K-12 Conservation Education Scope and Sequence

An Educator's Guide to Sequential Learning About Fish and Wildlife

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ASSOCIATION of FISH & WILDLIFE AGENCIES

A Project of the Association of Fish and Wildlife Agencies' North American Conservation Education Strategy;

Prepared by Oksana Bartosh, University of British Columbia

Funded by a Multistate Grant of the Sport Fish and Wildlife Restoration Program

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Association of Fish and Wildlife Agencies

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www.fishwildlife.org

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A Message from Dr. Judy Silverberg

Chair, AFWA K-12 Conservation Education Sub-committee

In 2003, conservation educators from fish and wildlife agencies met at a summit at the National Conservation Training Center in West Virginia to develop a conservation education plan for the twenty-first century. Facing growing conservation challenges, the directors of fish and wildlife agencies directed the assembled educators to prepare a visionary plan for state agencies to implement to sustain the future of wildlife, through stewardship and recreation. The directors recognize conservation education as a mission-critical management component of every fish and wildlife agency. As expressed by Corky Pugh, Director of Wildlife and Freshwater Fisheries Division for the Alabama Department of Conservation and Natural Resources, **"An educated, informed and involved citizenry is imperative for effective management and protection of natural resources."**

The purpose of the AFWA K-12 Conservation Education scope and sequence is to address the Association of Fish and Wildlife Agencies' goals to elevate the value of Conservation Education, and to advance the AFWA Strategic Plan and the North American Model of Fish and Wildlife Conservation (available on the AFWA website: www.fishwildlife.org). The development of the AFWA K-12 Conservation Education scope and sequence follows the formal education sector's practice of undertaking a rigorous review of what is reasonable to expect a student to know and be able to do at their age and stage in life.

The AFWA K-12 Conservation Education Scope and Sequence is a set of expectations that describe what students should know and be able to do in three grade bands, K-5, 6-8, and 9-12. The domains of science, social science, and health and fitness are especially important segments of every child's education. Science provides the key to understanding the world we live in, and the ability to ask and answer meaningful questions. Social science offers tools for critically reasoning and understanding the interplay between the natural world and society's impact. Together, a solid understanding and capability in science and social science can help today's children solve tomorrow's critical environmental, economic, and societal problems, and build a safe and secure life for themselves and their families.

The task of developing a scope and sequence was an AFWA and Multistate Conservation Education grant priority in 2008. Recommendations were carried out by the K-12 Conservation Education Sub-committee. A group of 25 of our nation's most experienced conservation educators and leaders provided input on the project. Oksana Bartosh Consulting and the Pacific Education Institute provided technical support; both have extensive national experience in conservation, science, and environmental education.

In addition to implementing the AFWA Core Concepts, the Conservation Education Working Group has consulted with most states and surveyed hundreds of science educators. I want to express my personal thanks and appreciation to all those who have contributed to this important work.

— Judy Silverberg, Wildlife Education Programs Supervisor, New Hampshire
Chair, AFWA K-12 Conservation Education Sub-committee

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AFWA K-12 Conservation Education Scope and Sequence

Overview

The *AFWA K-12 Conservation Education Scope and Sequence* is a detailed list of what *all students* are expected to know and be able to do at each level of our educational system in the areas of science, social science, and health and fitness. The purpose of these standards is to provide strong support for state agency conservation educators to provide programs for students, parents, teachers, and the broader community by guiding the alignment of the school curriculum, instruction, and assessment at local and state levels.

To accomplish this purpose, it is essential that this document be used in the following ways:

> Conservation educators responsible for **curriculum development and alignment** should refer to this document in selecting or developing instructional materials that enable students to acquire conceptual knowledge and abilities in science.
>
> Conservation educators responsible for **education evaluation and assessment** should refer to this document in selecting and/or developing tools and rubrics that support student achievement of the science and conservation education standards and the measurement of that achievement, from the classroom level to the state level.
>
> Conservation educators responsible for **instructional alignment** should refer to this document in designing classroom instruction and professional development of teachers to ensure that priority be placed on achievement of these standards as the core of a science and conservation education program.

It is also important to point out what the standards are <u>not</u> intended to provide:

> *The scope and sequence does not prescribe teaching methods.* The scope and sequence does not specify preferred teaching methods or materials. The purpose of the scope and sequence is solely to enable conservation educators to develop programs that align curriculum, assessment and instruction by clearly specifying what students are to understand and be able to do – not to prescribe how teachers should teach.
>
> *The scope and sequence does not represent a curriculum.* The scope and sequence specifies a core of conceptual knowledge and abilities that conservation educators nationwide have agreed all students should achieve by the time they leave formal schooling.
>
> *The standards are not test specifications*. The standards describe what students should know and be able to do, and they inform the content of statewide tests. However, they do not specify how knowledge or abilities are to be assessed, either at the local or state levels.

Organization of Scope and Sequence

Note: The Scope and Sequence organization framework is illustrated in the example chart on the next page.

The AFWA K-12 Conservation Education Scope and Sequence is based upon the five areas of concentration, or standards (from 1 to 5) under the core Conservation Education concepts. The scope and sequence in this document translates the AFWA core concepts into both *content standards* and *performance expectations*. It is organized as a collection of charts and maps that show how students' understanding of concepts and skills should be developed from kindergarten through grade 12. The charts are sequenced so that new knowledge is constructed on prior knowledge. Each chart presents an AFWA Conservation Education Core Concept (column 1) and identifies the main themes that this concept encompasses (column 2). It also identifies main concepts from science, social studies, physical education and health, and in some cases mathematics, that students need to acquire to develop an understanding of the AFWA concepts (column 3-5). Finally, the charts also provide indicators that can be used to assess whether students have developed an understanding of the AFWA concepts (column 3-5).

The five AFWA K-12 Conservation Education Standards are stated at the top of each scope and sequence.

AFWA Core Concepts that relate to each standard appear as statements in the far left column of the document. Agreement on core concepts was the first step in developing the *K-12 AFWA Conservation Education Standards*.

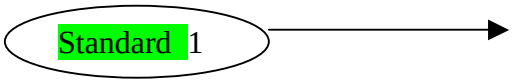
The Key Themes for each AFWA core concept are listed in the next column. These are similar to the themes included in the AAAS Atlas of Science Literacy.

AFWA Concepts, which appear at the top of each grade band column in the body of this document, describe what students should know and be able to do. The scope and sequence is based on national and state science, social science and health and fitness standards. The sources for K-12 education standards are referenced in the scope and sequence document.

Indicators for concept understanding, which appear below the concept understanding, provide clear guidance to all (e.g., curriculum and assessment developers, teachers, students, parents, and others) about the depth of knowledge expected at each grade band and how students are expected to demonstrate their understanding and abilities on formative and summative measures. In the text of the Scope and Sequence, sample indicators that are suitable for K-2 level are marked as 'K-2' and are highlighted in italics.

Grade Bands. The AFWA Conservation Education Working Group identified the three grade bands K-4, 5-8 and 9-12, but these can be broken down further by aligning with a particular state's standards.

Association of Fish and Wildlife Agencies Conservation Education
Scope and Sequence: EXAMPLE



Standard 1. Appreciates that conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA core concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.1 The health and well-being of fish, wildlife, and humans depend on the quality of their environment. 1.1.1.Many species are indicators of environmental health.	**Health of humans and ecosystems**	**Concepts** • Some things people take into their bodies from the environment can hurt them (AAAS1, 6E/2, p89). • Certain poisons in the environment can harm humans and other living things (AAAS1, 6E/2, p. 89). **Sample Indicators** • *K-2: Describe the characteristics of a healthy environment, such as air, water, and food.* • Explain why a healthy environment is important for all organisms to have. • Give examples of fish and wildlife and habitat species in your neighborhood that scientists watch to learn about the health of your environment.	**Concepts** • The environment may contain dangerous levels of substances that are harmful to human beings. Therefore, the good health of individuals requires monitoring of the soil, air, and water and taking steps to make them safe. (AAAS1, 6E/5, p.98). • The length and quality of human life are influenced by many factors, including... environmental conditions... (AAAS1, 6B/5, p. 89). **Sample Indicators** • Develop a working definition of pollution and how it affects fish and wildlife. • Investigate and identify local sources of pollution and how it affects your local fish and wildlife. • Collect and analyze data measuring soil, air, and /or water quality, and link these indicators to fish and wildlife presence.	**Concepts** • Conditions now are very different from the conditions in which the species evolved. But some of the differences may not be good for human health (AAAS1, 6E/3, p. 89). • In-depth field investigations are essential to scientific understanding of the environment (AWFA CE). • Human health and well being depends on access to the outdoors and an environment with sustainable and renewable resources (AFWA CE – Children & Nature Network Research Summary). **Sample Indicators** • Analyze the requirements for sustaining healthy ecosystems and how health of humans and other living (e.g. fish, wildlife,85 and habitat) organisms is affected by changes in environmental conditions. • Design and implement an investigation to determine the environmental health of a local resource and analyze its potential value to fish, wildlife, and humans, including recreational use.

The majority of the academic concepts included in the AFWA Conservation Education Scope and Sequence were located in the national and state academic standards and the AAAS Atlas of Science Literacy; and some of the references are provided in parentheses after each individual concept. The complete list of state and national standards reviewed and used in the development of this document is provided in the Appendices.

A number of academic concepts were developed by the AFWA Conservation Education Working Group and are referenced as "AFWA CE". This was done if the concept was absent from the state and/or national standards or if the group did not agree with the interpretation presented in other standards.

Indicators are critical to understanding the standards and are intended to be met by all students. For each standard, we provide a set of sample indicators listed under each group of academic concepts. These are listed in random order and should not be considered to be an all-inclusive list.

The *K-12 Scope and Sequence for Conservation Education* also includes concept "**maps"** that illustrate the connections between the concepts and themes and their progression from kindergarten to grade 12. The maps are based on and are similar in structure to those in the AAAS's Atlas of Science Literacy.

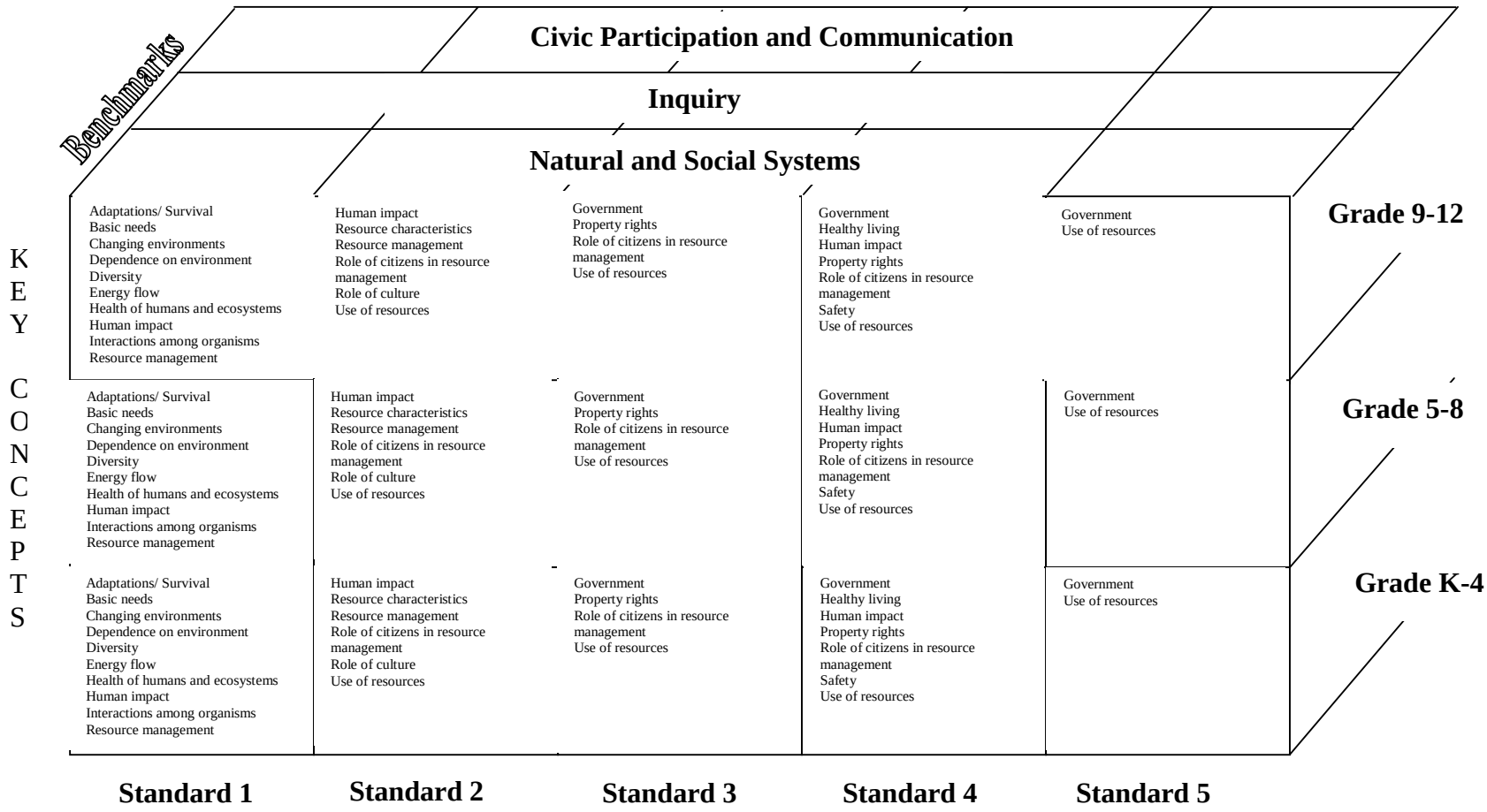
Core Concepts

The Association of Fish and Wildlife Agencies developed core concepts for conservation education as an important first step in moving the Association's *North American Conservation Education Strategy* forward. To be effective in our efforts, we need to speak with one voice and clearly state what we want every citizen to know and understand. Having this consistency throughout all conservation education programs of the Association's members is the key to the strategy's success.

The sixty-two core concepts are a nationally agreed upon set of impressions that support the mission and vision of the North American Conservation Education Strategy. The concepts, designed by a select group of conservation education experts, address only that part of conservation education that focuses on fish, wildlife, and their management. They were approved by the entire membership of the Association of Fish and Wildlife Agencies, including the 50 state agencies and all federal and Canadian partners.

From a national perspective, the Conservation Education core concepts will provide fish and wildlife agencies with a foundation from which to work with the fish and wildlife community to ensure that our conservation education programs are consistent and complimentary.

In summary, the **content** of the AFWA K-12 Conservation Education Scope and Sequence may be represented by the graphic on the following page.


Benchmarks
Civic Participation and Communication
Inquiry
Natural and Social Systems
KEY CONCEPTS
Grade 9-12
Grade 5-8
Grade K-4
Standard 1
Standard 2
Standard 3
Standard 4
Standard 5
Adaptations/ Survival
Basic needs
Changing environments
Dependence on environment
Diversity
Energy flow
Health of humans and ecosystems
Human impact
Interactions among organisms
Resource management
Human impact
Resource characteristics
Resource management
Role of citizens in resource management
Role of culture
Use of resources
Government
Property rights
Role of citizens in resource management
Use of resources
Government
Healthy living
Human impact
Property rights
Role of citizens in resource management
Safety
Use of resources
Government
Use of resources

STANDARD 1

Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment.
1.2. All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space.
1.3. The "Carrying Capacity" of an area determines the size of the population that can exist or will be tolerated.
1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quality of food, water, shelter, space, also disease, predation, climatic conditions.
1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species.
1.6. Ecological succession is a process involving continuous replacement of one community by another.
1.7. Species differ in their ability to adapt.
1.8. Conserving biodiversity is important.
1.9. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.

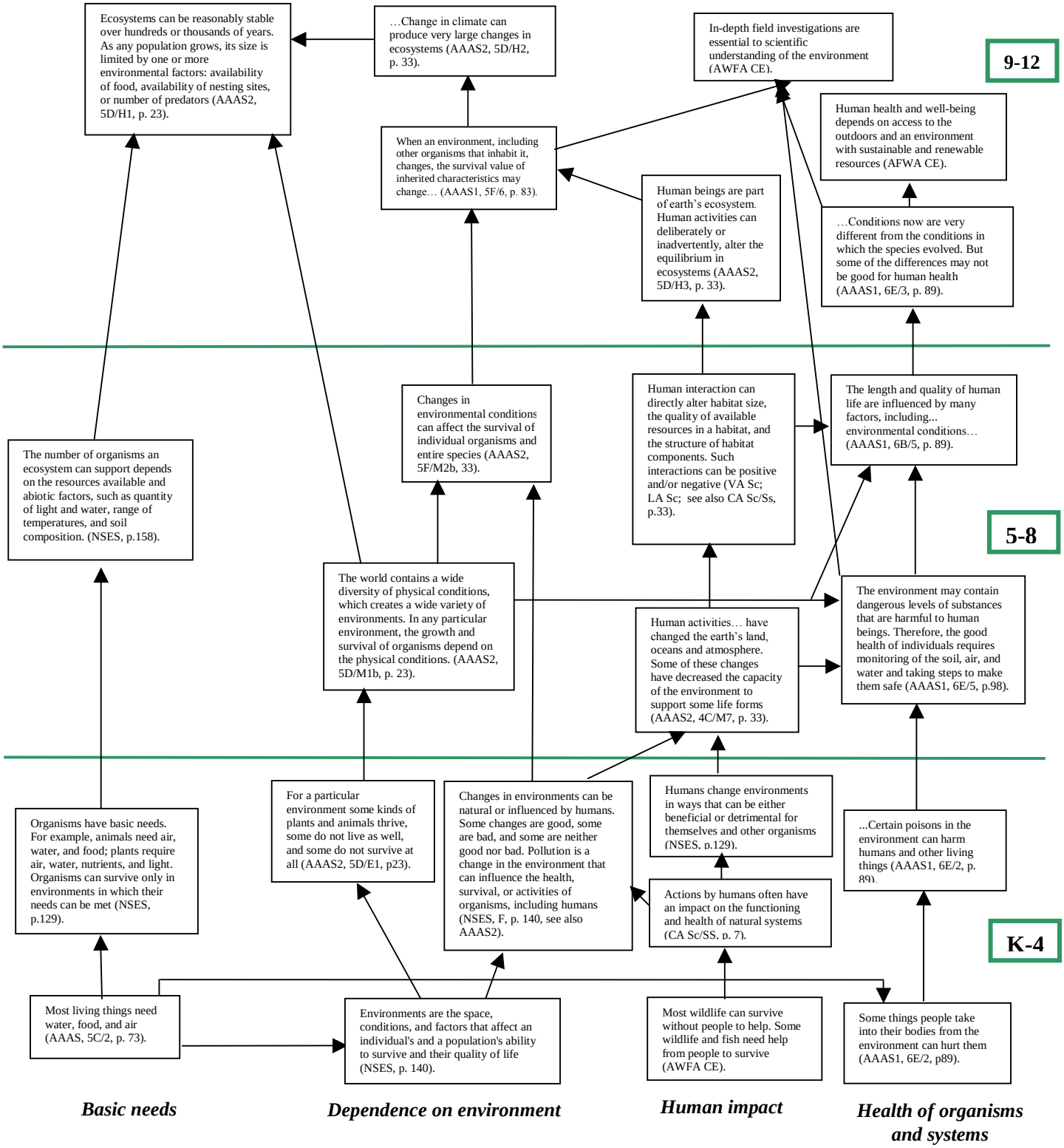
Standard 1: Themes at a Glance

Standard number and descriptor	Key Theme 1	Key Theme 2	Key Theme 3	Key Theme 4
1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment.	Basic Needs	Dependence on the Environment	Human Impact	Health of Organisms and Systems
1.2. All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space.	Basic Needs	Dependence on the Environment	Human Impact	
1.3. The "Carrying Capacity" of an area determines the size of the population that can exist or will be tolerated	Interactions among Organisms	Human Impact		
1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quality of food, water, shelter, space, also disease, predation, climatic conditions.	Basic Needs	Interactions among Organisms		
1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species.	Diversity	Energy	Interactions among Organisms	Dependence on the Environment
1.6. Ecological succession is a process involving continuous replacement of one community by another.	Changing Environment	Human Impact		
1.7. Species differ in their ability to adapt.	Adaptations/ Survival	Human Impact		
1.8 Conserving biodiversity is important.	Biodiversity	Human Impact		
1.9. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.	Basic Needs	Resource Management		

Standard 1 by Theme

Theme	Standards
Adaptations/ Survival	1.7. Species differ in their ability to adapt.
Basic Needs	1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment. 1.2. All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space. 1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quality of food, water, shelter, space, also disease, predation, climatic conditions. 1.9. Fish and wildlife can be conserved and restored through science based management which considers the needs of humans as well as those of fish and wildlife.
Changing Environment	1.6. Ecological succession is a process involving continuous replacement of the one community by another.
Dependence on the environment	1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment. 1.2. All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space. 1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species.
Diversity	1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species. 1.8 Conserving biodiversity is important.
Energy	1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species.
Health of Organisms and Systems	1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment.
Human Impact	1.1. The health and well-being of fish, wildlife and humans depend on the quality of their environment. 1.2. All living things depend on habitat that includes adequate supplies and suitably arranged food, water, shelter, and space. 1.3. The “Carrying Capacity” of an area determines the size of the population that can exist or will be tolerated. 1.6. Ecological succession is a process involving continuous replacement of one community by another. 1.7. Species differ in their ability to adapt. 1.8 Conserving biodiversity is important.
Interactions among Organisms	1.3. The “Carrying Capacity” of an area determines the size of the population that can exist or will be tolerated. 1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quality of food, water, shelter, space, also disease, predation, climatic conditions. 1.5. Fish and wildlife are present in nearly all areas of Earth. Each ecosystem has characteristic species.
Resource Management	1.9. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.

Map 1.1. The health and well-being of fish, wildlife, and humans depend on the quality of their environment



Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1. 1. The health and well-being of fish, wildlife, and humans depend on the quality of their environment. 1.1.1. Many species are indicators of environmental health.	**Basic needs**	**Concepts** • Most living things need water, food, and air (AAAS2, 5C/2, p. 73). • Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met (NSES, p.129). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Identify the basic needs of local fish and wildlife (e.g., food, water, light).* • Describe how the basic needs of fish and wildlife are met in their environments. • Identify what plants and animals need to grow and survive (e.g. food, water, air, space and shelter (AFWA; AZ Sc, p. 34).	**Concepts** • The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition (NSES, p.158). **Sample Indicators: Use fish and wildlife as an example.** • Describe the common life processes necessary to the survival of organisms (i.e. growth, reproduction, life span, response to stimuli, energy use, exchange of gas, use of water, elimination of waste) (MO Sc, p. 41). • Evaluate and compare how resources are used by many organisms and recognize that resources are limited. • Describe that both plants and animals extract energy from food but plants produce their own food from light, air, water, and mineral nutrients while animals consume energy-rich foods (WA Sc, p. 37).	**Concepts** • Ecosystems can be reasonably stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators (AAAS2, 5D/H1, p. 23). **Sample Indicators: Use fish and wildlife as an example.** • Calculate exponential growth of populations. • Analyze and make predictions about the impact on populations of geographic locales, natural events, diseases, and birth and death rates. • Predict how a change in an environmental factor (e.g. rainfall, habitat loss, non-native species) can affect the number and diversity of species in an ecosystem (AZ Sc, p. 40).
	Dependence on environment	**Concepts** • Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life (NSES, p. 140).	**Concepts** • The world contains a wide diversity of physical conditions, which creates a wide variety of environments. In any particular environment, the growth and	**Concepts** • …Change in climate can produce very large changes in ecosystems (AAAS2, 5D/H2, p. 33). • When an environment, including other organisms that inhabit it,

