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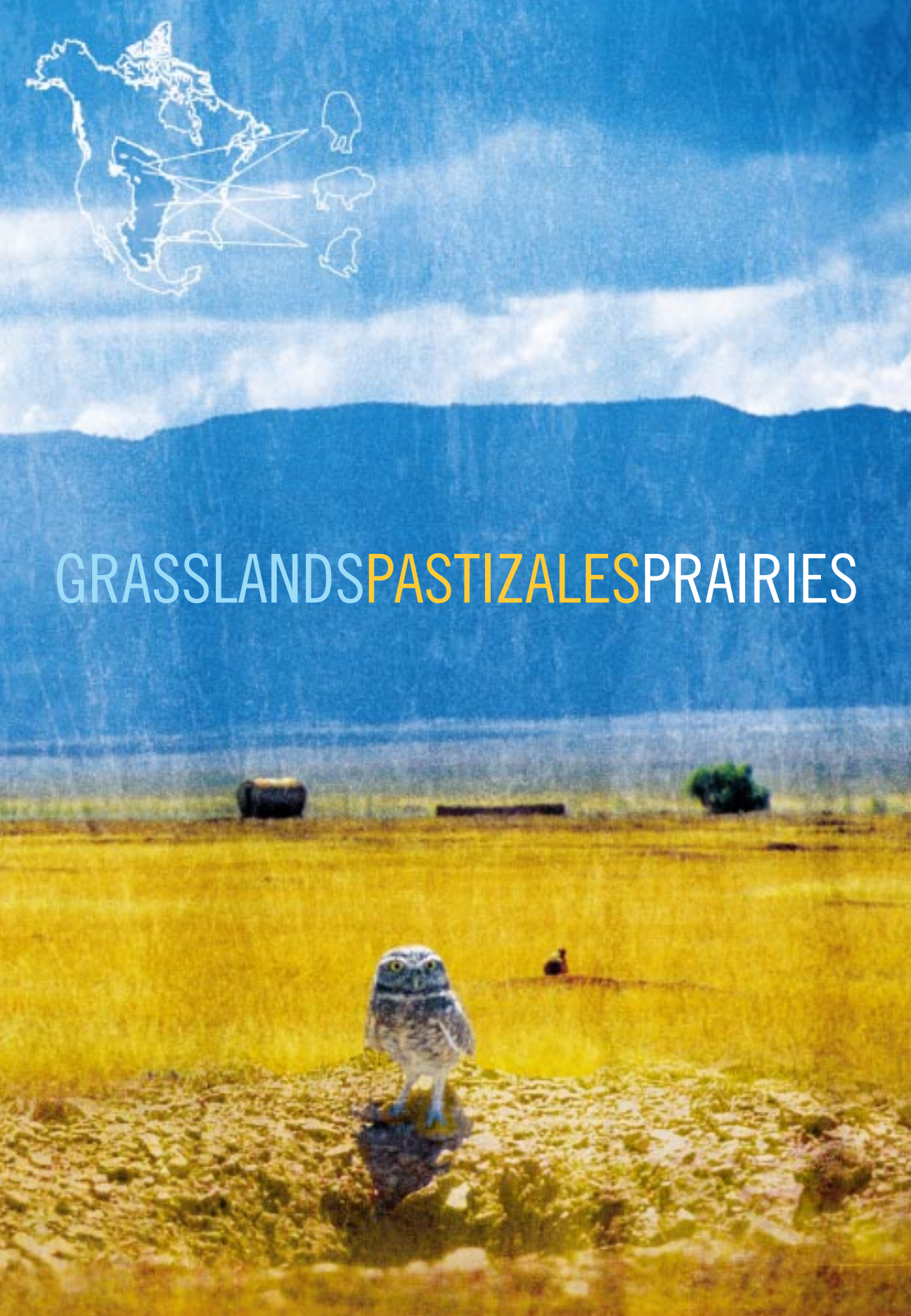

GRASSLANDS PASTIZALES PRAIRIES

GRASSLANDS

Toward a North American Conservation Strategy

Hacia una estrategia de conservación para los pastizales de América del Norte

Vers une stratégie de conservation des prairies nord-américaines

The Commission for Environmental Cooperation (CEC) was established under the North American Agreement on Environmental Cooperation (NAAEC) to address environmental issues in North America from a continental perspective, with a particular focus on those arising in the context of liberalized trade.

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GRASSLANDS

Toward a North American Conservation Strategy

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La Commission de coopération environnementale (CCE), qui a été créée en vertu de l'Accord nord-américain de coopération dans le domaine de l'environnement, est chargée de s'occuper des questions environnementales en Amérique du Nord dans une perspective continentale, en portant une attention particulière aux questions associées à la libéralisation des échanges.

La présente publication a été préparée par le Secrétariat de la CCE et ne reflète pas nécessairement les vues des gouvernements du Canada, du Mexique ou des États-Unis.

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La Comisión para la Cooperación Ambiental (CCA) se creó al amparo del Acuerdo de Cooperación Ambiental de América del Norte (ACAAN) para tratar asuntos ambientales de los tres países desde una perspectiva regional, con énfasis en los derivados del ámbito de la liberación comercial.

Esta publicación fue preparada por el Secretariado de la CCA y no refleja necesariamente las opiniones de la CCA o de los gobiernos de Canadá, Estados Unidos y México.

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SUMMARY

This publication is intended to provide a framework for tri- and binational cooperation between Canada, the United States and Mexico that promotes the conservation and sustainable use of central North American grasslands.

It does so by providing a trinational overview of information about the central North American grasslands and the conservation issues faced in the region. This contextual framework seeks to move the conservation agenda forward to the eventual development of a conservation strategy for the grasslands of North America that will integrate, build upon and enhance individual initiatives found in the three countries of North America that could complement each other.

Trinational cooperation towards the conservation of central North American grasslands is necessary in support of local, regional and national activities. The reasons for such complementary support include the following:

1. The impacts of human activities that both serve and work against conservation objectives require focus at multiple scales to assess the effectiveness of conservation activities.
2. The central grasslands have been significantly impacted throughout North America, historically and in recent times, by a wide array of human activities. These impacts have created a general sense of urgency in dealing with the fairly impoverished biological system that remains.
3. Transboundary species and parts of their life-support systems (water, air) are not limited to political jurisdictions.
4. Critical connections exist among the three countries in terms of linkages and movements of species of common conservation concern.
5. Issues such as the best management use of grazing and fire, sustainable wildlife harvesting, best practices to sustain dryland agriculture, the impacts of exotic species, and impacts and adaptations associated with climate change are of common concern.

Governments, nongovernmental organizations, businesses, industry and individuals of North America are encouraged to adopt a vision to conserve North America's central grasslands that aims:

> *To sustain the ecological integrity and viability of grassland landscapes in North America through environmental, social and economic actions designed to meet the needs of current and future generations.*

In adopting this vision, it is recommended that governments, nongovernmental organizations, institutions, businesses/industry and individuals create a trinational working group to develop a North American grasslands conservation strategy that:

- contributes to the maintenance of the ecological integrity of North American grassland ecosystems and habitats;
- sustains environmental, economic and cultural values in ways that assure the continued health and integrity of North American grassland ecosystems;
- contributes to the mitigation, reduction and eventual elimination of current and future threats to the shared species, habitats and ecosystems of the North American grasslands;

- fosters a continental and integrated perspective to the management, conservation and sustainable use of grassland biodiversity;
- strengthens the capacity of a wide array of sectors of North American society to conserve the continent's grassland biodiversity (i.e., genetics, species and habitats/ecosystems); and
- promotes wide public involvement in the conservation, sustainable use and the equitable sharing of benefits of North American grassland biodiversity.

A survey of grassland experts from throughout North America identified issues, in both the short- and mid-term, of potential relevance to all three countries that were of high ecological importance and that addressed policy and agency needs that could benefit from trinational collaboration.

BIODIVERSITY

Primary biodiversity issues were declines in biodiversity, fragmentation of habitats and ploughing of grasslands.

> ***Recommendation**: Trinational cooperative activities should include greater promotion of habitat conservation, identification of high-value habitats and management activities that foster prevention and reversal of declines and restoration of species and habitats.*

LAND-USE PRACTICES AND MANAGEMENT

Issues of common high priority were increased demands for water and potential conflicts in regard to water shortages. The United States and Canada shared numerous concerns over issues such as insufficient areas of grasslands receiving protection, inappropriate agricultural practices, draining and filling of wetlands, and the impacts of exploration and development activity. Mexico's concerns focused more on overgrazing, pasture management issues, and on aquifer depletion.

> ***Recommendation**: Trinational cooperative activities should address land-use practice and management issues including assistance towards sustaining diverse ecosystems across the central grasslands, encouraging the minimization of human disturbances of the grasslands and encouraging the creation of markets for environmentally produced agricultural goods.*

POLICIES AND SOCIO-ECONOMIC ISSUES

The three countries were concerned about the lack of incentives for conservation, restoration and management of grassland, the lack of productive and economic alternatives, organization and marketing incentives that would support desired lifestyles and grasslands conservation, the impact of global subsidies and government support policies on commodity prices that could affect grasslands conservation objectives, and the lack of integration of policies related to overall economic and ecological systems.

Mexico's primary policy and socio-economic concerns also involved the lack of incentives and alternatives for proper range management and the lack of linkages between production and conservation policies and between producers and specialists that would foster rangeland conservation.

> ***Recommendation**: Trinational cooperative activities should facilitate improved laws, regulations, policies and programs favoring grasslands conservation, improved incentive programs, improved inter-agency and better-coordinated conservation programming.*

DEMOGRAPHIC

Ultimately, the success of any policies, programs or practices recommended within a trinational strategy for grasslands conservation will depend on the extent to which they have contended with the demographic, social and cultural realities of regions. Factors such as rural population declines and aging and deterioration of rural services and infrastructure are concerns in rural communities throughout North America that could affect grasslands conservation objectives.

> ***Recommendation**: Trinational cooperative activities should be founded upon a scientific assessment of attitudes and perceptions to grasslands conservation of stakeholders in the central grasslands of North America.*

EDUCATION AND COMMUNICATION

Mexican respondents were particularly concerned with the general lack of awareness among the population about the worth of environmental services provided by grasslands. US and Canadian respondents focused more on the lack of grasslands conservation programs, inadequate communication among stakeholders, and inadequate knowledge or appreciation of specific regional problems by federal officials.

> ***Recommendation**: Trinational cooperative activities should encourage greater outreach efforts that focus on culturally specific education and communication programs. Such programs should focus on promoting a net gain of grasslands, supporting ecosystem restoration of degraded grasslands, increasing awareness of the worth of the environmental services provided by grasslands, promoting simple techniques for grasslands conservation, promoting the efforts of landowners/managers that conserve grasslands, increasing contacts with local producer organizations, promoting training opportunities for future land managers, and further developing training opportunities that integrate wildlife issues with rangeland management.*

RESEARCH AND MONITORING

A wide array of needs for research and monitoring have been identified that would be useful in addressing many grassland conservation issues: (1) increase the number and extent of permanent areas for grasslands conservation research; (2) focus on wildlife for their recovery; (3) improve assessment measures (indicators) of policies and programs; (4) focus on impacts of invasive species; (5) identify threats/stressors at different spatial and temporal scales; and (6) focus on integrated ecological, economic and social assessments.

> ***Recommendation**: Trinational cooperative activities should focus on promoting the establishment of more permanent areas for grassland research, increasing research on threats/stressors, on wildlife for their recovery and on the impacts of invasive species, and promoting research focused on integrated ecological, economic and social assessments as well as research on the best means to implement recovery and management plans, and to improve assessment measures (indicators) of policies and programs. Trinational cooperation could assist in identifying key grasslands that require immediate study and promote uniform and consistent long-term monitoring techniques and research and a common terminology.*

RESUMEN

El propósito de este documento es ofrecer un marco de cooperación trilateral y bilateral entre Canadá, Estados Unidos y México para fomentar la conservación y el uso sustentable de los pastizales del centro de América del Norte.

Para ello se presenta un resumen con información trinacional sobre los pastizales de América del Norte y los problemas de conservación que la región enfrenta. Este marco de referencia contextual se propone orientar la agenda de la conservación hacia la formulación de una estrategia para la conservación de los pastizales de América del Norte que integre, aproveche y mejore iniciativas individuales en curso en los tres países que bien podrían complementarse entre sí.

La cooperación trinacional para la conservación de los pastizales de América del Norte es necesaria para apoyar las actividades locales, regionales y nacionales por diversas razones, entre otras:

1. Los efectos de las actividades humanas, tanto aquellas que contribuyen al cumplimiento de los objetivos de la conservación como las que los obstaculizan, exigen atender múltiples escalas para evaluar la eficacia de las actividades de conservación.
2. Los pastizales centrales han sido muy afectados, lo mismo históricamente que en tiempos recientes, por una amplia gama de actividades humanas. Este marcado impacto ha generado una conciencia de la urgencia de preservar el sistema biológico que, si bien bastante empobrecido, a la fecha subsiste.
3. Las especies transfronterizas y los elementos de sus sistemas de vida (agua, aire) no están delimitados por las jurisdicciones políticas.
4. Existen vínculos fundamentales entre los tres países en términos de enlaces y movimientos de especies amenazadas de preocupación común.
5. Son también de preocupación común asuntos como el manejo óptimo del pastoreo y los incendios periódicos, la captura sustentable de fauna silvestre, las mejores prácticas para mantener la agricultura en tierras áridas, el impacto de las especies exóticas y los efectos y las adaptaciones asociadas con el cambio climático.

Se invita a los gobiernos, las organizaciones no gubernamentales, las empresas, la industria y la ciudadanía de América del Norte a adoptar una visión para la conservación de los pastizales centrales del subcontinente que aspire a:

> *Preservar la integridad y la viabilidad ecológicas de los pastizales en América del Norte mediante acciones ambientales, sociales y económicas diseñadas para satisfacer las necesidades de las generaciones actuales y futuras.*

Al adoptar esta visión, se exhorta a gobiernos, organizaciones no gubernamentales, empresas, industria y ciudadanos a continuar impulsando a una estrategia trinacional de políticas, programas y acciones de cooperación para:

- contribuir a la preservación de la integridad ecológica de los ecosistemas y hábitats de los pastizales de América del Norte;
- mantener valores ambientales, económicos y culturales que garanticen la salud sostenida y la integridad de los ecosistemas de los pastizales de América del Norte;

- contribuir a la mitigación, reducción y, finalmente, eliminación de las amenazas, actuales y futuras, que se ciernen sobre las especies, hábitats y ecosistemas compartidos de los pastizales de América del Norte;
- fomentar una perspectiva continental e integral para el manejo, conservación y uso sustentable de la biodiversidad de los pastizales;
- fortalecer la capacidad de un amplio conjunto de sectores en la sociedad de América del Norte para conservar la biodiversidad de los pastizales del subcontinente (es decir, genética, especies, hábitats y ecosistemas), y
- promover una amplia participación pública en la conservación, uso sustentable y aprovechamiento equitativo y compartido de los beneficios de la biodiversidad de los pastizales de América del Norte.

Una encuesta realizada entre expertos de toda la región permitió identificar asuntos de suma importancia ecológica que, tanto en el corto como en el mediano plazos, pueden resultar relevantes para los tres países, y que atañen a necesidades de política y de gestión que podrían beneficiarse de la colaboración trinacional.

BIODIVERSIDAD

Los principales problemas relacionados con la biodiversidad son la disminución de la diversidad biológica, fragmentación de hábitats y arado de los pastizales.

> ***Recomendación:*** *Las actividades de cooperación trinacional deberán incluir una mayor promoción de la conservación del hábitat, la identificación de hábitats de especial valor y actividades de manejo que permitan no sólo prevenir y revertir la disminución de especies y hábitats, sino también restaurarlos.*

PRÁCTICAS Y GESTIÓN DEL USO DE LA TIERRA

Los problemas compartidos de mayor prioridad son las cada vez mayores demandas de agua y los posibles conflictos por la escasez del líquido. Canadá y Estados Unidos comparten numerosas preocupaciones en torno a asuntos como la insuficiencia de áreas de pastizales protegidas, la predominancia de prácticas agrícolas inadecuadas, la desecación o el relleno de humedales y los efectos de las actividades de exploración y aprovechamiento. Las preocupaciones de México se centran más en el sobrepastoreo, cuestiones relacionadas con la gestión de las tierras de pastoreo y el agotamiento de los acuíferos.

> ***Recomendación:*** *Las actividades de cooperación trinacional deberán incluir cuestiones relacionadas con las prácticas y la gestión del uso de la tierra, incluidos apoyos para preservar diversos ecosistemas a todo lo largo de los pastizales centrales, fomentar la reducción al mínimo de las alteraciones al entorno de origen antropogénico y alentar la creación de mercados para productos agrícolas ecológicos.*

ASPECTOS SOCIOECONÓMICOS Y DE POLÍTICA

A los tres países les preocupa la falta de incentivos para la conservación, restauración y manejo de los pastizales; la falta de alternativas económicas y productivas, organización e incentivos de mercado que permitirían mantener los estilos de vida deseados y al mismo tiempo conservar los pastizales; el impacto de los subsidios generales y políticas de apoyo gubernamental a los precios de productos que podrían afectar los objetivos de conservación de los pastizales, y la falta de políticas de integración en relación con los sistemas económicos y ecológicos en general.

Las principales preocupaciones socioeconómicas y de política de México se refieren a la falta de enlaces entre las políticas de apoyo a la producción y las políticas de conservación, así como entre productores y especialistas que fomenten la conservación de las tierras de pastoreo.

Recomendación: *Las actividades de cooperación trinacional deberán propiciar mejores leyes, reglamentos, políticas y programas que favorezcan la conservación de los pastizales; mejores programas de incentivos; mejores relaciones entre las distintas dependencias de gobierno y una programación mejor coordinada para la conservación.*

ASPECTOS DEMOGRÁFICOS Y SOCIALES

A pesar de las incuestionables evidencias de la disminución y envejecimiento de la población rural, y del deterioro de los servicios y la infraestructura rurales, es sorprendente que sean tan pocas las cuestiones demográficas y sociales identificadas como problemas de alta prioridad compartidos entre las tres naciones. Los expertos mexicanos y estadounidenses interrogados no identificaron las crecientes presiones en las comunidades rurales como una preocupación prioritaria que podría afectar los objetivos de conservación de los pastizales. En última instancia, el éxito de cualesquiera políticas, programas o prácticas recomendadas como parte de una estrategia trinacional para la conservación de los pastizales dependerá del grado en que respondan a las realidades demográficas, sociales y culturales de las distintas regiones.

Recomendación: *Las actividades de cooperación trinacional deberán sustentarse en una evaluación científica de las actitudes y percepciones de los distintos grupos de interés respecto de la conservación de los pastizales centrales de América del Norte.*

EDUCACIÓN Y COMUNICACIÓN

A los expertos de México que respondieron a la encuesta les preocupa en particular la falta de conciencia generalizada entre la población respecto del valor de los servicios ambientales que los pastizales suministran. Los especialistas canadienses y estadounidenses entrevistados se centraron más en la falta de programas para la conservación de los pastizales, en la comunicación inadecuada entre los interesados directos y la falta de conocimiento o apreciación de problemas regionales específicos por parte de los funcionarios federales.

Recomendación: *Las actividades de cooperación trinacional deberán fomentar mayores esfuerzos de difusión centrados en programas educativos y de comunicación específicos para cada cultura. Tales programas han de centrarse en propiciar una ganancia neta en los pastizales, apoyar la rehabilitación de los ecosistemas en pastizales deteriorados, aumentar la conciencia del valor de los servicios ambientales que los pastizales proporcionan, promover técnicas simples para la conservación de los pastizales, fomentar las iniciativas de propietarios y administradores de las tierras para conservar los pastizales, aumentar los contactos con las organizaciones de productores locales, procurar oportunidades de capacitación para futuros administradores de la tierra y ampliar aún más las oportunidades de capacitación para integrar los problemas vinculados a las especies silvestres con la problemática del manejo de las tierras de pastoreo.*

INVESTIGACIÓN Y MONITOREO

Los expertos a los que se interrogó identificaron un amplio conjunto de necesidades de investigación y monitoreo que serían de utilidad para abordar muchos de los prob-

lemas de conservación de los pastizales: 1) aumentar el número y la amplitud de las áreas permanentes de investigación para la conservación de los pastizales; 2) centrarse en la recuperación de especies silvestres; 3) mejorar las medidas de evaluación (indicadores) de políticas y programas; 4) centrarse en los efectos de las especies invasoras; 5) identificar las amenazas o factores de presión en las diferentes escalas espaciales y temporales, y 6) centrarse en evaluaciones ecológicas, económicas y sociales integradas.

Recomendación: *Las actividades de cooperación trinacional deberán centrarse en promover el establecimiento de áreas más permanentes para la investigación en torno a los pastizales; aumentar la investigación sobre amenazas o factores de presión, recuperación de especies silvestres y efectos de las especies invasoras, y fomentar la investigación centrada en evaluaciones ecológicas, económicas y sociales integradas, así como los estudios acerca de los mejores métodos para instrumentar planes de recuperación y manejo y para mejorar las medidas de evaluación (indicadores) de políticas y programas. La cooperación trinacional podría ayudar a identificar los pastizales clave que requieren de un estudio inmediato y promover técnicas de investigación y monitoreo de largo plazo uniformes y coherentes, así como una terminología común.*

RÉSUMÉ

Le présent document a pour objet d'établir un cadre de référence en vue d'une coopération trilatérale et bilatérale entre le Canada, le Mexique et les États-Unis, qui assure la conservation et l'utilisation durable des prairies du centre de l'Amérique du Nord.

À cette fin, le document brosse un tableau de la situation dans les trois pays en ce qui concerne les prairies du centre de l'Amérique du Nord et les problèmes de conservation dans la région. Ce cadre de référence se veut un outil supplémentaire dans la mise en œuvre du programme de conservation, en vue de l'élaboration éventuelle d'une stratégie de conservation pour les prairies nord-américaines. Cette stratégie intégrera, enrichira et renforcera les activités individuelles qui sont mises en œuvre dans les trois pays nord-américains et qui pourraient se compléter les unes les autres.

La coopération trilatérale en matière de conservation des prairies du centre de l'Amérique du Nord est nécessaire pour assurer le succès des activités locales, régionales et nationales. Les raisons d'une telle complémentarité sont les suivantes :

1. Les répercussions des activités humaines qui viennent à l'appui des objectifs de conservation ou qui nuisent à ces objectifs doivent être abordées selon une approche à échelle variable lorsqu'on évalue l'efficacité des mesures de conservation.
2. Les prairies centrales ont été profondément marquées, à travers l'histoire et encore récemment, par un large éventail d'activités humaines. Les répercussions de ces activités ont fait naître un sentiment d'urgence général face à ce qu'il reste du système biologique, passablement appauvri.
3. Les espèces transfrontalières et certains éléments de leur milieu vital (eau, air) ne sont pas confinés à l'intérieur des frontières.
4. Les relations entre les trois pays sont cruciales en raison des liens entre espèces suscitant des préoccupations communes en matière de conservation, de même qu'en raison des déplacements de ces espèces.
5. Les trois pays partagent les mêmes préoccupations en ce qui a trait à des questions telles que l'utilisation optimale du pâturage et des feux, l'exploitation durable des ressources fauniques et floristiques, les meilleures techniques pour une agriculture durable sur terrains arides, les incidences des espèces exotiques ainsi que les répercussions du changement climatique et l'adaptation à ce changement.

Les gouvernements, les organisations non gouvernementales, le milieu des affaires, les industries et les citoyens nord-américains sont encouragés à adopter une vision de la conservation des prairies du centre de l'Amérique du Nord axée sur l'objectif suivant :

> *Préserver l'intégrité écologique et la viabilité des paysages de prairie en Amérique du Nord grâce à des interventions environnementales, sociales et économiques qui répondent aux besoins des générations actuelles et futures.*

En adoptant cette vision, les gouvernements, les organisations non gouvernementales, les institutions, le milieu des affaires, les industries et les citoyens sont encouragés à mettre en place une stratégie trinationale de politiques, programmes et interventions concertés visant les objectifs suivants :

- contribuer à la préservation de l'intégrité écologique des écosystèmes et des habitats des prairies nord-américaines;
- maintenir les valeurs environnementales, économiques et culturelles de manière à assurer la santé et l'intégrité à long terme des écosystèmes des prairies nord-américaines;
- contribuer à l'atténuation, à la réduction et, finalement, à l'élimination des menaces présentes et futures sur les espèces, les habitats et les écosystèmes des prairies nord-américaines, que partagent les trois pays;
- favoriser une perspective continentale et intégrée en ce qui a trait à la gestion, à la conservation et à l'utilisation durable de la diversité biologique des prairies;
- renforcer la capacité d'un large éventail de segments de la société nord-américaine de conserver la diversité biologique des prairies du continent (ressources génétiques, espèces et habitats/écosystèmes);
- promouvoir une large participation du public à la conservation et à l'utilisation durable de la diversité biologique des prairies nord-américaines, ainsi qu'au partage équitable des avantages qui découlent de cette diversité biologique.

Des experts de toute l'Amérique du Nord, spécialistes des prairies, ont mené une enquête à la suite de laquelle ils ont établi une série d'enjeux à court et à moyen terme, susceptibles de concerner les trois pays, enjeux qui revêtent une grande importance du point de vue écologique et qui exigent des interventions, de la part des gouvernements et des organismes concernés, qu'une collaboration trilatérale pourrait rendre plus efficaces.

BIODIVERSITÉ

Les principaux enjeux en rapport avec la biodiversité concernent le déclin de la diversité biologique, la fragmentation des habitats et le labourage des prairies.

> ***Recommandation :*** *Les activités trilatérales devraient comprendre des mesures visant à promouvoir plus intensément la conservation des habitats, des études en vue d'inventorier les habitats de grande valeur et des activités de gestion qui favorisent la prévention et le renversement des processus de déclin ainsi que le rétablissement des espèces et la restauration des habitats.*

MÉTHODES DE MISE EN VALEUR DES TERRES ET GESTION DE L'UTILISATION DES TERRES

Les enjeux qui présentent une haute priorité pour les trois pays concernent l'accroissement de la demande d'eau et les conflits potentiels suscités par les pénuries d'eau. Les États-Unis et le Canada se préoccupent également de nombreux problèmes qui touchent les prairies, tels que l'insuffisance des aires protégées, des pratiques agricoles inadéquates, le drainage et le remblayage des milieux humides, les répercussions des activités d'exploration et de développement. Le Mexique est plus préoccupé par les questions de surpâturage, de gestion des pâturages, d'épuisement des aquifères.

> ***Recommandation :*** *Les activités trilatérales devraient porter sur les questions relatives aux méthodes de mise en valeur des terres et à la gestion de l'utilisation des terres et viser notamment à faciliter la préservation de divers écosystèmes dans les prairies cen-*

trales, à encourager les efforts déployés pour réduire au minimum les perturbations résultant des activités humaines, à favoriser la création de marchés pour les produits agricoles écologiques.

POLITIQUES ET QUESTIONS SOCIOÉCONOMIQUES

Les éléments suivants préoccupent les trois pays : l'absence de mesures incitatives pour assurer la conservation, la restauration et la gestion des prairies; l'absence d'activités de production et de solutions économiques de remplacement; le manque de mesures incitatives en matière d'organisation et de commercialisation qui favoriseraient la préservation du mode de vie souhaité et la conservation des prairies; les répercussions des subventions et des politiques d'aide gouvernementales, appliquées dans divers pays, sur les prix des produits de base et, potentiellement, sur les objectifs de conservation des prairies; le manque d'intégration des politiques relatives aux systèmes économiques et écologiques globaux.

Au chapitre des politiques et des questions socioéconomiques, le Mexique est surtout préoccupé par l'absence de mesures incitatives et de solutions de remplacement pour assurer une gestion appropriée des parcours, ainsi que par l'absence de liens entre les politiques de production et de conservation et entre les producteurs et les spécialistes favorables à la conservation des parcours.

Recommandation : *Les activités trilatérales devraient faciliter l'amélioration des lois, règlements, politiques et programmes visant à favoriser la conservation des prairies; l'instauration de programmes d'encouragement efficaces; le renforcement de la collaboration interorganismes; une meilleure coordination des programmes de conservation.*

QUESTIONS DÉMOGRAPHIQUES ET SOCIALES

Malgré l'abondance de preuves concernant le déclin et le vieillissement de la population rurale et la détérioration des services et de l'infrastructure en milieu rural, étonnamment, peu de questions démographiques et sociales semblent susciter des préoccupations communes importantes dans les trois pays. Néanmoins, les personnes interrogées au Mexique et aux États-Unis ont mentionné que l'accroissement du stress dans les collectivités rurales constituait un problème très important qui pourrait nuire aux objectifs de conservation des prairies. En dernière analyse, le succès des politiques, programmes ou pratiques qui pourraient être recommandés dans le cadre d'une stratégie trinationale de conservation des prairies dépendra de la mesure dans laquelle on aura tenu compte des réalités démographiques, sociales et culturelles des régions.

Recommandation : *Les activités trilatérales devraient être fondées sur une évaluation scientifique des attitudes et des perceptions des intervenants en rapport avec la conservation des prairies du centre de l'Amérique du Nord.*

ÉDUCATION ET COMMUNICATION

Les personnes interrogées au Mexique étaient particulièrement préoccupées par le fait que la majorité de la population n'a pas conscience de la valeur des services environnementaux que rendent les prairies. Aux États-Unis et au Canada, les répondants ont surtout mis l'accent sur l'absence de programmes de conservation des prairies, sur le manque de communication entre intervenants et sur le fait que les responsables fédéraux connaissent mal ou saisissent mal certains problèmes régionaux particuliers.

Recommandation : *Les activités trilatérales devraient favoriser les efforts de sensibilisa-*

tion qui mettent l'accent sur des programmes d'éducation et de communication culturellement ciblés. Ces programmes devraient avoir pour objet de promouvoir un gain net de prairies; de favoriser la restauration des écosystèmes dans les prairies dégradées; de sensibiliser la population à la valeur des services environnementaux que rendent les prairies; de promouvoir des techniques simples pour conserver les prairies; d'encourager les propriétaires de terrains et les gestionnaires qui s'appliquent à conserver les prairies; de multiplier les liens avec les organisations locales de producteurs; de promouvoir les activités de formation à l'intention des futurs responsables de la gestion des terres; d'accroître les activités de formation qui intègrent les questions relatives à la faune dans la gestion des parcours.

RECHERCHE, SURVEILLANCE ET PRODUCTION DE RAPPORTS

Les répondants ont mis en lumière un large éventail de mesures en matière de recherche et de surveillance qui seraient utiles pour résoudre bon nombre des problèmes relatifs à la conservation des prairies : 1) accroître le nombre et la superficie des aires permanentes de recherche sur la conservation des prairies; 2) mettre l'accent sur les espèces fauniques en vue de leur rétablissement; 3) améliorer l'évaluation (en améliorant les indicateurs) des politiques et des programmes; 4) mettre l'accent sur les impacts des espèces envahissantes; 5) définir les menaces et les facteurs de stress à différentes échelles spatiales et temporelles; 6) mettre l'accent sur les évaluations intégrant les aspects écologiques, économiques et sociaux.

Recommandation : *Les activités trilatérales devraient avoir pour objet de promouvoir l'établissement d'un plus grand nombre d'aires permanentes de recherche sur les prairies; d'intensifier la recherche sur les menaces et les facteurs de stress, sur les espèces fauniques en vue de leur rétablissement et sur les impacts des espèces envahissantes; de promouvoir la recherche centrée sur les évaluations intégrant les aspects écologiques, économiques et sociaux ainsi que la recherche sur les meilleurs moyens de mettre en œuvre des plans de rétablissement et de gestion et d'améliorer l'évaluation (en améliorant les indicateurs) des politiques et des programmes. La coopération entre les trois pays pourrait aider à inventorier les prairies prioritaires qui requièrent une étude immédiate; à promouvoir des techniques de surveillance à long terme uniformes et cohérentes; à harmoniser les recherches; à établir une terminologie commune.*

PREFACE

The central grasslands of North America offer a unique opportunity for cooperation to conserve our shared natural endowment from the species to the ecosystem level.

It is interesting to note that what started in the year 2000 as an initiative to protect species soon turned into a more comprehensive effort looking into the major forces that threaten directly and indirectly these species, leading in turn to an ecosystem approach to species conservation. We anticipate that this will result in institutions and organizations being better able to coordinate regional multistakeholder efforts and to allocate their resources in a more effective way pursuant to their conservation and sustainable use interests.

Being able to effectively address this challenge is underscored by the notion that grasslands are worldwide considered among the most imperiled ecosystems. North America is no exception. The decline of this ecosystem since 1830 (especially of the tall-grass prairie) has exceeded declines reported for any other regional major ecosystem. The significant population decline of grassland birds over the last century well reflects this situation, where as a group, grasslands bird species have shown greater population declines than any other habitat guild.*

In this context, the information presented in this publication will hopefully contribute to building a common understanding among the various players in Canada, Mexico and the United States. Moreover, this assessment is aimed to serve both those who have a direct impact on the well-being of the shared grassland species and spaces, and those interested in joining in the growing opportunities for cooperation related to the grasslands shared by the three North American countries.

Building a framework for cooperation is precisely the *raison d´être* of the Commission for Environmental Cooperation of North America (CEC). This trinational organization was created under the North American Agreement on Environmental Cooperation (NAAEC) by Canada, Mexico and the United States to address regional environmental concerns, help prevent potential trade and environmental conflicts and promote the effective enforcement of environmental law. NAAEC complements the environmental provisions established in the North American Free Trade Agreement (NAFTA) to which it is a side accord.

Vic Shantora, Acting Executive Director

Hans Herrmann, Head, Biodiversity Program

Jürgen Hoth, Biodiversity Program

Commission for Environmental Cooperation

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* Blancher, P. 2003. *Importance of North America's Grasslands to Birds*. Commission for Environmental Cooperation. Unpublished report. 21 pp.

PREFACIO

Los pastizales centrales de América del Norte entrañan una oportunidad única de cooperación para la conservación de nuestro patrimonio natural compartido, a escalas que van desde las especies hasta los ecosistemas.

