

Management of CRP in the Southern Great Plains for the Lesser Prairie Chicken

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2009

Funding provided by Environmental Defense

INTRODUCTION:

The potential importance of the Conservation Reserve Program (CRP) in the recovery of the Lesser Prairie-chicken (LPC) is related to type of plantings, management applied, and proximity to core LPC populations. Unfortunately, throughout the range of the LPC there is not a consistent pattern. In OK and TX, for instance, the primary plantings for CRP were non-native grasses (e.g. Old World bluestems and weeping lovegrass), which are considered inappropriate for LPC habitat requirements. In addition, many of the CRP fields in the LPC range were planted to perennial vegetation and then allowed to develop without a management plan which incorporated disturbance. Therefore, many of these CRP fields are considered unsuitable LPC habitat.

The goal of this project was to evaluate, recommend, and estimate cost (Appendix 2) of implementing appropriate management practices for CRP fields and then to assess the current status of CRP fields in OK, TX, NM, CO, and KS (Appendix 3). Specifically, we used the Rocky Mountain Bird Observatory's report "Assessment of CRP Fields within Current Lesser Prairie Chicken Range" as a starting point for determining the field categories within the 5 state region. Following this assessment, we developed management recommendations for CRP fields with varying vegetation cover type within LPC range. Cost estimates were calculated for each of these categories of management (e.g. conversion of weeping lovegrass to native), and likelihood of success was proposed.

The final product is a flow chart (Appendix 4) which is to be used to easily determine the appropriate conversion process of the CRP field (if necessary), appropriate management following conversion to more suitable LPC habitat. This can be used by conservation planners as a decision guide for field types throughout the range of the LPC.

State: New Mexico

Dominant Vegetation: Native

Primary grasses include silver bluestem, sand dropseed, prairie three-awn, and side-oats grama.

Field Types: CP2, CP10

Management:

Woody Cover

1) Does field have woody tree cover? Note: This does not include native shrubs which may include shinnery oak, sand sagebrush, plum species, and sumac species.

If No, go to 7

If Yes, go to 2

2) Is woody cover predominantly juniper?

If No, go to 6

If Yes, go to 3

3) Are the majority of juniper < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 4

If Yes, go to 5

4) ACTION – Utilize mechanical removal of all juniper from site. Cut juniper should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 7

5) ACTION – Utilize prescribed fire to remove all juniper from site. For sites with few juniper of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density juniper, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of juniper. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of juniper.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 7

6) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as cottonwood, Russian olive, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method.

Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 7

Grass Cover

7) Is the average grass height < 12”?

If No, go to 8

If Yes, go to 9

8) Is the average grass height > 30”?

If No, go to 11

If Yes, go to 10

9) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30”. If not, then no actions needed. Many sites in New Mexico may not be capable of producing this grass height. If the site is capable, then other grass species may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 11

10) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive juniper, and the stimulation of forbs. Disking will also increase forb production and provide some control of juniper but is more costly. Grazing will not control juniper and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control juniper of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 11

11) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 12

If Yes, go to 13

12) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Haying should be the last resort as it will contribute little to patchiness. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 13

Forb Cover

13) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 15

14) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the least expensive and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legume interseeding may be needed. The least expensive of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken. COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 15

15) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 16

Fence Fragmentation

16) Does the field contain permanent fences?

If No, no action required

If Yes, go to 17

17) Does the field contain fences that are no longer used?

If No, go to 19

If Yes, go to 18

18) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 19

19) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: New Mexico

Dominant Vegetation: Exotic

Fields dominated by >30% Weeping Lovegrass.

Field Types: CP10

Species Description: See Appendix 1

Management:

Grass Cover

1) Is the grass cover > 30% weeping lovegrass?

If No, refer to New Mexico Native Grass Guidelines

If Yes, go to 2

2) Is tillage possible (or desirable)?

If No, go to 4

If Yes, go to 3

3) **ACTION** – Field contains Weeping lovegrass that does not provide suitable native vegetation. Combining mechanical and chemical treatments is necessary to eradicate Weeping lovegrass. If a combination of herbicide and tillage can be implemented, burn Weeping lovegrass in March and apply glyphosate in May to actively growing Weeping lovegrass followed by tillage in June and again in August. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare plant species. Re-seed the following spring with native species based on ecological site guidelines.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS: Moderate to High if Weeping lovegrass is successfully killed.

Go to 5

4)ACTION – Field lacks suitable native vegetation. Weeping lovegrass should be eradicated through mechanical and chemical means, field should then be reseeded to native grass and forb species. To eradicate weeping lovegrass conduct a dormant season burn, allow regrowth to ~6 inches in height, apply glyphosate (high label rate) (around late May), again allow regrowth to reach ~6 inches in height and follow with another application of glyphosate (application date depends on precipitation). Reseeding of native grass and forb species should be conducted after weeping lovegrass has been eradicated. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm. Many sites in New Mexico will not support grass cover > 30 cm.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or yucca may be a surrogate.

Woody Cover

5) Does field have woody cover other than low growing native shrubs (may include shinners oak and sand sagebrush)?

If No, go to 11

If Yes, go to 6

6) Is woody cover predominantly juniper?

If No, go to 10

If Yes, go to 7

7) Are the majority of juniper < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 8

If Yes, go to 9

8) ACTION – Utilize mechanical removal of all junipers from site. Cut juniper should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 11

9) ACTION – Utilize prescribed fire to remove all juniper from site.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 11

10) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as cottonwood, Russian olive, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method.

Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 11

Forb Cover

11) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 13

12) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the cheapest and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legumes

interseeding may be needed. The cheapest of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

13) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 14

Fence Fragmentation

14) Does the field contain permanent fences?

If No, no further modification is required.

If Yes, go to 15

15) Does the field contain unnecessary fences?

If No, go to 17

If Yes, go to 16

16) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

17) ACTION – Mark all fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Colorado

Dominant Vegetation: Native

Primary grasses include western wheatgrass, blue grama, squirreltail, and side-oats grama.