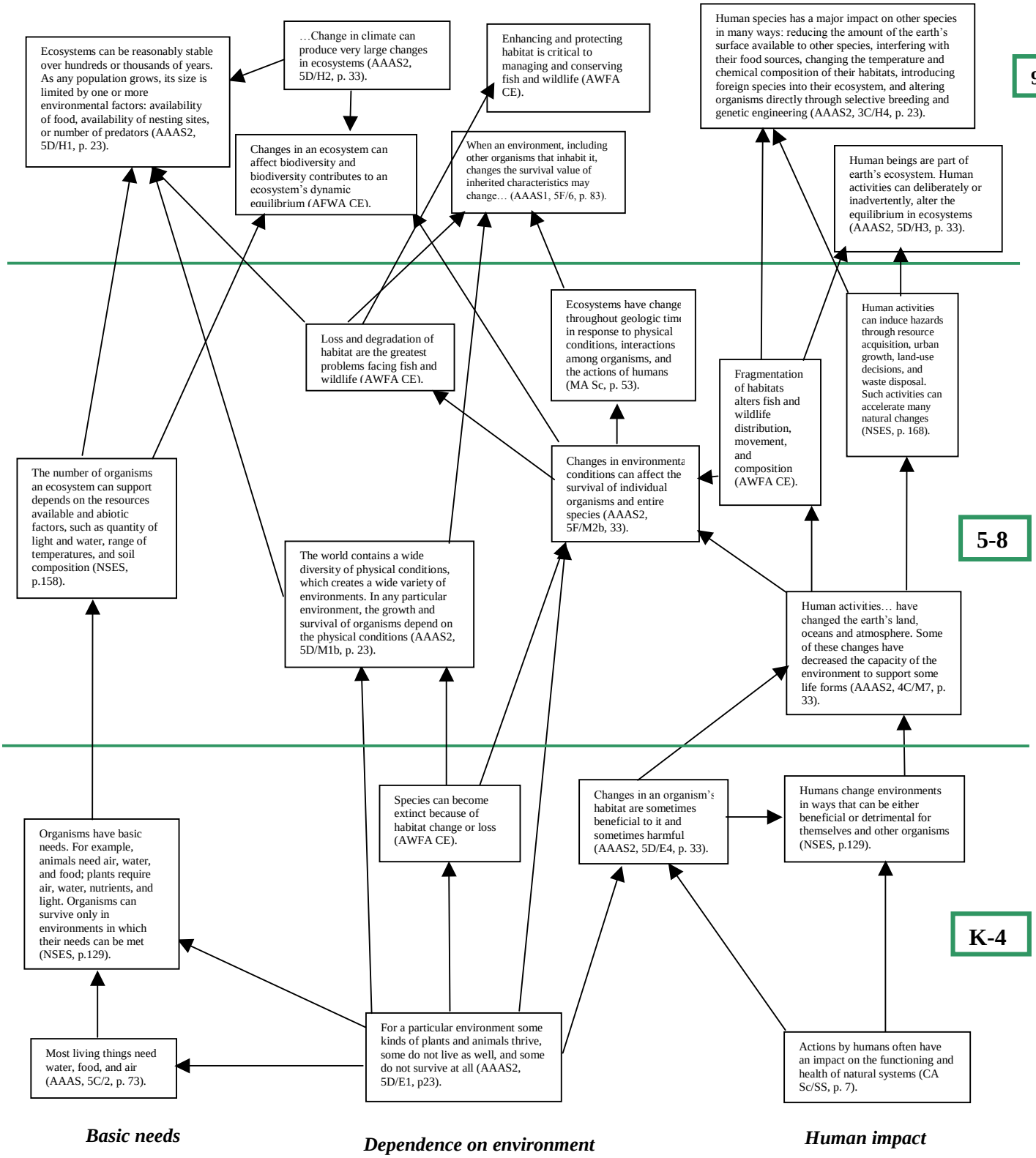
AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		• Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans (NSES, p. 140; see also AAAS2, 5D/E4, p. 33; MA Sc, p. 47). • Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another (BSL, Diversity of Life). • For a particular environment some kinds of plants and animals thrive, some do not live as well, and some do not survive at all (AAAS2, 5D/E1, p23). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Watch a local area through at least two seasons, describe the changes you observe in the living things over time.* • *K-2: Talk with an older person in the community OR look for old pictures of your area and describe how forest, plants and wildlife have changed over time.* • Identify parts of a natural system, and describe how the parts go together. • Given a specific location or habitat, describe how the habitat provides for	survival of organisms depend on the physical conditions (AAAS2, 5D/M1b, p. 23). • Changes in environmental conditions can affect the survival of individual organisms and entire species (AAAS2, 5F/M2b, 33). **Sample Indicators: Use fish and wildlife as an example.** • Conduct simulations demonstrating competition for resources within an *ecosystem.* • Summarize the ways in which environmental changes have affected species. • Describe ways in which humans can protect habitat for fish and wildlife. • Identify how ecosystems are managed to maintain diversity of fish and wildlife (e.g. natural balances versus human management practices). • Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive and non-native species (MA Sc, p. 56). • Name several extinct and threatened species and discuss how habitat changes or loss may have contributed (AWFA CE).	changes the survival value of inherited characteristics may change… (AAAS1, 5F/6, p. 83) **Sample Indicators: Use fish and wildlife as an example.** • Analyze complex relationships among organisms and habitats and the importance of a healthy habitat for fish and wildlife. • Explain how natural and human factors affect ecosystems and communities. • Identify and investigate environmental changes that affect the diversity and balance of an ecosystem. • Analyze changes in population size and biodiversity that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive and non-native species (MA Sc, p. 56).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		fish and wildlife. • Explain how organisms (fish, wildlife and habitat) and ecosystems change over time, e.g. life cycles and seasons. • Describe the life cycle of human beings. • Watch a specific organism through several life stages, describe how the life cycle is the same of difference to humans.		
	Human impact	**Concepts** • Most wildlife can survive without people to help. Some wildlife and fish need help from people to survive (AWFA CE). • Actions by humans often have an impact on the functioning and health of natural systems (CA Sc/SS, p. 7; OR Sc). • Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms (NSES, p.129). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Identify actions that students do at home and at school that have impact on the environment.* • Describe examples of human actions and natural events that affect fish and wildlife and their habitats and their ability to survive. • Identify examples where human activity has had beneficial or harmful effects on other organisms (e.g.	**Concepts** • Human activities… have changed the earth's land, oceans and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms (AAAS2, 4C/M7, p. 33). • Human interaction can directly alter habitat size, the quality of available resources in a habitat, and the structure of habitat components. Such interactions can be positive and/or negative (VA Sc; LA Sc; see also CA Sc/SS, p.33). **Sample Indicators: Use fish and wildlife as an example.** • Explain the consequences of human-caused changes for fish and wildlife and its habitat. • Analyze how all organisms, including humans, cause changes in their ecosystems and how these changes can be beneficial, neutral	**Concepts** • Human beings are part of earth's ecosystem. Human activities can deliberately or inadvertently, alter the equilibrium in ecosystems (AAAS2, 5D/H3, p. 23, 33). • Human activities such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed the earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life (AAAS, 4C/M7, p. 21). **Sample Indicators: Use fish and wildlife as an example.** • Model, analyze and/or predict the effect of human-caused and natural events on the stability and health of fish and wildlife. • Describe and illustrate how humans are an integral part of the Earth's

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		feeding birds, littering vs. picking up trash, hunting/conservation of species, paving/restoring green space) (MO Sc, p. 53). • Demonstrate the ability to make choices and take responsibility for personal actions (OH SS, p. 91).	or detrimental (e.g., beaver ponds, earthworm burrows, grasshoppers eating plants, people planting and cutting trees and people introducing a new species) (see OH Sc; MO Sc; CA Sc/SS). • Describe possible solutions to potentially harmful environmental changes within an ecosystem (MO Sc).	system and the choices humans make today impact natural systems in the future (OH Sc).
	Health of humans and ecosystems	**Concepts** • Some things people take into their bodies from the environment can hurt them (AAAS1, 6E/2, p. 89). • Certain poisons in the environment can harm humans and other living things (AAAS1, 6E/2, p. 89). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Describe the characteristics of a healthy environment.* • *K-2: Describe ways that people stay healthy.* • Explain why a healthy environment is important for all organisms, including humans. • Observe living things in a specific area. Based on your observations, determine if the living things are many, few or rare. Compare these observations with other locations or observe the same areas in a different season . • Keep an observation log which lists kinds of living things in different places you visit.	**Concepts** • The environment may contain dangerous levels of substances that are harmful to human beings Therefore, the good health of individuals requires monitoring of the soil, air, and water and taking steps to make them safe (AAAS1, 6E/5, p.98). • The length and quality of human life are influenced by many factors, including... environmental conditions… (AAAS1, 6B/5, p. 89) **Sample Indicators: Use fish and wildlife as an example.** • Develop a working definition of pollution and describe how it affects fish and wildlife. • Investigate and identify local sources of pollution and how it affects your local fish and wildlife • Collect and analyze data measuring soil, air, and /or water quality, and link these indicators to fish and wildlife presence.	**Concepts** • …Conditions now are very different from the conditions in which species evolved. But some of the differences may not be good for human health (AAAS1, 6E/3, p. 89). • In-depth field investigations are essential to scientific understanding of the environment (AWFA CE). • Human health and well-being depends on access to the outdoors and an environment with sustainable and renewable resources (AFWA CE – Children & Nature Network Research Summary). **Sample Indicators: Use fish and wildlife as an example.** • Analyze the requirements for sustaining healthy ecosystems and how health of humans and other living (e.g. fish, wildlife and habitat) organisms is affected by changes in environmental conditions.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		• Participate in an activity out of doors that allows you to observe wildlife in some way.	• Describe the application of strategies for controlling environmental factors like emission control, water quality and waste management, and describe how these controls impact the presence of fish and wildlife. • Give examples of fish and wildlife and indicator species in your neighborhood that scientists watch to learn about the health of your environment.	• Design and implement an investigation to determine the environmental health of a local resource and analyze its potential value to fish, wildlife and humans, including recreational use. • Evaluate the ecosystem for the quality of the water, air, and renewable and non-renewable natural resources – criteria must include sustainability for 7 generations (AFWA CE- Education for Sustainability).

Map 1.2. All living things depend on habitat that includes adequate and suitably arranged food, water, shelter, and space.

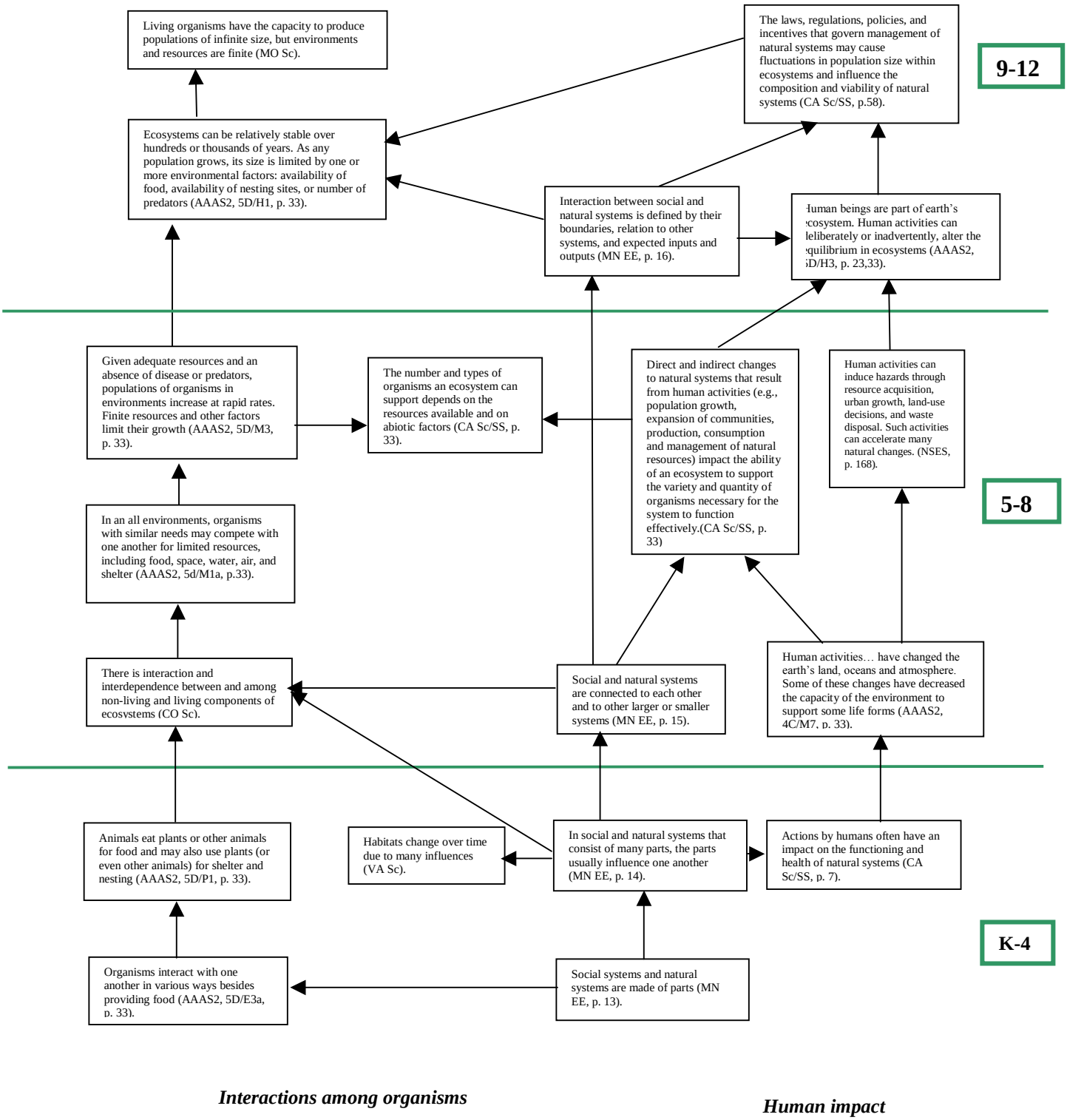


Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.2. All living things depend on habitat that includes adequate and suitably arranged food, water, shelter, and space. 1.2.1. Fish and wildlife numbers and species compositions are constantly changing based on a variety of natural and human-caused conditions. 1.2.2. Loss and degradation of habitat are the greatest problems facing fish and wildlife; therefore, enhancing and protecting habitat is critical to managing and conserving them. • Human changes to the landscape alter fish and wildlife habitat, changing the amount and type available. • Natural events alter the landscape, changing the amount and type of fish and wildlife habitats available. The effects of these events can be exacerbated by human changes to the landscape. • Fragmentation of habitats alters fish and wildlife distribution, movement, and composition.	**Dependence on environment**	**Concepts** • For a particular environment some kinds of plants and animals thrive, some do not live as well, and some do not survive at all (AAAS2, 5D/E1, p23). • Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful (AAAS2, 5D/E4, p. 33, also see MA Sc, p. 47). • Species can become extinct because of habitat change or loss (AFWA). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Observe a local area through at least two seasons, describe the changes you observe in the living things over time.* • Identify parts of a natural system and describe how the parts go together. • Given a specific location or habitat, describe how the habitat provides for fish and wildlife. • Explain how organisms and ecosystems change over time, e.g. life cycles and seasons.	**Concepts** • The world contains a wide diversity of physical conditions, which creates a wide variety of environments. In any particular environment, the growth and survival of organisms depend on the physical conditions (AAAS2, 5D/M1b, p. 23). • Changes in environmental conditions can affect the survival of individual organisms and entire species (AAAS2, 5F/M2b, 33). • Loss and degradation of habitat are the greatest problems facing fish and wildlife. • Ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans (MA Sc, p. 53). **Sample Indicators: Use fish and wildlife as an example.** • Summarize the ways in which environmental changes have affected species. • Conduct simulations demonstrating competition for resources within an *ecosystem* (AR Sc). • Name several extinct and threatened species and discuss how habitat changes or loss may have contributed. • Describe ways in which humans can protect habitat for fish and wildlife. • Identify how ecosystems are managed to maintain diversity of fish and wildlife (natural balances or human management practices).	**Concepts** • …Change in climate can produce very large changes in ecosystems (AAAS2, 5D/H2, p. 33). • Changes in an ecosystem can affect biodiversity and biodiversity contributes to an ecosystem's dynamic equilibrium (AFWA CA). • When an environment, including other organisms that inhabit it, changes the survival value of inherited characteristics may change… (AAAS1, 5F/6, p. 83) • Enhancing and protecting habitat is critical to managing and conserving fish and wildlife (AFWA CE). **Sample Indicators: Use fish and wildlife as an example.** • Analyze complex relationships among organisms and habitats and the importance of a healthy habitat for fish and wildlife. • Identify and investigate environmental changes that affect the diversity and balance of an ecosystem. • Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the introduction of invasive and non-native species (MA Sc, p. 56).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
	Basic needs	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***
	Human impact	***See Standard 1.1/Map 1.1***	**Concepts** • Human activities… have changed the earth's land, oceans and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms (AAAS2, 4C/M7, p. 33; also see CA Sc/SS, p.33; VA Sc; LA Sc). • Fragmentation of habitats alters fish and wildlife distribution, movement, and composition (AFWA CE). • Human activities can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes (NSES, p. 168). **Sample Indicators: Use fish and wildlife as an example.** • Predict the effects of habitat fragmentation on fish and wildlife due to human activity. • Observe and describe beneficial and harmful activities of organisms, including humans (e.g. deforestation, overpopulation, water and air pollution, global warming, restoration of natural environments, river bank/coastal stabilization, recycling, channelization, reintroduction of species, depletion of resources) and explain how these activities affect organisms within an ecosystem (MO Sc). • Propose possible solutions to potentially harmful environmental changes within an ecosystem (MO Sc).	***See Standard 1.1/Map 1.1***

Map 1.3. The carrying capacity of an area determines the size of the population that can exist or will be tolerated there.



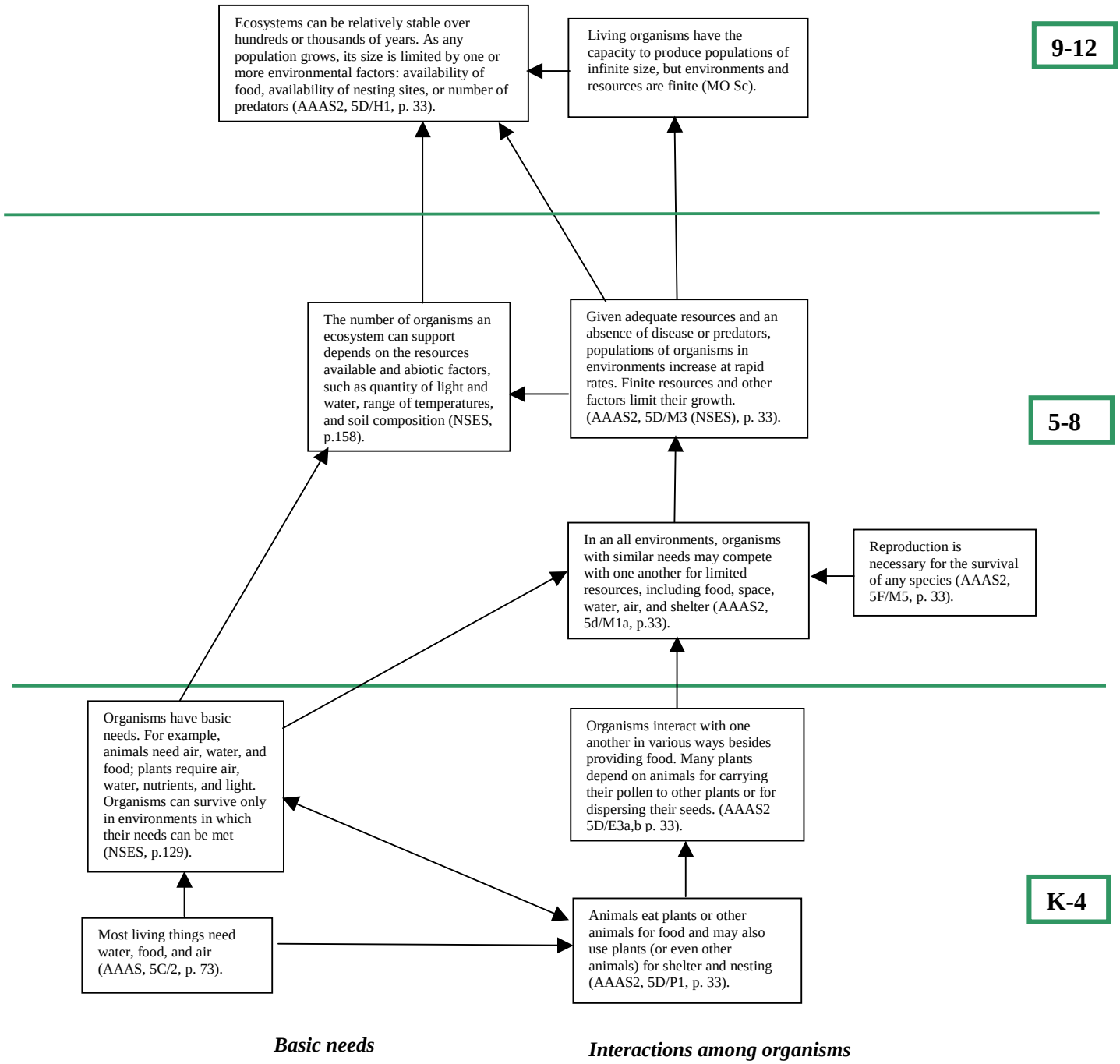
Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.3. The "carrying capacity" of an area determines the size of the population that can exist or will be tolerated there. 1.3.1. Biological "carrying capacity" is an equilibrium between the availability of habitat and the number of animals of a given species the habitat can support over time. 1.3.2.Cultural "carrying capacity" is the number and type of a given species that people will tolerate over time. 1.3.3. "Carrying capacity" is dynamic and can change from season to season and from year to year. 1.3.4. Regulated hunting, fishing, and trapping are important tools for preventing populations of certain species from exceeding the "carrying capacity" of their habitat.	**Interactions among organisms**	**Concepts** • Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting (AAAS2, 5D/P1, p. 33). • Organisms interact with one another in various ways besides providing food. Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds (AAAS2 5D/E3a,b, p. 33). • Habitats change over time due to many influences (VA Sc). **Sample Indicators: Use fish and wildlife as an example.** • Describe ways plants and animals depend on each other (NECAP Sc**).** • Explain the role of an organism in an ecosystem (e.g., predator, prey, consumer, producer, decomposer, scavenger, carnivore, herbivore, and omnivore) (WA Sc, p. 37).	**Concepts** • In an environment, organisms with similar needs may compete with one another for limited resources, including food, space, water, air, and shelter (AAAS2, 5d/M1a, p.33). • Given adequate resources and an absence of disease or predators, populations of organisms in environments increase at rapid rates. Finite resources and other factors limit their growth (AAAS2, 5D/M3, p. 33). • The number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors (CA Sc/SS, p. 33). • There is interaction and interdependence between and among non-living and living components of ecosystems (CO Sc). **Sample Indicators: Use fish and wildlife as an example.** • Distinguish among and model: organisms, populations, communities, ecosystems, biosphere (AR Sc). • Describe how parts of a natural system interact and influence each other.	**Concepts** • Ecosystems can be relatively stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators (AAAS2, 5D/H1, p. 33). **Sample Indicators: Use fish and wildlife as an example.** • Explain how animals and physical components of ecosystems are connected. • Explain the concept of carrying capacity in an ecosystem (PA ENV). • Analyze how carrying capacity and population dynamics impact the distribution of organisms in their ecosystems. • Identify and explain the limiting factors that may affect the carrying capacity of a population of an ecosystem (MO Sc; also see ME, p. 20). • Predict how an ecosystem might maintain stability over long periods of time through interdependence, cycles, and equilibrium.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
			• Using data and observation,predict outcomes when abiotic/biotic factors are changed in an ecosystem (NECAP). • Predict the possible effects of changes in number and types of organisms in an ecosystem on the populations of other organisms within that ecosystem (MO Sc). • Evaluate data related to problems associated with population growth (e.g., overgrazing, forest management, invasion of non-native species) and the possible solutions. (AZ Sc, p. 36).	• Predict how populations within an ecosystem change in number and or structure in response to hypothesized changes in biotic and or abiotic factors in an ecosystem (MO Sc, p. 60).
	Human impact	**Concepts** • Actions by humans often have an impact on the functioning and health of natural systems (CA Sc/SS, p. 7). • Social systems and natural systems are made of parts (MN EE, p. 13). • In social and natural systems that consist of many parts, the parts usually influence one another (MN EE, p. 14). **Sample Indicators: Use fish and wildlife as an example.** • Describe how humans use fish and wildlife. • Identify the living and non-living things in a picture of a particular ecosystem and explain how the parts go together, and how they depend on	**Concepts** • Social and natural systems are connected to each other and to other larger or smaller systems (MN EE, p. 15). • Direct and indirect changes to natural systems that result from human activities (e.g., population growth, expansion of communities, production, consumption and management of natural resources) impact the ability of an ecosystem to support the variety and quantity of organisms necessary for the system to function effectively (CA Sc/SS, p.33; see also VA Sc). • Human activities… have changed the earth's land, oceans and atmosphere. Some of these changes have decreased the capacity of the	**Concepts** • The laws, regulations, policies, and incentives that govern management of natural systems may cause fluctuations in population size within ecosystems and influence the composition and viability of natural systems (CA Sc/SS, p.58). • Interaction between social and natural systems is defined by their boundaries, relation to other systems, and expected inputs and outputs (MN EE, p. 16). • Human beings are part of earth's ecosystem. Human activities can deliberately or inadvertently, alter the equilibrium in ecosystems (AAAS2, 5D/H3, p. 23, 33). **Sample Indicators: Use fish and**

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		each other. • Demonstrate the ability to make choices and take responsibility for personal actions (OH SS, p. 91).	environment to support some life forms (AAAS2, 4C/M7, p. 33). • Human activities can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes (NSES, p. 168). **Sample Indicators: Use fish and wildlife as an example.** • Describe how the human activities such as hunting, fishing and trapping affect the fish and wildlife populations. • Describe how parts of a natural system interact and influence each other. • Observe the effect of human interaction in local ecosystems and collect, record, chart, and interpret data concerning the effect of interaction (VA Sc).	**wildlife as an example.** • Analyze resource management strategies and their role in sustainability of the ecosystem. • Analyze natural systems, including the inputs and outputs. • Analyze how human action and natural changes affect the balance within an ecosystem (PA ENV). • Analyze and evaluate the possible benefits and consequences of people's use of the environment. • Devise a multi step plan to restore the stability and/or biodiversity of an ecosystem when given a scenario describing the possible adverse effects of human interactions with that ecosystem (e.g. destruction caused by direct harvesting, pollution, and atmospheric changes) (MO Sc, p. 60).