Es interesante señalar que lo que comenzó en 2000 como una iniciativa para proteger especies derivó en un esfuerzo más amplio que se ha ocupado de las principales fuerzas que amenazan directa e indirectamente a estas especies, dando lugar a un enfoque de conservación de las especies desde los ecosistemas. Anticipamos que ello se traducirá en que instituciones y organizaciones adquieran mayor capacidad para coordinar iniciativas regionales multisectoriales y para asignar sus recursos de manera más efectiva en conformidad con sus intereses de conservación y aprovechamiento sustentable.

El hecho de que en todo el mundo los pastizales estén considerados entre los ecosistemas en mayor peligro subraya la importancia de hacer frente a este desafío en forma efectiva. Y en este sentido, América del Norte no es una excepción. El deterioro de estos ecosistemas a partir de 1830 (sobre todo de las praderas de pastos altos) supera al deterioro registrado para cualquiera de los otros ecosistemas regionales relevantes. La marcada reducción en las poblaciones de aves de los pastizales durante el siglo recién concluido refleja claramente esta situación, en la que, como grupo, las especies avifáunicas de los pastizales han registrado una disminución mayor que la de cualquier otra asociación de hábitats.*

En este contexto, esperamos que el marco de cooperación presentado en este documento contribuya a la creación de un entendimiento común entre los distintos actores en Canadá, Estados Unidos y México. Más aún, esta evaluación pretende servir tanto a quienes tienen un impacto directo en el bienestar de las especies y los espacios de los pastizales compartidos, como a aquellos con interés en sumar esfuerzos a las crecientes oportunidades para la cooperación en favor de los pastizales compartidos por los tres países.

Generar un marco para la cooperación es, precisamente, la razón de ser de la Comisión para la Cooperación Ambiental (CCA) de América del Norte, organización trinacional que Canadá, Estados Unidos y México crearon en términos del Acuerdo de Cooperación Ambiental de América del Norte (ACAAN) para atender las preocupaciones ambientales de la región, prevenir posibles controversias comerciales y ambientales y fomentar la aplicación efectiva de la legislación ambiental. El ACAAN, convenio paralelo del Tratado de Libre Comercio de América del Norte (TLCAN) en materia de medio ambiente, complementa las disposiciones ambientales de dicho tratado.

Vic Shantora, Director Ejecutivo interino

Hans Herrmann, Jefe, Programa para la Conservación de la Biodiversidad

Jürgen Hoth, Programa para la Conservación de la Biodiversidad

Comisión para la Cooperación Ambiental

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* Blancher, P., 2003, *Importancia de los pastizales de América del Norte para las aves*, Comisión para la Cooperación Ambiental, Informe inédito, 21 pp.

AVANT-PROPOS

Les prairies du centre de l'Amérique du Nord offrent une occasion unique de travailler de manière concertée pour conserver notre patrimoine naturel commun, du niveau de l'espèce à celui de l'écosystème.

Il est intéressant de noter que l'initiative lancée en 2000 pour protéger des espèces s'est rapidement transformée en un travail plus global centré sur l'étude des principales forces qui menacent directement et indirectement ces espèces, travail qui a conduit à une démarche axée sur l'écosystème pour résoudre le problème de la conservation des espèces. Nous nous attendons à ce que tout ce travail aide les institutions et les organisations à mieux coordonner les efforts multilatéraux sur le plan régional et à utiliser plus efficacement leurs ressources pour atteindre leurs objectifs en matière de conservation et d'utilisation durable des richesses naturelles.

La nécessité de relever ce défi est d'autant plus impérieuse que les prairies sont considérées, partout dans le monde, comme l'écosystème le plus menacé. L'Amérique du Nord ne fait pas exception. La détérioration de cet écosystème depuis 1830 (surtout l'écosystème de prairie d'herbes longues) a été plus rapide que pour tout autre grand écosystème régional. Le déclin important de la population d'oiseaux des prairies au cours du dernier siècle témoigne bien de cette situation; de fait, les espèces d'oiseaux des prairies, en tant que groupe, ont enregistré la plus grande baisse de population par rapport à toutes les autres guildes.*

Dans ce contexte, le présent cadre de coopération présente dans ce document, nous l'espérons, offrira une compréhension commune de la situation parmi les divers acteurs au Canada, au Mexique et aux États-Unis. De plus, cette évaluation a été préparée à l'intention à la fois de ceux dont les actions ont une incidence directe sur le bien-être des espèces et des espaces communs associés aux prairies, et de ceux qui souhaitent participer aux occasions de coopération, de plus en plus nombreuses, en rapport avec les prairies partagées par les trois pays nord-américains.

L'établissement d'un cadre de coopération est précisément la raison d´être de la Commission de coopération environnementale (CCE) de l'Amérique du Nord. Cette organisation trilatérale a été créée par le Canada, le Mexique et les États-Unis aux termes de l'Accord nord-américain de coopération dans le domaine de l'environnement (ANACDE), et a pour mandat de se pencher sur les problèmes environnementaux à l'échelle du continent nord-américain, de contribuer à la prévention des différends commerciaux et environnementaux et de promouvoir l'application efficace des lois de l'environnement. L'ANACDE complète les dispositions environnementales de l'Accord de libre-échange nord-américain.

Vic Shantora, directeur exécutif par intérim

Hans Herrmann, chef, Conservation de la biodiversité

Jürgen Hoth, gestionnaire, Conservation de la biodiversité

Commission de coopération environnementale

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* Blancher, P. 2003. *Importance of North America's Grasslands to Birds.* Commission de coopération environnementale, rapport inédit.

INTRODUCTION

THE NEED FOR TRINATIONAL GRASSLANDS COOPERATION TO CONSERVE CENTRAL NORTH AMERICAN GRASSLANDS

The central grasslands are an example of one of only a few contiguous North American ecological regions that are shared among the three countries. Such a continental connection implies a shared responsibility among the United States, Mexico and Canada for its conservation. However, such a large geographic area also encompasses a diversity of species and ecosystems, all functioning within a diverse mosaic of land-use activities, cultures, and political and management approaches subject to varying laws and regulations. Given such diversity and the nature of institutionalized mandates for resource management and conservation, it is not surprising that the vast majority of grassland conservation efforts occur at local or regional scales. Fewer, but equally important, conservation initiatives have been carried out at national, binational (especially within and between Canada and the United States) and trinational levels.

Table 1. Examples of trinational and national grassland conservation projects.

Trinational	Canada	US	Mexico
North American Bird Conservation Initiative	Alberta Prairie Conservation Forum	Partners In Flight	Rangeland management, Campo Experimental La Campana—INIFAP (Chihuahua),
North American Waterbird Conservation Plan	Manitoba Prairie Conservation Action Plan	United States Shorebird Conservation Plan	Rangeland management, Campo Experimental Vaquerías—INIFAP (Jalisco)
North American Waterfowl Management Plan	Saskatchewan Prairie Conservation Action Plan	Interstate Prairie Dog Working Group—Multi-State Black Tailed Prairie Dog Assessment	Rangeland management, Rancho Los Angeles—UAAAN (Coahuila).
The Nature Conservancy Prairie Wings Program	Prairie Farm Rehabilitation Administration	US Department of Agriculture, Forest Service—Northern Great Plains Grasslands Strategic Plan	
	Wildlife Habitat Canada Agricultural Landscapes and Countryside Canada Programs	US Department of the Interior, Bureau of Land Management—BLM Grasslands Strategic Plan	

It is critical to continue fostering and sustaining activities at the regional and national levels, and to avoid reducing support for those activities. However, it is also increasingly apparent that trinational cooperation towards the conservation of central North American grasslands is necessary in support of local, regional and national activities. The reasons for such complementary support include the following.

1. *The impacts of human activities that both serve and work against conservation objectives require focus at multiple scales to assess the effectiveness of conservation activities.* At a general conceptual level, based on ecological theory, the full impact of human activities on species and ecosystems cannot be fully discerned at any one spatial or temporal scale. Forces affecting the sustainability of species and habitats may occur across longer time periods or originate from a larger geographic area than the scope of the local or regional conservation activity. In such cases,

it will be difficult, if not impossible, to assess the effectiveness of such local or regional conservation programs if they do not address these larger driving forces. A trinational approach allows a better contextual understanding of the driving forces and responses to those forces in the assessment of the effectiveness of local, regional and national conservation activities.

2. *The central grasslands have been significantly impacted historically and in recent times, by a wide array of human activities. These impacts have created a general sense of urgency in dealing the fairly impoverished biological system that remains.* That urgency has been recognized in numerous cooperative agreements to address issues relevant to grassland ecosystems. Even existing binational agreements, however, tend to focus on the "parts" rather than the "whole" of the grasslands. It is very difficult to develop a comprehensive, contextual overview for any particular issue that draws the linkages among the various driving forces and responses to the state of grasslands. A trinational strategy would help to develop and sustain the broader, integrated perspective required for assessing the efficacy of approaches to land-use management and conservation in the grasslands.
3. *Transboundary species and parts of their life-support systems (water, air) are not limited to political jurisdictions.* Thus, the conservation of North American transboundary species requires a trinational focus. The Convention on Biodiversity (CBD) addressed grasslands and their biodiversity conservation during the Conference of the Parties (COP5) sessions in Nairobi, Kenya in May 2000. The CBD recognized world grasslands, at a small spatial scale, to be the "most species-rich habitats on Earth" and that particular sites can often be of global importance for biological diversity, far out of proportion to their physical extent. The CBD recognized the potential for transboundary protected areas to help achieve the conservation of transboundary species. The development, establishment and maintenance of a system of North American transboundary protected areas requires a strategic plan that addresses the full spectrum of central North American grassland issues.
4. *Critical connections exist among the three countries in linkages and movements among species of common conservation concern.* The three federal Wildlife Services of North America have agreed to work together to protect 17 species of wild birds and mammals considered *"Species of Common Conservation Concern"* (SCCC).[*] A trinational strategy is essential in order to insure effective, common approaches to the development, implementation and monitoring of management plans for SCCC that work across organization and agency mandates and address the full spectrum of forces impacting upon such species and their habitats.

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[*] These species include the Ferruginous Hawk, *Buteo regalis*; Peregrine Falcon, *Falco peregrinus*; Loggerhead Shrike, *Lanius ludovicianus;* Piping Plover, *Charadrius melodus*; Mountain Plover, *Charadrius montanus*; Burrowing Owl, *Athene cunicularia*; Northern Spotted Owl, *Strix occidentalis caurina*; Mexican Spotted Owl, *Strix occidentalis lucida*; Golden-cheeked Warbler, *Dendroica chrysoparia*; Whooping Crane, *Grus americana*; California Condor, *Gymnogyps californianus*; Black-tailed Prairie Dog, *Cynomys ludovicianus*; Sonoran Pronghorn, *Antilocapra Americana sonoriensis*; Lesser long-nosed bat, *Leptonycteris curasoae yerbabuenae*; (Greater) Mexican long-nosed bat, *Leptonycteris nivalis*; Black Bear, *Ursus americanus*; Gray Wolf, *Canis lupus*. The complete report on these species can be obtained at <http://www.cec.org/files/PDF/BIODIVERSITY/SCCC-Web-e_EN.PDF>

5. *Issues such as the best management use of grazing and fire, sustainable wildlife harvesting, best practices to sustain dryland agriculture, the impacts of exotic species, and impacts and adaptations associated with climate change are of common concern.* At the CBD COP 5, principles of ecosystem management were adopted aimed at managing protected and adjacent areas in a coordinated and integrated approach. Based on principles of ecosystem management, a trinational strategy can address issues that transcend the concerns, or perhaps even the capacities, of any one region or country and work towards the development and implementation of best practices to address those common issues.

Ultimately, a trinational conservation strategy for central North American grasslands will be accomplished when:

- the conservation of migratory and transboundary grassland species is addressed through initiatives that attend to their whole range, and a North American perspective is adopted;
- critical grassland habitats of North America are identified, conserved and managed in a holistic, integrated and intricately linked manner;
- issues pertaining to the conservation and sustainable use of grassland biodiversity are internalized by social and economic sectors of North American society;
- all potential mechanisms, including those related to trade, economy and finance, bilateral and multilateral funds, law and policy, as well as outreach and education are used to successfully conserve and sustainably use North American grasslands; and
- all stakeholders, including those from the economic sectors, private landowners, government, academia, indigenous peoples, and nongovernmental organizations, are involved in and linked through initiatives for the conservation and sustainable use of North American grasslands.

THE PURPOSE

This book is intended to provide a framework for tri- and binational cooperation between Canada, Mexico and the United States that promotes the conservation and sustainable use of central North American grasslands.

It does so by providing a trinational overview of information about the central North American grasslands and the conservation issues faced in the region. This contextual framework seeks to move the conservation agenda forward to the eventual development of a conservation strategy for the grasslands of North America that will integrate, build upon and enhance individual initiatives found in the three countries of North America that could complement each other.

This framework document:

- provides a general overview of central North American grassland ecosystems;
- articulates a vision and guiding principles for the conservation of North American grasslands;
- provides an overview of many issues, needs and opportunities for grassland conservation in each country and highlights bi- and trinational commonalities; and
- determines the role of a trinational strategy, highlighting the opportunities for

international cooperation with regards to the conservation of grassland habitat and wildlife, including the SCCC.

It is intended that this document should serve:

- as a guidance document, not a set of rigid prescriptions;
- to foster awareness and cooperation in the three nations through existing programs and delivery mechanisms;
- to help to link the work or initiatives of other national/international groups working on grasslands;
- to strengthen the involvement of other resource groups besides wildlife, e.g. land, soils, agriculture, water groups;
- to strengthen the involvement of landscape-based and habitat-based professional groups;
- to garner support at the national/international level as well as land owners and managers with a focus on land stewardship; and
- To provide a focus on grasslands at the habitat/ecosystem levels while not losing focus on the species of common conservation concern.

THE PROCESS

The Commission for Environmental Cooperation (CEC) has a mandate from the federal governments of the United States, Canada and Mexico to provide guidance on environmental issues of trinational concern related to the North American Free Trade Agreement. The CEC seeks to meet its mandate by promoting cooperation throughout North America based upon an open, participatory approach. In keeping with that approach, the development of this framework document builds upon the views of advisors and stakeholders from a wide range of North American society. Appendix 1 shows the activities and timelines involved in the development of CEC's grassland initiative to date.

Through the process of working towards the development of a trinational strategy for the conservation of central North American grasslands, it is the CEC's intent to foster trinational cooperation among organizations and agencies and to complement and support ongoing efforts. That process (see Appendix 1) began in 1995 with a standardized description of ecological regions throughout North America. In 2000 the three federal Wildlife Services of North America agreed to work together to protect 17 species of wild birds and mammals considered *"Species of Common Conservation Concern"* (SCCC). Given that the majority of these species are associated with grasslands, the CEC organized a workshop to establish the foundations of a conservation strategy for these species. The workshop took place in Nuevo Casas Grandes, Chihuahua, Mexico, March 2001 (CEC 2001), and involved government representatives from Canada, the United States and Mexico, as well as representatives from non-government organizations (NGOs), academia and landowners. One of the key results of this workshop was the elaboration of a preliminary shared vision, which emphasized the need to protect grassland species through the conservation of their habitat.

Following upon the suite of recommendations resulting from the Trinational Grassland SCCC workshop held in Chihuahua, the CEC agreed to facilitate, in cooperation with Mexico, Canada, and the US, a focus on the conservation of grasslands of trinational importance. While the CEC recognizes the importance of all North American grass-

lands, the focal attention of this work is at the trinational level, and therefore CEC's role is to facilitate and catalyze processes for central North American grasslands conservation that would benefit from a trinational coordinated approach to conservation.

Taking into consideration the main outcomes from the Chihuahua trinational grasslands meeting and recognizing the relevance of building upon current and past conservation efforts and strategies oriented towards grassland conservation in North America, the authors are confident that continued cooperation among the three countries will lead to a North American strategy for grasslands conservation.

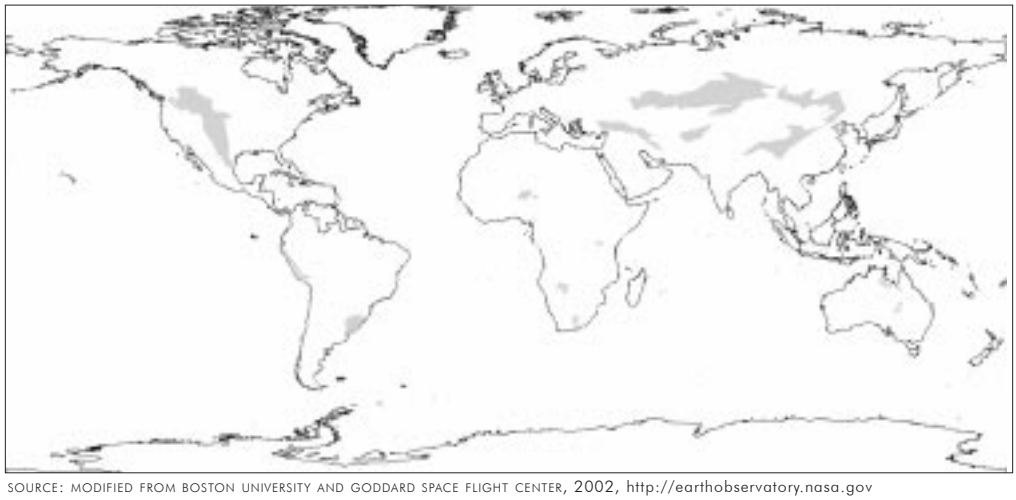
OVERVIEW: GRASSLAND ECOSYSTEMS

WORLD GRASSLANDS AND NATURAL PROCESSES

Grassland ecosystems cover between 41–56 million km² (31–43%) of the earth's surface (see Figure 1) (Brown 1989; Curry-Lindahl 1981; World Resources Institute 2000). They represent one of the earth's major biomes and, historically at least, are one of the most productive and diverse terrestrial ecosystems (IUCN 1994).

Grasslands are "terrestrial ecosystems dominated by herbaceous and shrub vegetation, maintained by grazing, fire, drought and/or low temperatures" (World Resources Institute 2000). These processes are dynamic and display great variability in terms of time, extent, intensity, and place. The range of variation of these processes is a critical component of grassland biodiversity.

Figure 1. World grasslands



SOURCE: MODIFIED FROM BOSTON UNIVERSITY AND GODDARD SPACE FLIGHT CENTER, 2002, http://earthobservatory.nasa.gov

Grazing

The variability of grazing activity created by different animals at different times is a vital part of the ecosystem. Prairie vegetation reflects adaptations to the long history of grazing pressure. Many perennial prairie grasses grow from points at or below the soil surface, rather than from the tip of the plant, and can rapidly grow new leaves and shoots after being grazed. Some prairie plants have also adapted to grazing pressure by developing spines, prickles or toxic substances which discourage grazers. Grazing helps to prevent trees

Millions of bison once roamed the North American grasslands.

(SOURCE: CANADIAN PLAINS RESEARCH CENTER)

from overtaking the grasses since tree seedlings are destroyed when their tips are eaten. While most birds and animals flourish under moderate grazing regimes, some species need heavily grazed areas to exist, while others thrive only in lightly grazed areas.

Fire

Fires typically burn surface growth, but usually do not kill off the deep root systems of grasses. Fire also helps impede the colonization of new sites by invader plant species, alters soil structure, and reduces insect populations. In the past, in addition to the natural occurrence of fires, aboriginal people set fires to stimulate vegetative growth and attract animals that depended on early successional vegetation.

ABOVE: Prairie fire. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

BELOW: Blowing soil caused by drought conditions (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

Drought

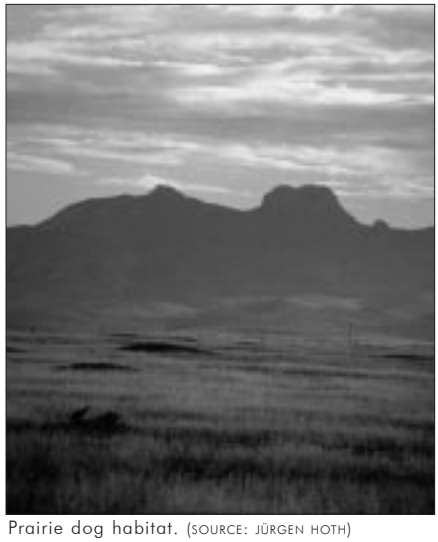
Periodic droughts are a natural feature and play a key role in the ecosystem dynamics of the central grassland environment. The influence of drought on grassland ecosystems can be complex. Generally, diverse plant communities are more resistant to, and recover more fully from, major drought. Such findings raise concerns about the resilience and maintenance of productivity on grasslands that have been converted to less diverse cropland and tame pasture. As well, plants and animals in grasslands may face additional pressures from changes to the intensity and periodicity of droughts resulting from changes to precipitation and temperature regimes due to human-induced impacts such as increased carbon dioxide concentrations in the atmosphere.

Erosion and Deposition

Erosional and depositional processes support the biological diversity that characterizes grasslands. For example wind erosion keeps some sand dunes active, providing a home for species adapted to more arid conditions. Periodic flooding in some regions deposits seeds and rich silts on river valley floors creating suitable seedbed conditions for the rejuvenation of riparian areas.

Animal Activity

Some species such as ground squirrels, badgers and earthworms serve to actively mix grassland soils when they dig their burrows and get their food, thereby facilitating air and water movement in the soil, and adding organic material to the soil.



Prairie dog habitat. (SOURCE: JÜRGEN HOTH)

Grasslands—Dynamic and Imperiled Ecosystems

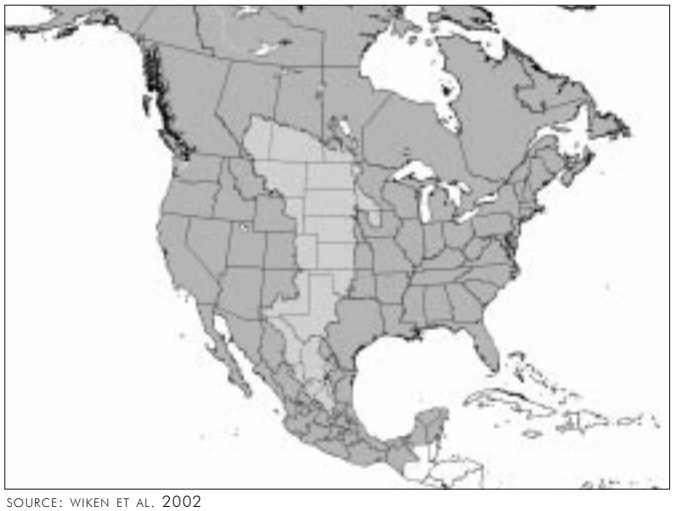
Grassland ecosystems are not static. Soil structure changes as organic materials increase or decrease. Water and wind erosion create badlands topography (equivalent in Mexico to "Malpais" which is uneven/steep/rocky land unsuitable for agriculture or grazing) and areas of shifting sand dunes. Periodic droughts, floods, cold spells, and other climatic changes are natural phenomena that have been occurring for millennia to which plants and animals have either adapted or been eliminated.

Today, grasslands of all types are the most imperiled ecosystem on the planet, their habitats having been modified by human activity to such a degree that a low percentage remains in a natural state relative to other habitats (World Resources Institute 2000). There are some understandable reasons for this. Grasslands in all latitudes have provided for human needs since early evolutionary times and many grasslands constitute some of the most productive agricultural lands on earth which are a foundation of the world's food supply.

NORTH AMERICAN GRASSLANDS

The three great areas of grasslands of the Americas are the great plains of north and central Mexico, mid-United States and south-central Canada; the Pampas in Argentina and Uruguay; and the flats of Venezuela and Colombia (White et al. 2000). As part of the CEC's focus on North American grassland species of common conservation concern, an updated map of the central grasslands of North America was developed by Wiken et al. (2002). That map (see Figure 2) shows the distribution of central grasslands of North

Figure 2. Extent of the central grasslands in North America



SOURCE: WIKEN ET AL. 2002

Table 2. Summary statistics, central grasslands of North America (Wiken et al. 2002)	
Central Grasslands of North America	4,110,764 km² or 19% of the continent (area of Mexico, US and Canada = 21,353,000 km²)
United States central grasslands	2,385,417 km² or 25% of the continental US (continental area of US = 9,372,000 km²); 58% of all N.A. central grasslands
Canada central grasslands	1,156,988 km² or 12% of Canada (area of Canada = 9,985,000 km²); 28% of all N.A. central grasslands
Mexico central grasslands	567,624 km² or 28% of Mexico (area of Mexico = 1,996,000 km²); 14% of all N.A. central grasslands

Table 3. Grassland and non-grassland cover types of North America (Wiken et al. 2002)

LAND COVER TYPES	CANADA Sq. Km.	%	USA Sq. Km.	%	MEXICO Sq. Km.	%	Total Sq. Km.	%
Non-Grasslands	768,236	44.20	809,625	46.60	159,402	9.17	1,737,975	42.3
Grasslands	7,632	1.85	395,750	96.20	8,111	1.97	411,494	10.0
Grasslands + Minor Cropland	29,651	8.02	323,131	87.40	16,911	4.57	369,693	9.0
Grasslands + Minor Natural Cover	5,263	1.10	292,524	61.40	178,850	37.52	476,636	11.6
Cropland + Minor Grassland	341,255	48.57	336,605	47.90	24,766	3.52	702,649	17.0
Natural Cover + Minor Grassland	4,951	1.20	227,782	55.20	179,584	43.55	412,317	10.0
Central Grassland Study Area	1,156,988	28.15	2,385,417	58.03	567,624	13.81	4,110,764	100.0

America, and Tables 2 and 3 provide information on the area of central grasslands in the three countries.

Geographical Setting

In North America the central grasslands are the largest vegetative province, covering around one-fifth of the subcontinent and representing 7–10% of the grasslands of the world. The central grasslands extend over the widest latitudinal range of any single North American ecological region and constitute a relatively continuous and roughly triangular area covering about 4.1 million km². They extend from the provinces of Alberta, Saskatchewan and Manitoba in Canada, south through the central, northern and mid-west states of the United States to southern Texas into northeastern and central Mexico, and from western Indiana to the foothills of the Rockies. In the United States, the central grasslands border the Chihuahuan Desert to the southwest, the subtropical thorn woodland to the south, mixed coniferous and deciduous forest to the southeast, deciduous forest to the east, boreal forest to the north, and the foothills of the Rocky Mountains to the west (Lauenroth et al. 1999). Canada's central grasslands include the Prairie and Boreal Plains ecozones extending from the Precambrian Shield in eastern Manitoba, through southern and central Saskatchewan, to the foothills and northern regions of Alberta and a northeastern portion of British Columbia. Grass is the dominant vegetation of the prairies, but there are also a variety of forbs and low shrubs present. Taller shrubs and trees, mostly cottonwoods, are found in areas where there is sufficient moisture. In Canada the prairie grasslands also surround a small, geologically unique upland that has a lodgepole pine vegetation similar to that found in

montane regions to the west. Mexico's grasslands are largely concentrated in the Altiplano Mexicano (Mexican Plateau) region, which includes part of the submontane scrubland in the Chihuahuan Desert and Tamaulipecan shrubland. The Chihuahuan desert is considered to be one of the most biologically diverse arid regions in the world, uniquely characterized by vast temperate grasslands located at mid-elevations on mountains flanking the desert (Hoyt 2002). This region is located between Sierra Madre Occidental in the west, and Sierra Madre Oriental in the east, while the Altiplano Potosino-Zacatecano Plateau limits the south, including the Bolsones and intermountain valleys that used to be dominated by open grasslands and now are composed by desert scrublands and izotales (Rzedowsky 1981).The area includes 10 states of Mexico (Sonora, Chihuahua, Coahuila, Durango, Nuevo León, Tamaulipas, Zacatecas, San Luis Potosí, Guanajuato and Querétaro) which contain 247 municipalities.

Burrowing owl. (SOURCE: JÜRGEN HOTH)

Physical Setting

TOPOGRAPHY, GEOLOGY AND SOILS

The central grasslands occupy smooth to irregular landscapes. In the northern and central grasslands, most of the rivers have their origins in the Rockies, where rainfall, snowmelt and glacial runoff in the north contribute to their formation. The soils are commonly deep throughout most of the region and were originally highly fertile. The main soil classes of the central grasslands (based on the US Soil Classification System) are Mollisols, Entisols, Aridisols, Vertisols, and Ustalfs (Peterson and Cole 1995). Over 90% of the carbon in grassland ecosystems is in the soil, and these soils store substantial amounts of atmospheric carbon (Burke et al. 1997, Connor et al. 2000). For example, Burke et al. (1997) have estimated that temperate grasslands contain 18% of global soil C reserves, more that any other ecosystem except for forest ecosystems (World Resources Institute 2000: 51). Today, soils of agricultural potential throughout the central grasslands face problems of reduced nutrient potential, increasing salinity and susceptibility to wind and water erosion.

In Canada the central grasslands are generally flat to slightly rolling plains. The landscape of the Canadian Prairies (as well as the northern prairies of the United States) has been shaped by a variety of glacial deposits consisting mostly of undulating and kettled glacial till, and level to gently-rolling lacustrine deposits. These landforms are associated with intermittent sloughs and ponds. The Canadian prairie is underlain by Pleistocene sedimentary rock, which was extensively scoured by both continental and cordilleran glaciation. The present landscape, formed after the last glacial period ended 12,000 years ago, includes old lake beds, gently undulating plains, rolling hills, wetlands, coulees, sand dunes, and exposed bedrock. Several well-defined river valleys cut through the region, exposing Cretaceous shales and sandstones.

In the United States, the central grasslands are characterized by gentle topography, sloping from about 1500 meters in the west to about 300 meters in the east (Reiners 1995, Lauenroth et al. 1999). Sizable portions in the United States are hilly or classified as tablelands with moderate relief (100–175 m). Several islands of rougher topography and different ecosystems lie within the Central grasslands, the most notable being the Black Hills of South Dakota and Wyoming. The northern plains were glaciated during the last ice age and are dotted with millions of ponds and lakes called "Prairie Potholes." Similarly, the southern plains are scattered with depressions called "Playa Lakes" that are periodically filled with water. Surficial geology in the remainder of the central grasslands is varied. Major portions are eolian, others are stream deposits, and much of the region is comprised of thin residual sediments.

Mexican grassland landscapes alternate flat areas and low hills. Dominant soil types in the Mexican grasslands include Xerosol, Litosol, Rendzina and Solonchak, while the dominant rock types are volcanic (from the Cenozoic Period) and sedimentary (from the Mesozoic and Cenozoic periods) (COTECOCA, 1972).

CLIMATE

The climate of the central grasslands is dry and continental, characterized in the north by short, hot summers and long, cold winters. High winds are an important climatic factor in many parts of the grasslands since they evaporate moisture from soil and plants. The central grasslands are also subject to periodic, intense droughts and frosts. Low annual precipitation is a defining characteristic of central North American grasslands.

The climate of the central grasslands of Canada, with an average of 250 to 750 mm of rain and snow annually, ranges from semi-arid to humid continental, with long and cold winters, short and very warm summers, and cyclonic storms. Precipitation is generally low, but it increases slightly from south to north and more markedly from west to east. Spring is the wettest season in most of the Canadian central grasslands, while temperatures range from very warm summer temperatures (40 °C) to very cold winter weather (–40 °C). Temperatures are highest at lower elevations in the south, progressively decreasing with increasing altitude and latitude. The precipitation trend, combined with the temperature gradients, creates a series of climatic zones from cool semi-arid in the southwest to moderately cold subhumid in the northeast. Climatic zonation also occurs in response to altitude, as moderately cold semi-arid to subhumid conditions prevail on uplands in what is otherwise the driest part of the Canadian central grasslands.

Due to their position in the interior of North America, the US central grasslands are representative of a continental climate. The presence of persistent low pressure to the north causes prevailing westerly winds (Borchert 1950). The prevailing westerlies, along with the orographic effect of the Rocky Mountains to the west, causes much of the precipitation, especially in winter, to be deposited in the mountains (Borchert 1950). Thus, the central grasslands west of the 100th meridian are in the rain shadow of the Rockies. There are 5 main climatic subtypes, represented from west to east by arid, semi-arid, dry subhumid, moist subhumid, and humid (Lauenroth et al. 1999). Mean annual precipitation follows a smooth gradient ranging from 200–400 mm in the west to above 1,000 mm in the east (Lauenroth et al. 1999). Most of this precipitation falls during the growing season, and no region receives more than 20% of its precipitation during the winter (Lauenroth et al. 1999). Patterns of precipitation are characterized by high variability within seasons and by periodic drought from year to year

(Borchert 1950). Evaporation exceeds precipitation (Dornbusch et al. 1995). In general, summers are hot and winters are cold, with large seasonal temperature variations. Mean annual temperatures generally increase from 16–20 °C in the south to 0–4 °C in the north (Lauenroth et al. 1999). The number of annual frost-free days varies from over 240 in the south to 81–120 in the north (Reiners 1995).

In Mexico, the climate in the Chihuahuan Desert area is extremely dry (Köppen type B, modified by E. García) with an annual mean temperature between 18 °C, an annual average rainfall of 200 to 600 mm and a summer rain regime.

BIOLOGICAL SETTING

The central grasslands in their native state supported rich and highly specialized plant and animal communities. The interaction of climate, fire and grazing influenced the development and maintenance of the central grasslands. The increasing amounts of rainfall from west to east defined different types of native prairies. Shortgrass prairie occurs in the west, in the rain shadow of the Rocky Mountains, with mixed-grass prairie in the central grasslands and tall-grass prairie in the wetter eastern region. In the Mexican grasslands, prickly scrub vegetation currently dominates the landscape, in transition between the desert conditions and the warmer and wetter conditions of the Prickly Tropical Forest (warm-dry forest). Because of the suitability of the central grasslands for agricultural production, many native prairie vegetation types have been radically transformed. The short-, mixed- and tall-grass prairies of the central and eastern grasslands now correspond to the western rangelands, the wheat belt and the corn/soybean regions, respectively. Those landscape transformations have had important influences on grassland biodiversity (e.g., for impacts on birds, see Blancher 2003).

