USDA Natural Resources Conservation Service

Ecological site R080AY090OK
Ponded Bottomland

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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

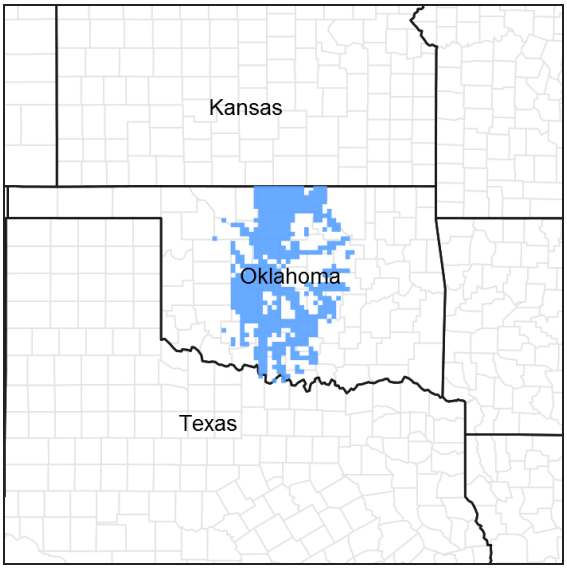

Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 080A–Central Rolling Red Prairies

MLRA 80A is characterized by dark red Permian rocks that are exposed on gently sloping plains. These plains are dissected by rivers that flow from northwest to southeast. Major rivers of this MLRA include the Chikaskia and Bluff rivers in KS, the Salt Fork, Cimarron, North and South Canadian, Washita, Cache, Red River in OK, and branches of the Wichita River in TX. Soils are generally well drained, loamy or clayey deposits overlying Permian sandstones or shales.

Classification relationships

This ecological site is correlated to soil components at the Major Land Resource Area (MLRA) level which is further described in USDA Ag Handbook 296.

Ecological site concept

These sites occur in backwater, poorly drained areas along stream and tributaries. They have formed as clays have settled out of floodwaters and created a restrictive layer that ponds water. These areas remain ponded for long periods of time and are often dominated by wetland plants including reeds, rushes, and willow species. During drier periods the vegetation may shift to species that are better adapted to dry soil conditions such as tallgrasses,

midgrasses, and some woody plants. Many of these sites have been drained and farmed or planted to an introduced forage species. While these sites are relatively small in extent, they can be quite important habitats for certain plant and wildlife species.

Associated sites

R080AY045OK	**Clay Bottomland** Fine textured soils on floodplains. Not ponded.

Similar sites

R080AY095OK	**Subirrigated Bottomland** Coarse textured soils. Endosaturated.

Table 1. Dominant plant species

Tree	(1) *Salix nigra*
Shrub	(1) *Cephalanthus occidentalis*
Herbaceous	(1) *Phyla nodiflora* (2) *Polygonum pensylvanicum*

Physiographic features

These sites occur mainly on backwater areas on floodplains.

Table 2. Representative physiographic features

Landforms	(1) Alluvial plain > Flood plain (2) Alluvial plain > Depression
Runoff class	Low to medium
Flooding duration	Very brief (4 to 48 hours) to long (7 to 30 days)
Flooding frequency	Occasional to frequent
Ponding duration	Long (7 to 30 days) to very long (more than 30 days)
Ponding frequency	Occasional to frequent
Elevation	152–305 m
Slope	0–2%
Ponding depth	0–30 cm
Water table depth	0–91 cm
Aspect	Aspect is not a significant factor

Table 3. Representative physiographic features (actual ranges)

Runoff class	Low to high
Flooding duration	Not specified
Flooding frequency	Not specified
Ponding duration	Not specified
Ponding frequency	Not specified
Elevation	Not specified
Slope	Not specified
Ponding depth	Not specified

Water table depth	Not specified

Climatic features

The climate is characterized by moist, cool, springs; hot, often dry summers; mild autumns; and mild to cold winters. Variation in timing and amounts of precipition from year to year is quite common. Drought cycles range from three to five years duration with occasionally longer periods occurring at unpredictable intervals. Above normal rainfall cycles are usually just as random, but shorter in duration.