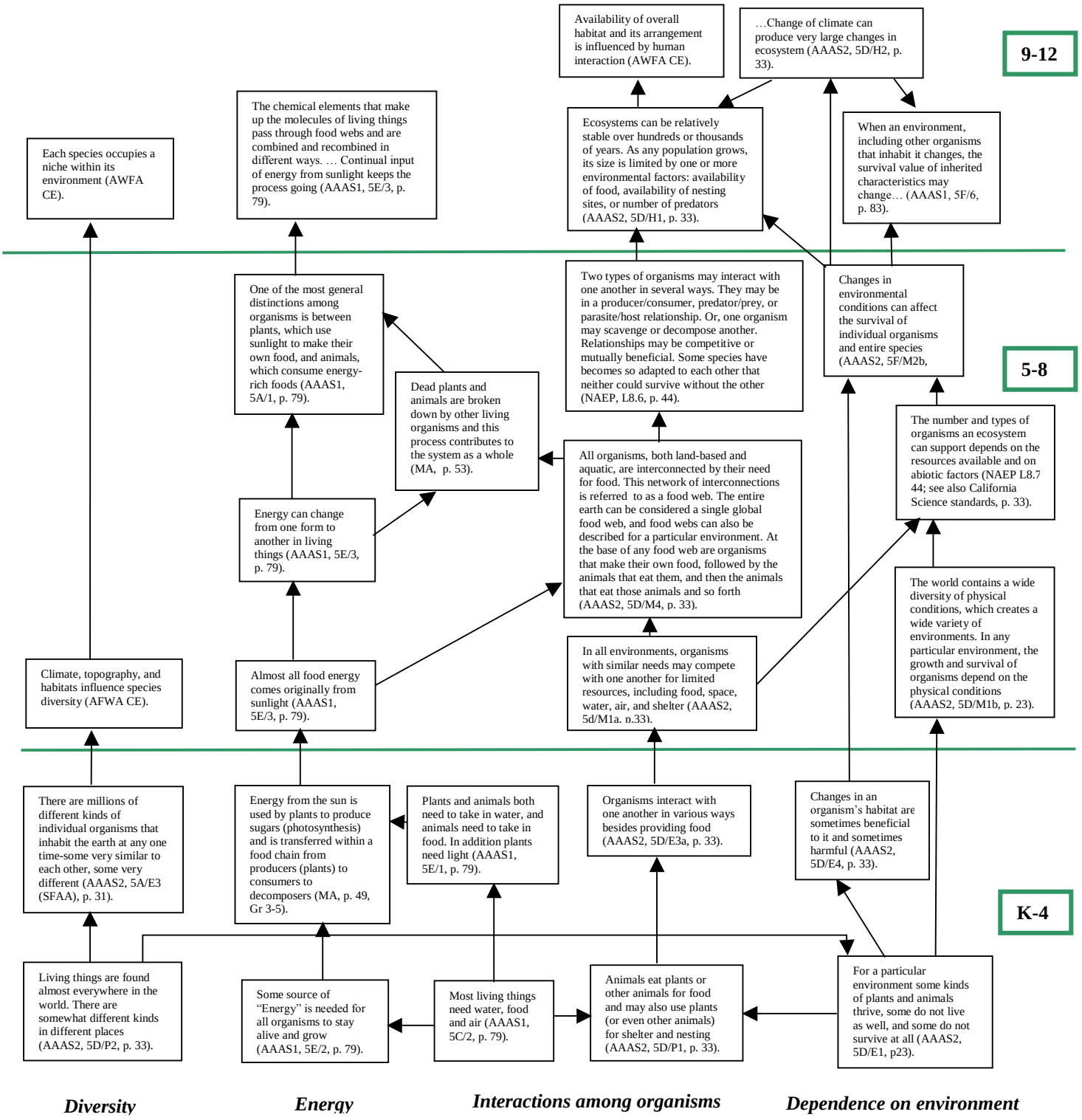
Map 1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quantity and quality of food, water, shelter, and space. Other limiting factors may include disease, predation, and climatic conditions.



Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.4. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quantity and quality of food, water, shelter, and space. Other limiting factors may include disease, predation, and climatic conditions. 1.4.1. When a population becomes too large it may damage or destroy its habitat as well as habitat for many other species. 1.4.2. When a population exceeds the "carrying capacity" for an area, individuals of that population must out-compete others, emigrate, or die.	**Interactions among organisms**	***See Standard 1.3/ Map 1.3.***	***See Standard 1.3/ Map 1.3.***	***See Standard 1.3/ Map 1.3.***
	Basic needs	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***

Map 1.5. Fish and wildlife are present in nearly all areas of the earth. Each ecosystem has characteristic species



Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

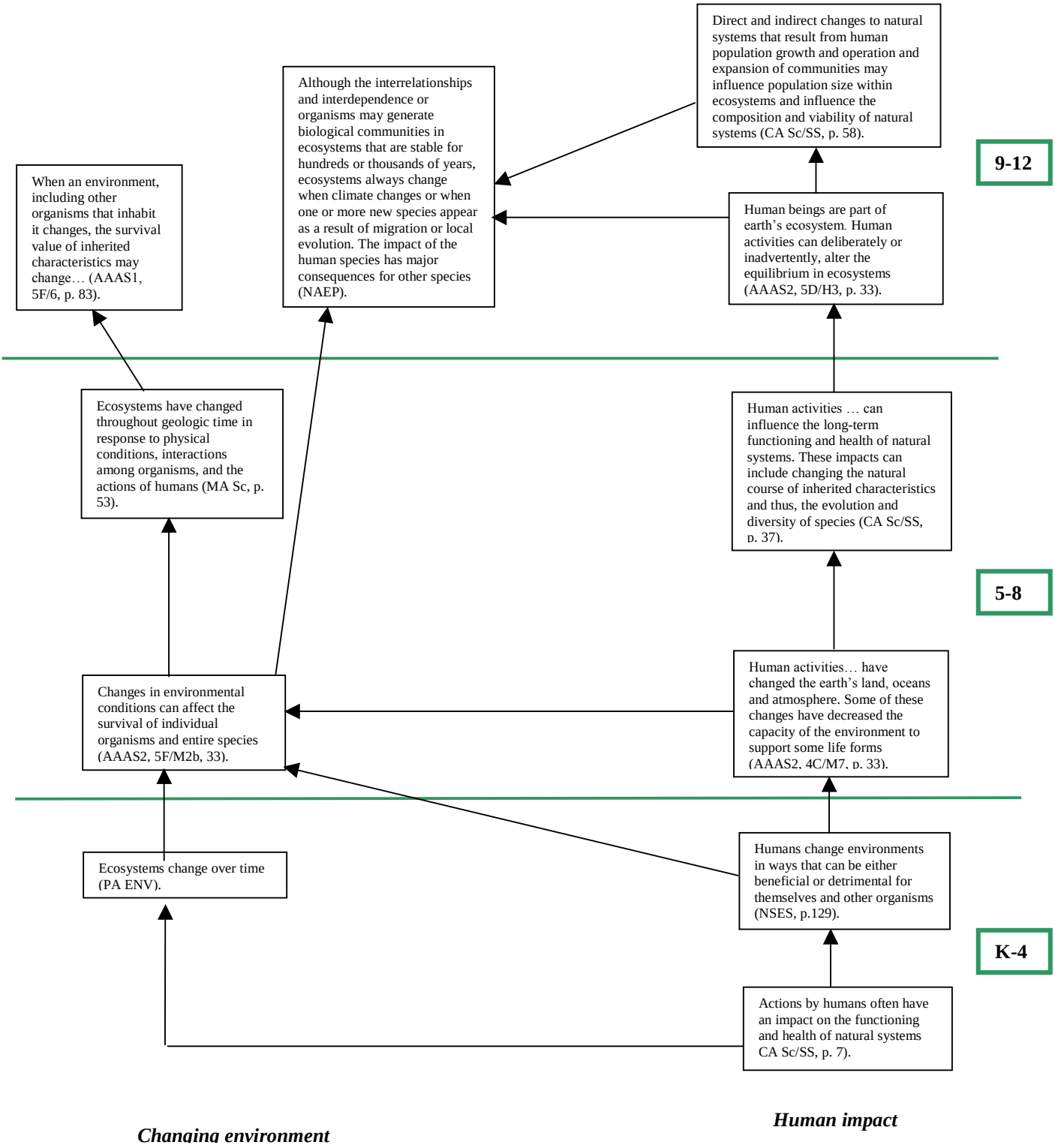
AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.5. Fish and wildlife are present in nearly all areas of the earth. Each ecosystem has characteristic species 1.5.1. Climate, topography, and habitats influence species diversity. 1.5.1. All living things are connected to each other and their environment. • Plants and animals in ecological systems live in a web of interdependence in which each species contributes to the function of the overall system. • Energy from the sun is captured by plants and enters the animal world primarily through animals that eat plants. • Interactions between different fish and wildlife populations include competition, predation, and symbiosis. 1.5.3. Each species occupies a niche within its	**Interactions among organisms**	**Concepts** • Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting (AAAS2, 5D/P1, p. 33). • Organisms interact with one another in various ways besides providing food. Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds (AAAS2 5D/E3a,b p. 33). **Sample Indicators**: • *K-2: Observe how (fish, wildlife and habitat) organisms interact with one another. Ask questions about objects, organisms, and events in the environment. Make predictions based on observed patterns (MA Sc, p. 11).* • *K-2: Name and use simple equipment and tools to gather data and extend the senses (rulers, meter sticks, thermometers, hand lenses, and balances) (MA Sc, p.11) and binoculars.* • *Record observations and data with pictures, numbers or written statements (MA, p. 11).*	**Concepts** • In a11 environments, organisms with similar needs may compete with one another for limited resources, including food, space, water, air, and shelter (AAAS2, 5d/M1a, p.33). • All organisms, both land-based and aquatic, are interconnected by their need for food. This network of interconnections is referred to as a food web. The entire earth can be considered a single global food web, and food webs can also be described for a particular environment. At the base of any food web are organisms that make their own food, followed by the animals that eat them, and then the animals that eat those animals and so forth (AAAS2, 5D/M4, p. 33). • The number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors. (NAEP, p. 44; see also CA Sc/SS, p. 33). • Two types of organisms may interact with one another in several ways. They may be in a producer/consumer, predator/prey,	**Concepts** • Ecosystems can be reasonably stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators (AAAS2, 5D/H1, p. 23). • Availability of overall habitat and its arrangement is influenced by human interaction (AFWA CE). **Sample Indicators** • Explain how fish and wildlife, and all the physical components of ecosystems are connected. • Analyze how fish and wildlife stakeholders are dependent on the health of ecosystems (AFWA CE). • Explain how fish and wildlife resources are managed in an ecosystem, to maintain ecosystem health (AFWA CE). • Explain how the environment and interactions between organisms can affect the number of species and the diversity of species in an ecosystem. • Describe how matter cycles and energy flow through different

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
environment.			or parasite/host relationship. Or, one organism may scavenge or decompose another. Relationships may be competitive or mutually beneficial. Some species have becomes so adapted to each other that neither could survive without the other (NAEP, p. 44). **Sample Indicators** • Analyze the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems. • Describe interactions between different fish and wildlife populations include competition, predation, and symbiosis, and human interaction recreation and science-based management. • Discuss predator/prey relationships and identify predators and prey in an ecosystem and predict what might happen when the predator/prey balance changes. • Analyze natural factors that influence populations (e.g., temperature and climate, soil composition, predation, habitat).	levels of organization in living systems and between living systems and the physical environment. Explain how some energy is stored and much is dissipated into the environment as thermal energy (e.g., food webs and energy pyramids) (OH Sc, p. 65).
	Energy flow	**Concepts** • Most living things need water, food and air (AAAS1, 5C/2, p. 79). • Plants and animals both need to take in water, and animals need to	**Concepts** • Energy can change from one form to another in living things (AAAS1, 5E/3, p. 79). • One of the most general	**Concepts** • The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		take in food. In addition plants need light (AAAS1, 5E/1, p. 79). • Some source of "energy" is needed for all organisms to stay alive and grow (AAAS1, 5E/2, p. 79). • Energy from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers (MA Sc, p. 49). **Sample Indicators: Use fish and wildlife as examples.** • Recognize and describe how living things need constant energy supplied from food or light.	distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods (AAAS1, 5A/1, p. 79). • Almost all food energy comes originally from sunlight (AAAS1, 5E/3, p. 79). • Dead plants and animals are broken down by other living organisms and this process contributes to the system as a whole (MA Sc, p. 53). **Sample Indicators: Use fish and wildlife as examples.** • Illustrate how individual organisms use matter and energy for life processes. • Explain how the sun provides the energy to power life cycles. • Explain the roles and relationships among producers, consumers, and decomposers in the process of energy transfer in a food web (MA Sc, p. 53).	different ways. …Continual input of energy from sunlight keeps the process going (AAAS1, 5E/3, p. 79). **Sample Indicators: Use fish and wildlife as examples.** • Explain how life can be sustained by obtaining, transporting, releasing, and eliminating matter and energy. Show how fisheries and wildlife management biologists apply this concept. • Explain how energy from the sun is captured in the process of photosynthesis by plants and enters the animal world primarily through animals that eat plants.
	Diversity	**Concepts** • Living things are found almost everywhere in the world. There are somewhat different kinds in different places (AAAS2, 5D/P2, p. 33). • There are millions of different kinds of individual organisms that inhabit the earth at any one time-	**Concepts** • Climate, topography, and habitats influence species diversity (AFWA CE). • The number of organisms and populations an ecosystem can support depends on the biotic resources available and abiotic factors, such as quantity of light	**Concepts** • Each species occupies a niche within its environment (AFWA CE). • Changes in an ecosystem can affect biodiversity, and biodiversity contributes to an ecosystem equilibrium (CO Sc). • Although the interrelationships and

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		some very similar to each other, some very different (AAAS2, 5A/E3 (SFAA), p. 31). • When the environment changes some plants and animals survive and reproduce; others die or move to new locations (NAEP). • Variation among individuals within a population increases the probability that the population will survive when there are changes in a natural system (CA Sc/SS, p.10). **Sample Indicators: Use fish and wildlife as examples.** • *K-2: Identify similarities and differences among a wide variety of living organisms.* • *K-2: Go outside and collect and catalog examples of diverse flora and fauna.* • Describe and compare features of local fish and wildlife (e.g., color, shape, size, texture). • Inventory the diversity of local fish and wildlife.	and water, range of temperatures, and soil composition (NAEP). **Sample Indicators: Use fish and wildlife as examples.** • Analyze natural factors that influence populations (e.g., temperature and climate, soil composition, predation, habitat). • Investigate the characteristics of fish and wildlife, and classify diverse organisms according to specific characteristics. • Show understanding (explain or model) of biodiversity as the variety of life on earth, including variety within each species of fish and wildlife, among species in communities, and among communities. • Develop a biotic index of aquatic insects. • Survey a habitat recording biotic information (species number, habitat type, location and time). • Inventory the diversity of local fish and wildlife, indicating species of greatest concern to state agencies responsible for fish and wildlife.	interdependence of organisms may generate biological communities in ecosystems that are stable for hundreds or thousands of years, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. The impact of the human species has major consequences for other species (NAEP). **Sample Indicators: Use fish and wildlife as examples.** • Classify fish and wildlife into groups according to structural, genetic and other characteristics. • Explain how natural and human factors influence species diversity. • Understand that each species occupies a niche within its environment. • Develop an instrument and use to collect data comparing the biodiversity in two defined areas (natural versus built). • Use technological resources to inventory the diversity of local fish and wildlife, indicating species of greatest concern to state agencies responsible for fish and wildlife, and report data to authorities asking biodiversity questions.
	Dependence on environment	***See Standard 1.2/Map 1.2***	***See Standard 1.2/Map 1.2***	***See Standard 1.2/Map 1.2***

Map 1.6. Ecological succession is a process involving continuous replacement of one community by another.



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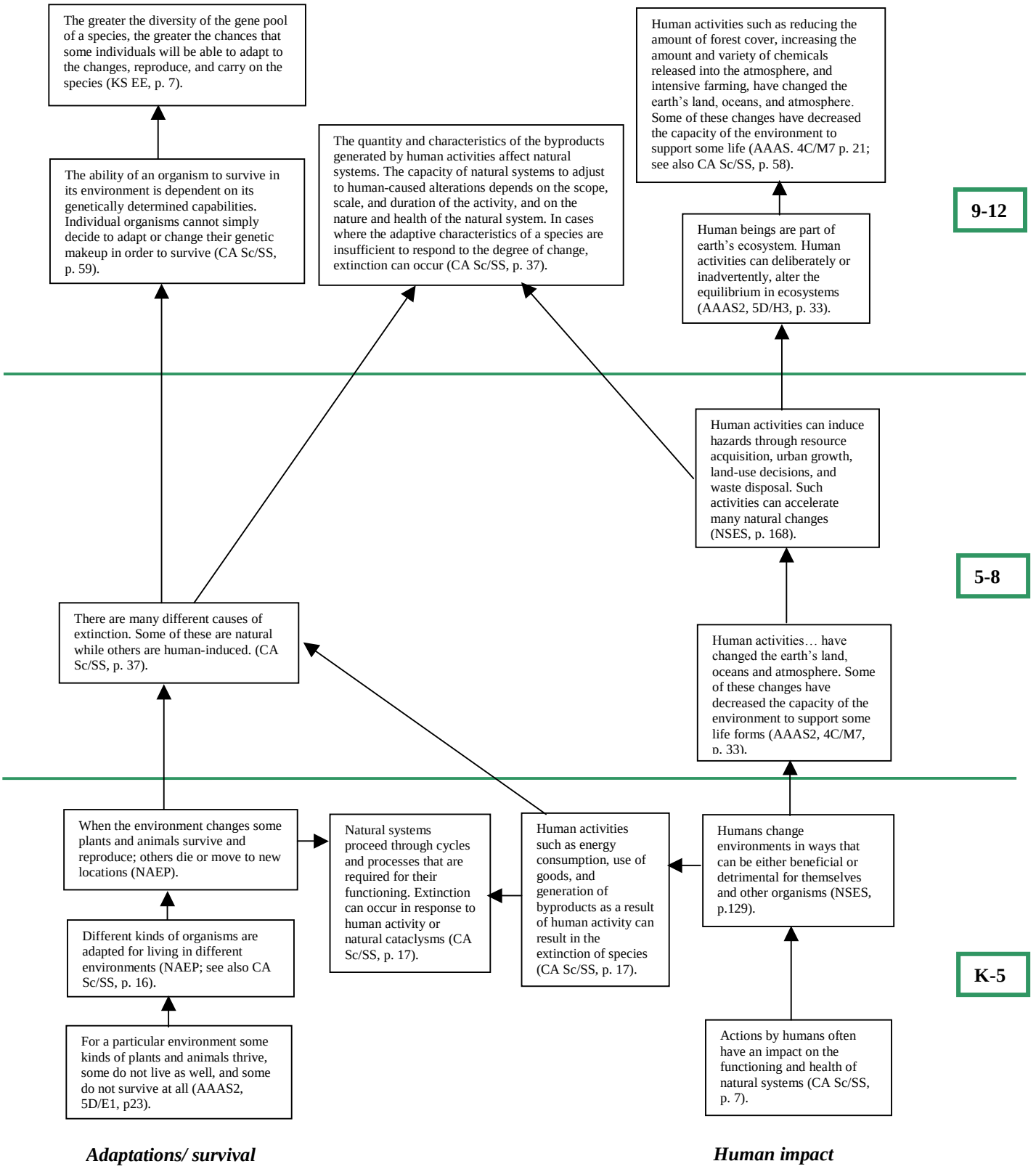
AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.6. Ecological succession is a process involving continuous replacement of one community by another. 1.6.1. As succession occurs fish and wildlife found in that community will change. 1.6.2. Natural events and human activities affect the rate and direction of succession.	**Changing environments**	**Concepts** • Ecosystems change over time (PA ENV). **Sample Indicators: Use fish and wildlife as examples.** • *K-2: Identify changes that occur/ may occur in your local area.* • *K-2: Talk to your parents/community members Or look at old photos and describe what your community used to look like and what has changed.*	**Concepts** • Changes in environmental conditions can affect the survival of individual organisms and entire species (AAAS2, 5F/M2b, 33). • Ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans (MA Sc, p. 53). **Sample Indicators: Use fish and wildlife as examples.** • Explain that some environmental changes occur slowly while others occur rapidly (e.g., forest and pond succession, fires and decomposition) (OH Sc). • Illustrate how physical processes produce changes in ecosystems, e.g. the process of succession after a forest fire or desertification (NH SS). • Design an investigation from a testable question related to change over time in ecosystems, communities, populations, or organisms. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis (VA Sc).	**Concepts** • Although the interrelationships and interdependence of organisms may generate biological communities in ecosystems that are stable for hundreds or thousands of years, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. The impact of the human species has major consequences for other species (NAEP). • When an environment, including other organisms that inhabit it changes, the survival value of inherited characteristics may change… (AAAS1, 5F/6, p. 83). **Sample Indicators: Use fish and wildlife as examples.** • Describe the steps of succession in various biotic communities. • Compare the stages of succession and how they influence the cycles existing in an ecosystem (PA ENV). • Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity, and the

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
				introduction of invasive and non-native species (MA Sc, p. 56).
	Human impact	***See Standard 1.1/ Map 1.1***	**Concepts** • Human activities (e.g., human population growth and expansion of communities, production and consumption of natural resources, the operation and expansion of human communities and the laws, regulations, policies, and incentives that govern management of natural systems) can influence the long-term functioning and health of natural systems. These impacts can include changing the natural course of inherited characteristics and thus, the evolution and diversity of species (CA Sc/SS, p. 37). ***For other concepts and Indicators see Standard 1.1/ Map 1.1***	**Concepts** • Direct and indirect changes to natural systems that result from human population growth and operation and expansion of communities may influence population size within ecosystems and influence the composition and viability of natural systems (CA Sc/SS, p. 58). ***For other concepts and Indicators see Standard 1.1/ Map 1.1***

Map 1.7. Species differ in their ability to adapt.

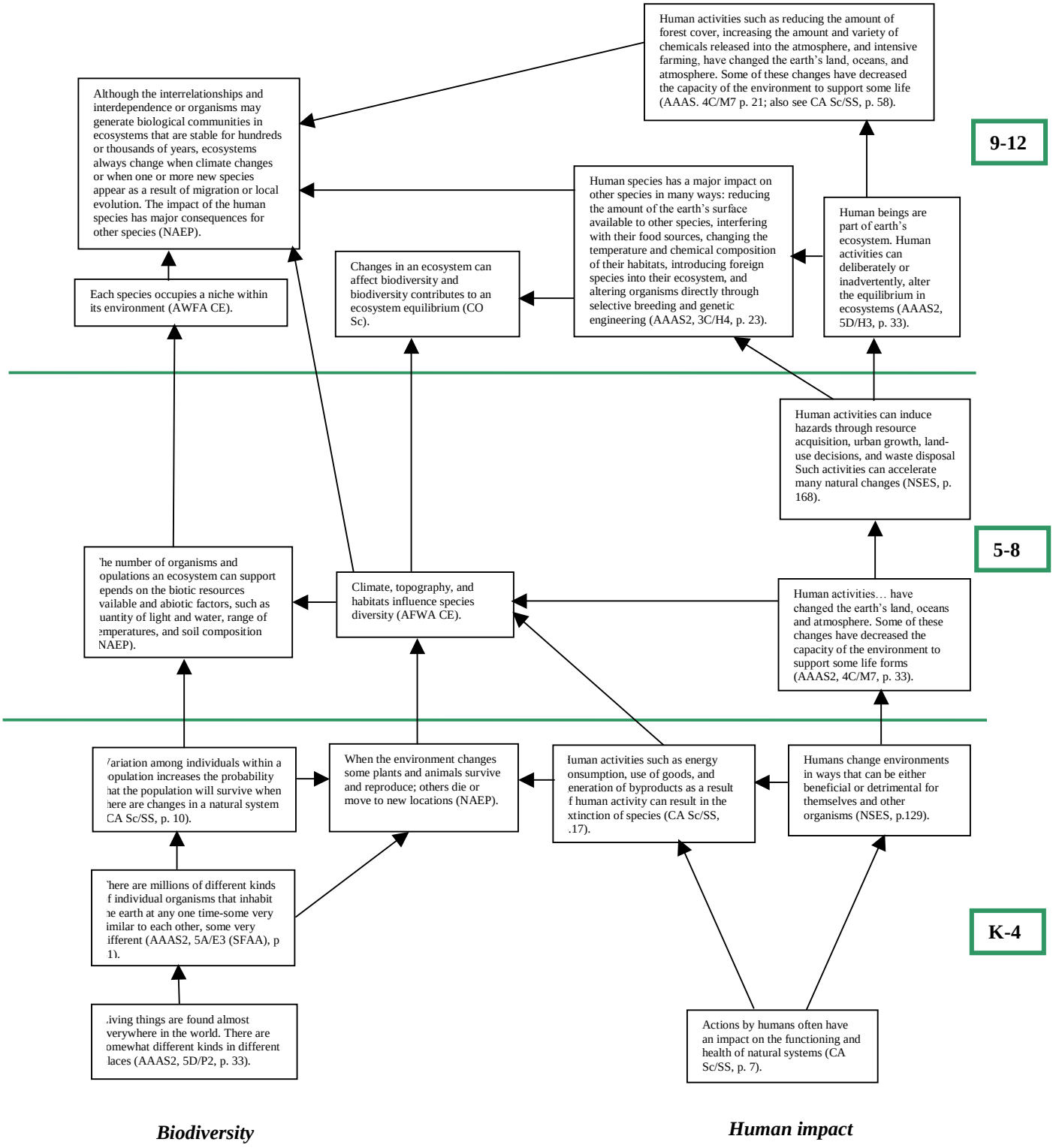


Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.7. Species differ in their ability to adapt. 1.7.1. Fish and wildlife are adapted to their environment in ways that enable them to compete and survive. 1.7.2. The more adaptable a species is, the more likely it is to thrive. 1.7.3. Most species that are endangered or threatened in North America became so as a result of natural or human-caused changes in their habitat and their inability to adapt or adjust to such changes.	**Adaptations/ Survival**	**Concepts** • For a particular environment some kinds of plants and animals thrive, some do not live as well, and some do not survive at all (AAAS2, 5D/E1, p.23). • Different kinds of organisms are adapted for living in different environments (NAEP; see also CA Sc/SS, p. 16). • When the environment changes, some plants and animals survive and reproduce; others die or move to new locations (NAEP). • Natural systems proceed through cycles and processes that are required for their functioning. Extinction can occur in response to human activity or natural cataclysms (CA Sc/SS, p. 17). **Sample Indicators: Use fish and wildlife as examples.** • Identify plant and animal adaptations and describe the role that these adaptations have made to the survival of the species (KS EE, p.8). • Describe how plants and animals respond to changes in the environment.	**Concepts** • There are many different causes of extinction. Some of these are natural while others are human-induced (CA Sc/SS, p. 37). **Sample Indicators: Use fish and wildlife as examples.** • Discuss how human actions affect the status of endangered and threatened species (AWFA CE) • Compare natural and human-induced causes of extinction. • Describe the following adaptations for survival in the environment: coloration, mimicry, odor glands, beaks, feet, fur, ears, etc. (AR Sc).	**Concepts** • The ability of an organism to survive in its environment is dependent on its genetically determined capabilities. Individual organisms cannot simply decide to adapt or change their genetic makeup in order to survive (CA Sc/SS, p. 59). • The greater the diversity of the gene pool of a species, the greater the chances that some individuals will be able to adapt to the changes, reproduce, and carry on the species (KS EE, p. 7). • The quantity and characteristics of the byproducts generated by human activities affect natural systems. The capacity of natural systems to adjust to human-caused alterations depends on the scope, scale, and duration of the activity, and on the nature and health of the natural system. In cases where the adaptive characteristics of a species are insufficient to respond to the degree of change, extinction can occur (CA Sc/SS, p. 37). **Sample Indicators: Use fish and wildlife as examples.**

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
				• Explain how genetic diversity among individuals within a species increases the chances of survival of the species when environmental changes occur (KS EE, p. 7). • Explain how biodiversity of species in an environment increases the chances of survival of at least a few species (KS EE, p. 7).
	Human impact	***See Standard 1.1and 1.3/ Maps 1.1 and 1.3.***	***See Standard 1.1and 1../ Maps 1.1 and 1.3***	***For other Concepts and Indicators see Standard 1.1and 1.3/ Maps 1.1 and 1.3.***

Map 1.8. Conserving biodiversity is important.

