Fisheries

Grades 11 and 12

Unit 1

Course/Subject:	Grade:		Suggested Timeline:
Fisheries	11 & 12		5-6 weeks

Grade Level Summary	This semester course focuses on the identification of various shellfish, warm and cold finfish species, boating and boating safety. Students will look at different water ways and habitats. Emphasis will be placed on conservation, habitat evaluation, environmental analysis, game fish management, and possible careers. Projects and laboratory exercises will be the major forms of assessment within the course.
Grade Level Units	Zoology and Ecology of Fish, Reptiles, and Amphibians; Marine Mammals, Birds, Reptiles and Amphibians; Conservation Management; Pa fishing regulations and tactics

Unit Title	Zoology and Ecology of Fish, Reptiles, and Amphibians
Unit Summary	This unit will look at all the cold blooded animals such as fish, reptiles, and amphibians. It will look at their physical features, reproduction, and habitat.

Unit Essential Questions:	**Key Understandings:**
• What are key characteristics that easily identify fish, reptiles, and amphibians?	• Freshwater fish • Anadromous and Diadromous fish • Saltwater fish and Fauna

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
NRS.01.02.03.b	Apply identification techniques to determine the species of wildlife or insect.
NRS.01.02.03.a	Research and examine the characteristics used to identify wildlife and insects.

Important Standards Addressed in the Unit:

CC.3.5.11-12.J.	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
CC.3.5.11-12.A.	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
CC.3.5.11-12.B.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
CC.1.2.11–12.K	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibly from a range of strategies and tools.
CC.1.2.11–12.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.

CC.1.4.11–12.A	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
CC.1.4.11–12.S	Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.
CC.1.4.11–12.V	Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
CC.1.4.11–12.W	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Misconceptions:	**Proper Conceptions:**
• Fish live in either fresh water or salt water.	• There are several species of fish that can live in salt water and freshwater.

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Fish, reptile and amphibian ● Identification ● Reproduction ● Habitat	● Identify the basic anatomy of animals. ● Identification through physical characteristics ● Determine reproduction habits and quantities ● Identify and locate ideal habit	● Persistence ● Curiosity

Academic Vocabulary:

● Freshwater	● Pelvic fin	● diadromous fish
● Anatomy	● Anal fin	● anadromous fish
● Spawn	● Laterally compressed	● catadromous fish
● Roe	● Hybrid	● iteroparous fish
● Milt	● Darter	● redd
● Bullhead	● Tapetum lucidum	● alevin
● Barbell	● Aerated water	● yolk sac
● Dorsal fin	● Race	● yolk-sac fry
● Pectoral fin	● Aquaculturist	● yolk
● Adipose fin	● School	● fry
● Hatchery stock	● Char	● fingerling
● Anadromy	● Cannibalistic	● smolt
● Kelt	● Caviar	● barging
● Jacks	● Scute	● wild stock
● Steelhead	● Fauna	● sinistral fish
● Ichthyology	● Cartilaginous fish	● dextral fish
● Leptocephali	● Egg case	● camouflage
● Elver	● Torpedo	● isospondylous fish
● Hermaphrodite	● Pelagic	● demersal spawner
● Bivalve	● Billfish	● larva
● Antenna	● Flatfish	● smelt
● Compound eye	● swimmeret	

Assessments:

- Test
- Quizzes
- Projects
- Homework
- Classwork (worksheets, group work, lab work, etc)

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit and all units in this course relate very closely to science, in particularly biology. Students will look at zoology and ecology of fish, reptiles, amphibians, birds and marine mammals found in the environment.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- Fish and Wildlife Principles of Zoology and Ecology 3rd edition
- Pa Fishing Digest rules and regulations book