Field Types: CP2, CP4, CP4D, CP10

Management:

Woody Cover

1) Does field have woody tree cover? Note: This does not include native shrubs which may include sand sagebrush, plum species, and sumac species.

If No, go to 7

If Yes, go to 2

2) Is woody cover predominantly juniper?

If No, go to 6

If Yes, go to 3

3) Are the majority of juniper < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 4

If Yes, go to 5

4) ACTION – Utilize mechanical removal of all juniper from site. Cut juniper should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 7

5) ACTION – Utilize prescribed fire to remove all juniper from site. For sites with few juniper of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density juniper, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of juniper. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of juniper.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 7

6) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as cottonwood, Russian olive, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method.

Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 7

Grass Cover

7) Is the average grass height < 12”?

If No, go to 8

If Yes, go to 9

8) Is the average grass height > 30”?

If No, go to 11

If Yes, go to 10

9) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30”. If not, then no actions needed. Many sites in Colorado may not be capable of producing this grass height. If the site is capable, then other grass species may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 11

10) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive juniper, and the stimulation of forbs. Disking will also increase forb production and provide some control of juniper but is more costly. Grazing will not control juniper and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control juniper of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 11

11) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 12

If Yes, go to 13

12) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Haying should be the last resort as it will contribute little to patchiness. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 13

Forb Cover

13) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 15

14) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the least expensive and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legume interseeding may be needed. The least expensive of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken. COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 15

15) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 16

Fence Fragmentation

16) Does the field contain permanent fences?

If No, no action required

If Yes, go to 17

17) Does the field contain fences that are no longer used?

If No, go to 19

If Yes, go to 18

18) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 19

19) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Kansas

Dominant Vegetation: Native

Primary grasses include little bluestem, silver bluestem, switchgrass, western wheatgrass, sand dropseed, and side-oats grama.

Field Types: CP2, CP4, CP4D, CP10, CP25

Management:

Woody Cover

1) Does field have woody tree cover? Note: This does not include native shrubs which may include sand sagebrush, plum species, and sumac species.

If No, go to 7

If Yes, go to 2

2) Is woody cover predominantly eastern redcedar?

If No, go to 6

If Yes, go to 3

3) Are the majority of eastern redcedar < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 4

If Yes, go to 5

4) ACTION – Utilize mechanical removal of all eastern redcedar from site. Cut redcedar should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 7

5) ACTION – Utilize prescribed fire to remove all eastern redcedar from site. For sites with few redcedar of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density eastern redcedar, a growing season fire would be more appropriate. This is

due to the slower rate of spread and thus longer heating time of cambium of redcedar. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of redcedar.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 7

6) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as osage-orange, cottonwood, Russian olive, hackberry, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method. Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 7

Grass Cover

7) Is the average grass height < 12”?

If No, go to 8

If Yes, go to 9

8) Is the average grass height > 30”?

If No, go to 11

If Yes, go to 10

9) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30”. If not, then no actions needed. If the site is capable, then grasses such as little bluestem may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama. In this case interseeding other native grass species may be warranted.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 11

10) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive redcedar, and the stimulation of forbs. Disking will also increase forb production and provide some control of redcedar but is more costly. Grazing will not control redcedar and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control redcedar of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

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temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 13

Forb Cover

13) Does the field contain a diversity of native forb species including both annuals and perennials?

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14) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the least expensive and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legume interseeding may be needed. The least expensive of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken. COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 15

15) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 16

Fence Fragmentation

16) Does the field contain permanent fences?

If No, no action required

If Yes, go to 17

17) Does the field contain fences that are no longer used?

If No, go to 19

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18) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 19

19) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Texas

Dominant Vegetation: Native

Primary grasses include silver bluestem and western wheatgrass.

Field Types: CP2

Management:

Woody Cover

1) Does field have woody tree cover? Note: This does not include native shrubs which may include sand sagebrush, plum species, and sumac species.

If No, go to 7

If Yes, go to 2

2) Is woody cover predominantly eastern redcedar?

If No, go to 6

If Yes, go to 3

3) Are the majority of eastern redcedar < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 4

If Yes, go to 5

4) ACTION – Utilize mechanical removal of all eastern redcedar from site. Cut redcedar should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 7

5) ACTION – Utilize prescribed fire to remove all eastern redcedar from site. For sites with few redcedar of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density eastern redcedar, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of redcedar. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of redcedar.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 7

6) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as osage-orange, cottonwood, Russian olive, hackberry, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method.

Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 7

Grass Cover

7) Is the average grass height < 12”?

If No, go to 8

If Yes, go to 9

8) Is the average grass height > 30”?

If No, go to 11

If Yes, go to 10

9) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30”. If not, then no actions needed. If the site is capable, then grasses such as little bluestem may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama. In this case interseeding other native grass species may be warranted.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 11

10) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive redcedar, and the stimulation of forbs. Disking will also increase forb production and provide some control of redcedar but is more costly. Grazing will not control redcedar and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control redcedar of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 11

11) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 12

If Yes, go to 13

12) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Haying should be the last resort as it will contribute little to patchiness. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 13

Forb Cover

13) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 15

14) **ACTION** – Field lacks sufficient forb species or cover. Disturbance will be the least expensive and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legume interseeding may be needed. The least expensive of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken. **COST** – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 15

15) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 16

Fence Fragmentation

16) Does the field contain permanent fences?

If No, no action required

If Yes, go to 17

17) Does the field contain fences that are no longer used?

If No, go to 19

If Yes, go to 18

18) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 19

19) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Texas

Dominant Vegetation: Exotic

Fields dominated by Old World Bluestem.

Field Types: CP1, CP2, CP10

Species Description: See Appendix 1

Management:

Grass Cover

1) Is the grass cover > 30% Old World Bluestem?

If No, go to 2

If Yes, go to 3

2) Is the Old World Bluestem cover patchy throughout the field or concentrated in one area?

If patchy, go to 3.

If concentrated, go to 4

3) Is tillage possible?

