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 31AB

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Ecological Sites within Disturbance Response Group 31AB:
Modal Site: Silt Flat 028BY042NV

Group	Name	Site ID
	Silt Flat	**028AY001NV**
31AB	Silt Flat	028BY056NV
	Silty Plain 8-10" P.Z.	028BY054NV

MLRA 28
Group 31

Disturbance Response Group (DRG) 31 consists of three ecological sites. The precipitation ranges from 8 to 10 inches. The slope ranges from 0 to 8 percent but 0 to 2 percent slopes are typical. Elevation ranges from 5000 to 6500 feet. Production ranges from 325 to 425 lbs/acre for a normal year. Soils on these sites are typically deep to very deep and have moderate to high available water holding capacity. It is common for sites within this group to experience ponding due to the soil's naturally slow water intake rate. The soils in the Silt Flat ecological sites are salt and sodium affected throughout. The potential native plant community is dominated by Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis)* with an understory of bottlebrush squirreltail (*Elymus elymoides*). Indian ricegrass (*Acnatherum hymenoides*) and Sandberg bluegrass (*Poa secunda)* are also common on these sites.

Modal Site:
The Silt Flat (028AY001NV) ecological site in MLRA 28A is the modal site that represents this DRG, as it has the most acres mapped. This site occurs on alluvial flats and alluvial plains. Slope gradients of 0 to 2 percent are most typical. Elevations are 5000 to 6500 feet. The soils of this site are deep to very deep and well drained. Surface soils are medium to moderately fine textured and generally less than 20 inches thick to the subsoil or underlying material. These soils are generally salt and sodium affected throughout the soil profile. The surface layer will normally crust and bake upon drying, inhibiting water infiltration and seedling emergence. Runoff is slow to very slow and ponding occurs in many areas. The available water holding capacity is moderate to high. The plant community is dominated by Wyoming big sagebrush and bottlebrush squirreltail. Production is 325 lbs/acre for a normal year.

Disturbance Response Group 31 Ecological Sites:

Silt Flat (Modal)	028AY001NV
Silt Flat	028BY056NV
Silty Plain 8-10" P.Z.	028BY054NV

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 influence resilience include site productivity, species composition and structure, and population regulation and regeneration (Chambers et al. 2013).

The ecological sites in this DRG are dominated by deep-rooted cool season perennial bunchgrasses and long-lived shrubs (50+ years) with high root to shoot ratios. The dominant shrubs usually root to the full depth of the winter-spring soil moisture recharge, which ranges from 1.0 to over 3.0 m. (Comstock and Ehleringer 1992). Root length of mature sagebrush plants was measured to a depth of 2 meters in alluvial soils in Utah (Richards and Caldwell 1987). These shrubs have a flexible generalized root system with development of both deep taproots and laterals near the surface (Dobrowolski et al. 1990).

Perennial bunchgrasses generally have somewhat shallower root systems than shrubs in these systems, but root densities are often as high as or higher than those of shrubs in the upper 0.5 m. General differences in root depth distributions between grasses and shrubs result in resource partitioning in these shrub/grass systems.

In the Great Basin, the majority of annual precipitation is received during the winter and early spring. This continental semiarid climate regime favors growth and development of deep-rooted shrubs and herbaceous cool season plants using the C3 photosynthetic pathway (Comstock and Ehleringer 1992). Winter precipitation and slow melting of snow results in deeper percolation of moisture into the soil profile. Herbaceous plants, more shallow-rooted than shrubs, grow earlier in the growing season and thrive on spring rains, while the deeper rooted shrubs lag in phenological development because they draw from deeply infiltrating moisture from snowmelt the previous winter. Periodic drought regularly influences sagebrush ecosystems and drought duration and severity has increased throughout the 20th century in much of the Intermountain West. Major shifts away from historical precipitation patterns have the greatest potential to alter ecosystem function and productivity. Species composition and productivity can be altered by the timing of precipitation and water availability within the soil profile (Bates et al 2006).

Wyoming big sagebrush, the most drought tolerant of the big sagebrushes, is generally long-lived; therefore it is not necessary for new individuals to recruit every year for perpetuation of the stand. Infrequent large recruitment events and simultaneous low, continuous recruitment is the foundation of population maintenance (Noy-Meir 1973). Survival of the seedlings is depended on adequate moisture conditions.

The Great Basin sagebrush 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. The invasion of sagebrush communities by cheatgrass (*Bromus tectorum)* has been linked to disturbances (fire, abusive grazing) that have resulted in fluctuations in resources (Chambers et al. 2007).