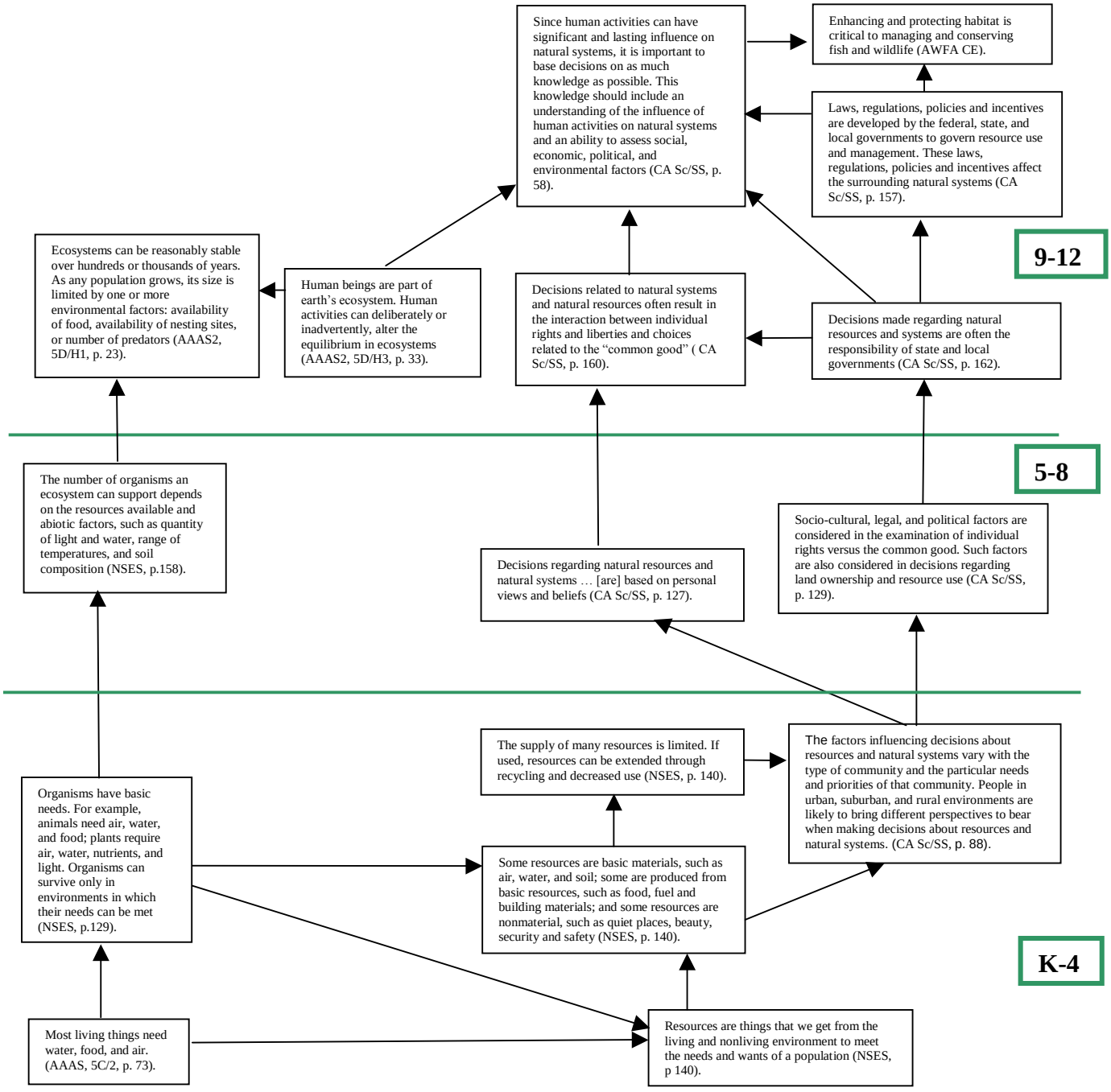


Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.8. Conserving biodiversity is important. 1.8.1. Isolated ecosystems and populations are more vulnerable to environmental change than well connected ecosystems. 1.8.2. Native species are important to the stability of an ecosystem. 1.8.3. Exotic/non-native species introduced into a community can change the dynamics of that community. 1.8.4. Reintroduction of fish or wildlife into its former range may be possible if conditions such as suitable habitat and social acceptance exist.	**Biodiversity**	**Concepts** • Living things are found almost everywhere in the world. There are somewhat different kinds in different places (AAAS2, 5D/P2, p. 33). • There are millions of different kinds of individual organisms that inhabit the earth at any one time-some very similar to each other, some very different (AAAS2, 5A/E3 (SFAA), p. 31). • When the environment changes, some plants and animals survive and reproduce; others die or move to new locations (NAEP). • Variation among individuals within a population increases the probability that the population will survive when there are changes in a natural system (CA Sc/SS, p.10). **Sample Indicators: Use fish and wildlife as examples.** • *K-2: Observe and record*/ describe and compare *features of local fish and wildlife (e.g., color, shape, size, texture).* • *K-2: Sort living things by various characteristics.* • *K-2: Observe biodiversity at the*	**Concepts** • Climate, topography, and habitats influence species diversity. • The number of organisms and populations an ecosystem can support depends on the biotic resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition (NAEP). **Sample Indicators: Use fish and wildlife as examples.** • Analyze natural factors that influence populations (e.g., temperature and climate, soil composition, predation, habitat). • Investigate the characteristics of fish and wildlife, and classify diverse organisms according to specific characteristics. • Create a chart that illustrates biodiversity as the variety of life on earth, including variety within each species of fish and wildlife, among species in communities, and among communities. • Develop a biotic index of aquatic insects. • Survey a habitat recording biotic information (species number,	**Concepts** • Each species occupies a niche within its environment. • Changes in an ecosystem can affect biodiversity, and biodiversity contributes to an ecosystem equilibrium (CO Sc). • Although the interrelationships and interdependence of organisms may generate biological communities in ecosystems that are stable for hundreds or thousands of years, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. The impact of the human species has major consequences for other species (NAEP). **Sample Indicators: Use fish and wildlife as examples.** • Classify fish and wildlife into groups according to structural, genetic and other characteristics. • Explain how natural and human factors influence species diversity. • Explain how each species occupies a niche within its environment. • Develop an instrument and use to collect data comparing the

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		playground. • *K-2: Go outside and collect and catalogue examples of local flora and fauna.* • Identify similarities and differences among a wide variety of living organisms. • Use basic observation techniques to inventory the diversity of local fish and wildlife.	habitat type, location and time). • Use technological resources, to inventory the diversity of local fish and wildlife, indicating species of greatest concern.	biodiversity in two defined areas (natural versus built). • Use technological resources, to inventory and report the diversity of local fish and wildlife, indicating species of greatest concern.
	Human impact	***See Standard 1.1and 1.3/ Maps 1.1 and 1.3.***	***See Standard 1.1and 1.3/ Maps 1.1 and 1.3.***	**Concepts** • Human species has a major impact on other species in many ways: reducing the amount of the earth's surface available to other species, interfering with their food sources, changing the temperature and chemical composition of their habitats, introducing foreign species into their ecosystem, and altering organisms directly through selective breeding and genetic engineering (AAAS2, 3C/H4, p. 23). ***For other Concepts and Indicators see Standard 1.1and 1.3/ Maps 1.1 and 1.3.***

Map 1.9. Fish and wildlife can be conserved and restored through science-based management which considers the needs of humans as well as those of fish and wildlife.



Standard 1. Conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
1.9. Fish and wildlife can be conserved and restored through science based management which considers the needs of humans as well as those of fish and wildlife. 1.9.1. Fish and wildlife management practices are based on natural, physical, and social sciences. 1.9.2. Wildlife management practices involve population and habitat inventory and monitoring, research, manipulation of populations, protection and manipulation of habitat, regulation, and education. o Wildlife populations are managed through such practices as regulated hunting, fishing and trapping; artificial propagation; stocking; and transplanting as well as predator and damage control. o Enhancing and protecting healthy habitat are critical to managing and conserving fish and wildlife. o Management of one	**Resource management**	**Concepts** • Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population (NSES, p 140). • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security and safety (NSES, p. 140). • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140) • The factors influencing decisions about resources and natural systems vary with the type of community and the particular needs and priorities of that community. People in urban, suburban, and rural environments are likely to bring different perspectives to bear when making decisions about resources and natural systems (CA Sc/SS, p. 88). **Sample Indicators: Use fish and wildlife as examples.** • Identify types of natural resources and explain the difference between renewable and non-renewable resources. • Identify and explain various	**Concepts** • Socio-cultural, legal, and political factors are considered in the examination of individual rights versus the common good. Such factors are also considered in decisions regarding land ownership and resource use (CA Sc/SS, p. 129). • Decisions regarding natural resources and natural systems … [are] based on personal views and beliefs (CA Sc/SS, p. 127). **Sample Indicators: Use fish and wildlife as examples** • Identify natural, human and capital resources and explain their significance by 1) showing the patterns of economic activity and land use; 2) evaluating perspectives and consequences regarding the use of resources (VA SS, p. 37) • Describe the effects of the interrelationship among multiple natural resources and agricultural practices (e.g. forestry management, wildlife population management, nutrient and pesticide use) (VT, p. 7.6). • Describe how management and development practices affect resource conservation and agricultural systems (e.g., deciding when and how to harvest trees, fish, and wildlife; where to	**Concepts** • Decisions made regarding natural resources and systems are often the responsibility of state and local governments (CA Sc/SS, p. 162). • Laws, regulations, policies and incentives are developed by the federal, state, and local governments to govern resource use and management. These laws, regulations, policies and incentives affect the surrounding natural systems (CA Sc/SS, p. 157). • Decisions related to natural systems and natural resources often result in the interaction between individual rights and liberties and choices related to the "common good" (CA Sc/SS, p. 160). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political, and environmental factors (CA Sc/SS, p. 58). • Enhancing and protecting habitat

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
species may affect other species within the same ecosystem. 1.9.3. Fish and wildlife management decisions consider biological, economic, social, and political factors. 1.9.4. Conservation of fish and wildlife habitats provides human health, recreation, aesthetic, and economic benefits.		perspectives from which people view fish and wildlife. • Name natural resources available in the community and explain how they are being used.	plant and how to grow crops; where to preserve wild areas; where to locate businesses and homes; and how farm practices can reduce their impacts on streams) (VT, p. 7.6). • Investigate the relationships between individuals, various groups of stakeholders and the environment and explain why stakeholders with different views on resource management should work together. • Identify a variety of beliefs and values toward the environment and fish and wildlife and acknowledge that people may hold different views on management and conservation issues.	is critical to managing and conserving fish and wildlife (AWFA CE). **Sample Indicators: Use fish and wildlife as examples** • Apply the concepts of scarcity, resources, choice, opportunity cost, price incentives, supply, demand, production and consumption (VA SS, p. 26). • Explain how groups concerned about fish and wildlife conservation and the environment can meet their needs and wants as well as wants and needs of society as a whole. • Evaluate methods used to manage natural resources (e.g. reintroduction of wildlife, fire ecology) (AZ Sc, p. 140). • Evaluate how science, technology and socio/economic principles are used by individuals, private groups and governments to make informed decisions about natural resources and agricultural management (e.g., managing farm and urban nutrients/crops; establishing town zoning, pollution emission standards, hunting and fishing regulations or adding/removing a species) (VT, p. 7.6).
	Basic needs	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***	***See Standard 1.1/Map 1.1***

STANDARD 2

Students should understand and actively participate in the stewardship and support of our natural resources.

2.1. A person's culture affects his or her view and use of fish and wildlife and their habitats.
2.2. The distribution and abundance of fish and wildlife provide significant economic benefits.
2.3. Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase.
2.4. Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.

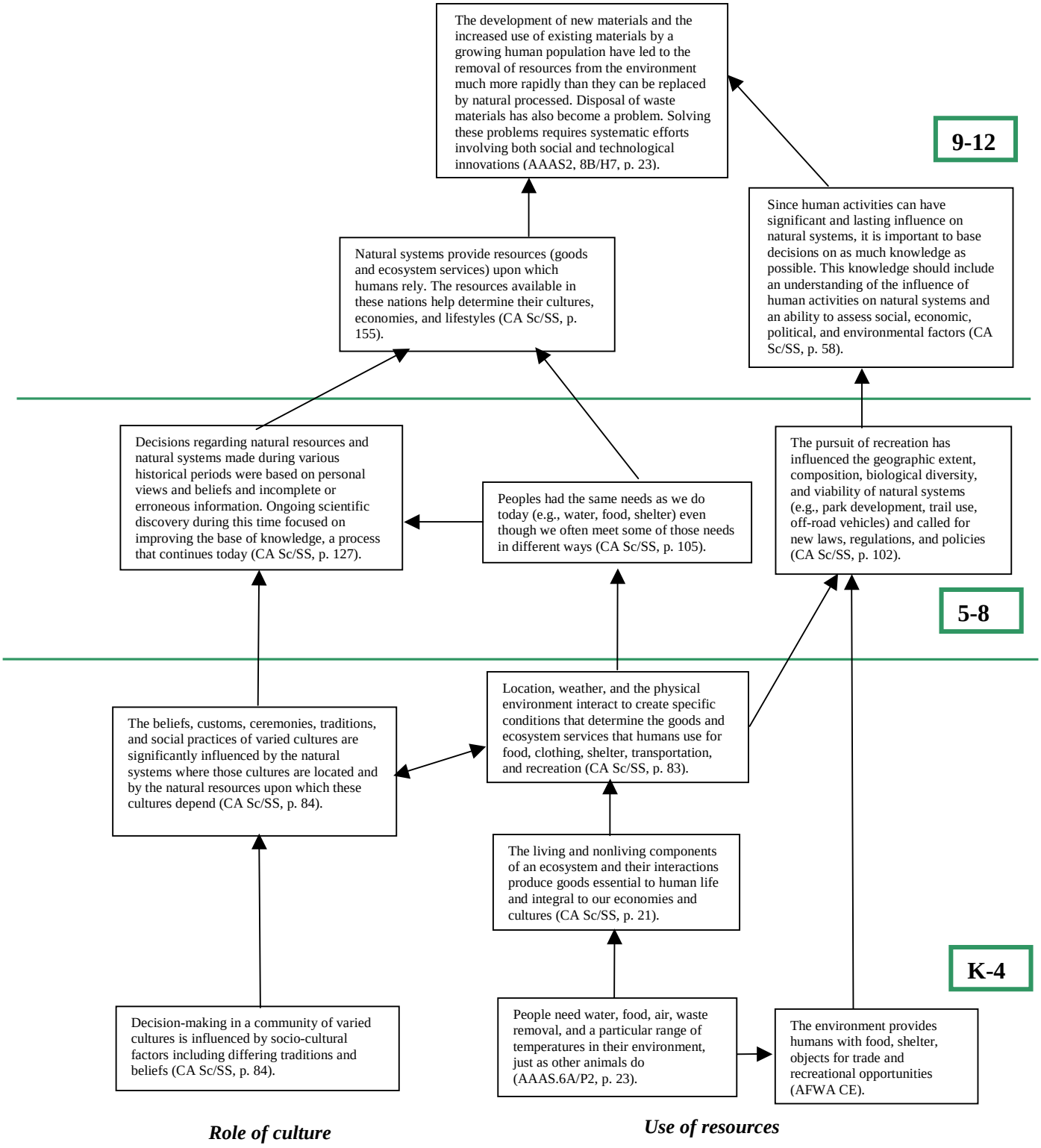
Standard 2: Themes at a Glance

Map number and descriptor	Key Theme 1	Key Theme 2	Key Theme 3	Key Theme 4
2.1. A person's culture affects his or her view and use of fish and wildlife and their habitats.	Role of Culture	Use of Resources		
2.2. The distribution and abundance of fish and wildlife provide significant economic benefits.	Use of Resources	Resource Distribution		
2.3. Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase.	Role of Citizens	Human Impact		
2.4. Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.	Role of Citizens	Role of Culture	Resource Management	Human Impact

Standard 2 by Theme

Theme	Standards
Role of Culture	2.1 A person's culture affects his or her view and use of fish and wildlife and their habitats. 2.4 Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.
Use of Resources	2.1 A person's culture affects his or her view and use of fish and wildlife and their habitats. 2.2 The distribution and abundance of fish and wildlife provide significant economic benefits.
Resource Distribution	2.2 The distribution and abundance of fish and wildlife provide significant economic benefits.
Role of Citizens	2.3 Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase. 2.4 Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.
Human Impact	2.3 Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase. 2.4 Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.
Resource Management	2.4 Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.

Map 2.1. A person's culture affects his or her view and use of fish and wildlife and their habitats.



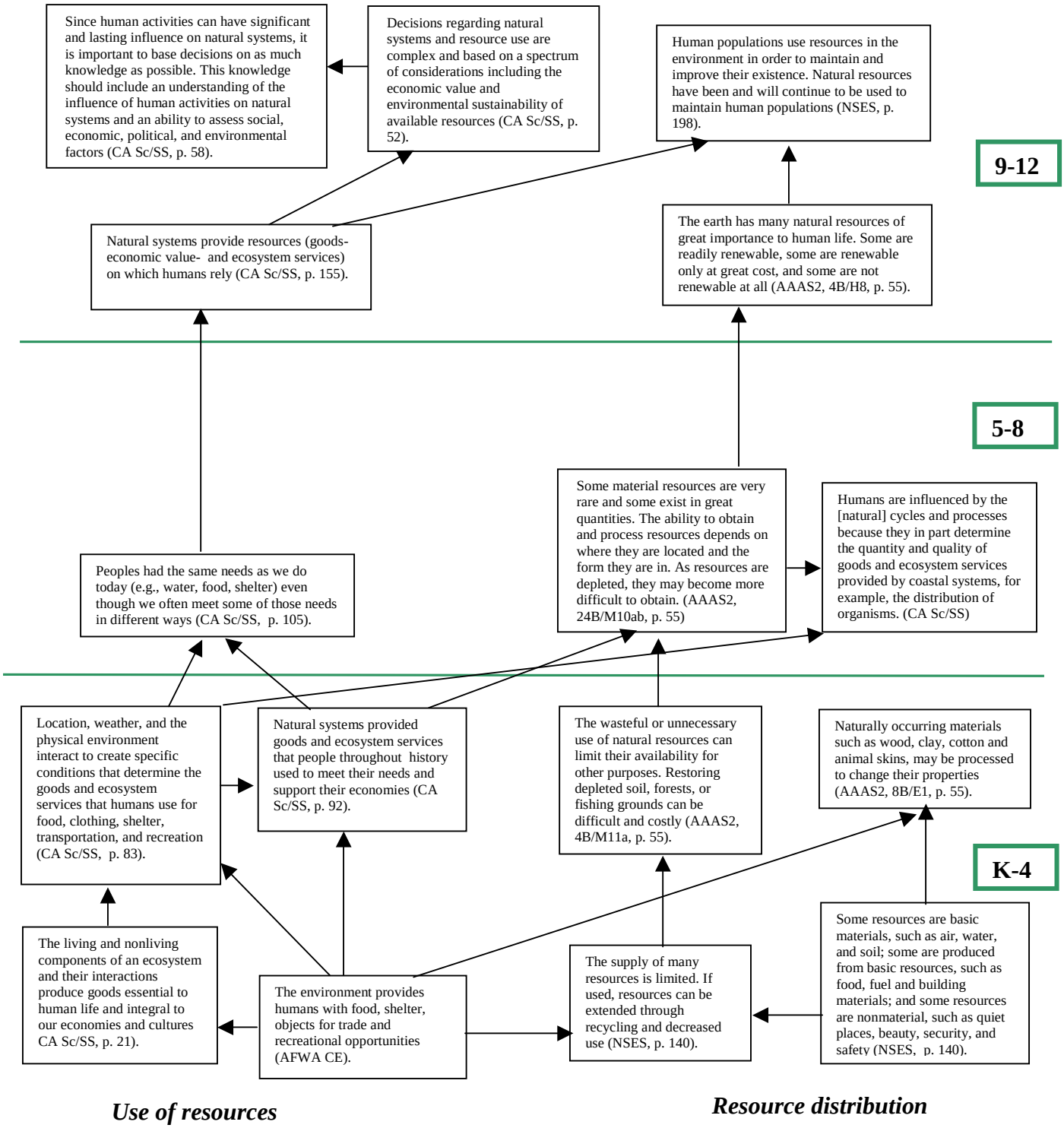
Standard 2. Students should understand and actively participate in the stewardship and support of our natural resources.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
2.1. A person's culture affects his or her view and use of fish and wildlife and their habitats. 2.1.1. People use fish and wildlife resources for food, shelter, clothing, and other products; practices that have continued throughout history. 2.1.2. Fish and wildlife provide a recreational focus for millions of people in North America.	**Role of culture**	**Concepts** • The beliefs, customs, ceremonies, traditions, and social practices of varied cultures are significantly influenced by the natural systems where those cultures are located and by the natural resources upon which these cultures depend (CA Sc/SS, p. 84). • Decision-making in a community of varied cultures is influenced by socio-cultural factors including differing traditions and beliefs (CA Sc/SS, p. 84). **Sample Indicators: Using fish and wildlife as examples** • *K-2: Describe his/her family culture (e.g. food, customs).* • *K-2: Compare his/her culture and customs with culture and customs of other students.* • Identify the cultural/ethnic groups in your local community, and in the world, and describe by using characteristics of culture (e.g., food, housing, customs, beliefs) (VT History and Social Sciences, p. 6.4). • Describe how cultural traditions are passed down in families and communities, and how traditions change over time. (e.g., holiday festivals worldwide, oral histories, writing and other media) (VT, p. 6.4). • Describe how people are affected by,	**Concepts** • Decisions regarding natural resources and natural systems made during various historical periods were based on personal views and beliefs and incomplete or erroneous information. Ongoing scientific discovery during this time focused on improving the base of knowledge, a process that continues today (CA Sc/SS, p. 127). **Sample Indicators: Using fish and wildlife as examples** • Identify and analyze key ways in which culture is transmitted, (e.g., oral tradition, media, migration, and conquest), and the key forces of cultural change (e.g., technological, economic, political, military) (VT, p. 6.4). • Develop an understanding that culture, local knowledge, history, and interaction with the environment contribute to the development of scientific knowledge, and local applications provide opportunity for understanding scientific concepts and global issues (AK, p. 16).	**Concepts** • Natural systems provide resources (goods and ecosystem services) upon which humans rely. The resources available in these nations help determine their cultures, economies, and lifestyles (CA Sc/SS, p. 144). **Sample Indicators: Using fish and wildlife as examples** • Explain how a person's culture affects his or her views and use of fish and wildlife and their habitats. • Assess the role of culture, beliefs and values in fish and wildlife management and conservation decision making. • Give correct and incorrect examples to explain subsistence as a way of life (AK, p. 145). • Demonstrate an understanding of the interaction between people and their physical environment by: using texts/sources to analyze the similarities and differences in the cultural attributes (e.g., language, hunting and gathering practices, art, music/dance, beliefs, worldview), movement, interactions, and settlement of native peoples (AK, p. 142).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		depend on, adapt to and change their environments (MO SS, p. 21).		
	Use of resources	**Concepts** • People need water, food, air, waste removal, and a particular range of temperatures in their environment, just as other animals do (AAAS2, 6A/P2, p. 23). • Environment provides humans with food, shelter, objects for trade and recreational opportunities. • The living and nonliving components of an ecosystem and their interactions produce goods essential to human life and integral to our economies and cultures (CA Sc/SS, p. 21). • Location, weather, and the physical environment interact to create specific conditions that determine the goods and ecosystem services that humans use for food, clothing, shelter, transportation, and recreation (CA Sc/SS, p. 83). **Sample Indicators: Using fish and wildlife as examples** • *K-2: Name various benefits that fish and wildlife provide to humans.* • *K-2: Describe how people use fish and wildlife resources for food, shelter, clothing and other needs (MO SS, p. 51).* • Classify fish and wildlife products as food, clothing, or shelter.	**Concepts** • The pursuit of recreation has influenced the geographic extent, composition, biological diversity, and viability of natural systems (e.g., park development, trail use, off-road vehicles) and called for new laws, regulations, and policies (CA Sc/SS, p. 102). • Peoples had the same needs as we do today (e.g., water, food, shelter) even though we often meet some of those needs in different ways (CA Sc/SS, p. 105). **Sample Indicators: Using fish and wildlife as examples** • Investigate and compare how the ways humans have used fish and wildlife resources has changed throughout history. • Analyze food, clothing, shelter and other products to determine what fish and wildlife natural resources used.	**Concepts** • Natural systems provide resources (goods- economic value- and ecosystem services) on which humans rely (CA Sc/SS, p. 155). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political, and environmental factors (CA Sc/SS, p. 58). • The development of new materials and the increased use of existing materials by a growing human population have led to the removal of resources from the environment much more rapidly than they can be replaced by natural processes. Disposal of waste materials has also become a problem. Solving these problems requires systematic efforts involving both social and technological innovations (AAAS2, 8B/H7, p. 23). **Sample Indicators: Using fish and wildlife as examples** • Compare and contrast the perspectives of sport, commercial,

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
				and subsistence users on policies regarding fish and game management (AK, p. 145). • Demonstrate an understanding of the discovery, impact, and role of natural resources by: using texts/ sources to draw conclusions about the significance of natural resources (e.g., fisheries, timber, oil discovery, "sustained yield") in [your state's] development and in the statehood movement (AK, p. 144). • Evaluate current management and conservation practices and their effect on fish and wildlife resources and the local economy.