Created By:
Troy Summey

Fisheries

Grades 11 and 12

Unit 2

Course/Subject:	Grade:		Suggested Timeline:
Fisheries	11 & 12		5-6 weeks

Grade Level Summary	This semester course focuses on the identification of various shellfish, warm and cold finfish species, boating and boating safety. Students will look at different water ways and habitats. Emphasis will be placed on conservation, habitat evaluation, environmental analysis, game fish management, and possible careers. Projects and laboratory exercises will be the major forms of assessment within the course.
Grade Level Units	Zoology and Ecology of Fish, Reptiles, and Amphibians; Marine Mammals, Birds, Reptiles and Amphibians; Conservation Management; Pa fishing regulations and tactics

Unit Title	Marine Mammals, Birds, Reptiles and Amphibians
Unit Summary	This unit looks at wildlife that attributes and affects fisheries. Marine mammals, birds, reptiles and amphibians all play critical rolls in sustaining balanced fisheries. This unit will look at identification and the role this wildlife plays on fisheries.

Unit Essential Questions:	**Key Understandings:**
• How do marine mammals, waterfowl, reptiles, and amphibians add to the balance of fisheries? What would those fisheries look like if they were to get out of balance?	• Marine mammals • Waterfowl • Retile and amphibians

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
NRS.01.02.03.b	Apply identification techniques to determine the species of wildlife or insect.
NRS.01.02.03.a	Research and examine the characteristics used to identify wildlife and insects.

Important Standards Addressed in the Unit:

CC.3.5.11-12.J.	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
CC.3.5.11-12.A.	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
CC.3.5.11-12.B.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
CC.1.2.11–12.K	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibly from a range of strategies and tools.
CC.1.2.11–12.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.

CC.1.4.11–12.A	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
CC.1.4.11–12.S	Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.
CC.1.4.11–12.V	Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
CC.1.4.11–12.W	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Misconceptions:	**Proper Conceptions:**

Knowledge & Concepts	**Skills & Competencies**	**Dispositions & Practices**
● Species identification ● Habitat ● Reproduction ● Diet ● Impact on ecosystem	● Recognize the importance of wildlife and forestry as it relates to natural resources management. ● impacts of invasive species on ecosystems ● native and nonnative species identification ● identify through physical appearance ● classification	● persistence ● curiosity

Academic Vocabulary:

● marine mammal	● toothed whale	● lamellae
● finfeet	● krill	● duckling
● pinniped	● dolphin	● dabbling duck
● crustacean	● cuttlefish	● molt
● mollusk	● pod	● gosling
● shellfish	● waterfowl	● grit
● white coat	● avian	● gizzard
● manatee	● oviparous	● cygnet
● oceanology	● incubation	● ectotherm
● oceanologist	● viviparous	● endotherm
● blowhole	● ornithology	● reptile
● cetacean	● skink	● amphibian
● blubber	● gecko	● metamorphosis
● chorion	● ecdysis	● amniote egg
● allantois	● viper	● embryonic membranes
● amnion	● elapid	● herpetologist
● amniotic fluid	● Jacobson's organ	● tympanum
● caiman	● Constrictor	● nare
● iguana	● Plastron	● tadpole
● terrapin	● Tortoise	● polliwog
● turtle	● Neotenic	● eft
● keel	● ornithologist	
● baleen whale	● down	
● whalebone	● plumage	

Assessments:

- Test
- Quizzes
- Projects
- Homework
- Classwork (worksheets, group work, lab work, etc)

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit and all units in this course relate very closely to science, in particularly biology. Students will look at zoology and ecology of fish, reptiles, amphibians, birds and marine mammals found in the environment.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- Fish and Wildlife Principles of Zoology and Ecology 3rd edition
- Pa Fishing Digest rules and regulations book

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Fisheries

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Unit 3

Course/Subject:	Grade:		Suggested Timeline:
Fisheries	11 & 12		3-4 weeks

Grade Level Summary	This semester course focuses on the identification of various shellfish, warm and cold finfish species, boating and boating safety. Students will look at different water ways and habitats. Emphasis will be placed on conservation, habitat evaluation, environmental analysis, game fish management, and possible careers. Projects and laboratory exercises will be the major forms of assessment within the course.
Grade Level Units	Zoology and Ecology of Fish, Reptiles, and Amphibians; Marine Mammals, Birds, Reptiles and Amphibians; Conservation Management; Pa fishing regulations and tactics

Unit Title	Pa fishing regulations and tactics
Unit Summary	This unit looks into the rules and regulations of fishing in Pennsylvania. Students will study the laws and creel limits pertaining to Pennsylvania waters. This unit will also look at the tactics for harvesting fish.

