Final Report
USDA Ecological Site Description
State-and-Transition Models
Major Land Resource Area 28A and 28B Nevada
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Disturbance Response Group 13AB

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Ecological Sites within Disturbance Response Group 13AB:
Modal Site: Sodic Flat 5-8” 028BY020NV

Group	Name	Site ID
	Sodic Flat 5-8" P.Z.	**028BY020NV**
13AB	Shallow Sodic Terrace 5-8" P.Z.	028AY103NV
	Sodic Terrace 5-8" P.Z.	028AY024NV
	Clay Dune	028BY101NV

MLRA 28

Group 13

Disturbance Response Group (DRG) 13 consists of five ecological sites. The precipitation ranges from 5 to 8 inches. Slopes range from less than 2 to 15 percent. Elevations range from 4300 to 5800 feet. Production ranges from 200 to 500 lbs/acre for a normal year. Soils on these sites are typically deep to very deep and well drained. The available water holding capacity is high. The soil temperature regime it typically mesic and the soil moisture regime is typic aridic. The potential native plant community is dominated by black greasewood (*Sarcobatus vermiculatus*), alkali sacaton (*Sporobolus airoides*) and Indian ricegrass (*Achnatherum hymenoides*). Other shrubs important to these sites include shadscale (*Atriplex confertifolia*), rubber rabbitbrush (*Chrysothamnus viscidiflorus*) and bud sagebrush (*Picrothamnus desertorum*). Inland saltgrass (*Distichlis spicata*), basin wildrye (*Leymus cinereus*) and bottlebrush squirreltail (*Elymus elymoides*) are also commonly found on these sites.

Modal Site:
The Sodic Flat 5-8" ecological site is the modal site that represents this DRG, as it has the most acres mapped. This site occurs on alluvial flats or lake plains usually adjacent to playas. Slope gradients of less than 2 percent are most typical. Elevations are 4500 to 5800 feet. The soils in this site are very deep and somewhat poorly to well drained. The somewhat poorly well drained soils may have a seasonally high water table within 40 inches of the surface. During the summer the table stabilizes below 60 inches. The upper portion of most of these soils is strongly salt and sodium affected due to capillary movement of dissolved salts upward from ground water. Effective rooting depths are limited by the fluctuating water table. The surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence. High salt concentrations reduce seed viability, germination and the available water holding capacity of these soils. Runoff is low to medium depending on degree of soils surface crusting, sodium content of the surface layer, and slope gradients. The soil temperature regime it typically mesic and the soil moisture regime is typic aridic. Potential for sheet and rill erosion is slight to moderate.

Disturbance Response Group 13 – ecological sites:

Sodic Flat 5-8" P.Z. Modal	028BY020NV
Sodic Terrace 5-8" P.Z.	028BY074NV
Sodic Terrace 5-8" P.Z.	028AY024NV
Shallow Sodic Terrace 5-8" P.Z.	028AY103NV
Clay Dune	028BY101NV

Ecological Dynamics and Disturbance Response:

An ecological site is the product of all the environmental factors responsible for its development and it has a set of key characteristics that influence a site's resilience to disturbance and resistance to invasives. Key characteristics include 1) climate (precipitation, temperature), 2) topography (aspect, slope, elevation, and landform), 3) hydrology (infiltration, runoff), 4) soils (depth, texture, structure, organic matter), 5) plant communities (functional groups, productivity), and 6) natural disturbance regime (fire, herbivory, etc.) (Caudle et al 2013). Biotic factors that that influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al. 2013).

The Great Basin shrub communities have high spatial and temporal variability in precipitation, both among years and within growing seasons. Nutrient availability is typically low but increases with elevation and closely follows moisture availability. The moisture resource supporting the greatest amount of plant growth is usually the water stored in the soil profile during the winter. The invasibility of plant communities is often linked to resource availability. Disturbance can decrease resource uptake due to damage or mortality of the native species and depressed competition or can increase resource pools by the decomposition of dead plant material following disturbance.

Black greasewood is classified as a phreatophyte (Eddleman 2002), and its distribution is well correlated with the distribution of groundwater (Mozingo 1987). Meinzer (1927) discovered that the taproots of black greasewood could penetrate from 20 to 57 feet below the surface. Romo (1984) found water tables ranging from 3.5 to 15 m under black greasewood dominated communities in Oregon. Black greasewood stands develop best where moisture is readily available, either from surface or subsurface runoff (Brown 1971). It is commonly found on floodplains that are either subject to periodic flooding, have a high water table at least part of the year, or have a water table less than 34 feet deep (Harr and Price 1972, Blauer et al. 1976, Branson et al. 1976, Blaisdell and Holmgren 1984, Eddleman 2002). Ganskopp (1986) reported that water tables within 9.8 to 11.8 inches of the surface had no effect on black greasewood in Oregon. However, a study, conducted in California, found that black greasewood did not survive six months of continuous flooding (Groeneveld and Crowley 1988, Groeneveld 1990). Black greasewood is usually a deep rooted shrub but has some shallow roots near the soil surface; the maximum rooting depth can be determined by the depth to a saturated zone (Harr and Price 1972).

