

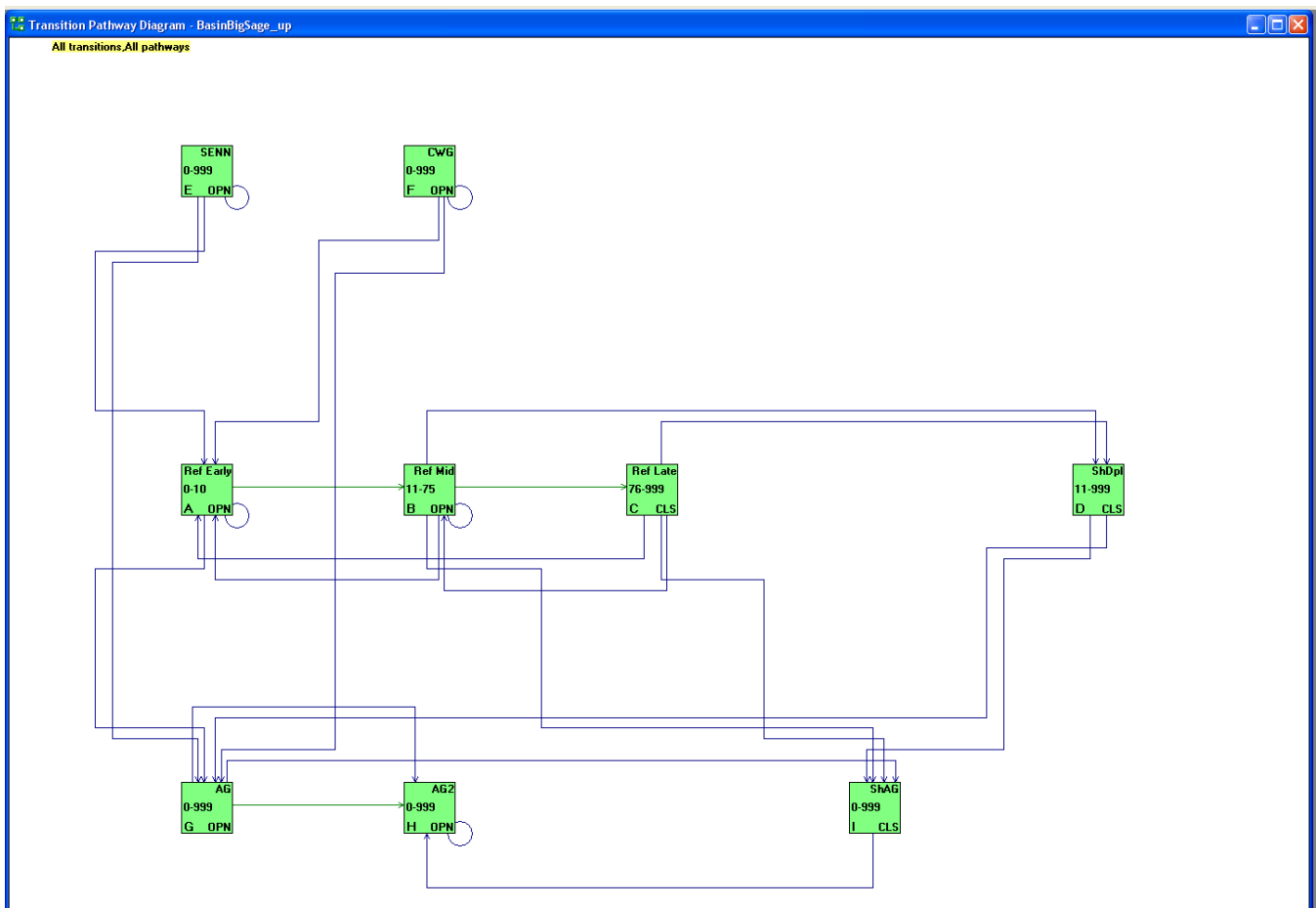
**Basin Big Sagebrush**

**NRCS Management Landscape Resource Area - MLRA 10**

**Relevant NRCS Ecological Sites:**

Loamy 12-16 ARTRT/PSSP6, Loamy 8-12 ARTRT/PSSP6, Loamy Bottom 8-14 ARTRT/LECI, Sand 8-12 ARTRT/ACHY, Sandy 8-14 ARTRT/HECO8-ACHY, Shallow Fractured 8-12 ARTRT/PSSP6, Shallow Loamy 8-12, ARTRT/PSSP6, Shallow Loamy/Fractured 8-12 ARTRT/PSSP6, Stony Loamy 10-12 ARTRT/PSSP6

**VDDT Model – BasinBigSage\_up**



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 19	20 - 40% native herbaceous cover, <10% shrub cover (Basin Big, rabbitbrush, WY big sage)
B Ref Mid-Open	20 -59	11 - 20% cover Basin big sage, 10 - 40% native herbaceous cover
C Ref Late - Closed	60 - 999	21 – 40% cover Basin big sage, <30% native herbaceous cover

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D ShDpl	61 - 999	>40% cover BasinY big sage, <20% native herbaceous cover, 5 – 15% cover annual grass (cheatgrass)
E SENN - Open	0 - 999	10 – 40% cover seeded non-native or native/non-native mix
F CWG - open	0 - 999	>10% crested, <20% shrub cover
G AG - Open	0-999	5 – 15% cover annual grass (cheatgrass)
H AG2 - Open	0-999	<15% cover annual grass (cheatgrass)
I ShAG - Closed	25 - 999	20 – 60% cover Basin big sage, 5 - 40% cover annual grass (cheatgrass)

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D, E, G, and I represent *transition* classes vulnerable to movement into *Alternative Stable States* (Classes F, H).