Unit Essential Questions:	**Key Understandings:**
• Why are laws and creel limits put in place and why do they differ from area to area and state to state?	• Pa fish laws • Pa game species and nongame species • Fishing tactics

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
NRS.02.01.01.b	Analyze the structure of laws associated with natural resource systems.
NRS.02.01.01.a	Distinguish between the types of laws associated with natural resource systems.
NRS.02.01.01.c	Evaluate the impact of laws associated with natural resource systems.
NRS..02.02.01.a	Summarize the relationship between natural resources, ecosystems and human activity.
NRS.02.01.02.c	Evaluate the impact and effectiveness of agencies associated with natural resources system.
NRS.02.02.01.c	Evaluate how the availability of natural resources can be improved through changes to human activity.

Important Standards Addressed in the Unit:	
CC.1.4.11–12.X	Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences.
CC.1.4.11–12.S	Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.
CC.1.4.11–12.G	Write arguments to support claims in an analysis of substantive topics.
CC.1.4.11–12.A	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
CC.3.5.11-12.G.	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Misconceptions:	Proper Conceptions:
• You are a Pennsylvania resident so you can fish in any waters for any fish. • You may kill snakes because you don't like them.	• Resident or Non-resident once you have reached the age of 16, you must possess a fishing license and special stamps for trout and salmon. • In Pa you are only allowed to harvest 1 venomous snake per year with proper permit.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● PA Fishing regulations and laws ● Game fish ● Nongame fish ● Rod and reel fishing ● Fly fishing ● Cast netting ● Gill netting ● history of conservation in Pennsylvania. ● different methods of sustainable agriculture	● Identify game fish ● Use fishing tackle to target game fish ● Determine areas to target fish ● Understand and follow all fishing laws ● Read and understand the fishing rules and regulations handbook ● Explain the importance of management and planning of resources. ● Assess the impacts of invasive species on ecosystems	● Curiosity

Academic Vocabulary:		
● Law ● Regulation ● Creel limit ● Possession limit ● Invasive species ● Inland waters ● Artificial bait ● Lure ● Catch and release ● harvest	● Lake ● River ● Stream ● Trout/salmon stamp ● Game species ● Baitfish ● Fly ● Barbless ● Foul hook ● Panfish	● Migratory fish ● Hatchery ● Gill net ● Cast net ● Rod and reel ● Treble hook ● barb

Assessments:

- Test
- Quizzes
- Projects
- Homework
- Classwork (worksheets, group work, lab work, etc)

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit and all units in this course relate very closely to science, in particularly biology. Students will look at zoology and ecology of fish, reptiles, amphibians, birds and marine mammals found in the environment.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
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- Pa Fishing Digest rules and regulations book

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Fisheries

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Unit 4

Course/Subject:	Grade:		Suggested Timeline:
Fisheries	11, & 12		5-6 weeks

Grade Level Summary	This semester course focuses on the identification of various shellfish, warm and cold finfish species, boating and boating safety. Students will look at different water ways and habitats. Emphasis will be placed on conservation, habitat evaluation, environmental analysis, game fish management, and possible careers. Projects and laboratory exercises will be the major forms of assessment within the course.
Grade Level Units	Zoology and Ecology of Fish, Reptiles, and Amphibians; Marine Mammals, Birds, Reptiles and Amphibians; Conservation Management; Pa fishing regulations and tactics

Unit Title	Conservation and Management
Unit Summary	This unit looks at the conservation of natural resources in particular fisheries. In order for an ecosystem to support fish, there must be conservation of water, soil, and air. This unit will also look at the fishing rules and regulation in Pennsylvania and the management practices of the fisheries.