If No, go to 4

If Yes, go to 5

4) ACTION – Field contains Old World Bluestem that could spread further throughout the field. Combining fire and chemical treatments is necessary to eradicate OWB. Adequate control requires spot treatment using two herbicide applications per year in combination with burning before and after first herbicide application. In early spring conduct prescribed fire to remove residue of last year's growth. Apply glyphosate in May to actively growing OWB (~6" tall), follow this with another burn in June/July, allow regrowth of OWB, again to ~6" and follow with a second glyphosate application. Re-seed the following spring with native species based on ecological site guidelines.

LIKELIHOOD OF SUCCESS: Moderate depending on control of OWB with glyphosate.

COST: \$56.00/acre for OWB eradication; re-seeding costs depend on seed mixture used (Appendix 2)

Go to 6

5) ACTION – Field contains Old World Bluestem that could spread further throughout the field. Combining mechanical and chemical treatments is necessary to eradicate OWB. If a combination of herbicide and tillage can be implemented, burn OWB in March and apply glyphosate in May to actively growing OWB followed by tillage in June and again in August. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare species. Re-seed the following spring with native species based on ecological site guidelines.

LIKELIHOOD OF SUCCESS: Moderate to High if OWB is successfully killed.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

Go to 6

6) Is the average grass height <12”?

If No, go to 7

If Yes, go to 8

7) Is the average grass height >30”?

If No, go to 10

If Yes, go to 9

8) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm. If not, then no actions needed. If the site is capable, then grasses such as little bluestem and big bluestem may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama. In this case interseeding other native grass species may be warranted.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 10

9) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive redcedar, and the stimulation of forbs. Disking will also increase forb production and provide some control of redcedar but is more costly. Grazing will not control redcedar and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control redcedar of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 10

10) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 11

If Yes, go to 12

11) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for

temporary fence, water is cost prohibitive if it does not exist on site, grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 12

Woody Cover

12) Does field have woody tree cover? Note: This does not include native shrubs which may include shinnery oak, sand sagebrush, plum species, and sumac species.

If No, go to 18

If Yes, go to 13

13) Is woody cover predominantly eastern redcedar?

If No, go to 17

If Yes, go to 14

14) Are the majority of eastern redcedar < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 15

If Yes, go to 16

15) ACTION – Utilize mechanical removal of all eastern redcedar from site. Cut redcedar should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 18

16) ACTION – Utilize prescribed fire to remove all eastern redcedar from site. For sites with few redcedar of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density eastern redcedar, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of redcedar. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of redcedar.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 18

17) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as osage-orange, cottonwood, Russian olive, hackberry, and locust. As these plants

resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20/acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method. Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 18

Forb Cover

18) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 19

If Yes, go to 20

19) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the cheapest and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legumes interseeding may be needed. The cheapest of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 20

20) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 19

If Yes, go to 21

Fence Fragmentation

21) Does the field contain permanent fences?

If No, no action required

If Yes, go to 22

22) Does the field contain fences that are no longer used?

If No, go to 24

If Yes, go to 23

23) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 24

24) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Texas

Dominant Vegetation: Exotic

Fields dominated by >30% Weeping Lovegrass.

Field Types: CP1, CP2, CP10

Species Description: See Appendix 1

Management:

Grass Cover

1) Is the grass cover > 30% weeping lovegrass?

If No, refer to Texas Native Grass Guidelines

If Yes, go to 2

2) Is tillage possible (or desirable)?

If No, go to 4

If Yes, go to 3

3) **ACTION** – Field contains Weeping lovegrass that does not provide suitable native vegetation. Combining mechanical and chemical treatments is necessary to eradicate Weeping lovegrass. If a combination of herbicide and tillage can be implemented, burn Weeping lovegrass in March and apply glyphosate in May to actively growing Weeping lovegrass followed by tillage in June and again in August. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare plant species. Re-seed the following spring with native species based on ecological site guidelines.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS: Moderate to High if Weeping lovegrass is successfully killed.

Go to 5

4)ACTION – Field lacks suitable native vegetation. Weeping lovegrass should be eradicated through mechanical and chemical means, field should then be reseeded to native grass and forb species. To eradicate weeping lovegrass conduct a dormant season burn, allow regrowth to ~6 inches in height, apply glyphosate (high label rate) (around late May), again allow regrowth to reach ~6 inches in height and follow with another application of glyphosate (application date depends on precipitation). Reseeding of native grass and forb species should be conducted after weeping lovegrass has been eradicated. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or yucca may be a surrogate.

Woody Cover

5) Does field have woody cover other than low growing native shrubs (may include shinnery oak and sand sagebrush)?

If No, go to 11

If Yes, go to 6

6) Is woody cover predominantly juniper?

If No, go to 10

If Yes, go to 7

7) Are the majority of juniper < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 8

If Yes, go to 9

8) ACTION – Utilize mechanical removal of all junipers from site. Cut juniper should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 11

9) ACTION – Utilize prescribed fire to remove all juniper from site.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 11

10) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as cottonwood, Russian olive, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method. Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 11

Forb Cover

11) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 13

12) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the cheapest and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legumes interseeding may be needed. The cheapest of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

13) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 14

Fence Fragmentation

14) Does the field contain permanent fences?

If No, no further modification is required.

If Yes, go to 15

15) Does the field contain unnecessary fences?

If No, go to 17

If Yes, go to 16

16) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

17) ACTION – Mark all fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Oklahoma

Dominant Vegetation: Native

Primary grasses include little bluestem, big bluestem, switchgrass, and side-oats grama.

Field Types: CP1, CP2, CP10, CP25

Management:

Woody Cover

1) Does field have woody tree cover? Note: This does not include native shrubs which may include shinnery oak, sand sagebrush, plum species, and sumac species.

If No, goto 7

If Yes, goto 2

2) Is woody cover predominantly eastern redcedar?

If No, goto 6

If Yes, go to 3

3) Are the majority of eastern redcedar < 6' and is there adequate fine fuels (grass) for fire?