Table 4. Representative climatic features

Frost-free period (characteristic range)	173-187 days
Freeze-free period (characteristic range)	194-203 days
Precipitation total (characteristic range)	838-940 mm
Frost-free period (actual range)	157-192 days
Freeze-free period (actual range)	191-208 days
Precipitation total (actual range)	813-991 mm
Frost-free period (average)	179 days
Freeze-free period (average)	199 days
Precipitation total (average)	889 mm

Climate stations used

- (1) WATONGA [USC00349364], Watonga, OK
- (2) PAULS VALLEY 4 WSW [USC00346926], Pauls Valley, OK
- (3) ANTHONY [USW00013980], Anthony, KS
- (4) STILLWATER 5 WNW [USW00053927], Stillwater, OK
- (5) OKEENE [USC00346629], Okeene, OK
- (6) WALTERS [USC00349278], Walters, OK
- (7) KINGFISHER [USC00344861], Kingfisher, OK
- (8) JEFFERSON [USC00344573], Medford, OK
- (9) CHEROKEE 4W [USC00341724], Cherokee, OK

Influencing water features

Ponded water is an essential indicator of these sites. These areas are wet for long periods during the year. Flood events, as well as overland flow from upland sites, saturate the soils. Due to the slow permeability of these soils, the water often stagnates and creates habitat for both aerobic and anaerobic wetland species.

Wetland description

These sites are known to support hydrophytic wetland vegetation. A site specific analysis will be needed to determine wetland/hydric soil status.

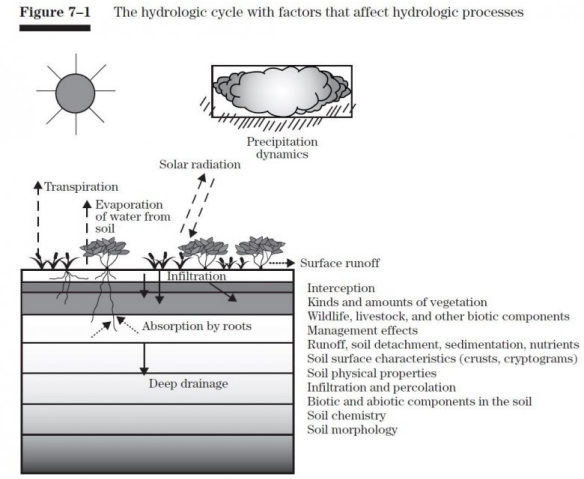

Figure 8.

Soil features

Soils are mapped for each county within the MLRA. Mapunits are representations of the major soil series component(s) and named accordingly. Each Mapunit is spatially represented on a digital soils map as polygons of different shapes and sizes. Within these Mapunits, there are often minor soil series components included. These minor components are soils that occur within a Mapunit polygon but are of small extent (15% or less of the Mapunit area). However, it is difficult to separate these minor soils spatially due to the scale of soil mapping.

Ecological sites are correlated at the component level of the soil survey. Therefore, a single Mapunit may contain multiple Ecological Sites just as it may contain multiple soil components. This is important to understand when investigating soils and Ecological Sites. A soil survey Mapunit may be correlated to a single Ecological Site based on the major component; however, there may be inclusional areas of additional Ecological Sites which are correlated to the minor components of that particular soil Mapunit.

These soils are very deep, poorly drained with slow permeability. Soils are formed in alluvium from clayey shale. Surface texture is generally clay, with minimal or no surface fragments.

Representative soil components for this site include:
Lebron clay and Harjo clay

Table 5. Representative soil features

Parent material	(1) Alluvium–clayey shale
Surface texture	(1) Clay (2) Loamy fine sand (3) Clay
Drainage class	Poorly drained to very poorly drained
Permeability class	Very slow
Soil depth	203 cm
Surface fragment cover <=3"	0–1%
Surface fragment cover >3"	0–1%
Available water capacity (0-101.6cm)	10.16–25.4 cm
Calcium carbonate equivalent (0-101.6cm)	0–5%
Electrical conductivity (0-101.6cm)	0–1 mmhos/cm

Sodium adsorption ratio (0-101.6cm)	0–1
Soil reaction (1:1 water) (0-101.6cm)	6–7.5
Subsurface fragment volume <=3" (Depth not specified)	0–1%

Ecological dynamics

The information contained in the State and Transition Diagram (STD) and the Ecological Site Description was developed using historical data, professional experience, and scientific studies. The information presented is representative of a very complex set of plant communities. Not all scenarios or plants are included. Key indicator plants, animals and ecological processes are described to inform land management decisions.