Canada

The central grasslands of Canada constitute a relatively young ecosystem following glaciation just 12,000 years ago. Grass is the dominant vegetation of the prairies, but there are also a variety of forbs and low shrubs present. The increasing amounts of rainfall from west to east defined different types of native prairies. A mixed-grass community dominates the central part of the ecozone, where a late summer moisture deficit, caused by low precipitation and high evapotranspiration, and periods of extensive droughts typify the climate of the area. The vegetation includes what are often referred to as “short grasses” (blue grama grass and June grass) and “mid to tall grasses” (wheatgrasses, needle-and-thread, and porcupine grass), along with pasture sage and club moss. Drier sites in the southwest support sparser grass cover with abundant prickly pear and sagebrush. Northward and eastward from the mixed grassland, moisture deficits are less severe and droughts are less prolonged. Here, “mid-grass”-dominated mixed grasslands alternate with plains rough fescue grasslands, more extensive shrublands, aspen grove woodlands, and wetlands. The Aspen Parkland, the northern transition zone to the boreal forest, has expanded south into former grasslands since European settlement effectively stopped prairie fires. Also in Canada the prairie grasslands surround a small, geologically unique unglaciated upland (the Cypress Hills) that has lodgepole pine forest and fescue grassland similar to that found in montane regions to the west. Today, the remaining natural vegetation is dominated by spear grasses, wheat grasses and blue grama grass, where local saline areas feature alkali grass, foxtail barley, greasewood, red samphire and sea blite.

In the historic past, large populations of grazing animals (for example, bison, elk, pronghorn antelope, jack rabbit, Richardson’s ground squirrel, northern pocket

RIGHT: Meadowlark. (SOURCE: MANITOBA CONSERVATION)

BELOW: Pronghorn Antelope. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

gopher) inhabited the Canadian prairies and were preyed upon by several species of predators (for example, plains wolf, plains grizzly bear, black-footed ferret, swift fox, long-tailed weasel, badger, and coyote). White-tailed deer are a recent invader. Examples of representative bird species of the Canadian prairies include long-billed curlew, Swainson's hawk, ferruginous hawk, burrowing owl, black-billed magpie, brown thrasher, Sprague's pipit, Baird's sparrow, chestnut-collared longspur, lark bunting, western meadowlark, and brown-headed cowbird.

Species such as the plains grizzly and wolf have largely been eliminated from most of the Canadian prairie, where they once roamed. At least one prairie species, the passenger pigeon, is known to be extinct. Many other species may have disappeared without recognition. Freshwater snail species, for example, are very environment specific, and many may have died out when the wetlands in which they lived were drained. In Alberta, for example, 7 of 9 species rely on prairie habitats, and 78% of wildlife species have been assessed as being seriously at risk, with four native prairie plants currently endangered or threatened.

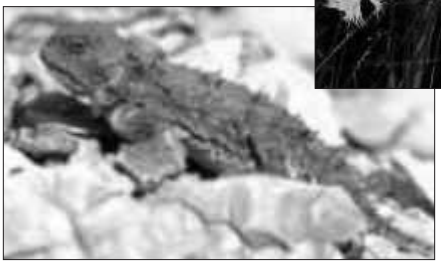
The United States

The central grasslands of the United States are subdivided into 3 major grassland classifications: tallgrass prairie (or "true prairie"), mixed-grass prairie (or northern and southern mixed prairie), and shortgrass prairie (or shortgrass steppe) (Lauenroth et al. 1999). Native prairie vegetation ranges from grama grass, wheatgrass and bluestem prairie in the north, to different shrub and grassland combinations (e.g., mesquite-acacia savanna and mesquite-live oak savanna) and grassland and forest combinations (e.g., juniper-oak savanna and mesquite-buffalo grass) in the south. There are also areas of blackland prairie, bluestem-scachuista and southern cordgrass prairie in the southern US. The eastern border of the region, stretching from central Iowa to Texas, shows patterns of grassland and forest combinations mixed with oak-hickory forest. Throughout the remainder of the US central grasslands there are few native deciduous trees that occur, except in the eastern regions or in very sheltered locations along waterways or at upper elevations.

Swift fox. (SOURCE: CANADIAN PLAINS RESEARCH CENTER)

The prairie mammal community is dominated by species that colonized the grasslands from surrounding ecosystems (Benedict et al. 1996). Only 11.6% of species are considered true grassland species. This paucity of endemic species is due, in part, to the young geological age of the region, climactic changes during the last Ice Age, hunting pressure by early humans, and a

RIGHT: Western Prairie Fringed Orchid. (SOURCE: TOM SPIEKERMEIER)
BELOW: Eastern Short-horned lizard. (SOURCE: CHRIS D. GRONDAHL)



high degree of altercation of the habitats by current humans (Benedict et al. 1996). Most large predators, and two species that historically had great influence on the habitat, the black-tailed prairie dog and the bison, have been much reduced in number (Benedict et al. 1996). The primary mammalian grazers on today's grasslands are domestic cattle, and lagomorphs (Lauenroth and Milchunas 1991).

As with mammals, the number of endemic bird species is low. There are only 9 endemic breeding species, and another 20 are considered secondary, more widespread grasslands associates (Knopf 1996). At least 124 species (90 reptiles and 34 amphibians) are associated with grassland or desert habitats in the US central grasslands (Corn and Peterson 1996). Species occur in declining gradients from south to north and from east to west (Corn and Peterson 1996).

Grassland streams are, in general, low gradient, highly meandering, and have rich biota (Rabeni 1996). There are approximately 204 species of fish found in the central grasslands of the US (Rabeni 1996). Although the number of invertebrate species associated with central grasslands is not known, that number would dwarf all others and make up the majority of species present (Arenz and Joern 1996). Arthropods (insects and spiders) typically represent the largest groups in terms of numbers of species, and make up a large portion of the total biomass in grassland ecosystems (Arenz and Joern 1996, Lauenroth and Milchunas 1991). Insect diversity increases from north to south (Arenz and Joern 1996).

Mexico

In Mexico, the characteristic natural vegetation of the grasslands consists of prickly scrubs, with dominant species including creosotebush, mesquite, acacia, paloverde, silverleaf, hackberry, Texas olive, barreta, corbagallina, and ocotillo. Salt-tolerant communities are common in the lower portions of the Mexican central grasslands near the Laguna Madre. Among many other critical contributions, Mexican grasslands host the largest black-tailed prairie dog colony remaining in North America.

However, many Mexican grassland species have suffered substantial declines, largely as a result of: (1) competition with human activities, resulting in the extirpation or significant reductions of the grizzly bear, Mexican wolf, jaguar and ferruginous hawk; (2) large scale wildlife removal campaigns, for instance using "1080" poison (sodium monofluroacetate), indiscriminately applied throughout northern

Black-tailed prairie dog. (SOURCE: JÜRGEN HOTH)

Mexico through a program jointly developed by ministries of the United States and Mexico and implemented in 1956 without consideration of the impacts to the larger grassland ecosystem; and (3) the introduction of livestock by colonizing Spaniards (1540–1680) that had significant negative competitive effects on bison, pronghorn, mule deer and prairie dogs. Additionally, hunting has decimated some wildlife species. Another key factor affecting grassland ungulates such as bison and pronghorn has been the presence of artificial fences. These fragment habitats, resulting in population losses. "Overgrazing, water diversion, aquifer 'mining' (pumping at an unsustainable rate), and over-collecting of native plants and animals are considered the greatest threats to biodiversity in the Chihuahuan desert ecoregion" (Hoyt 2002: 16).

Burrowing owl. (SOURCE: JÜRGEN HOTH)

Moreover, the vulnerability to climate change of the biota of the Mexican portion of the Central grasslands is further underscored through the potential impacts of climate change. Recent projections for assessing the potential impact of global climate change on the Mexican fauna (Peterson et al. 2002) indicate that, under a small climatic change (conservative scenario), the Mexican portion of the Central grasslands may suffer the highest species turnover (40%) of all ecosystems in central and northern Mexico. This pioneer study included the information of all known Mexican mammals, birds and two families of butterflies (n=1,870 species).

Water, Wetlands and Waterfowl

Water is arguably the most limiting resource in the central grasslands, and the region is characterized, in general, by low amounts of surface water.

In the Canadian prairie pothole region of the northern Great Plains, wetland concentrations are generally greatest in the glaciated, subhumid northern grasslands and adjacent aspen parkland, where up to half of the land is wetland. These wetlands provide major breeding, staging, and nesting habitat for shorebirds and migratory waterfowl. Overall, these wetlands provide critical habitat for more than half of North America's ducks and are key staging or breeding areas for many western hemispheric species of shorebirds.

The US portion of the region contains 24 major river systems (Rabeni 1996), generally flowing from west to east. The prairie potholes region of the US covers approximately 870,000 km^2 in its northern grasslands and contains 2–7 million depressional wetlands resulting from the last glacial period (Bratt 1996). This region is an extremely important breeding area for migratory waterfowl. Significant wetlands are also found in the Nebraska sandhills as well as in the southern US grasslands,

Snow geese. (SOURCE: CANADIAN PLAINS RESEARCH CENTER)

where there are approximately 25,000 depressional wetlands called "Playa Lakes." There are 3 major underground aquifer systems in the central grasslands: the High Plains or Ogallala Aquifer, the Northern Plains Aquifer, and the western portions of the Midwest Regional Aquifer (Dornbusch et al. 1995).

During winter, the Mexican bodies of water provide habitat for numerous migrant waterfowl from Canada and the United States. From a biodiversity viewpoint in Mexico, the lagoons and playas (saline ephemeral lakes) of the Chihuahuan desert were the most productive, given that they served for centuries as wintering habitat for millions of waterfowl, shorebirds and grassland birds. However the construction of dams (such as El Palmito, La Boquilla, Las Lajas, El Tintero and Las Vírgenes) built from the late 1800s to the mid-twentieth century resulted in the gradual desiccation of playas and lagoons. "Up to 99 percent of the water in the perennial rivers of the Chihuahuan Desert is diverted to municipal water supplies or to irrigate fields" (Hoyt 2002: 17), resulting in the loss of native fish populations and riparian forests. Today, the level of biodiversity loss due to this cause remains largely unknown.

HUMAN ACTIVITIES

The central North American grasslands have both supported and been shaped in different ways by a variety of human cultures. Smithsonian (2001) documents a mosaic of 36 distinct First Nations/Native Americans (Table 4) who, prior to European settlement, were supported by the central grasslands, which was also home to millions of bison, pronghorn antelope, elk, mule deer, plains grizzly bears and plains wolves. Today, the central grasslands have a disproportionately high number of rare, threatened, vulnerable and endangered species. Some species are extirpated while others have suffered severe reductions. Other less visible species (e.g., insects) may have

The grasslands supported a mosaic of 36 distinct First Peoples/Native Americans (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

Table 4. Tribes of the Central Grasslands of North America (overall North to South distribution, early 19th century)

Stoney	Yankton-Yanktonai	Missouria	Navajo	Mescalero Apache
Sarcee	Santee	Comanche	Tiwa	Jocome and Jano
Blackfoot	Cheyenne	Kiowa	Tewa	Suma
Gross Ventre	Teton	Plains Apache	Tano	Jumano
Plains Cree	Ponca	Osage	Pecos	Concho
Plains Ojibwa	Omaha	Wichita	Tompiro	Tarahumara
Assiniboine	Iowa	Quapaw	Acoma	Toboso
Crow	Arapaho	Kitsai	Zuni	Tepehuan
Hidatsa	Pawnee	Lipan	Hopi	Zacatec
Mandan	Otoe	Tonkawa	Western Apache	Pame
Arikara	Kansa	Jicarilla Apache	Chiricahua Apache	

Sources:
Smithsonian 1983. *Handbook of North American Indians: Southwest.* A. Ortiz and W. Sturtevant (Eds.). Smithsonian Institution. Washington. Vol 10. 868 pp.
Smithsonian 2001. *Handbook of North American Indians: Plains.* R. DeMallie and W. Sturtevant (Eds.). Smithsonian Institution. Washington. Vol 13. 1360 pp.

disappeared without ever having been recorded by science. While climate, fire and grazing are often cited as dominant factors influencing natural prairie environments, the cumulative impacts of human activity over the past century have had the largest effect in reshaping the grasslands. Human population and demographic trends, the economics of farming and ranching combined with agricultural policy and industrial development—all have been driving forces in shaping the impacts of human activity throughout the grasslands.

Demographics

CANADA

In 1996 there were approximately 3.97 million people occupying the Canadian prairies (Statistics Canada 1997). However, similar to the US prairies, the vast majority of the Canadian prairie population lives in urban areas. In Canada, the proportion of the urban population in the prairie ecozone is 81%, compared to 76% for all of Canada, a remarkable figure given that agricultural activities dominate the landscape and that urban land use occupies only 0.3% of the region (Government of Canada 1996). In the Canadian prairies, urban growth accounts for 95% of population growth (Statistics Canada 2000a). Decreases in rural populations have been the norm since 1990, and projections are for that to continue, with Saskatchewan experiencing the greatest emigration from rural areas. Loss of young

Small towns dot the rural landscape on the Prairies. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

people and an increasing proportion of people aged 65 or older are also common trends in rural prairie Canada (Roach and Berdahl 2001).

UNITED STATES

In 2000 there were 8.58 million people in the 449 US counties in the mixed-grass and shortgrass prairies (US Bureau of Census 2001). Overall, the population of the central grasslands of the United States has exhibited the slowest growth in the US over the last 50 years (Rathge 1995). Most of this growth has occurred in the few metropolitan areas, while the majority of rural areas have declined in population during the same time period (Rathge 1995). For example, in the United States 56% of the population was located in urban counties that comprise only 7% of the landscape. In contrast to the central grasslands as a whole, tribal populations have shown population increases throughout, and indications are that these trends will continue into the future. The majority of the people leaving the rural areas are young, which creates a natural decrease, and leaves a large elderly population remaining (Rathge 1995).

Within the rural central grasslands are some of the least populated areas of the continent. In the shortgrass and mixed-grass regions in the United States there were 229 counties (51%) in 2000 that had less than 2.34 people per square kilometer, the threshold that the 1890 census used to define "frontier" (i.e., six people per square mile). Seventy-six counties (17%) had less than 0.78 people per square kilometer, a threshold that the 1890 census used to define "wilderness" (i.e., two people per square mile). Central grassland rural populations have been declining since the 1930s. Consider that North Dakota was only 21% "frontier" in 1920 while in 2000 the figure was 68%. Throughout the mixed-grass and shortgrass prairies, 60% of the US counties lost population from 1990 to 2000. Of the 100 counties that had the greatest population loss (percentage wise) in the United States from 1990 to 2000, 74 were in the mixed-grass and shortgrass prairies, even though the region only has 14% of all US counties. Projections for the central grassland states show modest population increases to the year 2025 (Campbell 1997); yet current trends suggest that most of the growth will occur in urban areas, with rural areas experiencing population declines.

The demographic decline in the rural central grasslands of Canada and the United States has been well documented and can be traced directly to the fortunes of the agrarian economy. The decline is most simply and cogently explained by the economics of supply and demand. For example, in 1940 the American farmer produced enough food to feed 10.7 people, while in 1980 the same farmer produced enough food to feed 75.7 people, a 707% increase (Gauthier and Licht, in press). Yet during that same period the US population increased a comparatively modest 71%. When supply exceeds demand the most marginal producers are the first to suffer. Some of the most marginal agricultural producers are found in the shortgrass and mixed-grass plains.

MEXICO

The Mexican central grasslands, among the least populated areas in Mexico, exhibit similar patterns to the United States and Canada. The concentration of population is around 36 persons per square kilometre in those 55 million hectares of area. The annual population growth rate is 1.7%, and 40% of the population is under 18 years old. Excluding the major urban centres of Monterrey, Chihuahua, Saltillo, Juarez, San Luis Potosí, Zacatecas and Durango, the concentration of population is around 36 persons per square kilometer in those 55 million hectares of area. Ten percent of the popula-

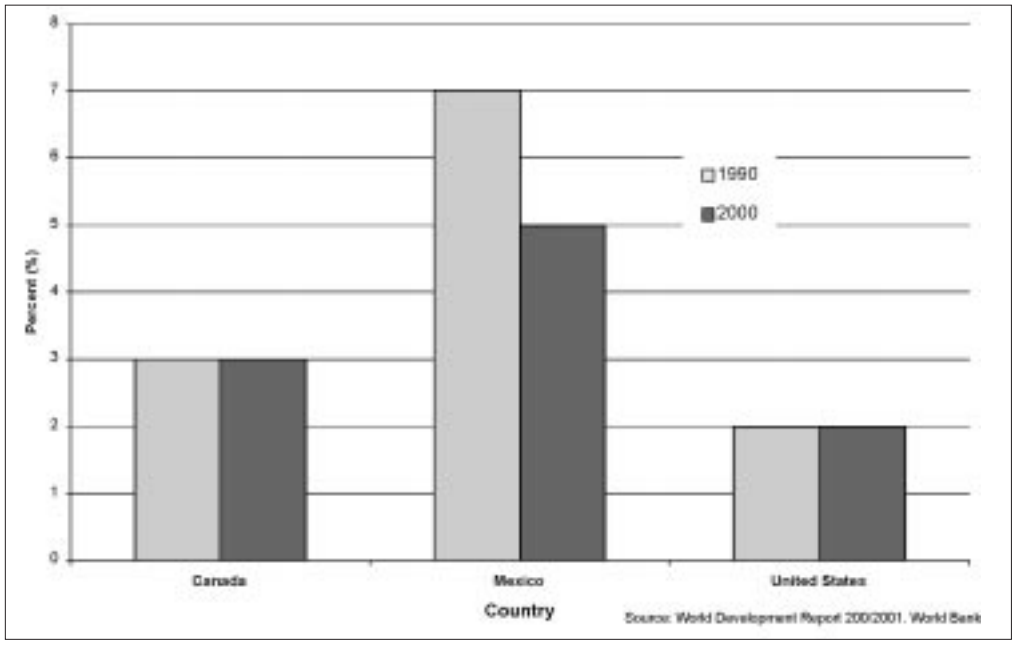
tion is made up of those considered to be primary workers (farmers, cattle risers and loggers), while an additional 10% are from the secondary sector. Ethnic groups include: Yaquis, Pimas, Tepehuanes, Tarahumaras, Huarojios, Kikapues, Huicholes, Guachichiles, Pames, Huastecos, Coras (INI personal communication). Twenty-five percent of the population does not read or write, 55% did not finish elementary school, 20% finished secondary school, 15% went to high school, 10% have a college degree, and 5% finished graduate school. Mexico's Institute for Statistics, Geography and Informatics (INEGI) reports migration from rural to urban areas due to shortage of employment opportunities, drought and increasing job opportunities in the in-bond "maquiladora" industry. The percentage of the rural-to-urban migrants ranges from 2.5 to 27% of the economically active segment of society. Similarly, the population growth in towns within the Chihuahuan Desert is minimal or even negative.

Agricultural Activity and the Agricultural Economy

The central North American grasslands is a culturally-molded ecosystem and has been shaped in different ways by the influence of a variety of human cultures over its full extent. However, agriculture constitutes the dominant land use activity with the most significant consequences to the region. Figure 3 shows the value of agriculture in terms of the percent of GDP for Canada, Mexico and the United States for 1990 and 2000. Farming in the central grasslands has been traditionally characterized by a limited variety of crops. For example, in Canada, only 15 field crops (grain, oilseeds, and pulses) and even fewer forage crops occupy more than 95% of the cropped area (Government of Canada 1996). Beef and dairy cattle, swine, horses, chickens, and turkeys are the primary domesticated animals.

In the United States and Canada, the first European settlers began moving westward into the northern and central grasslands from the eastern forest regions. At first,

Figure 3. Agriculture as a percentage of GDP



settlers considered the prairies to be infertile, so they stayed where trees persisted. But soon, settlers realized that the prairie soil was one of the most productive soils in the world. Today, the prairie grasslands of the United States and Canada are among the largest farming and ranching areas of the earth. Agriculture is the most important economic activity, as well as the dominant land use. A significant portion of the food produced in North America comes from the prairies, including cereal grains, oilseeds, and livestock. Irrigation, intensive farming practices and agricultural industries have helped to augment the productivity of the region and have contributed significantly to the regional economy, which provides for a relatively high quality of life for its citizens. Historically in the United States and Canada, ranching has helped to preserve and maintain native grasslands, whereas in Mexico it has led to severe situations of overgrazing and loss of biodiversity.

There are approximately 535,000 farms and ranches in the US central grasslands averaging approximately 405 hectares (1,000 acres) each, over twice the national average (Skold 1995). The main cultivated crops are sorghum, wheat, corn, sunflowers, canola, cotton and beans. Corn is grown along the eastern and the more moist northern and central portions, whereas winter wheat and sorghum predominate in the central and southern parts. In the undulating and drier land of open scrub vegetation in the southwest, extensive cattle and goat ranching is very important. In portions of the region, scrub vegetation has been replaced by hay meadow. The Rio Grande crosses this region, acting both as an international border for 650 kilometers and as an area of extensive commercial activity. The central grasslands produces about 51% of all wheat harvested, 50% of all cattle fed, 40% of all sorghum, 22% of all cotton, and 13% of all corn in the United States (Skold 1995). The mixed-grass and short-grass regions of the US produced US$146 billion of agricultural products (market value) in 1997 (National Agricultural Statistics Service 1999). Yet the agrarian economy in both Canada and the United States has been depressed, and may continue to be for the foreseeable future. Canada, for example, has experienced a general decline in net farm income in all three prairie provinces, largely as a result of lower commodity prices for grains and oilseeds in Saskatchewan and Manitoba, and

An Alberta wheat field (above) and a Nebraska corn field (below) are both aided by irrigation. (SOURCES: ABOVE, ALBERTA PRAIRIE ENVIRONMENT SERIES, AND BELOW, TOWN OFFICE, HAZARD, NEBRASKA)

higher livestock expenses in Alberta (Statistics Canada 2000b).

Economic factors and government programs have affected the life choices of agricultural producers. Largely as a response to economic forces, there has been a general trend in Canada and the United States away from small- and medium-sized farms to large agribusiness operations. The process of farm consolidation on the Canadian prairies is evidenced by a decline in the total number of farms between 1991 and 1996, a slight decrease in the total area of farms, and a substantial decrease in the number of individual or family holdings.

Off-farm residency and employment have become necessities for many producers. For example, 31% of the farm operators in the mixed-grass and shortgrass region of the United States did not reside on the farms they operated in 1997, up from 27% in 1982. The principal occupation of 34% of the farmers was something other than farming, up from 26% in 1982. Off-farm employment for Canadian prairie farmers increased from 33% in 1991 to 37% in 1996. Off-farm employment has become an increasingly important form of economic support for farm families (Swidinsky et al. 1998) and has increased the dependency of farm families on larger rural communities.

In response to economic conditions, an enormous amount of federal, state and provincial money and resources have gone into supporting the region. In 1997, 67% of the farmers in the mixed-grass and shortgrass regions of the United States received direct

LEFT: Rounding up cattle. (SOURCE: EASTERN IRRIGATION DISTRICT)

BELOW LEFT: Cattle ranch, Alberta. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

BELOW: Toboso grass (*Hilaria mutica*), Durango, Mexico; these desert grasslands are common in northern Mexico. (SOURCE: JÜRGEN HOTH)

payments from the federal government. The average payment was US$10,650. In 1997, 45% of the farms in the shortgrass ecozone and 39% in the mixed-grass zone were—when government payments are excluded—deficit farms in that they actually lost money. When government aid is excluded and fallow land accounted for, grazing profits are similar to wheat (i.e., cultivated farming) production (Heimlich and Kula 1991). From the 1960s through the 1980s, Canadian federal and provincial payments in direct support of agriculture grew to CAN$4 billion annually, although by the end of the 1990s those payments had been reduced to about CAN$1 billion annually (MacGregor and McRae 2000).

Cypress Uplands. (CANADIAN PLAINS RESEARCH CENTER)

The amount of aid increases dramatically during drought periods. In 1988 the United States spent US$3.1 billion in drought relief. Agricultural losses in Canada from the same drought amounted to US$1.8 billion (Wheaton and Arthur 1989). Since droughts are a natural feature of the central grassland environment, these costs are not likely to lessen, particularly if exacerbated by impacts from climate change. However, even without climate change, an important consideration is that most historical droughts have been longer-lasting (~10 years) and more intense than those of the 1930s. In the Canadian central grasslands, extreme droughts (e.g., 1930s and worse) occur every 60–100 years, with a 23–45% probability of one occurring by 2030 (Leavitt 2001).

Historically, the northern grasslands of Mexico have been significantly impacted by agricultural activity. The introduction of Spanish cattle in the northern grasslands of Mexico in the sixteenth century created a huge impact on native vegetative cover and wildlife habitat. Clear signs of overgrazing were evident as early as 1580. Herds of 20,000 head of cattle were considered "small." Thomas et al.(1956) noted that some of the haciendas in north central Mexico had more than 150,000 head of cattle. A French visitor wrote in 1594: "Great endless plains full covered by an infinite number of cattle" (Crosby 1973). By the seventeenth and eighteenth centuries the expansion of cattle herds in the northern Mexican grasslands declined largely related to a decline in the quality and quantity of grasses throughout most of the area. By the start of the twentieth century, the cooler, wetter conditions that had supported the lush grasslands of the Chihuahuan Desert gave way to a warmer and drier climate with more frequent droughts and a decline of up to 70% of grass cover on heavily grazed ranges. "As warmer, drier conditions prevailed and heavy grazing continued, thousands of hectares of Chihuahuan Desert grasslands were converted to desert shrubland, a process that continues to this day" (Hoyt 2002: 16). In more recent times, the cultivation of grasslands has been promoted, with the hope of harvesting potatoes, corn, beans, oats other rain fed-crops. For the past ten years, however, those efforts have shown continuous losses, highlighting the importance of maintaining the areas under native grassland cover.

ABOVE: Maquiladoras—assembly factories, northern Mexico. (SOURCE: INGOLF VOGELER, UNIVERSITY OF WISCONSIN)
ABOVE RIGHT: Oil tanks, desert grasslands, Arizona. (SOURCE: JÜRGEN HOTH)
RIGHT: Oil drilling on the prairies. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

Industry Considerations

Although energy production is a distant second to agriculture, the US central grasslands produced about 39% of the nation's mineral and energy wealth in 1991 (Johnson and Mankin 1995), most of which was derived from petroleum, natural gas, and coal. Most US oil and gas is produced in the southern plains, while most of its coal comes from the northern plains. In Canada in 1999 there were an estimated 104,000 producing oil and gas wells in the Canadian prairies, contributing just under 5% of Canada's gross domestic product (GDP). Although energy activities have declined significantly throughout the central grasslands in the past decade, the industry is notoriously cyclical and may experience another boom in the region. Yet future booms may be more localized. As noted in a US Forest Service (1989) report, most of the easily recovered supplies have been depleted in the United States.

In the Mexican grassland regions, the most important industrial influence is a concentration of assembly plants in the northern Mexican states, which draw people from across Mexico. While some argue that this industrial concentration entices workers to stay in Mexico, others suggest that it may also promote the emigration of people from northern Mexico to the United States as well as from rural to urban areas.

The change to a more complex economic structure in this region, influenced by international market forces, is also reflected in an increasing service sector. In the central grasslands, irrigation agriculture along the Platte, Arkansas and Rio Grande rivers is very important, as it is in the southern portion of the Mexican central grasslands.

CHANGES TO THE PRAIRIES

Prior to European settlement, the central grasslands supported millions of bison, pronghorn antelope, elk and mule deer, plains grizzly bears and plains wolves. Today, the central grasslands is home to a disproportionately high number of rare, threatened, vulnerable and endangered species. Thus, within the last 150 years, sweeping changes have taken place in the central prairie grassland region considered one of the most biologically productive of the continent. Change itself is not a cause of alarm. Prairie ecosystem processes are normally dynamic and variable. However, the rate of change to prairie ecosystems rapidly accelerated with human settlement.

Native grassland. (SOURCE: CANADIAN PLAINS RESEARCH CENTER)

In North America, the grasslands were once the dominant vegetation type across the entire continent (Henwood 1998). Tall-grass prairie has been reduced to 1%, and mixed-prairie and shortgrass prairie to 20–30% of their former extent, jointly exceeding losses reported for any other major ecological community in North America (Gauthier and Wiken 1998; Samson et al. 1998; World Resources Institute 2000). The decline of grassland landscapes has been caused primarily by agriculture expansion, urbanization, mineral exploitation and water extraction, accompanied by the spread of invasive species, to the point of making the grasslands one of the continent's most threatened ecosystems (CEC 1997; Government of Canada 1996; Mosquin 2000; Samson and Knopf 1994; Samson et al. 1998; Valdés and Cabral 1993.) In the United States some mixed-grass prairie states have lost over 70% of their native grasslands (Samson and Knopf 1994). Shortgrass regions have been generally less affected by the plow; still, some states, such as Texas, have lost more than 80% of their shortgrass prairie (Samson and Knopf 1994). Cropland (harvested and unharvested) alone accounted for 51% of the mixed-grass region and 26% of the shortgrass region in 1997 in the United States. The net losses of native vegetation within grassland types are 90% for tallgrass prairie, 36–69% for northern mixed prairie, 27–65% for southern mixed prairie, and approximately 40% for shortgrass prairie (Steinauer and Collins 1996, Bragg and Steuter 1996).

Since European settlement of the prairies, humans have managed selectively for or against certain species and processes. For example, in Canada, attempts to eliminate ground squirrels led to the decline of burrowing owls and other birds of prey. Suppression of natural prairie fires negatively impacted on the composition and integrity of grasslands and their soils. Bison were virtually exterminated and Swift foxes, trumpeter swans and many other wildlife species were extirpated or severely reduced in number.

Other impacts have also diminished the biological diversity of the central grasslands. Riemer et al. (1997) found that many remnant prairies in Canada were threatened by exotic plant and brush invasion, heavy grazing, and other factors. Exotic plants such as

leafy spurge, Canada thistle, spotted knapweed, and sweetclover threaten many remaining prairies.

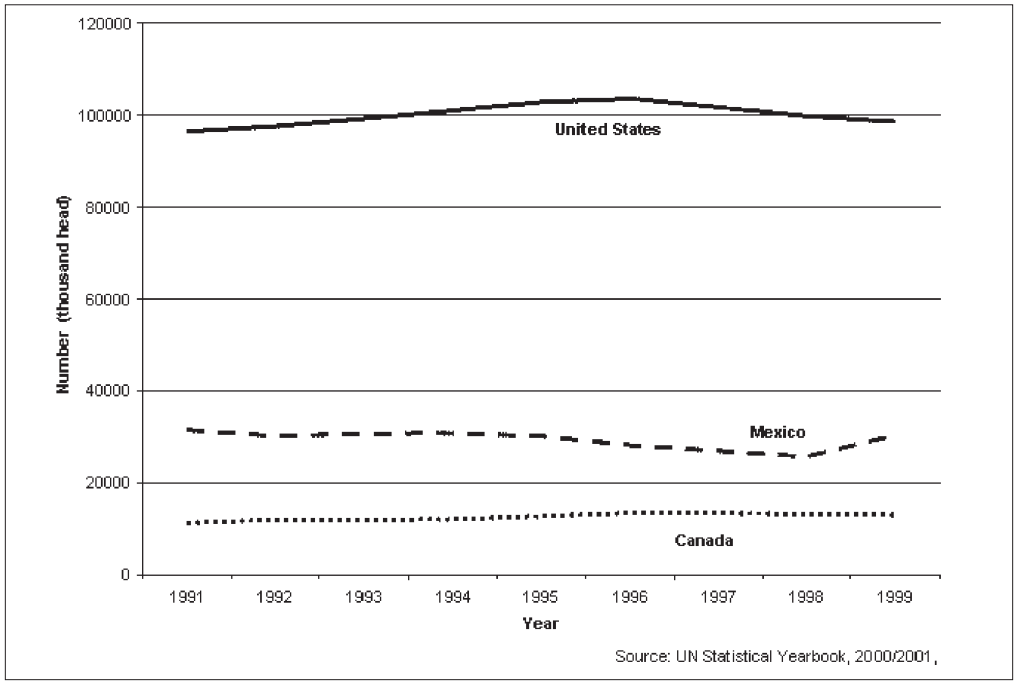
The biggest change to the prairies since the 1880s is the change from native grasslands to cultivated crops. People removed native vegetation from much of the prairie, and its rich topsoil now supports crops grown for human and livestock food. The rate of cultivation of native prairie has slowed over the last few decades, and some marginal lands are returning to permanent cover. Where the prairies were not suitable for cultivation, they were used as rangeland for cattle production.

Millions of hectares of prairie and parkland wetlands in the United States and Canada were drained and converted to agricultural use, with significant losses of wildlife habitat and detrimental effects on water and soil quality. Wetland margins, which provide even richer wildlife habitat than the wetlands themselves, shrank in size or disappeared.

Recognition of the dangers of pesticides has also been increasing. Most of the herbicides being used in agriculture today are of low acute oral toxicity to birds and mammals; they may, however, have indirect effects on wildlife that are more substantial. These chemicals may kill either the plants wildlife feed on or the plants which host insects important to wildlife diets. Nutrient contamination of water resources is becoming a greater problem across the prairies, especially in areas of high agricultural intensity.

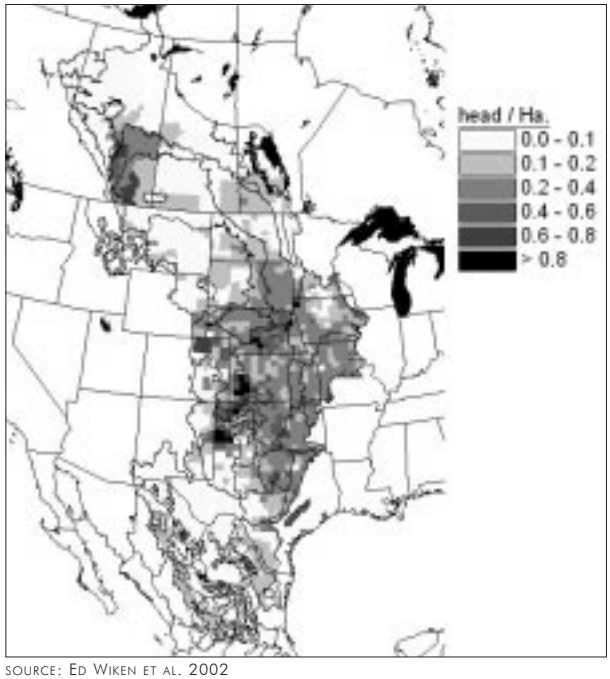
To a certain extent, cattle replaced the great herds of bison, pronghorn, and elk which once grazed the prairie, but ranching also helped keep native grassland from being plowed or developed (see Figures 4 and 5). Good range management practiced by livestock producers has included adjusting numbers of animals to compensate for periods of drought, using planned grazing systems with pasture rest periods, better fencing and

Figure 4. Number of cattle and bison, North America, 1991–1999



watering systems to protect riparian areas, and permanent cover for all pasture lands. Increasingly in the past decade, range health approaches are being used in the United States and Canada by a variety of agencies and organizations such as the Natural Resource Conservation Service (NRCS), the US Forest Service, the Bureau of Land Management, and Alberta Sustainable Resource Development (Busby et al. 1994; Task Group 1995). Many ranchers are integrating their range management system with the needs of wildlife, and, increasingly, more native plant species are being used to reclaim and improve disturbed rangelands.