The introduction of annual weedy species, like cheatgrass, may cause an increase in fire frequency and eventually lead to an annual state. Conversely, as fire frequency decreases, sagebrush will increase and with inappropriate grazing management the perennial bunchgrasses and forbs may be reduced.

Millions of acres in the arid and semi-arid West have been brush-beaten and planted with crested wheatgrass *(Agropyron cristatum)* in order to benefit both livestock and wildlife and to increase range production (Zlatnik 1999). Crested wheatgrass is a cool-season, medium height, exotic perennial bunchgrass. As a native of Russia, it is adapted to very cold and very dry climates which made it the common choice for range rehabilitation. Sites within this DRG may exhibit an understory of crested wheatgrass in areas where historical seedings have been allowed to return to sagebrush.

Native insect outbreaks are also important drivers of ecosystem dynamics in sagebrush communities. Climate is generally believed to influence the timing of insect outbreaks, especially a sagebrush defoliator, Aroga moth (*Aroga websteri*). Aroga moth infestations occurred in the Great Basin in the 1960s, early 1970s, and has been ongoing in Nevada since 2004 (Bentz et al 2008). Thousands of acres of

big sagebrush have been impacted, with partial to complete die-off observed. Aroga moth can partially or entirely kill individual plants or entire stands of big sagebrush (Furniss and Barr 1975).

The ecological sites in this DRG have low resilience to disturbance and low resistance to invasion. Historically this site would rarely experience fire due to low fuel loads, however the introduction of fine fuels from non-native annual grasses increases fire risk. Three possible alternative stable states have been identified for this DRG.

Fire Ecology:
Wyoming big sagebrush is easily killed by fire (Blaisdell 1953). Pre-European settlement fire return intervals for Wyoming big sagebrush vary depending on study source and location from 50-100 years (Wright and Bailey 1982), 100-240 years (Baker 2006), and most recently, Baker (2011) summarized five sources of fire interval estimates and found 200-350 years to be the most common estimate. Wyoming big sagebrush only regenerates from seed. Repeated fires may eliminate the onsite seed source; reinvasion into these areas may be extremely slow (Bunting et al. 1987). Reestablishment after fire may require 50-120 or more years (Baker 2006). Even then, up to 25 years after fire, Wyoming big sagebrush may have less than 5% of pre-fire cover (Baker 2011). The introduction and expansion of cheatgrass has dramatically altered the fire regime (Balch et al. 2013), therefore altering restoration potential of Wyoming big sagebrush communities (Evans and Young 1978).

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). Fire will remove aboveground biomass from bluebunch wheatgrass but plant mortality is generally low (Robberecht and Defossé 1995). However, season and severity of the fire will influence plant response. Plant response will vary depending on post-fire soil moisture availability.

Bottlebrush squirreltail is considered more fire tolerant than Indian ricegrass due to its small size, coarse stems, and sparse leafy material (Britton et al. 1990). Post-fire regeneration occurs from surviving root crowns and from on- and off-site seed sources. Bottlebrush squirreltail has the ability to produce large numbers of highly germinable seeds, with relatively rapid germination (Young and Evans 1977) when exposed to the correct environmental cues. Early spring growth and ability to grow at low temperatures contribute to the persistence of bottlebrush squirreltail among cheatgrass dominated ranges (Hironaka and Tisdale 1973).

A prominent grass on this site, Indian ricegrass, is fairly fire tolerant (Wright 1985), which is likely due to its low culm density and below ground plant crowns. Vallentine (1989) cites several studies in the sagebrush zone that classified Indian ricegrass as being slightly damaged from late summer burning. Indian ricegrass has also been found to reestablish on burned sites through seed dispersed from adjacent unburned areas (Young 1983, West 1994). Thus the presence of surviving, seed producing plants facilitates the reestablishment of Indian ricegrass. Grazing management following fire to promote seed production and establishment of seedlings is important.

Wildfire in sites with cheatgrass present could transition to cheatgrass dominated communities. Without management, cheatgrass and annual forbs are likely to invade and dominate the site, especially after

fire. Reduced deep-rooted bunchgrass vigor or density provides an opportunity for Sandberg bluegrass expansion and/or cheatgrass and other invasive species such as halogeton to occupy interspaces.