The Ponded Bottomland site is fairly unique site due to the presence of ponded surface water. The saturated conditions create habitat for certain hydrophytic plant species not found on adjacent well drained areas.
Unlike many of the ecological sites in the Great Plains, grazing and fire are not significant drivers in the plant community dynamics. Grazing is often limited on these sites due to the surface water and boggy nature of the saturated soils. While certainly some dormant season wildfires may have impacted the vegetation. These areas have often been protected from fire. The primary driver on these sites is the presence or absence of water as well as the duration and frequency of flood events.

When the soils become saturated and ponded by flood events or run-on water from upland sites, only plants adapted to these wet conditions will thrive. As these areas dry out over time, the hydrophytic vegetation cannot persist and may be replaced by other species acclimated to the drier soil conditions. This change in vegetation may occur within a growing season or from year to year depending on precipitation patterns and flooding frequencies.

While these sites are often small in acreage and may not produce much desirable forage for a grazing operation, they may play important roles in the habitat requirement for certain plant and animal species.

State and Transition Diagram:
A State and Transition Diagram for the Ponded Bottomland (R080AY090OK) is depicted below. Thorough descriptions of each state, transition, and pathway follow the model. Experts base this model on available experimental research, field observations, professional consensus, and interpretations. It is likely to change as knowledge increases.
Plant communities will differ across the MLRA because of the natural variability in weather, soils, and aspect. The Reference Plant Community is not necessarily the management goal; other vegetative states may be desired plant communities as long as the Range Health assessments are in the moderate and above category.

The biological processes on this site are complex. Therefore, representative values are presented in a land management context. The species lists are representative and are not botanical descriptions of all species occurring, or potentially occurring, on this site. They are not intended to cover every situation or the full range of conditions, species, and responses for the site.

Composition by dry weight and percent canopy cover are provided to describing the functional groups. Most observers find it easier to visualize or estimate percent canopy for woody species (trees and shrubs).

The following diagram suggests some pathways that the vegetation on this site might take. There may be other states not shown on the diagram. This information is intended to show what might happen in a given set of circumstances. It does not mean that this would happen the same way in every instance. Local professional guidance should always be sought before pursuing a treatment scenario.