If No, goto 4

If Yes, goto 5

4) ACTION – Utilize mechanical removal of all eastern redcedar from site. Cut redcedar should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 7

5) ACTION – Utilize prescribed fire to remove all eastern redcedar from site. For sites with few redcedar of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density eastern redcedar, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of redcedar. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of redcedar.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 7

6) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as osage-orange, cottonwood, Russian olive, hackberry, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazapyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method.

Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 7

Grass Cover

7) Is the average grass height < 12”?

If No, go to 8

If Yes, go to 9

8) Is the average grass height > 30”?

If No, go to 11

If Yes, go to 10

9) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm. If not, then no actions needed. If the site is capable, then grasses such as little bluestem and big bluestem may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama. In this case interseeding other native grass species may be warranted.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 11

10) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive redcedar, and the stimulation of forbs. Disking will also increase forb production and provide some control of redcedar but is more costly. Grazing will not control redcedar and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control redcedar of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 11

11) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 12

If Yes, go to 13

12) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Haying should be the last resort as it will contribute little to patchiness. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 13

Forb Cover

13) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 15

14) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the least expensive and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legume interseeding may be needed. The least expensive of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken. COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 15

15) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 14

If Yes, go to 16

Fence Fragmentation

16) Does the field contain permanent fences?

If No, no action required

If Yes, go to 17

17) Does the field contain fences that are no longer used?

If No, go to 19

If Yes, go to 18

18) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 19

19) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Oklahoma

Dominant Vegetation: Exotic

Fields dominated by Old World Bluestem.

Field Types: CP1, CP2, CP10, CP 25

Species Description: See Appendix 1

Management:

Grass Cover

1) Is the grass cover > 30% Old World Bluestem?

If No, go to 2

If Yes, go to 3

2) Is the Old World Bluestem cover patchy throughout the field or concentrated in one area?

If patchy, go to 3.

If concentrated, go to 4

3) Is tillage possible?

If No, go to 4

If Yes, go to 5

4) ACTION – Field contains Old World Bluestem that could spread further throughout the field. Combining fire and chemical treatments is necessary to eradicate OWB. Adequate control requires spot treatment using two herbicide applications per year in combination with burning before and after first herbicide application. In early spring conduct prescribed fire to remove residue of last year's growth. Apply glyphosate in May to actively growing OWB (~6" tall), follow this with another burn in June/July, allow regrowth of OWB, again to ~6" and follow with a second glyphosate application. Re-seed the following spring with native species based on ecological site guidelines.

LIKELIHOOD OF SUCCESS: Moderate depending on control of OWB with glyphosate.

COST: \$56.00/acre for OWB eradication; re-seeding costs depend on seed mixture used (Appendix 2)

Go to 6

5) ACTION – Field contains Old World Bluestem that could spread further throughout the field. Combining mechanical and chemical treatments is necessary to eradicate OWB. If a combination of herbicide and tillage can be implemented, burn OWB in March and apply glyphosate in May to actively growing OWB followed by tillage in June and again in August. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare species. Re-seed the following spring with native species based on ecological site guidelines.

LIKELIHOOD OF SUCCESS: Moderate to High if OWB is successfully killed.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

Go to 6

6) Is the average grass height < 12”?

If No, go to 7

If Yes, go to 8

7) Is the average grass height > 30”?

If No, go to 10

If Yes, go to 9

8) ACTION – Field lacks sufficient grass cover. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm. If not, then no actions needed. If the site is capable, then grasses such as little bluestem and big bluestem may be established into existing field to create sufficient grass cover. An example of this would be if the field is predominantly composed of side-oats grama. In this case interseeding other native grass species may be warranted.

COST – \$50/acre

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or soapweed yucca may be a surrogate.

Go to 10

9) ACTION – Grass cover is too tall. Apply disturbance to remove grass cover. This could be in the form of disking, prescribed fire, haying, or grazing. Prescribed fire should be the primary method due to low cost, control of invasive redcedar, and the stimulation of forbs. Disking will also increase forb production and provide some control of redcedar but is more costly. Grazing will not control redcedar and does not increase forb production as well as other disturbances. If grazing is utilized, only use temporary electric fence to reduce fence collision risk unless there is existing fence on field. Haying does little to stimulate forbs, but will control redcedar of small size.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover; disking: \$7-\$13/acre; haying: none; grazing: \$500-\$750/mile for temporary fence, water is cost prohibitive if it does not exist on site (Appendix 2), grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 10

10) Does the field contain a diversity of native grass structure? In other words, is the grass made up of bunch grasses with bare ground and interspaces present with varying height?

If No, go to 11

If Yes, go to 12

11) ACTION – Field is too uniform. This can result from a monoculture of few grass species or from lack of disturbance. In the case of low grass diversity, interseeding native grass species not present on site may be beneficial (consult ecological site description for species adapted).

Otherwise, utilize a disturbance to create a patchy structure. This could be accomplished with prescribed fire, strip disking (up to ½ of field), haying (up to ½ of field), or grazing. For grazing, low stocking rates may result in no benefit while high rates will result in lack of cover.

Moderate stocking rate should result in grazing patches. Note: Uniformity is NOT the goal.

COST - Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated; haying: net benefit; grazing: \$500-\$750/mile for

temporary fence, water is cost prohibitive if it does not exist on site, grazing lease should yield \$5-\$30/acre depending on quality.

LIKELIHOOD OF SUCCESS – High

Go to 12

Woody Cover

12) Does field have woody tree cover? Note: This does not include native shrubs which may include shinnery oak, sand sagebrush, plum species, and sumac species.

If No, go to 18

If Yes, go to 13

13) Is woody cover predominantly eastern redcedar?

