Teacher's Guide For

Pacific Northwest

For grade 7 - College

Programs produced by
Centre Communications, Inc. for
Ambrose Video Publishing, Inc.

Executive Producer
William V. Ambrose

Teacher's Guide by
Mark Reeder

Published and Distributed by...
Ambrose Video Publishing
145 West 45th St., Suite 1115
New York, NY 10036
1-800-526-4663
24-Hour Fax 212-768-9282
http://www.ambrosevideo.com

Note to this Teacher's Guide for *Pacific Northwest*

Please take the time to read this note carefully.

This Teacher's Guide presents all three programs under *Pacific Northwest.* The individual programs are listed below in the order in which they appear in this Teacher's Guide. They can also be found in the Guide's Table of Contents with their chapters.

1. *Program 1: Geography*
2. *Program 2: History*
3. *Program 3: Climate Change*

Inside this Teacher's Guide, each program is presented as a single unit, including its Blackline Master Quiz to test students' comprehension and learning. **Please find the unit and quiz appropriate to the program you are teaching.**

Table of Contents

This DVD is closed-captioned

CLASSROOM/LIBRARY CLEARANCE NOTICE

This program is for instructional use. The cost of each program includes public performance rights as long as no admission charge is made. Public performance rights are defined as viewing of the DVD in the course of face-to-face teaching activities in a classroom, library, or similar setting devoted to instruction.

Closed Circuit Rights are included as a part of the public performance rights as long as closed-circuit transmission is restricted to a single campus. For multiple locations, call your Ambrose representative.
Television/Cable/Satellite Rights are available. Call your Ambrose representative for details.
Digital Download and Streaming Rights Available. Call your Ambrose representative for details.
Duplication Rights are available if requested in large quantities. Call your Ambrose representative for details.
Quantity Discounts are available for large purchases. Call your Ambrose representative for information and pricing. Discounts, and some special services, are not applicable outside the United States.

Your suggestions and recommendations are welcome. Feel free to call Ambrose Video Publishing at 1-800-526-4663 between the hours of 9am and 5pm Eastern Time.

MATERIALS IN THE PROGRAM

Teacher's Guide -This Teacher's Guide has been prepared to aid the teacher in utilizing materials contained within *Pacific Northwest* three programs. **Please find the unit and quiz appropriate to the program you are teaching.** In addition to this introductory material, the guide contains the following for each program:

- *Suggested Instructional Notes*
- *Student Learning Goals*
- *Blackline Masters Quiz for duplication and handout to students*
- *Timeline of Events for Pacific Northwest*
- *Timeline of Events for Climate Change*
- *Maps & Graphics*

INSTRUCTIONAL NOTES

It is suggested that you preview the individual program or programs that you will be teaching and read the Student Goals and Teacher Points. By doing so, you will become familiar with the materials and be better prepared to adapt the program (s) to the needs of your class. Please note that each program is set up to be played continuously and you will probably find it best to follow the program in the order in which it is presented, but this is not necessary. Each program in *Pacific Northwest* can be divided into chapters accessed through the DVD's Menu Screen under Chapter Selects. In this way each

program's chapters can be played and studied separately. A proposed Lesson Plan based on chapter headings accessed through the DVD menu screen can be found with each program presented in this Teacher's Guide. It is also suggested that each program presentation take place before the entire class and under your direction. As you review the instructional program outlined in the Teacher's Guide, you may find it necessary to make some changes, deletions, or additions to fit the specific needs of your students. After viewing each program, you may wish to copy the **Blackline Master Quiz** and distribute it to your class to measure students' comprehension of the events.

LINKS TO CURRICULUM STANDARDS

The design for each program was guided by the National Center for History in the Schools, and the California Public School Standards for Historical Content, Grade 8 - Standards 8.1, 8.2 and 8.3 (#4 - #7), Standard 8.8 (#1) and Grade 11, Standards 11.1 (#2, #3), 11.3 (#5), 11.5 - (#3, #4) and 11.10 (#2, #3) and Grade 12, Standards 12.1, 12.4 and 12.5. In addition this program includes the following curriculum correlations: National Science Educations Standards, Content Standard D – Structure of the Earth system, Earth's history, Earth in the solar system and the McRel K-12 Science Standards and Benchmarks, Level III (Grades 6-8) and Level IV (Grades 9-12).