State and transition model

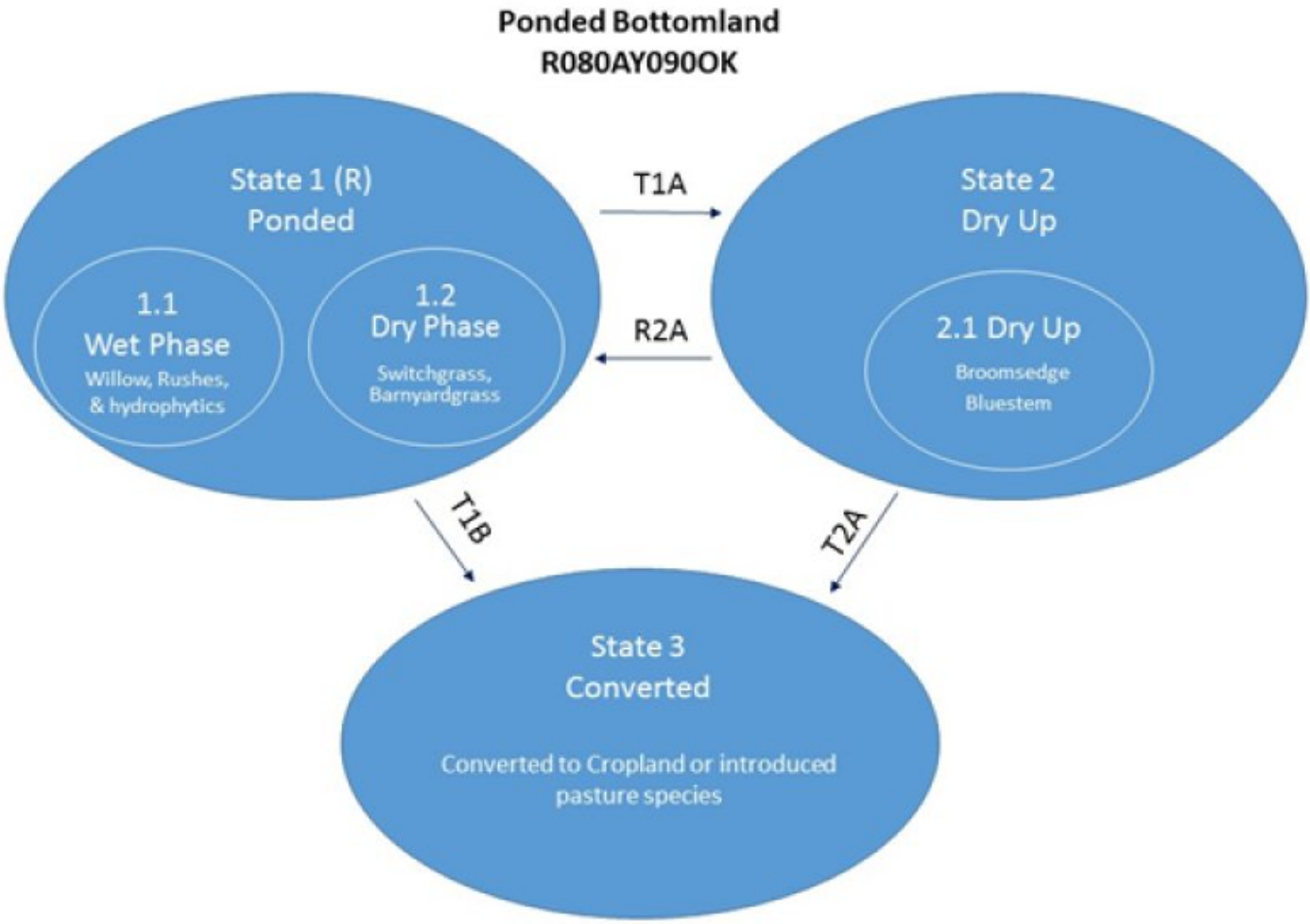

Figure 9. R080AY090OK

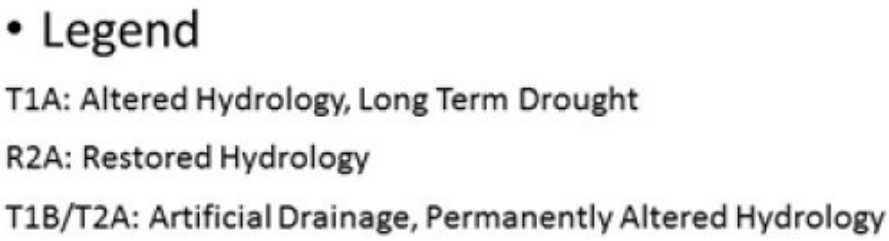

Figure 10. R080AY090OK

State 1
Ponded

This is the reference or diagnostic community for the site. The description is based on early range site descriptions, clipping data, professional consensus of experienced range specialists, and analysis of field work. Within the reference state there are variations in vegetation as a result of the variation in surface water. Many plants including Switchgrass, Barnyardgrass, Knotgrass, and many forbs can tolerate moist soils. However, most of these plants cannot thrive under prolonged inundation. When water ponds for long periods, the plant community may be dominated by rushes, smartweeds, willows and other species adapted to the conditions. As the amount and duration of ponding on these sites varies from year to year, so will the plant community. The vegetative production for this site has been estimated by range specialists at 2,500 to 6,500 pounds per acre.

Dominant plant species

- willow (*Salix*), shrub
- common buttonbush (*Cephalanthus occidentalis*), shrub
- fogfruit (*Phyla*), other herbaceous

Community 1.1

State 2
Dry Up

The description for this plant community is derived from analysis of limited field data and professional consensus of range trained individuals. This ecological state is the result of altered hydrologic flow in the site. The seasonal wetting has ceased and the site has been dry for multiple growing seasons. This transition may be the result of a

long term drought event, or the result of manipulated drainage to keep the site dry year round. As the site remains dry, the obligate wetland plant species will be the first to decline. Replacement species such as Broomsedge Bluestem, Silver Bluestem, and annual threeawn may thrive. The exact plant community composition will greatly depend on surrounding seed sources and management. If the hydrology is restored to the site and surface water remains intact, the site may transition back to the reference state (1).

Dominant plant species

- broomsedge bluestem (*Andropogon virginicus*), grass
- silver beardgrass (*Bothriochloa laguroides*), grass

State 3
Converted

The description for this plant community is derived from analysis of limited field data and professional consensus of range trained individuals. This state is the result of cultivation. The area has been cleared of any woody species and tilled. The soil structure and biology has been altered. The hydrology will also be changed and may never return to that of the reference state(1) even if abandoned.