Contributing BPS Models: ([Base: LANDFIRE BPS – 1080 for Mapzone 18](#), Modified: Raft River/Grouse Creek Utah Project - 1080bw)

## Development Classes

- A – Reference Early |
- B – Reference Mid-Open | See Landfire 1080 MZ18 Descriptions
- C – Reference Late – Closed |

D – ShDpl (Shrub Depleted) This transitional class describes sites that have lost a significant portion of native understory but retain resiliency to recover through time/rest or low cost restoration (DPL Restore Lo) or if annual grass cover is high, then AG Rehabilitate Lo.

E – SENN (Seeded Native, Non-Native, Mix) This class could be either transition or alternate state, depending on the type of seed mix used and treatment success.

F – CWG (Past Crested Wheatgrass seedings) This alternate state describes old crested seedings with little/no native grass/forb component. Given time and nearby seed source, native shrubs can re-establish. Replacement fire is infrequent (FRI yrs).

G - AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

H – AG2 (Annual Grass 2) This class describes sites that have crossed a threshold to an alternate state characterized by annual grass cover exceeding 15-20%

I – ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2). As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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## Identified Probabilistic Transitions<sup>1</sup>

### Natural Disturbance

- ✓ Replacement Fire
- ✓ Insect/Disease
- ✓ Wind/Weather/Stress

### Other Disturbance

- ✓ AG-Invasion
- ✓ Excessive-Herbivory
- ✓ Alternate Succession
- ✓ CWG Seeding
- ✓ CWG Restoration

- ✓ AG Rehabilitation – Low
- ✓ AG Rehabilitation – Hi
- ✓ REF- Restoration – Low
- ✓ REF-Restoration – Hi
- ✓ DPL-Restoration – Low
- ✓ DPL-Restoration – Hi

## VDDT – Modeled Landscape Proportions

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	9%	2,855
B	REF	8%	2,537
C	REF	2%	634
D	TRS	1%	317
E	TRS	0%	0
F	ALT	0%	0
G	TRS	57%	18,080
H	ALT	21%	6,661
I	TRS	2%	634

## COMMENTS:

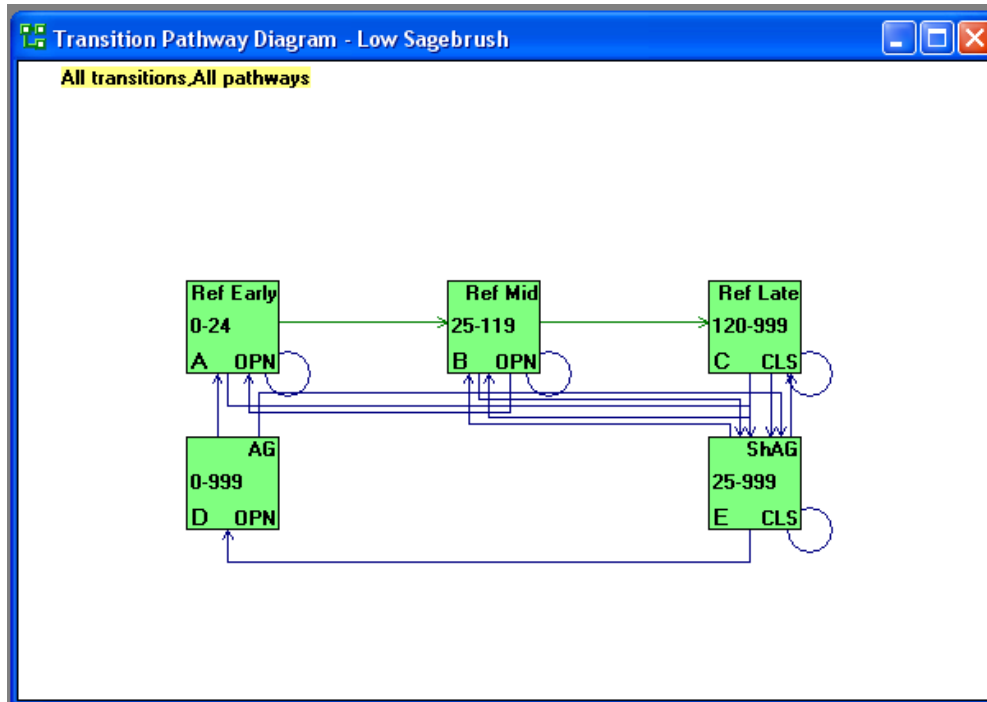
## Low Sagebrush

NRCS Management Landscape Resource Area - MLRA 10

Relevant NRCS Ecological Sites:

Shallow Stony Loam 8-16 ARAR8/PSSP6

### VDDT Model – Low Sagebrush



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 24	<10% cover low sage, <10% herbaceous cover
B Ref Mid-Open	25 - 119	11-20% cover low sage, 5-20% native herbaceous cover
C Ref Late - Open	120 - 999	10 – 25% cover low sage, 5 – 20% native herbaceous cover, <10% tree cover (JUOC)
D ShAG - Closed	25 - 999	5 – 20% cover low sage, <15% cover annual grass (cheatgrass)
E AG - Open	0-999	5 – 15% cover annual grass (cheatgrass)

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D and E represent *transition* classes. No *Alternative Stable States* described.

# [State-and-Transition Model Descriptions Shoshone BLM – Wildhorse Case Study]

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Contributing BPS Models: ([Base: LANDFIRE BPS – 1079 for Mapzone 18](#), Modified: 1079aa – Raft River Grouse Creek Project in Utah).

## Development Classes

- A – Reference Early |
- B – Reference Mid-Open | See Landfire 1079 MZ18 Descriptions
- C – Reference Late – Open |

D – ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2). As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

E – AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

## **Identified Probabilistic Transitions<sup>1</sup>**

### Natural Disturbance

- ✓Replacement Fire
- ✓Insect/Disease
- ✓Wind/Weather/Stress

### Other Disturbance

- ✓AG-Invasion
- ✓Excessive-Herbivory
- ✓CWG Seeding
- ✓CWG Restoration

- ✓AG Rehabilitation – Low
- ✓AG Rehabilitation – Hi
- ✓REF- Restoration – Low
- ✓REF-Restoration – Hi
- ✓DPL-Restoration – Low
- ✓DPL-Restoration – Hi

## VDDT – Modeled Landscape Proportions

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	0%	0
B	REF	0%	0
C	REF	0%	0
D	TRS	0%	0
E	TRS	0%	0

**COMMENTS:** Some small amount of low sage exists within the Wildhorse area, but none was surveyed through BLM or TNC field sampling, and none was mapped for the area. This model description is included, but no area was allocated to this model in the scenario simulation analyses (8/24/09).

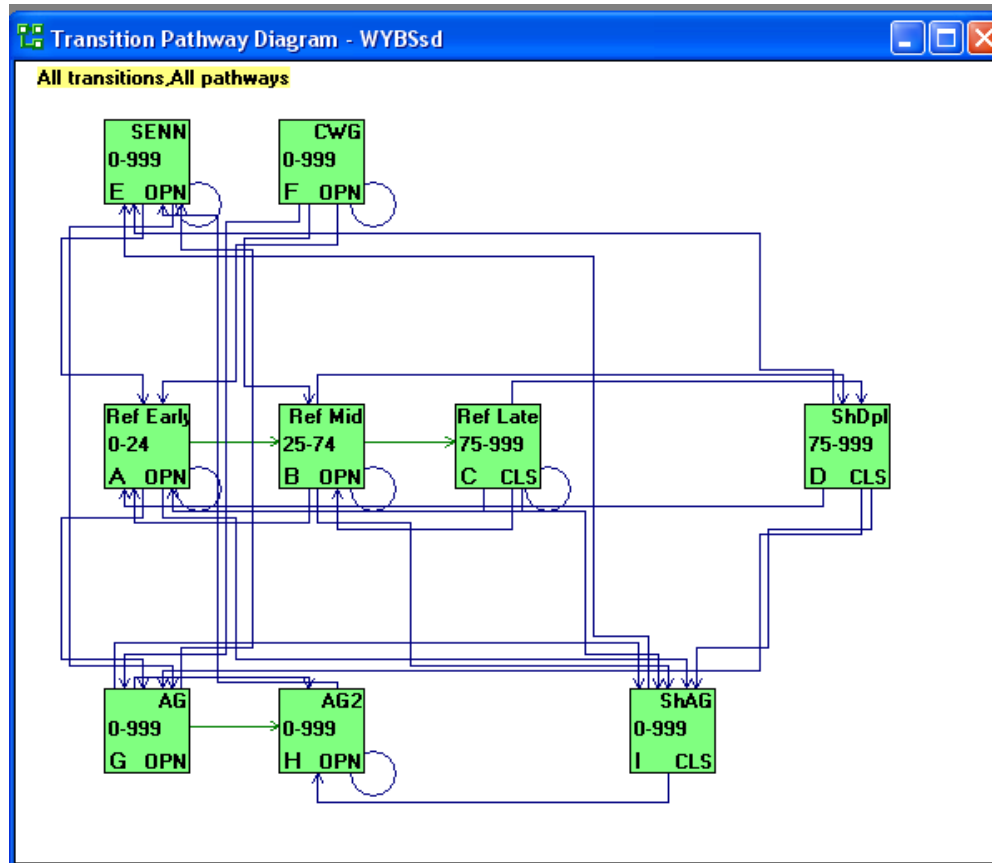
## Wyoming Big Sagebrush – *semi-desert*

