

Ecological site R034AY318WY

Impervious Clay High Plains Southeast (IC)

Accessed: 05/19/2024

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.

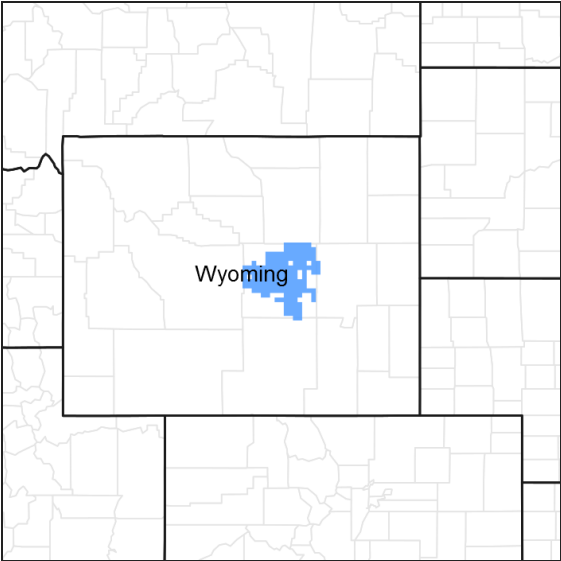


Figure 1. Mapped extent

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.

Associated sites

R034AY304WY	<b>Clayey High Plains Southeast (Cy)</b> CLayey
R034AY344WY	<b>Saline Upland High Plains Southeast (SU)</b> Saline Upland

Similar sites

R034AY310WY	<b>Dense Clay High Plains Southeast (DC)</b> Dense Clay (DC) 10-14" P.Z. High Plains Southeast has higher production and does not have high concentrations of exchangeable sodium throughout the profile.
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Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	Not specified

Physiographic features

This site will usually occur in a lowland position, on flat to gently sloping land, but can occur in all positions.

**Table 2. Representative physiographic features**

Landforms	(1) Alluvial fan (2) Stream terrace
Elevation	1,676–2,286 m
Slope	0–40%
Ponding depth	0 cm
Aspect	Aspect is not a significant factor

## **Climatic features**

Annual precipitation ranges from 10-14 inches per year. Wide fluctuations may occur in yearly precipitation and result in more dry years than those with more than normal precipitation. Temperatures show a wide range between summer and winter and between daily maximums and minimums. This is predominantly due to the high elevation and dry air, which permits rapid incoming and outgoing radiation. Cold air outbreaks in winter move rapidly from northwest to southeast and account for extreme minimum temperatures. Extreme storms may occur during the winter, but most severely affect ranch operations during late winter and spring.

Daytime winds are generally stronger than nighttime and occasional strong storms may bring brief periods of high winds with gusts to more than 50 mph.

Growth of native cool season plants begins about April 15 and continues to about June 15. Some green up of cool season plants usually occurs in September.

The following information is from the “Laramie” climate station:

Minimum Maximum 5 yrs. out of 10 between

Frost-free period (days): 57 149 June 1 – September 16

Freeze-free period (days): 94 183 May 15 – September 28

Annual Precipitation (inches): 5.8 17.34

Mean annual precipitation: 11.53 inches

Mean annual air temperature: 42.2 F (30.4 F Avg. Min. to 53.9 F Avg. Max.)

For detailed information visit the Natural Resources Conservation Service National Water and Climate Center at <http://www.wcc.nrcs.usda.gov/> website. Other climate station(s) representative of this precipitation zone include “Dixon ” and “Medicine Bow”.

**Table 3. Representative climatic features**

Frost-free period (average)	149 days
Freeze-free period (average)	183 days
Precipitation total (average)	356 mm

## **Influencing water features**

Stream type: None

## **Soil features**

The soils of this site are moderately deep (greater than 20” to bedrock) to very deep, well drained soils formed in alluvium. The topsoil, except for thin ineffectual layers, will be heavy clays and/or soils that develop large cracks when dry and are very sticky when wet. These soils are not high in salinity and/or alkalinity but do have high concentrations of exchangeable sodium throughout the profile.