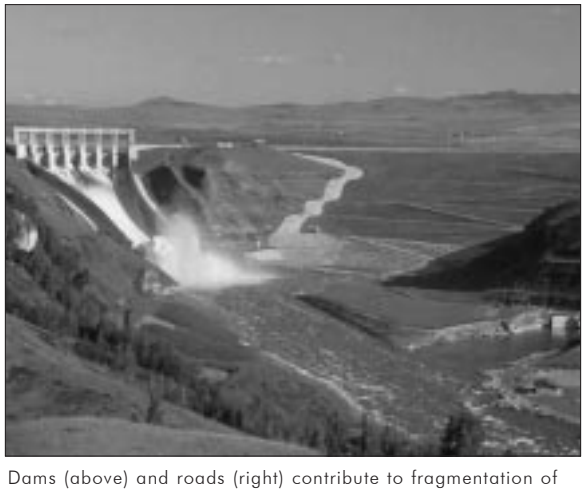
Figure 5. Cattle density



SOURCE: ED WIKEN ET AL. 2002

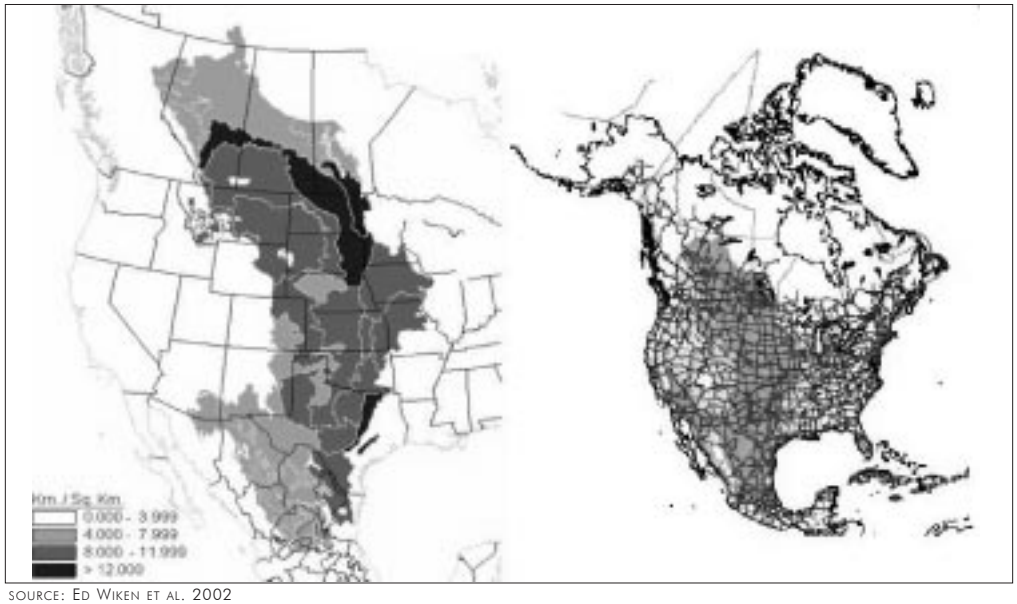
Ranching has also helped to protect the prairie against fragmentation, because ranchers need large blocks of land for their cattle. Despite that protection, land development pressures have dissected the grasslands into increasingly smaller blocks of land and large areas of the North American prairie grasslands are now severely fragmented.

Cultivation, urban development, oil and gas development, and the construction of transportation corridors and dams are the major agents of fragmentation. Increasing road density is also a major agent of fragmentation (Figure 6). Roads not only allow other kinds of development to exist and flourish, they change patterns of water flow, reduce infiltration of water to the soil and water table, compact soils, alter animal movements and destroy



Dams (above) and roads (right) contribute to fragmentation of native prairie grasslands. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

Figure 6. Road density



SOURCE: ED WIKEN ET AL. 2002

habitat for ground-burrowing animals. Roads also act as conduits for the dispersal of weed species and exotic plants. Reclamation and mitigation policies, and somewhat tougher environmental regulations relating to access, are helping to alleviate these stressors. Habitat fragmentation has been recognized as a serious threat to biological diversity, but to date there has been little assessment of the cumulative impacts of habitat fragmentation. It is known that fragmentation of habitats impedes the movements of wildlife in their search for food, shelter, and mating partners. Attempts to move between fragments of habitat can be fatal, particularly when animals cross busy transportation corridors. Land fragmentation can cause changes in micro-climate and vegetation. Plant and animal communities suffer from loss of genetic diversity as species are replaced by monoculture crops, disappear due to changing conditions, or are pushed out by non-native species invading disturbed areas.

Urbanization has drastically altered native prairie landscapes. Towns, cities and related developments (for example, golf courses) continue to expand onto rural land, including native prairie. Throughout much of the Great Plains, urban sprawl has become a major threat to biodiversity resulting from predatory species change and habitat fragmentation. Introduced garden plants and weed species from cities, cottage developments, acreages and industrial parks are spread by waterways, wind, wildlife, livestock, equipment and vehicles to riparian and native prairie areas. Once land use has shifted from grazing to cultivation or urbanization, the change back is almost impossible.

CONSERVATION

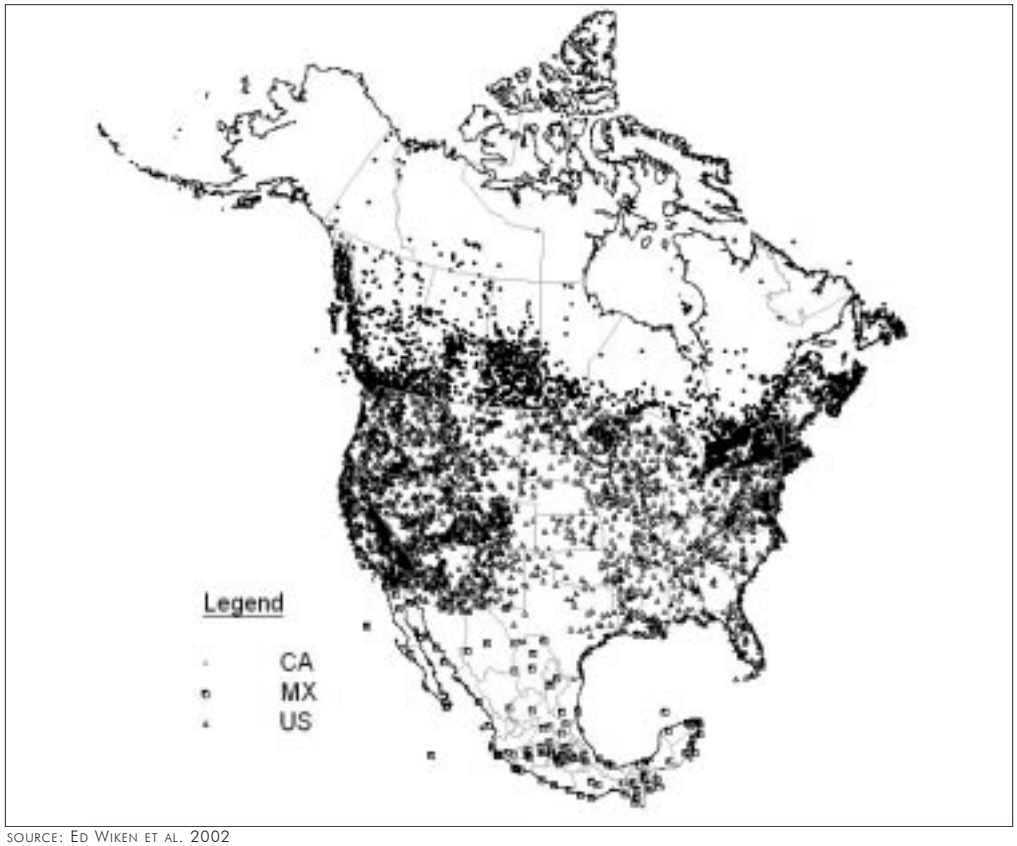
Information on the extent and distribution of conservation areas throughout North America is often difficult to locate and interpret. Many different agencies and organizations collect and maintain protected area information. National park databases are often separate from state, provincial or territorial park databases, or separate from databases for other conservation area categories such as wildlife or forest reserves. Where such information is combined, it is generally organized at the level of states, provinces or territories. Seldom is protected area information presented in terms of

ecosystems (Gauthier and Wiken 1999; Pisanty-Baruch et al. 1999). Furthermore, there is inconsistent standardization of protected area category types across national or state/provincial jurisdictions (Gauthier and Wiken 1998). For example, activities that are permitted in one state's or province's parks may be different from those allowed in other state/provincial parks. While IUCN (International Union for the Conservation of Nature–World Conservation Union) categories provide a framework for standardization across jurisdictions, those categories generally refer to management intent and may not be a fair reflection of actual conditions at a protected area site.

Within each country, efforts are underway to overcome many of these issues through the development of national conservation or managed area databases. Mexico has established a national compendium of information on protected areas (Ordoñez and Flores 1995). The United States has developed the Managed Areas Database (McGhie 1996) and Canada has established the Canadian Conservation Areas Database (CCAD) (Beric 1999). Using those three databases, an initial attempt has been made to develop a North American Conservation Areas Database (NCAD) (Canada 1999, Gauthier and Wiken 2002).

NCAD contains information on the distribution of national, state and provincial parks for North America according to political jurisdictions and ecological regions (Figure 7). The database is not complete in that all sites are not represented. However, for sites over 1,000 hectares in size, the database provides some interesting information. For example, there are just over 600 national, state/provincial park areas that are greater

Figure 7. Conservation areas, North America



SOURCE: ED WIKEN ET AL. 2002

than 1,000 hectares in the central grasslands, occupying just under 6% of the historic grassland area. Almost three-quarters of those sites are in the US central grasslands. US central grassland states vary widely in the proportion of that prairie that is protected. In Canada, Saskatchewan contains the greatest area of the Prairie Ecozone and also has the greatest number of protected areas over 1,000 hectares and the largest proportion of protected prairie (5%) in Canada. Protected areas in the Mexican central grasslands tend to be few and small.

Conservation programs typically involve a multiplicity of owners, including private owners and lessees, as well as rural and urban counties and municipalities, state/provincial and federal governments, and a host of interest groups (see Table 5). On a regional scale, private land stewardship is important for the grasslands of North America. Approximately 84% of the central grasslands of the United States is in private ownership, while the federal government, Departments of Interior and Agriculture own and manage approximately 7% of the central grasslands. States also own considerable acreages of grassland. Lands currently in US federal ownership comprise about 8% of the shortgrass prairie and 2% of the mixed-grass prairie (Licht 1997). The Bureau of Land Management, US Forest Service, US Fish and Wildlife Service, and National Park Service administer 49%, 41%, 8%, and 2% of these lands, respectively. In the three prairie provinces of Canada, approximately 30% is in private ownership with just under 7% in federal forms of ownership and the remainder in provincial government holdings. In Mexico, 80% of the country consists of communal property, 15% is in private properties, and the remaining 5% is government owned (federal, state and county). Communal properties are mainly within the states of Durango, Zacatecas, and San Luis Potosí and are more concentrated in forested area than in grasslands.

Much private land is in the hands of agricultural producers who have often argued that they are expected by society to privately absorb the cost for the conservation of a public good (i.e., wildlife species and habitat), at the expense of losses to crop depredation or lost opportunity costs. Faced with economic pressures and taxation policies that have traditionally favored land conversion to achieve economic production objectives, there have in the past been few incentives for landowners to maintain wildlife habitats. Changes in policies are occurring that recognize the ecological value of lands and encourage landowners to conserve wildlife habitat, for example, through stewardship agreements, conservation easement legislation, and programs such as the North American Waterfowl Management Plan and PFRA's Permanent Cover Program (Agriculture and Agri-Food Canada 1997, Riemer 1993, WHC 2001). Current agricultural conservation practices can prevent erosion, and maintain or even increase soil organic matter, even under continued crop cultivation. For example, direct seeding into stubble and no-till operations has reduced soil fertility losses and erosion. With changing government polices and increases in farm costs relative to farm revenues, more marginal land may be taken out of cultivation, leading to decreases in erosion,

Table 5. Landownership of the Central North American Grasslands

	Private	Federal Government	State/Municipal/County/ Tribal/Provincial
Canada	30%	7%	63%
United States	84%	7%	9%
Mexico	94% (communally and pivately owned)	5%	1%

salinization, soil compaction and other agricultural problems. Many farmers and small communities are recognizing the need for good environmental stewardship. Various programs exist which encourage rural landowners to maintain or create habitat for prairie species.

While much of the federal assistance to farmers comes in the form of cropland set-aside programs that are aimed primarily at reducing production, those programs have secondary benefits such as reducing soil erosion and providing wildlife habitat. From 1930–90, set-aside programs in the United States averaged 12 million hectares annually, with the amount of area increasing in recent years (Licht 1997). The Conservation Reserve Program alone retired approximately 8.1 million hectares in the mixed-grass and shortgrass region in 1992. In many parts of the central grasslands, the cost of set-aside contracts exceeds the value of the land and buildings on it (Licht 1997). Currently, a limitation of these set-aside programs is their lower species diversity and different structure compared to native grasslands. They are most often seeded with a mixture (typically 5 or fewer species) of native grasses (and in some cases include forbs and shrubs). Also, the species chosen may not be endemic to the region.

In Canada the Prairie Farm Rehabilitation Administration (PFRA) initiated the Permanent Cover Program (PCP) in 1989, in which land marginal for annual cultivation and cereal production was converted to long-term forages. Approximately 15,000 parcels of land totalling 518,000 hectares are involved in the program. Also, PFRA's Community Pasture Program, begun in the 1930s to reclaim badly eroded areas, has returned more than 145,000 hectares of poor quality cultivated lands to grass cover since 1937 and currently encompasses in excess of 900,000 hectares of rangeland. Through these and other programs (together with the impact of a number of other factors), lands under conventional tillage in Prairie Canada declined by 22% from 1991 to 1996, while lands under conservation tillage increased by 20% (Statistics Canada

ABOVE: Native grassland. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

RIGHT: Prairie wetland. (SOURCE: ALBERTA PRAIRIE ENVIRONMENT SERIES)

1996). The reduction in area under summer fallow and the expansion of seeded pasture from 1981 to 1996 have increased the availability of habitat for some Canadian grassland species (Neave et al. 2000).

However, the conservation benefits of these lands are greatly compromised by the fragmented ownership patterns. For example, the 1.4 million hectares of National Grasslands in the United States have an area-to-perimeter ratio of 1:2.3, with a median size of 128 hectares (Licht 1997). In addition, competing land uses and multiple-use missions often compromise wildlife conservation on federal/state/provincial lands. Wildlife lands of small size also often have limited value to conserving wildlife with large spatial needs, although they may serve an important ecological function as "stepping stones" that allow organisms to move among patches. For example, the approximately 140 Wildlife Management Areas in Nebraska average only 331 hectares in size. In the Canadian prairies, approximately 25,000,000 hectares (or 5.3% of the prairie ecozone) are contained in over 1,000 properties set aside for conservation purposes, but 37% of those lands are less than 1,000 hectares in size (Gauthier and Wiken 2002).

Non-government entities are playing a larger role in grassland conservation. The Nature Conservancy in the United States and The Nature Conservancy of Canada are actively conserving large tracts of shortgrass and mixed-grass prairie through acquisitions, easements, and other agreements with private landowners. Media mogul Ted Turner has acquired substantial holdings in the shortgrass and mixed-grass region, in part, to conduct commercial bison operations and, in part, to restore the region's biological diversity (approximately 206,400 hectares in South Dakota, Nebraska, Kansas, Oklahoma, and New Mexico and an additional 208,000 hectares in the desert grasslands of New Mexico).

Conservation Legislation and Protected Areas

CANADA

While endangered species legislation is a relatively recent phenomenon in Canadian politics, the conservation of wildlife habitat and nature is not (Wiken et al., 1998). Actions to conserve critical and significant wildlife habitats and natural areas in Canada through legislative means go back to the 1870s (Gilbert and Dodds 1987). An act to protect bison was belatedly passed in 1877 but had little effect due to lack of enforcement. Laws to strengthen protection of endangered wood bison were passed in 1893. Last Mountain Lake Sanctuary in the prairies of Saskatchewan was created in 1887 and was the very first wildlife area not only in Canada but also in North America. Gilbert and Dodds (1987) trace the modern beginnings of federal wildlife management activities to the Commission of Conservation constituted under the Conservation Act (1909). In 1916, the Advisory Board on Wildlife Protection drafted the Migratory Bird Treaty and the Migratory Bird Convention Act Regulations (1917). These early conservation efforts at the turn of the twentieth century seemed to bode well for Canada's future stewardship of its habitats, species, lands and waters. Yet, at the beginning of the twenty-first century, there are many indications that Canadian efforts to protect species and their habitats have fallen short.

Only one of Canada's three prairie provinces (Manitoba) has a specific act directed towards endangered, threatened or vulnerable species. The Manitoba Endangered Species Act (proclaimed in 1990 and amended in 1993) was enacted to ensure the protection and survival of species designated as "endangered" or "threatened" in the province, and to enable the reintroduction of designated "extirpated" species into the

province (Government of Manitoba 2002). The Act prohibits human activities that would kill, disturb or interfere with any listed species. It also prohibits human activities that damage, destroy or remove habitats and natural resources that protected species are dependent upon for life and propagation. Possession of species listed by regulation under the Act is prohibited. About 25% of Manitoba's native plants and animals are considered provincially rare, often because Manitoba is at the edge of their range. The 28 species listed as extirpated, endangered, or threatened in Manitoba make up less than 1% of all Manitoba's known plants and animals. Southern Manitoba is home to most of Manitoba's species at risk. This is due in large part to the impact that human settlement has had on habitat for these plants and animals.

Saskatchewan is the only prairie province to have a specific wildlife habitat protection act, although all Canadian jurisdictions have wildlife and fisheries acts, as well as acts devoted to parks, natural areas, protected places or ecological reserves. There are also more general acts that incorporate ecosystem aspects, such as acts respecting heritage conservation (Manitoba). Most jurisdictions have broad environment acts, and Saskatchewan has a specifically designated environmental assessment act.

The variety of legislation, policies and programs suggests the many mechanisms by which to achieve the protection and conservation of wildlife. A summary of gaps in legislation/policies/programs in Canada was cooperatively prepared among the jurisdictions under the National Accord for the Protection of Species at Risk (Environment Canada 1999). That assessment indicated that, while Alberta had generally well-developed legislation and programs in place, key provisions were mostly discretionary. In Saskatchewan, the Wildlife Act, 1997 and Wild Species at Risk Regulation incorporated almost all of the Accord provisions, although, as in the case of Alberta, most key provisions were discretionary. Although, as mentioned above, Manitoba was the only one of the three Canadian prairie provinces to have an Endangered Species Act, key provisions were half discretionary and half mandatory.

Canada has recently established federal endangered species legislation, the Species at Risk Act (SARA), which recognizes that a narrow focus on 'endangered species' and 'federal lands' is insufficient. It calls for cooperative partnerships among land and water managers, and the protection of critical wildlife habitats. It recognizes that a species-by-species approach will not easily work and that the real focus should shift to habitats/ecosystems at risk.

Grasslands National Park, Canada. (SOURCE: GREAT CANADIAN PARKS)

The federal government is the largest holder of conservation properties in Canada with 30 million square kilometers. Many of the federal acts rely on the designation and management of protected areas by organizations such as the

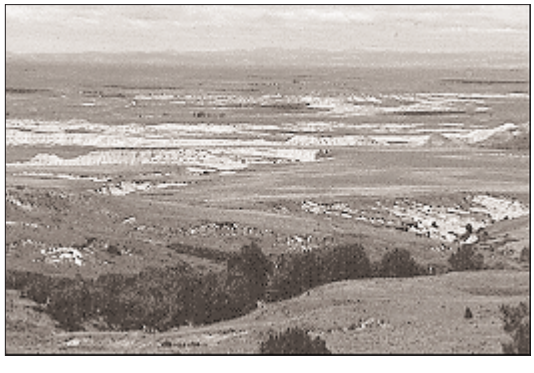
Canadian Wildlife Service, Parks Canada, and Fisheries and Oceans Canada as the primary means of achieving their objectives (Lynch-Stewart et al. 1999). Many of these acts were not intended at their onset to protect wildlife habitats (for example, the conservation of representative ecosystems may have been the primary goal), and those that did were limited largely to selective migratory species or to parts of the yearly life cycle of given species, as with Migratory Bird Sanctuaries (MBSs). One third of Canada's federally protected lands (Beric 1999) are administered under MBSs and National Wildlife Areas (NWAs) and are amongst the most poorly financed and monitored protected areas (Wiken and Gauthier 1997). The MBSs account for most (90%) of that property. Sanctuaries, by virtue of the name alone, conjure up images of safeguards for wildlife that would far exceed other types of protected areas. However, the reverse is true, in that very little overall protection is provided to habitats under the MBS regulations. MBSs act as temporary spots with restricted safeguards for certain birds and their nests. The general habitat in these areas *per se* is not afforded much protection nor is there long term year-round protection.

While wildlife conservation is strongly supported by Canadians (Filion et al. 1995), the assumption is that conservation of species is automatic once protected areas have been set aside. However, this assumption is not always borne out in fact. While wildlife management and park agencies, for example, monitor species, the monitoring is often selective and time-specific. Generally in Canada, there is a lack of effective, comprehensive ongoing monitoring of species or their habitats, or comprehensive assessments of trends in changes in habitats (Gauthier and Wiken 2001). In particular, due consideration of the broader concerns of wildlife habitats before they reach critical points of having species become at risk is a major void.

UNITED STATES

Numerous pieces of federal legislation affect conservation activities in the United States central grasslands. They include the Federal Aid in Wildlife Restoration Act ("Pittman-Robertson Act") (1937), the Federal Aid in Fish Restoration Act (1950), the National Environmental Policy Act (1970), the Clean Water Act (1977), the Endangered Species Act (1973) and the Neotropical Migratory Bird Treaty Conservation Act (1998). Each of the states also have a variety of conservation legislation.

The US Farm Bill (1985), with amendments in 1990 and 1996, enhanced wildlife benefits of conservation programs (Heard et al. 2000). Under the



ABOVE: Oglala National Grasslands, Nebraska. (SOURCE: UNIVERSITY OF NEBRASKA–LINCOLN, ANTHROPOLOGY)

RIGHT: Badlands National Park, South Dakota. (SOURCE: US NATIONAL PARK SERVICE)

new US Farm Bill (2002), conservation programmes have been expanded and funding increased substantially. The Conservation Reserve Program (CRP) is re-authorized until 2007, maximum enrolments are expanded from 14.7 million hectares to 15.9 million hectares, and some enrolment criteria have changed. The Environmental Quality Incentive Program (EQIP), Wetlands Reserve Program (WRP), Wildlife Habitat Incentive Program (WHIP) and Farmland Protection Program (FPP) are all re-authorized through to 2007. A new Grassland Reserve Program, Conservation Security Program (CSP) and other programmes have been included in the FSRI Act. Much of the new spending in this Conservation Title is directed at land currently in production, rather than to additional land retirement. The 2002 US Farm Bill contains several programs intended to help farmers curb air, water and soil pollution, protect wildlife habitat and defend farmland from development. For example, the bill contains a Conservation Security Program that will reward farmers for applying conservation practices to working lands. That program establishes three "tiers" of increasingly stringent conservation practices for which farmers can receive escalating payments. An Environmental Quality Incentives Program provides funding to help producers comply with soil, water, air and wildlife habitat regulations and assists growers in implementing environmentally beneficial changes to their operations. The Conservation Reserve Program provides rental payments to farmers to set aside sensitive lands and increases the program's acreage cap to 0.9 million hectares from the current limit of 0.6 million hectares. The bill also contains a new Grassland Reserve Program aimed at protecting prairie by providing money for the purchase of development rights from ranchers. That program allows 10-year, 30-year and permanent easements. In addition, the US $1.5 billion Wildlife Habitat Incentives Program will provide funding for farmers to create and protect wildlife habitat on their property.

The Farm Bill also contains an energy subsection that seeks to promote the use of ethanol, biodiesel and other alternative fuels produced on farms and ranches. It includes a bioenergy program that provides payments to bioenergy producers who purchase agricultural commodities for the purpose of expanding production of biodiesel and fuel-grade ethanol. A grant program is included to educate government and private fuel consumers about the benefits of biodiesel fuel use. The energy subsection also establishes a loan, loan guarantee and grant program to assist farmers in purchasing renewable energy systems and making energy efficiency improvements. The bill also authorizes funding to continue the Biomass Research and Development Act, which promotes development of renewable energy technology. Finally, the energy subsection requires that federal agencies purchase bio-based, rather than petroleum-based products wherever practicable, based on a list of products to be developed by the Secretary of Agriculture.

MEXICO

The National System of Protected Areas (SINAP) in Mexico comprises six federal categories: Biosphere Reserves (Reservas de la Biosfera), National Parks (Parques Nacionales), Wild and Aquatic Flora and Fauna Protection Areas (Áreas de Protección de Flora y Fauna Silvestre y Acuática), Sanctuaries (Santuarios), Natural Monuments (Monumentos Naturales), and Natural Resource Protection Areas (Áreas de Protección de Recursos Naturales). Of these categories, the first four have been applied in the marine environment. If all state, municipal and the few private protected areas of Mexico are included, the actual number exceeds one thousand protected areas.

RIGHT: Mapimi Biosphere Reserve, Chihuahua, Coahoila and Durango states, Mexico. (SOURCE: INSTITUTO DE ECOLOGIA)

BELOW: Janos, Chihuahua—a Mexican grassland home to the largest prairie dog colony in North America (SOURCE: JÜRGEN HOTH)

Mexico has a number of laws and regulations related to the use of natural resources that affect grassland areas. For example, the Ley General del Equilibrio Ecológico y Protección al Ambiente (1994) requires that changes in land use should be approved by SEMARNAT, the Mexican Ministry for the Environment, in order to conserve and protect lands relative to economic activity. Also, regulations exist to prohibit the overuse of grasslands in forested areas (NOM 020-RECNAT-2001). In addition, COTECOCA has incorporated the concept of carrying capacity into its programs. Nonetheless, there are no cases of legal actions pursued because of overuse of grasslands despite substantial evidence of overuse. However, Durango state has initiated a new program to protect the grasslands (Ley de ganadería del estado de Durango) that includes regulations to protect the grasslands.

Different Mexican agencies have natural resource conservation and protection programs. The environmental and natural resources secretariat has been working with laws and regulations in different field, establishing the norms or regulations for species with status (NOM 059). The National Commission for Arid Zones (CONAZA) has the mandate for land and water conservation in arid zones. The Protected Area National Commission (CONANP) manages the system of areas, including National Parks, Flora and Fauna Protected Areas, National Monuments, and Biosphere Reserves, in addition to other categories. The Social Development Secretariat (SEDESOL) provides funds for rural people in order to enhance natural resource conditions. The Secretariat for Agriculture, Cattle, Rural Development, Fisheries and Feed maintains statistical data as well as extension services for producers.

LEARNING FROM GRASSLANDS

At the turn of the twentieth century, it must have been difficult to imagine that species and habitats would ever become endangered in an area as vast as the central North American grasslands. Over the past 100 years, our perception of the vastness and apparent inexhaustibility of resources of the area has fundamentally changed. The lessons learned include:

- The importance of critical connections at the continental and macro-ecosystem scales, that is, the realization that what was happening elsewhere, outside of any one region (such as the grasslands, a state or province, or a nation) can have critical impacts to the wider overall region.
- The thresholds and breaking points of critical ecosystems and habitats can be breached under the pressure of human-generated stresses.
- Seemingly minor or seemingly negligible by-products of humans activities can accumulate in ecosystems and have significant negative long-term impacts on habitats and species (for example, inordinate levels of pollution and impacts of land use).
- The grasslands can become extensively degraded and altered at the continental and macro-ecosystem scales.
- Wildlife and habitats have reached unexpected degrees of economic and social importance.
- To protect species, it is critical to protect their habitats and the ecosystems that contain those habitats.

PRINCIPLES FOR ACTION

From those lessons learned, it seems clear that the conservation of North American grasslands can only be accomplished according to guiding principles of equity that require thinking, planning and acting in terms of ecosystems. In that context, a collaborative, comprehensive, shared vision for grassland conservation and protection should address three needs: to ensure ecosystem integrity; to ensure human health and well-being; and to ensure natural resource sustainability. The vision is founded on the recognition that:

- most grasslands in North America are degraded or transformed;
- interactions between the environment (air, water, land and biota) and human activities (social, cultural and economic systems) are inseparable parts of an ecosystem;
- humans through their activities and decisions are a major driving force of ecological change;
- habitats critical for the maintenance of all grassland biodiversity and, in particular, wildlife species of common conservation concern must be sustained;
- healthy grasslands are linked to the economic and social viability of ranching and other agricultural communities, that is, the direct, human benefits of agriculturally-wise ranching rely on healthy grasslands;
- in addition to other benefits, there are substantial benefits to be realized from maintaining and restoring North American grasslands to sequester carbon and mitigate potential climate change;
- the needs of current and future generations must be an integral basis for grasslands conservation; and
- the ecological integrity of grasslands must be sustained.

VISION FOR GRASSLANDS

Following upon the guiding principles, we encourage government, non-government, institutions, businesses, industry and individuals of North America to adopt a vision to conserve North America's central grasslands that aims:

> *To sustain the ecological integrity and viability of grassland landscapes in North America through environmental, social and economic actions designed to meet the needs of current and future generations.*

In adopting this vision, governments, non-government organizations, institutions, businesses/industry and individuals are encouraged to continue pursuing a trinational strategy of collaborative policies, programs and actions to:

- contribute to the maintenance of the ecological integrity of North American grassland ecosystems and habitats;
- sustain environmental, economic and cultural values in ways that assure the continued health and integrity of North American grassland ecosystems.
- contribute to the mitigation, reduction and eventual elimination of current and future threats to the shared species, habitats and ecosystems of the North American grasslands;
- foster a continental and integrated perspective to the management, conservation and sustainable use of grassland biodiversity;
- strengthen the capacity of a wide array of sectors of North American society to conserve the continent's grassland biodiversity (i.e. genetics, species and habitats/ecosystems); and
- promote wide public involvement in the conservation, sustainable use and equitable sharing of the benefits of North American grassland biodiversity.

ISSUES/NEEDS

Grassland conservation issues cover a wide spectrum of concerns and stakeholders. It is clear that the conservation of biodiversity cannot be achieved in isolation from socioeconomic, demographic, political, and cultural considerations that set the societal context for conservation. Therefore, what are the main agents of change, the trends and opportunities that impact upon grasslands conservation? In this section we identify the specific issues and needs related to grasslands conservation that have been derived from consultations with various experts among the three countries.

In this survey, "issues" might best be considered as "the problems/challenges", that is, what are the major problems that need to be addressed, both in the short- and mid-term, to achieve the conservation of central North American grasslands? In particular, what issues or problems exist that could adequately be addressed through a trinational approach? "Needs" should be thought of as what can be done to address the issues or problems, again with the focus on a trinational approach.

More than 400 experts from diverse government and non-governmental sectors from Canada, the United States and Mexico were contacted and provided with a list of issues and needs identified through earlier stages of consultation. The experts were asked for their assessment of which were the critically important issues for the conservation of central North American grasslands from a trinational perspective; and what ought to be done to best jointly address those issues. They were also asked to rank the issues and needs in terms of whether they were of short-term (immediate to 1 year) or mid-term (>1–5 years) importance (on a scale of 1–3, "1" = very important, "2" = important, "3" = not important).

The following table shows the number of agencies, organizations or individuals contacted and the number of responses relative to the three countries and various stakeholder interests.

Table 6. Responses to survey of grasslands issues.

Country	Advisors	Government	Ranching and Farming	Academics	Students	Non-government	Consultants	Industry	Total
Canada									
Contacts	5	52	18	34	8	44	6	2	169
Responses	5	10	0	4	1	7	0	0	27
United States									
Contacts	4	52	18	34	8	44	6	2	168
Responses	2	7	1	1	0	5	0	0	16
Mexico									
Contacts	3	11	16	18	8	9	14	4	83
Responses	3	4	5	8	6	7	4	4	41
Total									
Contacts	12	115	52	86	24	97	26	8	420
Responses	10	21	6	13	7	19	4	4	84
% total	12	25	7	15	8	23	5	5	100

A number of criteria were developed to assist the experts in identifying and ranking issues and needs. These criteria are not presented in order of importance. For different agencies, organizations or land owners, different criteria will assume greater importance than others.

1. Should be of potential relevance in all 3 countries, that is, of trinational importance, but with recognition that there are critically important issues that are binational; must be of at least national priority.
2. Must address policy and agency needs.
3. Must be of high ecological importance.
4. Must reflect a potential need for collaboration.

A summary of the issues and needs that were identified as most important by respondents in the short- and mid-term is shown at the end of this section in Tables 7 and 8.

We urge a cautionary note in interpretation of the results of the survey. This survey was intended as a starting point for further discussion of issues and needs. The survey is not comprehensive of all grassland stakeholder interests in the three countries, nor of any one particular group of stakeholders. As shown in Table 6, the response rate was relatively low and very uneven among countries and sectors. Hence, it is not a statistically valid sample. However, of most importance to readers will likely be the comprehensive identification of issues and needs by the respondents. The particular ranking of the issues within the short- and mid-term categories of importance should be interpreted cautiously since those could change with an increased sample size and inclusion of a wider range of stakeholders.

