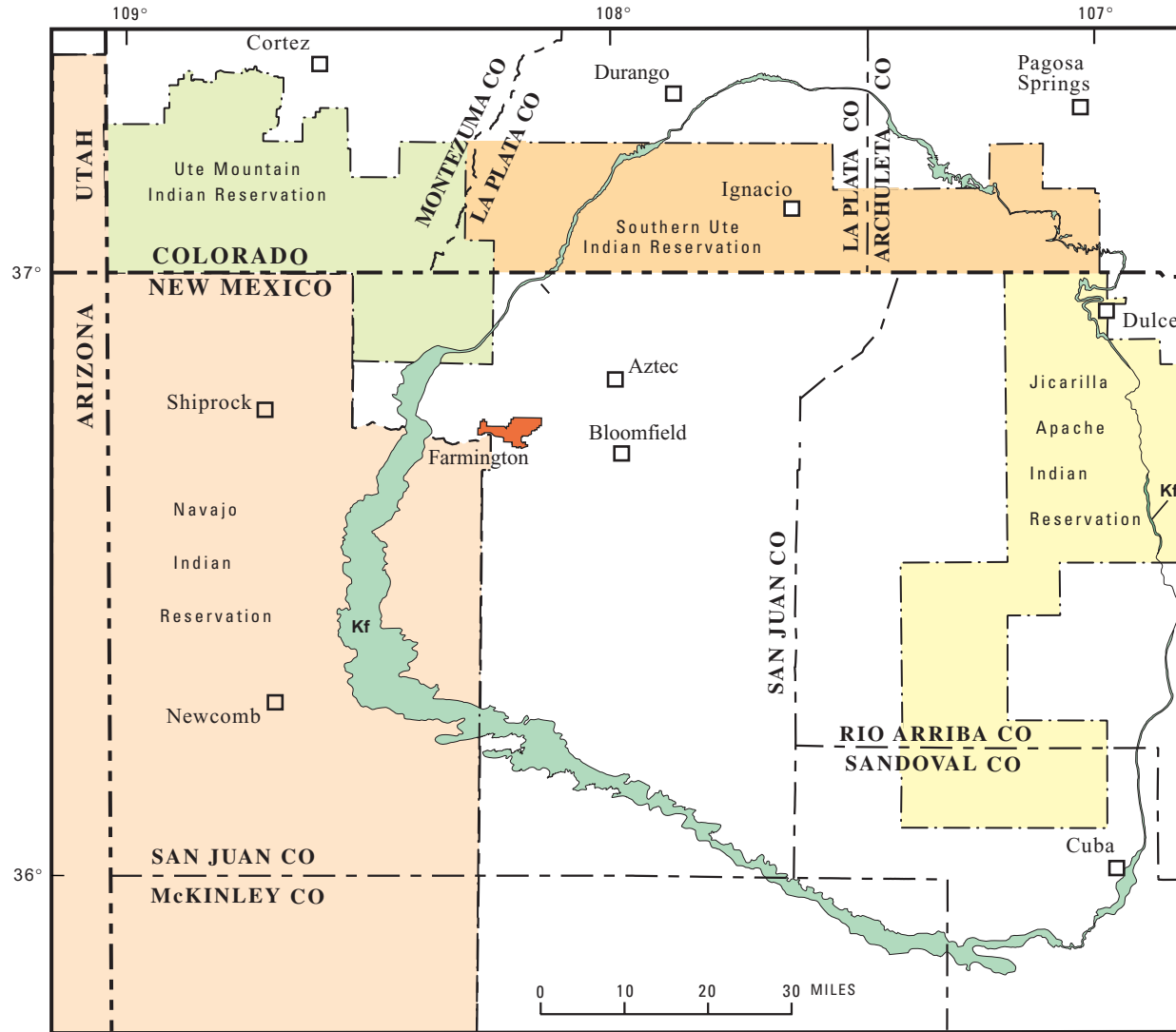


Figure 15. Index map of San Juan Basin Tribal areas (modified from Fassett, chap. Q, this CD-ROM). Tribal-area boundaries are from USGS base maps for New Mexico and Colorado. Map does not show scattered tracts of Indian lands outside of reservation boundaries nor non-Indian lands within some of the reservation boundaries. The basin is defined in this report as the area inside the outcrop of the Fruitland Formation (Kf) (see Fassett, chap. Q, this CD-ROM).