INTRODUCTION AND SUMMARY OF PACIFIC NORTHWEST - PROGRAM 1: GEOGRAPHY

Pacific Northwest – Program 1: Geography is an in-depth look at the forces that have shaped the Pacific Northwest. The program is designed to present *Pacific Northwest – Program 1: Geography* in a way that promotes successful student learning. The program begins by examining the geologic forces that have shaped the Pacific Northwest's varied landmasses. It then discusses the diverse climates and ecosystems of the region, from its ocean shores and coastal tide pools, to its temperate rain forests, and to the arid steppes of Washington, Idaho and Oregon. The program ends with an overview of each state's people and history.

Student Goals - In *Pacific Northwest – Program 1: Geography* the students will learn:

- The Pacific Northwest's varied landforms and how they were shaped by tectonic action and volcanoes
- The Pacific Northwest's diverse climates and ecosystems as well as the common plants and animals
- Basic human geography facts about the three states that make up the region – Washington, Oregon and Idaho

SUGGESTED LESSON PLAN

Pacific Northwest – Program 1: Geography is laid out so that the program can be viewed in its entirety, or, by selecting the DVD Menu Screen, Chapter Selects, individual chapters can be viewed separately to create a lesson plan. Each chapter presents a part of the uniqueness of the Pacific Northwest. The program shows how the diverse geology, climates and people have shaped the region from millions of years ago to the present.

Below is a list of the program and its chapters. Using these chapters, teachers can create a lesson plan to cover the specific issues, themes and the historical figures mentioned.

Pacific Northwest – Program 1: Geography

- Landforms of the Pacific Northwest
- Climates and Ecosystems of the Pacific Northwest
- Oregon
- Washington
- Idaho

Chapter One: Landforms of the Pacific Northwest

Student Goals - In this *Pacific Northwest – Program 1: Geography* chapter the students will learn:

- No region in the United States has had its landforms shaped more by tectonic action and volcanoes than the Pacific Northwest
    - The most prominent of these landforms are its mountain ranges
    - Along the Pacific Coast, are the ranges mountains covered by temperate rainforests

    - East of the coastal mountain ranges are the Cascades, extending from southern British Columbia, Canada to Northern California
    - The Cascades have many volcanic peaks including Mt. Rainier, Mt. Hood and Mt. Saint Helens
    - The Cascades' volcanic peaks contain the area's water supply in the form of its many glaciers
- Between the coastal and Cascade mountain ranges is what is known as a trough
    - The trough between the coastal mountain ranges and the Cascades is called the Puget/Willamette trough
    - In Washington the Puget trough is filled with salt water and is called Puget Sound
    - Washington's major urban complexes of Seattle, Tacoma and Olympia are located on Puget Sound
    - Puget Sound is an important resource for salmon and all kinds of shellfish
- East of the Cascades, in eastern Washington and the northern part of eastern Oregon, is the Columbia Plateau, also known as the Columbia Basin
- The southern part of eastern Oregon is the northern most extension of the Great Basin
    - It is a huge desert complex of parallel mountains and valleys
- Just west of the Columbia Plateau on the Oregon /Idaho border is the Palouse Plateau
    - This is a wetter region in the shadow of the Rocky Mountains
    - The Rockies are the most extensive mountain range in the United States, and they create the Continental Divide
- The Snake River basin in central Idaho is the final major landform in the Pacific Northwest
    - The Yellowstone hotspot, as it is called, is responsible for creating the Snake River basin
    - A hotspot is a hot mantle plume rising up from below a continental or oceanic plate
    - The Yellowstone hotspot started in eastern Oregon, 17 million years ago and is responsible for the many lava flows that formed the geological base of the Pacific Northwest
- The Pacific Northwest's rivers have helped shaped the region geographically and agriculturally
    - The Snake River is the most important river in the Pacific Northwest, providing irrigation for Idaho and eastern Washington crops
    - The Salmon, also known as the 'River of No Return,' is the longest wild river in the country
    - The Yakima River provides irrigation for growing apples, cherries, pears and grapes in Eastern Washington
    - The Willamette River and its tributaries in Oregon form one of the most fertile agricultural regions of the United States
    - The river that all the other Pacific Northwest's rivers flow into, is the Columbia River