Map 2.2. The distribution and abundance of fish and wildlife provide significant economic benefits.

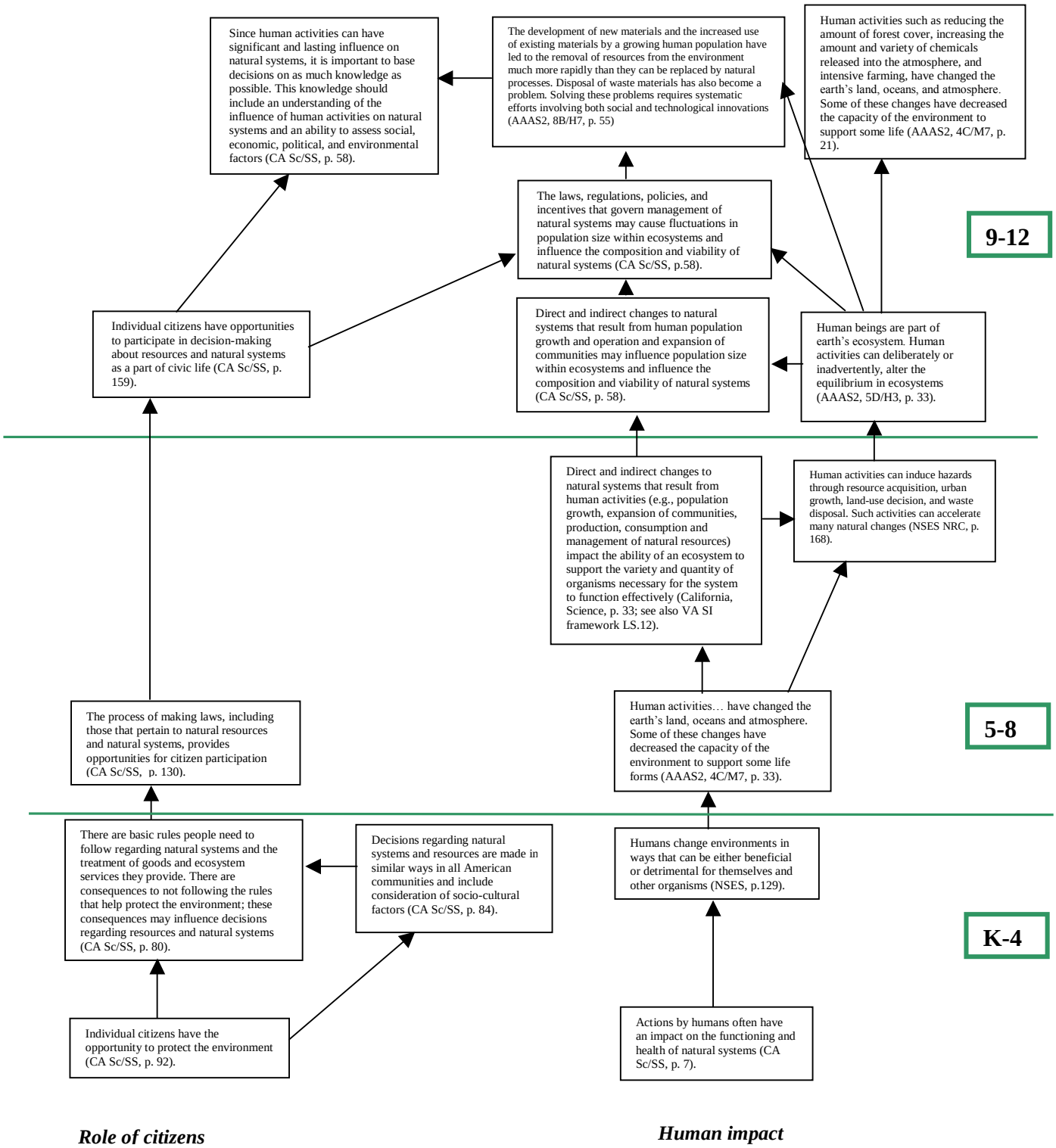


Standard 2. Students should understand and actively participate in the stewardship and support of our natural resources.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
2.2. The distribution and abundance of fish and wildlife provide significant economic benefits.	**Resource distribution**	**Concepts** • Naturally occurring materials such as wood, clay, cotton and animal skins, may be processed to change their properties (AAAS2, 8B/E1, p. 55). • The wasteful or unnecessary use of natural resources can limit their availability for other purposes. Restoring depleted soil, forests, or fishing grounds can be difficult and costly (AAAS2, 4B/M11a, p. 55). • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety (NSES, p. 140). • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140). **Sample Indicators: Using fish and wildlife as examples** • *K-2: Identify natural and agricultural resources and where they come from (e.g. wildlife, fish, plant, rock, water, soil, sunlight and air) and distinguish between natural resources and things made by humans (e.g. sand vs. cement, milk vs. ice cream, wheat vs. bread, sap vs. syrup, wildlife vs. domesticated animals) (VT, p. 7.6)* • *K-2: Identify/illustrate ways in which*	**Concepts** • Some material resources are very rare and some exist in great quantities. The ability to obtain and process resources depends on where they are located and the form they are in. As resources are depleted, they may become more difficult to obtain (AAAS2, 4B/M10ab, p. 55). • Humans are influenced by the [natural] cycles and processes because they in part determine the quantity and quality of goods and ecosystem services provided by coastal systems, for example, the distribution of organisms (CA Sc/SS). **Sample Indicators: Using fish and wildlife as examples** • Explain how uneven distribution of fish and wildlife resources influences their use and perceived value. • Analyze the distribution of fish and wildlife in the US and explain how it has affected the peoples of North America.	**Concepts** • The earth has many natural resources of great importance to human life. Some are readily renewable, some are renewable only at great cost, and some are not renewable at all (AAAS2, 4B/H8, p. 55). • Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations (NSES, p. 198). **Sample Indicators: Using fish and wildlife as examples** • Analyze and evaluate the possible costs, benefits and the consequences of human use of the fish and wildlife. • Evaluate current management and conservation practices and their effect on fish and wildlife resources and the local economy. • Select key fish and wildlife stakeholders and describe their rights and responsibilities as stewards and consumers.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		resources are used (e.g. use of trees to produce wood for building, wood products, heat) (LA SS). • Illustrate the basic concepts of resource and resource distribution.		
	Use of resources	**Concepts** • The natural environment provides humans with food, shelter, objects for trade and recreational opportunities (AFWA CE). • Natural systems provided goods and ecosystem services that people thought the history used to meet their needs and support their economies (CA Sc/SS, p. 92). **Sample Indicators: Using fish and wildlife as examples** • *K-2: Identify the basic human needs of food, clothing and shelter (LA SS).* • Explain ways in which people in local communities depend on the physical environment to satisfy basic needs (LA SS). • *K-2: Identify various types of human shelters.* • Describe building materials used for construction (LA SS). ***For other Concepts and Indicators see Standard 2.1 / Map 2.1.***	***See Standard 2.1 / Map 2.1.***	**Concepts** • Decisions regarding natural systems and resource use are complex and based on a spectrum of considerations including the economic value and environmental sustainability of available resources (CA Sc/SS, p. 52). ***For other Concepts and Indicators see Standard 2.1 / Map 2.1.***

Map 2.3. Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase.

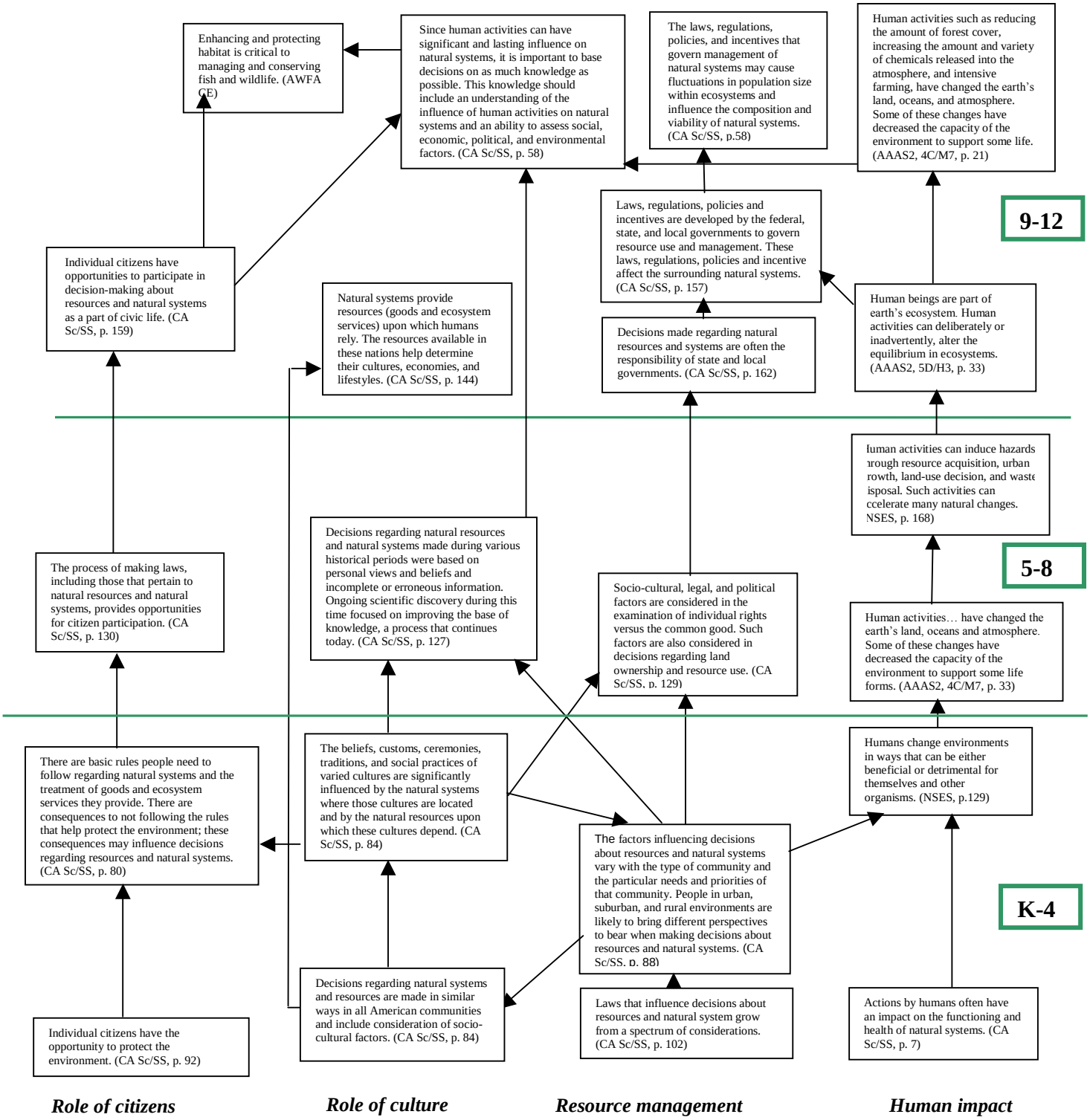


Standard 2. Students should understand and actively participate in the stewardship and support of our natural resources.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
2.3. Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase. 2.3.1. Conversion of fish and wildlife habitat for human uses has altered the amount of land and water available for fish, wildlife, and associated recreation. 2.3.2. Humans are agents in the spread of invasive species and fish and wildlife diseases; and therefore, must take steps to avoid associated problems.	**Role of citizens in resource management**	**Concepts** • There are basic rules people need to follow regarding natural systems and the treatment of goods and ecosystem services they provide. There are consequences to not following the rules that help protect the environment; these consequences may influence decisions regarding resources and natural systems (CA Sc/SS, p. 80). • Decisions regarding natural systems and resources are made in similar ways in all American communities and include consideration of socio-cultural factors (CA Sc/SS, p. 84). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92). **Sample Indicators: Use fish and wildlife as examples** • *K-2: Identify governmental employees and their roles (LA SS).* • Describe actions an individual can take to conserve natural resources (fish and wildlife). • Identify natural and agricultural resources and where they come from (e.g. wildlife, fish, plant, rock, water, soil, sunlight and air) and distinguish between natural resources and things made by humans (e.g sand vs. cement, milk vs. ice cream, wheat vs. bread, sap vs. syrup, wildlife vs. domesticated animals) (VT, p. 7.6).	**Concepts** • The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130). **Sample Indicators: Using fish and wildlife as examples** • Explain the role of citizenship in the promotion of laws and regulations regarding fish and wildlife management and conservation. • Explain why conservation of fish and wildlife resources is important • Exercise political participation by discussing public issues, building consensus, becoming involved in political parties and political campaigns, and voting (AK, p. 21). using fish and wildlife issues as examples. • Research laws (state and local) that protect fish and wildlife along with habitat in the community and explain which laws encourage or require people to participate in resource management.	**Concepts** • Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). **Sample Indicators: Using fish and wildlife as examples** • Analyze how environmental knowledge and responsible action can affect survival of fish and wildlife • Evaluate the role of a citizen in decision making processes on resource conservation and management locally, nationally, and internationally. • Evaluate how individuals, businesses, governments, and non-governmental organizations impact fish and wildlife management and conservation, methods of decision making and action, and public opinion. • Demonstrate an understanding of the discovery, impact, and role of natural resources by using texts/ sources to analyze the multiple perspectives in the continuing debate between conservation and development of resources (AK, p.145).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		• Identify actions individuals and families can take to help manage natural resources and agriculture (e.g. walking on established trails, fishing and hunting in season, picking up litter, recycling, purchasing locally grown agricultural products) (VT, p. 7.6).		
	Human impact	***See Standards 1.1, 1.3, 1.6/ Maps 1.1, 1.3, 1.6***	***See Standards 1.1, 1.3, 1.6/ Maps 1.1, 1.3, 1.6***	**Concepts** • The development of new materials and the increased use of existing materials by a growing human population have led to the removal of resources from the environment much more rapidly than they can be replaced by natural processes. Disposal of waste materials has also become a problem. Solving these problems requires systematic efforts involving both social and technological innovations (AAAS2, 8B/H7, p. 55). ***For other Concepts and Indicators see Standard 1.1, 1.3, 1.6/ Maps 1.1, 1.3, 1.6***

Map 2.4. Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on their environment.



Standard 2. Students should understand and actively participate in the stewardship and support of our natural resources.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
2.4. Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on their environment. 2.4.1. People make decisions collectively and individually each day that directly and indirectly impact fish and wildlife and their habitats. 2.4.2. Decisions people make relative to fish and wildlife are based on their values, as well as knowledge of and experiences with those resources.	**Role of citizens in resource management**	**Concepts** • There are basic rules people need to follow regarding natural systems and the treatment of goods and ecosystem services they provide. There are consequences to not following the rules that help protect the environment; these consequences may influence decisions regarding resources and natural systems (CA Sc/SS, p. 80). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92). **Sample Indicators: Use fish and wildlife as examples** • *K-2: Demonstrate responsible behavior in caring for their immediate environment.* • *K-2: Identify governmental employees and their roles (e.g., postal workers, police) (LA SS).* • Identify actions individuals and families can take to help manage natural resources and agriculture (e.g. walking on established trails, fishing and hunting in season, picking up litter, recycling, purchasing locally grown agricultural products) (VT, p. 7.6).	**Concepts** • The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130). **Sample Indicators: Use fish and wildlife as examples** • Explain the role of citizenship in the promotion of laws and regulations regarding fish and wildlife management and conservation. • Explain why conservation of fish and wildlife resources is important. • Exercise political participation by discussing public issues, building consensus, becoming involved in political parties and political campaigns, and voting (AK, p. 21). • Research laws (state and local) that protect fish and wildlife along with habitat in the community and explain which laws encourage or require people to participate in resource management.	**Concepts** • Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political, and environmental factors (CA Sc/SS, p. 58). **Sample Indicators: Use fish and wildlife as examples** • Analyze how environmental knowledge and responsible action can affect survival of fish and wildlife. • Evaluate the role of a citizen in decision making processes on resource conservation and management locally, nationally, and internationally.
	Human impact	***See Standards 1.1, 1.3/ Maps 1.1, 1.3***	***See Standards 1.1, 1.3/ Maps 1.1, 1.3***	***See Standards 1.1, 1.3/ Maps 1.1, 1.3***
	Resource management	**Concepts** • Laws that influence decisions about resources and natural system grow from a spectrum of considerations (CA	**See *Standard 1.9/ Maps 1.9***	**See *Standard 1.9/ Maps 1.9***

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		Sc/SS, p. 102). **Sample Indicators: Use fish and wildlife as examples.** • Name natural resources available in the community and explain how they are being used. ***For other Concepts and Indicators see Standard 1.9/ Maps 1.9***		
	Role of culture	**See *Standard 2.1/ Map 2.1***	**See *Standard 2.1/ Map 2.1***	**See *Standard 2.1/ Map 2.1***

STANDARD 3

Students should understand the value of our fish and wildlife resources as a public trust.

3.1. In North America, fish and wildlife are public trust resources managed by governmental agencies.
3.2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies.

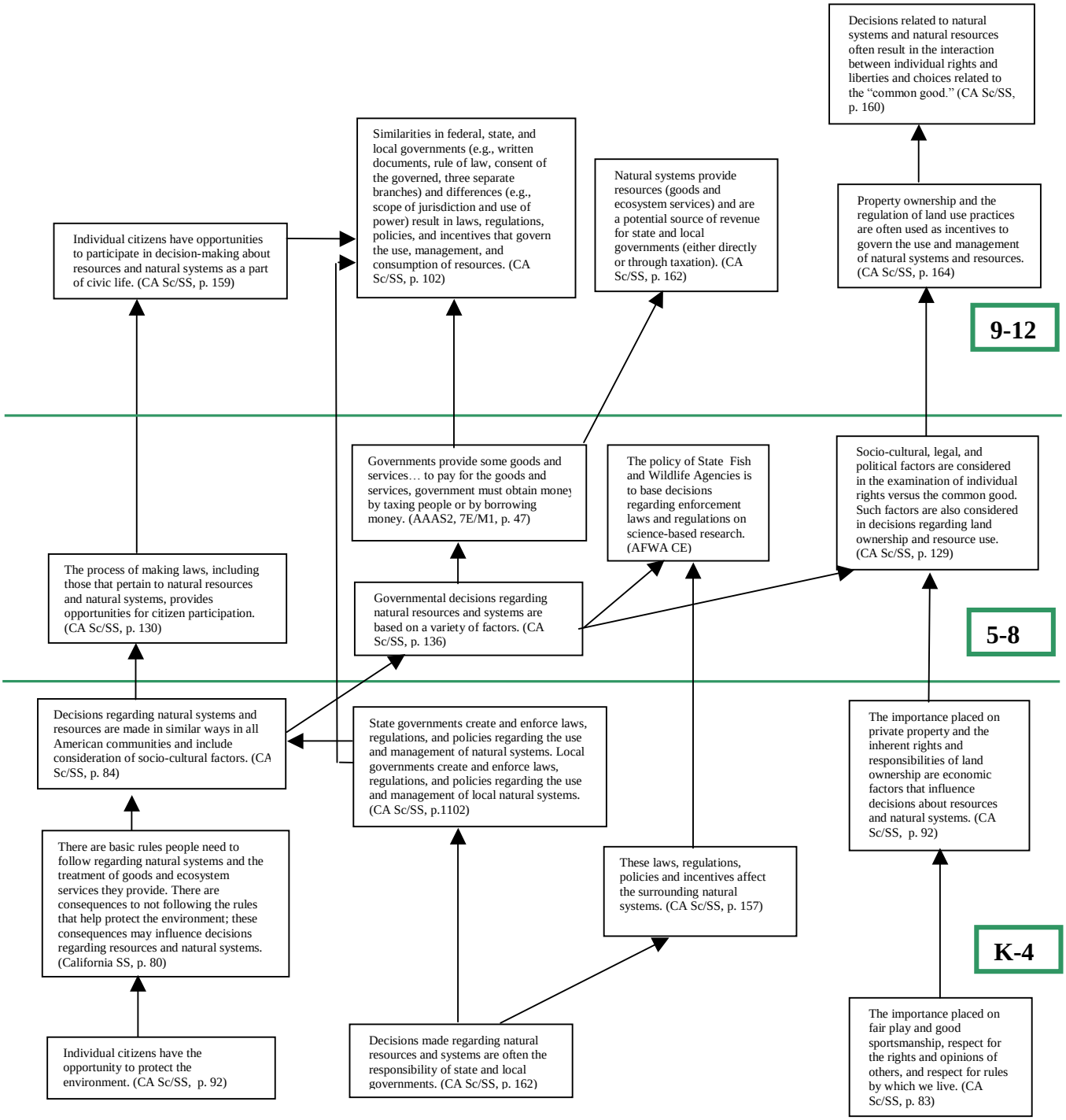
Standard 3: Themes at a Glance

Map number and descriptor	Key Theme 1	Key Theme 2	Key Theme 3
3.1. In North America, fish and wildlife are public trust resources managed by governmental agencies.	Government	Property Rights	Role of Citizens
3.2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies.	Government	Use of Resources	

Standard 3 by Theme

Theme	Standards
Government	3.1. In North America, fish and wildlife are public trust resources managed by governmental agencies. 3.2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies.
Use of Resources	3.1. In North America, fish and wildlife are public trust resources managed by governmental agencies.
Property Rights	2.2 The distribution and abundance of fish and wildlife provide significant economic benefits.
Role of Citizens	3.2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies.

Map 3.1. In North America fish and wildlife are public trust resources managed by governmental agencies.

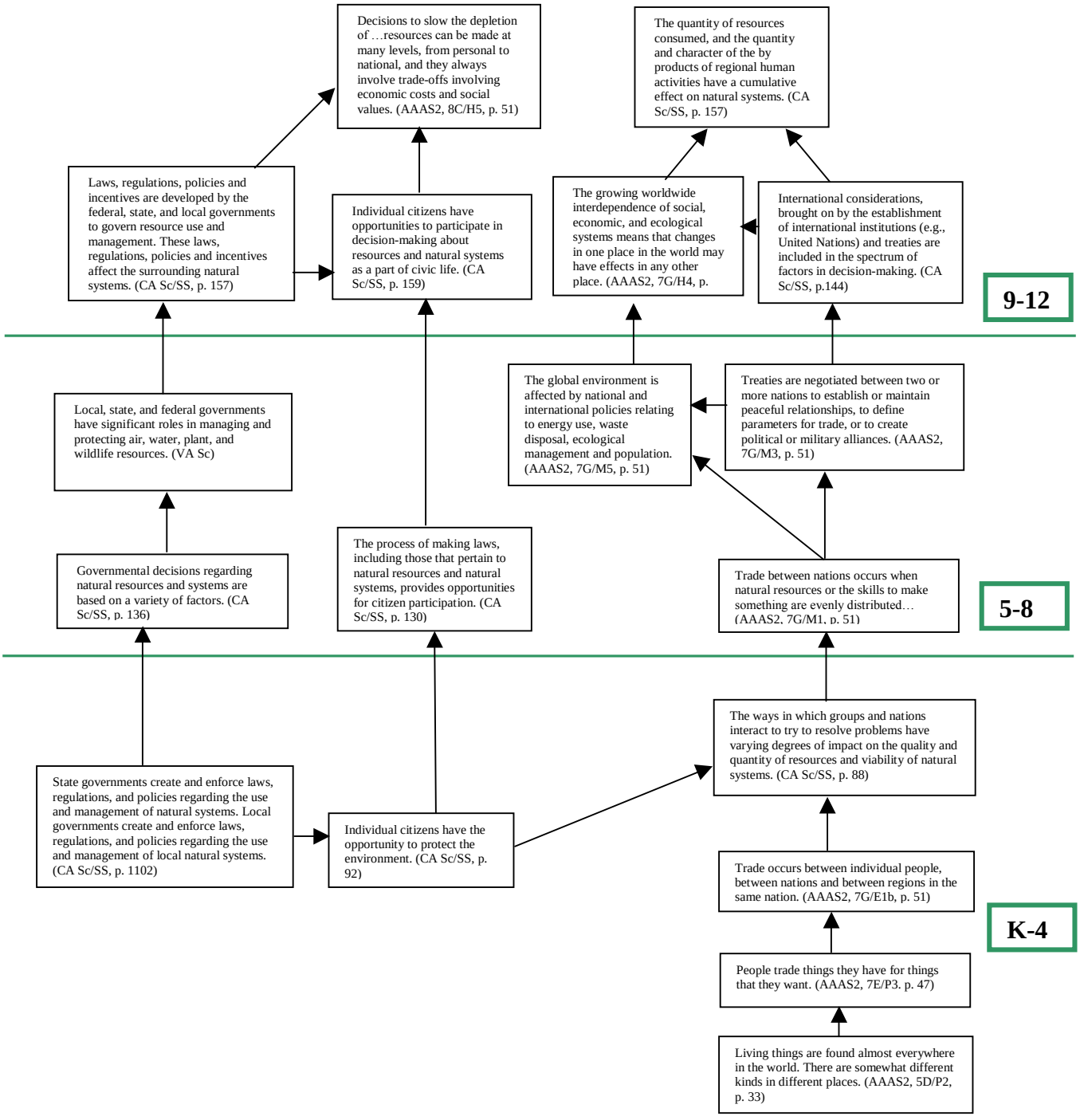


Standard 3. Students should understand the value of our fish and wildlife resources as a public trust.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
3.1. In North America fish and wildlife are public trust resources managed by governmental agencies. 3.1.1. Ownership of land does not convey ownership of wildlife. 3.1.2. Non-government organizations, businesses, and individuals play important roles as advocates and conservation partners with fish and wildlife agencies. 3.1.3. Since most wildlife live on private lands, private landowners play an important role in sustaining and improving habitat.	**Government**	**Concepts** • Decisions made regarding natural resources and systems are often the responsibility of state and local governments (CA Sc/SS, p. 162). • Laws that influence decisions about resources and natural system grow from a spectrum of considerations (CA Sc/SS, p. 102). • State governments create and enforce laws, regulations, and policies regarding the use and management of natural systems. Local governments create and enforce laws, regulations, and policies regarding the use and management of local natural systems (CA Sc/SS, p. 1102). **Sample Indicators: Use fish and wildlife as examples** • Summarize the roles and responsibilities of local governments. • Explain the role of fish and wildlife agencies to provide benefits for wildlife and the general public. • Identify local governments and/or private organizations involved in fish and wildlife management and conservation.	**Concepts** • Governmental decisions regarding natural resources and systems are based on a variety of factors (CA Sc/SS, p. 136). • Governments provide some goods and services… to pay for the goods and services, government must obtain money by taxing people or by borrowing money (AAAS2, 7E/M1, p. 47). • The policy of State Fish and Wildlife Agencies is to base decisions regarding enforcement laws and regulations on science-based research (AFWA CE). **Sample Indicators: Use fish and wildlife as examples** • Describe levels and responsibilities of government and how it is involved in resource management. • Act constructively to further the public good (MI SS).	**Concepts** • Natural systems provide resources (goods and ecosystem services) and are a potential source of revenue for state and local governments (either directly or through taxation) (CA Sc/SS, p. 162). • Similarities in federal, state, and local governments (e.g., written documents, rule of law, consent of the governed, three separate branches) and differences (e.g., scope of jurisdiction and use of power) result in laws, regulations, policies, and incentives that govern the use, management, and consumption of resources (CA Sc/SS, p. 102). **Sample Indicators: Use fish and wildlife as examples** • Analyze the structure, responsibilities and function of US federal, state, and local governments involved in resource management. • Evaluate how individuals, businesses, governments, and non-governmental organizations impact fish and wildlife management and conservation, methods of decision making and action, and public opinion.
	Property rights	**Concepts** • The importance placed on private property and the inherent rights and responsibilities of land ownership are economic factors that influence decisions about resources and natural systems (CA Sc/SS, p. 92).	**Concepts** • Socio-cultural, legal, and political factors are considered in the examination of individual rights versus the common good. Such factors are also considered in decisions regarding land	**Concepts** • Decisions related to natural systems and natural resources often result in the interaction between individual rights and liberties and choices related to the "common good" (CA Sc/SS, p. 160).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		• The importance placed on fair play and good sportsmanship, respect for the rights and opinions of others, and respect for rules by which we live (CA Sc/SS, p. 83). **Sample Indicators: Use fish and wildlife as examples** • Describe the idea of personal and private property.	ownership and resource use. (CA Sc/SS, p. 129). **Sample Indicators: Use fish and wildlife as examples** • Describe the role of private/public ownership and how these are related to fish and wildlife. • Analyze individual rights vs. public interests.	• Property ownership and the regulation of land use practices are often used as incentives to govern the use and management of natural systems and resources (CA Sc/SS, p. 164). **Sample Indicators: Use fish and wildlife as examples** • Explain resource management and conservation issues from the perspectives of various stakeholders (individual, private owners, NGOs, government, community, international community). • Evaluate how the purposes of government have been interpreted, e.g., promoting the general welfare or protection of private property (NH SS). • Assess the various considerations involved in resource management, including sustainability, availability, social/cultural consequences, economic consequences, and political consequences. • Describe the role of private property rights in fish and wildlife use locally, nationally and internationally.
	Role of citizens in resource management	***See Standard 2.3/Map 2.3***	***See Standard 2.3/Map 2.3***	***See Standard 2.3/Map 2.3***

Map 3.1. In North America fish and wildlife are public trust resources managed by governmental agencies.