NRCS Management Landscape Resource Area – MLRA 25

Relevant NRCS Ecological Sites:

Loamy 8-12 ARTRW8/PSSP6-ACTH7

### VDDT Model - WYBSsd



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 24	10 - 25% native herbaceous cover, <10% shrub cover (rabbitbrush, WY big sage, BBS)
B Ref Mid-Open	25 - 74	11 - 20% cover WY big sage, 10 - 25% native herbaceous cover,
C Ref Late - Closed	75 - 999	21 – 40% cover WY big sage, <15% native herbaceous cover
D ShDpl	75 - 999	10 - 40% cover WY big sage, <10% native herbaceous cover, 5 - 15% cover annual grass (cheatgrass)
E SENN - Open	0 - 999	10 – 40% cover seeded non-native or native/non-native mix

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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F CWG - open	0 - 999	>10% crested, <10% shrub cover
G AG - Open	0-999	5 – 15% cover annual grass (cheatgrass)
H AG2 - Open	0-999	<15% cover annual grass (cheatgrass)
I ShAG - Closed	25 - 999	20 – 40% cover WY big sage, 5 - 40% cover annual grass (cheatgrass)

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D, G, and I represent *transition* classes vulnerable to movement into *Alternative Stable States* (Classes E, F, and H).

Contributing BPS Models: ([Base: LANDFIRE BPS – 1080 for Mapzone 18](#), Modified: BPS 1080sd – Raft River Grouse Creek Project in Utah)

## Development Classes

A – Reference Early

B – Reference Mid-Open

C – Reference Late – Open

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See Landfire 1180 MZ18 Descriptions

D – ShDpl (Shrub Depleted) This transitional class describes sites that have lost a significant portion of native understory but retain resiliency to recover through time/rest or low cost restoration (DPL Restore Lo) or if annual grass cover is high, then AG Rehabilitate Lo.

E – SENN (Seeded Native, Non-Native, Mix) This class could be either transition or alternate state, depending on the type of seed mix used and treatment success.

F – CWG (Past Crested Wheatgrass seedings) This alternate state describes old crested seedings with little/no native grass/forb component. Given time and nearby seed source, native shrubs can re-establish. Replacement fire is infrequent (FRI yrs).

G – AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

H – AG2 (Annual Grass 2) This class describes sites that have crossed a threshold to an alternate state characterized by annual grass cover exceeding 15-20%

I – ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2). As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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## Identified Probabilistic Transitions<sup>1</sup>

### Natural Disturbance

- ✓ Replacement Fire
- ✓ Insect/Disease
- ✓ Wind/Weather/Stress

### Other Disturbance

- ✓ AG-Invasion
- ✓ Excessive-Herbivory
- ✓ CWG Seeding
- ✓ CWG Restoration

- ✓ AG Rehabilitation – Low
- ✓ AG Rehabilitation – Hi
- ✓ REF- Restoration – Low
- ✓ REF-Restoration – Hi
- ✓ DPL-Restoration – Low
- ✓ DPL-Restoration – Hi

## VDDT – Modeled Landscape Proportions

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	12%	22
B	REF	4%	7
C	REF	3%	5
D	TRS	4%	7
E	ALT	0%	0
F	ALT	0%	0
G	TRS	4%	7
H	ALT	26%	48
I	TRS	47%	86