Livestock/Wildlife Grazing Interpretations:
Overgrazing leads to an increase in sagebrush and a decline in understory plants such as Indian ricegrass and basin wildrye. Squirreltail and Sandberg bluegrass will increase temporarily with further degradation (Jameson 1962, Tisdale and Hironaka 1981). Invasion of annual weedy forbs and cheatgrass could occur with further grazing degradation, leading to a decline in squirreltail and an increase in bare ground.

Bottlebrush squirreltail generally increases in abundance when moderately grazed or protected (Hutchings and Stewart 1953). In addition, moderate trampling by livestock in big sagebrush rangelands of central Nevada enhanced bottlebrush squirreltail seedling emergence compared to untrampled conditions. Heavy trampling however was found to significantly reduce germination sites (Eckert et al. 1987). Squirreltail is more tolerant of grazing than Indian ricegrass but all bunchgrasses are sensitive to over-utilization within the growing season.

Indian ricegrass is a deep-rooted, cool season perennial bunchgrass that is adapted primarily to sandy soils. Indian ricegrass is a preferred forage species for livestock and wildlife (Cook 1962, Booth et al. 2006). This species is often heavily utilized in winter because it cures well (Booth et al. 2006). It is also readily utilized in early spring, being a source of green feed before most other perennial grasses have produced new growth (Quinones 1981). Booth et al. (2006) note that the plant does well when utilized in winter and spring. Cook and Child (1971) however, found that repeated heavy grazing reduced crown cover, which may reduce seed production, density, and basal area of these plants. Additionally, heavy early spring grazing reduces plant vigor and stand density (Stubbendieck 1985). In eastern Idaho, productivity of Indian ricegrass was at least 10 times greater in undisturbed plots than in heavily grazed ones (Pearson 1965). Cook and Child (1971) found significant reduction in plant cover even after 7 years of rest from heavy (90%) and moderate (60%) spring use. The seed crop may be reduced where grazing is heavy (Bich et al. 1995). Spring deferment of grazing may be necessary for stand enhancement (Pearson 1964, Cook and Child 1971); however, utilization of less than 60% is recommended.

STM Narrative Group 31

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 3 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 Wyoming big sagebrush, bottlebrush squirreltail, and Indian ricegrass. Other shrubs include green molly, shadscale, and rabbitbrush. Forbs and other grasses make up smaller components.

Community Phase Pathway 1.1a: Fire will decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fires will typically be low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush giving a competitive advantage to the perennial grasses and forbs.

Community Phase Pathway 1.1b: Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long-term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency and allowing big sagebrush to dominate the site.

Community Phase 1.2:
This community phase is characteristic of a post-disturbance, early-seral community. Bottlebrush squirreltail, Indian ricegrass, and other perennial bunchgrasses dominate. Depending on fire severity or intensity of Aroga moth infestations, patches of intact sagebrush may remain.

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

Community Phase 1.3:
Sagebrush increases in the absence of disturbance. Decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs and/or from herbivory.

Silty Plain 8-10" (028BY054NV). Phase 1.3. T. Stringham, September 2012.

Community Phase Pathway 1.3a: A low severity fire, Aroga moth, or combinations will reduce the sagebrush overstory and create a sagebrush/grass mosaic.

Community Phase Pathway 1.3b: Fire will decrease or eliminate the overstory of sagebrush and will allow for the perennial bunchgrasses to dominate the site. Fires will typically be low severity resulting in a mosaic pattern due to low fine 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

sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs.

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, and halogeton.
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.

T1B: Transition from Reference State 1.0 to Shrub State 3.0:

Trigger: Repeated heavy growing season grazing will decrease or eliminate deep-rooted perennial bunchgrasses, increase Sandberg bluegrass, and favor shrub growth and establishment.
Slow variables: Long term decrease in deep-rooted perennial grass density.
Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

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. A site may be considered to be in the Current Potential State if the non-native seeded species crested wheatgrass is present.

Community Phase 2.1:

This community is dominated by Wyoming big sagebrush, bottlebrush squirreltail, and Indian ricegrass. Other shrubs include green molly, shadscale, and rabbitbrush. Forbs and other grasses make up smaller components. Seeded species such as crested wheatgrass may be present and/or dominate the understory. Annual non-native species such as halogeton and cheatgrass may also be present.

Community Phase Pathway 2.1a: Fire will decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fires will typically be low severity resulting in a mosaic pattern due to low fuel loads. A fire following an unusually wet spring may be more severe and reduce sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large decrease in sagebrush giving a competitive advantage to the perennial grasses and forbs.