**Table 4. Representative soil features**

Surface texture	(1) Clay (2) Silty clay
Family particle size	(1) Clayey
Drainage class	Well drained
Permeability class	Slow to very slow
Soil depth	38–152 cm
Available water capacity (0-101.6cm)	7.62–11.43 cm
Calcium carbonate equivalent (0-101.6cm)	0–15%
Electrical conductivity (0-101.6cm)	0–8 mmhos/cm
Sodium adsorption ratio (0-101.6cm)	0–5
Soil reaction (1:1 water) (0-101.6cm)	6.6–8.4

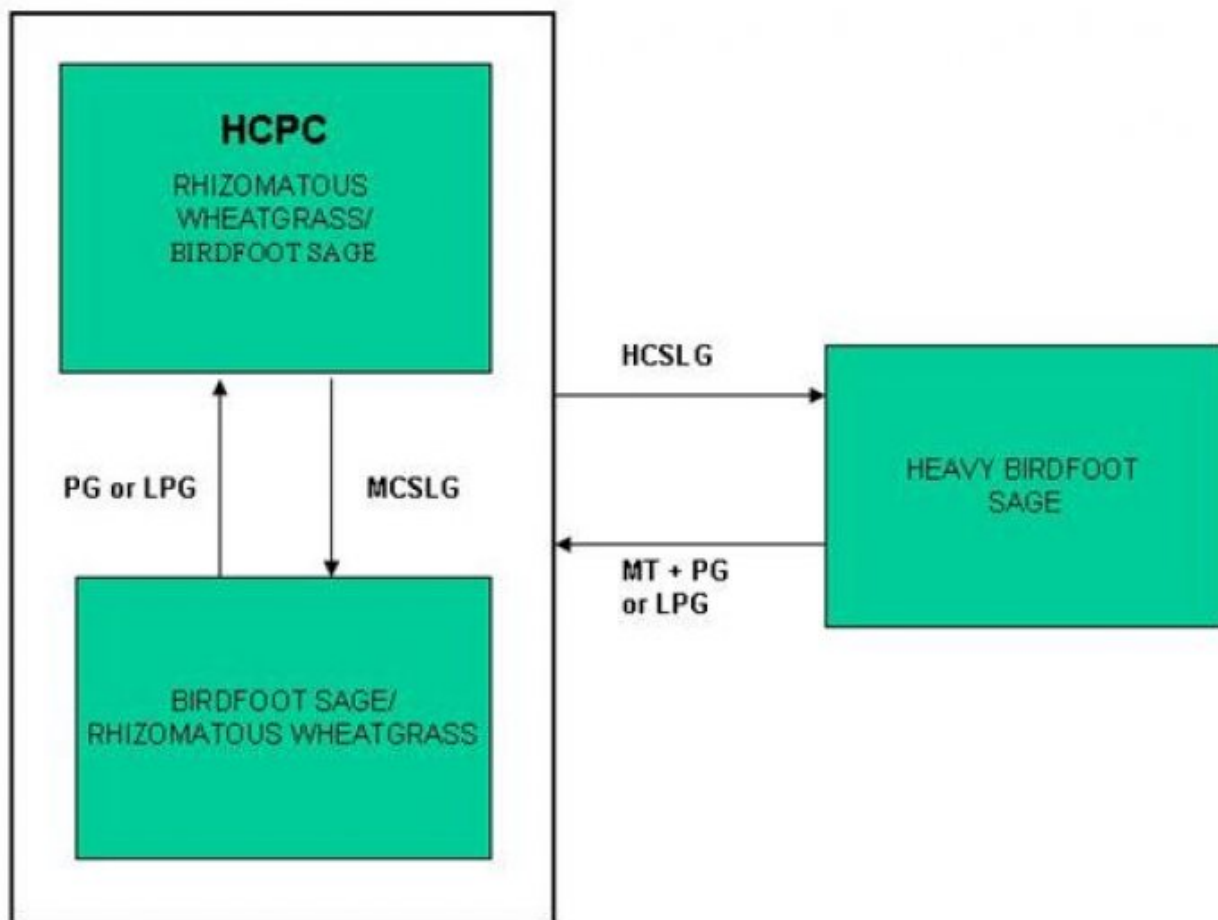
## Ecological dynamics

As this site deteriorates from improper grazing management, species such as birdfoot sage and unpalatable forbs will increase. Indian ricegrass will decrease in frequency and production.