## COMMENTS:

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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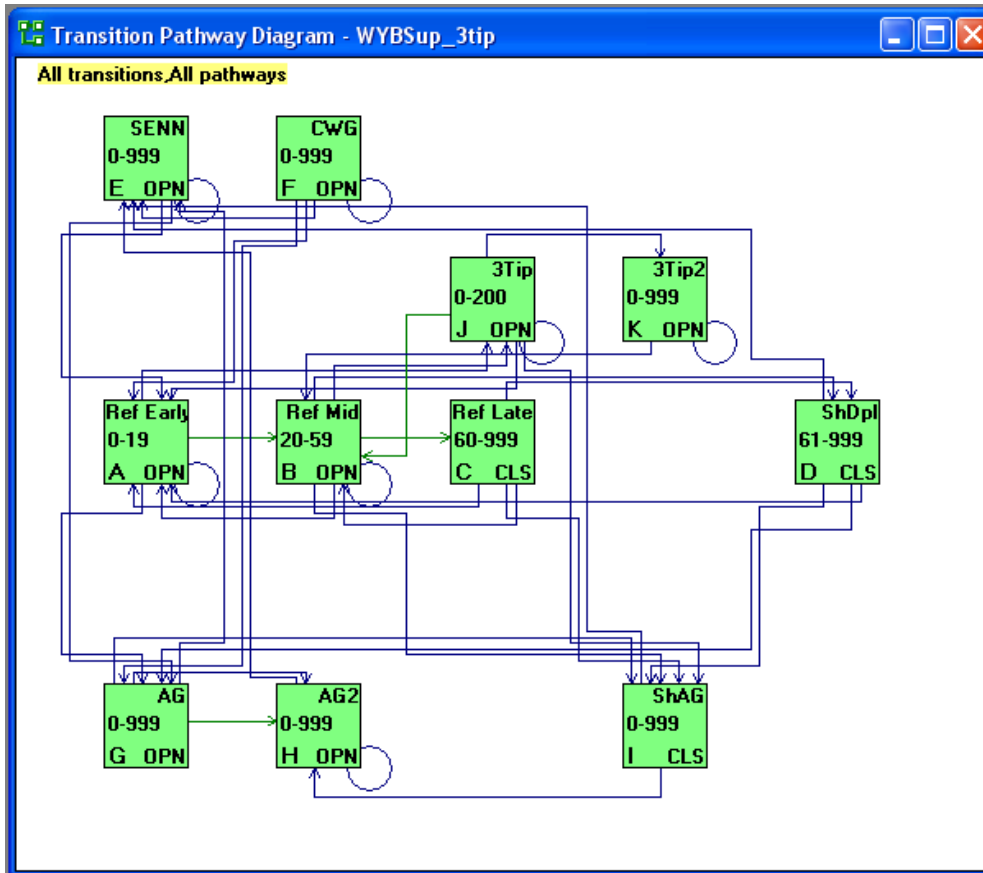
## Wyoming Big Sagebrush – *upland w/ 3-tip*

NRCS Management Landscape Resource Area – MLRA 25

### Relevant NRCS Ecological Sites:

Loamy 12-16 ARTRW8/PSSP6

### VDDT Model – WYBSup\_3tip



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 19	20 - 40% native herbaceous cover, <10% shrub cover (rabbitbrush, WY big sage, BBS)
B Ref Mid-Open	20 - 59	11 - 20% cover WY big sage, 10 - 40% native herbaceous cover
C Ref Late - Closed	60 - 999	21 - 40% cover WY big sage, <30% native herbaceous cover
D ShDpl	61 - 999	>30% cover WY big sage, <20% native herbaceous cover, 5 - 15% cover annual grass (cheatgrass)
E SENN - Open	0 - 999	10 - 40% cover seeded non-native or native/non-native mix

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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F CWG - open	0 - 999	>10% crested, <20% shrub cover
G AG - Open	0-999	5 – 15% cover annual grass (cheatgrass)
H AG2 - Open	0-999	<15% cover annual grass (cheatgrass)
I ShAG - Closed	25 - 999	20 – 40% cover WY big sage, 5 - 40% cover annual grass (cheatgrass)
J 3Tip - Open	0 - 200	11 - 20% cover 3-tip sage, 10 - 40% native herbaceous cover
K 3Tip2 - Closed	0 - 999	>21% 3-tip sage, <30% native herbaceous cover

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D, G, and I represent *transition* classes vulnerable to movement into *Alternative Stable States* (Classes E, F, and H).

Contributing BPS Models: ([Base: LANDFIRE BPS – 1080 for Mapzone 18](#), Modified: BPS 1080up – Raft River Grouse Creek Project in Utah)

## Development Classes

A – Reference Early

B – Reference Mid-Open

C – Reference Late – Closed

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See Landfire 1080 MZ18 Descriptions

D – ShDpl (Shrub Depleted) This transitional class describes sites that have lost a significant portion of native understory but retain resiliency to recover through time/rest or low cost restoration (DPL Restore Lo) or if annual grass cover is high, then AG Rehabilitate Lo.

E – SENN (Seeded Native, Non-Native, Mix) This class could be either transition or alternate state, depending on the type of seed mix used and treatment success.

F – CWG (Past Crested Wheatgrass seedings) This alternate state describes old crested seedings with little/no native grass/forb component. Given time and nearby seed source, native shrubs can re-establish. Replacement fire is infrequent (FRI yrs).

G – AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

H – AG2 (Annual Grass 2) This class describes sites that have crossed a threshold to an alternate state characterized by annual grass cover exceeding 15-20%

I – ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2). As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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J – 3Tip (3-Tip Sage encroachment) . This transitional class describes early 3-tip sage encroachment . 3-tip sage co-dominates with other shrub species. Given time, or reduced fire occurrence, this class will move back to Reference. Requires 3-tip Sage site in proximity.

K – 3-Tip2 (3-Tip Sage encroachment 2) This transitional –to – alternate state class describes 3-tip sage dominating WY sage sites. Multiple fire events have reduced/removed WY sage seed source. Requires 3-tip Sage site in proximity.