Drought will initially cause a decline in bunchgrasses, but prolonged drought will eventually cause a decline in shrubs, including black greasewood. As site condition deteriorates, these sites may become a pure stand of black greasewood or a pure stand with an annual understory. Marcum and Kopec (1997) found inland saltgrass more tolerant of increased levels of salinity than alkali sacaton therefore dewatering and/or long term drought causing increased levels of salinity would create environmental conditions more favorable to inland saltgrass over alkali sacaton. Alkali sacaton is considered a facultative wet species in this region; therefore it is not drought tolerant. A lowering of the water table can occur with ground water pumping in these sites and has been identified in other MLRA's. This may contribute to the loss of deep rooted species such as greasewood and basin wildrye and an increase in rabbitbrush, shadscale and other species with the absence of drought.

Vegetation on these sites is normally restricted to coppice mound areas that are surrounded by playa-like depressions or nearly level, usually barren interspaces. These communities often exhibit the formation of microbiotic crusts within the interspaces. These crusts influence the soils on these sites and their ability to reduce erosion and increase infiltration, they may also alter the soil structure and possibly increase soil fertility (Fletcher and Martin 1948, Williams 1993). Finer textured soils such as silts tend to support more microbiotic cover than coarse texture soils (Anderson et al. 1982). Disturbance such as hoof action from inappropriate grazing and cheatgrass (*Bromus tectorum*) invasion can reduce biotic crust integrity (Anderson et al. 1982, Ponzetti et al. 2007) and increase erosion. Annual non-native species such as Russian thistle (*Salsola* L.), halogeton (*Halogeton glomeratus*) and cheatgrass invade these sites where competition from perennial species is decreased.

The ecological sites in this DRG have moderate resilience to disturbance and resistance to invasion. A primary disturbance on these ecological sites is extended drought or other disturbance leading to lowering of the seasonal water table. This facilitates an increase in shrubs and a decrease in basin wildrye. The introduction of annual weedy species, like cheatgrass, may cause an increase in fire frequency and eventually lead to an annual state or a state dominated by black greasewood and

rabbitbrush. Three possible stable states have been identified for this DRG but an annual state has been noted in other MLRAs.

Fire Ecology:
Fire is a rare disturbance in these plant communities likely occurring in years with above average production. Natural fire return intervals are estimated to vary between less than 35 years up to 100 years in salt desert ecosystems with basin wildrye (Paysen et al. 2000). Historically, black greasewood-saltbush communities had sparse understories and bare soil in intershrub spaces, making these communities somewhat resistant to fire (Young 1983, Paysen et al. 2000). They may burn only during high fire hazard conditions; for example, years with high precipitation can result in almost continuous fine fuels, increasing fire hazard (West 1994, Paysen et al. 2000).

Black greasewood may be killed by severe fires, but can resprout after low to moderate severity fires (Robertson 1983, West 1994). Sheeter (1969) reported that following a Nevada wildfire, black greasewood sprouts reached approximately 2.5 feet within 3 years. Grazing and other disturbance may result in increased biomass production due to sprouting and increased seed production, also leading to greater fuel loads (Sanderson and Stutz 1994). Higher production sites would have experienced fire more frequently than lower production sites.

Shadscale is intolerant of fire and can only regenerate through seed (Zielinski 1994). Increases in the fire return interval leads to increases in the shrub component of the plant community, potentially facilitating increases in bare ground, inland salt grass and invasive weeds. Lack of fire combined with excessive herbivory decreases or eliminates the herbaceous understory, favoring black greasewood and annual species. Therefore, fire can be detrimental to these communities, especially in the presence of fire tolerant, annual non-native species.

The effect of fire on bunchgrasses relates to culm density, culm-leaf morphology, and the size of the plant. The initial condition of bunchgrasses within the site along with seasonality and intensity of the fire all factor into the individual species response. For most forbs and grasses the growing points are located at or below the soil surface providing relative protection from disturbances which decrease above ground biomass, such as grazing or fire. Thus, fire mortality is more correlated to duration and intensity of heat which is related to culm density, culm-leaf morphology, size of plant and abundance of old growth (Wright 1971, Young 1983). However, season and severity of the fire will influence plant response. Plant response will vary depending on post-fire soil moisture availability.