Southern Piceance Basin

In the Southern Piceance Basin assessment unit, Colorado, 64 percent of the land surface is managed by the Federal Government (no illustration shown) and 74 percent of the assessment unit is underlain by federally owned coal. This illustration shows the distribution of federally owned coal in the southern Piceance Basin. The

Federal coal tonnage in this basin is approximately 94 billion short tons, which is 79 percent of the total coal tonnage in this assessment unit.

For a detailed discussion of the geology and coal resources of the Southern Piceance Basin assessment unit, see Hettinger and others (chap. O, this CD-ROM).

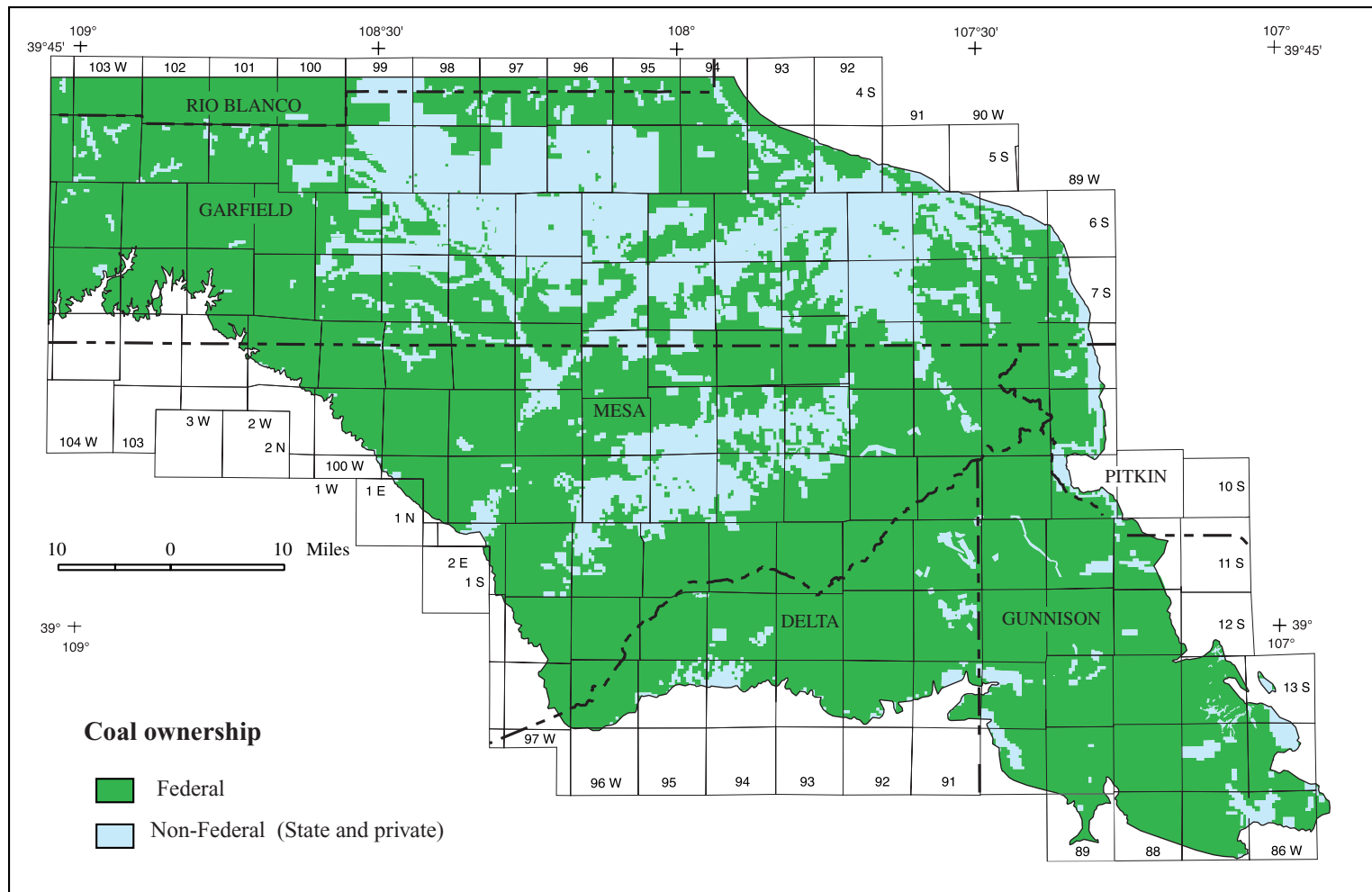


Figure 16. Coal ownership in the southern part of the Piceance Basin, Colorado (after Hettinger and others, chap. O, this CD-ROM).