## Identified Probabilistic Transitions

### Natural Disturbance

- ✓Replacement Fire
- ✓Insect/Disease
- ✓Wind/Weather/Stress

### Other Disturbance

- ✓AG-Invasion
- ✓Excessive-Herbivory
- ✓CWG Seeding
- ✓CWG Restoration

- ✓AG Rehabilitation – Low
- ✓AG Rehabilitation – Hi
- ✓REF- Restoration – Low
- ✓REF-Restoration – Hi
- ✓DPL-Restoration – Low
- ✓DPL-Restoration – Hi

## VDDT – Modeled Landscape Proportions

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	16%	1,449
B	REF	12%	1,087
C	REF	10%	906
D	TRS	7%	634
E	ALT	0%	0
F	ALT	0%	0
G	TRS	24%	2,174
H	ALT	7%	634
I	TRS	17%	1,539
J	TRS	4%	362
K	ALT	3%	272

## COMMENTS:

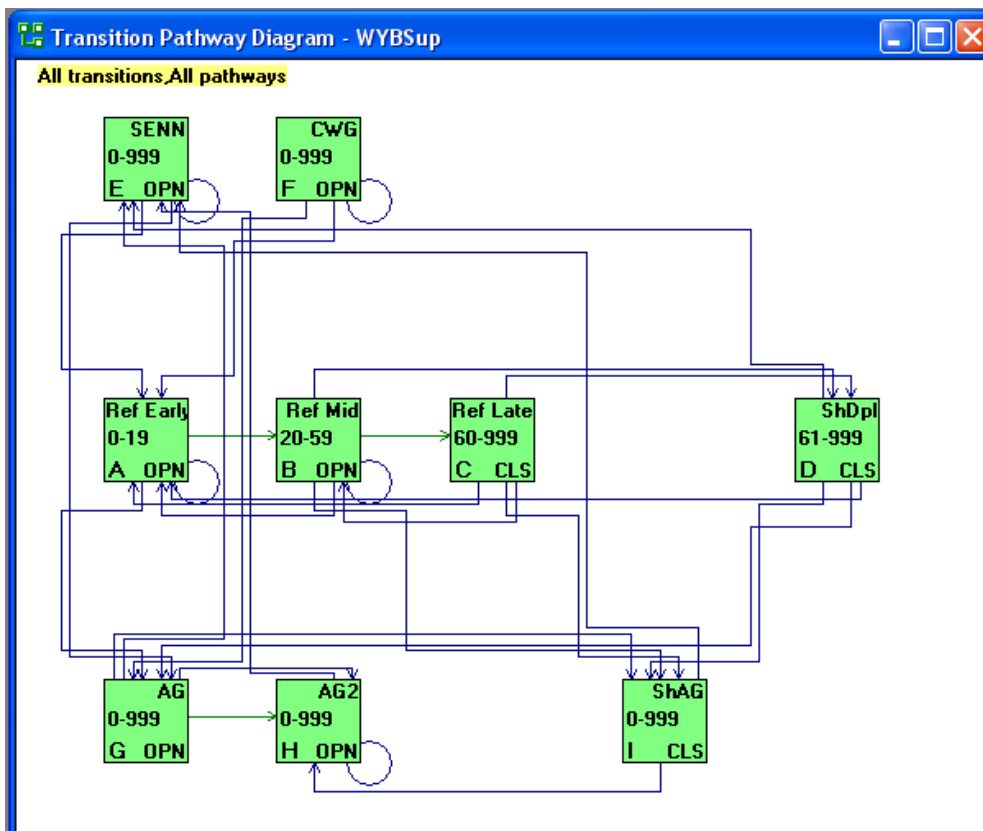
## Wyoming Big Sagebrush – *upland*

NRCS Management Landscape Resource Area – MLRA 25

Relevant NRCS Ecological Sites:

Loamy 11-13 ARTRW8/PSSP6, Loamy 12-16 ARTRW8/PSSP6, Loamy 8-12 ARTRW8/PSSP6,  
Shallow Loamy 8-12 ARTRW8/PSSP6

*VDDT Model – WYBSup*



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 19	20 - 40% native herbaceous cover, <10% shrub cover (rabbitbrush, WY big sage, BBS)
B Ref Mid-Open	20 -59	11 - 20% cover WY big sage, 10 - 40% native herbaceous cover
C Ref Late - Closed	60 - 999	21 – 40% cover WY big sage, <30% native herbaceous cover
D ShDpl	61 - 999	>30% cover WY big sage, <20% native herbaceous cover, 5 – 15% cover annual grass (cheatgrass)

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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E SENN - Open	0 - 999	10 – 40% cover seeded non-native or native/non-native mix
F CWG - open	0 - 999	>10% crested, <20% shrub cover
G AG - Open	0-999	5 – 15% cover annual grass (cheatgrass)
H AG2 - Open	0-999	<15% cover annual grass (cheatgrass)
I ShAG - Closed	25 - 999	20 – 40% cover WY big sage, 5 - 40% cover annual grass (cheatgrass)

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D, G, and I represent *transition* classes vulnerable to movement into *Alternative Stable States* (Classes E, F, and H).