If No, go to 17

If Yes, go to 14

14) Are the majority of eastern redcedar < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 15

If Yes, go to 16

15) ACTION – Utilize mechanical removal of all eastern redcedar from site. Cut redcedar should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 18

16) ACTION – Utilize prescribed fire to remove all eastern redcedar from site. For sites with few redcedar of short height (< 3'), dormant season fires should be adequate. For sites with taller and/or high density eastern redcedar, a growing season fire would be more appropriate. This is due to the slower rate of spread and thus longer heating time of cambium of redcedar. Note: Fire return intervals of 7-10 years will usually be required to maintain grasslands free of redcedar.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, and tree cover.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 18

17) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as osage-orange, cottonwood, Russian olive, hackberry, and locust. As these plants

resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20/acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method. Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 18

Forb Cover

18) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 19

If Yes, go to 20

19) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the cheapest and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legumes interseeding may be needed. The cheapest of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

Go to 20

20) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 19

If Yes, go to 21

Fence Fragmentation

21) Does the field contain permanent fences?

If No, no action required

If Yes, go to 22

22) Does the field contain fences that are no longer used?

If No, go to 24

If Yes, go to 23

23) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

Go to 24

24) ACTION – Mark all remaining fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Oklahoma

Dominant Vegetation: Exotic

Fields dominated by >30% Weeping Lovegrass.

Field Types: None reported

Species Description: See Appendix 1.

Management:

Grass Cover

1) Is the grass cover > 30% weeping lovegrass?

If No, refer to Oklahoma Native Grass Guidelines

If Yes, go to 2

2) Is tillage possible (or desirable)?

If No, go to 4

If Yes, go to 3

3) **ACTION** – Field contains Weeping lovegrass that does not provide suitable native vegetation. Combining mechanical and chemical treatments is necessary to eradicate Weeping lovegrass. If a combination of herbicide and tillage can be implemented, burn Weeping lovegrass in March and apply glyphosate in May to actively growing Weeping lovegrass followed by tillage in June and again in August. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare plant species. Re-seed the following spring with native species based on ecological site guidelines.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS: Moderate to High if Weeping lovegrass is successfully killed.

Go to 5

4)ACTION – Field lacks suitable native vegetation. Weeping lovegrass should be eradicated through mechanical and chemical means, field should then be reseeded to native grass and forb species. To eradicate weeping lovegrass conduct a dormant season burn, allow regrowth to ~6 inches in height, apply glyphosate (high label rate) (around late May), again allow regrowth to reach ~6 inches in height and follow with another application of glyphosate (application date depends on precipitation). Reseeding of native grass and forb species should be conducted after weeping lovegrass has been eradicated. Ecological site description should be considered to determine if site can support plant community capable of reaching 30 cm.

COST: \$35.00/acre; re-seeding costs depend on seed mixture used (Appendix 2)

LIKELIHOOD OF SUCCESS – Moderate if ecological site will allow for other grass species of sufficient height to persist. For very shallow soil sites, nest cover is unlikely to exist in the form of grass cover. Shrub cover such as sand sagebrush or yucca may be a surrogate.

Woody Cover

5) Does field have woody cover other than low growing native shrubs (may include shinnery oak and sand sagebrush)?

If No, go to 11

If Yes, go to 6

6) Is woody cover predominantly juniper?

If No, go to 10

If Yes, go to 7

7) Are the majority of juniper < 6' and is there adequate fine fuels (grass) for fire?

If No, go to 8

If Yes, go to 9

8) ACTION – Utilize mechanical removal of all junipers from site. Cut juniper should be left in place and not piled. Once sufficient fine fuel accumulates, use prescribed fire to remove woody debris.

COST - \$25-\$130/acre depending on density of trees.

LIKELIHOOD OF SUCCESS - High

Go to 11

9) ACTION – Utilize prescribed fire to remove all juniper from site.

COST - \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc.

LIKELIHOOD OF SUCCESS – High if proper fire prescription is used.

Go to 11

10) ACTION – The following management prescriptions are for the removal of sprouting woody plants such as cottonwood, Russian olive, and locust. As these plants resprout (with varying vigor) following fire or mechanical thinning, herbicide application is most appropriate. Foliar applications of glyphosate, imazipyr, triclopyr, picloram, and 2-4 D can be used. However, the most effective (but costlier) treatment for persistent resprouters is cutting and applying a herbicide such as triclopyr to stump.

COST – \$8-20 acre (foliar) depending on herbicide type; \$35-\$150/acre (cut and spray) depending on herbicide type and density of trees

LIKELIHOOD OF SUCCESS – Moderate to high depending on species and application method. Some woody species (e.g. Russian olive) may require multiple herbicide applications.

Go to 11

Forb Cover

11) Does the field contain a diversity of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 13

12) ACTION – Field lacks sufficient forb species or cover. Disturbance will be the cheapest and quickest management action to remedy. If disturbance obligate plant species (including annuals) are absent, disturbance may be all that is required and should be applied first. However, if adequate forb response does not establish following disturbance, perennial forb and legumes interseeding may be needed. The cheapest of these is alfalfa. This noninvasive exotic plant is easy to establish, persists, and is highly preferred by the lesser prairie-chicken.

COST – Prescribed fire: \$5-25/acre depending on terrain, size of burn, type of fireguards, tree cover, etc; disking: \$7-\$13/acre treated. Interseeding alfalfa: \$20-\$30/acre; interseeding native forb mix: \$100/acre.

LIKELIHOOD OF SUCCESS – Moderate to high for disturbance and interseeding alfalfa, moderate for interseeding native forb mix.

13) Does the field contain an adequate composition (10-30% cover depending on ecological site) of native forb species including both annuals and perennials?

If No, go to 12

If Yes, go to 14

Fence Fragmentation

14) Does the field contain permanent fences?

If No, no further modification is required.

If Yes, go to 15

15) Does the field contain unnecessary fences?

If No, go to 17

If Yes, go to 16

16) ACTION – Remove any unnecessary fences within the field as these cause high mortality to lesser prairie-chickens.

COST – \$1,500-\$3,000/mile

LIKELIHOOD OF SUCCESS - High

17) ACTION – Mark all fences using vinyl fence markers as designed by Sutton Avian Research Center. Between fence posts use 3 markers (evenly spaced) on top wire and 2 markers (evenly spaced) on either 2nd wire (4 strand fence) or 3rd wire (5 strand fence).