Deserado Priority Assessment Unit, Lower White River Coal Field

These illustrations of the Deserado assessment unit, Colorado, show that 94 percent of the land surface is administered by the Federal Government and 99 percent of the Deserado assessment unit is underlain by federally owned coal. The Federal coal tonnage in the Deserado assessment unit is approximately 360 million short

tons, which is 98 percent of the total coal tonnage in this assessment unit.

For a detailed discussion of the geology and coal resources of the Deserado assessment unit, see Brownfield and others (chap. N, this CD-ROM).

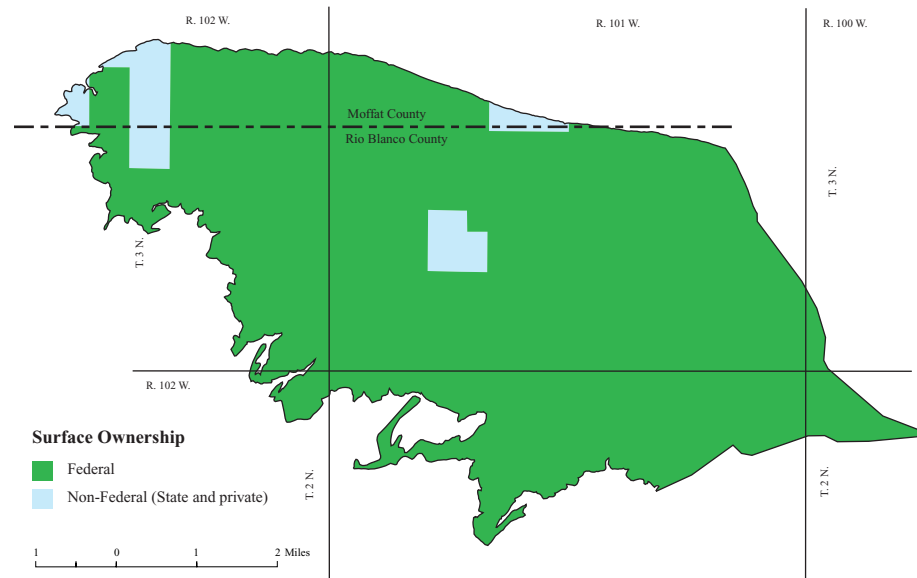


Figure 17A. Surface ownership in the Deserado coal assessment unit, Lower White River coal field (after Brownfield and others, chap. N, this CD-ROM).