Community Phase Pathway 2.1b: Time and lack of disturbance such as fire allows for sagebrush to increase and become decadent. Long-term drought, herbivory, or combinations of these will cause a decline in perennial bunchgrasses and fine fuels leading to a reduced fire frequency and allowing big sagebrush to dominate the site.

Community Phase 2.2:
This community phase is characteristic of a post-disturbance, early-seral community. Bottlebrush squirreltail, Indian ricegrass, and other perennial bunchgrasses dominate. Depending on fire severity or intensity of Aroga moth infestations, patches of intact sagebrush may remain. Seeded species such as crested wheatgrass may be present and/or dominate the understory. Annual non-native species such as halogeton and cheatgrass are may also be present.

Community Phase Pathway 2.2a: Time and lack of disturbance will allow sagebrush to increase.

Community Phase 2.3 (at risk):
This community phase is at risk of transitioning to another State. Sagebrush increases in the absence of disturbance. Decadent sagebrush dominates the overstory and the deep-rooted perennial bunchgrasses in the understory are reduced either from competition with shrubs and/or from herbivory. Seeded species such as crested wheatgrass may be present and/or dominate the understory. Annual non-native species such as halogeton and cheatgrass may also be present. This site is susceptible to further degradation from inappropriate grazing management and long-term drought.

Silt Flat (028AY001NV) Phase 2.3. T. Stringham, August 2013.

Community Phase Pathway 2.3a: A low severity fire, Aroga moth, or combinations will reduce the sagebrush overstory and create a sagebrush/grass mosaic.

Community Phase Pathway 2.3b: Fire will decrease or eliminate the overstory of sagebrush and allow for the perennial bunchgrasses to dominate the site. Fires will typically be low severity, resulting in a mosaic pattern due to low fine 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 sagebrush cover to trace amounts. A severe infestation of Aroga moth could also cause a large

decrease in sagebrush within the community, giving a competitive advantage to the perennial grasses and forbs.

T2A: Transition from Current Potential State 2.0 to Shrub State 3.0:

Trigger: Repeated heavy growing season grazing will decrease or eliminate deep-rooted perennial bunchgrasses, increase Sandberg bluegrass, and favor shrub growth and establishment.
Slow variables: Long term decrease in deep-rooted perennial grass density.
Threshold: Loss of deep-rooted perennial bunchgrasses changes nutrient cycling, nutrient redistribution, and reduces soil organic matter.

Shrub State 3.0: This state is a product of many years of heavy grazing during time periods harmful to perennial bunchgrasses. Sandberg bluegrass will increase with a reduction in deep-rooted perennial bunchgrass competition and become the dominant grass. Sagebrush dominates the overstory and rabbitbrush may be a significant component. Sagebrush cover exceeds site concept and may be decadent, reflecting stand maturity and lack of seedling establishment due to competition with mature plants. The shrub overstory and Sandberg bluegrass understory dominate site resources such that soil water, nutrient capture, nutrient cycling and soil organic matter are temporally and spatially redistributed.

Community Phase 3.1:

Decadent sagebrush dominates the overstory. Rabbitbrush may be a significant component. Deep-rooted perennial bunchgrasses may be present in trace amounts or absent from the community. Squirreltail, Sandberg bluegrass, and annual non-native species increase. Bare ground is increasing. Crested wheatgrass may be a significant component in this phase if the site has a history of seeding treatments.

Silt Flat (028BY026NV) Phase 3.1. T. Stringham, July 2013.

Silt Flat (028AY001NV) Phase 3.1. T. Stringham, July 2014.

Silt Flat (028BY056NV) Phase 3.1. T. Stringham, August 2014.

Community Phase Pathway 3.1a: Long-term drought or repeated heavy growing season grazing will decrease or eliminate the understory herbaceous community and favor shrub growth and establishment.