The Historic Climax Plant Community (description follows the plant community diagram) has been determined by study of rangeland relic areas, or areas protected from excessive disturbance. Trends in plant communities going from heavily grazed areas to lightly grazed areas, seasonal use pastures, and historical accounts have also been used.

The following is a State and Transition Model Diagram that illustrates the common plant communities (states) that can occur on the site and the transitions between these communities. The ecological processes will be discussed in more detail in the plant community narratives following the diagram.

## State and transition model



BMA – Brush Management (all methods)  
BMC – Brush Management (chemical)  
BMF – Brush Management (fire)  
BMM – Brush Management (mechanical)  
CSP – Chemical Seedbed Preparation  
CSLG – Continuous Season-long Grazing  
DR – Drainage  
CSG – Continuous Spring Grazing  
HB – Heavy Browse  
HCSLG – Heavy Continuous Season-long Grazing  
HI – Heavy Inundation  
LPG – Long-term Prescribed Grazing  
MT – Mechanical Treatment (chiseling, ripping, pitting)  
MCSLG – Moderate Continuous Season Long Grazing

NF – No Fire  
NS – Natural Succession  
NWC – Noxious Weed Control  
NWI – Noxious Weed Invasion  
NU – Nonuse  
P&C – Plow & Crop (including hay)  
PG – Prescribed Grazing  
RPT – Re-plant Trees  
RS – Re-seed  
SGD – Severe Ground Disturbance  
SHC – Severe Hoof Compaction  
WD – Wildlife Damage (Beaver)  
WF – Wildfire

**State 1**  
**Rhizomatous Wheatgrass/ Birdfoot Sage Plant Community (HCPC)**

**Community 1.1**  
**Rhizomatous Wheatgrass/ Birdfoot Sage Plant Community (HCPC)**

The interpretive plant community for this site is the Historic Climax Plant Community. Potential vegetation is estimated at 50% grasses or grass-like plants, 5% forbs and 45% woody plants. The major grasses include western wheatgrass, bottlebrush squirreltail, Indian ricegrass, and Sandberg bluegrass. Birdfoot sagebrush is the major woody plant. Other woody plants that may occur include Gardner’s saltbush and winterfat. A typical plant composition for this state consists of western wheatgrass 25-45%, bottlebrush squirreltail 10-20%, Indian ricegrass 10-20%, up to 5% Sandberg bluegrass, perennial forbs 1-5%, birdfoot sagebrush 25-40%, and 5-10% other woody species. Ground cover, by ocular estimate, varies from 30-45%. The total annual production (air-dry weight) of this state is about 500 pounds per acre, but it can range from about 350 lbs./acre in unfavorable years to about 700 lbs./acre in above average years. This state is extremely stable and well adapted to the Cool Central Desertic Basins and Plateaus climate. The diversity in plant species allows for high drought resistance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity). Transitions or pathways leading to other plant communities are as follows: • Heavy Continuous Season-long Grazing will convert the plant community to the Heavy Birdfoot Sage Plant Community. • Moderate Continuous Season-long Grazing will convert the plant community to the Birdfoot Sage/ Rhizomatous Wheatgrass Plant Community.

Figure 4. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

**State 2**  
**Birdfoot Sage/Rhizomatous Wheatgrass Plant Community**

**Community 2.1**  
**Birdfoot Sage/Rhizomatous Wheatgrass Plant Community**

This plant community is the result of moderate continuous season long grazing of the HCPC. Birdfoot sage and rhizomatous wheatgrasses dominate. Birdfoot sagebrush usually comprises 50-60% of annual production. When compared to the HCPC, Indian ricegrass has decreased, rhizomatous wheatgrasses remain and birdfoot sage has increased. The total annual production (air-dry weight) of this state is about 300 pounds per acre, but it can range from about 200 lbs./acre in unfavorable years to about 400 lbs./acre in above average years. The soil is not protected and erosion will increase if management is not changed. The biotic integrity may be reduced due to low vegetative production. The watershed is functioning at risk. Transitional pathways leading to other plant communities are as follows: • Prescribed Grazing or Long-term Prescribed Grazing will return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Birdfoot Sage Plant Community). • Heavy Continuous Season-long Grazing will convert the plant community to the Heavy Birdfoot Sage Plant Community.