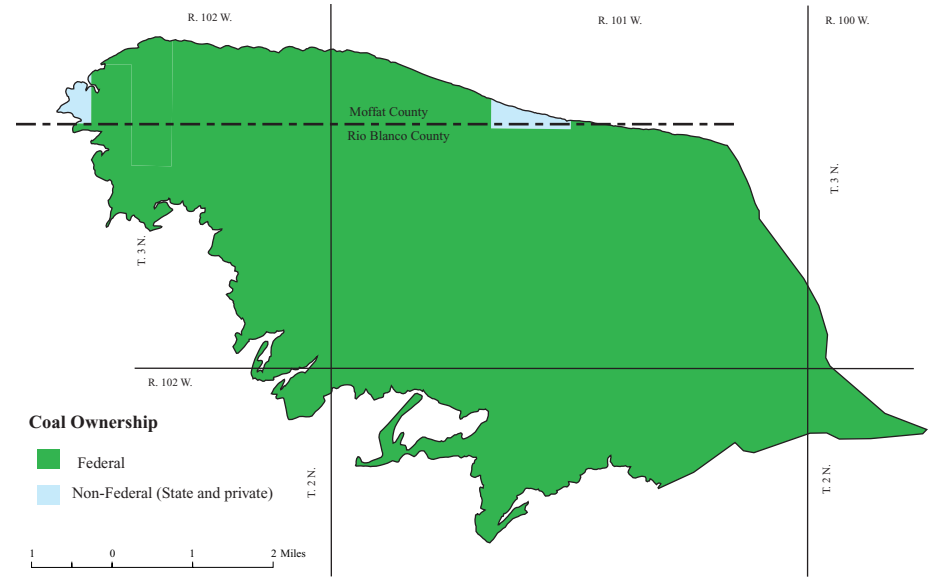


Figure 17B. Coal ownership in the Deserado coal assessment unit, Lower White River coal field (after Brownfield and others, chap. N, this CD-ROM).

Southern Wasatch Plateau

In the Southern Wasatch Plateau assessment unit, Utah, 94 percent of the land surface is managed by the Federal Government and 96 percent of the assessment unit is underlain by federally owned coal, as these two illustrations show. The Federal coal tonnage in the Southern Wasatch Plateau assessment unit is approximately 6.5

billion short tons, which is 96 percent of the total coal tonnage in this assessment unit.

For a detailed discussion of the geology and coal resources of the Southern Wasatch Plateau assessment unit, see Dubiel and others (chap. S, this CD-ROM).

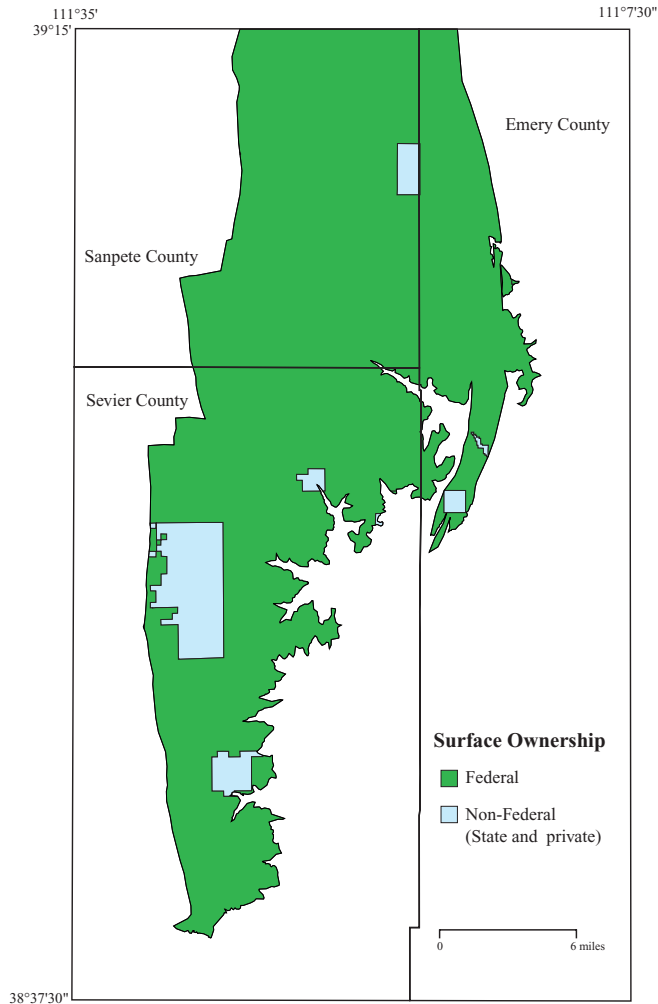


Figure 18A. Surface ownership in the Southern Wasatch Plateau assessment unit (after Dubiel and others, chap. S, this CD-ROM).