Alkali sacaton is a native, long-lived, warm season densely tufted perennial bunchgrass ranging from 20 to 40 inches in height. It usually grows on saline soils but is not restricted to saline soils and can be found on nonsaline soils, rocky sites, open plains, valleys and bottom lands (Dayton 1931). Alkali sacaton is tolerant of, but not resistant to fire. Recovery of alkali sacaton after fire has been reported as 2 to 4 years (Bock and Bock 1978).

Basin wildrye, a minor component on this site, is relatively resistant to fire, particularly dormant season fire, as plants sprout from surviving root crowns and rhizomes (Zschaechner 1985). Miller et al. 2013 reports fall and spring burning increased total shoot and reproductive shoot densities in the first year, although live basal areas were similar between burn and unburned plants. By year two there was little difference between burned and control treatments.

Livestock/ Wildlife Grazing Interpretations:

Black greasewood is typically not considered an important browse species for wildlife and livestock. However, in a study by Smith et al. (1992), utilization of new growth on greasewood shrubs by cattle was 77 percent in summer, and greasewood was found to have the highest amounts of crude protein when compared to perennial and annual grasses. Black greasewood plants have been found to contain high amounts of sodium and potassium oxalates which are toxic to livestock and caution should be taken when grazing these communities. These shrubs can be used lightly in the spring as long as there is a substantial amount of other preferable forage available (Benson et al. 2011). Black greasewood also provides good cover for wildlife species (Benson et al. 2011).

Shadscale is a valuable browse species for a wide variety of wildlife and livestock (Blaisdell and Holmgren 1984). The spinescent growth habit of shadscale lends to its browsing tolerance with no more than 15 to 20% utilization by sheep being reported (Blaisdell and Holmgren 1984) and significantly less utilization by cattle. Increased presence of shadscale within grazed versus ungrazed areas is generally a result of the decreased competition from more heavily browsed associates (Cibils et al. 1998). Reduced competition from more palatable species in heavily grazed areas may increase shadscale germination and establishment. Chambers and Norton (1993) found shadscale establishment higher under spring than winter browsing as well as heavy compared to light browsing ($p<0.01$). During years of below average precipitation, shadscale has been found very susceptible to grazing pressure regardless of season (Chambers and Norton 1993).

Alkali sacaton has been found to be sensitive to early growing season defoliation whereas late growing season and/or dormant season use allowed recovery of depleted stands (Hickey and Springfield 1966). Shadscale, squirreltail, and saltgrass will eventually decline with continued inappropriate grazing. Thus, inadequate rest and recovery from defoliation can cause a decrease in basin wildrye and an increase in rabbitbrush and black greasewood, along with inland saltgrass and non-native weeds (Young et al. 1976, Roundy 1985).

Spring defoliation of basin wildrye and/or consistent, heavy grazing during the growing season has been found to significantly reduce basin wildrye production and density (Krall et al. 1971). Basin wildrye is valuable forage for livestock (Ganskopp et al. 2007) and wildlife, but is intolerant of heavy, repeated, or spring grazing (Krall et al. 1971). Basin wildrye is used often as a winter feed for livestock and wildlife; not only providing roughage above the snow but also cover in the early spring months (Majerus 1992).

State and Transition Model Narrative – Group 13

Reference State 1.0: The Reference State 1.0 is a representative of the natural range of variability under pristine conditions. The Reference State has three general community phases; a shrub-grass dominant phase, a perennial grass dominant phase and a shrub dominant phase. State dynamics are maintained by interactions between climatic patterns and disturbance regimes. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Plant community phase changes are primarily driven by fire, periodic long term drought and/or insect or disease attack.

Community Phase 1.1:

This community is dominated by black greasewood. Shadscale and rubber rabbitbrush are also common. The herbaceous understory is dominated by alkali sacaton. Inland saltgrass, basin wildrye and other perennial grasses and shrubs make up minor components.

Sodic Terrace 5-8" (028BY074NV) Phase 1.1 T. Stringham May 2012

Sodic Terrace 5-8" (028BY074NV) Phase 1.1 T. Stringham May 2012

Community Phase Pathway 1.1a: A low severity fire would decrease the overstory of black greasewood and allow for the understory perennial grasses to increase. Fires are typically low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring facilitating an increase in fine fuels may be more severe and reduce black greasewood cover to trace amounts.