    - The fourth longest river in the country, its drainage basin covers 258,000 square miles
    - With 14 hydroelectric dams along its course, it is the number one hydroelectric power producing river in North America
- The Pacific Northwest's landscape features are powerful factors in establishing its climates and ecosystems

Chapter Two: Climates and Ecosystems of the Pacific Northwest

Student Goals - In this *Pacific Northwest – Program 1: Geography* chapter the students will learn:

- The Pacific Northwest's climates and ecosystems are some of the most diverse in the nation
    - They range from temperate rain forests on the coast, to glacial peaks in the Cascades, and to arid steppes in eastern Washington, Oregon and Idaho
    - A climate is defined by a region's yearly average precipitation and temperature
    - The Pacific Northwest has both terrestrial and oceanic ecosystems
- This oceanic ecosystem is along Washington and Oregon's coast
    - It is populated by pods of orcas or killer whales, shrimp, Dungeness crab, salmon, tuna and other sport fish
    - Salmon make spawning runs up the region's many rivers, using fish ladders to get by dams
    - The oceanic ecosystem also has tide pools - rocky areas on the edge of the ocean where land meets the sea
    - Tide pools contain many plants and animals such as starfish, anemones, clams and kelp
- The region's terrestrial climates are largely defined by the amount of precipitation received both as rain and snow
    - The western portion of the region from the coast to the Cascade Mountains gets plentiful rainfall
    - East of the Cascade Mountains, there is almost no rainfall
- The ecosystem that is adapted to the heavy rainfall along and in the coastal mountain ranges is known as a temperate rain forest
    - The forest is made up of large conifers – Douglas fir and spruce
- In Oregon between the coastal mountain ranges and the Cascades is the Willamette Valley
    - The valley was once prairie ecosystem of tall grasses and perennial forbs and is now converted to agriculture
- East of the Cascade mountains is the sagebrush steppe ecosystem
    - Here frost tolerant sagebrush and native grasses are adapted to hot dry summers and cold dry winters
    - Pronghorn antelope and black tailed jackrabbits thrive here
- Another prairie ecosystem is centered on the Palouse Plateau
- The last major ecosystem in the Pacific Northwest is a classic northern pine forest situated on the slopes of the Rocky Mountains in Idaho and Washington
    - The forest is dominated by hemlock, Douglas fir and the giant white pine

- Elk and moose can be seen throughout this ecosystem

Chapter Three: Oregon

Student Goals - In this *Pacific Northwest – Program 1: Geography* chapter the students will learn:

- In 1859, Oregon became the 33rd state to be admitted to the Union
- It encompasses 96,000 square miles of diverse topography and ecosystems and is home to approximately 3.5 million people
- Oregon has a long history of exploration by the Spanish and English
- Lewis and Clark reached the mouth of the Columbia in 1805
- By 1840 it was the destination of pioneers traveling along the Oregon Trail
- Half the state is forest
- Abundant, green electricity is produced by the numerous dams located on the Columbia River
- Portland is the nation's 28th largest city
    - It is located on the Willamette River near its confluence with the Columbia
    - It is home to sports industry giant, Nike
    - It has become, in the 21st century, the number one model of a green city with its many parks and efficient public transportation system
- Oregon's capital is located in Salem

Chapter Four: Washington

Student Goals - In this *Pacific Northwest – Program 1: Geography* chapter the students will learn:

- Washington is the 42nd state, joining the union in 1889
- Washington's land encompasses 66,500 square miles, and it has nearly 6 million people
- In 1824, Britain's Hudson Bay Company established Fort Vancouver in Washington
- The Fort quickly became a destination for American fur trappers
- In the 1880s the shore along Puget Sound became a magnet for settlers from the Midwest and immigrants from foreign countries
- During World War II, Washington became the center for building aircraft for the war effort
- Agriculture and timber are two of the state's biggest industries
- Washington is also home to Microsoft, Amazon Books, Starbucks and Costco
- Washington's capital is Olympia