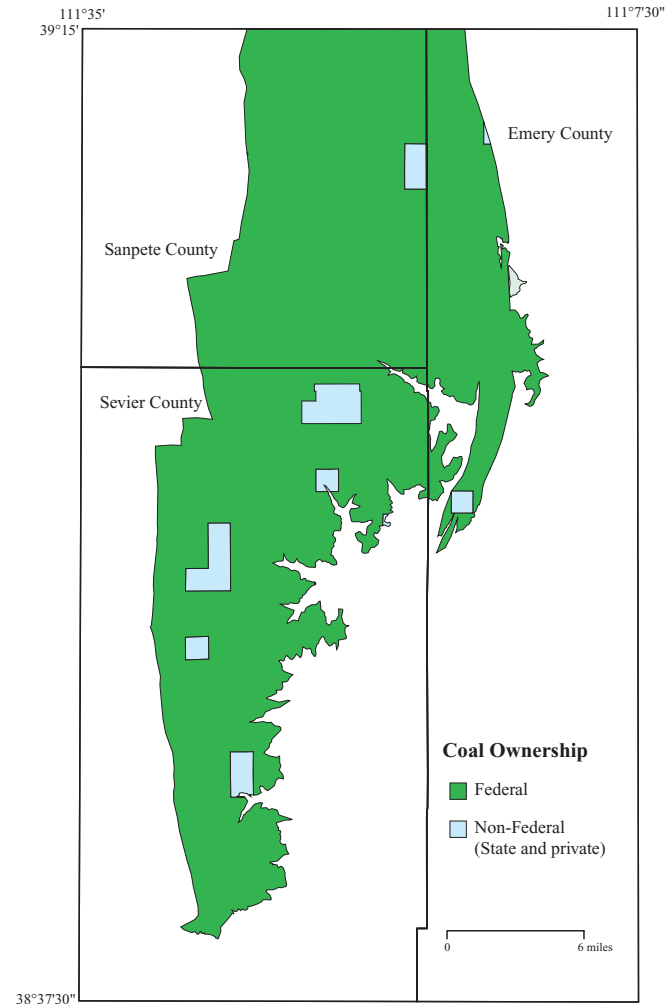


Figure 18B. Coal ownership in the Southern Wasatch Plateau assessment unit (after Dubiel and others, chap. S, this CD-ROM).

Kaiparowits Plateau

Essentially the entire Kaiparowits Plateau coal assessment unit, Utah, consists of federally managed land surface (no illustration shown) underlain by federally owned coal. This illustration shows the distribution of federally owned coal, which is 99 percent of the total coal tonnage in the assessment unit. The Federal coal tonnage in the Kaiparowits assessment unit is approximately 61 billion short tons.