Figure 5. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

**State 3**  
**Heavy Birdfoot Sage Plant Community**

**Community 3.1**  
**Heavy Birdfoot Sage Plant Community**

This plant community is a result of heavy continuous season-long grazing. Severe hoof compaction typically occurs

due to fine soil textures. Birdfoot sage increases to 60-80% of the annual production. Cool season bunchgrasses decrease while rhizomatous wheatgrass prevails. Annual forbs increase. The total annual production (air-dry weight) of this state is about 200 pounds per acre, but it can range from about 100 lbs./acre in unfavorable years to about 300 lbs./acre in above average years. This state is unstable and vulnerable to excessive erosion. The biotic integrity of this plant community is at risk or non-functioning. The watershed is usually at risk or non-functioning as bare ground increases. Transitional pathways leading to other plant communities are as follows: • Mechanical Treatment (Chiseling, etc.) followed by Prescribed Grazing or Long-term Prescribed Grazing may eventually return this state to near Historic Climax Plant Community (Rhizomatous Wheatgrass/ Birdfoot Sage Plant Community).

**Figure 6. Plant community growth curve (percent production by month).  
WY0901, 34AI, Upland Sites. All Upland Sites.**

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	10	35	40	10	0	5	0	0	0

## Additional community tables

**Table 5. Community 1.1 plant community composition**

Group	Common Name	Symbol	Scientific Name	Annual Production (Kg/Hectare)	Foliar Cover (%)
<b>Grass/Grasslike</b>					
1				140–252	
	western wheatgrass	PASM	<i>Pascopyrum smithii</i>	140–252	–
2				56–112	
	squirreltail	ELEL5	<i>Elymus elymoides</i>	56–112	–
3				56–112	
	Indian ricegrass	ACHY	<i>Achnatherum hymenoides</i>	56–112	–
4				0–28	
	Sandberg bluegrass	POSE	<i>Poa secunda</i>	0–28	–
5				0–28	
	Grass, perennial	2GP	<i>Grass, perennial</i>	0–28	–
<b>Forb</b>					
6				28–84	
	Forb, perennial	2FP	<i>Forb, perennial</i>	0–28	–
	textile onion	ALTE	<i>Allium textile</i>	0–28	–
	rosy pussytoes	ANRO2	<i>Antennaria rosea</i>	0–28	–
	milkvetch	ASTRA	<i>Astragalus</i>	0–28	–
	fleabane	ERIGE2	<i>Erigeron</i>	0–28	–
	desertparsley	LOMAT	<i>Lomatium</i>	0–28	–
	phlox	PHLOX	<i>Phlox</i>	0–28	–
	woodyaster	XYLOR	<i>Xylorhiza</i>	0–28	–
<b>Shrub/Vine</b>					
7				112–224	
	birdfoot sagebrush	ARPE6	<i>Artemisia pedatifida</i>	112–224	–
8				28–56	
	Gardner's saltbush	ATGA	<i>Atriplex gardneri</i>	28–56	–
9				0–28	
	yellow rabbitbrush	CHVI8	<i>Chrysothamnus viscidiflorus</i>	0–28	–
10				0–28	
	winterfat	KRASC	<i>Krascheninnikovia</i>	0–28	–
11				0–28	
	Shrub (>.5m)	2SHRUB	<i>Shrub (&gt;.5m)</i>	0–28	–

## Animal community

### Animal Community – Wildlife Interpretations

Rhizomatous Wheatgrass/ Birdfoot Sage Plant Community (HCPC): Suitable thermal and escape cover for mule deer may be limited due to the low height of woody plants. However, sagebrush provides important winter forage for mule deer and antelope. Year-round habitat is provided for sage grouse and many other sagebrush obligate species such as the sage sparrow, sage thrasher, pygmy rabbit, sagebrush vole, horned lizard, and pronghorn antelope. Open spaces in the sagebrush canopy are potential sage grouse lek locations.

Birdfoot Sage/ Rhizomatous Wheatgrass Plant Community: This plant community has a low level of diversity. Due to the dominance of grasses, feed for browsing animals is limited. Areas of bare ground may provide leks for sage grouse.

Heavy Birdfoot Sage Plant Community: This plant community may be beneficial for the same wildlife that would use the Historic Climax Plant Community. However, the plant community composition is less diverse, and thus, less apt to meet the seasonal needs of these animals.