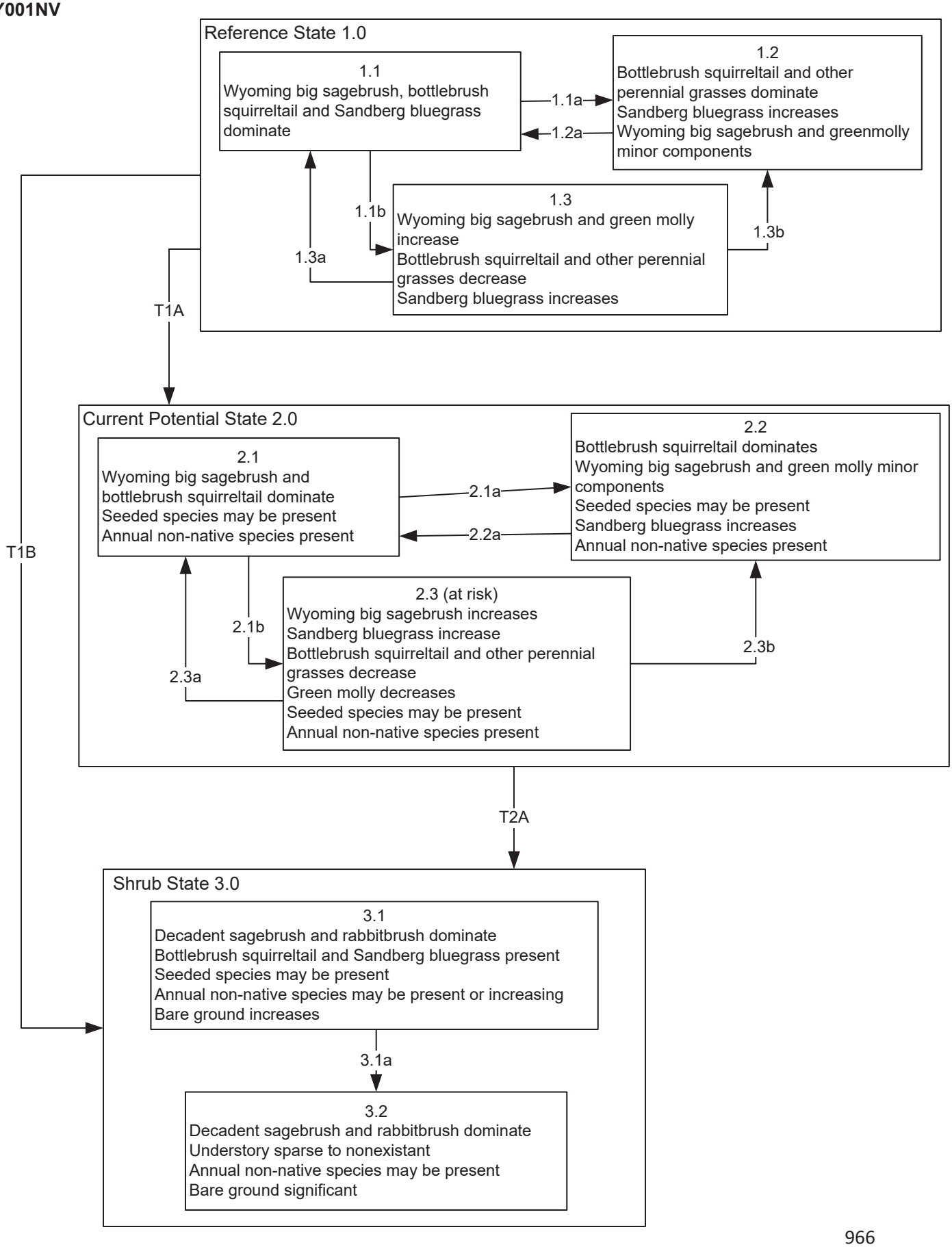
Community Phase 3.2:
Decadent sagebrush dominates the overstory. Rabbitbrush may be a significant component. Bare ground is significant. Bunchgrasses may be present in trace amounts or absent from the community. Annual non-native species may increase. Crested wheatgrass may be a significant component in this phase if the site has a history of seeding treatments.

Potential resilience differences in other ecological sites in this group:

Silt Flat (028BY056NV): This site is similar to the modal.

Silty Plain 8-10” (028BY054NV): This site is more productive than the modal site. It tends to have a larger component of Indian ricegrass. Winterfat may be a significant component.

MLRA 28AB
Group 31AB
Silt Flat
028AY001NV



KEY
MLRA 28AB
Group 31AB
Silt Flat
028AY001NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.
Transition T1B: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 3.0 Community Phase Pathways
3.1a: Inappropriate grazing management and or chronic drought.