Chapter Five: Idaho

Student Goals - In this *Pacific Northwest – Program 1: Geography* chapter the students will learn:

- Idaho became the 43rd state in 1890
- It is 83,000 square miles and has 1.5 million people
- In the 1860s, gold and silver were discovered in Idaho, producing a great gold rush
- Throughout the 20th century, extraction industries – mining and lumbering – and agriculture have been the focus of Idaho's economy
- Idaho produces over one fourth of the nation's potatoes and is the leader in commercially raised salmon
- Boise is Idaho's largest city and capital

Answers to Blackline Master 1A Quiz

1-a; 2-a, c, d; 3-c; 4-b; 5-b; 6-d; 7-a; 8–a, d, f, g; 9-b, c; 10-d; 11– a = f, b = d, c = e; 12-a; 13-c; 14-c

INTRODUCTION AND SUMMARY OF *PACIFIC NORTHWEST – PROGRAM 2: HISTORY*

Pacific Northwest – Program 2: History is a new approach to presenting the exciting history of the Pacific Northwest from its earliest Native Americans to the 21st century. The program is designed to present *Pacific Northwest – Program 2: History* in a way that promotes successful student learning. The program begins with the end of the ice age, the hunter gatherer groups moving into the area, and the formation of the region's American Indian tribes. It then goes into the age of exploration and settlement by Europeans and the resulting Indian Wars. Following settlement, the story shifts to the region's two biggest industries – mining and timber and the impact of transportation and labor. Finally the 20th century's two biggest events, the Depression and World War II are recounted and the program ends with the outlook of the Pacific Northwest in the 21st century.

Student learning Goals - In *Pacific Northwest – Program 2: History* the students will learn:

- Who the first humans were that came into the Pacific Northwest
- The three common language and geographic groups of Pacific Coast Indian tribes
- The many explorations that opened up the Pacific Northwest to Europeans and Americans
- Settlement of the Pacific Northwest by easterners traveling the Oregon Trail
- When each state of the region achieved statehood and their political systems
- How mining and timber defined the region during the 19th century and remain important industries today
- That today's harbors and railroads are a reminder of those early days when the Pacific Northwest's industries needed transportation to survive
- How the Industrial Workers of the World were important to the Pacific Northwest
- The unique way that the Pacific Northwest handled the Great Depression and World War II
- How the Pacific Northwest is defined in the 21st century

SUGGESTED LESSON PLAN

Pacific Northwest – Program 2: History is laid out so that the program can be viewed in its entirety, or by selecting the DVD Menu Screen, Chapter Selects, individual chapters can be viewed separately to create a lesson plan. Each chapter presents an aspect of those important events that have shaped the Pacific Northwest for the last 10,000 years.

Below is a list of the program and its chapters. Using these chapters, teachers can create a lesson plan to cover the specific issues, themes and the historical figures mentioned.

Pacific Northwest – Program 2: History

- Prehistory and American Indian Tribes
- Exploration
- Settlement

- The Indian Wars
- Statehood and the Political System
- Mining and Timber
- Transportation and Labor
- The Great Depression
- World War II and After
- The 21st Century

Chapter One: Prehistory and American Indian Tribes

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- Sometime after the height of the last Ice Age, 20,000 years ago, people began moving into the Pacific Northwest
    - Soon, hunter-gatherer groups, known as Paleo Indians, developed
    - They hunted the last of the giant mammals with a spear-throwing device called an atlatl
    - Hunter-gatherer groups known as archaic cultures followed
    - The Pacific Northwest is famous for the discovery of a complete archaic human skeleton called the Kennewick Man
- By the time Europeans arrived in the late 1700s, the Pacific Northwest was divided into distinct American Indian nations
    - These Indians had bows and arrows as well as pottery but remained mostly hunter gatherers
    - The Pacific Northwest Indian tribes can be arranged into three common language and geographic groups
    - The first lived along the Pacific Coast and are the northwest coastal Indians
        - They carved totem poles and fished from huge dugout canoes
    - The second lived along the Columbia Plateau
        - At first they lived along the Columbia and its tributaries, but with the arrival of horses they became more nomadic
    - The third tribal cultural group were the Great Basin Indians – Paiute, Bannock and Shoshone
        - They survived by living in small, mobile family groups