#### Animal Community – Grazing Interpretations

The following table lists suggested stocking rates for cattle under continuous season-long grazing under normal growing conditions. These are conservative estimates that should be used only as guidelines in the initial stages of the conservation planning process. Often, the current plant composition does not entirely match any particular plant community (as described in this ecological site description). Because of this, a field visit is recommended, in all cases, to document plant composition and production. More precise carrying capacity estimates should eventually be calculated using this information along with animal preference data, particularly when grazers other than cattle are involved. Under more intensive grazing management, improved harvest efficiencies can result in an increased carrying capacity. If distribution problems occur, stocking rates must be reduced to maintain plant health and vigor.

#### Plant Community Production Carrying Capacity\*

(lb./ac) (AUM/ac)

Rhizomatous Wheatgrass/ Birdfoot Sage (HCPC) 350-700 .2

Birdfoot Sage/ Rhizomatous Wheatgrass 200-400 .1

Heavy Birdfoot Sage 100-300 .05

\* - Continuous, season-long grazing by cattle under average growing conditions.

Grazing by domestic livestock is one of the major income-producing industries in the area. Rangeland in this area may provide yearlong forage for cattle, sheep, or horses. During the dormant period, the forage for livestock use needs to be supplemented with protein because the quality does not meet minimum livestock requirements.

### Hydrological functions

Water is the principal factor limiting forage production on this site. This site is dominated by soils in hydrologic group D. Infiltration ranges from slow to very slow. Runoff potential for this site varies from high to very high depending on ground cover (refer to Part 630, NRCS National Engineering Handbook for detailed hydrology information).

Rills and gullies should not typically be present. Water flow patterns should be barely distinguishable if at all present. Pedestals are only slightly present in association with bunchgrasses. Litter typically falls in place, and signs of movement are not common. Chemical and physical crusts are rare to non-existent. Cryptogammic crusts are present, but only cover 1-2% of the soil surface.

### Recreational uses

This site provides limited hunting opportunities.

### Wood products

No appreciable wood products are present on the site.

### Other products

None noted.

### Inventory data references

#### Inventory Data References (narrative)

Information presented here has been derived from NRCS clipping data and other inventory data. Field observations from range trained personnel were also used. Other sources used as references include: USDA NRCS Water and Climate Center, USDA NRCS National Range and Pasture Handbook, and USDA NRCS Soil Surveys from various counties.

#### Inventory Data References



Data Source Number of Records Sample Period State County  
SCS-RANGE-417 69 1967-1988 WY Carbon  
& others

## Contributors

B. Brazee

## 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)	
Contact for lead author	
Date	05/01/2005
Approved by	E. Bainter
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

## Indicators

1. **Number and extent of rills:** Rills should not be present

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2. **Presence of water flow patterns:** Barely observable

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3. **Number and height of erosional pedestals or terracettes:** Not evident

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4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):** Bare ground is 25-35%, occurring in small openings throughout the site.

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5. **Number of gullies and erosion associated with gullies:** Active gullies should not be present.

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

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7. **Amount of litter movement (describe size and distance expected to travel):** Little to no plant litter movement. Plant litter remains in place and is not moved by erosional forces.

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8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of**

**values):** Plant cover and litter is at 60% or greater of soil surface and maintains soil surface integrity. Soil Stability class is anticipated to be 5 or greater.

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9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):** Use Soil Series description for depth and color of A-horizon
- 
10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:** Grass canopy and basal cover should reduce raindrop impact and slow overland flow providing increased time for infiltration to occur. Infiltration varies with soil texture from moderately rapid to rapid.
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11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be mistaken for compaction on this site):** No compaction layer or soil surface crusting should be present.
- 
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:
- Sub-dominant:
- Other:
- Additional: Shrubs > Mid stature Grasses > Forbs = short stature grasses
- 
13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):** Some plant mortality and decadence is expected
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14. **Average percent litter cover (%) and depth ( in):** Average litter cover is 20-25% with depths of 0.10 to 0.25 inches
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15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):** 500 lbs/ac
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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:** Birdfoot sagebrush, Annuals, and Species found on Noxious Weed List
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17. **Perennial plant reproductive capability:** May be Limited due to effective moisture and seed to soil contact

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