BIODIVERSITY

Issues

Relative to biodiversity issues, respondents in the three countries were consistent in identifying the decline in biodiversity as the primary issue. US and Canadian respondents identified the extirpation of species and altered guild structure/species composition of predators, respectively, as the second and third most important biodiversity issues. Mexican respondents, however, placed altered guild structures ahead of species extirpations as their second most important issue.

In terms of habitat issues, the loss/fragmentation of wildlife habitat and the conversion of grasslands to cropland were primary issues in the United States and Canada. Mexico's primary issue was the conversion of grasslands to croplands. In the short-term, Mexico had a more specific concern about the fragmentation of riparian habitats (a mid-term concern of US and Canadian respondents), and in the mid-term, more general losses and fragmentation of wildlife habitat were of concern. A narrow or restricted focus on species management was also seen as a primary issue in Canada, but regarded as a secondary issue in the United States and of even less importance by Mexican respondents. Altered disturbance regimes were of secondary short-term importance among the countries, but assumed primary importance in the mid-term for US respondents. Common secondary issues were loss in structural diversity and creation of artificial habitats.

Information/Data issues were not ranked as primary issues in the three countries. They were of secondary concern, however, in terms of the lack of or inadequate data from private lands, the lack of a full biotic inventory for grasslands, and the lack of adequate biophysical trend data.

Mexican respondents identified the overexploitation of ground water as a critically important issue. US and Canadian respondents regarded it as of secondary importance in the short term but of primary importance in the mid-term. US and Canadian respondents also identified the insufficient understanding of hydrologic function in relation to various land uses as an important secondary water issue.

Finally, increasing numbers of introduced and invasive species were felt to be a primary short-term issue in Canada but a secondary short-term issue in the United States and Mexico. Canada and the United States did recognize this issue as important in the mid-term.

Needs

Given the above issues, respondents from the three countries agreed that a primary need was to promote habitat conservation. Canadian respondents also identified primary short-term needs to: (1) restore wildlife populations, endangered species and natural processes to prevent extirpations, and (2) reverse declines and prevent exotic plant invasions. US respondents regarded those as of secondary importance.

Common secondary short term needs in the United States and Canada were:

1. to achieve complete identification, understanding and representation of biodiversity,
2. to identify target species, high value habitats and natural corridors for wildlife and create a joint database,
3. to determine the biotic and abiotic requirements of native prairie species and communities, and
4. to counteract excessive removal of flora and fauna.

Common important mid-term needs to address biodiversity and habitat issues identified by US and Canadian respondents were:

1. to restore extirpated wildlife populations,
2. to effectively manage endangered and threatened species and habitats to prevent extirpations,
3. to reverse declines in grassland species,
4. to prevent exotic plant invasions, and
5. to significantly improve the promotion of habitat conservation.

Secondary mid-term needs important in the United States and Canada were:

1. to achieve complete representation of biodiversity, identification and understanding,
2. to identify target species, high value habitats and natural corridors for wildlife and create a joint database,
3. to counteract excessive removal of flora and fauna, and
4. to determine the biotic and abiotic requirements of native prairie species and communities.

LAND USE PRACTICES AND MANAGEMENT

Issues

While there tended to be general agreement among respondents from the three countries in regard to biodiversity issues, there was a greater divergence in their identification of issues related to land use practices and management.

In the United States and Canada, primary issues in this category related to protected areas and land conversion. In terms of protected areas, a primary issue was the insufficient area of grasslands receiving protection, while a secondary issue was the insufficient use of ecological management practices in protected areas.

Relative to land conversion, development and intensification, primary issues were inappropriate agricultural practices, draining and filling of wetlands, and plowing of grasslands. Some differences in primary concerns between the United States and Canada were that the impacts of exploration and development activity were of primary concern in the short- and mid-term in Canada, but of primary concern in the United States only in the mid-term. On the other hand, marginal land conversion was a primary short-term issue in the United States, but only of primary mid-term concern in Canada. Common secondary land-use practice issues between the two countries were development of industrial sites, expansion of urban, suburban and country residential areas, road and drainage infrastructure, lack of technical assistance about management practices to private landowners, and the impacts of increased recreational use. Respondents in both countries were concerned about the draining and filling of wetlands, and the expansion of urban, suburban and country residential areas into grasslands.

Issues related to grazing management were not of primary concern in the short term in either Canada or the United States, although common secondary issues of concern included overgrazing and overuse, limited understanding of livestock grazing management practices, grazing in riparian zones and wetlands, grazing impacts on wildlife, timing of haying operations, cattle and hog waste management, lack of or inadequate pasture management programs, lack of extension and outreach programs and lack of wildlife-friendly fences. Of lower concern were the loss of traditional pasture management practices and insufficient use of grazing as a wildlife habitat management tool. In the mid-term, however, grazing issues assumed much higher priority in the United States and Canada, although with some significant differences. US respondents identified the limited understanding of livestock grazing management practices and grazing in riparian zones and wetlands as primary issues, whereas those were secondary issues in Canada. The primary mid-term issues in Canada were cattle and hog waste management and lack of extension and outreach programs, which were both secondary issues in the United States. Common secondary mid-term grazing issues were numerous; these included overgrazing and overuse, and inadequate use of grazing as a wildlife habitat management tool, the impact of domestic grazing on wildlife, timing of haying operations and lack of wildlife-friendly fences.

In contrast to the US and Canada, protected area and land conversion issues were not of primary importance to Mexican respondents in the short or mid-term. Mexican respondents were primarily concerned about the lack of extension programs promoting appropriate grazing management, over-grazing and the impacts of pasture management techniques on wildlife.

Differences were also very evident in Mexican concerns about climate change compared to US and Canadian respondents. Over the longer term, US and Canadian respondents were concerned about climate change issues related to the impact of global climate change, inadequate recognition of benefits of grasslands as an atmospheric carbon sink, increases in agricultural greenhouse gas emissions, and reduction of the earth's ozone layer. They also expressed long-term concerns about the potential for water shortages and conflicts, and increased demands for water. In strong contrast, Mexican respondents clearly identified increased demands for water and potential conflicts in regard to water shortages related to climate change as the major land-use practice issues that they face. Climate change issues assumed greater importance in the mid-term for US and Canadian respondents, whose primary concerns were increased demands for water, the potential for water shortages and conflicts and inadequate recognition of the benefits of grasslands as an atmospheric carbon sink. Secondary issues were increases in agricultural greenhouse gas emissions and reduction of the earth's ozone layer.

Respondents from the three countries agreed that, in the short term, pollution issues related to the impact of nutrient and chemical applications, and the impact of increased concentrated animal-feeding operations were of secondary concern. Canadians, however, identified the impact of nutrient and chemical applications and the effects of genetically modified crops on native grasslands as primary mid-term concerns, while those issues were of secondary mid-term importance for US and Mexican respondents.

Needs

Given the wide array of issues of varying importance among the three countries, respondents felt that the primary short- and mid-term need in relation to land-use practices and management was to sustain diverse ecosystems across the entire central grasslands. US and Canadian respondents also identified an important primary need to encourage the creation of markets for environmentally produced agricultural goods. Common secondary needs that applied throughout the grasslands were to minimize human disturbance, reduce chronic overgrazing, foster carbon sequestration, restore degraded ecosystems, promote improved liquid and solid storage methods for manure, and encourage the development of native plant covers and seed industry. Canadian respondents also emphasized the importance of developing new pest control products and methods. US respondents identified a primary need to reduce chronic over-grazing, which was not a significant concern for Canadians.

POLICIES AND SOCIO-ECONOMIC ISSUES

Issues

As in the case of land-use practices and management, there were differences in the policy and socio-economic issues emphasized by Mexican respondents compared to US or Canadian respondents.

In Mexico, the most important issues were related to lack of incentives for conservation and inadequate linkages between conservation and production policies and programs. The primary issues were: lack of incentives for conservation, restoration and management of pastures; insufficient incentives and lack of financial alternatives for proper range management; lack of linkages between policies and programs for production

and conservation; and the lack of linkages between producers and technical specialists that would foster pasture conservation. Secondary issues in Mexico were: over-reliance on cooperative community, collective, or group management to manage pastures in larger units.

The primary short-term issues for both US and Canadian respondents were:

1. inadequate policies, programs, regulations and enforcement to support conservation programs, and
2. inefficient and contradictory missions among government agencies.

United States respondents felt that concerns over private property rights was a primary short-term issue, while Canadian respondents did not. In contrast, Canadian respondents identified a number of other primary issues that United States respondents felt were of secondary importance:

1. the lack of inclusion of all stakeholders in the planning process,
2. the lack of incentives for preservation/restoration/management of grasslands,
3. inadequate rewards for good stewardship,
4. no established market value for public goods.

Common issues of secondary and tertiary short-term concern between the two countries were:

1. management plans lacking incorporation of non-game species,
2. lack of coordination within and among countries planning efforts,
3. lack of involvement of non-traditional sectors,
4. too many resources oriented towards planning, bureaucracy and coordination,
5. no information about the link between economic and ecological impacts and benefits and conservation and production policies and programs,
6. concerns over private property rights,
7. insufficient innovative/alternative funding, and
8. lack of time and effort to work cooperatively across political boundaries.

Issues that were of secondary short-term importance in Canada but of tertiary importance in the United States were:

1. absolute power of resource owners,
2. no link between producers and technical specialists,
3. inadequate legislation.

An interesting variation in an issue between the United States and Canada was the Canadian perception that the *limited use* of cooperative community, collective or group management was an issue, while US respondents identified *over-reliance* on cooperative community, collective or group management as an issue.

Due to the importance of markets and income security in affecting behaviors related to grassland conservation, respondents were asked to rank issues in those areas. A primary common issue of concern in the three countries was the lack of integration of policies related to overall economic and ecological systems. Canadian and Mexican respondents also considered the impact of global subsidies and government support policies on commodity prices to be a primary issue while United States respondents did not. On the other hand, US and Mexican respondents identified as a primary concern

the lack of productive and economic alternatives, organization and marketing incentives that would support desired lifestyles and grasslands conservation. Canadian respondents viewed that issue as of secondary importance. Also, US respondents perceived threats to future economic security of agricultural producers as a primary issue while Canadian respondents ranked it as of secondary importance.

Secondary and tertiary issues in the United States and Canada were:

1. technical assistance and mechanisms that would support desired lifestyles and grasslands conservation,
2. the lack of equity in support provided to industry, and
3. the lack of alternative social and financial mechanisms.

Mexican respondents ranked those issues of higher importance than either Canada or the United States. However, respondents in the three countries were consistent in ranking the following issues as of secondary or tertiary importance:

1. the lack of direct interactions between urban consumers and producers,
2. negative impacts on conservation associated with globalizing markets and trade liberalization,
3. high levels of private land ownership,
4. policies encouraging larger farm size,
5. inefficient and unresponsive rural governance structures,
6. lack of management/communication among governments and producers,
7. unwillingness of country-side organizations to participate, and
8. inadequate monitoring mechanisms.

Of lowest concern were issues related to market and consumer preferences, changes of ownership of grasslands, the lack of direct interaction between urban consumers and producers, and increasing reliance on and consolidation of services in regional centres.

In the mid-term, concerns were raised in both the United States and Canada about the exclusivity of many management programs and planning approaches, for example, the lack of incorporation of non-game species into many management plans, the lack of involvement of non-traditional sectors and failure to include all stakeholders in the planning process. Respondents felt that major mid-term issues were the lack of or insufficient incentives for preservation/restoration/management of grasslands, lack of rewards for good stewardship and general concerns about private property rights. Many respondents were concerned about policies encouraging larger farm size, the lack of productive and economic alternatives, the impact of global subsidies and government support policies on commodity prices, perceived threats to future economic security of agricultural producers and the need for integration of overall economic and ecological system. They felt that it was important to improve on innovative/alternative funding, establish a market value for public goods and substantially improve information about the link between economic and ecological impacts and benefits. Inadequate policies, programs, regulations and enforcement to support conservation programs and inefficient/contradictory missions among government agencies were also cited as issues of concern.

Issues of producer behavior were important in each of the three countries. The primary issue was lack of confidence in government and non-government policies and programs. Secondary issues related to resistance to change in farm management

practices, the low level of awareness of values and profitability of conservation practices, and a lack of knowledge about the role of wildlife in grassland ecosystems. Respondents in the United States also identified excessive political and social power among ranchers as a secondary issue.

Other important mid-term issues included the lack of coordination in countries planning efforts, and the lack of time and effort to work cooperatively across political boundaries. Of interest was the opposing view that too many resources were oriented towards planning, bureaucracy and coordination. Additional issues were inadequate links between producers and technical specialists, high levels of private land ownership, changes of ownership of grasslands, inefficient and unresponsive rural governance structures, lack of management/communication among governments and producers, inadequate monitoring mechanisms and the importance of better assessing market and consumer preferences.

Needs

To address policy issues, US and Canadian respondents identified a number of common primary needs. They were:

1. To identify, promote and develop laws, regulations, policies and programs that favour conservation practices,
2. To include all stakeholders in grassland conservation planning and management, and
3. To improve grasslands management through incentives.

Canadian respondents also identified primary needs to: (1) establish federal legislation in Canada for protection of endangered species, (2) develop and support programs that remove marginal lands from production and offer tangible economic advantages to producers, and (3) create new fund-raising tools for North American Grasslands Conservation through the private sector. Those were secondary needs for US respondents whose primary short-term needs were to develop innovative markets for traditional agricultural commodities and non-traditional products and to create free-market incentives for private landowners. In contrast, those were secondary needs for Canadian respondents.

US and Canadian respondents also identified common policy and program needs of secondary importance in the short term:

1. To complete ecoregional planning,
2. To make changes to existing endangered species legislation to better support grasslands species/habitat conservation,
3. To develop and sustain new, better and well-funded conservation reserve programs,
4. To adopt an inter-agency approach to identify areas of high risk for drainage/destruction,
5. To establish a “one-stop shopping” approach to delivery of conservation programs and promote government actions through changes in policy measures,
6. To set habitat goals that recognize the needs of targeted groups of species, and
7. To develop and support programs that promote coordination among international, federal, state/provincial and municipal policies that implement recovery plans for endangered or threatened species.

Many of the above needs were considered of importance in the mid-term for government and non-government agencies and organizations, which additionally included:

1. To identify, promote and develop laws, regulations, policies and programs that favour conservation practices,
2. To improve grasslands management through incentives,
3. To include all stakeholders in grasslands conservation planning and management,
4. To help in the creation and promotion of free-market incentives for private landowners that contribute to grasslands conservation,
5. To develop and support programs that remove marginal lands from production and offer tangible economic advantages to producers,
6. To develop non-traditional products that contribute to grasslands conservation,
7. To create new fund-raising tools for North American Grasslands Conservation through the private sector, and
8. To develop innovative markets for traditional agricultural commodities.

DEMOGRAPHIC AND SOCIAL ISSUES

Demographic and social issues were generally not of primary concern in the three countries, although increased stress in rural communities was identified as a primary concern in Mexico and the United States. Canadian respondents identified depopulation and increasingly aging populations as a secondary short-term issue, whereas these were tertiary issues in the United States and Mexico.

EDUCATION, COMMUNICATION, RESEARCH AND MONITORING

Issues

Mexican respondents were most concerned about the general lack of awareness in society of the worth of environmental services provided by grasslands. Important issues for US and Canadian respondents were:

1. insufficient grasslands conservation education programs,
2. inadequate knowledge or appreciation of specific regional problems by federal policy-makers or managers,
3. inadequate communication and collaboration with and among stakeholders, and
4. the lack of integration of information and awareness of the worth of environmental services,
5. the lack of accessibility to existing information, and
6. the lack of means to communicate agricultural producers' needs to governments and insufficient education programs.

US respondents also identified a decreasing number of volunteers as a sign of weakness in grasslands conservation education and communication programs.

Needs

To address those issues, respondents identified the following needs:

1. To develop and apply culturally-specific education and communication programs that facilitate changes of attitude and culture that would support grasslands conservation,
2. To establish more outreach efforts,
3. To promote net gain of grassland and ecosystem restoration,
4. To support and promote efforts of private and public land managers who conserve native prairie,
5. To work with the North American Bird Conservation Initiative to make grasslands a high priority,
6. To develop simple techniques for grasslands conservation,
7. To develop and recognize more local producer organizations and landowner contact programs and build relationships and raise awareness, and
8. To promote training opportunities for future land managers and encourage formal education curricula.

US respondents an important mid-term need to integrate wildlife management issues into rangeland extension programming, whereas Canadian respondents regarded that as a secondary need. Canadian respondents felt that an overall general increase in educational programs was an important secondary need.

In terms of research and monitoring, US and Canadian respondents also expressed the need for more permanent areas for grasslands conservation research and increased research on wildlife for their recovery. However, they differed in that US respondents saw a primary need to improve assessment measures (indicators) of policies and programs, which was a secondary need for Canadian respondents. The primary needs identified by Canadian respondents (which were secondary needs for United States respondents) were:

1. To increase research on impacts of invasive species,
2. To identify threats/stressors at different spatial and temporal scales, and
3. To conduct complete integrated ecological, economic and social assessments.

Common secondary short-term research and monitoring needs for both US and Canadian respondents were:

1. To complete abiotic and biotic inventories,
2. To conduct research on the integration of ecosystem information in land management,
3. To increase research on invasive and rare species and how to implement recovery and management plans,
4. To develop and promote uniform and consistent long-term monitoring techniques and research,
5. To follow up and monitor habitat improvement projects,
6. To assess the status, distribution and trends of existing functional grasslands,
7. To identify areas as conservation priorities associated with species assemblages and indicator species in order to establish a more representative monitoring system,

8. To explore the potential of carbon sequestration and new genetic, biochemical, pharmaceutical and other resources associated with grasslands,
9. To identify key geographic areas that require immediate study,
10. To conduct research to measure contributions to bird population trends, and
11. To quantify changes in land cover and use over time.

An additional secondary short-term need for Canadian respondents and a tertiary need for US respondents was to evaluate conservation tillage practices in terms of achieving conservation objectives. Other tertiary needs were to generate information on impacts of increased recreational activity, and to develop a common terminology.

US respondents identified three primary mid-term needs for research and monitoring:

1. To identify areas as conservation priorities associated with species assemblages and indicator species to establish a monitoring system,
2. To identify threats/stressors at different levels, and
3. To improve assessment measures (indicators) of policies and programs.

Canadian respondents' first two primary mid-term needs were identical to those of US respondents but the US respondents' third primary need was a secondary need in Canada. Canada's other primary mid-term needs for research and monitoring included:

1. To increase research on invasive and rare species and how to implement recovery and management plans,
2. To develop and promote uniform and consistent long-term monitoring techniques and research,
3. To explore potential of carbon sequestration and new genetic, biochemical, pharmaceutical and other resources, and
4. To quantify changes in land cover and use over time.

The above additional primary Canadian needs were identified as secondary mid-term needs by US respondents.

US and Canadian respondents showed numerous common secondary needs for research and monitoring in the mid-term:

1. To increase research on invasive and rare species and how to implement recovery and managements plans,
2. To complete ecological, economic and social assessments and abiotic and biotic inventories,
3. To conduct research on the integration of ecosystem information in land management,
4. To follow up and monitor habitat improvement projects,
5. To assess the status, distribution and trends of existing functional grasslands,
6. To evaluate conservation tillage practices,
7. To identify key geographic areas that require immediate study, and
8. To conduct research to measure contributions to bird population trends.

SUMMARY

Tables 7 and 8 provide a summary of the issues and needs identified by respondents, in both the short- and mid-term, of potential relevance to all three countries that were of high ecological importance and that addressed policy and agency needs that could benefit from trinational collaboration.

Biodiversity

Primary biodiversity issues were declines in biodiversity, fragmentation of habitats and plowing of grasslands.

Land-use Practices and Management

While there were numerous land-use practice and management issues identified, relatively few were of common high priority for all three countries. Issues of common high priority were increased demands for water and potential conflicts in regard to water shortages. The United States and Canada shared numerous concerns over issues such as insufficient areas of grasslands receiving protection, inappropriate agricultural practices, draining and filling of wetlands, and the impacts of exploration and development activity. Mexico's concerns focused more on overgrazing, pasture management issues, and on aquifer depletion.

Policies and Socio-economic Issues

As in the case of land-use practices and management, the three countries shared only a few policy and socio-economic issues of primary concern in common. All were concerned about the lack of incentives for conservation, restoration and management of grassland, the lack of productive and economic alternatives, organization and marketing incentives that would support desired lifestyles and grasslands conservation, the impact of global subsidies and government support policies on commodity prices that could affect grasslands conservation objectives, and the lack of integration of policies related to overall economic and ecological systems. The United States and Canada shared more issues in common, ranging from lack of confidence in the planning process, policies, programs, regulation and enforcement and the lack of adequate participation by stakeholders and non-traditional sectors in planning for grasslands to concerns over private property rights in relation to grasslands conservation and threats to the future economic security of agricultural producers. Following upon their focus on grazing issues in relation to land-use practices and management, Mexico's primary policy and socio-economic concerns involved the lack of incentives and alternatives for proper range management and the lack of linkages between production and conservation policies and between producers and specialists that would foster rangeland conservation.

Demographic

Factors such as rural population declines and aging, and deterioration of rural services and infrastructure are concerns throughout rural communities in North America. Respondents generally felt that such issues were of longer-term concern than the time frame specified for the questionnaire. Mexican and US respondents did identify increased stress in rural communities as a high priority concern impacting on decision-making that could affect grasslands conservation objectives.

Education and Communication

Mexican respondents were particularly concerned with the general lack of awareness among the population about the worth of environmental services provided by grasslands. US and Canadian respondents focused more on the lack of grasslands conservation programs, inadequate communication among stakeholders and inadequate knowledge or appreciation of specific regional problems by federal officials.

Research and Monitoring

Respondents identified a wide array of needs for research and monitoring that would be useful in addressing many of the grassland conservation issues and that reflect many of the needs already discussed. These included:

1. increase the number and extent of permanent areas for grasslands conservation research,
2. focus on wildlife for their recovery,
3. improve assessment measures (indicators) of policies and programs,
4. focus on impacts of invasive species,
5. identify threats/stressors at different spatial and temporal scales, and
6. focus on integrated ecological, economic and social assessments.

Table 7. Primary short and mid-term grassland conservation issues in Mexico, the United States and Canada (st = short term, mt = mid-term).

Issue	Mexico		US		Canada	
	st	mt	st	mt	st	mt
Biodiversity:						
Declines in biodiversity	✓	✓	✓	✓	✓	✓
Loss/fragmentation of wildlife habitat		✓	✓	✓	✓	✓
Plowing of grasslands	✓	✓	✓	✓	✓	✓
Fragmentation of riparian habitat	✓			✓		✓
Excessive focus on species management					✓	✓
Altered disturbance regimes				✓		
Over-exploitation of groundwater	✓	✓				
Introduced and invasive species				✓	✓	✓
Land Use Practices and Management:						
Insufficient areas of grasslands receiving protection			✓	✓	✓	✓
Inappropriate agricultural practices			✓	✓	✓	✓
Draining and filling of wetlands			✓	✓	✓	✓
Impacts of exploration and development activity				✓	✓	✓
Marginal land conversion			✓			✓
Limited understanding of livestock management practices				✓		
Grazing in riparian zones and wetlands				✓		
Cattle and hog waste management						✓
Lack of extension and outreach programs promoting appropriate grazing management	✓	✓				✓
Overgrazing	✓	✓				
Impacts of pasture management techniques on wildlife	✓	✓				

Table 7. (continued)

Issue	Mexico		US		Canada	
	$	mt	$	mt	$	mt
Land Use Practices and Management (continued):						
Increased demands for water and potential conflicts in regard to water shortages related to climate change	□	□		□		□
Inadequate recognition of the benefits of grasslands as an atmospheric carbon sink				□		□
Impact of nutrient and chemical applications						□
Effects of genetically modified crops on native grasslands						□
Policies and Socio-economic Issues:						
Lack of incentives for conservation, restoration and management of grasslands	□	□		□	□	□
Insufficent incentives and lack of financial alternatives for proper range management	□	□				
Lack of linkages between policies and programs for production and conservation	□	□				
Lack of linkages between producers and technicial specialists that would foster pasture conservation	□	□				
Inadequate policies, programs, regulations and enforcement to support conservation programs and inefficient/contradictory missions among government agencies			□	□	□	□
Private property rights			□	□		□
Lack of inclusion of all stakeholders in the planning process				□	□	□
Inadequate rewards for good stewardship				□	□	□
No established market value for public goods				□	□	□
Lack of integration of policies related to overall economic and ecological systems	□		□	□	□	□
Impact of global subsidies and government support policies on commodity prices	□			□	□	□
Lack of productive and economic alternatives, organization and marketing incentives that would support desired lifestyles and grasslands conservation	□		□	□		□
Threats to future economic security of agricultural producers			□	□		□
Lack of incorporation of non-game species into many management plans				□		□
Lack of involvement of non-traditional sectors				□		□
Policies that encourage larger farm sizes				□		□
Lack of confidence in government and non-government policies and programs				□		□
Social Issues:						
Increased stress in rural communities	□	□	□	□		
Education and Communication Issues:						
Lack of awareness of the worth of environmental services	□	□				
Insufficient grasslands conservation education programs			□	□	□	□
Inadequate knowledge or appreciation of specific regional problems by federal policy-makers or managers			□	□	□	□
Inadequate communication and collaboration with and among stakeholders			□	□	□	□

Table 8. Important needs identified for the conservation of central N.A. grasslands	
Biodiversity:	
1.	Promote habitat conservation
2.	Restore wildlife populations, endangered species and natural processes to prevent extirpations
3.	Reverse declines and prevent exotic plant invasions
4.	Achieve complete identification, understanding and representation of biodiversity
5.	Identify target species, high-value habitats and natural corridors for wildlife and create a joint database
6.	Determine the biotic and abiotic requirements of native prairie species and communities
7.	Counteract excessive removal of flora and fauna
Land Use Practices and Management:	
8.	Sustain diverse ecosystems across the entire prairies
9.	Encourage the creation of markets for environmentally produced agricultural goods
10.	Minimize human disturbance
11.	Reduce chronic overgrazing
12.	Foster carbon sequestration
13.	Restore degraded ecosystems
14.	Promote improved liquid and solid storage methods for manure
15.	Encourage the development of native plant covers and seed industry
16.	Develop new pest control products and methods
Policies and Socio-economic Needs	
17.	To identify, promote and develop laws, regulations, policies and programs that favor conservation practices
18.	To include all stakeholders in grassland conservation planning and management
19.	To improve grasslands management through incentives
20.	To establish federal legislation in Canada for protection of endangered species
21.	To develop and support programs that remove marginal lands from production and offer tangible economic advantages to producers
22.	To create new fund-raising tools for North American Grasslands Conservation through the private sector
23.	To develop innovative markets for traditional agricultural commodities and non-traditional products and create free-market incentives for private landowners
24.	To complete ecoregional planning
25.	To make changes to existing Endangered Species legislation to better support grasslands species/habitat conservation
26.	To develop and sustain new, better and well-funded conservation reserve programs
27.	To adopt an interagency approach to identify areas of high risk for drainage/destruction
28.	To establish a “one-stop shopping” approach to delivery of conservation programs and promote government actions through changes in policy measures
29.	To set habitat goals that recognize the needs of targeted groups of species
30.	To develop and support programs that promote coordination among international, federal, state/provincial and municipal policies that implement recovery plans for endangered or threatened species

Table 8. (continued)
Education and Communication:
31. To develop and apply culturally-specific education and communication programs that facilitate changes of attitude and culture that would support grasslands conservation
32. To establish more outreach efforts
33. To promote net gain of grassland and ecosystem restoration
34. To support and promote efforts of private and public land managers who conserve native prairie
35. To work with the NABCI to make grasslands a high priority
36. To develop simple techniques for grasslands conservation
37. To develop and recognize more local producer organizations and landowner contact programs and build relationships and raise awareness
38. To promote training opportunities for future land managers and encourage formal education curricula
39. To integrate wildlife management issues into rangeland extension programming
Research and Monitoring:
40. To establish more permanent areas for grasslands conservation research
41. To increase research on wildlife for their recovery
42. To improve assessment measures (indicators) of policies and programs
43. To increase research on impacts of invasive species
44. To increase research on invasive and rare species and how to implement recovery and management plans
45. To identify threats/stressors at different spatial and temporal scales
46. To conduct complete integrated ecological, economic and social assessments
47. To complete abiotic and biotic inventories
48. To conduct research on the integration of ecosystem information in land management
49. To develop and promote uniform and consistent long-term monitoring techniques and research and to develop a common terminology
50. To follow up and monitor habitat improvement projects
51. To identify key geographic areas that require immediate study
52. To assess the status, distribution and trends of existing functional grasslands
53. To identify areas as conservation priorities associated with species assemblages and indicator species in order to establish a more representative monitoring system
54. To conduct research to measure contributions to bird population trends
55. To quantify changes in land cover and use over time
56. To evaluate conservation tillage practices in terms of achieving conservation objectives
57. To explore the potential of carbon sequestration and new genetic, biochemical, pharmaceutical and other resources associated with grasslands
58. To generate information on impacts of increased recreational activity

NEXT STEPS

It is recommended that a trinational working group for grasslands conservation be formed to develop a North American grasslands conservation strategy.

In the development of a trinational grasslands conservation strategy, the three countries must determine what is politically and legally possible to include in such a strategy/agreement. Successful conservation partnership strategies tend to share a number of common elements that can provide some guidance to the CEC and all grassland stakeholders working to achieve a trinational strategy. Based on those common elements, a strategy for the conservation of the central grasslands of North America should:

- Establish a steering committee and working groups relative to major goals.
- Engage a representative cross-section of stakeholders in the development and monitoring of the strategy.
- Respect the rights of all land users to be heard, with careful consideration of the impact of their needs and wants on the environmental, social and economic sustainability of grassland ecosystems.
- Develop an applied focus for the strategy, which should serve as a blueprint to conserve biodiversity.
- Present an action plan with an explicit statement of goals, objectives, and actions for achieving objectives with clear timelines and agency/organization leads and responsibilities.
- Encourage projects that require broad, trinational collaboration.
- Establish annual work plans.
- Involve government as one of many participants at the table; government should not oversee or unilaterally set the direction for the program.
- Evaluate progress over the short and mid-term.
- Establish a forum for active exchange of information with other projects, agencies, organizations and citizens.
- Provide sufficient long-term resources not only to develop the strategy but also to administer, implement and monitor it.
- Not act in competition for funds or program delivery responsibility.

It is clear that addressing the full array of grasslands conservation issues in a trinational strategy will require a spectrum of approaches that are sensitive to the temporal and spatial scale of issues, the historical antecedents to those issues and the variations in biophysical conditions, cultural attitudes, laws/regulations/policies/programs and human practices that collectively form the context, as well as the obstacles and opportunities, to achieving a shared vision for grasslands conservation.

A wide array of issues has been identified throughout the central grasslands of Canada, Mexico, and the United States. Many are specific to local settings and will need to be dealt with at that scale. However, there is ample room for a trinational conservation strategy to assist local and regional initiatives, as well as to complement national and international initiatives, for reasons outlined in the introduction to this report.

At the trinational scale, a conservation strategy for the central grasslands of North America will need to address a wide array of issues and needs relating to biodiversity,

land-use practices and management, land-use policies and economic issues, demographic and social issues, education and communication issues and research, monitoring and reporting issues. The strategy will also need to consider issues and needs from both short- and mid-term perspectives and recognize that while there are a number of common, trinational issues and needs, there are also numerous issues and needs that are country-specific or localized.

FOCUS FOR A NORTH AMERICAN GRASSLANDS CONSERVATION STRATEGY

Biodiversity

Trinational cooperative activities should include greater promotion of habitat conservation, identification of high-value habitats and management activities that foster prevention and reversal of declines and restoration of species and habitats.

Both short- and mid-term strategies should be developed that, at a minimum, provide a focus on the decline in biodiversity, the extirpation of species, altered guild structures/species composition of predators, the loss or fragmentation of wildlife habitat, the conversion of croplands to grassland and the need to better promote habitat conservation. Over the mid-term, the strategy should also address issues related to a narrow or restricted focus on species management, increasing numbers of introduced and invasive species, the need to reverse declines and prevent exotic plant invasions, the need to restore wildlife populations, endangered species and natural processes to prevent extirpations, the fragmentation of riparian habitat corridors and altered disturbance regimes. At a national level, Canada has a particular concern about the impact of the overexploitation of groundwater on its prairie biodiversity.

Land-use Practices and Management

Trinational cooperative activities should address land-use practice and management issues, including assistance towards sustaining diverse ecosystems across the central grasslands, helping to minimize human disturbances of the grasslands and encouraging the creation of markets for environmentally produced agricultural goods.

While there are numerous differences in land-use practices and approaches to management of grasslands across North America, according to the responses received there are common issues and needs that should be addressed in a trinational strategy over both the short- and mid-term. They include:

- the insufficient area of grasslands receiving protection,
- inappropriate agricultural practices,
- the draining and filling of wetlands,
- plowing of grasslands,
- marginal land conversion,
- the need to sustain diverse ecosystems across the entire prairies,
- the need for increased efforts to encourage the creation of markets for environmentally produced agricultural goods, and
- the impacts of exploration and development activity.

Specific to the mid-term, in particular, the strategy should also address:

- the insufficient use of ecological management practices in protected areas,

- the expansion of urban, suburban and country residential areas,
- issues related to the impact of climate change, including benefits of grasslands as an atmospheric carbon sink,
- the potential for water shortages and conflicts and increased demands for water,
- the need to restore degraded prairie ecosystems, and
- the development of native plant covers and an associated seed industry.

At a national level, the strategy should address mid-term concerns in the US prairies related to the relatively limited understanding in the general population about livestock grazing management practices, issues associated with grazing in riparian zones and wetlands and the need to reduce chronic over-grazing. In Canada, mid-term attention should be paid to cattle and hog waste management, impacts associated with nutrient and chemical applications on agricultural lands, the impacts of biotechnology and genetically modified crops on grasslands conservation and the lack of extension and outreach conservation programs. For Mexico, the strategy will need to address concerns about the lack of extension programs promoting appropriate grazing management, over-grazing, the impacts of pasture management techniques on wildlife, concerns over increased demands for water and potential conflicts from water shortages related to climate change.

Land-use Policies and Economic Issues

Trinational cooperative activities should facilitate improved laws, regulations, policies and programs favouring grasslands conservation, improved incentive programs, improved inter-agency and better-coordinated conservation programming.