Community Phase Pathway 1.1b: Absence of disturbance over time, significant herbivory, long term drought or combinations of these would allow the black greasewood overstory to increase and dominate the site. This will generally cause a reduction in perennial bunchgrasses; however inland saltgrass may increase in the understory depending on the timing and intensity of herbivory. Heavy spring utilization will favor an increase in black greasewood.

Community Phase 1.2:

This community phase is characteristic of a post-disturbance, early-seral community phase. Basin wildrye and alkali sacaton dominate the community. Black greasewood will decrease but will likely sprout and return to pre-burn levels within a few years. Early colonizers such as rabbitbrush and shadscale may increase.

Community Phase Pathway 1.2a: Time and lack of disturbance will allow shrubs to increase

Community Phase 1.3:
Black greasewood and shadscale increase in the absence of disturbance. Decadent shrubs dominate the overstory and deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs, herbivory, drought or combinations of these.

Sodic Flat 5-8" (028BY020) Phase 1.3 T. Stringham September 2012

Community Phase Pathway 1.3a: Fire will decrease the overstory of black greasewood and allow for the perennial bunchgrasses to dominate the site. Fires will typically by high intensity in this phase due to the dominance of greasewood resulting in removal of the overstory shrub community.

T1A: Transition from Reference State 1.0 to Current Potential State 2.0:
Trigger: This transition is caused by the introduction of non-native annual plants, such as cheatgrass, mustards, halogeton, and Russian thistle.
Slow variables: Over time the annual non-native species will increase within the community.
Threshold: Any amount of introduced non-native species causes an immediate decrease in the resilience of the site. Annual non-native species cannot be easily removed from the system and have the potential to significantly alter disturbance regimes from their historic range of variation.

Current Potential State 2.0: This state is similar to the Reference State 1.0 with three similar community phases. Ecological function has not changed, however the resiliency of the state has been reduced by the presence of invasive weeds. Non-natives may increase in abundance but will not become dominant within this State. These non-natives can be highly flammable and can promote fire where historically fire had been infrequent. Negative feedbacks enhance ecosystem resilience and contribute to the stability of the state. These feedbacks include the presence of all structural and functional groups, low fine fuel loads, and retention of organic matter and nutrients. Positive feedbacks decrease ecosystem resilience

and stability of the state. These include the non-natives' high seed output, persistent seed bank, rapid growth rate, ability to cross pollinate, and adaptations for seed dispersal.

Community Phase 2.1:
This community phase is similar to the Reference State Community Phase 1.1. This community is dominated by black greasewood. Shadscale and rubber rabbitbrush are also common. The herbaceous understory is dominated by alkali sacaton, inland saltgrass, basin wildrye and other perennial grasses are also common. Non-native annual species such as halogeton, Russian thistle and cheatgrass are present.

Sodic Terrace (028BY074NV) Phase 2.1 T. Stringham May 2012

Community Phase Pathway 2.1a: A low severity fire would decrease the overstory of black greasewood and allow for the understory perennial grasses to increase. Fires are typically low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring or a change in management favoring an increase in fine fuels may be more severe and reduce black greasewood cover to trace amounts. Brush treatments with minimal soil disturbance may also reduce black greasewood and allow for perennial bunchgrasses to increase. Annual non-native species are likely to increase after fire.

Community Phase Pathway 2.1b: Absence of disturbance over time, long term drought, inappropriate grazing management or combinations of these would allow the black greasewood overstory to increase and dominate the site. Inappropriate grazing management reduces the perennial bunchgrass understory; conversely inland saltgrass may increase in the understory.

Community Phase 2.2:
This community phase is characteristic of a post-disturbance, early-seral community where annual non-native species are present. Perennial bunchgrasses such as alkali sacaton, inland saltgrass and basin wildrye dominate the site. Depending on fire severity patches of intact shrubs may remain. Black greasewood and rabbitbrush may be sprouting. Annual non-native species are stable to increasing in the community.

Community Phase Pathway 2.2a: Absence of disturbance over time and/or grazing management that favors the establishment and growth of black greasewood allows the shrub component to recover.

Community Phase 2.3:
Black greasewood dominates the overstory and perennial bunchgrasses in the understory are reduced, either from competition with shrubs or from inappropriate grazing, or from both. Rabbitbrush may be a significant component. Annual non-native species are stable or increasing. This community is at risk of crossing a threshold to State 3.0 (grazing or fire).