Chapter Two: Exploration

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- In the 16th century, the English and Spanish explored the Pacific Northwest
    - In 1579, English privateer, Sir Francis Drake sailed to the Columbia River
    - In 1592, Spanish sailor Juan de Fuca explored the Strait of Juan de Fuca
- In 1803 Lewis and Clark began their epic journey from St. Louis, Missouri
- In 1805 Lewis and Clark entered the Pacific Northwest and wintered at the mouth of the Columbia at Fort Clatsop
- Following Lewis and Clark came fur traders
    - John Jacob Astor founded Astoria in 1811 in the same area as Fort Clatsop

- Dr. John McGloughlin of the British owned Hudson's Bay Company founded Fort Vancouver on the north bank of the Columbia River across from present day Portland

Chapter Three: Settlement

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- By the late 1830s, Easterners, reading that the Pacific Northwest was the new Garden of Eden, began to catch 'Oregon Fever'
- Over the next 40 years more than 500,000 immigrants followed the Oregon Trail westward to the Pacific Northwest and California
  - The travel was long, dangerous and arduous
  - One in five pioneers died along the trail
- Many settlers stayed in Oregon
- Others went north to Washington territory, where they met an unusual supporter, Chief Sealth, sometimes called Chief Seattle
- Because of Sealth's help, the white Settlers named Seattle after him

Chapter Four: The Indian Wars

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- By 1869, the railroads began to replace the great Oregon Trail, bringing in more miners and settlers
- Conflict with the Indians increased as Native Americans were pressured to give up their lands
- War happened, ironically, with the Bannock, Shoshone and the Nez Perce tribes who had originally welcomed white settlers
  - In 1863, the U.S. Army defeated a force of Bannock and Shoshone warriors at the Battle of Bear River and forced the tribes onto a reservation
  - In June 1877, war broke out with the Nez Perce
    - Chief Joseph and his lieutenants led 700 Nez Perce in a flight to Canada
    - In the most brilliant military retreat ever on American soil, 200 Nez Perce warriors held off 2000 U.S. Army soldiers for three months
    - The Nez Perce were finally stopped, forty miles from the Canadian border
    - It was then that Chief Joseph uttered the most famous words ever by an American Indian
- With the Indians cleared out of the way, the road from territory to statehood was now easy

Chapter Five: Statehood and the Political System

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- In 1845 Oregon territory was jointly occupied by Britain and the United States
- In 1846, the Oregon Treaty between the U.S. and Britain gave America the Pacific Northwest below the 49th parallel
- Oregon gained statehood in 1859, Washington in 1889, and Idaho in 1890
    - Their capitals are Salem, Oregon; Olympia, Washington; and Boise, Idaho
- Each state's government is based upon a Constitution with three branches of government
    - A governor as the executive, a two-house legislature, and a statewide court system

Chapter Six: Mining and Timber

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- After the discovery of gold in California's Sierra Nevada Mountains and the Rocky Mountains in Colorado, gold fever whipped through the country
- The Gold rushes of the Pacific Northwest produced legendary boomtowns
    - Most boomtowns died out, but some became tourist towns
- In the 21st century, Idaho continues to be a major source of minerals and chemicals necessary to the modern economy
- With nearly half of the Pacific Northwest in forests, logging boomtowns soon appeared
    - The biggest timber boomtown was Seattle, Washington
- Today the timber business is still a major part of the Pacific Northwest economy

Chapter Seven: Transportation and Labor

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- The Columbia River was wide and navigable
    - The Columbia River funneled the produce of its great basin to the Pacific
    - Seattle and Tacoma became the biggest shipping ports on the west coast
- Pacific Northwest labor would form the backbone of the International Workers of the World or the Wobblies
    - The labor movement could become violent
    - Wobblies clashed with police on the docks in Everett, Washington
    - The onset of WWI brought an end to the Wobblie movement
- During the Roaring Twenties, the Pacific Northwest prospered
- In 1929, the Great Depression affected the Pacific Northwest
- The region answered the problem by building hydroelectric dams to provide low cost sustainable power and irrigation