For all three countries the strategy will have to pay substantial short- and mid-term attention to land-use policies and economic issues related to grasslands. In particular:

- inadequate policies, programs, regulations and enforcement to support conservation programs,
- inefficient and contradictory missions among government agencies,
- the lack of integration of policies related to overall economic and ecological systems,
- lack of confidence in government and nongovernment policies and programs,
- the need to identify, promote and develop laws, regulations, policies and programs that favor conservation practices,
- the need to include all stakeholders in grassland conservation planning and management,
- the need to improve grasslands management through incentives,
- the need to develop innovative markets for traditional agricultural commodities and non-traditional products and create free-market incentives for private landowners,
- the lack of productive and economic alternatives, organization and marketing incentives that would support desired lifestyles and grasslands conservation,
- threats to future economic security of agricultural producers,
- issues related to private property rights and grasslands conservation,

- the need to develop and support programs that remove marginal lands from production and offer tangible economic advantages to producers,
- the lack of inclusion of all stakeholders in the planning process,
- the lack of incentives for preservation/restoration/management of grasslands,
- the impact of global subsidies and government support policies on commodity prices,
- inadequate rewards for good stewardship, and
- the lack of an established market value for public goods.

In the United States and Canada, over the mid-term in particular, the strategy should address:

- the need for management plans that better incorporate non-game species,
- programs that work to overcome the lack of involvement of non-traditional sectors in grasslands conservation,
- insufficient innovative/alternative funding,
- improving information about the link between economic and ecological impacts and benefits and conservation and production policies and programs,
- policies that encourage large farm sizes,
- establishing a "one-stop" shopping approach to delivery of information about conservation programs and that promotes government actions through changes in policy measures.

At a national scale, the strategy should address Canada's need to create new fundraising tools for North American Grasslands Conservation through the private sector. The strategy will have to pay particular attention in Mexico to the impact of global subsidies and government support policies on commodity prices, the lack of productive and economic alternatives, and marketing incentives that would support desired lifestyles and grasslands conservation.

Demographic and Social Issues

Trinational cooperative activities should be founded upon a scientific assessment of attitudes and perceptions to grasslands conservation of stakeholders in the central grasslands of North America.

Demographic and social issues were generally not ranked as high in priority as other issues and needs related to grasslands conservation, although respondents to the survey recognized the contextual importance of those issues. Ultimately, the success of any policies, programs or practices recommended within a trinational strategy for grasslands conservation will depend on the extent to which they have contended with the demographic, social and cultural realities of regions.

Education and Communication

Trinational cooperative activities should encourage greater outreach efforts that focus on culturally specific education and communication programs. Such programs should focus on promoting a net gain of grasslands, supporting ecosystem restoration of degraded grasslands, increasing awareness of the worth of the environmental services provided by grasslands, promoting simple techniques for grasslands conservation, promoting the efforts of landowners/managers that conserve grasslands,

increasing contacts with local producer organizations, promoting training opportunities for future land managers and further developing training opportunities that integrate wildlife issues with rangeland management.

Two major issues were raised in relation to communication and education relative to grasslands conservation:

1. There is inadequate communication and collaboration with and among stakeholders, that is, the development of a comprehensive grasslands conservation strategy must involve expanded and continuous stakeholder consultation, and
2. There are insufficient grasslands conservation education programs that either address the full array of issues or reach the necessary audiences in order to effect changes.

Research, Monitoring and Reporting

Trinational cooperative activities should focus on promoting the establishment of more permanent areas for grassland research, increasing research on threats/stressors, on wildlife for their recovery and on the impacts of invasive species, and promoting research focused on integrated ecological, economic and social assessments as well as research on the best means to implement recovery and management plans, and to improve assessment measures (indicators) of policies and programs. Trinational cooperation could assist in identifying key grasslands that require immediate study and promote uniform and consistent long-term monitoring techniques and research and a common terminology.

Today's conservation strategies and interests in endangered species and habitat issues have leapt ahead of the supporting data and information. The way ahead must place a greater emphasis on integrated, comprehensive inventories and monitoring systems—ones that are specially designed to meet analytical needs at the scales of habitats and ecosystems. These data sets need to be ecosystem-based, scientifically sound, and collected over longer time frames.

A WAY AHEAD

The existence and growth in the number of species and habitats at risk in the central North American grasslands is symptomatic of larger problems. They are a signal and reflection of the increasing impacts of humans on ecosystems and the difficulties that we humans have had in adjusting our actions to sustain ecosystem integrity. In recognition of this, the concerns of many North Americans have evolved over time from questions of interest in nature to questions about ecosystem integrity and health.

Addressing the issue of endangered species is one means of drawing attention to the recovery of species or preventing their further loss. Yet there is little practicality and sense over the long term of managing by individual species or even by communities of species. Ecosystem management is best thought of as an approach that integrates our collective wisdom and actions instead of dividing up actions, jurisdictions, scientific approaches and capabilities. Ultimately, success will result from decision-making processes that follow such patterns. For example, could wildlife managers and planners effectively care for migratory waterfowl throughout the grasslands without knowing their habitats and needs during the year, their lifecycle requirements, their tolerance to human activities and pollutants, their role in native cultures, their importance to tourism and recreation, their contribution to biodiversity and ecosystem dynamics, their relationship in the food-chain, and so on? It is necessary to understand the connected parts and their relationships over temporal and spatial periods.

Innovative and integrative solutions to resource management are required—approaches that put the highest priority on sustaining the integrity of habitats and ecosystems. North America's grassland habitats must be managed as resources, and as functional areas that serve both nature and people. A reorganization of priorities will happen in one of two ways. Either people will come to recognize the need to integrate their demands and habitat goals within the context of the carrying capacity of grassland ecosystems or habitat degradation will compound the overall degradation of ecosystems.

Endangered species considerations have moved to the forefront in discussions regarding grasslands conservation. However, society is faced with wildlife habitat health and integrity issues that are much broader. Based upon key cooperation experiences related to grassland conservation throughout North America, it is clear that success in reducing the endangerment of wildlife will not be achieved without an integrated focus that at least:

- further combines partnerships and skills among governments, First Peoples/Native Americans, industries, private landowners and other land stewards;
- adopts hierarchical spatial and temporal approaches based on wildlife habitat and ecological principles;
- sets measurable objectives and goals, and provides a means to monitor them;
- integrates biophysical and socio-economic, cultural and political considerations into habitat and resource management decision-making; and
- operates according to principles of sustainable resource use, adaptive management and ecosystem management.

Managing wildlife and their habitats in a sustainable fashion is a type of contract made

cooperatively among citizens and groups that commits them to meeting their own needs without seriously compromising both the rights and needs of others and also the basic quality of the environment. Its three principal goals are to ensure ecosystem integrity, ensure human health and well-being, and ensure natural resource conservation. Sustainability cannot be achieved without achieving all of those elements, nor can it be expected to succeed if the basic needs of humans are not met. Ecosystem management is a key approach to achieving habitat goals. It requires a shift in the focus of humans from the production of goods and services to sustaining the viability of systems that are necessary to deliver goods and services—now and into the future (ESA 1995). This approach when applied to habitats requires the commitment of all levels of government, businesses, industries, and all citizens to think, plan and act in terms of ecosystems. Approaches to resolving the endangerment of wildlife habitats and their associated species should, therefore, be seen as one component of an overall ecosystem management strategy aiming to achieve sustainability of resources.

Policies and programs are often predicated upon approaches imposed upon jurisdictional boundaries such as counties, districts, regional municipalities, states/provinces and nations. The concerns of grasslands conservation, whether in terms of species, habitats or ecosystems, often transcend those types of boundaries, as is the case with issues such as acid rain, climate change and forest sustainability. In that context, politics are really about mobilizing jurisdictional authorities and stakeholders to operate on the basis of the ecosystems and habitats that they share.

Our intent in authoring this publication is to facilitate further consultation among all who are interested in the conservation of the central North American grasslands. It is being distributed widely among North American stakeholders who are encouraged to provide comments to the authors and the CEC, and to work with the CEC in establishing a trinational working group that will further the development of a North American grasslands strategy.

GLOSSARY

Abiotic

Non-living; usually referring to rock, minerals, and non-organic parts of the natural environment.

Arable

Land that is capable of producing crops.

Badlands

Regions where erosion of the nearly horizontal, unconsolidated sedimentary beds resulted in a land of narrow ravines, sharp crests and pinnacles, devoid or almost devoid of vegetation.

Biodiversity (biological diversity)

The variability among living organisms from all sources, including, *inter alia*, terrestrial, marine, and other ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.

Biome

A major ecological community of living plants and animals occupying an extensive area, e.g., desert, grassland.

Biotic

Of, pertaining to, or relating to, living organisms.

Carbon Sequestration

Carbon removed from the atmosphere and fixed in living or dead organic material.

Conservation

The maintenance or sustainable use of the Earth's resources in a manner that maintains ecosystems, species, and genetic diversity and the evolutionary and other processes that shaped them. Conservation may or may not involve the use of resources; that is, certain areas, species, or populations may be excluded from human use as part of an overall landscape/waterscape conservation approach.

Conservation Reserve Program (CRP)

A major provision of the United States' Food Security Act of 1985 and extended under the Food, Agriculture, Conservation and Trade Act of 1990, the Federal Agriculture, Improvement and Reform (FAIR) Act of 1996 and more recently by the Farm Security and Rural Investment (FSRI) Act of 2002, was designed to reduce erosion on 40 to 45 million acres (16 to 18 million hectares) of farm land. Under the programme, producers who sign contracts agree to convert erodible crop land to approved conservation uses for ten years. Participating producers receive annual rental payments and cash or payment in kind to share up to 50% of the cost of establishing permanent vegetative cover. The CRP is part of the *Environmental Conservation Acreage Reserve Program*. The 1996 FAIR Act authorised a 36.4 million acre (14.7 million hectares) maximum under CRP, its 1995 level. This has been extended to 39.2 million acres (15.8 million hectares) under the FSRI Act of 2002.

Cropland

Land used primarily for the production of cultivated crops.

Crown Land

Land owned by either the provincial or federal government in Canada.

Cultivated

Land that has been broken from its native state, in order to raise crops.

Development

Any project, operation or activity or any alteration or expansion of any project, operation or activity which is likely to:

(i) have an affect on any unique, rare or endangered feature of the environment;
(ii) substantially utilize any provincial resource and in so doing preempt the use, or potential use, of that resource for any other purpose;
(iii) cause the emission of any pollutants or create by-products, residual or waste products which require handling and disposal in a manner that is not regulated by any other Act or regulation;
(iv) cause widespread public concern because of potential environmental changes;
(v) involve a new technology that is concerned with resource utilization and that may induce significant environmental change; or
(vi) have a significant impact on the environment or necessitate a further development which is likely to have a significant impact on the environment.

Drainage

Artificial removal of standing water from fields or pasture.

Ecological Integrity

The quality of a natural, unmanaged or managed ecosystem in which the natural ecological processes are sustained, with genetic species, and ecosystem diversity assured for the future.

Ecoregion

A subdivision of representative areas with similar attributes, characterized by similar landforms, climates, vegetation, soils, water, and regional human activity patterns.

Ecosystem

Ecosystems are composed of a dynamic complex of plants, animal, and micro-organism communities and their non-living environment interacting as a functional unit. Each component performs a specialized role within the ecosystem. Ecosystems provide ecological services such as the conversion of solar energy into carbohydrates and protein, oxygen production, water purification, and climate moderation. They produce the soils in which we grow our crops and remove greenhouse gases from our air. Human health, like the health of all other living things, is linked to the well-being, or integrity, of these systems.

Ecosystems vary in scale. They may be as small as a pond or as vast as a continent or the globe. Each ecosystem is unique in terms of its chemical, biological and physical characteristics, whether defined spatially as a watershed, coastline or some other form of landscape or seascape.

Ecosystem Management

A management practice and philosophy aimed at selecting, maintaining, and/or enhancing the ecological integrity of an ecosystem in order to ensure continued ecosystem health while providing resources, products, or non-consumptive values for humans.

Ecotourism

A nature travel experience that contributes to conservation of the ecosystem and to the cultural and economic resources of the host communities.

Ecozone

An area of the earth's surface representative of large and very generalized units characterized by interactive and adjusting abiotic and biotic factors.

Endangered

Any native wild species of plant or animal that is threatened with imminent extirpation or extinction.

Exotic Species

A species which is not native to the region in which it is found.

Extirpated

Any native wild species of plant or animal that no longer exists in a given area, but exists elsewhere in the wild.

Fragmentation

The breaking of native prairie into smaller pieces, leaving islands of native prairie surrounded by cultivated land or seeded pastures.

Grasslands

Terrestrial ecosystems dominated by herbaceous and shrub vegetation, maintained by grazing, fire, drought and/or low temperatures" (World Resources Institute 2000).

Grazing System

The manipulation of grazing and browsing animals to accomplish a desired result. The manner in which grazing and non-grazing periods are arranged within the grazing season, either within or between years.

Herbivore

An animal that subsists on plants or plant materials.

Indicators

Species that indicate the presence of certain environmental conditions, seral stages, or previous treatment.

Indigenous

Born, growing, or produced naturally in a specific region.

Monoculture

Vegetation dominated by only one species of plant.

Native Plants

Plants found naturally in a region before European settlement.

Overgrazing

Grazing land often or continuously during the growing season each year such that insufficient time is available for plants to recover. As a result, roots become shorter, plants become less productive, weeds are more likely to invade and the plants become more susceptible to drought.

Protected Area

Geographically defined area that is designed or regulated and managed to achieve specific conservation objectives.

Range Management

A distinct discipline founded on ecological principles and dealing with the use of rangelands and range resources for a variety for purposes. These purposes include use as wildlife habitat, grazing by livestock, recreation, aesthetics, as well as other associated uses.

Reclamation

To return the capability of disturbed land to support its prior use or some other land use.

Restoration

To bring land back to as close to its original state as possible.

Revegetation

Establishment of vegetation following a disturbance that partially or completely removes the original vegetation.

Stewardship

The individual and corporate responsibility of one generation to maintain the natural inheritance that it has received, both for its benefit and for the benefit of future generations. A commitment to conserve and maintain the natural features of the land.

Succession

The progressive natural development of vegetation from an initial pioneer stage; one community being replaced by another under the influence of physical and biotic factors.

Sustainability

The ability of an ecosystem to maintain ecological processes and functions, biological diversity, and productivity over time.

Sustainable Development

A conceptual ideal where development meets the needs of the present generations without compromising the ability of future generations to meet their own needs.

Sustainable Use

Use of components of biodiversity (i.e., organisms or ecosystem), in a way and at a rate that does not lead to the long-term decline of biodiversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations.

Threatened

Any native wild species of plant or animal that is likely to become endangered if the factors leading to its endangerment are not reversed

Ungulate

A hoofed animal, including ruminants but also horses, deer, and swine.

Vulnerable

Any native wild species of plant or animal that is of special concern because of low or declining numbers due to human activities or natural events but that is not endangered or threatened.

Wetland

An area of low-lying land, submerged periodically by fresh or saline water.

LIST OF ACRONYMS

BCR	Bird Conservation Region
CCAD	Canadian Conservation Areas Database
CEC	Commission for Environmental Cooperation
CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
CONANP	Mexican Commision for Protected Areas
COTECOCA	Comisión Técnico-Consultivo de Coeficientes de Agostaderos (SAGARPA)
CPRC	Canadian Plains Research Center (University of Regina, Saskatchewan, Canada)
CRP	Conservation Reserve Program
DGVS	Dirección General de Vida Silvestre (SEMARNAT)
ENGO	Environmental Non Governmental Organization
IBA	Important Bird Area
INEGI	Instituto Nacional de Estadística, Geografía e Informática
IUCN	International Union for the Conservation of Nature, currently World Conservation Union
MAD	Managed Areas Database (US)
MCPA	Manitoba Cattle Producers Association
NABCI	North American Bird Conservation Initiative
NAFEC	North American Fund for Environmental Cooperation (CEC)
NAWCP	North American Waterbird Conservation Plan
NAWMP	North American Wetlands Management Plan
NCAD	North American Conservation Areas Database
NGO	Non Governmental Organization
PCAP	Prairie Conservation Action Plan (Saskatchewan)
PCF	Prairie Conservation Forum (Alberta)
PFRA	Prairie Farm Rehabilitation Administration (Agriculture Canada)
PIF	Partners in Flight
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación
SCCC	Species of Common Conservation Concern
SCCC-G	Grassland Species of Common Conservation Concern
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales
TNC	The Nature Conservancy
UNAM	Universidad Nacional Autónoma de México
UNAM-IE	Instituto de Ecología (UNAM)
UNEP	United Nations Environment Program
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WHC	Wildlife Habitat Canada
WCMC	World Conservation Monitoring Center (UNEP)
WCPA	World Commission of Protected Areas (IUCN)
WHSRN	Western Hemisphere Shorebird reserve Network
WWF	World Wildlife Fund (USA)
WWF-C	World Wildlife Fund-Canada

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APPENDIX 1. TIMELINE OF GRASSLANDS-RELATED ACTIVITIES PROMOTED THROUGH THE CEC.

1994	Commission for Environmental Cooperation (CEC) established.
1997	Ecological Regions of North America report published (CEC 1997).
1996–1998	"Ecoregion-Based Conservation in the Chihuahuan Desert" Consultation Process, with the involvement of CEC, Comisión Nacional para el Uso y Conocimiento de la Biodiversidad (CONABIO), Instituto Tecnológico de Monterrey (ITESM), Pronatura, The Nature Conservancy (TNC), and World Wildlife Fund (WWF).
1999	North American Bird Conservation Initiative (NABCI) established.
2000	Species of Common Conservation Concern (SCCC) report presented to the Trilateral Committee of Wildlife and Ecosystem Conservation and Management.
2001	1st Trinational Grasslands Meeting, Chihuahua, Mexico: vision statement drafted, initiated development of trinational grasslands framework, identification of grassland issues and needs, and development of an information base for North American grasslands.
2001	First Draft of CEC's strategy for the conservation of biodiversity.
2001	Priority ecoregions of North America identified, including Central grasslands.
2001	Grasslands Workshop, Durango, Mexico. Assisted Mexico to develop national perspective related to grassland conservation.
2002	Formation of the CEC's Biodiversity Working Group.
2002	The Wildlife Society Symposium, Bismarck, North Dakota: presentation of the trinational grasslands issues, needs and information.
2003	Completion and official endorsement of CEC's "Strategic Plan for North American Cooperation in the Conservation of Biodiversity."

(APPENDIX 2)
INTRODUCCIÓN

LA NECESIDAD DE LA COOPERACIÓN TRINACIONAL PARA CONSERVAR LOS PASTIZALES CENTRALES DE AMÉRICA DEL NORTE

Los pastizales centrales son una de las pocas regiones ecológicas contiguas de América del Norte compartidas por los tres países. Si bien esta conexión subcontinental entraña una responsabilidad compartida entre Canadá, Estados Unidos y México en lo que respecta a su conservación, también es cierto que tratándose de un área geográfica tan extensa, con una enorme diversidad de especies y ecosistemas, el mosaico de actividades y prácticas de uso de la tierra, culturas y enfoques políticos y de manejo es, a su vez, muy diverso y está sujeto a leyes y reglamentos variables. Dada tal diversidad y la naturaleza de los mandatos institucionalizados para el manejo y la conservación de los recursos, a nadie sorprende que la gran mayoría de las iniciativas para conservar los pastizales se den a escala local o regional. Con todo, se han llevado a cabo algunas iniciativas -menos en número pero igualmente importantes- en los ámbitos nacional, binacional (sobre todo entre Canadá y Estados Unidos) y trinacional.

Cuadro 1. Ejemplos de proyectos trinacionales y nacionales para la conservación de los pastizales.

Trinacionales	CanadÆ	Estados Unidos	MØxico
Iniciativa para la Conservación de las Aves de América del Norte Plan para la Conservación de las Aves Acuáticas de América del Norte Plan de Manejo de Aves Acuáticas de América del Norte Programa Alas de las Praderas (Prairie Wings) de la Nature Conservancy	Foro para la Conservación de las Praderas de Alberta Plan de Acción para la Conservación de las Praderas de Manitoba Plan de Acción para la Conservación de las Praderas de Saskatchewan Administración para la Rehabilitación de Granjas en las Praderas Programas Hábitat Silvestre de Canadá, Paisajes Agrícolas y Medio Rural de Canadá (*Wildlife Habitat Canada, Agricultural Landscapes* y *Countryside Canada*)	*Partners In Flight* Plan para la Conservación de las Aves Playeras de Estados Unidos Grupo Interestatal de Trabajo sobre el Perrito de las Praderas - Evaluación multiestatal del perrito de las praderas de cola negra Departamento de Agricultura, Servicio Forestal - Plan Estratégico para los Pastizales del norte de las Grandes Planicies Departamento del Interior, Oficina de Manejo de la Tierra - Plan estratégico en materia de pastizales	Manejo de tierras de pastoreo, Campo Experimental La Campana - INIFAP (Chihuahua) Manejo de tierras de pastoreo, Campo Experimental Vaquerías - INIFAP (Jalisco) Manejo de tierras de pastoreo, Rancho Los Ángeles - UAAAN (Coahuila).

Es fundamental sostener y fomentar actividades a escalas regional y nacional, así como evitar que se reduzcan los apoyos a tales actividades. Pero también resulta cada vez más evidente que la cooperación trinacional para conservar los pastizales centrales de

América del Norte es necesaria como apoyo a las actividades locales, regionales e incluso nacionales. Entre las razones de tal apoyo complementario se incluyen las siguientes:

1. *Los efectos de las actividades humanas, tanto aquellas que contribuyen al cumplimiento de los objetivos de la conservación como las que los obstaculizan, exigen atender múltiples escalas para evaluar la eficacia de las actividades de conservación.* En un nivel conceptual general, fundamentado en la teoría ecológica, resulta imposible discernir plenamente el impacto absoluto de las actividades humanas en las especies y los ecosistemas en escala espacial o temporal determinada. Las fuerzas que afectan la sustentabilidad de las especies y los hábitats pueden ocurrir durante periodos mayores o bien originarse de áreas geográficas más amplias que el alcance de la actividad local o regional de conservación. En tales casos, será difícil -si no imposible- evaluar la eficacia de tales programas locales o regionales de conservación si éstos no atienden a tales fuerzas motrices mayores. Un enfoque trinacional permite una mejor comprensión contextual de las fuerzas motrices y de las respuestas a tales fuerzas en la evaluación de la eficacia de las actividades locales, regionales y nacionales de conservación.
2. *Los pastizales centrales han sido muy afectados, lo mismo históricamente que en tiempos recientes, por una amplia gama de actividades humanas. Este marcado impacto ha generado una conciencia de la urgencia de preservar el sistema biológico que, si bien bastante empobrecido, a la fecha subsiste.* Tal urgencia ha sido reconocida en numerosos convenios de cooperación para atender asuntos de relevancia para los ecosistemas de los pastizales. No obstante, incluso los acuerdos bilaterales tienden a centrar la atención en las "partes" más que en la "totalidad" de los pastizales. Resulta sumamente difícil desarrollar una perspectiva integral, contextual, respecto de cualquier aspecto particular que establece los vínculos entre las distintas fuerzas motrices y respuestas al estado de los pastizales. Una estrategia trinacional contribuiría a desarrollar y mantener la perspectiva más amplia e integral necesaria para evaluar la eficacia de los enfoques de gestión del uso de la tierra y conservación en los pastizales.
3. *Las especies transfronterizas y los elementos de sus sistemas de vida (agua, aire) no están delimitados por las jurisdicciones políticas.* Por consiguiente, la conservación de las especies transfronterizas de América del Norte exige un enfoque trinacional. El Convenio sobre la Diversidad Biológica (CDB) se ocupó de la conservación de los pastizales y su diversidad biológica durante las sesiones de la Conferencia de las Partes (COP5) realizadas en Nairobi, Kenia, en mayo de 2000. El CDB reconoció los pastizales mundiales, a pequeña escala espacial, como los "hábitats más ricos en especies sobre la tierra" y planteó que a menudo algunos sitios en particular pueden revestir una importancia global para la diversidad biológica, fuera de toda proporción con su extensión física. El CDB reconoció, asimismo, el potencial de las áreas transfronterizas protegidas para contribuir a la conservación de las especies transfronterizas. El desarrollo, establecimiento y mantenimiento de un sistema norteamericano de áreas protegidas transfronterizas exige un plan estratégico que se ocupe de todo el espectro de la problemática de los pastizales centrales de América del Norte.
4. *Existen vínculos fundamentales entre los tres países en términos de enlaces y movimientos de especies amenazadas de preocupación común.* Las tres dependencias federales

encargadas de la vida silvestre en América del Norte han acordado colaborar en la protección de 17 especies de aves y mamíferos silvestres consideradas "especies amenazadas de preocupación común" (EAPC).* Una estrategia trinacional es fundamental a fin de garantizar enfoques comunes eficaces para la formulación, instrumentación y monitoreo de planes de manejo para las EAPC aplicables a través de los mandatos de las diversas dependencias y organizaciones, y que se ocupen de todo el espectro de las fuerzas que actúan sobre dichas especies y sus hábitats.

5. *Son también de preocupación común asuntos como el manejo óptimo del pastoreo y los incendios periódicos, la captura sustentable de fauna silvestre, las mejores prácticas para mantener la agricultura en tierras áridas, el impacto de las especies exóticas y los efectos y las adaptaciones asociadas con el cambio climático.* En la COP5 del CDB se adoptaron principios del manejo centrado en los ecosistemas, orientados a manejar en forma coordinada e integral las áreas protegidas y adyacentes. Con base en tales principios, una estrategia trinacional puede abordar asuntos que trasciendan las preocupaciones, o quizás incluso las capacidades, de cualquier región o país y permitir avances en la formulación e instrumentación de las prácticas óptimas para atender la problemática compartida.

En última instancia, se logrará una estrategia trinacional de conservación para los pastizales centrales de América del Norte cuando:

- se atienda la conservación de las especies migratorias y transfronterizas a través de iniciativas que con un enfoque integral, y se adopte una perspectiva de América del Norte;
- se identifiquen los hábitats críticos de pastizales de América del Norte, y se les conserve y maneje en forma holística, vinculada e integral;
- los múltiples sectores sociales y económicos de la sociedad de América del Norte adquieran conciencia de los asuntos relacionados con la conservación y el aprovechamiento sustentable de la biodiversidad de los pastizales;
- todos los mecanismos potenciales, incluidos aquellos relacionados con comercio, economía y finanzas, fondos bilaterales y multilaterales, legislación y política, así como difusión y educación, se utilicen exitosamente para conservar y aprovechar en forma sustentable los pastizales de América del Norte, y
- todos los interesados directos, incluidos los de los distintos sectores económicos gubernamentales y académicos, propietarios privados, comunidades indígenas y organizaciones no gubernamentales, participen en y se vinculen entre

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* Estas especies incluyen al aguililla real, *Buteo regalis*; el halcón peregrino, *Falco peregrinus*; el alcaudón verdugo, *Lanius ludovicianus*; el chorlo chiflador, *Charadrius melodus*; el chorlo llanero, *Charadrius montanus*; el tecolote llanero, *Athene cunicularia*; el búho manchado del norte, *Strix occidentalis caurina*; el búho manchado mexicano, *Strix occidentalis lucida*; el chipe mejilla dorada, *Dendroica chrysoparia*; la grulla blanca, *Grus americana*; el cóndor californiano, *Gymnogyps californianus*; el perrito llanero de cola negra, *Cynomys ludovicianus*; el berrendo de Sonora, *Antilocapra Americana sonoriensis*; el murciélago magueyero chico, *Leptonycteris curasoae yerbabuenae*; el murciélago magueyero grande, *Leptonycteris nivalis*; el oso negro, *Ursus americanus*, y el lobo gris, *Canis lupus*. El informe completo sobre estas especies puede consultarse en <http://www.cec.org/files/PDF/BIODIVERSITY/SCCC-Web-e_EN.PDF>.

sí mediante iniciativas para la conservación y aprovechamiento sustentable de los pastizales de América del Norte.

PROPÓSITO

El presente documento tiene el propósito de brindar un marco para la cooperación trinacional y binacional entre Canadá, Estados Unidos y México que promueva la conservación y el uso sustentable de los pastizales centrales de América del Norte.

PASOS SIGUIENTES

Se recomienda integrar un grupo de trabajo trinacional para la conservación de los pastizales encargado de formular una estrategia propia de América del Norte.

En la formulación de una estrategia trinacional de conservación de los pastizales, los tres países deben determinar los elementos que dicha estrategia o convenio puede incluir, política y jurídicamente. Las estrategias exitosas de alianzas para la conservación suelen compartir numerosos elementos comunes que podrían servir de guía a la CCA y a todos los grupos de interesados que colaboren en la formulación de una estrategia trinacional. Con base en tales elementos comunes, una estrategia para la conservación de los pastizales centrales de América del Norte deberá:

- Crear un comité directivo y grupos de trabajo en correspondencia con las principales metas.
- Lograr la participación de un segmento amplio y representativo de los sectores interesados en la formulación y monitoreo de la estrategia.
- Respetar los derechos de todos los usuarios de la tierra, con especial consideración del impacto de sus necesidades y aspiraciones respecto de la sustentabilidad ecológica, social y económica de los ecosistemas de los pastizales.
- Dar a la estrategia un enfoque aplicado que sirva de programa para la conservación de la biodiversidad.
- Presentar un plan de acción en el que explícitamente se planteen las metas, objetivos y medidas para lograr los objetivos, con cronogramas precisos y descripciones detalladas de las principales funciones y responsabilidades de cada dependencia u organización.
- Alentar proyectos que entrañan una amplia colaboración trinacional.
- Formular planes de trabajo anuales.
- Involucrar a los gobiernos en condiciones de equidad respecto del resto de los participantes; los gobiernos no tienen por qué supervisar o establecer unilateralmente la orientación del programa.
- Evaluar los avances a corto y mediano plazos.
- Establecer un foro para el intercambio activo de información con otros proyectos, dependencias, organizaciones y ciudadanos.
- Proveer suficientes recursos en el largo plazo, no sólo para formular la estrategia sino también para administrarla, ponerla en práctica y monitorear su instrumentación.
- Evitar competir por fondos o por la asignación de responsabilidades para la ejecución de programas.

Resulta claro que para abordar en su totalidad el conjunto de asuntos relativos a la conservación de los pastizales es preciso que la estrategia trinacional comprenda una amplia gama de enfoques sensibles a las escalas espaciales y temporales de los problemas, a sus antecedentes históricos y a las variaciones en las condiciones biofísicas, actitudes culturales, leyes, reglamentos, políticas y programas, así como a las prácticas humanas que en conjunto integran no sólo el contexto, sino también los obstáculos y las oportunidades, de manera que pueda lograrse una visión compartida para la conservación de los pastizales.

Se ha podido identificar un amplio conjunto de problemas a lo largo de los pastizales centrales de Canadá, Estados Unidos y México, muchos de ellos específicos de las condiciones locales, por lo que deberá atendérseles en esa escala. Con todo, por las razones que ya se señalaron en la introducción de este informe, existe un ámbito de acción muy amplio en el que la estrategia trinacional de conservación puede apoyar iniciativas locales y regionales, así como complementar iniciativas nacionales e internacionales.

A escala trinacional, la estrategia de conservación para los pastizales centrales de América del Norte deberá abordar un amplio conjunto de problemas y necesidades en relación con la biodiversidad, prácticas y gestión del uso de la tierra, políticas y aspectos económicos del uso de la tierra, cuestiones demográficas y sociales, asuntos educativos y de comunicación, e investigación, monitoreo y elaboración de informes. Asimismo, la estrategia ha de considerar la problemática y las necesidades desde una perspectiva tanto de corto como de mediano plazo, y reconocer que si bien existen numerosos problemas y necesidades trinacionales compartidos, también son muchos los que están localizados o son específicos de un país.

POLOS DE ATENCIÓN DE UNA ESTRATEGIA DE CONSERVACIÓN DE LOS PASTIZALES DE AMÉRICA DEL NORTE

Biodiversidad

> ***Las actividades de cooperación trinacional deberán incluir una mayor promoción de la conservación del hábitat, la identificación de hábitats de especial valor y actividades de manejo que permitan no sólo prevenir y revertir la disminución de especies y hábitats, sino también restaurarlos.***

Deberán formularse estrategias lo mismo de corto que de largo plazo que, cuando menos, centren la atención en la disminución de la biodiversidad, la desaparición de especies, las alteraciones en la estructura de las asociaciones o la composición de especies depredadoras, la pérdida o fragmentación del hábitat silvestre, la conversión de tierras de cultivo a pastizales y la necesidad de encontrar mejores maneras de promover la conservación del hábitat. A mediano plazo, la estrategia deberá también abordar la problemática derivada de: un enfoque estrecho o limitado del manejo de las especies; números crecientes de especies introducidas e invasoras; la necesidad de revertir la disminución de las poblaciones locales y prevenir la invasión de plantas exóticas; la necesidad de restablecer las poblaciones de especies silvestres, las especies en peligro de extinción y los procesos naturales para impedir las desapariciones; la fragmentación de los corredores de hábitat ribereño, y los regímenes de perturbación alterados. A escala nacional, Canadá tiene una especial preocupación respecto del impacto que la sobreexplotación del agua del subsuelo puede tener en la biodiversidad de sus praderas.

Prácticas y gestión del uso de la tierra

Las actividades de cooperación trinacional deberán incluir cuestiones relacionadas con las prácticas y la gestión del uso de la tierra, incluidos apoyos para preservar diversos ecosistemas a todo lo largo de los pastizales centrales, fomentar la reducción al mínimo de las alteraciones al entorno de origen antropogénico y alentar la creación de mercados para productos agrícolas ecológicos.

Si bien existen numerosas diferencias en las prácticas de uso de la tierra y en los enfoques para el manejo de los pastizales en toda América del Norte, de acuerdo con las respuestas recibidas, son muchos los problemas y necesidades compartidos que deberán atenderse en una estrategia trinacional a corto y mediano plazos, a saber:

- la insuficiencia de áreas de pastizales protegidas;
- la predominancia de prácticas agrícolas inadecuadas;
- la desecación o el relleno de humedales;
- el arado de pastizales;
- la conversión de tierras poco productivas;
- la necesidad de preservar diversos ecosistemas a todo lo largo de las praderas;
- la necesidad de aumentar los esfuerzos para alentar la creación de mercados para productos agrícolas ecológicos, y
- los efectos de las actividades de exploración y aprovechamiento.