Sodic Flat 5-8" (028BY020) Phase 2.3 T. Stringham April 2013

Community Phase Pathway 2.3a: Grazing management that reduces shrubs will allow for the perennial bunchgrasses in the understory to increase. Heavy late-fall/winter grazing may cause mechanical damage to black greasewood promoting the perennial bunchgrass understory. Brush treatments with minimal soil disturbance will also decrease black greasewood and release the perennial understory. Annual non-native species are present and may increase in the community. A low severity fire would decrease the overstory of black greasewood and allow for the understory perennial grasses to increase.

Community Phase Pathway 2.3b: A high severity fire would remove shrubs in the overstory and allow for the perennial bunchgrasses in the understory to increase.

Transition T2A: From Current Potential State 2.0 to Shrub State 3.0:
Trigger: To Community Phase 3.1: Inappropriate cattle/horse grazing will decrease or eliminate deep rooted perennial bunchgrasses and favor shrub growth and establishment. To Community Phase 3.2: Severe fire will reduce and/or eliminate black greasewood overstory and decrease perennial bunchgrasses. Soil disturbing brush treatments will reduce black greasewood and possibly increase non-native annual species. Lowering of the water table due to groundwater pumping will also decrease black greasewood and allow for rabbitbrush and other shrubs to increase.
Slow variables: Long term decrease in deep-rooted perennial bunchgrasses density and/or black greasewood.
Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter. Loss of long-lived, black greasewood changes the temporal and depending on the replacement shrub, the spatial distribution of nutrient cycling.

Shrub State 3.0: This state has two community phases, one that is characterized by a dominance of a black greasewood overstory and the other with a rabbitbrush overstory. This site has crossed a biotic

and abiotic threshold and site processes are being controlled by shrubs. Bare ground has increased and pedestalling of grasses may be excessive.

Community Phase 3.1:
Black greasewood dominates the overstory. Rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses such as alkali sacaton have significantly declined. Annual non-native species increase. Bare ground is significant.

Sodic Flat 5-8" (028BY020NV) Phase 3.1 T. Stringham June 2012

Sodic Terrace 5-8" (028BY074NV) Phase 3.1 T. Stringham May 2012

Community Phase Pathway 3.1a: Long term drought and/or lowering of water table by groundwater pumping would reduce black greasewood and allow for rabbitbrush and other shrubs on the site to dominate. Severe fire would also reduce black greasewood overstory and allow for an increase rabbitbrush.

Community Phase 3.2
Rabbitbrush dominates the site. Perennial bunchgrasses may be present but will be a minor component. Annual non-native species are present and may be increasing in the understory.

Community Phase Pathway 3.2a: Release from drought and/or grazing pressure may allow for black greasewood, basin wildrye and other perennial bunchgrasses to increase.

Potential Resilience Differences with other Ecological Sites:

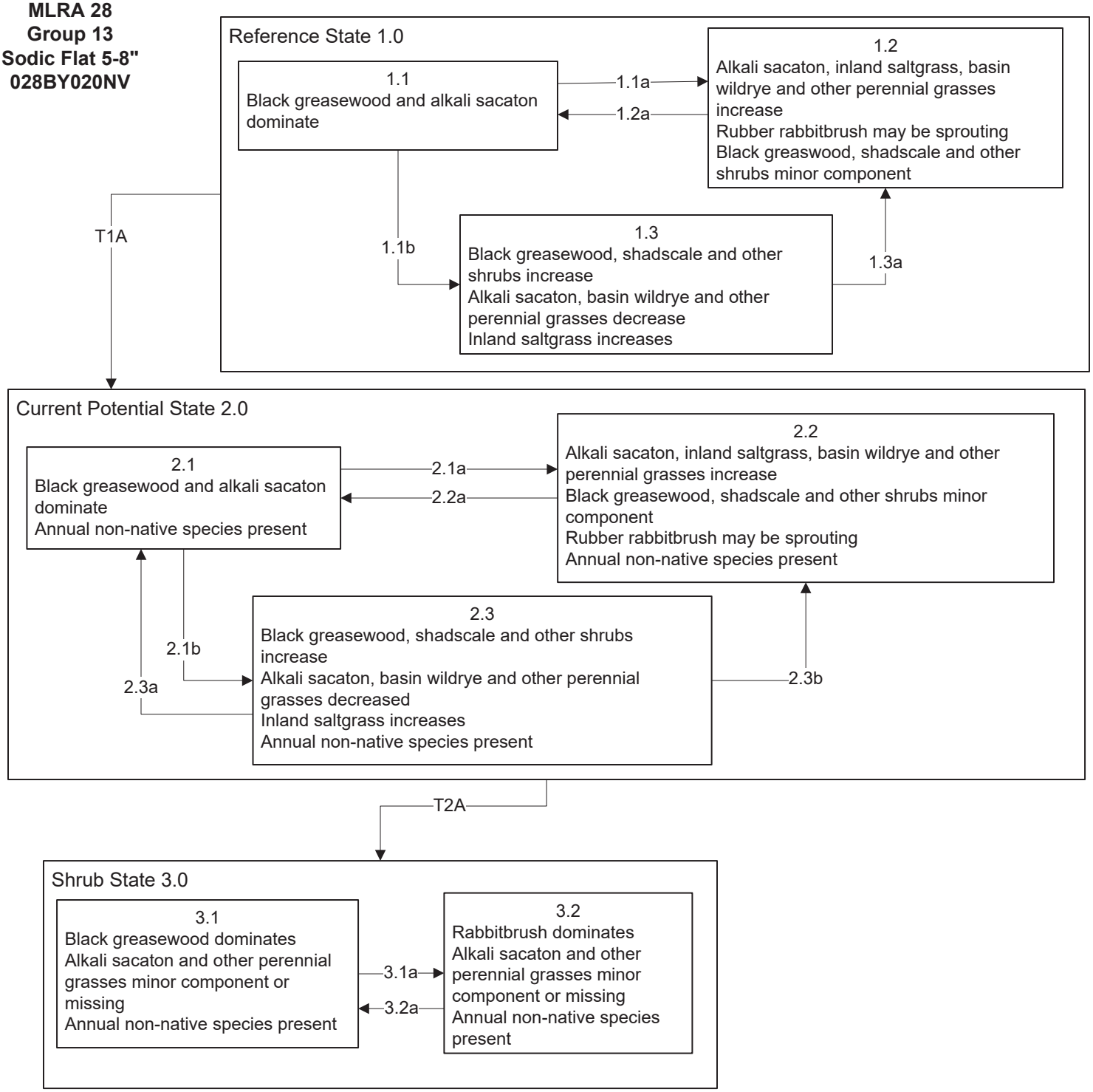
Sodic Terrace 5-8" (R028BY074NV): This plant community is dominated by shadscale and black greasewood. Although shadscale makes up most of the annual production, black greasewood is often prevalent enough to dominate the visual aspect.

Sodic Terrace 5-8" (R028AY024NV): This plant community is dominated by alkali sacaton and black greasewood. Shadscale, Indian ricegrass, and inland saltgrass are important species associated with this site.

Shallow Sodic Terrace 5-8" (R028AY103NV): This plant community is dominated by stunted, nearly prostrate black greasewood. The soils of this site have an effective rooting depth of less than 30 inches. A duripan at about 20 to 30 inches results in black greasewood exhibiting a stunted, nearly prostrate, growth form. The surface layer will normally crust and bake upon drying, inhibiting infiltration and forming a barrier to seedling emergence. High salt concentrations reduce seed viability. Available water capacity is low to very low. Runoff is slow.

Clay Dune (R028BY101NV): This site is similar to the modal site, but it is lacking the shadscale component. Black greasewood and alkali sacaton dominate the site with rubber rabbitbrush, horsebrush and gray molly making up minor components.

MLRA 28
Group 13
Sodic Flat 5-8"
028BY020NV



MLRA 28
Group 13
Sodic Flat 5-8"
028BY020NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/shrub mosaic.
1.1b: Time and lack of disturbance, drought, herbivoryl or combinations.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Fire significantly reduces shrub cover and leads to early/mid-seral community.

Transition T1A: Introduction of non-native species such as cheatgrass and halogeton.

Current Potential State 2.0 Community Phase Pathways
2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.
2.1b: Time and lack of disturbance, drought inappropriate grazing or combinations.
2.2a: Time and lack of disturbance allows for shrub regeneration, may be coupled with grazing management to increase shrubs.
2.3a: Heavy late fall/winter grazing, brush treatments and/or fire.

Transition T2A: Inappropriate grazing management would reduce the perennial understory(3.1). Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (3.2)

Shrub State 3.0 Community Phase Pathways
3.1a: Drought and/or lowering of the water table due to groundwater pumping and/or severe fire.
3.2a: Release of drought and/or grazing pressure may allow for black greasewood and perennial bunchgrasses to increase