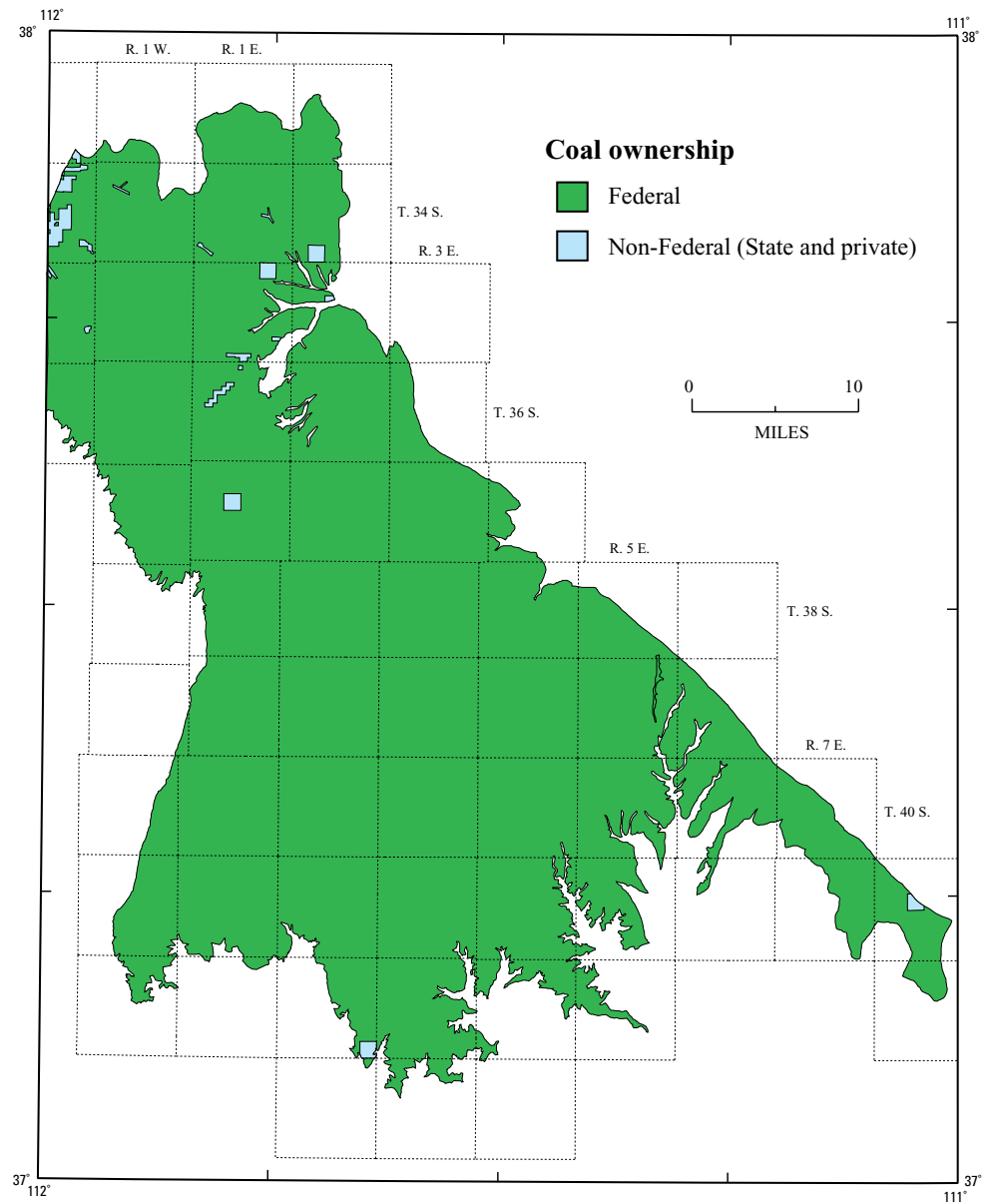


Figure 19. Coal ownership in the Kaiparowits Plateau assessment unit (after Hettinger and others, chap. T, this CD-ROM).

Kaiparowits Plateau Query Results

This illustration is an example in which we identified locations of Federal coal resources under specific geologic conditions, as part of an analysis of the Kaiparowits Plateau (Hettinger and others, chap. T, this CD-ROM). Similar analyses can be shown for any of the seven assessment units. By using USGS-prepared digital databases, we searched for areas of the Kaiparowits Plateau where federally owned coal beds are dipping less than 12 degrees and occur under less than 3,000 ft of overburden. This map displays the total coal thickness for areas that met these criteria.

For a detailed discussion of the geology and coal resources of the Kaiparowits assessment unit, see Hettinger and others (chap. T, this CD-ROM).