Respecto del mediano plazo, en particular, la estrategia deberá también ocuparse de:

- el uso insuficiente de prácticas de manejo ecológico en áreas protegidas;
- el crecimiento acelerado de zonas urbanas, suburbanas y residenciales en áreas rurales;
- asuntos relacionados con el impacto del cambio climático, incluidos los beneficios que los pastizales brindan como sumidero de carbono atmosférico;
- las posibilidades de que se registren escasez de agua, conflictos por el líquido y demandas crecientes de suministro;
- la necesidad de restablecer los ecosistemas de las praderas degradados, y
- el desarrollo de coberturas de plantas nativas y de una industria asociada para la producción de semillas.

En el ámbito nacional, la estrategia deberá ocuparse de las preocupaciones de mediano plazo en las praderas de Estados Unidos en relación con el relativamente limitado conocimiento de la población en general acerca de las prácticas de manejo del ganado, cuestiones asociadas con el pastoreo en zonas ribereñas y humedales y la necesidad de reducir el sobrepastoreo crónico. En Canadá ha de prestarse atención en el mediano plazo al manejo del ganado y del estiércol porcino, a los efectos asociado con el uso de nutrientes y sustancias químicas en tierras agrícolas, al impacto de la biotecnología y de los cultivos genéticamente modificados en la conservación de los pastizales y a la falta de alcance y difusión de los programas de conservación. En México, por su parte, la estrategia deberá abordar preocupaciones relativas a la falta de programas de extensión que promuevan prácticas adecuadas de manejo del ganado; el sobrepastoreo; los efectos de la aplicación de técnicas de manejo de las tierras de pastoreo en las especies de vida silvestre; la creciente demanda de agua, y los posibles conflictos derivados de la escasez de agua provocada por el cambio climático.

Aspectos socioeconómicos y de política

Las actividades de cooperación trinacional deberán propiciar mejores leyes, políticas y programas que favorezcan la conservación de los pastizales; mejores programas de incentivos; mejores relaciones entre las distintas dependencias de gobierno, y una programación mejor coordinada para la conservación.

En los tres países la estrategia deberá prestar particular atención, en el corto y el mediano plazos, a las políticas de manejo de la tierra y cuestiones económicas relacionadas con los pastizales. Específicamente a:

- políticas, programas, reglamentos y medidas de aplicación en apoyo a programas de conservación;
- misiones ineficientes y contradictorias entre las dependencias gubernamentales;
- la falta de integración de las políticas relacionadas con los sistemas económicos y ecológicos en general;
- la falta de confianza en políticas y programas gubernamentales y no gubernamentales;
- la necesidad de identificar, promover y promulgar leyes, reglamentos, políticas y programas en favor de las prácticas de conservación;
- la necesidad de incluir a todos los sectores interesados en la planeación y la gestión para la conservación de los pastizales;
- la necesidad de mejorar el manejo de los pastizales a través de iniciativas;
- la necesidad de desarrollar mercados innovadores para productos agrícolas tradicionales y no tradicionales, y crear incentivos de libre mercado para los propietarios de tierras privados;
- la falta de alternativas económicas y productivas, organización e incentivos de mercado que permitirían mantener los estilos de vida deseados y al mismo tiempo conservar los pastizales;
- las amenazas a la futura seguridad económica de los productores agrícolas;
- cuestiones relacionadas con los derechos de propiedad (privada) y la conservación de los pastizales;
- la necesidad de elaborar y apoyar programas que retiren tierras poco productivas de la producción y ofrezcan a los productores ventajas económicas tangibles;
- la falta de participación de todos los sectores interesados en el proceso de planeación;
- la falta de incentivos para la conservación, restauración y manejo de los pastizales;
- el impacto de los subsidios generales y políticas de apoyo gubernamental a los precios de productos;
- el inadecuado sistema de gratificaciones o reconocimientos a las prácticas de resguardo ambiental, y
- la falta de un valor de mercado establecido para los bienes públicos.

En Estados Unidos y Canadá, a mediano plazo, la estrategia deberá abordar:

- la necesidad de planes de manejo que incorporen de mejor manera a especies no cinegéticas;
- programas que permitan superar la falta de participación de los sectores no tradicionales en la conservación de los pastizales;
- la insuficiencia de fuentes de financiamiento alternativas o innovadoras;
- una mejor información sobre los vínculos entre efectos y beneficios económicos y ecológicos, por un lado, y políticas y programas de conservación y producción, por el otro;
- políticas que propicien la creación de granjas de gran tamaño, y
- el establecimiento de un enfoque integrado para proporcionar información sobre los programas de conservación y que promueva acciones gubernamentales a través de cambios en las medidas de política.

A escala nacional, la estrategia deberá ocuparse de la necesidad de Canadá de crear nuevas herramientas con las cuales obtener financiamiento del sector privado para la Conservación de los Pastizales de América del Norte. En México, la estrategia deberá prestar particular atención al impacto de los subsidios generales y políticas de apoyo gubernamental a los precios de los productos, así como a la falta de alternativas económicas y productivas y de incentivos de mercado favorables para mantener los estilos de vida deseados y, al mismo tiempo, conservar los pastizales.

Aspectos demográficos y sociales

Las actividades de cooperación trinacional deberán sustentarse en una evaluación científica de las actitudes y percepciones de los distintos grupos de interés respecto de la conservación de los pastizales centrales de América del Norte.

En términos generales, los aspectos demográficos y sociales no figuraron entre los asuntos y necesidades de mayor prioridad para la conservación de los pastizales, aun cuando los expertos entrevistados reconocieron la importancia contextual de dichos aspectos. En última instancia, el éxito de cualesquiera políticas, programas o prácticas recomendadas como parte de una estrategia trinacional para la conservación de los pastizales dependerá del grado en que respondan a las realidades demográficas, sociales y culturales de las distintas regiones.

Educación y comunicación

Las actividades de cooperación trinacional deberán fomentar mayores esfuerzos de difusión centrados en programas educativos y de comunicación específicos para cada cultura. Tales programas han de centrarse en propiciar una ganancia neta en los pastizales, apoyar la rehabilitación de los ecosistemas en pastizales deteriorados, aumentar la conciencia del valor de los servicios ambientales que los pastizales proporcionan, promover técnicas simples para la conservación de los pastizales, fomentar las iniciativas de propietarios y administradores de las tierras para conservar los pastizales, aumentar los contactos con las organizaciones de productores locales, procurar oportunidades de capacitación para futuros administradores de la tierra y ampliar aún más las oportunidades de capacitación para integrar los problemas relacionados con las especies silvestres con la problemática del manejo de las tierras de pastoreo.

Dos fueron los principales asuntos identificados como prioritarios para la conservación de los pastizales en materia de comunicación y educación:

1. La insuficiencia en la comunicación y cooperación con y entre los sectores interesados; por ello, la formulación de una estrategia integral para conservar los pastizales deberá incluir un proceso ampliado y continuo de consulta a los interesados directos.
2. No existen suficientes programas educativos para la conservación de los pastizales que aborden la problemática en su conjunto o bien que lleguen a los destinatarios adecuados para influir en los cambios necesarios o propiciarlos.

Investigación y monitoreo

Las actividades de cooperación trinacional deberán centrarse en promover el establecimiento de áreas más permanentes para la investigación en torno a los pastizales; aumentar la investigación sobre amenazas o factores de presión, recuperación de especies silvestres y efectos de las especies invasoras, y fomentar la investigación centrada en evaluaciones ecológicas, económicas y sociales integradas, así como los estudios acerca de los mejores métodos para instrumentar planes de recuperación y manejo y para mejorar las medidas de evaluación (indicadores) de políticas y programas. La cooperación trinacional podría ayudar a identificar los pastizales clave que requieren de un estudio inmediato y promover técnicas de investigación y monitoreo de largo plazo uniformes y coherentes, así como una terminología común.

Las actuales estrategias de conservación e intereses en la problemática de las especies y hábitats en peligro han rebasado con mucho el nivel de la información de apoyo. Esta delantera debe traducirse en un mayor énfasis en inventarios y sistemas de monitoreo integrales y amplios, especialmente concebidos para satisfacer las necesidades de análisis en las escalas de los hábitats y los ecosistemas. Los conjuntos de datos de apoyo han de basarse en los ecosistemas, estar científicamente fundamentados y haberse recabado a lo largo de periodos prolongados.

COMO AVANZAR

La existencia de especies y hábitats en riesgo en los pastizales centrales de América del Norte y su número en constante aumento son sintomáticos de una problemática mayor; son señal y reflejo del impacto cada vez mayor del ser humano en los ecosistemas, y de las dificultades que los humanos hemos tenido para adaptar nuestras acciones a efecto de mantener la integridad de los ecosistemas. En reconocimiento de ello, las preocupaciones de muchos habitantes de América del Norte han venido evolucionando con el tiempo, pasando de un interés general en la naturaleza a un enfoque sobre la integridad y la salud de los ecosistemas.

Abordar el problema de las especies en peligro de extinción es una forma de llamar la atención hacia la recuperación de las especies o de evitar su pérdida futura. Sin embargo, el manejo de especies individuales o incluso de comunidades de especies resulta poco práctico y carente de sentido en el largo plazo. El manejo centrado en los ecosistemas es un enfoque que integra nuestro conocimiento y acciones colectivas, en lugar de dividir acciones, jurisdicciones, perspectivas científicas y capacidades. Por ejemplo, ¿acaso podrían los encargados del manejo de la vida silvestre y responsables de la planeación en la materia proteger en forma eficaz a las aves acuáticas migratorias en

toda la extensión de los pastizales sin conocer sus hábitats y necesidades a lo largo del año, los requerimientos de su ciclo de vida, su tolerancia a las actividades y contaminantes humanos, su función en las culturas nativas, su importancia para el turismo y la recreación, su contribución a la biodiversidad y a la dinámica de los ecosistemas y sus relaciones en la cadena alimenticia, entre otros aspectos? Es preciso comprender la interconexión entre las partes y sus relaciones temporales y espaciales.

Se requieren soluciones integrales e innovadoras para el manejo de los recursos: enfoques que asignen la máxima prioridad a preservar la integridad de los hábitats y ecosistemas. Los hábitats de los pastizales de América del Norte deben manejarse como recursos y como áreas funcionales que sirven tanto a la naturaleza como a los seres humanos. La rejerarquización de las prioridades puede ocurrir por dos vías: ya sea que la gente reconozca la necesidad de integrar sus demandas y metas respecto del hábitat en el contexto de la capacidad de subsistencia de los ecosistemas de los pastizales, o bien que la degradación del hábitat exacerbe la degradación general de los ecosistemas.

Si bien las consideraciones respecto de las especies en peligro de extinción ocupan hoy un primer plano en las discusiones sobre conservación de los pastizales, la sociedad enfrenta una problemática mucho más amplia en materia de salud e integridad de los hábitats silvestres. Con base en diversas experiencias en materia de conservación de los pastizales (por ejemplo, los planes de acción para la conservación de las praderas canadienses), resulta evidente que el éxito en la reducción de las amenazas a la vida silvestre no se logrará sin un enfoque integral que cuando menos:

- combine aún mayores alianzas y capacidades entre los gobiernos, las comunidades indígenas, la industria, los propietarios privados y otros administradores de las tierras;
- adopte perspectivas espaciales y temporales jerarquizadas con base en principios ecológicos y funcionales de los hábitats silvestres;
- establezca objetivos y metas mensurables, y proporcione opciones para monitorear su cumplimiento;
- integre consideraciones biofísicas y socioeconómicas, culturales y políticas en la toma de decisiones sobre manejo del hábitat y de los recursos, y
- opere conforme a los principios del uso sustentable de los recursos y del manejo adaptativo de los ecosistemas.

El manejo sustentable de la vida silvestre y sus hábitats entraña cierta clase de acuerdo de colaboración entre ciudadanos y grupos que se comprometen a satisfacer sus propias necesidades sin poner en riesgo los derechos o las necesidades de otros, ni tampoco la calidad básica del medio ambiente. Las tres metas principales del manejo sustentable son garantizar la integridad de los ecosistemas, asegurar la salud y el bienestar humanos y garantizar la conservación de los recursos naturales. No es posible alcanzar la sustentabilidad sin lograr todos esos elementos, ni tampoco puede esperarse que ésta tenga éxito si no se satisfacen las necesidades básicas de los seres humanos. El manejo centrado en los ecosistemas es un enfoque clave para el logro de las metas respecto de los hábitats. Exige un cambio en el polo de atención de los humanos: de la mera producción de bienes y servicios al sostenimiento de la viabilidad de los sistemas necesarios para producir bienes y servicios, en el presente y en el futuro (ESA, 1995). Este enfoque, aplicado a los hábitats, requiere del compromiso de todos los niveles de gob-

ierno, las empresas, las industrias y toda la ciudadanía para pensar, planear y actuar en términos de los ecosistemas. Por consiguiente, todo enfoque que se proponga resolver el problema de la vulnerabilidad de los hábitats silvestres amenazados y sus especies de flora y fauna asociadas, deberá ser considerado como uno de los elementos integrantes de toda una estrategia general de manejo centrado en los ecosistemas para lograr la sustentabilidad de los recursos.

Las políticas y los programas suelen fundamentarse en enfoques que responden a fronteras jurisdiccionales (condados, distritos, municipios, estados o provincias y naciones). Sin embargo, las preocupaciones respecto de la conservación de los pastizales, ya sea en términos de especies, hábitats o ecosistemas, trascienden a menudo tales fronteras, como ocurre con otras problemáticas -lluvia ácida, cambio climático y sustentabilidad de los bosques. En ese contexto, el verdadero sentido de la política radica en movilizar a las autoridades jurisdiccionales y a los sectores interesados para actuar con base en los ecosistemas y hábitats compartidos.

Este informe-marco se propone facilitar la consulta entre todos los interesados en la conservación de los pastizales centrales de América del Norte. Para esto se le distribuirá ampliamente entre los sectores interesados de toda la región, a quienes se invita a proporcionar sus comentarios a los autores y a la CCA, y a colaborar con la CCA en la creación de un grupo de trabajo trinacional encargado de poner en marcha una estrategia para los pastizales de América del Norte.

GLOSARIO

Abiótico
: Desprovisto de vida; por lo general se refiere a rocas, minerales y elementos no orgánicos del entorno natural.

Aprovechamiento sustentable
: Uso de los elementos que integran la biodiversidad (es decir, organismos o ecosistemas) en una forma y a un ritmo que no provoquen su deterioro en el largo plazo, o sea, conservando la capacidad de los ecosistemas para satisfacer las necesidades y aspiraciones de las generaciones presentes y futuras.

Arable
: Tierra en la que se pueden cultivar alimentos.

Área cultivada
: Tierra cuyo estado original fue alterado con fines de producción agrícola.

Área protegida
: Área geográficamente definida, designada o regulada y manejada para lograr objetivos de conservación específicos.

Avenamiento
: Proceso por el que se retiran artificialmente (canalizándolas) las aguas estancadas de un campo o pastizal.

Malpaís (Badlands)
: Tierras yermas. Regiones donde la erosión de los lechos sedimentarios no consolidados, casi horizontales, dio lugar a comarcas de cañadas estrechas, cimas y pináculos afilados, desprovistos o casi desprovistos de vegetación.

Biodiversidad (diversidad biológica)

La variabilidad entre los seres vivos de todos los medios -terrestres, marinos y otros-, así como los complejos ecológicos de los que forman parte. Comprende la diversidad en los organismos de una misma especie, entre las especies y de los ecosistemas.

Bioma

Comunidad ecológica principal conformada por especies de flora y fauna distintivas que ocupan un área muy amplia; por ejemplo, los desiertos, los pastizales.

Biótico

De, perteneciente o relativo a los seres vivos.

Conservación

Preservación o aprovechamiento sustentable de los recursos de la tierra, de manera que se mantienen los ecosistemas, las especies y la diversidad genética, así como los procesos evolutivos y de otra índole por los que tuvieron lugar. La conservación puede -o no- entrañar el aprovechamiento de los recursos; es decir, ciertas áreas, especies o poblaciones pueden quedar excluidas del uso humano como parte de un enfoque global de conservación basado en el paisaje.

Desarrollo sustentable

Ideal conceptual en el que el aprovechamiento de los recursos satisface las necesidades de las generaciones presentes sin comprometer la capacidad de las generaciones futuras para satisfacer sus propias necesidades.

Ecorregión

Subdivisión de áreas representativas con atributos semejantes, caracterizadas por formaciones geográficas, clima, vegetación, suelos y cuerpos de agua similares, así como determinados patrones regionales de actividad humana.

Ecosistema

Un complejo dinámico de comunidades vegetales, animales y de microorganismos en interacción entre sí y con su entorno no vivo, como unidades funcionales. Cada uno de los elementos que conforman un ecosistema desempeña una función especializada en el sistema. Los ecosistemas brindan servicios ecológicos tales como la conversión de energía solar en carbohidratos y proteínas, la producción de oxígeno, la purificación de agua y la moderación del clima. Asimismo, producen los suelos en los que cultivamos nuestros alimentos y eliminan de la atmósfera los gases de efecto invernadero. La salud humana, al igual que la salud de todos los demás seres vivos, está vinculada al bienestar o integridad de los ecosistemas. Los ecosistemas varían considerablemente en escala: pueden ser pequeños como un estanque o tan vastos como un continente o el globo terráqueo mismo. Cada ecosistema es único en términos de sus características químicas, biológicas y físicas, independientemente de si se le ha definido espacialmente como una cuenca hídrica, una costa o alguna otra forma de paisaje terrestre o marino.

Ecoturismo

Experiencia de viaje en entornos naturales que contribuye a la conservación de un ecosistema y a los recursos culturales y económicos de las comunidades anfitrionas.

Ecozona

Zona de la superficie terrestre representativa de unidades de gran tamaño y muy generalizadas, caracterizadas por factores bióticos y abióticos en constante interacción y adaptación.

Especie amenazada

Cualquier especie nativa de flora o fauna silvestres que probablemente llegue a estar en peligro de extinción si no se revierten los factores de deterioro o amenaza.

Especie eliminada

Cualquier especie nativa de flora o fauna silvestres que ha dejado de existir en una zona determinada, pero que puede encontrarse en otros lugares en estado silvestre.

Especie exótica

Especie que no es nativa de la región en la que se encuentra.

Especie indicadora

Especie que señala la presencia de ciertas condiciones ambientales, de etapas serales (en la sucesión de especies vegetales) o bien de tratamiento previo.

Explotación

Todo proyecto, operación o actividad, o cualquier alteración o ampliación de un proyecto, operación o actividad, con probabilidades de:

i) afectar alguna característica única, rara o amenazada del entorno;
(ii) utilizar en forma sustancial cualquier recurso y, al hacerlo, evitar el uso o posible aprovechamiento de ese recurso con otros propósitos;
(iii) producir la emisión de contaminantes de cualquier clase o generar subproductos, residuos o desechos que requieren ser manejados y eliminados en alguna forma no reglamentada en ninguna otra ley o reglamento;
(iv) provocar preocupación ciudadana generalizada en virtud de los posibles cambios ambientales a los que puede dar lugar;
(v) entrañar el uso de una nueva tecnología para el aprovechamiento de un recurso con posibles efectos ambientales significativos, o
(vi) tener un impacto considerable en el medio ambiente o requerir de una futura explotación que, a su vez, probablemente tenga un impacto considerable en el entorno.

Fragmentación

Interrupción o "ruptura" de las praderas nativas en segmentos menores, quedando sólo islas de praderas rodeadas de tierras cultivadas o de pastizales sembrados para el pastoreo.

Herbívoro

Animal que se alimenta de plantas o materia vegetal.

Humedal

Área de tierras bajas, sumergidas.

Indígena

Que ha nacido y crecido o se ha producido naturalmente en una región específica.

Integridad ecológica

La cualidad de un ecosistema natural, manejado o no con prácticas humanas, en el que los procesos ecológicos naturales se mantienen y la diversidad genética de las especies y de los ecosistemas está garantizada para el futuro.

Malpaís (Badlands)

Tierras yermas. Regiones donde la erosión de los lechos sedimentarios no consolidados, casi horizontales, dio lugar a comarcas de cañadas estrechas, cimas y pináculos afilados, desprovistos o casi desprovistos de vegetación.

Manejo centrado en los ecosistemas

Filosofía y práctica de manejo que se proponen seleccionar, mantener y mejorar la integridad ecológica de un ecosistema, a fin de garantizar una salud continua del ecosistema al tiempo que se provee a los seres humanos de recursos, productos o valores no consuntivos.

Manejo del pastoreo

Disciplina diferenciada, basada en principios ecológicos y que se ocupa del aprovechamiento de las tierras y recursos de pastoreo con diversos propósitos, entre los que se incluyen su uso como hábitat silvestre, para el apacentamiento de ganado o con fines recreativos o estéticos, así como otros propósitos asociados.

Monocultivo

Cultivo único o predominante de una sola especie vegetal en determinada región.

Pastizales

"Ecosistemas terrestres en los que la vegetación predominante son los pastos y los arbustos, y que se conservan mediante el pastoreo, los incendios periódicos, la sequía y las bajas temperaturas" (Instituto de Recursos Mundiales, 2000).

Plantas nativas

Plantas que crecían naturalmente en una región, antes del establecimiento europeo en el continente.

Peligro de extinción

Categoría que se asigna a cualquier especie silvestre, vegetal o animal, que se encuentra amenazada por la extinción o en inminente riesgo de eliminación.

Programa de Reservas para la Conservación

En Estados Unidos, una de las principales disposiciones de la Ley de Seguridad Alimentaria de 1985, ampliada posteriormente en la Ley de Conservación Agrícola y Comercio de Alimentos y Productos Agrícolas de 1990, la Ley Federal de Mejoramiento y Reforma de la Agricultura de 1996 (Ley FAIR, por sus siglas en inglés) y la Ley de Seguridad Agrícola e Inversión Rural de 2002 (Ley FSRI), es el Programa de Reservas para la Conservación (Conservation Reserve Program, CRP), diseñado con el propósito de reducir la erosión en 16 a 18 millones de hectáreas de tierras de labranza. Los productores que participan en el Programa se comprometen, mediante la firma de un contrato, a convertir tierras de cultivo erosionables en "reservas para la conservación", destinándolas durante diez años a usos de conservación aprobados. A cambio, reciben una renta anual y efectivo o pagos en especie para cubrir hasta 50 por ciento de los costos de establecer una cobertura vegetal permanente. El CRP es parte del Programa de Áreas de Reserva para la Conservación Ambiental (Environmental Conservation Acreage Reserve Program). La Ley FAIR de 1996 autorizó un máximo de 14.7 millones de hectáreas a manejarse bajo el programa CRP, pero este nivel (alcanzado ya en 1995) fue ampliado a 15.8 millones de hectáreas en la Ley FSRI de 2002.

Recuperación

Devolver a tierras deterioradas la capacidad para sustentar su uso original o algún otro.

Repoblamiento vegetal

Restablecimiento de la vegetación tras una situación de alteración o deterioro que eliminó parcial o totalmente las comunidades vegetales originales.

Resguardo ambiental

La responsabilidad individual o corporativa de una generación de mantener el patrimonio natural recibido, tanto para su propio beneficio como para beneficio de las generaciones futuras. Compromiso de conservar y mantener las características naturales de la tierra.

Restauración

Devolver a la tierra condiciones que permitan un estado tan cercano a su estado original como sea posible.

Secuestro de carbono

Proceso por el que el carbono de la atmósfera se absorbe y se fija en la materia orgánica viva y muerta.

Sistema de pastoreo

Manipulación de ganado y animales de pastoreo para lograr un resultado. Forma en que se distribuyen los periodos de apacentamiento y de descanso (sin pastoreo) a lo largo de la temporada de pastoreo, o de un año a otro.

Sobrepastoreo

Apacentamiento frecuente o continuo en determinado territorio, ya sea durante la temporada de crecimiento o bien año con año, de manera que no se da a las plantas tiempo suficiente para recuperarse. Como resultado, las raíces se acortan, las plantas se hacen menos productivas, aumentan las probabilidades de invasión de maleza y la vegetación se vuelve más vulnerable a la sequía.

Sucesión

Desarrollo natural progresivo de la vegetación, a partir de una etapa pionera; proceso por el que, bajo la influencia de factores físicos y bióticos, una comunidad es reemplazada por otra.

Sustentabilidad

La capacidad de un ecosistema de mantener procesos y funciones ecológicos, su diversidad biológica y su productividad a lo largo del tiempo.

Tierras de cultivo

Tierras cuyo uso principal es la labranza o producción de cultivos agrícolas.

Tierras de la Corona

Tierras que pertenecen al gobierno federal o a los gobiernos provinciales en Canadá.

Ungulado

Animal provisto de pezuñas; el grupo de los ungulados incluye a los rumiantes, así como también a caballos, ciervos y cerdos.

Vulnerable

Cualquier especie silvestre nativa, vegetal o animal, que amerita especial preocupación debido a los reducidos o decrecientes niveles de su población como resultado de actividades humanas o de eventos naturales, pero que no está en peligro de extinción o amenazada.

(APPENDIX 3.)

INTRODUCTION

LA NÉCESSITÉ D'UNE COOPÉRATION TRILATÉRALE POUR CONSERVER LES PRAIRIES DU CENTRE DE L'AMÉRIQUE DU NORD

Les praires centrales constituent un exemple des rares écorégions contiguës nord-américaines que partagent les trois pays. Une telle relation continentale entraîne nécessairement une responsabilité partagée de la part du Canada, du Mexique et des États-Unis en ce qui concerne la conservation de cette écorégion. Cependant, une zone géographique aussi étendue abrite forcément une grande diversité d'espèces et d'écosystèmes qui fonctionnent tous dans un contexte que l'on peut définir comme une mosaïque d'activités de mise en valeur des terres, de cultures, de politiques et de méthodes de gestion assujetties à des lois et règlements variables. Face à une telle diversité et compte tenu de la nature des mandats confiés aux institutions chargées de la gestion et de la conservation des ressources, il n'est pas surprenant que la grande majorité des efforts de conservation des prairies interviennent aux échelles locale ou régionale. Les activités de conservation mises en œuvre aux échelles nationale, binationale (surtout entre le Canada et les États-Unis) et trinationale, tout en étant aussi importantes, sont moins nombreuses.

Tableau 1. Exemples de projets de conservation aux échelles trinationale et nationale

chelle trinationale	Canada	tats-Unis	Mexique
Initiative de conservation des oiseaux de l'Amérique du Nord	*Alberta Prairie Conservation Forum*	Partenaires d'envol	Gestion des parcours, ferme expérimentale La Campana—INIFAP (Chihuahua)
Plan nord-américain de conservation des oiseaux aquatiques	Plan d'action pour la conservation des prairies du Manitoba	Plan de conservation des oiseaux de rivage des États-Unis	Gestion des parcours, ferme expérimentale Vaquerías—INIFAP (Jalisco)
Plan nord-américain de gestion de la sauvagine	Plan d'action pour la conservation des prairies de la Saskatchewan	Groupe de travail interétatiques sur les chiens de prairie—Évaluation des chiens de prairie (*Cynomys ludovicianus*) dans différents États	Gestion des parcours, Rancho Los Angeles—UAAAN (Coahuila)
Programme *Prairie Wings* de la *Nature Conservancy*	Administration du rétablissement agricole des Prairies	Ministère de l'Agriculture des États-Unis, Service des forêts—Plan stratégique pour les prairies des Grandes Plaines du Nord	
	Programmes d'Habitat faunique Canada et de Paysage agricole canadien	Ministère de l'Intérieur des États-Unis, Bureau de la gestion des terres (BLM)—Plan stratégique du BLM pour les prairies	

Il est essentiel de continuer d'encourager et de maintenir les activités sur les plans régional et national, et d'éviter de réduire le soutien apporté à ces activités. Toutefois, il est de plus en plus évident aussi qu'une coopération trilatérale axée sur la conserva-

tion des prairies du centre de l'Amérique du Nord est nécessaire pour assurer le succès des activités locales, régionales et nationales. Les raisons d'une telle complémentarité sont les suivantes :

1. *Les répercussions des activités humaines qui viennent à l'appui des objectifs de conservation ou qui nuisent à ces objectifs doivent être abordées selon une approche à échelle variable lorsqu'on évalue l'efficacité des mesures de conservation.* D'un point de vue théorique général, selon les principes de l'écologie, l'impact des activités humaines sur les espèces et les écosystèmes ne peut pas être déterminé de manière exhaustive à une échelle spatiale ou temporelle donnée quelconque. Les forces qui ont une incidence sur la pérennité des espèces et des habitats peuvent agir sur de plus longues périodes de temps ou avoir leur origine dans une plus large zone géographique que celle couverte par les mesures de conservation locales ou régionales. Il est alors difficile, voire impossible, d'évaluer l'efficacité des programmes de conservation locaux ou régionaux si ces programmes ne tiennent pas compte de ces forces motrices de plus grande portée. Une démarche trilatérale permet de mieux comprendre, dans le contexte global, les forces motrices et les réactions à ces forces lorsqu'on évalue l'efficacité des mesures de conservation locales, régionales et nationales.
2. *Les prairies centrales ont été profondément marquées, à travers l'histoire et encore récemment, par un large éventail d'activités humaines. Les répercussions de ces activités ont fait naître un sentiment d'urgence général face à ce qu'il reste du système biologique, passablement appauvri.* Cette urgence a été reconnue dans de nombreux accords de coopération visant à résoudre des problèmes concernant les écosystèmes de prairie. Cela dit, même les accords bilatéraux existants ont tendance à être axés sur des éléments plutôt que sur l'ensemble des prairies. Il est très difficile, dans le cas d'un problème donné, de brosser un tableau exhaustif et contextuel qui établit les liens entre les diverses forces motrices et les réactions, d'une part, et l'état des prairies, d'autre part. Une stratégie trinationale aiderait à établir, de façon durable, la perspective intégrée et plus large dont nous avons besoin pour évaluer l'efficacité des démarches adoptées en matière de gestion de l'utilisation des terres et de conservation dans les prairies.
3. *Les espèces transfrontalières et certains éléments de leur milieu vital (eau, air) ne sont pas confinés à l'intérieur des frontières.* En conséquence, la conservation des espèces transfrontalières nord-américaines requiert une approche trinationale. Les participants à la Cinquième Conférence des Parties (CdP5) de la Convention sur la diversité biologique, tenue en mai 2000 à Nairobi, au Kenya, se sont penchés sur la question des prairies et de la conservation de leur biodiversité. Ils ont reconnu que les prairies du monde, à une petite échelle spatiale, constituent les " habitats les plus riches en espèces sur la Terre " et que certains sites revêtent souvent une importance mondiale du point de vue de la diversité biologique, sans commune mesure avec leur étendue physique. Les participants à la CdP5 ont reconnu le potentiel des aires protégées transfrontalières en ce qui concerne la conservation des espèces transfrontalières. La conception, l'établissement et l'entretien d'un système d'aires protégées transfrontalières nord-américaines exigent un plan stratégique qui tienne compte de l'ensemble des questions associées aux prairies du centre de l'Amérique du Nord.

4. *Les relations entre les trois pays sont cruciales en raison des liens entre espèces suscitant des préoccupations communes en matière de conservation, de même qu'en raison des déplacements de ces espèces.* Les trois services fédéraux de la faune de l'Amérique du Nord ont convenu de travailler ensemble pour protéger 17 espèces d'oiseaux et de mammifères sauvages considérées comme des " espèces suscitant des préoccupations communes " (ESPC).* Une stratégie trinationale est essentielle pour assurer la mise en œuvre de démarches communes et efficaces en ce qui a trait à l'élaboration, à l'exécution et au suivi de plans de gestion des ESPC qui répondent aux mandats des divers organismes et organisations et qui tiennent compte de l'intégralité des forces agissant sur ces espèces et sur leurs habitats.

5. *Les trois pays partagent les mêmes préoccupations en ce qui a trait à des questions telles que l'utilisation optimale du pâturage et des feux, l'exploitation durable des ressources fauniques et floristiques, les meilleures techniques pour une agriculture durable sur terrains arides, les impacts des espèces exotiques ainsi que les répercussions du changement climatique et l'adaptation à ce changement.* Les participants à la CdP5 de la Convention sur la diversité biologique, ont adopté des principes de gestion écosystémique en vertu desquels la gestion des aires protégées et des aires adjacentes obéira à une démarche coordonnée et intégrée. Une stratégie trinationale, fondée sur les principes de gestion écosystémique, peut s'attaquer à des problèmes qui dépassent les préoccupations—ou peut-être même les capacités - d'une région ou d'un pays, et ouvrir la voie à la conception et à la mise en œuvre de pratiques optimales pour résoudre ces problèmes communs.

En dernière analyse, une stratégie de conservation trinationale pour les prairies du centre de l'Amérique du Nord aura porté des fruits lorsqu'on pourra observer les résultats suivants :

- la conservation des espèces migratrices et transfrontalières des prairies est assurée grâce à des initiatives qui tiennent compte de l'ensemble de l'aire de distribution de ces espèces, et la perspective adoptée est une perspective nord-américaine;
- les habitats de prairie cruciaux de l'Amérique du Nord sont répertoriés, conservés et gérés selon une approche holistique, intégrée et respectueuse de la complexité de ces habitats;
- les secteurs sociaux et économiques de la société nord-américaine ont assimilé les questions relatives à la conservation et à l'utilisation durable de la diversité biologique des prairies;
- tous les mécanismes potentiels, notamment ceux liés au commerce, à l'é-

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* Ces espèces sont les suivantes : buse rouilleuse, *Buteo regalis*; faucon pèlerin, *Falco peregrinus*; pie-grièche migratrice, *Lanius ludovicianus*; pluvier siffleur, *Charadrius melodus*; pluvier montagnard, *Charadrius montanus*; chouette des terriers, *Athene cunicularia*; chouette tachetée septentrionale, *Strix occidentalis caurina*; chouette tachetée du Mexique, *Strix occidentalis lucida*; paruline à dos noir, *Dendroica chrysoparia*; grue blanche d'Amérique, *Grus americana*; condor de Californie, *Gymnogyps californianus*; chien de prairie, *Cynomys ludovicianus*; antilope du Sonora, *Antilocapra Americana sonoriensis*; petite chauve-souris à long nez, *Leptonycteris curasoae yerbabuenae*; (grande) chauve-souris à long nez du Mexique, *Leptonycteris nivalis*; ours noir, *Ursus americanus*; loup gris, *Canis lupus*. Le rapport complet sur ces espèces est disponible à l'adresse suivante : <http://www.cec.org/files/PDF/BIODIVERSITY/SCCC-Web-f_FR.PDF>.

conomie et aux finances, les fonds bilatéraux et multilatéraux, le droit et les politiques, ainsi que la sensibilisation et l'éducation, sont utilisés pour assurer la conservation et l'utilisation durable des prairies nord-américaines;

- tous les intervenants, notamment ceux provenant des secteurs économiques, les propriétaires fonciers privés, les organismes gouvernementaux, les membres du milieu universitaire, les peuples autochtones et les organisations non gouvernementales, participent à des activités qui visent à assurer la conservation et l'utilisation durable des prairies nord-américaines et qui les lient entre eux.