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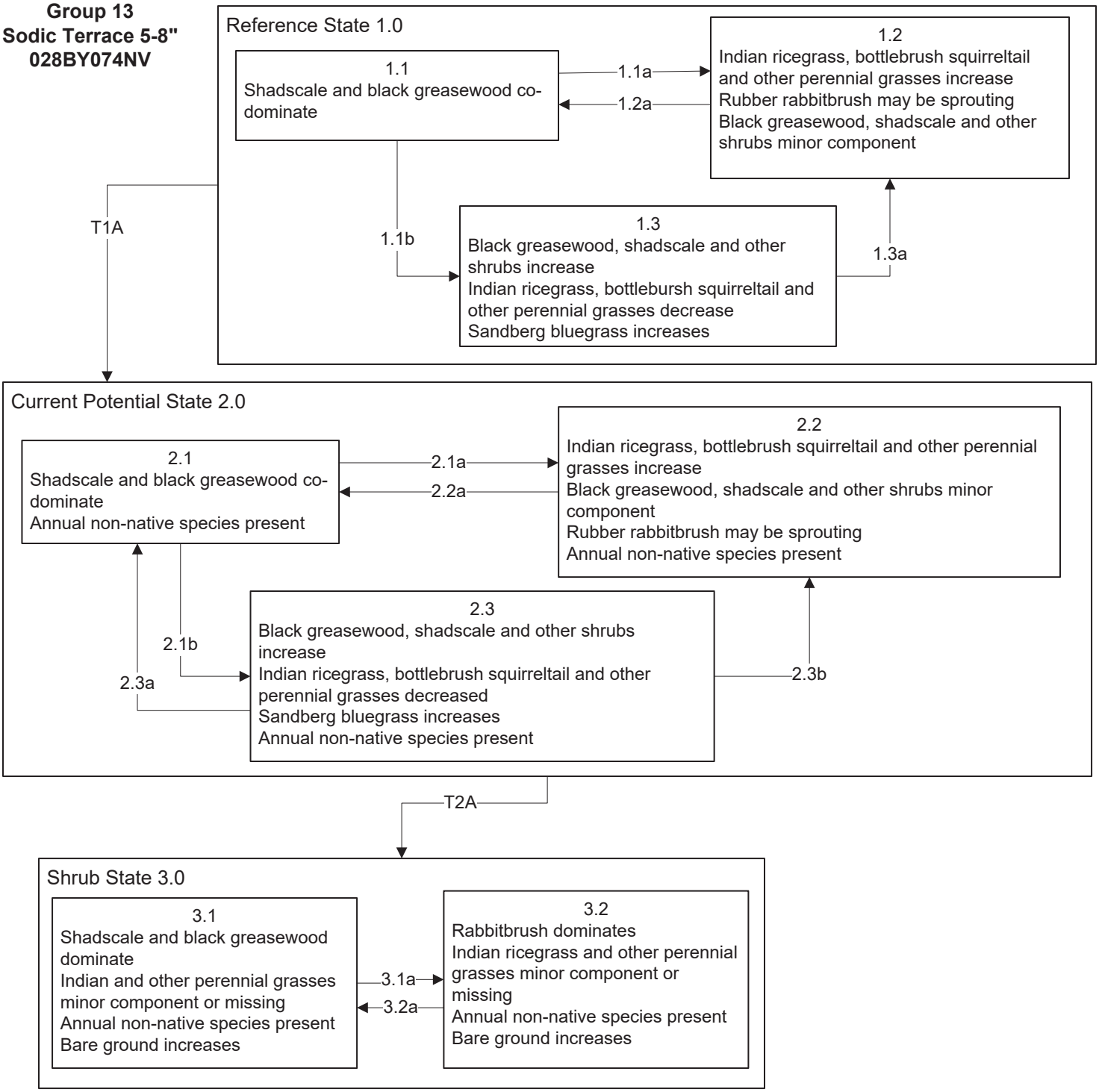
Group 13AB:

Additional State - and -Transition Models:

Name	Site ID
Shallow Sodic Terrace 5-8" P.Z. Model not included	028AY103NV
Sodic Terrace 5-8” P. Z.	028BY074NV
Sodic Terrace 5-8" P.Z.	028AY024NV
Clay Dune Model not included	028BY101NV

MLRA 28
Group 13
Sodic Terrace 5-8"
028BY074NV



MLRA 28
Group 13
Sodic Terrace 5-8"
028BY074NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/shrub mosaic.
1.1b: Time and lack of disturbance, drought, herbivory or combinations.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Fire significantly reduces shrub cover and leads to early/mid-seral community.