Unit Essential Questions:	**Key Understandings:**
• Why are the earth's natural resources a precious commodity? How do you/we need to conserver and manage them, so future generations can enjoy them as well?	• Responsible management of fisheries and wildlife resources • Conservation of natural resources • Human connection to fisheries and natural resources

Focus Standards Addressed in the Unit:

Standard Number	***Standard Description***
NRS.02.01.01.b	Analyze the structure of laws associated with natural resource systems.
NRS.02.01.01.a	Distinguish between the types of laws associated with natural resource systems.
NRS.02.01.01.c	Evaluate the impact of laws associated with natural resource systems.
NRS..02.02.01.a	Summarize the relationship between natural resources, ecosystems and human activity.
NRS.02.01.02.c	Evaluate the impact and effectiveness of agencies associated with natural resources system.
NRS.02.02.01.c	Evaluate how the availability of natural resources can be improved through changes to human activity.

Important Standards Addressed in the Unit:	
CC.3.5.11-12.J.	By the end of grade 12, read and comprehend science/technical texts in the grades 11–12 text complexity band independently and proficiently.
CC.3.5.11-12.A.	Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
CC.3.5.11-12.B.	Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
CC.1.2.11–12.K	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade-level reading and content, choosing flexibly from a range of strategies and tools.
CC.1.2.11–12.L	Read and comprehend literary nonfiction and informational text on grade level, reading independently and proficiently.
CC.1.4.11–12.A	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately.
CC.1.4.11–12.S	Draw evidence from literary or informational texts to support analysis, reflection, and research, applying grade-level reading standards for literature and literary nonfiction.
CC.1.4.11–12.V	Conduct short as well as more sustained research projects to answer a question (including a self generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation
CC.1.4.11–12.W	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.

Misconceptions:	Proper Conceptions:
• The federal government controls every aspect of fish management.	• The state agency sets forth seasons and creel limits that are suggested by fish biologist.

Knowledge & Concepts	Skills & Competencies	Dispositions & Practices
● history of conservation in Pennsylvania. ● renewable and non-renewable natural resources ● fisheries as it relates to natural resources management ● water quality, air quality, and waste management within ecosystems.	● Identify sources of point and non-point pollution ● Explain the importance of management and planning of resources ● Assess the impacts of invasive species on ecosystems ● Compare and contrast different methods of sustainable agriculture ● Compare and contrast the impact of conventional and alternative energy sources on the environment.	● Ethical behavior and civic responsibility

Academic Vocabulary:

- Erosion
- Soil conservation
- Toxic waste
- Biodegradable
- Overgrazing
- Acid precipitation
- Decomposer
- Nonbiodegradable
- Point source pollution
- Nonpoint source pollution
- Multiple use
- Oversight
- Poaching
- Riparian zone
- Silt load
- Conservation
- Renewable resource
- Nonrenewable resource
- Silt
- Alluvial fan
- Nitrate
- Phosphate
- Algae
- Adaptive behavior
- Smog
- Imprinting
- Biotechnology
- Genetic engineering
- Catalytic converter
- Wet scrubber
- Electrostatic precipitator
- Biota
- Domestic
- Transpiration
- Watershed
- Intrinsic value
- Pristine
- Steward
- Ethics
- Naturalist
- Stewardship
- Extinct
- Endangered species
- Threatened species
- Habitat
- Organism
- Alien species
- Nonadaptive behavior
- Biotic potential
- biologist

Assessments:

- Test
- Quizzes
- Projects
- Homework
- Classwork (worksheets, group work, lab work, etc)

Differentiation:

- Book work
- Lecture
- Demonstrations
- Video clips
- Hands on learning
- IEP accommodations

Interdisciplinary Connections:

- This unit and all units in this course relate very closely to science, in particularly biology. Students will look at zoology and ecology of fish, reptiles, amphibians, birds and marine mammals found in the environment.

Additional Resources:

- Video clips
- Articles
- Personal Accounts
- Fish and Wildlife Principles of Zoology and Ecology 3rd edition
- Pa Fishing Digest rules and regulations book

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