Dominant plant species

- wheat (*Triticum*), grass

Transition T1A
State 1 to 2

The site may experience a significant dry up as a result of a long term(multiyear) drought or if overhead water has been cut off. This results in a transition to state 2.

Transition T1B
State 1 to 3

Some of these sites have been drained with the use of heavy equipment and used for farming activities. The hydrology of the site has been severely altered.

Restoration pathway R2A
State 2 to 1

If the hydrology is restored as result of the end of a drought or restored drainage onto the site, the site may be restored to the reference state 1.

Transition T2A
State 2 to 3

Some of these sites have been drained with the use of heavy equipment and used for farming activities. The hydrology of the site has been severely altered.

Additional community tables

Table 6. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
Grass/Grasslike					
1				–	
	Pennsylvania smartweed	POPE2	*Polygonum pensylvanicum*	–	–
	turkey tangle fogfruit	PHNO2	*Phyla nodiflora*	–	–
Shrub/Vine					
2				–	
	buttonbush	CEPHA	*Cephalanthus*	–	–
Tree					
3				–	
	black willow	SANI	*Salix nigra*	–	–

Animal community

Domestic livestock and white-tail deer are the dominant grazers and browsers of the site. Various songbirds and small mammals may also find use of these areas. As the site changes towards the woody dominated community, the quality of the habitat may improve for some species and decline for others. Management must be applied to maintain a vegetative state in optimum habitat quality for the desired animal species.

Hydrological functions

These areas are wet for long periods during the year. Flood events, as well as overland flow from upland sites, saturate the soils. Due to the slow permeability of these soils, the water often stagnates and creates habitat for both aerobic and anaerobic wetland species.

Recreational uses

Camping, fishing, hunting, hiking, bird watching, horseback riding and many other outdoor recreational practices.

Wood products

There are no significant wood produts from this site.

Other products

NA

Other information

NA

Inventory data references

Historic OK NRCS Range Site Descriptions
Historic Soil Survey Manuscripts

Type locality

Location 1: Logan County, OK	
General legal description	Logan County, Oklahoma; 3800 feet east and 1200 feet south of the northwest corner of sec. 9, T. 17N., R. 2 W

References

Anderson, R.C. 1982. An evolutionary model summarizing the roles of fire, climate, and grazing animals in the origin and maintenance of grasslands. Pages 297–308 in , , and , editors. Grasses and grasslands: systematics and ecology.

Other references

USDA-NRCS (Formerly Soil Conservation Service) Range Site Descriptions (1960s)

USDA-NRCS (Formerly Soil Conservation Service) Ag Handbook 296 (2006)

Contributors

Edits by Colin Walden, Soil Survey Office, Stillwater, OK
Dr. Jack Eckroat, Grazing Lands Specialist, NRCS, Oklahoma

Approval

Bryan Christensen, 9/19/2023

Acknowledgments

Site Development and Testing Plan

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document.
Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	Steve Glasgow
Contact for lead author	100 SUDA, Suite 206, Stillwater, OK 74074
Date	09/04/2006
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:** None.

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2. **Presence of water flow patterns:** Very few.

3. **Number and height of erosional pedestals or terracettes:** None.

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** <20%. Bare ground may vary throughout site.

5. **Number of gullies and erosion associated with gullies:** None. These sites are associated with stream channels or old channels which are spring fed. Therefore, channels may exist but may be actual gullies.

6. **Extent of wind scoured, blowouts and/or depositional areas:** None.

7. **Amount of litter movement (describe size and distance expected to travel):** Very little movement due to flatter slopes.

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):** Soil stability classes 5-6. Soils stable with good organic matter content.

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Refer to soils series description for the site.

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass component slows runoff to allow for slow infiltration into soils that are usually poorly drained. Runoff not typically a concern.

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** None.

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant: Tallgrass = Midgrass = Willows

    Sub-dominant: Cool Season Grass/Grasslikes Forbs

    Other:

    Additional:

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or**

decadence): <5%

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14. **Average percent litter cover (%) and depth (in):**

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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** Reference production 2,500 - 6,500 lb/acre, annually.

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16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:** Potential for eastern redcedar, mainly around the edges where drier conditions exist.

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17. **Perennial plant reproductive capability:** All species are capable of reproducing, both vegetatively and by seed.