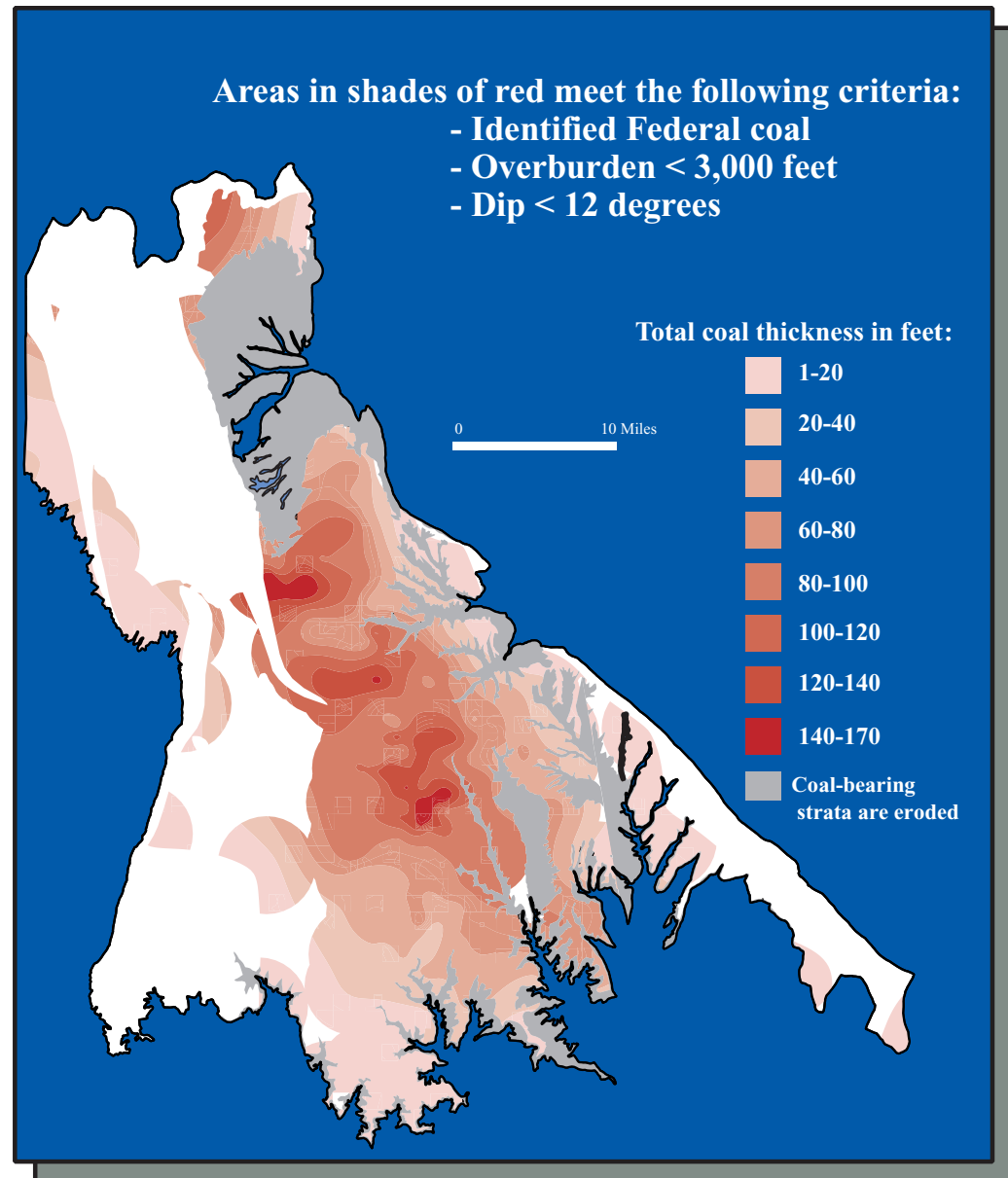


Figure 20. Computer-produced representation showing location of Federal coal resources that meet specified geologic criteria, Kaiparowits Plateau assessment unit (modified from Hettinger and others, chap. T, this CD-ROM).

Conclusions

The federally owned coal deposits of the Colorado Plateau region play an important role in supplying energy to our Nation. More than 360 billion short tons of Federal coal exist in the seven priority assessment units studied in this report. As United States coal resources continue to be examined for potential development, there is sustained interest in Federal coal in the Colorado Plateau region. The U.S. Geological Survey’s digital database of surface and coal ownership, joined with USGS geologic investigations, assists policy makers and land-use planners in making wise decisions regarding use of Federal land and coal resources to meet diverse social needs.