Standard 3. Students should understand the value of our fish and wildlife resources as a public trust.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
3.2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies. 3.2.1. Many species move across state, provincial, and national boundaries, requiring interstate and international agreements and partnerships to manage these species. 3.2.2. State, provincial, and tribal fish and wildlife agencies are responsible for managing most fish and wildlife on public and private lands and water within their geographic jurisdictions. 3.2.3.Federal agencies, in cooperation with state and tribal agencies, are responsible for managing migratory fish and wildlife and federally listed threatened and endangered species, and for regulating wildlife trade. (In Canada, federal provincial and territorial agencies share responsibility for federally-listed endangered species.) 3.2.4.The future of fish and wildlife conservation requires additional funding from a broad-based constituency.	**Government**	**Concepts** • State governments create and enforce laws, regulations, and policies regarding the use and management of natural systems. Local governments create and enforce laws, regulations, and policies regarding the use and management of local natural systems (CA Sc/SS, p. 1102). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92). **Sample Indicators: Use fish and wildlife as examples** • *K-2: Describe what actions an individual can do to conserve natural resources (fish and wildlife).* • Summarize the roles and responsibilities of local governments. • Identify local governments involved in fish and wildlife management and conservation.	**Concepts** • Governmental decisions regarding natural resources and systems are based on a variety of factors (CA Sc/SS, p. 136). • Local, state, and federal governments have significant roles in managing and protecting air, water, plant, and wildlife resources (VA Sc). • The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130). **Sample Indicators: Use fish and wildlife as indicators** • Describe levels, roles responsibilities of local, federal and state government in US that are involved in fish and wildlife management and conservation. • Identify the distinct governance structures of First Nations in Canada that oversee fish and wildlife resources. • Describe the role of local and state conservation professionals in managing natural resources. These include wildlife protection; forestry and waste management; and air, water, and soil conservation (VA Sc).	**Concepts** • Laws, regulations, policies and incentives are developed by the federal, state, and local governments to govern resource use and management. These laws, regulations, policies and incentives affect the surrounding natural systems (CA Sc/SS, p. 157). • Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). • Decisions to slow the depletion of …resources can be made at many levels, from personal to national, and they always involve trade-offs involving economic costs and social values (AAAS2, 8C/H5, p. 51). **Sample Indicators: Use fish and wildlife as indicators** • Analyze the structure, responsibilities and function of US federal, state, and local governments involved in resource management. • Evaluate how individuals, businesses, governments, and non-governmental organizations impact fish and wildlife

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
			• Explain the role of citizenship in the promotion of laws and regulations regarding fish and wildlife management and conservation.	management and conservation, methods of decision making and action, and public opinion. • Analyze organizations that govern relations among countries, including those dealing with trade and economics and environmental issues.
	Use of resources	**Concepts** • People trade things they have for things that they want (AAAS2, 7E/P3, p. 47). Trade occurs between individual people, between nations and between regions in the same nation (AAAS2, 7G/E1b, p. 51). • The ways in which groups and nations interact to try to resolve problems have varying degrees of impact on the quality and quantity of resources and viability of natural systems (CA Sc/SS, p. 88). • Living things are found almost everywhere in the world. There are somewhat different kinds in different places (AAAS2, 5D/P2, p. 33). **Sample Indicators: Use fish and wildlife as examples** • *K-2: Observe wildlife in your area and record your observation on a map.* • *K-2: Describe physical*	**Concepts** • The global environment is affected by national and international policies relating to energy use, waste disposal, ecological management and population (AAAS2, 7G/M5, p. 51). • Trade between nations occurs when natural resources or the skills to make something are evenly distributed… (AAAS2, 7G/M1, p. 51). • Treaties are negotiated between two or more nations to establish or maintain peaceful relationships, to define parameters for trade, or to create political or military alliances (AAAS2, 7G/M3, p. 51). **Sample Indicators: Use fish and wildlife as examples** • Investigate the relationships between individuals, various groups of stakeholders and the environment and explain why stakeholders should work together.	**Concepts** • The quantity of resources consumed, and the quantity and character of the byproducts of regional human activities have a cumulative effect on natural systems (CA Sc/SS, p. 157). • International considerations, brought on by the establishment of international institutions (e.g., United Nations) and treaties are included in the spectrum of factors in decision-making. (California SS, p.144). • The growing worldwide interdependence of social, economic, and ecological systems means that changes in one place in the world may have effects in any other place (AAAS2, 7G/H4, p. 51). • Decisions to slow the depletion of …resources can be made at many levels, from personal to national, and they always involve trade-offs involving economic costs and social values (AAAS2, 8C/H5, p. 51).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		characteristics of fish and wildlife in your area. • Identify local governments specifically involved in fish and wildlife management and conservation. • Name specific resources important to your local area (e.g. fish hatcheries, birdwatching).		**Sample Indicators: Use fish and wildlife as examples** • Analyze the role of economic networks, policies and cultural traditions in resource management and conservation. • Analyze the domestic and international regulations on environment, resource management, and trade. • Assess the various considerations involved in resource management, including sustainability, availability, social/cultural, economic, and political consequences.

STANDARD 4

Students should understand and accept and/or lawfully participate in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.

4.1. Regulated hunting, fishing and trapping are important tools for managing some wildlife populations and habitats.
4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.
4.3. Responsible users of fish, wildlife and the out of doors, respect the rights and property of others.

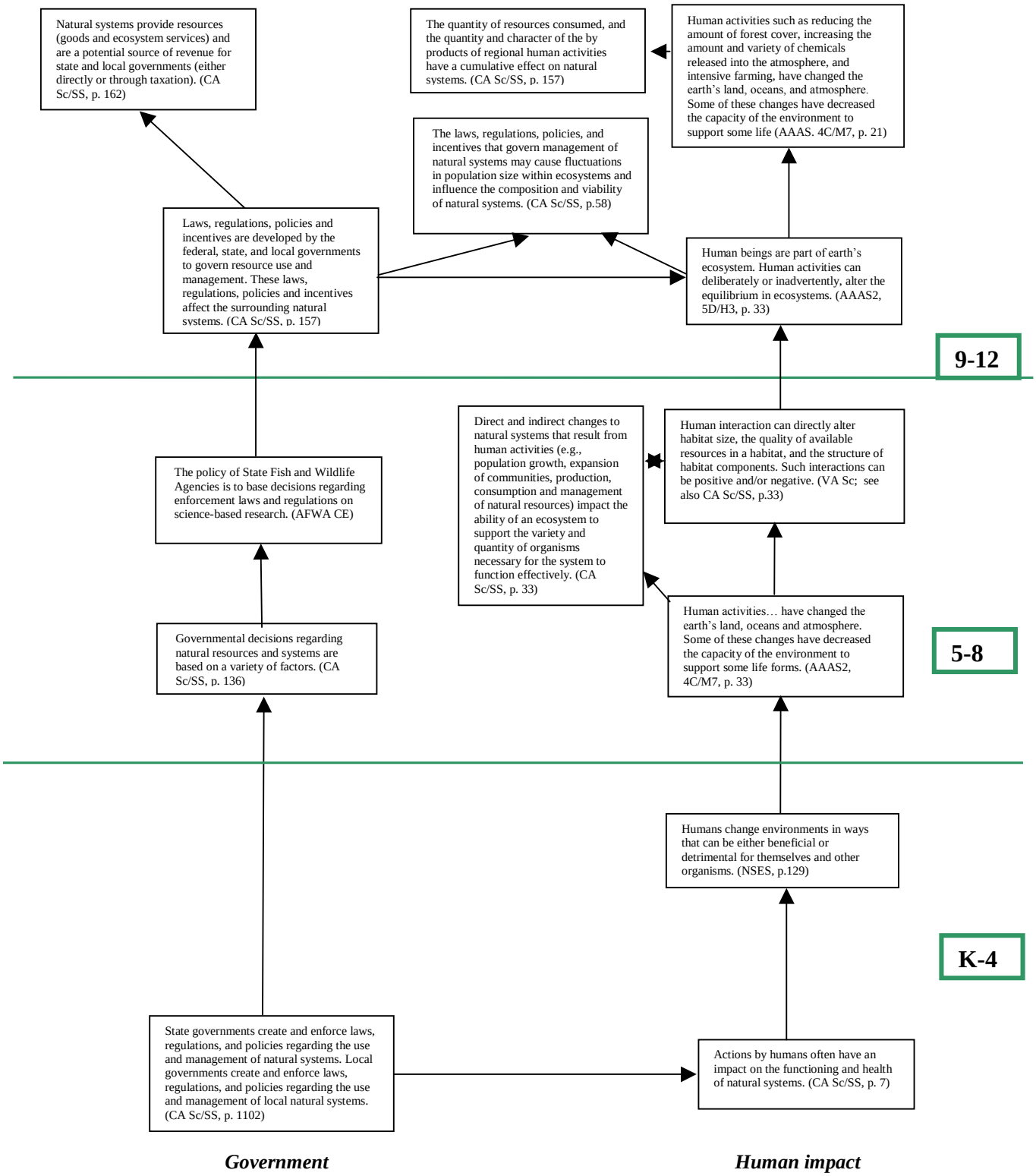
Standard 4: Themes at a Glance

Map number and descriptor	Key Theme 1	Key Theme 2	Key Theme 3
4.1. Regulated hunting, fishing and trapping are important tools for managing some wildlife populations and habitats.	**Government**	**Human Impact**	
4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.	**Healthy Living**	**Use of Resources**	**Role of Citizens**
4.3. Responsible users of fish, wildlife and the out of doors, respect the rights and property of others.	**Safety**	**Use of Resources**	**Property Rights**

Standard 4 by Theme

Theme	Standards
Government	4.1. Regulated hunting, fishing and trapping are important tools for managing some wildlife populations and habitats.
Use of Resources	4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation 4.3. Responsible users of fish, wildlife and the out of doors respect the rights and property of others.
Property Rights	4.3. Responsible users of fish, wildlife and the out of doors respect the rights and property of others.
Human Impact	4.1. Regulated hunting, fishing and trapping are important tools for managing some wildlife populations and habitats.
Healthy Living	4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.
Safety	4.3. Responsible users of fish, wildlife and the out of doors respect the rights and property of others.
Role of Citizens	4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.

Map 4.1. Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.



Standard 4. Students should understand and accept and/or lawfully participate in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
4.1. Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.	**Government**	***See Standard 3.1/ Map 3.1*** **Sample Indicators: Use fish and wildlife as examples** • Go fishing, hunting, wildlife watching, etc. with an understanding of the related rules, laws, rights and responsibilities.	***See Standard 3.1/ Map 3.1*** **Sample Indicators: Use fish and wildlife as examples** • Appreciate how characteristics of different physical environments provide opportunities or place constraints on human activities (NH SS). • Plan a lawful hunting, fishing, wildlife watching, outdoor recreation program for a younger students, conduct the outing safely, and teach the younger students about the related rules, laws, rights and responsibilities.	***See Standard 3.1/ Map 3.1*** **Sample Indicators: Use fish and wildlife as examples** • Evaluate current management and conservation practices and their effect on fish and wildlife resources and the local economy. • Assess the various considerations involved in resource management, including sustainability, availability, and social/cultural, economic, and political consequences.
	Human impact	***See Standards 1.1, 1.3, 1.7/ Maps 1.1, 1.3, 1.7*** **Sample Indicators: Relate to outdoor fish and wildlife recreation** • *K-2: Describe how humans use fish and wildlife resources.* • *K-2: Demonstrate the ability to make choices and take responsibility for personal actions (OH SS, p. 91).* • Provide examples of human actions and natural events that affect fish and wildlife and their habitats and their ability to survive.	***See Standards 1.1, 1.3, 1.7/ Maps 1.1, 1.3, 1.7*** **Sample Indicators: Relate to fish and wildlife recreation** • Describe how the human activities such as hunting, fishing and trapping affect the fish and wildlife populations. • Describe possible solutions to potentially harmful environmental changes within an ecosystem (MO Sc).	**Concepts** • The laws, regulations, policies, and incentives that govern management of natural systems may cause fluctuations in population size within ecosystems and influence the composition and viability of natural systems (CA Sc/SS, p.58). • The quantity of resources consumed, and the quantity and character of the by-products of regional human activities have a cumulative effect on natural systems (CA Sc/SS, p. 157). ***For other concepts and indicators see Standards 1.1, 1.3, 1.7/ Maps 1.1, 1.3, 1.7***

Map 4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.

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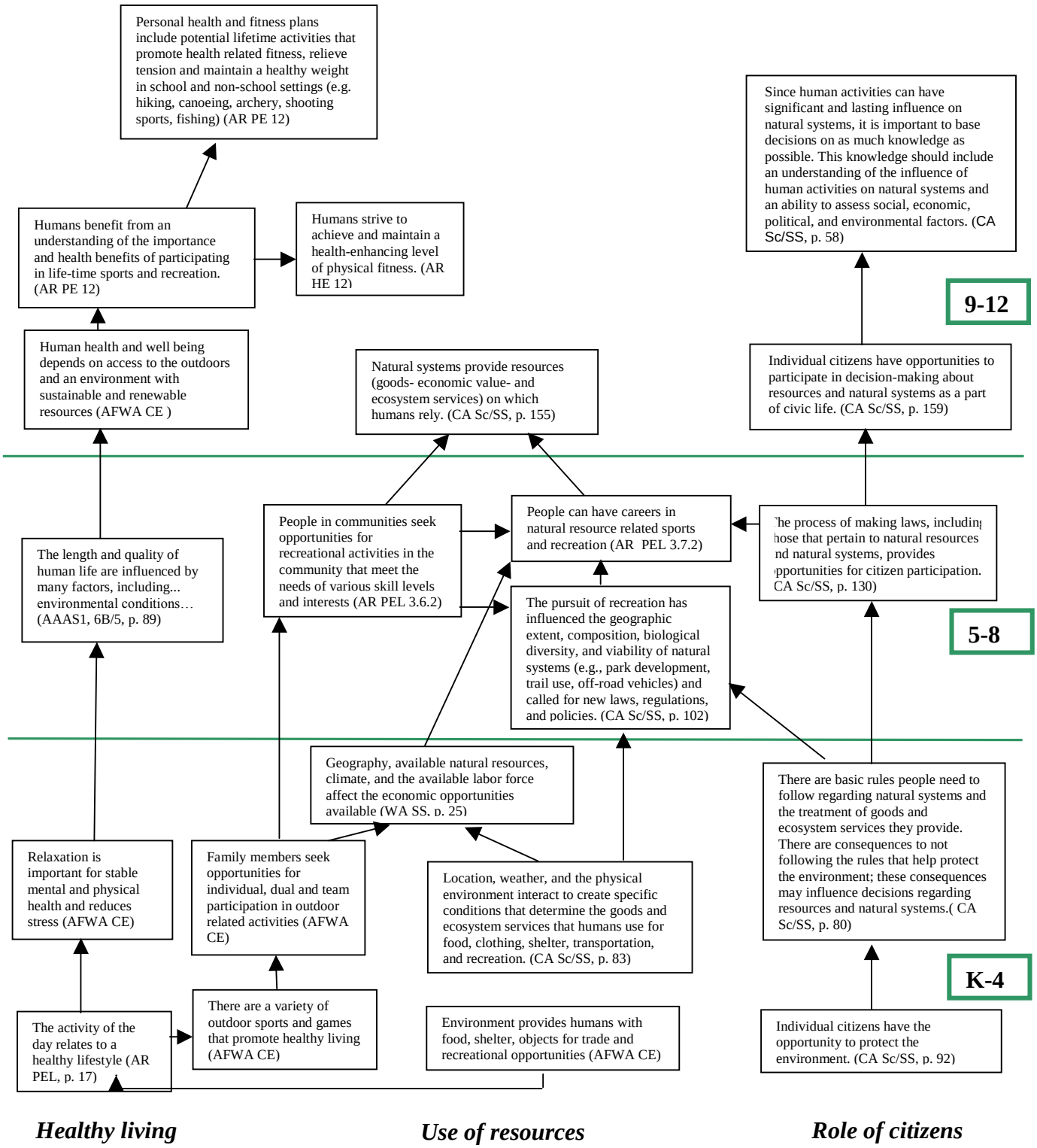
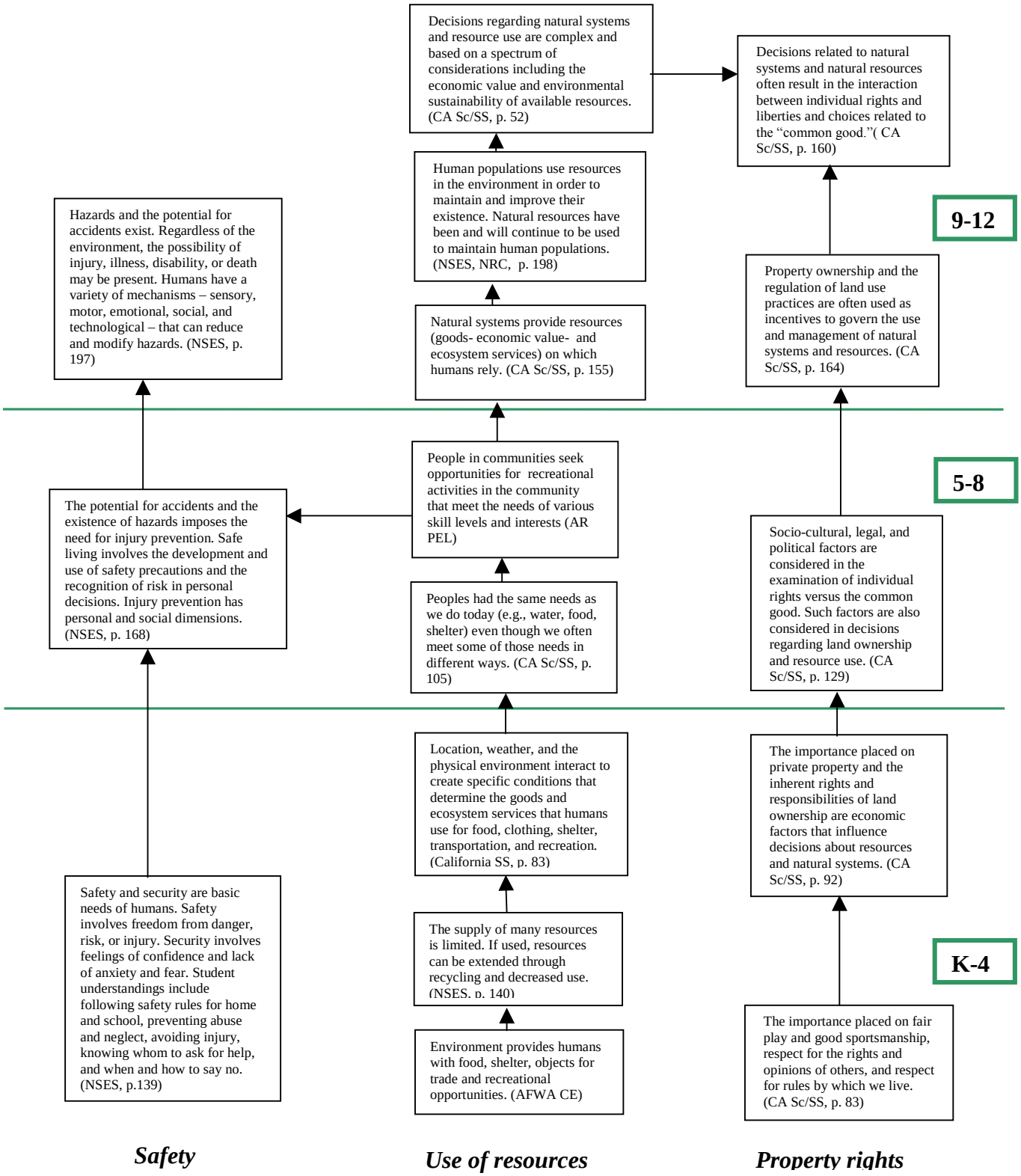


Standard 4. Students should understand and accept and/or lawfully participate in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
4.2. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.	**Use of resources**	**Concepts** • Geography, available natural resources, climate, and the available labor force affect the economic opportunities available (WA SS, p. 25). ***For other Concepts and Indicators see Standards 2.1 and 2.2/ Maps 2.1 and 2.2***	**Concepts** • People in communities seek opportunities for recreational activities in the community that meet the needs of various skill levels and interests (AR PEL). • People can have careers in natural resource related sports and recreation (AR PEL). **Sample Indicators: Use fish and wildlife as an example.** • Describe how humans use fish and wildlife resources. • Describe how fish and wildlife provides recreational benefits to people. • Describe the role that outdoor sports and recreation play in career and social environments. • Compare economies based on fish and wildlife resources in different locations and timeframes (compare past with present).	**Concepts** • Natural systems provide resources (goods-economic value- and ecosystem services) on which humans rely (CA Sc/SS, p. 155). • Humans benefit from an understanding of the importance and health benefits of participating in life-time sports and recreation (AR PE 12). **Sample Indicators: Use fish and wildlife as an example.** • Investigate and use local state, national and/or international fitness and recreational resources and organizations (e.g. trails, wilderness areas, rivers, lakes, mountains, fitness clubs, community fitness activities). • Examine the advantages and disadvantages of fish and wildlife based tourism (fishing, hunting, ecotourism). • Predict where fish and wildlife based economy can flourish in your state and develop a scenario to support that prediction.
	Healthy living	**Concepts** • The activity of the day relates to a healthy lifestyle (AR PEL, p. 17). • There are a variety of outdoor sports and games that promote healthy living (AFWA CE). • Relaxation is important for stable mental and physical health and	**Concepts** • The length and quality of human life are influenced by many factors, including... environmental conditions (AAAS1, 6B/5, p. 89). • People in communities seek opportunities for recreational	**Concepts** • Human health and well-being depends on access to the outdoors and an environment with sustainable and renewable resources (AFWA CE). • Humans strive to achieve and maintain a health-enhancing level of physical fitness (AR HE 12).