COST – \$300/mile

LIKELIHOOD OF SUCCESS - High

State: Oklahoma, Texas, New Mexico, Colorado

Dominant Vegetation: Crop

Field Types: New Signup

Management: To convert current cropland to a diverse, native plant community, plant field to an acceptable cover crop: sorghum, milo, or alfalfa. Seed native seed mix (Appendix 2) sometime in February through middle of April. Management post-seeding will require mowing 3 -4 months after seeding to remove competitive weedy species. Mowing may also be required in March/April of second year.

ACTION –COST: \$145.00/acre (Appendix 2)

LIKELIHOOD OF SUCCESS: High

Species Descriptions for Exotic Vegetation Types

Weeping lovegrass

Weeping lovegrass (*Eragrostis curvula*) is a perennial, warm season bunchgrass 2 – 6 feet in height, commonly planted along roadside rights-of-way in sites with sandy soil, and as an ornamental grass in landscaping applications. Typically, weeping lovegrass is used in more southern reaches of the U.S. This grass was brought into the US from South Africa and Tanzania in the 1920's by the USDA primarily for use in erosion control and forage production, however it's bunchgrass and fountain-like growthform made it desirable as an ornamental. In OK, NM, and TX weeping lovegrass was allowed in CRP contracts, thus it was planted to a large number of CRP fields. Weeping lovegrass has easily spread from roadside and CRP plantings via seed dispersal and once established has the ability to outcompete native plant species. Weeping lovegrass lacks the ability to provide any wildlife benefit especially for nesting or food resources.

Although Weeping lovegrass is considered an exotic threat to native rangelands, little research has been conducted to determine the best practices for controlling or eradicating it.

Old World Bluestem

Old World bluestems [Caucasian bluestem (*Bothriochloa bladhii*) and Yellow Bluestem (*B. ischaemum*)] are warm-season, perennial, caespitose grasses native to southern Asia and Australia. Several studies have been conducted at the USDA Southern Plains Experimental Research Station in Woodward, OK to determine Old World bluestem (OWB) potential as a livestock forage. Subsequently, over the past 30 years, this non-native grass has been used increasingly in revegetation projects, road rights-of-way plantings, hayfield plantings, and was the primary grass used in CRP seed mixtures in Oklahoma and NW Texas. Commonly used cultivars include WW-Spar, WW-Ironmaster, Plains bluestem, B. Dahl, and King Ranch bluestem. These grasses have the ability to reproduce via the large quantities of viable seeds they produce. Caucasian bluestem has been known to reproduce vegetatively by producing short

rhizomes. Yellow bluestem primarily reproduces vegetatively through rhizomes, however, if managed for hay production or heavy grazing they can produce stolons.

These invasive grasses are typically managed as monocultures and because of their popularity and widespread use, not only in CRP seed mixes but also in voluntary plantings by land managers (i.e. without government involvement or subsidy), the exact amount of land area planted to OWBs in Oklahoma, Kansas and Texas is not known. One estimate suggests that from 1986 – 1996 over 2.5 million acres were planted to OWB in Texas and Oklahoma, the majority of which was planted in the Lesser Prairie Chicken region, and was the primary non-native grass used in CRP (CP1 and CP2) seed mixes. Concerns about the usefulness of OWBs for wildlife have arisen within the past decade. OWB monocultures do not provide suitable habitat for most native wildlife species. Old World bluestem has been shown to reduce the diversity and abundance of native grassland birds, grassland arthropods, small mammals, and swift foxes (*Vulpes velox*). Also, OWB is capable of reducing native plant diversity following invasion on native rangeland.

Conversion of Old World Bluestem fields has shown to be difficult. OWB control methods have been evaluated in studies in TX, OK and KS and have had variable degrees of success. Results from these studies indicate that adequate control of OWB requires more than one herbicide application per year or a combination of herbicide and tillage. Tillage, however, is not always an appropriate control method, especially for prairie remnants or areas that have rocky ground and have high erosion potential, or contain rare plant species. The broad spectrum herbicide, Glyphosate, has been found to be the most effective herbicide for controlling OWB. If glyphosate is applied twice during a single growing season OWB can be controlled by 90% at the end of the first year. Burning and glyphosate applied independently can reduce OWB cover, but neither reduces cover by more than 50%, a level of control necessary for successful restoration following eradication of OWB. Preliminary work indicates burning in combination with two glyphosate applications has greater success in eradicating OWB than other treatments. In addition, OWB is thought to alter soil microbes and potentially inhibits establishment of native plant species, thus further research is needed to determine success of restoring diverse native plant community.

Lease grazing: (Varies widely depending on lease agreement)

Native pasture: \$5.00 - \$30.00/acre/year

Introduced grass pasture: \$12.00 - \$45.00/acre/year

BRUSH and WOODY PLANT CONTROL

Mechanical Control of Eastern Redcedar or other invasive or encroaching woody brush (not recommended for native shrub/tree species)

Clearing: \$25.00 - \$66.00/hour

Dozing (D6 or smaller): \$50.00 - \$110.00/hour

Dozing (D7 or larger): \$65.00 - \$125.00/hour

NRCS Cost share program:

>30% cover: \$128.00/acre (65% cost share so cost for landowner = \$83.20/acre)

<30% cover: \$73.50/acre (65% cost share cost for landowner - \$47.75)

Herbicide treatments:

Russian olive:

Resprouts so fire, grazing, or cutting alone is not effective.

Foliar application of herbicide

Glyphosate \$12.00 - \$18.00/acre (varies with fuel cost)

Imazipyr (arsenal) \$25.00/acre

Triclopyr (Remedy) \$18.00/acre

Picloram \$20.00

2-4 D \$8.00

Combination of cutting and herbicide application (i.e. cut stump or inject)

Cutting/clearing trees: \$25.00 - \$66.00/hour

Herbicide: depends on herbicide of choice and costs are on a per acre basis

\$ 12.00 - \$25.00/acre

Cottonwood:

Resprouts readily so fire and grazing are not effective alone.