References Cited

- Biewick, Laura R.H., 1997, Coal fields and Federal lands of the conterminous United States: U.S. Geological Survey Open-File Report 97-461, one plate, [available on the Web at: <http://energy.cr.usgs.gov/fedland/index.html>].
- U.S. Department of Energy, Energy Information Administration, 1995, Annual energy review 1994: DOE/EIA-0384(94), table 1.14.
- U.S. Department of Energy, Energy Information Administration, 1998, Coal industry annual, 1997: DOE/EIA-0584(97), table 13.
- U.S. Department of the Interior, Bureau of Land Management, 1991, Federal coal management report, fiscal year 1990—Annual report of the Secretary of the Interior, 38 p.
- U.S. Department of the Interior, Minerals Management Service, 1998, Coal revenues 1997—Report on coal receipts from Federal and Indian leases, figure 2, p. vi, [available on the Web at: <http://www.rmp.mms.gov/library/statroom/PDFDocs/cr97.pdf>].

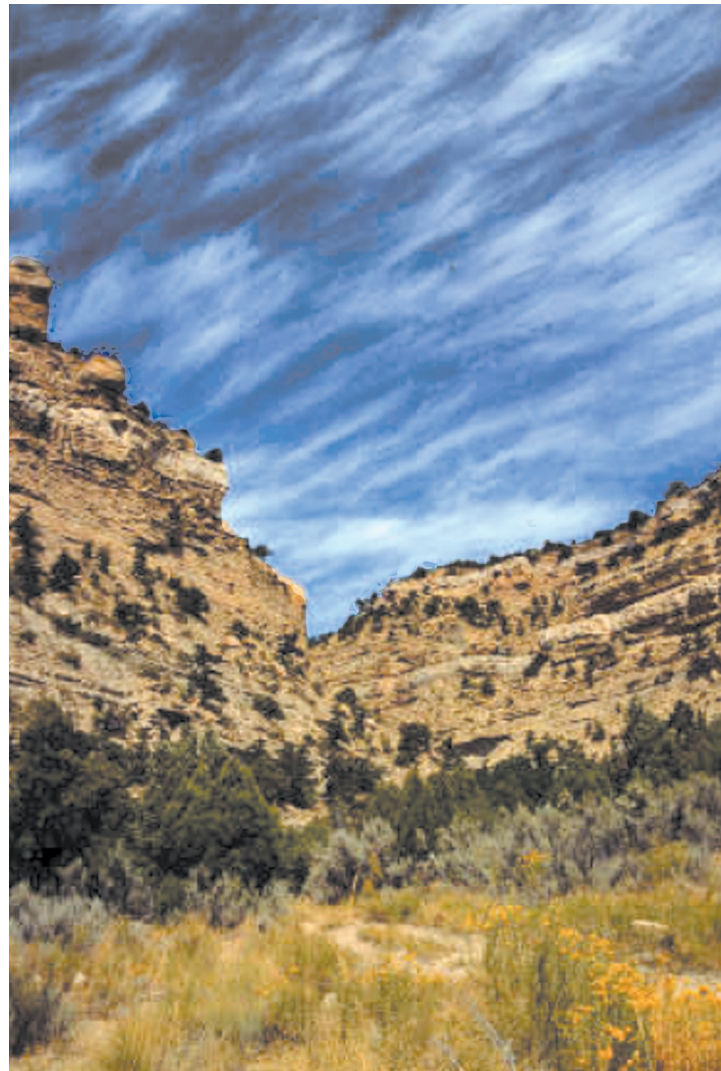
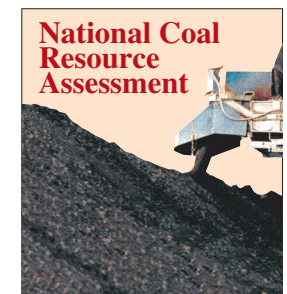


Figure 21. Scenic view of Spring Canyon, southern Wasatch Plateau, Utah. Photo by M. Kirschbaum, U.S. Geological Survey.



[Click here to return to Disc 1 Volume Table of Contents](#)