Contributing BPS Models: ([Base: LANDFIRE BPS – 1080 for Mapzone 18](#), Modified: BPS 1080up – Raft River Grouse Creek Project in Utah)

## Development Classes

A – Reference Early

B – Reference Mid-Open

C – Reference Late – Closed

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See Landfire 1080 MZ18 Descriptions

D – ShDpl (Shrub Depleted) This transitional class describes sites that have lost a significant portion of native understory but retain resiliency to recover through time/rest or low cost restoration (DPL Restore Lo) or if annual grass cover is high, then AG Rehabilitate Lo.

E – SENN (Seeded Native, Non-Native, Mix) This class could be either transition or alternate state, depending on the type of seed mix used and treatment success.

F – CWG (Past Crested Wheatgrass seedings) This alternate state describes old crested seedings with little/no native grass/forb component. Given time and nearby seed source, native shrubs can re-establish. Replacement fire is infrequent (FRI yrs).

G – AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

H – AG2 (Annual Grass 2) This class describes sites that have crossed a threshold to an alternate state characterized by annual grass cover exceeding 15-20%

I – ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2). As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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## Identified Probabilistic Transitions<sup>1</sup>

### Natural Disturbance

- ✓ Replacement Fire
- ✓ Insect/Disease
- ✓ Wind/Weather/Stress

### Other Disturbance

- ✓ AG-Invasion
- ✓ Excessive-Herbivory
- ✓ CWG Seeding
- ✓ CWG Restoration

- ✓ AG Rehabilitation – Low
- ✓ AG Rehabilitation – Hi
- ✓ REF- Restoration – Low
- ✓ REF-Restoration – Hi
- ✓ DPL-Restoration – Low
- ✓ DPL-Restoration – Hi

## VDDT – Modeled Landscape Proportions

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	7%	4,112
B	REF	5%	2,937
C	REF	3%	1,762
D	TRS	2%	1,174
E	ALT	0%	0
F	ALT	0%	0
G	TRS	55%	32,310
H	ALT	17%	9,987
I	TRS	11%	6,462

## COMMENTS:

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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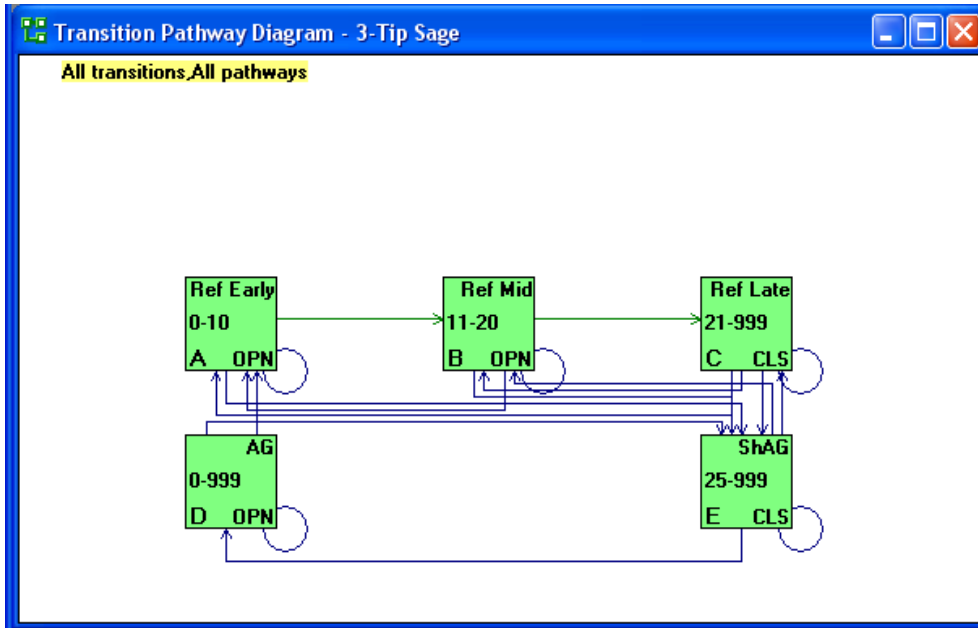
## 3-Tip Sagebrush (Ref BPS: New 3-tip\_sage)

NRCS Management Landscape Resource Area – MLRA 25

### Relevant NRCS Ecological Sites:

Loamy 12-16 ARTR4/FEID, Playa 8-12 ARTR4/PSSP6

### VDDT Model: 3-Tip Sage



Class/Stage	Age (yrs)	Vegetation cover description
A Ref Early	0 - 10	<10% 3-tip sagebrush, 20 – 40% native herbaceous cover
B Ref Mid-Open	10 -29	11 - 20% 3-tip sagebrush, 20 – 40% native herbaceous cover
C Ref Late - Open	21 - 999	21 - 35% 3-tip sagebrush, <30% native herbaceous cover
D AG - Open	0 - 999	<20% cover annual grass (cheatgrass)
E ShAG - Closed	25 - 999	20 – 35% cover WY big sage, 5 - 40% cover annual grass (cheatgrass)

**Model Description** – Classes A, B, and C represent *reference* condition in the NRCS state and transition framework. Classes D and E represent *transition* classes. No *Alternative Stable States* were described.