Glyphosate \$12.00 - \$18.00/acre

Rodeo \$18.00 - \$20.00/acre

Picloram (Tordon, Grazon) \$20.00/acre

Locust, mesquite, and osage orange:

Resprout readily for fire and grazing are not effective alone.

Foliar application of 0.25% Triclopyr (Remedy) \$18.00/acre

For large trees (any species) use 3/4 diesel and 1/4 Remedy (triclopyr) and apply to base of stump until wet around tree

Cost of herbicide \$2.00 - \$5.00/tree

Cutting tree down \$25.00 - \$66.00/hour

HERBACEOUS PLANT CONTROL

Smooth brome control:

Dormant season burn allow regrowth to gain 4-5 leaves (see costs above)

Then apply Plateau (8-12 oz) + 1.5-2 qts Glyphosate + methylated seed oil (1 qt)
20 gals/acre

Old World Bluestems control:

Dormant season burn, allow regrowth to ~6 inches in height

Apply Roundup (high label rate) (around late May) \$12.00 - \$18.00/acre

Allow regrowth to reach ~6 inches in height

Apply Roundup (application date depends on precipitation) \$12.00 - \$18.00/acre

Annual bromes control:

If dominant component of CRP field should consider herbicide, tillage and replanting.

Herbicide (Roundup \$12.00 - \$18.00/acre) applied as seedlings emerge on warm day (February – early march)

Tillage immediately following death of annual bromes (\$7.00 - \$13.00/acre)

Reseed (see restoration costs below) (best if seeding occurs between Feb and mid-late March)

Weeping Lovegrass control:

Dormant season burn, allow regrowth to ~6 inches in height

Apply Roundup (high label rate) (around late May)
Allow regrowth to reach ~6 inches in height
Apply Roundup (application date depends on precipitation)

RESTORATION:

Interseeding alfalfa: \$21.00 - \$30.00/acre

Reseeding:

High diversity (grass & forbs) seed mix ~ \$80.00/acre

Lower diversity (primarily grasses) seed mix ~ \$25.00/acre

Seed drill (rental) \$15.00/acre

Tractor (rental) \$5.00 - \$11.00/acre

COLORADO (83 fields)

APPENDIX 3

FIELD	DOMINANT GRASSES	% OF FIELDS	Average GRASS HEIGHT (% FIELDS) > 35CM	MEAN # GRASS SPP	% FORBS	# OF SHRUBS
CP10	Side-oats & Blue grama	85%	41%	3.4	~12%	2
CP4D	Side-oats & Blue grama	100	60	3.3	~12	0
CP2	W. wheatgrass Side-oats & Blue grama	24 55	49	2.8	~12	~6
CP4	Cheatgrass Blue grama Squirreltail	30 30 10	20	3.3	~12	0

KANSAS (380 fields)

FIELD	DOMINANT GRASSES	% OF FIELDS	Average	% Fields with		# OF SHRUBS
			GRASS HEIGHT % FIELDS > 35CM	All Native GRASS SPP	% FORBS	
CP10	Side-oats	48	>80	50%	20	
	Switchgrass	22		had natives		
CP2	Side-oats	40	>80	33%	28	
	Switchgrass	40				
	W. wheatgrass	15				
	Cheatgrass	12				
CP25	Cheatgrass	>30	>80	8	35	
	W. Wheatgrass	18%				
	Side-oats	10				
CP4	Silver bluestem	17	>80	33% had none	52	
	Sand dropseed	16		33% had natives		
	No grass	30				
CP4D	Switchgrass	30	>80	76%	28	
	Side-oats grama	13				
	Little bluestem	13				

NEW MEXICO (178 fields)

FIELD	DOMINANT GRASSES	% OF FIELDS	Average	% fields with		# OF SHRUBS
			GRASS HEIGHT % FIELDS > 35CM	All Native GRASS SPP	% FORBS	
CP10	Weeping lovegrass	30	93	46% all natives	21	
	Silver bluestem	30				
	Side-oats grama	15	93			
CP2	Side-oats grama	45		69% all natives	36	
	Sand dropseed	10				
	Prairie 3-awn	20				

OKLAHOMA (146 fields)

FIELD	DOMINANT GRASSES	% OF FIELDS	Average	% fields with		# OF SHRUBS
			GRASS HEIGHT % FIELDS > 35CM	All Native GRASS SPP	% FORBS	
CP1	OWB	60	>80	50% no natives 10		
	Big bluestem	27	>80	33		
CP10	OWB	55	>80	33	10	
	Side-oats	19	>80			
CP2	Side-oats	47	>80	40	23	
	OWB	25	>80			
CP25	OWB	25	>80	25	46	
	Switchgrass	18	>80			
	Little Bluestem	18	>80			
	Cheatgrass	18	>80			

NW TEXAS (150 fields)