BUT DU PRÉSENT DOCUMENT

Le présent document a pour objet d'établir un cadre de référence en vue d'une coopération trilatérale et bilatérale entre le Canada, le Mexique et les États-Unis, qui assure la conservation et l'utilisation durable des prairies du centre de l'Amérique du Nord.

PROCHAINES ÉTAPES

Il est recommandé d'établir un groupe de travail trilatéral pour la conservation des prairies, chargé d'élaborer une stratégie de conservation des prairies nord-américaines.

Avant d'élaborer une stratégie trinationale de conservation des prairies, les trois pays doivent déterminer les éléments qu'il est possible, politiquement et légalement, d'inclure dans une telle stratégie ou dans un tel accord. Les stratégies de partenariat en matière de conservation qui ont porté des fruits ont tendance à avoir en commun un certain nombre d'éléments dont la CCE et tous les intervenants peuvent s'inspirer pour élaborer une stratégie trinationale de conservation des prairies. Compte tenu de ces éléments communs, les responsables de cette stratégie trinationale devraient se conformer aux exigences suivantes :

- Établir un comité directeur et des groupes de travail pour les buts principaux.
- Faire participer un échantillon représentatif des intervenants à l'élaboration et au suivi de la stratégie.
- Respecter le droit de tous les utilisateurs des sols de se faire entendre et évaluer avec soin l'impact de leurs besoins et de leurs attentes sur la durabilité environnementale, sociale et économique des écosystèmes de prairie.
- Établir les cibles concrètes de la stratégie, qui définiront un plan directeur pour la conservation de la biodiversité.
- Présenter un plan d'action énonçant clairement les buts, les objectifs et les mesures à prendre pour atteindre les objectifs, avec un échéancier précis et une définition des tâches et responsabilités des organismes et organisations concernés.
- Favoriser les projets qui exigent une large collaboration trilatérale.
- Établir des plans de travail annuels.
- Veiller à ce que les pouvoirs publics participent au même titre que tous les autres participants; les pouvoirs publics ne devraient pas agir comme superviseur ni orienter unilatéralement le programme.

- Évaluer l'avancement des travaux à court et à moyen terme.
- Établir une tribune pour des échanges actifs d'informations avec les responsables d'autres projets, avec d'autres organismes et organisations ainsi qu'avec les citoyens.
- Prévoir des ressources à long terme suffisantes non seulement pour élaborer la stratégie, mais aussi pour l'administrer, la mettre en œuvre et en assurer le suivi.
- Veiller à ce que la stratégie n'entre pas en concurrence avec d'autres initiatives pour l'obtention de fonds ou la responsabilité de l'exécution de programmes.

Il est clair que, pour s'attaquer à l'éventail complet des problèmes relatifs à la conservation des prairies dans le cadre d'une stratégie trinationale, il faudra faire appel à toute une panoplie de méthodes qui tiennent compte des échelles temporelles et spatiales des problèmes, du contexte historique de ces problèmes et des différences dans les conditions biophysiques, dans les attitudes culturelles, dans les lois, règlements, politiques ou programmes et dans les pratiques qui, ensemble, forment le contexte—avec les obstacles et les possibilités—dans lequel les trois pays s'attacheront à concrétiser une vision commune de la conservation des prairies.

Les problèmes répertoriés dans les prairies centrales du Canada, du Mexique et des États-Unis sont très variés. Nombre de ces problèmes ont un caractère local et devront être abordés à cette échelle. Cependant, une stratégie de conservation trinationale viendrait fort opportunément appuyer les initiatives locales et régionales et compléter les initiatives nationales et internationales, pour les raisons indiquées dans l'introduction du présent document.

À l'échelle trinationale, la stratégie de conservation des prairies du centre de l'Amérique du Nord devra s'attaquer à une large gamme de problèmes et de besoins en rapport avec la biodiversité, les méthodes de mise en valeur des terres et la gestion de l'utilisation des terres, les politiques et les questions socioéconomiques relatives à l'utilisation des terres, les questions démographiques et sociales, l'éducation et la communication, les questions concernant la recherche, la surveillance et la production de rapports. La stratégie devra également aborder les problèmes et les besoins dans des perspectives à court terme et à moyen terme et tenir compte du fait que, s'il est vrai qu'il existe un certain nombre d'enjeux communs aux trois pays, il y a aussi de nombreux problèmes et besoins qui sont particuliers à un pays ou qui ont un caractère local.

CIBLES D'UNE STRATÉGIE DE CONSERVATION DES PRAIRIES NORD-AMÉRICAINES

Biodiversité

Les activités trilatérales devraient comprendre des mesures visant à promouvoir plus intensément la conservation des habitats, des études en vue d'inventorier les habitats de grande valeur et des activités de gestion qui favorisent la prévention et le renversement des processus de déclin ainsi que le rétablissement des espèces et la restauration des habitats.

Il convient d'élaborer des stratégies à court et à moyen terme qui, au moins, privilégient les aspects suivants : déclin de la biodiversité; disparition locale d'espèces; altération des structures de guilde et de la composition des espèces de prédateurs; perte ou fragmen-

tation de l'habitat des espèces sauvages; conversion des terres cultivées en prairies; nécessité de promouvoir plus intensément la conservation des habitats. À moyen terme, la stratégie devrait également cibler des problèmes plus précis en rapport avec la gestion des espèces, le nombre croissant d'espèces introduites et envahissantes, la nécessiter d'arrêter le déclin de certaines espèces et de prévenir les invasions de plantes exotiques, la nécessité de rétablir les populations d'espèces sauvages, les espèces en danger de disparition et les processus naturels pour prévenir la disparition locale d'espèces, la fragmentation des couloirs d'habitat riverain, les modes de perturbation. Sur le plan national, le Canada est plus particulièrement préoccupé par l'impact de la surexploitation des eaux souterraines sur la diversité biologique de ses prairies.

Méthodes de mise en valeur des terres et gestion de l'utilisation des terres

Les activités trilatérales devraient porter sur les questions relatives aux méthodes de mise en valeur des terres et à la gestion de l'utilisation des terres et viser notamment à faciliter la préservation de divers écosystèmes dans les prairies centrales, à encourager les efforts déployés pour réduire au minimum les perturbations résultant des activités humaines, à favoriser la création de marchés pour les produits agricoles écologiques.

Même s'il existe, en Amérique du Nord, de nombreuses différences dans les méthodes de mise en valeur des terres et dans la démarche adoptée pour la gestion des prairies, les réponses fournies par les personnes interrogées montrent qu'il existe également des problèmes et des besoins communs qu'une stratégie trinationale devrait s'attacher à résoudre à court et à moyen terme. Ces problèmes et besoins sont les suivants :

- insuffisance des aires protégées,
- pratiques agricoles inadéquates,
- drainage et remblayage de milieux humides,
- labourage de prairies,
- conversion des terres peu productives,
- nécessité de préserver divers écosystèmes dans l'ensemble des prairies,
- nécessité de déployer plus d'efforts afin d'encourager la création de marchés pour les produits agricoles écologiques,
- impacts des activités d'exploration et de développement.

À moyen terme, la stratégie devrait plus particulièrement cibler les problèmes suivants :

- utilisation insuffisante de méthodes de gestion écologiques dans les aires protégées,
- expansion des zones urbaines et périurbaines ainsi que des zones résidentielles en milieu rural,
- questions relatives à l'impact du changement climatique, notamment en ce qui concerne les avantages des prairies en tant que puits de carbone atmosphérique,
- potentiel de pénuries d'eau et de conflits et accroissement de la demande d'eau,
- nécessité de restaurer les écosystèmes de prairie dégradés,

- mise en place de couvertures végétales indigènes et implantation d'une industrie des semences connexe.

Sur le plan national, en ce qui concerne les prairies aux États-Unis, la stratégie devrait cibler les problèmes à moyen terme qui ont trait à la compréhension relativement limitée au sein de la population générale des pratiques de gestion des parcours; les questions associées au pâturage dans les zones riveraines et les milieux humides; la nécessité de réduire le surpâturage chronique. Au Canada, à moyen terme, il convient de prêter attention à la gestion des déchets du bétail et des porcheries; aux répercussions de l'épandage d'engrais et de produits chimiques sur les terrains agricoles; aux effets de la biotechnologie et des cultures génétiquement modifiées sur la conservation des prairies; à l'insuffisance des programmes de vulgarisation et de sensibilisation en matière de conservation. Au Mexique, la stratégie devra répondre aux préoccupations qui ont trait au manque de programmes de vulgarisation visant à promouvoir un aménagement approprié des pacages; au surpâturage; aux répercussions des techniques de gestion des pâturages sur la faune; à l'accroissement de la demande d'eau; aux conflits qui pourraient résulter des pénuries d'eau associées au changement climatique.

Politiques et questions socioéconomiques

Les activités trilatérales devraient faciliter l'amélioration des lois, règlements, politiques et programmes visant à favoriser la conservation des prairies; l'instauration de programmes d'encouragement efficaces; le renforcement de la collaboration interorganismes; une meilleure coordination des programmes de conservation.

Pour les trois pays, la stratégie devra accorder une grande attention, à court et à moyen terme, aux politiques et aux questions économiques relatives à l'utilisation des terres dans les prairies. Elle devra notamment chercher à apporter des solutions aux problèmes suivants :

- caractère inadéquat des politiques, programmes, règlements et mesures d'application à l'appui des programmes de conservation,
- missions inefficaces et contradictoires des organismes gouvernementaux,
- manque d'intégration des politiques relatives aux systèmes économiques et écologiques globaux,
- manque de confiance dans les politiques et les programmes gouvernementaux et non gouvernementaux,
- nécessité de définir, de promouvoir et d'établir des lois, règlements, politiques et programmes qui encouragent les pratiques favorables à la conservation,
- nécessité de faire participer tous les intervenants à la planification et à la gestion des activités visant à assurer la conservation des prairies,
- nécessité d'améliorer la gestion des prairies en instaurant des mesures incitatives,
- nécessité de créer des marchés novateurs pour les produits agricoles traditionnels et pour les produits non traditionnels, et nécessité d'instaurer des mesures incitatives basées sur le marché libre pour les propriétaires fonciers privés,
- absence d'activités de production et de solutions économiques de remplacement, et absence de mesures incitatives en matière d'organisation et de commercialisation qui favoriseraient la préservation du mode de vie souhaité et la conservation des prairies,

- menaces pesant sur la sécurité économique future des producteurs agricoles,
- questions relatives aux droits de propriété privée et à la conservation des prairies,
- nécessité d'établir et d'appuyer des programmes qui mettent un terme à l'exploitation des terres peu productives et qui offrent des avantages économiques tangibles aux producteurs,
- absence de mesures visant à faire participer tous les intervenants au processus de planification,
- absence de mesures incitatives pour la préservation, la restauration et la gestion des prairies,
- répercussions des subventions et des politiques d'aide gouvernementales, appliquées dans divers pays, sur les prix des produits de base,
- récompenses inadéquates pour la bonne intendance de l'environnement,
- absence d'une valeur marchande établie pour les biens publics.

Aux Canada et aux États-Unis, en ce qui concerne plus particulièrement le moyen terme, la stratégie devrait cibler les questions suivantes :

- nécessité d'établir des plans de gestion qui tiennent mieux compte des espèces non considérées comme gibier,
- mise en place de programmes visant à surmonter le problème du manque de participation des secteurs non traditionnels à la conservation des prairies,
- mécanismes de financement novateurs ou de remplacement insuffisants,
- amélioration de l'information au sujet des liens entre les impacts et avantages économiques et écologiques et les politiques et programmes en matière de conservation et de production,
- politiques qui encouragent les grandes exploitations,
- établissement d'un " guichet unique " pour fournir de l'information au sujet des programmes de conservation et qui encourage les actions gouvernementales par le biais de changements dans les politiques.

À l'échelle nationale, la stratégie devrait mettre de l'avant des mesures pour aider le Canada à créer les nouveaux outils de financement dont le pays a besoin pour assurer la conservation des prairies nord-américaines par le biais du secteur privé. Au Mexique, la stratégie devra prêter une attention particulière aux répercussions des subventions et des politiques d'aide gouvernementales, appliquées dans certains pays, sur les prix des produits de base, à l'absence d'activités de production et de solutions économiques de remplacement, aux mesures incitatives en matière de commercialisation qui favoriseraient la préservation du mode de vie souhaité et la conservation des prairies.

Questions démographiques et sociales

Les activités trilatérales devraient être fondées sur une évaluation scientifique des attitudes et des perceptions des intervenants en rapport avec la conservation des prairies du centre de l'Amérique du Nord.

En général, les questions démographiques et sociales ne se voyaient pas accorder la même priorité que d'autres problèmes et besoins en rapport avec la conservation des prairies, mais les répondants à l'enquête ont néanmoins reconnu l'importance contextuelle de ces questions. En dernière analyse, le succès des politiques, programmes

ou pratiques qui pourraient être recommandés dans le cadre d'une stratégie trinationale de conservation des prairies dépendra de la mesure dans laquelle on aura tenu compte des réalités démographiques, sociales et culturelles des régions.

Éducation et communication

Les activités trilatérales devraient favoriser les efforts de sensibilisation qui mettent l'accent sur des programmes d'éducation et de communication culturellement ciblés. Ces programmes devraient avoir pour objet de promouvoir un gain net de prairies; de favoriser la restauration des écosystèmes dans les prairies dégradées; de sensibiliser la population à la valeur des services environnementaux que rendent les prairies; de promouvoir des techniques simples pour conserver les prairies; d'encourager les propriétaires de terrains et les gestionnaires qui s'appliquent à conserver les prairies; de multiplier les liens avec les organisations locales de producteurs; de promouvoir les activités de formation à l'intention des futurs responsables de la gestion des terres; d'accroître les activités de formation qui intègrent les questions relatives à la faune dans la gestion des parcours.

Deux grands problèmes ont été soulevés en ce qui a trait à la communication et à l'éducation en rapport avec la conservation des prairies :

1. Il y a un manque de communication et de collaboration avec les intervenants et entre les intervenants; en d'autres termes, toute stratégie globale de conservation des prairies doit être élaborée en consultation permanente avec les intervenants et cette consultation doit être la plus large possible.
2. On manque de programmes d'éducation en matière de conservation des prairies, qu'il s'agisse de programmes couvrant l'ensemble des problèmes ou de programmes visant les groupes appropriés pour apporter des changements.

Recherche, surveillance et production de rapports

Les activités trilatérales devraient avoir pour objet de promouvoir l'établissement d'un plus grand nombre d'aires permanentes de recherche sur les prairies; d'intensifier la recherche sur les menaces et les facteurs de stress, sur les espèces fauniques en vue de leur rétablissement et sur les impacts des espèces envahissantes; de promouvoir la recherche centrée sur les évaluations intégrant les aspects écologiques, économiques et sociaux ainsi que la recherche sur les meilleurs moyens de mettre en œuvre des plans de rétablissement et de gestion et d'améliorer l'évaluation (en améliorant les indicateurs) des politiques et des programmes. La coopération entre les trois pays pourrait aider à inventorier les prairies prioritaires qui requièrent une étude immédiate; à promouvoir des techniques de surveillance à long terme uniformes et cohérentes; à harmoniser les recherches; à établir une terminologie commune.

Aujourd'hui, les stratégies de conservation et l'intérêt pour les espèces en danger de disparition et les problèmes d'habitat sont en plein essor, mais les données et l'information nécessaires ne suivent pas. La démarche à adopter pour aller de l'avant doit accorder une plus grande importance aux inventaires et aux systèmes de surveillance exhaustifs et intégrés, spécialement conçus pour répondre aux besoins analytiques aux échelles de l'habitat et de l'écosystème. Ces ensembles de données doivent être axés sur l'écosystème, fondés sur des études scientifiques et recueillis sur de plus longues périodes.

UNE VOIE À SUIVRE

L'existence d'espèces et d'habitats en danger de disparition dans les prairies du centre de l'Amérique du Nord et l'augmentation de leur nombre sont symptomatiques de problèmes plus vastes. C'est un signal et un reflet des impacts croissants des activités humaines sur les écosystèmes et des difficultés que nous avons à adapter nos façons d'agir pour préserver l'intégrité des écosystèmes. C'est pourquoi, avec le temps, de nombreux Nord-Américains ont cessé de s'intéresser seulement à la nature pour se préoccuper maintenant de l'intégrité et de la salubrité des écosystèmes.

La recherche de solutions au problème des espèces en danger de disparition constitue un moyen d'attirer l'attention sur le rétablissement des espèces ou de prévenir l'accentuation de leur déclin. Cependant, à long terme, la gestion d'espèces individuelles ou même de communautés d'espèces n'est ni réalisable ni rationnelle. Par gestion écosystémique, on entend l'adoption d'une démarche qui intègre notre sagesse et nos actions collectives, plutôt que de morceler les actions, les domaines de compétence, les approches scientifiques et les capacités. En dernière analyse, le succès viendra des processus décisionnels qui mettent l'accent sur l'intégration. Par exemple, les gestionnaires des espèces sauvages et les planificateurs pourraient-ils vraiment prendre soin des espèces de sauvagine migratrices dans les prairies sans rien savoir, notamment, de leurs habitats et de leurs besoins pendant l'année, de leurs exigences dans l'ensemble de leur cycle biologique, de leur tolérance aux activités humaines et aux polluants, de leur rôle dans la culture autochtone, de leur importance pour le tourisme et les loisirs, de leur contribution à la biodiversité et à la dynamique des écosystèmes, de leurs relations dans la chaîne alimentaire? Il est nécessaire de comprendre les éléments et les relations entre ces éléments, dans le temps et dans l'espace.

Il faut trouver des solutions novatrices et intégrantes au problème de la gestion des ressources - des façons de faire qui mettent la priorité sur la préservation de l'intégrité des habitats et des écosystèmes. Les habitats de prairie de l'Amérique du Nord doivent être gérés comme des ressources, comme des zones fonctionnelles qui servent les intérêts à la fois de la nature et des humains. Les priorités seront réorganisées, d'une façon ou d'une autre. Soit les humains finiront par reconnaître qu'ils doivent intégrer leurs demandes et leurs objectifs en matière d'habitat en respectant la capacité de charge des écosystèmes de prairie, soit la dégradation des habitats viendra aggraver la dégradation globale des écosystèmes.

Les considérations relatives aux espèces en danger de disparition ont accaparé toute l'attention dans les débats concernant la conservation des prairies. Cependant, la société fait face à des problèmes de salubrité et d'intégrité des habitats fauniques qui sont beaucoup plus vastes. Si l'on en juge à partir d'expériences clés de coopération en rapport avec la conservation des prairies (tels les plans d'action canadiens pour la conservation des prairies), il est clair que l'on ne réussira pas à réduire la menace de disparition qui pèse sur certaines espèces fauniques sans adopter une démarche intégrée qui réunisse au moins les caractéristiques suivantes :

- la démarche accorde une plus grande place aux partenariats et au partage des compétences entre gouvernements, Premières Nations, industries, propriétaires fonciers privés et autres intendants de territoires;
- elle met en œuvre des méthodes spatiales et temporelles hiérarchisées basées sur les habitats fauniques et les principes écologiques;

- elle établit des objectifs et des buts mesurables et fournit un moyen de surveiller leur réalisation;
- elle intègre les aspects biophysiques, socioéconomiques, culturels et politiques dans le processus décisionnel relatif à la gestion des habitats et des ressources;
- elle obéit aux principes de l'utilisation durable des ressources, de la gestion adaptative et de la gestion écosystémique.

La gestion durable des espèces fauniques et de leurs habitats représente une sorte de contrat conclu par les citoyens et les groupes, en vertu duquel ils s'engagent à combler leurs propres besoins sans compromettre gravement les droits et les besoins des autres, ni la qualité fondamentale de l'environnement. Les trois objectifs principaux d'une telle gestion sont d'assurer l'intégrité des écosystèmes, de préserver la santé et le bien-être des humains, d'assurer la conservation des ressources naturelles. Il ne peut y avoir durabilité si l'un quelconque de ces éléments fait défaut, et il ne peut y avoir de succès si les besoins fondamentaux des humains ne sont pas satisfaits. La gestion écosystémique constitue une méthode clé pour atteindre les objectifs en matière d'habitat. Elle exige que nous cessions de concentrer notre attention sur la production de biens et de services pour nous préoccuper de la préservation de la viabilité des systèmes qui sont nécessaires pour produire les biens et les services - maintenant et pour les années à venir (ESA, 1995). Cette approche, appliquée aux habitats, exige que tous les paliers de gouvernement, les entreprises privées, les industries et tous les citoyens soient déterminés à penser, à planifier et à agir en termes d'écosystème. Les moyens pour résoudre le problème de la menace de disparition des habitats fauniques et de leurs espèces associées doivent donc être vus comme un élément d'une stratégie globale de gestion écosystémique visant à assurer la pérennité des ressources.

Les politiques et les programmes reposent souvent sur des approches appliquées de manière restrictive à des territoires administratifs tels que des comtés, des districts, des municipalités régionales, des États ou provinces et des pays. Les préoccupations relatives à la conservation des prairies, qu'il s'agisse d'espèces, d'habitats ou d'écosystèmes, transcendent souvent ces types de frontières, comme c'est le cas pour d'autres enjeux tels que les dépôts acides, le changement climatique et l'exploitation durable des forêts. En conséquence, pour les responsables politiques, il s'agit avant tout de mobiliser les autorités administratives et les intervenants pour qu'ils agissent en fonction des écosystèmes et des habitats qu'ils partagent.

Le cadre de référence établi dans le présent document devrait faciliter les consultations avec tous ceux qui s'intéressent à la question de la conservation des prairies du centre de l'Amérique du Nord. Il sera distribué à un large éventail d'intervenants nord-américains qui sont invités à transmettre leurs commentaires aux auteurs et à la CCE, de même qu'à travailler avec cette dernière pour établir un groupe de travail trilatéral qui sera chargé de faire progresser l'élaboration d'une stratégie nord-américaine de conservation des prairies.

GLOSSAIRE

Abiotique

Synonyme de non vivant; qualifie habituellement les roches, les minéraux et les éléments non organiques du milieu naturel.

Aire protégée

Zone géographique définie qui est conçue ou réglementée et gérée de manière à permettre la réalisation d'objectifs de conservation particuliers.

Arable

Qualifie une terre cultivable.

Badlands

Régions où l'érosion des couches sédimentaires meubles, presque horizontales, a produit des ravins étroits, des crêtes et pinacles abrupts, dépourvus ou presque dépourvus de végétation.

Biodiversité (diversité biologique)

Variabilité des organismes vivants provenant de toutes les sources, dont les écosystèmes terrestres, marins et autres ainsi que les complexes écologiques dont ils font partie; cette notion recouvre la diversité au sein des espèces, entre espèces et des écosystèmes.

Biome

Communauté écologique importante de plantes et d'animaux occupant une zone donnée de grande superficie (p. ex., désert, prairie).

Biotique

Qui appartient ou qui est relatif aux organismes vivants.

Conservation

Préservation ou utilisation durable des ressources terrestres assurant le maintien des écosystèmes, des espèces, de la diversité génétique et des processus d'évolution et autres qui les façonnent. La conservation peut exclure ou non l'utilisation des ressources; en d'autres termes, certaines zones, espèces ou populations peuvent être soustraites à l'utilisation humaine dans le cadre d'une stratégie globale de conservation des paysages terrestres ou aquatiques.

Conservation Reserve Program (CRP, Programme de conservation des réserves)

Une disposition essentielle de la Food Security Act (Loi sur la sécurité alimentaire) des États-Unis, de 1985, reprise dans la Food, Agriculture, Conservation and Trade Act (Loi sur l'alimentation, l'agriculture, la conservation et le commerce) de 1990, dans la Federal Agriculture, Improvement and Reform Act (FAIR, Loi fédérale sur l'amélioration et la réforme de l'agriculture) de 1996 et, plus récemment, dans la Farm Security and Rural Investment Act (FSRI, Loi sur la sécurité agricole et les investissements ruraux) de 2002, avait pour objet de réduire l'érosion sur 16 à 18 millions d'hectares de terres agricoles. En vertu du programme, les producteurs qui signent des contrats acceptent de convertir des terres cultivées en terres réservées à des activités de conservation approuvées pour une période de dix ans. Les producteurs participants reçoivent une rente annuelle et des paiements en espèces ou non financiers à hauteur de 50 % du coût de l'établissement d'une couverture végétale permanente. Le CRP fait partie de l'Environmental Conservation Acreage Reserve Program (Programme de conservation environnementale des superficies de culture). La FAIR de 1996 autorisait la conversion d'une superficie maximale de 14,7 millions d'hectares dans le cadre du CRP, soit le niveau de 1995. Cette superficie est passée à 15,8 millions d'hectares en vertu de la loi FSRI de 2002.

Développement

Projet, entreprise ou activité de mise en valeur ou d'aménagement, ou modification ou expansion d'un projet, d'une entreprise ou d'une activité, susceptibles :

(i) d'avoir une incidence sur un élément unique, rare ou en danger de disparition de l'environnement;
(ii) d'utiliser de façon substantielle une ressource et, ce faisant, d'empêcher l'utilisation, ou l'utilisation potentielle, de cette ressource à d'autres fins;
(iii) d'entraîner le rejet d'un polluant quelconque ou de créer des sous-produits, des résidus ou des déchets exigeant une manipulation et une élimination par une méthode non régie par une loi ou un règlement;
(iv) de susciter des préoccupations largement partagées au sein du public en raison des changements environnementaux potentiels;
(v) de faire intervenir une nouvelle technologie qui a des incidences sur l'utilisation des ressources et qui peut entraîner des changements importants dans l'environnement;
(vi) d'avoir des répercussions importantes sur l'environnement ou de nécessiter d'autres aménagements susceptibles d'avoir des répercussions importantes sur l'environnement.

Développement durable
Idéal selon lequel le développement satisfait les besoins des générations actuelles sans compromettre la capacité des générations futures de répondre à leurs propres besoins.

Disparue localement
Qualifie toute espèce sauvage indigène, végétale ou animale, qui n'existe plus dans une zone donnée, mais que l'on trouve ailleurs dans la nature.

Drainage
Élimination artificielle de l'eau stagnante des champs ou des pâtures.

Écorégion
Combinaison de zones représentatives présentant des attributs similaires, caractérisées par un relief, un climat, une végétation, des sols, des ressources hydriques et des modes d'activité humaine semblables.

Écosystème
Complexe dynamique de plantes, d'animaux et de microorganismes et de leur environnement non vivant qui, par leurs interactions, forment une unité fonctionnelle. Chaque élément joue un rôle spécialisé au sein de l'écosystème. Les écosystèmes rendent des services écologiques tels que la conversion de l'énergie solaire en hydrates de carbone et en protéines, la production d'oxygène, la purification de l'eau et l'adoucissement du climat. Ils produisent les sols dans lesquels nous cultivons nos plantes et ils éliminent les gaz à effet de serre de notre atmosphère. La santé des êtres humains, comme la santé de tous les autres organismes vivants, est liée au bon état ou à l'intégrité de ces systèmes.
Les écosystèmes sont de tailles variées. Ils peuvent être aussi petits qu'une mare ou aussi vastes qu'un continent ou que la planète. Chaque écosystème est unique en termes de caractéristiques chimiques, biologiques et physiques, qu'il soit défini, dans l'espace, comme un bassin versant ou un rivage, ou qu'il prenne la forme d'un paysage terrestre ou marin.

Écotourisme
Tourisme axé sur la nature, qui contribue à la conservation de l'écosystème et aux ressources culturelles et économiques des collectivités d'accueil.

Écozone

Région de la surface terrestre représentative de grandes unités écologiques très générales se caractérisant par des facteurs biotiques et abiotiques en interaction et en adaptation constante.

En danger de disparition

Qualifie toute espèce sauvage indigène, végétale ou animale, qui est menacée de disparition locale imminente ou d'extinction.

Espèce exotique

Espèce non indigène dans la région où elle est présente.

Espèce indicatrice

Espèce qui indique la présence de certaines conditions environnementales, les stades biotiques ou un traitement antérieur.

Gestion des parcours

Discipline particulière fondée sur des principes écologiques, en rapport avec l'utilisation des parcours et des ressources des pâturages à diverses fins. Ces fins comprennent l'utilisation comme habitat faunique, le pâturage, les activités récréatives, les fins esthétiques, d'autres utilisations connexes.

Gestion écosystémique

Philosophie et méthode de gestion visant à assurer la salubrité de l'écosystème à long terme, par le choix, la préservation et/ou le renforcement de l'intégrité écologique de l'écosystème, tout en fournissant des ressources, des produits ou des valeurs non comptables pour les êtres humains.

Herbivore

Animal qui se nourrit de plantes ou de matière végétale.

Indigène

Qualifie une espèce vivant ou produite naturellement dans une région donnée.

Intégrité écologique

Qualité d'un écosystème naturel, faisant ou non l'objet d'une gestion, dans lequel les processus écologiques naturels sont préservés et la diversité des espèces génétiques et de l'écosystème est assurée pour les années à venir.

Intendance de l'environnement

Responsabilité individuelle et collective d'une génération de préserver le patrimoine naturel dont elle a hérité, à la fois pour son propre avantage et pour celui des générations futures. Détermination à conserver et à préserver les éléments naturels du milieu.

Menacée

Qualifie toute espèce sauvage indigène, végétale ou animale, susceptible de devenir une espèce en danger de disparition si les facteurs de danger ne sont pas éliminés.

Milieu humide

Terre basse, submergée.

Monoculture

Système de culture dominé par une seule espèce de plante.

Morcellement

Division de la prairie naturelle en parcelles, laissant des îlots de prairie naturelle entourés de terres cultivées ou de pâtures ensemencées.

Ongulé

Animal dont les pieds sont terminés par des sabots. Les ruminants, mais aussi les chevaux, les cerfs et les porcs, sont des ongulés.

Pérennité (durabilité)

Capacité d'un écosystème de maintenir à long terme les processus et fonctions écologiques, la diversité biologique et la productivité.

Plantes indigènes

Plantes vivant naturellement dans une région avant la colonisation européenne.

Prairies

Écosystèmes terrestres dominés par une végétation herbacée et arbustive, entretenue par le pâturage, les feux, la sécheresse et/ou les basses températures (World Resources Institute, 2000).

Réhabilitation

Remise en état d'un milieu dégradé de façon à lui permettre de retrouver son utilisation ancienne ou d'être utilisé à d'autres fins.

Restauration

Remise en état d'un milieu dégradé de façon à lui rendre son aspect ancien et son utilisation ancienne.

Revégétalisation

Établissement d'une couverture végétale après une perturbation qui a partiellement ou complètement éliminé la végétation originelle.

Séquestration du carbone

Carbone éliminé de l'atmosphère et fixé dans la matière organique vivante ou inanimée.

Succession

Évolution naturelle progressive de la végétation à partir d'un stade pionnier; une communauté est remplacée par une autre sous les effets de facteurs physiques et biotiques.

Surpâturage

Pâturage trop fréquent ou permanent pendant la saison de croissance annuelle, de telle sorte que la végétation n'a pas le temps de récupérer. En conséquence, les racines deviennent plus courtes, les plantes deviennent moins productives, les mauvaises herbes s'installent plus facilement et la végétation devient plus sensible à la sécheresse.

Système pastoral

Gestion des animaux qui paissent et qui broutent en vue d'obtenir le résultat désiré. Manière dont les périodes de pâturage et de non-pâturage sont organisées pendant la saison de pâturage, à l'intérieur d'une année ou sur plusieurs années.

Terre cultivable

Terre utilisée principalement pour la production de plantes cultivées.

Terre cultivée

Terre qui a été travaillée pour produire des plantes et qui n'est donc plus dans son état naturel.

Terres de la Couronne

Terres appartenant à un gouvernement provincial ou au gouvernement fédéral au Canada.

Utilisation durable

Utilisation d'éléments de la biodiversité (organismes, écosystèmes) d'une manière et à un rythme qui n'entraînent pas le déclin à long terme de la biodiversité, préservant ainsi son potentiel de combler les besoins et les aspirations des générations actuelles et futures.

Vulnérable

Qualifie toute espèce sauvage indigène, végétale ou animale, qui suscite des préoccupations particulières en raison de la faiblesse ou du déclin de la population, dus aux activités humaines ou à des événements naturels, mais qui n'est ni menacée ni en danger de disparition.

The central grasslands of North America are an imperiled ecosystem spanning Canada, Mexico and the United States. This book summarizes the case for a trinational approach to the conservation of this ecosystem, presenting a vision and identifying issues that must be addressed if the ecological integrity and viability of grasslands are to be sustained.

Los pastizales centrales de América del Norte constituyen un ecosistema amenazado el cual se extiende a través de Canadá, Estados Unidos y México. Este libro ofrece una perspectiva tri-nacional para la conservación de este ecosistema, presenta una visión e identifica retos que deben ser abordados para asegurar la integridad ecológica y viabilidad de los pastizales.

Les prairies du centre de l'Amérique du Nord constituent un écosystème en péril qui s'étend à travers le Canada, les États-Unis et le Mexique. La présente publication résume les arguments qui plaident en faveur d'une démarche trilatérale en vue d'assurer la conservation de cet écosystème, offrant une vision et établissant les enjeux sur lesquels il convient de se pencher si l'on veut préserver l'intégrité écologique et la viabilité des prairies.

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