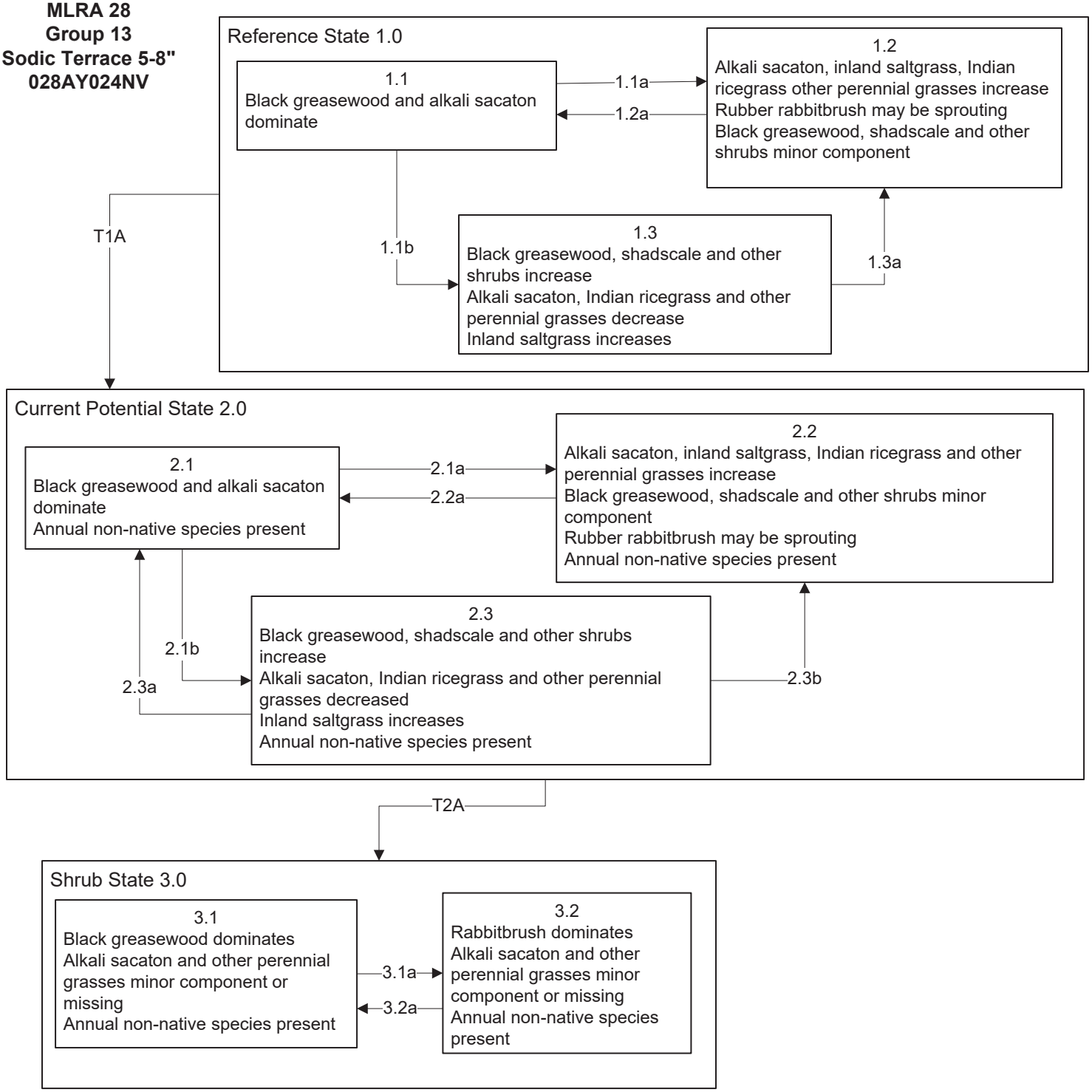
Transition T1A: Introduction of non-native species such as cheatgrass and halogeton.

Current Potential State 2.0 Community Phase Pathways
2.1a: Fire or brush treatments (i.e. mowing) with minimal soil disturbance.
2.1b: Time and lack of disturbance, drought inappropriate grazing or combinations.
2.2a: Time and lack of disturbance allows for shrub regeneration, may be coupled with grazing management to increase shrubs.
2.3a: Heavy late fall/winter grazing, brush treatments and/or fire.

Transition T2A: Inappropriate grazing management would reduce the perennial understory(3.1). Severe fire, lowering of water table from groundwater pumping and/or soil disturbing brush treatments (3.2)

Shrub State 3.0 Community Phase Pathways
3.1a: Drought and/or lowering of the water table due to groundwater pumping and/or severe fire.
3.2a: Release of drought and/or grazing pressure may allow for black greasewood and perennial bunchgrasses to increase

MLRA 28
Group 13
Sodic Terrace 5-8"
028AY024NV



MLRA 28
Group 13
Sodic Terrace 5-8"
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