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		reduces stress (AFWA – CE). • Family members seek opportunities for individual, dual and team participation in outdoor related activities (AFWA CE). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Identify outdoor sports and games* • *K-2: Develop lifelong outdoor skills through an outdoor classroom, schoolyard habitat or a nature trail (wildlife viewing, fishing, hiking, archery).* • Identify/compare and contrast outdoor sports and games that promote healthy living.	activities in the community that meet the needs of various skill levels and interests (AR PEL 3.6.2). **Sample Indicators: Use fish and wildlife as an example.** • Describe the role that outdoor sports and recreation play in career and social environments. • Investigate opportunities in your community that provide skill development for outdoor recreation. • Use school and community facilities to build competency in outdoor sport and recreation skills.	• Humans benefit from an understanding of the importance and health benefits of participating in life-time sports and recreation (AR PE 12). • Personal health and fitness plans include potential lifetime activities that promote health related fitness, relieve tension and maintain a healthy weight in school and non-school settings (e.g. hiking, canoeing, archery, shooting sports, fishing) (AR PE 12). **Sample Indicators: Use fish and wildlife as an example.** • Analyze the requirements for sustaining healthy ecosystems and how health of humans and other living (e.g. fish, wildlife and habitat) organisms is affected by changes in environmental conditions. • Analyze sport specific training versus lifetime fitness in the outdoors. • Show mastery/competency in a lifelong outdoor sport or recreational opportunity that benefits health and well-being.
	Role of citizens in resource management	***See Standard 2.3/Map 2.3***	***See Standard 2.3/Map 2.3***	***See Standard 2.3/Map 2.3***

Map 4.3. Responsible users of fish, wildlife, and the outdoors respect the rights and property of others.



Standard 4. Students should understand and accept and/or lawfully participate in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
4.3. Responsible users of fish, wildlife, and the outdoors respect the rights and property of others.	**Safety**	**Concept** • Safety and security are basic needs of humans. Safety involves freedom from danger, risk, or injury. Security involves feelings of confidence and lack of anxiety and fear. Student understandings include following safety rules for home and school, preventing abuse and neglect, avoiding injury, knowing whom to ask for help, and when and how to say no (NSES, p.139). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Describe safety plan and procedures for being in the outdoors in the natural areas (ticks, snakes etc).* • Describe how to manage an emergency situation in the outdoors (snake bite, cut, etc.).	**Concepts** • The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions. Injury prevention has personal and social dimensions (NSES, p. 168). **Sample Indicators: Use fish and wildlife as an example.** • Evaluate the physical and environmental damages associated with decisions made during different physical activities (e.g. boating safety) (AR PEL). • Predict outcomes of dangerous behaviors during physical activities in the outdoors (hiking, fishing, boating, hunting) (AR PEL).	**Concepts** • Hazards and the potential for accidents exist. Regardless of the environment, the possibility of injury, illness, disability, or death may be present. Humans have a variety of mechanisms – sensory, motor, emotional, social, and technological – that can reduce and modify hazards (NSES, p. 197). **Sample Indicators: Use fish and wildlife as an example.** • Investigate and report on how responsible citizens employ considerate and safe personal behaviors in physical activity (ethics of hunting and fishing, canoeing and hiking).
	Use of resources	**Concepts** • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140). • Location, weather, and the physical environment interact to create specific conditions that determine the goods and ecosystem services	**Concepts** • Peoples had the same needs as we do today (e.g., water, food, shelter) even though we often meet some of those needs in different ways (CA Sc/SS, p. 105). • People in communities seek opportunities for recreational	**Concepts** • Natural systems provide resources (goods- economic value - and ecosystem services) on which humans rely (CA Sc/SS, p. 155). • Decisions regarding natural systems and resource use are complex and based on a spectrum of considerations including the economic value and environmental

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
		that humans use for food, clothing, shelter, transportation, and recreation (CA Sc/SS, p. 83). • Environment provides humans with food, shelter, objects for trade and recreational opportunities (AFWA CE). **Sample Indicators: Use fish and wildlife as an example.** • *K-2: Describe how fish and wildlife provides recreational benefits to people* • Explain why there are laws to protect fish and wildlife (for example turtles, neo-tropical birds and song birds)	activities in the community that meet the needs of various skill levels and interests (AR PEL) **Sample Indicators: Use fish and wildlife as an example.** • List and explain the purpose for the rules to manage and conserve fish and wildlife locally • Describe the rights and responsibilities of an individual using of fish and wildlife natural resources for recreation	sustainability of available resources (CA Sc/SS, p. 52). • Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations (NSES, p. 198) **Sample Indicators: Use fish and wildlife as an example.** • Select key fish and wildlife stakeholders in fish and describe their rights and responsibilities as stewards and consumers. • Analyze and evaluate the possible costs, benefits and the consequences of human use of the fish and wildlife.
	Property rights	***See Standard 3.1/Map 3.1***	***See Standard 3.1/Map 3.1***	***See Standard 3.1/Map 3.1***

STANDARD 5

Students should understand the need for, and actively supports funding for fish and wildlife conservation.

5.1. Within the U.S., state fish and wildlife management is funded through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, fishing equipment, and motor boat fuels.

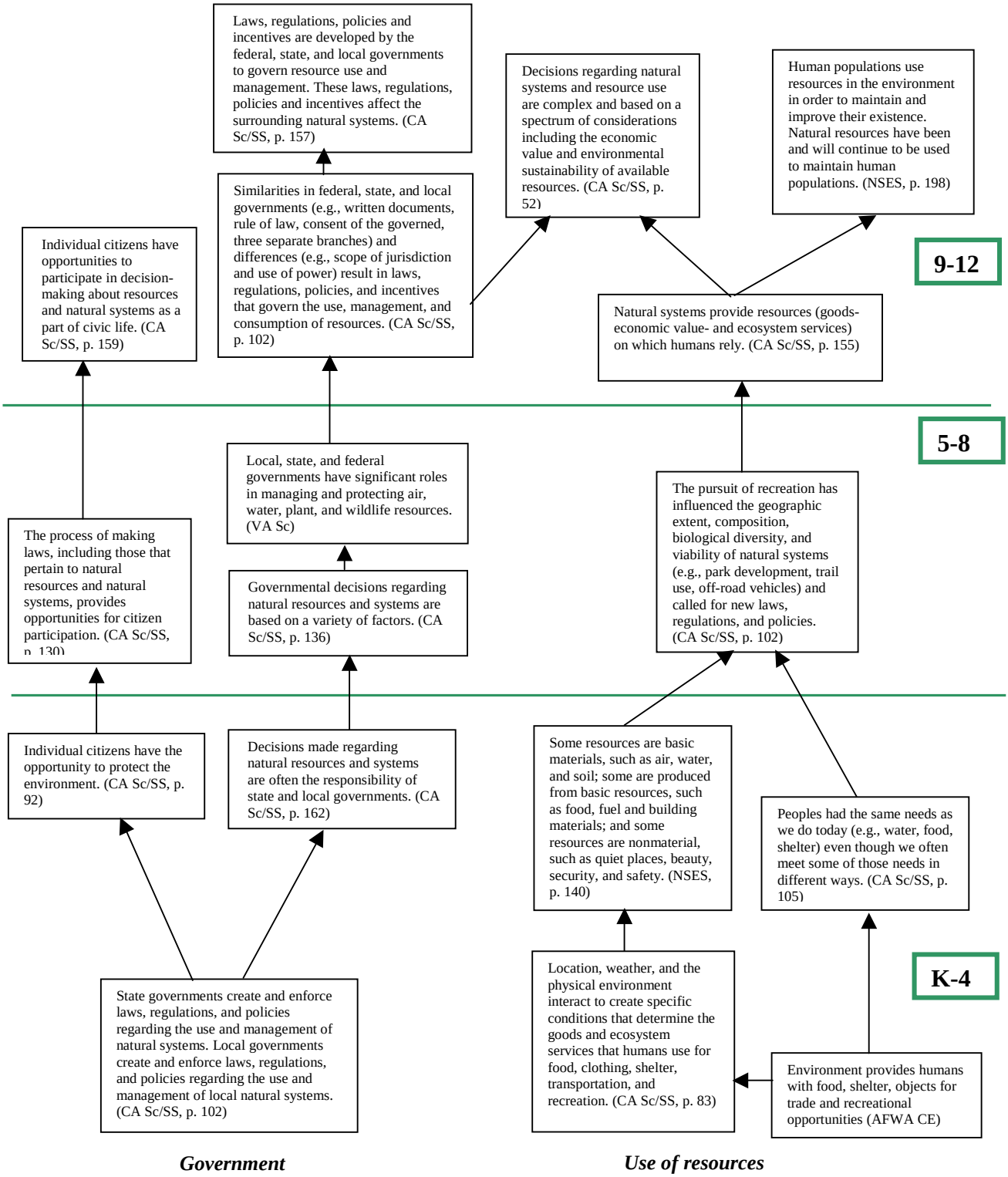
Standard 5: Themes at a Glance

Map number and descriptor	Key Theme 1	Key Theme 2
5.1. Within the U.S., state fish and wildlife management is funded through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, fishing equipment, and motor boat fuels	Government	Use of Resources

Standard 3 by Theme

Theme	Standards
Government	5.1.Within the U.S., state fish and wildlife management is funded through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, fishing equipment, and motor boat fuels.
Use of Resources	5.1. Within the U.S., state fish and wildlife management is funded through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, fishing equipment, and motor boat fuels.

Map 5. Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels.



Standard 5. Students should understand the need for, and actively supports funding for fish and wildlife conservation.

AFWA Core Concepts	Key themes	Grade K-4 Concepts & Indicators	Grades 5-8 Concepts & Indicators	Grade 9-12 Concepts & Indicators
5.1. Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels. 5.1.1. Wildlife Restoration - Federal Aid in Wildlife Restoration (Pittman-Robertson Act [1937]) provides funding in the U.S. for the protection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management research, hunter education, and the distribution of information produced by the projects 5.1.2. Sport Fish Restoration - Federal Aid in Sport Fish Restoration (Dingell-Johnson [1950] and Wallop-Breaux amendment [1984]) is a parallel program to Pittman Robertson for management, conservation, restoration of fishery resources, access and boating and aquatic resource education 5.2. Wildlife-based activities, such as hunting, fishing, viewing, and photography provide people with millions of days of outdoor	**Government**	**Concepts** • State governments create and enforce laws, regulations, and policies regarding the use and management of natural systems. Local governments create and enforce laws, regulations, and policies regarding the use and management of local natural systems (CA Sc/SS, p. 102). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92). • Decisions made regarding natural resources and systems are often the responsibility of state and local governments (CA Sc/SS, p. 162). **Sample Indicators: Use fish and wildlife as examples** • Summarize the roles and responsibilities of local governments. • Identify local governments involved in fish and wildlife management and conservation. • Describe what actions an individual can do to conserve natural resources (fish and wildlife).	**Concepts** • Governmental decisions regarding natural resources and systems are based on a variety of factors (CA Sc/SS, p. 136) • Local, state, and federal governments have significant roles in managing and protecting air, water, plant, and wildlife resources (VA Sc). • The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130). **Sample Indicators: Use fish and wildlife as examples** • Describe levels, roles responsibilities of local, federal and state government in US involved in fish and wildlife management and conservation. • Identify factors that influence government decisions regarding fish and wildlife. • Identify federal laws that regulate public fish and wildlife recreation. • Identify federal laws that provide for sustaining fish and wildlife recreation and describe the public's role.	**Concepts** • Similarities in federal, state, and local governments (e.g., written documents, rule of law, consent of the governed, three separate branches) and differences (e.g., scope of jurisdiction and use of power) result in laws, regulations, policies, and incentives that govern the use, management, and consumption of resources (CA Sc/SS, p. 102). • Laws, regulations, policies and incentives are developed by the federal, state, and local governments to govern resource use and management. These laws, regulations, policies and incentives affect the surrounding natural systems (CA Sc/SS, p. 157). • Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). **Sample Indicators: Use fish and wildlife as examples** • Analyze the structure, responsibilities and function of US federal, state, and local governments involved in resource management. • Evaluate how individuals,

recreation each year and generate billions of dollars for the economy.				businesses, governments, and non-governmental organizations impact fish and wildlife management and conservation, methods of decision making and action, and public opinion
	Use of resources	**Concepts** • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety (NSES, p. 140). ***For other Concepts and Indicators see Standard 2.1/ Map 2.1***	***For Concepts and Indicators see Standard 2.1/ Map 2.1***	**Concepts** • Decisions regarding natural systems and resource use are complex and based on a spectrum of considerations including the economic value and environmental sustainability of available resources (CA Sc/SS, p. 52). • Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations (NSES, p. 198). ***For other Concepts and Indicators see Standard 2.1/ Map 2.1***

Conclusion

These conservation education standards represent an important step in improving conservation education in the United States. Conservation education is critical to the ability of state fish and wildlife agencies to meet their mission. Conservation education's mission-critical role and responsibilities are to:

1. Prepare and include the general public and fish and wildlife customers in environmental assessment and decision making. (This role was described by Mark Duda at the AFWA 2008 Meeting as being essential for agency effectiveness.)
2. Prepare and involve the public and fish and wildlife customers in sharing responsibility for stewardship of fish and wildlife.
3. Prepare and involve the public and our fish and wildlife customers in responsible fish and wildlife related recreation (knowledge, skills and opportunities).

The *K-12 Conservation Education Scope and Sequence* provides a critical foundation for developing sound conservation education programs to advance the mission of fish and wildlife agencies. This is the first step for developing the strategic role of conservation education to meet the state fish and wildlife agency mission.

Needed next steps include:

- Identify science curricula and instructional support materials.
- Develop assessment instruments and other tools for teachers to improve student learning.
- Provide systematic professional development to increase teachers' knowledge of conservation education, their abilities to use conservation education instructional and assessment materials that support high student achievement.
- Develop online availability of resources in various forms and formats, particularly ecosystem information of local fish, wildlife and habitat, field studies and stewardship techniques and opportunities, and recreation skills and opportunities.

Six Priority Goals for Conservation Educators (Denver 2008):

1. **Curriculum Integration:** Educators will integrate CE Core Concepts into their curricula.
   The AFWA Conservation Education Core Concepts have been adopted by the member agencies as those wildlife concepts critical to having a supportive and informed citizenry. This goal expects all educators (both formal and non-formal) to teach these concepts to students.

2. **Outdoor Skills Education:** Outdoors skills will be included in the education process as a tool for team building, stewardship, personal health and life-long recreation.
   School curricula include outdoor skills training such as orienteering, archery, fishing, and survival skills. National Archery in the Schools program (NASP) is a good example of this goal.

3. **Natural Area Access:** Every child has access to a natural area (no matter how small) within walking distance of their school and educators are given skills, content knowledge and tools to use that area as an outdoor classroom for field investigations.

This does not suggest that agencies should acquire property but rather help educators identify natural areas that are accessible to children both during and after school. Schoolyard Habitat Programs are good examples of this goal.

4. **Field Investigation:** Field Investigation is part of authentic science inquiry.
   Children tend to think of a scientist as someone in a lab coat and holding a test tube. We want educators to recognize that our agency field staffs conduct legitimate scientific inquiry and through citizen science opportunities, engage students in rigorous field investigations to contribute to field science studies and improve their science achievement. NatureMapping is a good example of this goal.

5. **Community Partnerships:**
   a. Fish and Wildlife Agencies will facilitate community partnerships to ensure parent involvement in K-12, Fish & Wildlife related experiences.
      We recognize the importance of family and community support for successful recruitment into outdoor activities
   b. Youth Leadership – Fish and Wildlife Agencies will facilitate community partnerships to develop youth conservation leadership – by offering K-12 opportunities for leadership, skill development and recognition.
      Developing youth leaders in Conservation will serve to recruit other youth and will help agencies with work force employment.

6. **Conservation Literacy:**
   a. We offer web-based and other technologies to help schools build/enhance conservation literacy.
      Increased use of the internet and technology must be part of our outreach to engage future generations.
   b. Utilize Conservation Education Scope and Sequence (based on national education standards) as a guideline for how agencies partner with schools to achieve conservation environmental literacy.
      The K-12 Scope and Sequence document makes the Conservation Education Core Concepts available to educators according to what is age-appropriate for the learner.

Abbreviations

AAAS1	Atlas of Science Literacy, Volume 1
AAAS2	Atlas of Science Literacy, Volume 2
AFWA CE	AFWA Conservation Education Working Group
AK	Content and performance standards for Alaska students
AR HE 12	Arkansas Standards: Health and Safety Grades 9-12
AR PE 12	Arkansas Standards: Physical Education Grades 9-12
AR PEL	Arkansas Standards: Physical Education and Health Grades K-8
AR Sc	Arkansas Science Standards Grades K-8
AZ Sc	Arizona Science Standards Articulated by Grade Level.
BSL	Benchmarks for Science Literacy
CA Sc/SS	California Science and History/Social Science, Education and the Environment Initiative. Standards Alignment Maps, Kindergarten through Twelfth Grade.
CO Sc	Colorado Model Content Standards for Science
KS EE	Environmental Education Standards for Kansas
LA Sc	Louisiana Content Standards, Benchmarks, and Grade Level Expectations for Science
LA SS	Louisiana Content Standards, Benchmarks, and Grade Level Expectations for Social studies
MA Sc	Massachusetts Science and Technology/Engineering Curriculum Framework
ME	Maine Performance Indicators and Descriptors
MI SS	Michigan Grades K-8 Social Studies Content Expectations
MN EE	Environmental Literacy Scope and Sequence Providing a systems approach to environmental education in Minnesota
MO Sc	Missouri's Framework for Curriculum Development In Science K-12
MO SS	Missouri's Framework for Curriculum Development In Social Studies K-12
NAEP	National Assessment of Educational Progress Frameworks
NECAP Sc	
NH SS	New Hampshire Scope and Sequence Models for Building Vertical Science Literacy
NSES	National Science Education Standards (NSTA, 1996)
OH Sc	Ohio Science Academic Content Standards
OH SS	Ohio Academic Content standards, K-12 Social Studies
OR Sc	Oregon Science Standards
PA ENV	Pennsylvania Academic Standards for Environment and Ecology
TEKS	Texas Essential Knowledge and Skills
VA Sc	Virginia Revised Science Standards of Learning Curriculum Framework Adopted by the Board of Education
VA SS	Virginia History and Social Science Standards of Learning Curriculum Framework
VT	Vermont's Framework of Standards and Learning Opportunities
WA Sc	Washington State Science Essential Academic Learning Requirements: A Recommended Grade-by-Grade Sequence for Grade Level Expectations –K-12
WA SS	Washington State Social Studies Essential Academic Learning Requirements: A Recommended Grade-by-Grade Sequence for Grade Level Expectations - K-12

Additional References

Arizona Social Studies Standard Articulated by Grade Level
Arkansas American Government Standards Grades 9-12
Arkansas American History (U.S. History)
Arkansas Biology Standards Grades 9-12
Arkansas Civics for Core Curriculum Standards Grades 9-12
Arkansas Civics Standards Grades 9-12
Arkansas Environmental Science Standards Grades 9-12
Arkansas Social Studies Curriculum Framework Grades K-8
Chicago Academic Standards & Frameworks. Expecting more: Higher Standards for Chicago's Students. Science. Grades K-12
Colorado Model Content Standards for Civics
Georgia Science Performance Standards
Indiana's Core standards: Core Academic Concepts across the K–12 Continuum. Science
Indiana's Core standards: Core Academic Concepts across the K–12 Continuum. Social studies
Massachusetts History and Social Science Curriculum Framework
Michigan Content Standards and Draft Benchmarks
Montana Content Standards and Performance Descriptors
NAAEE Excellence in Environmental Education: Guidelines for Learning (Pre K-12)
Nevada K-12 Science Standards
Nevada K-12 Social Studies Standards
Nevada Science Achievement Indicators
New England Common Assessment Program – Science
North Carolina Extended Content Standards
Pennsylvania Academic Standards for Civics and Government
Pennsylvania Academic Standards for Geography
State of Alabama Academic Standards
Wisconsin Model Academic Standards for Social Studies
Wisconsin's Model Academic Standards for Science

Acknowledgements

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Appendix 1

AFWA North American Conservation Education Strategy

Mission:

To unify and strengthen conservation education efforts of the Association of Fish and Wildlife Agencies (AFWA) member agencies and partners in a manner that effectively advances the AFWA Strategic Plan* and the North American Model of Fish and Wildlife Conservation.*

Vision:

Conservation Education becomes an effective, dynamic means for the Association of Fish and Wildlife Agencies (AFWA), its members and partners to achieve the AFWA Strategic Plan through an informed and involved citizenry that:

1. Understands the value of our fish and wildlife resources as a public trust.
2. Appreciates that conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.
3. Understands and actively participates in the stewardship and support of our natural resources.
4. Understands and accepts and/or lawfully participates in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.
5. Understands and actively supports funding for fish and wildlife conservation.

Core Concepts for Conservation Education

Understands the value of our fish and wildlife resources as a public trust.

A. **In North America fish and wildlife are public trust resources managed by governmental agencies.**

1. Ownership of land does not convey ownership of wildlife.
2. Primary responsibility for most fish and wildlife management programs in North America is delegated to governmental agencies.
    a. State, provincial, and tribal fish and wildlife agencies are responsible for managing most fish and wildlife on public and private lands and water within their geographic jurisdictions.

        aa. In Mexico, only the six northern border states have been given authority over resident wildlife. In other parts of Mexico, the federal government maintains jurisdiction over resident wildlife and all inland fisheries.

b. Federal agencies, in cooperation with state and tribal agencies, are responsible for managing migratory fish and wildlife and federally listed threatened and endangered species, and for regulating wildlife trade. (In Canada, federal provincial and territorial agencies share responsibility for federally-listed endangered species.)

3. Non government organizations, businesses, and individuals play important roles as advocates and conservation partners with fish and wildlife agencies.
4. **Since most wildlife live on private lands, private landowners play an important role in sustaining and improving habitat.**
5. Many species move across state, provincial, and national boundaries, requiring interstate and international agreements and partnerships to manage these species.

B. **Sustainable natural resources depend on the support of an informed and responsible citizenry.**

C. Regulations are necessary for natural resources conservation.

1. The adoption and enforcement of regulations help conserve fish and wildlife resources.
2. Regulations allow for sustainable human use of fish and wildlife resources.
3. Regulations combat illegal trafficking and exploitation of fish and wildlife resources.

Appreciates that conservation and management of terrestrial and water resources are essential to sustaining fish and wildlife, the outdoor landscape, and the quality of our lives.

A. **The health and well-being of fish, wildlife, and humans depend on the quality of their environment.**

1. All living things depend on habitat that includes adequate and suitably arranged food, water, shelter, and space.
   a. Fish and wildlife numbers and species compositions are constantly changing based on a variety of natural and human-caused conditions.
   b. **Loss and degradation of habitat are the greatest problems facing fish and wildlife; therefore, enhancing and protecting habitat is critical to managing and conserving them.**
      i. Human changes to the landscape alter fish and wildlife habitat, changing the amount and type available.
      ii. Natural events alter the landscape, changing the amount and type of fish and wildlife habitats available. The effects of these events can be exacerbated by human changes to the landscape.
      iii. Fragmentation of habitats alters fish and wildlife distribution, movement, and composition.
2. The carrying capacity of an area determines the size of the population that can exist or will be tolerated there.
   a. Biological carrying capacity is an equilibrium between the availability of habitat and the number of animals of a given species the habitat can support over time.
   b. Cultural carrying capacity is the number and type of a given species that people will tolerate over time.
   c. Carrying capacity is dynamic and can change from season to season and from year to year.
   d. Regulated hunting, fishing, and trapping are important tools for preventing populations of certain species from exceeding the carrying capacity of their habitat.
3. Living things tend to reproduce in numbers greater than their habitat can support. The populations are limited by factors such as quantity and quality of food, water, shelter, and space. Other limiting factors may include disease, predation, and climatic conditions.

a. When a population becomes too large it may damage or destroy its habitat as well as habitat for many other species.

b. When a population exceeds the carrying capacity for an area, individuals of that population must out-compete others, emigrate, or die.

4. Fish and wildlife are present in nearly all areas of the earth. Each ecosystem has characteristic species.
   a. Climate, topography, and habitats influence species diversity.
   b. All living things are connected to each other and their environment.
      i. Plants and animals in ecological systems live in a web of interdependence in which each species contributes to the function of the overall system.
      ii. Energy from the sun is captured by plants and enters the animal world primarily through animals that eat plants.
      iii. Interactions between different fish and wildlife populations include competition, predation, and symbiosis.
   c. Each species occupies a niche within its environment.
5. Ecological succession is a process involving continuous replacement of one community by another.
   a. As succession occurs fish and wildlife found in that community will change.
   b. Natural events and human activities affect the rate and direction of succession.
6. Species differ in their ability to adapt.
   a. Fish and wildlife are adapted to their environment in ways that enable them to compete and survive.
   b. The more adaptable a species is, the more likely it is to thrive.
   c. Most species that are endangered or threatened in North America became so as a result of natural or human-caused changes in their habitat and their inability to adapt or adjust to such changes.
7. **Conserving biodiversity is important.**
   a. Isolated ecosystems and populations are more vulnerable to environmental change than well connected ecosystems.
   b. Native species are important to the stability of an ecosystem.
   c. Exotic/non-native species introduced into a community can change the dynamics of that community.
   d. Reintroduction of fish or wildlife into its former range may be possible if conditions such as suitable habitat and social acceptance exist.
8. Many species are indicators of environmental health.

B. **Fish and wildlife can be conserved and restored through science based management which considers the needs of humans as well as those of fish and wildlife.**

1. Fish and wildlife management practices are based on natural, physical, and social sciences.
2. Wildlife management practices involve population and habitat inventory and monitoring, research, manipulation of populations, protection and manipulation of habitat, regulation, and education.
   a. Wildlife populations are managed through such practices as regulated hunting, fishing and trapping; artificial propagation; stocking; and transplanting as well as predator and damage control.
   b. Enhancing and protecting healthy habitat are critical to managing and conserving fish and wildlife.
   c. Management of one species may affect other species within the same ecosystem.
3. Fish and wildlife management decisions consider biological, economic, social, and political factors.

4. Conservation of fish and wildlife habitats provides human health, recreation, aesthetic, and economic benefits.

Understands and actively participates in the stewardship and support of our natural resources.