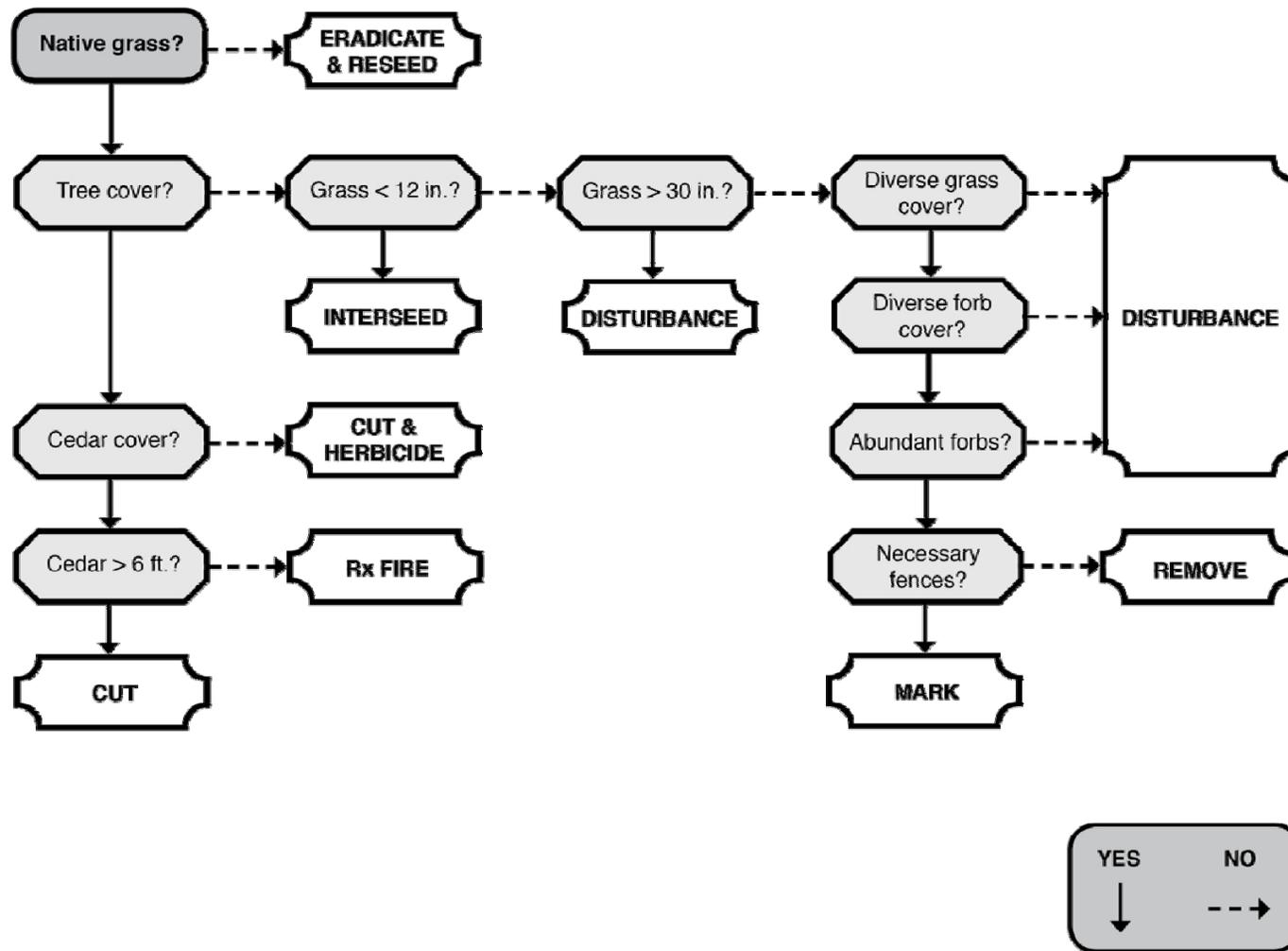
FIELD	DOMINANT GRASSES	% OF FIELDS	Average	% fields with		# OF SHRUBS
			GRASS HEIGHT % FIELDS > 35CM	All Native GRASS SPP	% FORBS	
CP1	Weeping lovegrass	43	85		23	
CP10	Weeping lovegrass	41	85		>50	
	Others	?				
CP2	Variable	?	85		32	

NE TEXAS (82 fields)

FIELD	DOMINANT GRASSES	% OF FIELDS	Average GRASS HEIGHT % FIELDS > 35CM	% fields with All Native GRASS SPP	% with FORBS	# OF SHRUBS
CP1	Weeping lovegrass	58	>85		<10	
	OWB	30	>85		<10	
CP10	Weeping lovegrass OR OWB	60	>85		13	
CP2	OWB or					
	Weeping lovegrass	41	>85		28	
	W. wheatgrass	14	>85			
	Silver Bluestem	21	>85			

APPENDIX 4

APPENDIX 4: Flowchart of Decision Process for CRP Fields for the Lesser Prairie-Chicken



APPENDIX 5

APPENDIX 5: Cost Estimate (\$'s) for Conversion/Management of LEPC Core Buffer

State	CRP Practice	Estimated Cost/acre to convert to native	Estimated Cost/acre to deal with woodies	Estimated Cost/acre to change structure	Total Cost to Convert
CO	CP10		63,140	1,722,202	
	CP2		18,822	570,852	
	CP4			16,083	2,421,274
KS	CP10		121,014	6,781,908	
	CP2		66,151	2,238,648	
	CP25			1,052,256	
	CP4		380	96	
	CP4D		3776	42,936	10,307,166
OK	CP1	498,358	19,499	21,821	
	CP10	15,771,589	93,784	557,895	
	CP2	5,818,559	85,611	1,064,423	
	CP25		50,021	15,638	23,994,204
NM	CP10	11,446,574	76,747	278,370	
	CP2		61,152	615,167	12,477,912

TXne	CP1	647,948	38,383	
	CP10	8,591,098	71,956	
	CP2	7,813,314	77,639	17,240,341
<hr/>				
TXw	CP1	8748		
	CP10	14,401		
	CP2	10601	2,293,657	2,327,408
<hr/>				
TOTAL ALL STATES:				\$68,771,308

NOTE:

For calculations of acreage, we summed acres by CP type by state that were located within the LPC core buffer. Then we divided this acreage by number of fields for that CP type by state to calculate average field size. All cost estimates are based on these averages.

Conversion to native includes all field types that are dominated by introduced grasses such as weeping lovegrass and old world bluestem as these fields will have similar conversion costs. Cost estimate for conversion assumes a high diversity plant mixture.

Management of woody includes all fields that contain at least 5 trees regardless of species. We assumed the midpoint \$ value for woody treatment as we do not know the woody species composition.

Management of structure includes fields that have grass cover > 35 cm. Forb cover was not included as most fields that are deficient in forb cover also have improper grass cover, thus are included in a management category already. We assumed \$15/acre for management of structure as most fields can be managed with fire or disking and this is an appropriate average cost for those practices.