Chapter Eight: The Great Depression

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- The masterpiece of the hydroelectric dam project was the Bonneville Dam on the Columbia River
- The most disputed issue arising from the dam's construction was whether the power should be public or private
- Congress answered by creating the Bonneville Power Administration, a public entity to market the dam's electric power to the region
- The dam's power jump-started the region's economy
- Irrigation made the region an agricultural paradise

Chapter Nine: World War II and After

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- WWII and the BPA heralded the technology industry that would dominate the Pacific Northwest for the last 70 years
- The Pacific Northwest's embrace of technology began with the Boeing Aircraft Company building planes for WWII
- The Pacific Northwest was the scene for several technological firsts, including Microsoft and Amazon's on line retailing

Chapter Ten: The 21st Century

Student Goals - In this *Pacific Northwest – Program 2: History* chapter the students will learn:

- The Pacific Northwest is a Mecca for tourists
- The Pacific Northwest has become a model for building green
- The Pacific Northwest is one of the favorites for best region of the country

Answers to Blackline Master 2A Quiz

1-b; 2-a; 3-c; 4-a; 5-d; 6-b; 7-b; 8-d; 9-b; 10-c; 11-c; 12-b; 13-b; 14-d; 15-a

INTRODUCTION AND SUMMARY OF PACIFIC NORTHWEST – PROGRAM 3: CLIMATE CHANGE

Pacific Northwest – Program 3: Climate Change is a new approach to presenting the impact of climate change on the Pacific Northwest. The program is designed to present *Pacific Northwest – Program 3: Climate Change* in a way that promotes successful student learning. The program begins with an overview of global warming and how global warming affects the different climates and ecosystems of the Pacific Northwest. The program then investigates the impact of climate change on the Pacific Northwest's forests, agriculture, water, snow, glaciers, and ends with what is perhaps climate change's greatest impact – sea level rise.

Student learning Goals - In this *Pacific Northwest – Program 3: Climate Change* students will learn:

- A brief overview of what causes climate change
- A concise description of climates and ecosystems of the Pacific Northwest
- About the forest ecosystems and how climate change will impact them
- About the Pacific Northwest's agricultural areas and how global warming will affect food production
- How sea level rise will affect the population of the Pacific Northwest

SUGGESTED LESSON PLAN

Pacific Northwest – Program 3: Climate Change is laid out so that the program can be viewed in its entirety, or by selecting the DVD Menu Screen, Chapter Selects, individual chapters can be viewed separately to create a lesson plan. Each chapter presents an in depth look at climate change and its impact on the Pacific Northwest.

Below is a list of the program and its chapters. Using these chapters, teachers can create a lesson plan to cover the specific issues, themes and the historical figures mentioned.

Pacific Northwest – Program 3: Climate Change

- Global Warming and Climate Change in the Pacific Northwest
- Climate Change Impacts on the Forests
- Water, Snow, and Glaciers
- Climate Change Impacts on Agriculture
- Sea Level Rise

Chapter One: Global Warming and Climate Change in the Pacific Northwest

Student Goals - In this *Pacific Northwest – Program 3: Climate Change* chapter the students will learn:

- A brief definition of global warming and climate change
    - Carbon dioxide is a powerful greenhouse gas that traps solar energy
        - As a result less heat escapes back into space during the night

        - The result is a slow warming of Earth's lower atmosphere causing it to hold more moisture and become more dynamic
        - The overall impact of this warming and charged up atmosphere is climate change across the Earth
- Climates are defined in a specific area as the average yearly temperatures and the average amount of precipitation
    - In the Pacific Northwest the coastal climate is cool and rainy
    - East of the Cascade Mountain Range, winters are cold, summers are hot and it barely rains at all
- Ecosystems are webs of life – plants and animals – adapted to a particular climate
    - Temperate rain forests are adapted to the coastal mountain ranges
    - Sagebrush is adapted to the dry steppes and plains of the East
    - As climates change, so do ecosystems
- Scientists have discovered the main source of the increased CO_2 in the atmosphere has occurred as a result of burning fossil fuels
    - This has an unintended consequence of global warming
- Global warming also melts the large store of water contained in mountain glaciers and in the ice sheets of Greenland and Antarctica
    - When ice sheets melt, sea levels begin to rise, impacting coastal regions
    - When glaciers shrink, drinking and irrigation water supplies are threatened
- The region in the continental United States that will experience the greatest change as a result of global warming is the Pacific Northwest
    - Winters will shorten
    - There will be more precipitation in the form of rain instead of snow
    - Heat waves will increase in frequency and intensity
    - There will be longer droughts
    - There will be more dry days punctuated by more intense, powerful storms
- These changes in climate and weather extremes will have the greatest impact on the region's ecosystems