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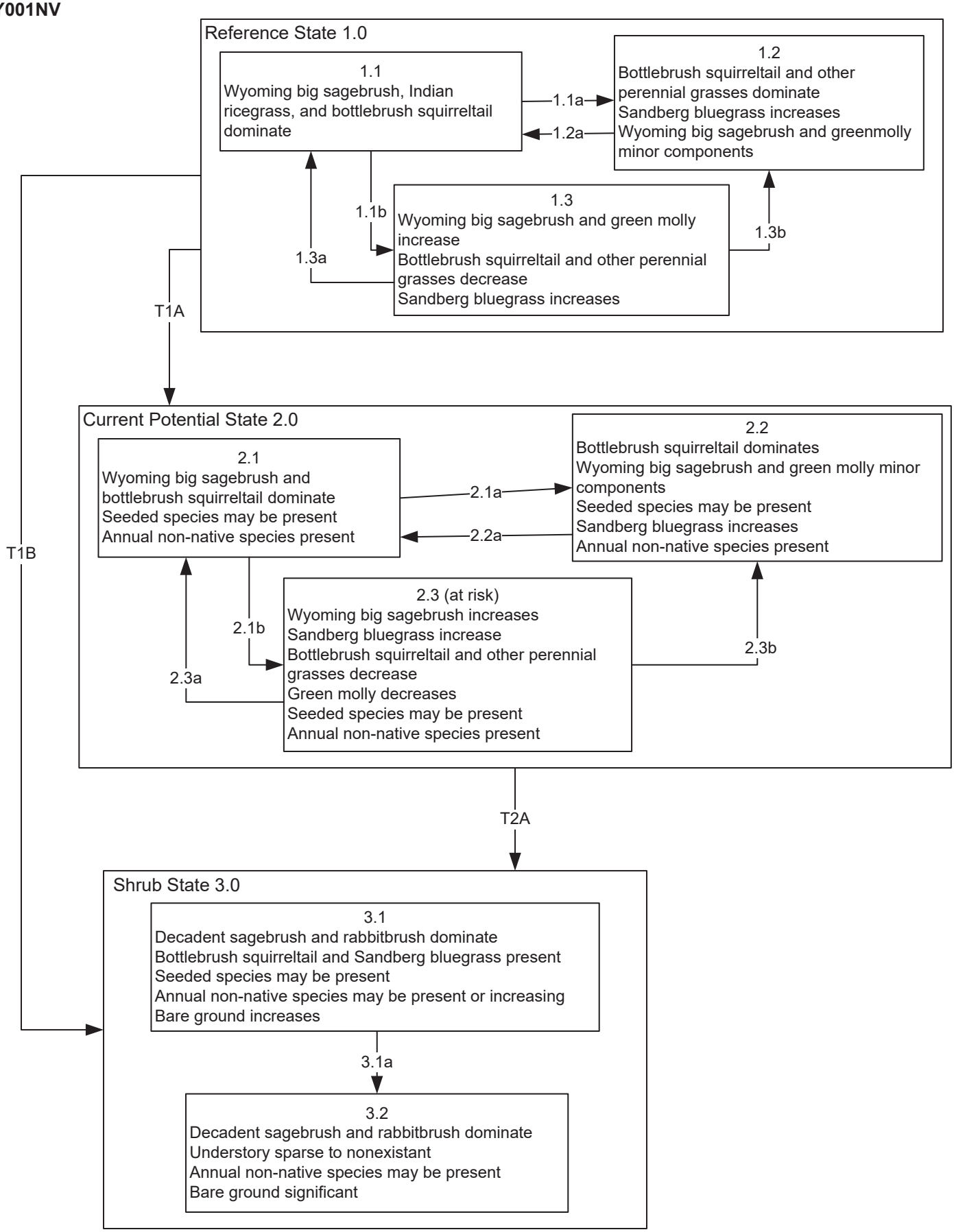
Group 31AB:

Additional State - and -Transition Models:

Name	Site ID
Silt Flat	028AY001NV
Silt Flat	028BY056NV
Silty Plain 8-10”	028BY054NV

MLRA 28AB
Group 31AB
Silt Flat
028AY001NV



KEY
MLRA 28AB
Group 31AB
Silt Flat
028AY001NV

Reference State 1.0 Community Phase Pathways
1.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community, dominated by grasses and forbs.
1.1b: Time and lack of disturbance such as fire or drought. Excessive herbivory may also decrease perennial understory.
1.2a: Time and lack of disturbance allows for shrub regeneration.
1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