A. A person's culture affects his or her view and use of fish and wildlife and their habitats.
   1. People use fish and wildlife resources for food, shelter, clothing, and other products; practices that have continued throughout history.
   2. Fish and wildlife provide a recreational focus for millions of people in North America.

B. The distribution and abundance of fish and wildlife provide significant economic benefits.

C. **Everyone impacts fish and wildlife and their habitats and as human populations grow, impacts on natural resources increase.**
   1. Conversion of fish and wildlife habitat for human uses has altered the amount of land and water available for fish, wildlife, and associated recreation.
   2. Humans are agents in the spread of invasive species and fish and wildlife diseases; and therefore, must take steps to avoid associated problems.

D. Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on their environment.
   1. People make decisions collectively and individually each day that directly and indirectly impact fish and wildlife and their habitats.
   2. Decisions people make relative to fish and wildlife are based on their values, as well as knowledge of and experiences with those resources.

Understands and accepts and/or lawfully participates in hunting, fishing, trapping, boating, wildlife watching, shooting sports, and other types of resource-related outdoor recreation.

A. **Regulated hunting, fishing, and trapping are important tools for managing some wildlife populations and habitats.**

B. Fish and wildlife-based resources provide recreational benefits directly to participants and increase advocacy for conservation.

C. Responsible users of fish, wildlife, and the outdoors respect the rights and property of others.

Understands the need for, and actively supports funding for fish and wildlife conservation.

A. **Within the U.S., state fish and wildlife management is funded primarily through hunting, fishing and trapping licenses and through federal excise taxes collected from the sale of hunting, target shooting, and fishing equipment and motor boat fuels.**
   1. Wildlife Restoration - Federal Aid in Wildlife Restoration (Pittman-Robertson Act [1937]) provides funding in the U.S. for the protection, restoration, rehabilitation and improvement of wildlife habitat, wildlife management research, hunter education, and the distribution of information produced by the projects.
   2. Sport Fish Restoration - Federal Aid in Sport Fish Restoration (Dingell-Johnson [1950] and Wallop-Breaux amendment [1984]) is a parallel program to Pittman Robertson for management, conservation, restoration of fishery resources, access and boating and aquatic resource education.

B. **Wildlife-based activities, such as hunting, fishing, viewing, and photography provide people with millions of days of outdoor recreation each year and generate billions of dollars for the economy.**

C. The future of fish and wildlife conservation requires additional funding from a broad-based constituency.

Appendix B

Academic Concepts used in AFWA Scope and Sequence by Themes

Key themes	Grade K-4 Concepts	Grades 5-8 Concepts	Grade 9-12 Concepts
Adaptations/ Survival	• For a particular environment some kinds of plants and animals thrive, some do not live as well, and some do not survive at all (AAAS2, 5D/E1, p.23). • Different kinds of organisms are adapted for living in different environments (NAEP; see also CA Sc/SS, p. 16). • When the environment changes, some plants and animals survive and reproduce; others die or move to new locations (NAEP). • Natural systems proceed through cycles and processes that are required for their functioning. Extinction can occur in response to human activity or natural cataclysms (CA Sc/SS, p. 17)	• There are many different causes of extinction. Some of these are natural while others are human-induced (CA Sc/SS, p. 37).	• The ability of an organism to survive in its environment is dependent on its genetically determined capabilities. Individual organisms cannot simply decide to adapt or change their genetic makeup in order to survive (CA Sc/SS, p. 59). • The greater the diversity of the gene pool of a species, the greater the chances that some individuals will be able to adapt to the changes, reproduce, and carry on the species (KS EE, p. 7). • The quantity and characteristics of the byproducts generated by human activities affect natural systems. The capacity of natural systems to adjust to human-caused alterations depends on the scope, scale, and duration of the activity, and on the nature and health of the natural system. In cases where the adaptive characteristics of a species are insufficient to respond to the degree of change, extinction can occur (CA Sc/SS, p. 37).
Basic needs	• Most living things need water, food, and air (AAAS2, 5C/2, p. 73). • Organisms have basic needs. For example, animals need air, water, and food; plants require air, water, nutrients, and light. Organisms can survive only in environments in which their needs can be met (NSES, p.129).	• The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition (NSES, p.158).	• Ecosystems can be reasonably stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators (AAAS2, 5D/H1, p. 23).

Key themes	Grade K-4 Concepts	Grades 5-8 Concepts	Grade 9-12 Concepts
Changing environments	• Ecosystems change over time (PA ENV).	• Changes in environmental conditions can affect the survival of individual organisms and entire species (AAAS2, 5F/M2b, 33). • Ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans (MA Sc, p. 53).	• Although the interrelationships and interdependence of organisms may generate biological communities in ecosystems that are stable for hundreds or thousands of years, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. The impact of the human species has major consequences for other species (NAEP). • When an environment, including other organisms that inhabit it changes, the survival value of inherited characteristics may change… (AAAS1, 5F/6, p. 83).
Dependence on environment	• Environments are the space, conditions, and factors that affect an individual's and a population's ability to survive and their quality of life (NSES, p. 140). • Changes in environments can be natural or influenced by humans. Some changes are good, some are bad, and some are neither good nor bad. Pollution is a change in the environment that can influence the health, survival, or activities of organisms, including humans (NSES, p. 140; see also AAAS2, 5D/E4, p. 33; MA Sc, p. 47) • Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful (AAAS2, 5D/E4, p. 33, also see MA Sc, p. 47). • For a particular environment some kinds of plants and animals thrive, some do not live as well, and some do not survive at all (AAAS2, 5D/E1, p23). • Some animals and plants are alike in the way they look and in the things they do, and others are very different from one another	• The world contains a wide diversity of physical conditions, which creates a wide variety of environments. In any particular environment, the growth and survival of organisms depend on the physical conditions (AAAS2, 5D/M1b, p. 23). • Changes in environmental conditions can affect the survival of individual organisms and entire species (AAAS2, 5F/M2b, 33). • Loss and degradation of habitat are the greatest problems facing fish and wildlife. • Ecosystems have changed throughout geologic time in response to physical conditions, interactions among organisms, and the actions of humans (MA Sc, p. 53).	• …Change in climate can produce very large changes in ecosystems (AAAS2, 5D/H2, p. 33). • When all environment, including other organisms that inhabit it, changes the survival value of inherited characteristics may change… (AAAS1, 5F/6, p. 83). • Changes in an ecosystem can affect biodiversity and biodiversity contributes to an ecosystem's dynamic equilibrium (AFWA CE). • Enhancing and protecting habitat is critical to managing and conserving fish and wildlife (AFWA CE).

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	(BSL, Diversity of Life) • Species can become extinct because of habitat change or loss (AFWA CE).		
Diversity	• Living things are found almost everywhere in the world. There are somewhat different kinds in different places (AAAS2, 5D/P2, p. 33). • There are millions of different kinds of individual organisms that inhabit the earth at any one time-some very similar to each other, some very different (AAAS2, 5A/E3 (SFAA), p. 31). • When the environment changes, some plants and animals survive and reproduce; others die or move to new locations (NAEP). • Variation among individuals within a population increases the probability that the population will survive when there are changes in a natural system (CA Sc/SS, p.10).	• Climate, topography, and habitats influence species diversity (AFWA CE). • The number of organisms and populations an ecosystem can support depends on the biotic resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition (NAEP).	• Each species occupies a niche within its environment (AFWA CE). • Changes in an ecosystem can affect biodiversity and biodiversity contributes to an ecosystem equilibrium (CO Sc) • Although the interrelationships and interdependence of organisms may generate biological communities in ecosystems that are stable for hundreds or thousands of years, ecosystems always change when climate changes or when one or more new species appear as a result of migration or local evolution. The impact of the human species has major consequences for other species (NAEP).
Energy flow	• Most living things need water, food and air (AAAS1, 5C/2, p. 79). • Plants and animals both need to take in water, and animals need to take in food. In addition plants need light (AAAS1, 5E/1, p. 79). • Some source of "energy" is needed for all organisms to stay alive and grow (AAAS1, 5E/2, p. 79). • Energy from the sun is used by plants to produce sugars (photosynthesis) and is transferred within a food chain from producers (plants) to consumers to decomposers (MA Sc, p. 49).	• Energy can change from one form to another in living things (AAAS1, 5E/3, p. 79). • One of the most general distinctions among organisms is between plants, which use sunlight to make their own food, and animals, which consume energy-rich foods (AAAS1, 5A/1, p. 79). • Almost all food energy comes originally from sunlight (AAAS1, 5E/3, p. 79). • Dead plants and animals are broken down by other living organisms and this process contributes to the system as a whole (MA Sc, p. 53).	• The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways. … Continual input of energy from sunlight keeps the process going (AAAS1, 5E/3, p. 79).
Government	• Decisions made regarding natural resources	• Governmental decisions regarding natural	• Natural systems provide resources (goods and

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	and systems are often the responsibility of state and local governments (CA Sc/SS, p. 162). • Laws that influence decisions about resources and natural system grow from a spectrum of considerations (CA Sc/SS, p. 102). • State governments create and enforce laws, regulations, and policies regarding the use and management of natural systems. Local governments create and enforce laws, regulations, and policies regarding the use and management of local natural systems (CA Sc/SS, p. 1102). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92).	resources and systems are based on a variety of factors (CA Sc/SS, p. 136) • Governments provide some goods and services… to pay for the goods and services, government must obtain money by taxing people or by borrowing money (AAAS2, 7E/M1, p. 47). • The policy of State Fish and Wildlife Agencies is to base decisions regarding enforcement laws and regulations on science-based research (AFWA CE). • Local, state, and federal governments have significant roles in managing and protecting air, water, plant, and wildlife resources. (VA Sc) • The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130).	ecosystem services) and are a potential source of revenue for state and local governments (either directly or through taxation) (CA Sc/SS, p. 162). • Similarities in federal, state, and local governments (e.g., written documents, rule of law, consent of the governed, three separate branches) and differences (e.g., scope of jurisdiction and use of power) result in laws, regulations, policies, and incentives that govern the use, management, and consumption of resources (CA Sc/SS, p. 102). • Laws, regulations, policies and incentives are developed by the federal, state, and local governments to govern resource use and management. These laws, regulations, policies and incentives affect the surrounding natural systems (CA Sc/SS, p. 157). • Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). • Decisions to slow the depletion of …resources can be made at many levels, from personal to national, and they always involve trade-offs involving economic costs and social values (AAAS2, 8C/H5, p. 51).
Health of humans and ecosystems	• Some things people take into their bodies from the environment can hurt them (AAAS1, 6E/2, p. 89). • Certain poisons in the environment can harm humans and other living things (AAAS1, 6E/2, p. 89).	• The length and quality of human life are influenced by many factors, including... environmental conditions… (AAAS1, 6B/5, p. 89). • The environment may contain dangerous levels of substances that are harmful to human beings. Therefore, the good health of individuals requires monitoring of the soil, air, and water and taking steps to make them safe (AAAS1, 6E/5, p.98).	• Human health and well being depends on access to the outdoors and an environment with sustainable and renewable resources (AFWA CE – Children & Nature Network Research Summary). • …Conditions now are very different from the conditions in which species evolved. But some of the differences may not be good for human health (AAAS1, 6E/3, p. 89). • In-depth field investigations are essential to

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			scientific understanding of the environment (AWFA CE).
Healthy living	**Concepts** • The activity of the day relates to a healthy lifestyle (AR PEL, p. 17). • There are a variety of outdoor sports and games that promote healthy living (AFWA CE). • Relaxation is important for stable mental and physical health and reduces stress (AFWA CE). • Family members seek opportunities for individual, dual and team participation in outdoor related activities (AFWA CE).	**Concepts** • The length and quality of human life are influenced by many factors, including... environmental conditions (AAAS1, 6B/5, p. 89). • People in communities seek opportunities for recreational activities in the community that meet the needs of various skill levels and interests (AR PEL 3.6.2).	**Concepts** • Human health and well being depends on access to the outdoors and an environment with sustainable and renewable resources (AFWA CE). • Humans strive to achieve and maintain a health-enhancing level of physical fitness (AR HE 12). • Humans benefit from an understanding of the importance and health benefits of participating in life-time sports and recreation (AR PE 12) • Personal health and fitness plans include potential lifetime activities that promote health related fitness, relieve tension and maintain a healthy weight in school and non-school settings (e.g. hiking, canoeing, archery, shooting sports, fishing) (AR PE 12).
Human impact	• Most wildlife can survive without people to help. Some wildlife and fish need help from people to survive (AWFA CE) • Actions by humans often have an impact on the functioning and health of natural systems (CA Sc/SS, p. 7; OR Sc). • Humans change environments in ways that can be either beneficial or detrimental for themselves and other organisms (NSES, p.129). • Social systems and natural systems are made of parts (MN EE, p. 13) • In social and natural systems that consist of many parts, the parts usually influence one another (MN EE, p. 14).	• Human interaction can directly alter habitat size, the quality of available resources in a habitat, and the structure of habitat components. Such interactions can be positive and/or negative (VA Sc; LA Sc; see also CA Sc/SS, p.33). • Human activities… have changed the earth's land, oceans and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms (AAAS2, 4C/M7, p. 33). • Human activities can induce hazards through resource acquisition, urban growth, land-use decisions, and waste disposal. Such activities can accelerate many natural changes (NSES, p. 168). • Direct and indirect changes to natural systems that result from human activities (e.g.,	• Human beings are part of earth's ecosystem. Human activities can deliberately or inadvertently, alter the equilibrium in ecosystems (AAAS2, 5D/H3, p. 23, 33). • Human activities such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the atmosphere, and intensive farming, have changed the earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life (AAAS, 4C/M7, p. 21). • Direct and indirect changes to natural systems that result from human population growth and operation and expansion of communities may influence population size within ecosystems and influence the composition and viability of natural systems (CA Sc/SS, p. 58).

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		population growth, expansion of communities, production, consumption and management of natural resources) impact the ability of an ecosystem to support the variety and quantity of organisms necessary for the system to function effectively (CA Sc/SS, p.33; see also VA Sc). • Human activities (e.g., human population growth and expansion of communities, production and consumption of natural resources, the operation and expansion of human communities and the laws, regulations, policies, and incentives that govern management of natural systems) can influence the long-term functioning and health of natural systems. These impacts can include changing the natural course of inherited characteristics and thus, the evolution and diversity of species (CA Sc/SS, p. 37). • Fragmentation of habitats alters fish and wildlife distribution, movement, and composition (AFWA). • Social and natural systems are connected to each other and to other larger or smaller systems (MN EE, p. 15).	• Interaction between social and natural systems is defined by their boundaries, relation to other systems, and expected inputs and outputs (MN EE, p. 16). • The laws, regulations, policies, and incentives that govern management of natural systems may cause fluctuations in population size within ecosystems and influence the composition and viability of natural systems (CA Sc/SS, p.58). • The development of new materials and the increased use of existing materials by a growing human population have led to the removal of resources from the environment much more rapidly than they can be replaced by natural processes. Disposal of waste materials has also become a problem. Solving these problems requires systematic efforts involving both social and technological innovations (AAAS 8B/H7 pg 55)
Interactions among organisms	• Animals eat plants or other animals for food and may also use plants (or even other animals) for shelter and nesting (AAAS2, 5D/P1, p. 33). • Organisms interact with one another in various ways besides providing food. Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds (AAAS2 5D/E3a,b, p. 33). • Habitats change over time due to many influences (VA Sc).	• In an environment, organisms with similar needs may compete with one another for limited resources, including food, space, water, air, and shelter (AAAS2, 5d/M1a, p.33). • The number and types of organisms an ecosystem can support depends on the resources available and on abiotic factors (CA Sc/SS, p. 33). • There is interaction and interdependence between and among non-living and living components of ecosystems (CO Sc). • All organisms, both land-based and aquatic,	• Ecosystems can be relatively stable over hundreds or thousands of years. As any population grows, its size is limited by one or more environmental factors: availability of food, availability of nesting sites, or number of predators (AAAS2, 5D/H1, p. 33).

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		are interconnected by their need for food. This network of interconnections is refereed to as a food web. The entire earth can be considered a single global food web, and food webs can also be described for a particular environment. At the base of any food web are organisms that make their own food, followed by the animals that eat them, and then the animals that eat those animals and so forth (AAAS2, 5D/M4, p. 33). • Two types of organisms may interact with one another in several ways. They may be in a producer/consumer, predator/prey, or parasite/host relationship. Or, one organism may scavenge or decompose another. Relationships may be competitive or mutually beneficial. Some species have becomes so adapted to each other that neither could survive without the other (NAEP, p. 44). • Given adequate resources and an absence of disease or predators, populations of organisms in environments increase at rapid rates. Finite resources and other factors limit their growth (AAAS2, 5D/M3, p. 33).	
Property rights	**Concepts** • The importance placed on private property and the inherent rights and responsibilities of land ownership are economic factors that influence decisions about resources and natural systems (CA Sc/SS, p. 92). • The importance placed on fair play and good sportsmanship, respect for the rights and opinions of others, and respect for rules by which we live (CA Sc/SS, p. 83).	**Concepts** • Socio-cultural, legal, and political factors are considered in the examination of individual rights versus the common good. Such factors are also considered in decisions regarding land ownership and resource use. (CA Sc/SS, p. 129)	**Concepts** • Decisions related to natural systems and natural resources often result in the interaction between individual rights and liberties and choices related to the "common good" (CA Sc/SS, p. 160). • Property ownership and the regulation of land use practices are often used as incentives to govern the use and management of natural systems and resources (CA Sc/SS, p. 164).
Resource distribution	• Naturally occurring materials such as wood, clay, cotton and animal skins, may be processed to change their properties	• Some material resources are very rare and some exist in great quantities. The ability to obtain and process resources depends on	• The earth has many natural resources of great importance to human life. Some are readily renewable, some are renewable only at great

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	(AAAS2, 8B/E1, p. 55) • The wasteful or unnecessary use of natural resources can limit their availability for other purposes. Restoring depleted soil, forests, or fishing grounds can be difficult and costly (AAAS2, 4B/M11a, p. 55) • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety (NSES, p. 140) • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140)	where they are located and the form they are in. As resources are depleted, they may become more difficult to obtain (AAAS2, 4B/M10ab, p. 55) • Humans are influenced by the [natural] cycles and processes because they in part determine the quantity and quality of goods and ecosystem services provided by coastal systems, for example, the distribution of organisms (CA Sc/SS)	cost, and some are not renewable at all (AAAS2, 4B/H8, p. 55) • Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations (NSES, p. 198)
Resource management	• Resources are things that we get from the living and nonliving environment to meet the needs and wants of a population (NSES, p 140). • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security and safety (NSES, p. 140). • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140) • The factors influencing decisions about resources and natural systems vary with the type of community and the particular needs and priorities of that community. People in urban, suburban, and rural environments are likely to bring different perspectives to bear when making decisions about resources and natural systems (CA Sc/SS, p. 88). • Laws that influence decisions about resources and natural system grow from a spectrum of	• Socio-cultural, legal, and political factors are considered in the examination of individual rights versus the common good. Such factors are also considered in decisions regarding land ownership and resource use (CA Sc/SS, p. 129). • Decisions regarding natural resources and natural systems … [are] based on personal views and beliefs (CA Sc/SS, p. 127).	• Decisions made regarding natural resources and systems are often the responsibility of state and local governments (CA Sc/SS, p. 162). • Decisions related to natural systems and natural resources often result in the interaction between individual rights and liberties and choices related to the "common good" (CA Sc/SS, p. 160). • Laws, regulations, policies and incentives are developed by the federal, state, and local governments to govern resource use and management. These laws, regulations, policies and incentives affect the surrounding natural systems (CA Sc/SS, p. 157). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political,

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	considerations (CA Sc/SS, p. 102). • Decision-making in a community of varied cultures is influenced by socio-cultural factors including differing traditions and beliefs. (CA Sc/SS, p. 84)		and environmental factors (CA Sc/SS, p. 58). • Enhancing and protecting habitat is critical to managing and conserving fish and wildlife (AWFA CE)
Role of citizens in resource management	• There are basic rules people need to follow regarding natural systems and the treatment of goods and ecosystem services they provide. There are consequences to not following the rules that help protect the environment; these consequences may influence decisions regarding resources and natural systems (CA Sc/SS, p. 80). • Decisions regarding natural systems and resources are made in similar ways in all American communities and include consideration of socio-cultural factors (CA Sc/SS, p. 84). • Individual citizens have the opportunity to protect the environment (CA Sc/SS, p. 92).	• The process of making laws, including those that pertain to natural resources and natural systems, provides opportunities for citizen participation (CA Sc/SS, p. 130).	• Individual citizens have opportunities to participate in decision-making about resources and natural systems as a part of civic life (CA Sc/SS, p. 159). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political, and environmental factors. (CA Sc/SS, p. 58)
Role of culture	• The beliefs, customs, ceremonies, traditions, and social practices of varied cultures are significantly influenced by the natural systems where those cultures are located and by the natural resources upon which these cultures depend (CA Sc/SS, p. 84). • Decision-making in a community of varied cultures is influenced by socio-cultural factors including differing traditions and beliefs (CA Sc/SS, p. 84).	• Decisions regarding natural resources and natural systems made during various historical periods were based on personal views and beliefs and incomplete or erroneous information. Ongoing scientific discovery during this time focused on improving the base of knowledge, a process that continues today (CA Sc/SS, p. 127).	• Natural systems provide resources (goods and ecosystem services) upon which humans rely. The resources available in these nations help determine their cultures, economies, and lifestyles (CA Sc/SS, p. 144).
Safety	**Concept** • Safety and security are basic needs of humans. Safety involves freedom from danger, risk, or injury. Security involves feelings of confidence and lack of anxiety and fear. Student understandings include following safety rules for home and school,	**Concepts** • The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions. Injury prevention has personal and	**Concepts** • Hazards and the potential for accidents exist. Regardless of the environment, the possibility of injury, illness, disability, or death may be present. Humans have a variety of mechanisms – sensory, motor, emotional, social, and technological – that can reduce and

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	preventing abuse and neglect, avoiding injury, knowing whom to ask for help, and when and how to say no (NSES, p.139)	social dimensions (NSES, p. 168).	modify hazards (NSES, p. 197).
Use of resources	• People need water, food, air, waste removal, and a particular range of temperatures in their environment, just as other animals do (AAAS2, 6A/P2, p. 23). • The natural environment provides humans with food, shelter, objects for trade and recreational opportunities (AFWA CE). • The living and nonliving components of an ecosystem and their interactions produce goods essential to human life and integral to our economies and cultures (CA Sc/SS, p. 21). • Location, weather, and the physical environment interact to create specific conditions that determine the goods and ecosystem services that humans use for food, clothing, shelter, transportation, and recreation (CA Sc/SS, p. 83). • Natural systems provided goods and ecosystem services that people thought the history used to meet their needs and support their economies (CA Sc/SS, p. 92). • Living things are found almost everywhere in the world. There are somewhat different kinds in different places (AAAS2, 5D/P2, p. 33). • Some resources are basic materials, such as air, water, and soil; some are produced from basic resources, such as food, fuel and building materials; and some resources are nonmaterial, such as quiet places, beauty, security, and safety (NSES, p. 140). • The supply of many resources is limited. If used, resources can be extended through recycling and decreased use (NSES, p. 140)	• Peoples had the same needs as we do today (e.g., water, food, shelter) even though we often meet some of those needs in different ways (CA Sc/SS, p. 105). • The pursuit of recreation has influenced the geographic extent, composition, biological diversity, and viability of natural systems (e.g., park development, trail use, off-road vehicles) and called for new laws, regulations, and policies (CA Sc/SS, p. 102). • People in communities seek opportunities for recreational activities in the community that meet the needs of various skill levels and interests (AR PEL). • People can have careers in natural resource related sports and recreation (AR PEL). • The global environment is affected by national and international policies relating to energy use, waste disposal, ecological management and population (AAAS2, 7G/M5, p. 51). • Trade between nations occurs when natural resources or the skills to make something are evenly distributed… (AAAS2, 7G/M1, p. 51). • Treaties are negotiated between two or more nations to establish or maintain peaceful relationships, to define parameters for trade, or to create political or military alliances (AAAS2, 7G/M3, p. 51)	• Natural systems provide resources (goods-economic value- and ecosystem services) on which humans rely (CA Sc/SS, p. 155). • Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations (NSES, p. 198) • The quantity of resources consumed, and the quantity and character of the byproducts of regional human activities have a cumulative effect on natural systems (CA Sc/SS, p. 157). • Since human activities can have significant and lasting influence on natural systems, it is important to base decisions on as much knowledge as possible. This knowledge should include an understanding of the influence of human activities on natural systems and an ability to assess social, economic, political, and environmental factors (CA Sc/SS, p. 58). • The development of new materials and the increased use of existing materials by a growing human population have led to the removal of resources from the environment much more rapidly than they can be replaced by natural processes. Disposal of waste materials has also become a problem. Solving these problems requires systematic efforts involving both social and technological innovations (AAAS2, 8B/H7, p. 23) • Decisions regarding natural systems and resource use are complex and based on a spectrum of considerations including the economic value and environmental sustainability of available resources (CA

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	• People trade things they have for things that they want (AAAS2, 7E/P3. p. 47). Trade occurs between individual people, between nations and between regions in the same nation (AAAS2, 7G/E1b, p. 51). • The ways in which groups and nations interact to try to resolve problems have varying degrees of impact on the quality and quantity of resources and viability of natural systems (CA Sc/SS, p. 88). • Geography, available natural resources, climate, and the available labour force affect the economic opportunities available (WA SS, p. 25).		Sc/SS, p. 52). • International considerations, brought on by the establishment of international institutions (e.g., United Nations) and treaties are included in the spectrum of factors in decision-making. (California SS, p.144). • The growing worldwide interdependence of social, economic, and ecological systems means that changes in one place in the world may have effects in any other place (AAAS2, 7G/H4, p. 51). • Decisions to slow the depletion of …resources can be made at many levels, from personal to national, and they always involve trade-offs involving economic costs and social values (AAAS2, 8C/H5, p. 51). • Humans benefit from an understanding of the importance and health benefits of participating in life-time sports and recreation (AR PE 12).