Chapter Two: Climate Change Impacts on the Forests

Student Goals - In this *Pacific Northwest – Program 3: Climate Change* chapter the students will learn:

- The Pacific Northwest is dominated by forest ecosystems
- Global warming threatens the forest ecosystems and the timber industry in two distinct ways – forest fires and insect infestations
- The climate has already changed enough that a longer fire season and fires that just can't be put out are happening now
- With the increase in forest fires, there will be an increase in hazards to human property and life
- Bark beetles attack a variety of the forest species
    - Bark beetle larvae burrow tunnels into the tree
    - Normally, healthy trees have defenses against bark beetles
    - Trees stressed by disease or warmer and dryer conditions can no longer defend themselves against the tunneling beetle larvae
    - As a result, trees die by the billions

- Bark beetle infestations have reached epidemic proportions because cold winters and high mountain cold, which stopped their migration have been removed by global warming
- It is estimated that as much as 80% of the Pacific Northwest's pine trees will be dead by 2015

Chapter Three: Water, Snow, and Glaciers

Student Goals - In this *Pacific Northwest – Program 3: Climate Change* chapter the students will learn:

- Water particularly defines the West because most of the West is arid
- Oregon needs water for life
- Water from the Columbia River and its tributaries irrigates crops, transports goods, creates power
- Climate change will impact the Pacific Northwest's water supply
- The main source of water in the region is from the glaciers and snow packs in the Cascade Mountains and snow packs in the Rocky Mountains
- Glaciers provide a steady flow of water in the summer for irrigation and drinking
- The Rocky Mountain glaciers have all but disappeared and the Cascade glaciers are being threatened by climate change
- On Mount Rainier and elsewhere, the glaciers are retreating
- The snow pack that accumulates in the mountains over the winter is also affected
- Climate change causes the summer melt to increase and shorter winters with more precipitation as rain
- The nature of the water volume flowing into the Pacific Northwest's rivers is changing
    - High water occurs earlier in the spring and there is less water in the late summer
    - As the fresh water supply continues to diminish, problems and conflicts will arise unless this supply is carefully managed to see who gets the water
    - Cities, hydroelectric and agriculture will all be affected

Chapter Four: Climate Change Impacts on Agriculture

Student Goals - In this *Pacific Northwest – Program 3: Climate Change* chapter the students will learn:

- Irrigation has turned the Pacific Northwest into an agricultural paradise
- The area east of the Cascades is some of the most agriculturally productive land in the country
- All of this agriculture is threatened by climate change
    - Less snow pack means less irrigation water for agriculture
- The agricultural areas are vulnerable to reduced water supplies from warmer and hotter summers
    - In the Yakima River Valley less water means fewer orchards
    - In the Columbia basin less water means less wheat
    - On the Palouse Plateau, a dryer area means irrigation will be needed to grow food there

    - In the Willamette Valley of Oregon, hotter dryer summers mean the ripening period for fruit is changing
- The high price of energy will make it too expensive to import food
- As the climate warms, current food crops may have to be moved on to British Columbia, or places farther north

Chapter Five: Sea Level Rise

Student Goals - In this *Pacific Northwest – Program 3: Climate Change* chapter the students will learn:

- Rising sea levels will affect the population and infrastructure along the coasts of Washington and Oregon
- Climate change impacts will have to be dealt with by an educated citizenry, through
    - Smart planning
    - A dramatic reduction of the Pacific Northwest's carbon footprint
    - By making spectacular gains in energy efficiencies

Answers to Blackline Master 3A Quiz

1-b; 2-a; 3-d; 4-b; 5-a; 6-c; 7-e; 8-b; 9-a; 10-c