Contributing BPS Models: This is a new model. No similar Landfire BPS models exist yet.

# [State-and-Transition Model Descriptions Shoshone BLM - Wildhorse Case Study]

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## Development Classes

A – Reference Early

B – Reference Mid-Open

C – Reference Late – Open

|

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See Landfire 1080 MZ18 Descriptions

D –AG (Annual Grass) This transitional class describes sites with 5-15% annual grass cover. Replacement fire is frequent (FRI yrs) with high potential to move into alternate state (AG2)

H –ShAG (Shrub-Annual Grass) This transitional class describes sites with >5% annual grass and >20% native shrub cover. As native shrub component still remains, Restoration treatments (DPL Restore Hi, AG Rehabilitate Lo or Hi) could be used to re-establish native understory .

## ***Identified Probabilistic Transitions<sup>1</sup>***

### Natural Disturbance

- ✓Replacement Fire
- ✓Insect/Disease
- ✓Wind/Weather/Stress

### Other Disturbance

- ✓AG-Invasion
- ✓Excessive-Herbivory
- ✓CWG Seeding
- ✓CWG Restoration

- ✓AG Rehabilitation – Low
- ✓AG Rehabilitation – Hi
- ✓REF- Restoration – Low
- ✓REF-Restoration – Hi
- ✓DPL-Restoration – Low
- ✓DPL-Restoration – Hi

## **VDDT – Modeled Landscape Proportions**

Class	State/Trans Type	Landscape Proportion (%)	Acres
A	REF	2%	102
B	REF	1%	51
C	REF	1%	51
D	TRS	40%	2,038
E	ALT	56%	2,853

## **COMMENTS:**

## Descriptions of Probabilistic Transitions

The following probabilistic transitions were used in the Shoshone BLM – Wildhorse models:

### Natural Disturbance

- *Replacement Fire* – wildland fire that completely destroys the existing vegetation on a site and causes a transition from one state to another.
- *Insect/Disease* – infestation of a site by insects or disease that causes a transition from one state to another.
- *Wind/Weather/Stress* – impacts of environmental events that cause a site to transition to another state

### Other Disturbance

- *AG-Invasion* – invasion of a site by cheatgrass. Causes transition from original state to either the AG or AG2 state.
- *Excessive-Herbivory* – impacts of uncontrolled grazing that cause a transition to another state. The effects of excessive herbivory can be different depending on the starting state. For example, excessive herbivory in a late reference state can effect a transition to a shrub depleted state through loss of forbs and native grasses and increasing shrub density. In an AG site, excessive herbivory can cause a transition to AG2.
- *Alternate Succession* – an alternative succession pathway. Whereas a state may normally transition to one state, under alternate succession, it can transition to a different state without the presence of any other disturbance.
- *CWG Seeding* – seeding of AG or AG2 areas with crested wheatgrass (*Agropyron cristatum*). CWG seeding consisted of pre-treatment application of chemical herbicide followed by seeding of crested wheatgrass.
- *CWG Restoration* – transition of SENN (seeded non-native) states to an early reference (RefEarly) state by restoration management to replace crested wheatgrass (*Agropyron cristatum*) with a native species. CWG restoration consisted of burning or plowing followed by drill seeding of native or non-native plants.
- *AG Rehabilitation Low* – Low-cost restoration of cheatgrass-dominated sites (AG or AG2) to a seeded-non-native (SENN) state. Low-cost restoration involved chemical pre-treatment and drill seeding of non-native or native plants. Low-cost restoration carried a lower probability of success than high-cost restoration.
- *AG Rehabilitation High* – High-cost restoration of cheatgrass-dominated sites (AG or AG2) to a seeded-non-native (SENN) state. High-cost restoration involved chemical pre-treatment, drill seeding, and aerial seeding of native and non-native plants. High-cost restoration carried a higher probability of success than low-cost restoration.

- *REF Restoration Low* – Low-cost restoration of sites back to a reference state. Low-cost reference restoration consisted of mowing. Not implemented in the Wildhorse case study.
- *Ref Restoration High* – High-cost restoration of sites back to a reference state. High-cost reference restoration consisted of mowing plus drill seeding of native or non-native plants. Not implemented in the Wildhorse case study.
- *DPL Restoration Low* – Low-cost restoration of depleted shrub states back to reference states. Low-cost restoration constituted either mowing/mastication or chemical treatment of sagebrush in depleted shrub sites. Not implemented in the Wildhorse case study.
- *DPL Restoration High* – High-cost restoration of depleted shrub states back to reference states. High-cost restoration consisted of mowing/mastication or chemical treatment of sagebrush plus drill seeding of native and non-native plants. Not implemented in the Wildhorse case study.