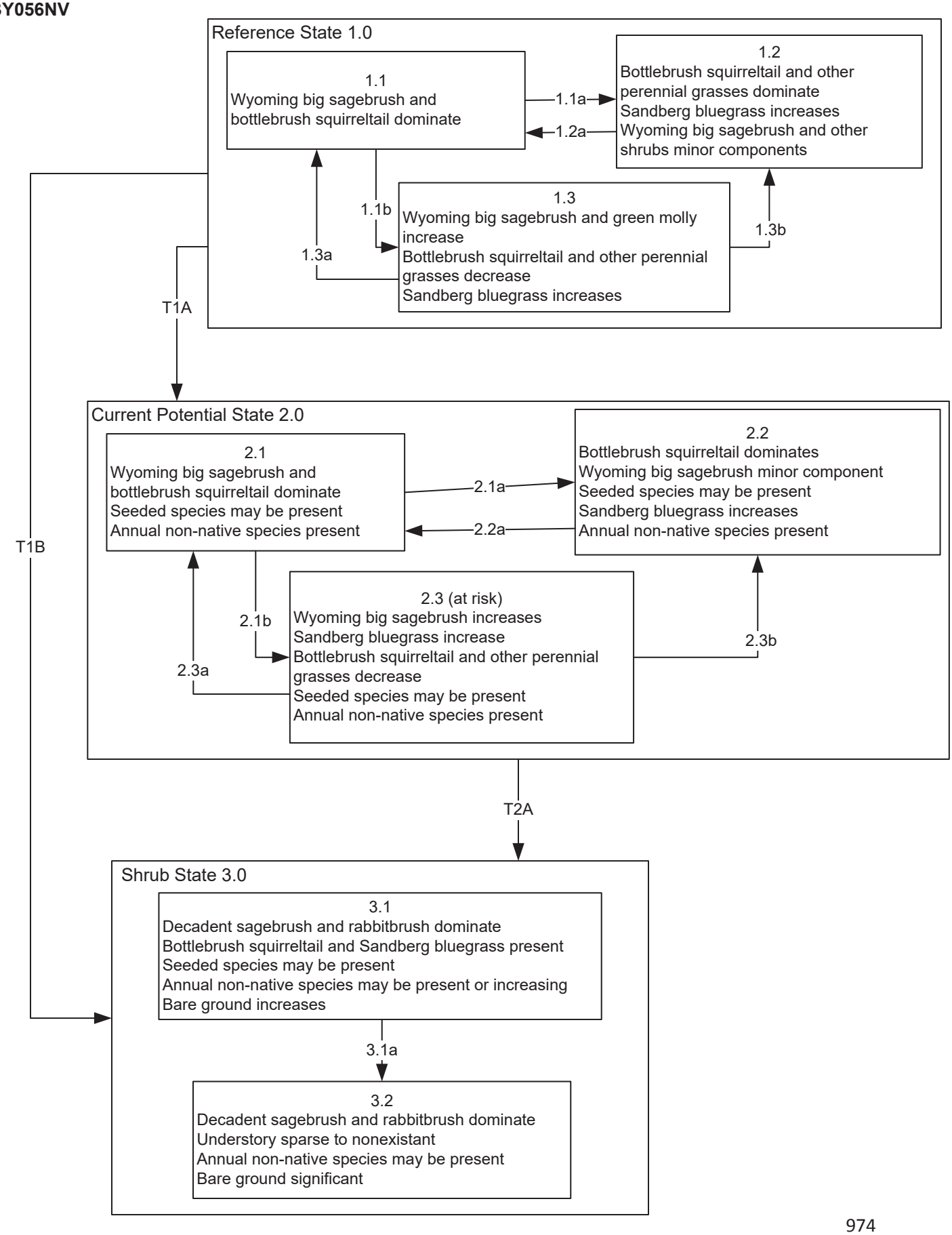
Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.
Transition T1B: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
2.1b: Time and lack of disturbance such as fire or drought. Inappropriate grazing management may also reduce perennial understory.
2.2a: Time and lack of disturbance allows for regeneration of sagebrush.
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 3.0 Community Phase Pathways
3.1a: Inappropriate grazing management and or chronic drought.

MLRA 28AB
Group 31AB
Silt Flat
028BY056NV



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MLRA 28AB
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Silt Flat
028BY056NV

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1.3a: Low severity fire or Aroga moth infestation resulting in a mosaic pattern.
1.3b: High severity fire significantly reduces sagebrush cover leading to early/mid-seral community.

Transition T1A: Introduction of non-native species such as bulbous bluegrass, cheatgrass and thistles.
Transition T1B: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 2.0 Community Phase Pathways
2.1a: Low severity fire creates grass/sagebrush mosaic; high severity fire significantly reduces sagebrush cover and leads to early/mid-seral community dominated by grasses and forbs; non-native annual species present.
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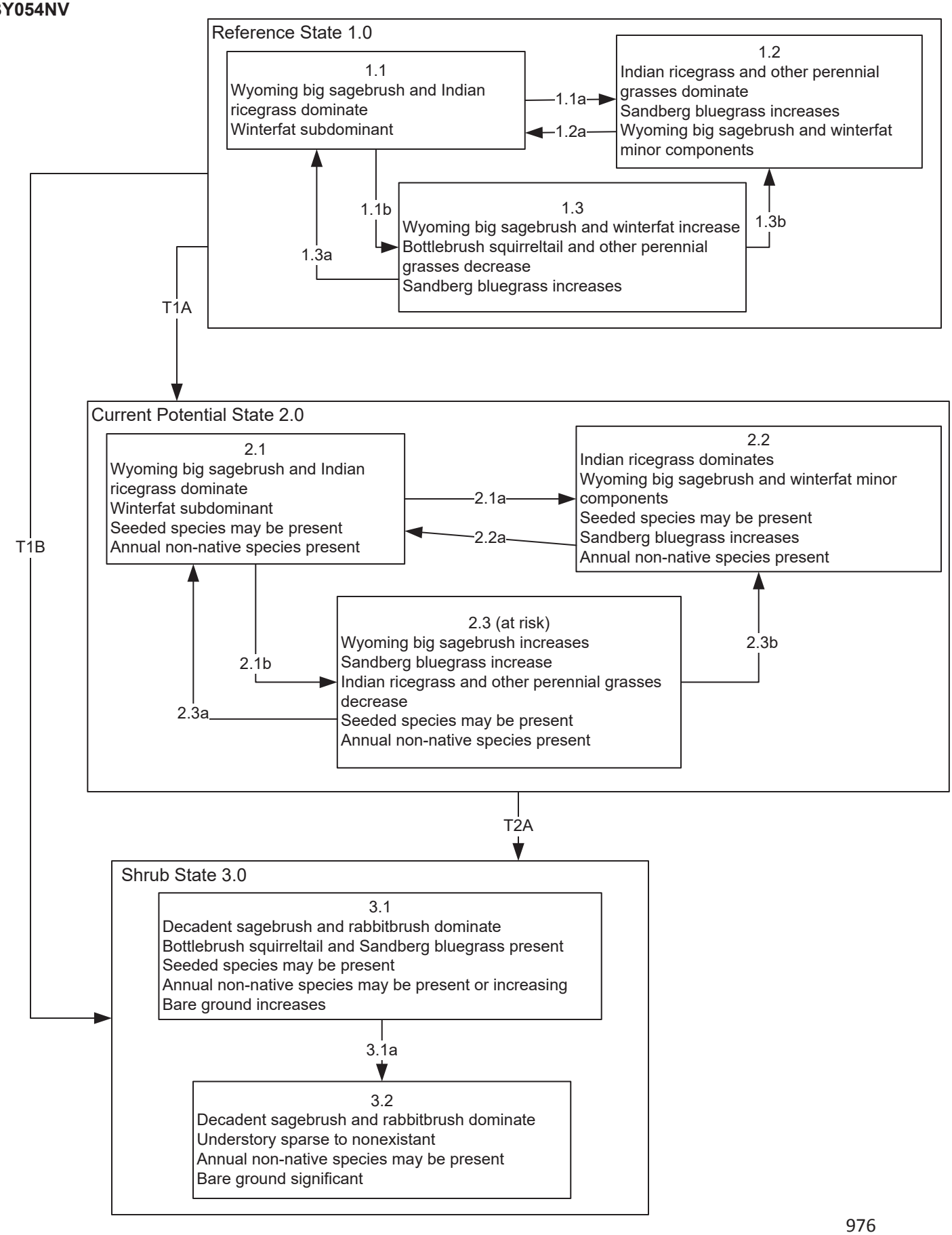
2.3a: Low severity fire or Aroga moth infestation creates sagebrush/grass mosaic. Brush management with minimal soil disturbance; late-fall/winter grazing causing mechanical damage to sagebrush.
2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 3.0 Community Phase Pathways
3.1a: Inappropriate grazing management and or chronic drought.

MLRA 28AB
Group 31AB
Silty Plain
028BY054NV



KEY
MLRA 28AB
Group 31AB
Silty Plain
028BY054NV

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Transition T1B: Time and lack of disturbance coupled with inappropriate grazing management.

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2.3b: High severity fire significantly reduces sagebrush cover leading to early mid-seral community.

Transition T2A: Time and lack of disturbance coupled with inappropriate grazing management.

Current Potential State 3.0 Community Phase Pathways
3.1a: Inappropriate grazing management and or chronic drought.