**APES Master Target List**

Gauge your understanding of each point using this grid:

1. = I understand it thoroughly and could teach others

3 = I feel fairly comfortable in understanding the concept

5 = I need to go back and review this concept more thoroughly

**Ecosystems Targets**

1. I can define and compare the first and second laws of thermodynamics and use them to explain energy transfer in food webs and energy pyramids

1 3 5

1. I can describe the levels of organization of matter in an ecosystem from simple to most complex

1 3 5

1. I know the main layers of the earth as well as the lithosphere and aesthenosphere..7

1 3 5

1. I am able to give examples of factors which may limit a population’s growth and I can define what is a range of tolerance for these types of factors

1 3 5

1. I can explain what happens to both energy and matter in an ecosystem.

1 3 5

1. I can explain, in detail, the steps of both photosynthesis, aerobic respiration, Gross Primary Productivity and Net Primary Productivity. I am also able to explain how the terms/processes are related

1 3 5

1. I can list and define the four types of biodiversity in an ecosystem and I can explain ways that humans are impacting biodiversity

1 3 5

1. I can use the Shannon Weiner Biodiversity Index to quantitatively compare the biodiversity levels of two or more ecosystems/sites

1 3 5

**Evolution and Biodiversity**

1. I can define evolution by natural selection and I can explain how it can account for the diversity of organisms on earth

1 3 5

1. I can explain how geologic processes, climate change and catastrophes affect evolution

1 3 5

1. I can define ‘ecological niche’. I can cite examples.

1 3 5

1. I can describe the processes of divergent and convergent evolution

1 3 5

1. I know how the extinction of species and the formation of new species affect biodiversity.

1 3 5

1. I can compare traits of generalist and specialist species

1 3 5

1. I can explain, in detail, the history of the planet’s mass extinction periods

1 3 5

1. I can discuss the role of genetic engineering in food production, citing examples, concerns and issues

1 3 5

**Climate and Terrestrial Biodiversity**

1. I can describe the factors that affect the earth’s climate and I can describe the difference between weather and climate

1 3 5

1. I can describe factors that contribute to global air-circulation patterns.

1 3 5

1. I can describe how ocean currents are created and what influences them and how they redistribute heat.

1 3 5

1. I can describe and diagram the rainshadow effect and explain how it contributes to local microclimates.

1 3 5

1. I can describe how climate affects the distribution of plant life on Earth. I am able to draw connections between biomes, climate patterns, plants, and animals

1 3 5

1. I can compare the climate and adaptations of plants and animals in the main biomes including:

Desert, semi -arid desert, tundra, tropical rainforest, temperate grasslands, tropical desert, temperate deciduous forest, forests, tropical grassland, temperate rainforest, boreal forest/taiga

1 3 5

1. I can interpret and apply climatographs to the major biomes.

1 3 5

1. I can calculate the board feet of wood in a tree.

1 3 5

1. I can use a tree guide to identify common native coniferous and deciduous trees in Highland Park.

1 3 5

1. I know the anatomy of a tree, including leaf arrangement and vascular structure.

1 3 5

**Aquatic Biodiversity**

1. I know the factors that affect the kinds of life that exists in marine and freshwater ecosystems

1 3 5

1. I can identify and describe the major types of saltwater life zones and explain how human activities affect them

1 3 5

1. I can identify and describe the major types of freshwater life zones and explain how human activities affect the

1 3 5

1. I can compare and contrast the characteristics of these lake types :

* Eutrophic
* Oligotrophic
* Mesotrophic

1 3 5

1. I can define cultural eutrophication and distinguish between it and the natural process of eutrophication

1 3 5

1. I know what thermal stratification is (aka thermocline) in a lake. I know when and how it occurs.

1 3 5

1. I am able to explain types of wetlands and explain their economic and environmental benefits

1 3 5

**Community Ecology**

1. I can explain the factors that control and determine the number of species in a community.

1 3 5

1. I can classify species according to the roles they play in an ecosystem

1 3 5

1. I can explain the different ways that species interact with each other

1 3 5

1. I am able to describe types of competition and I can describe strategies species use to reduce competition.

1 3 5

1. I can explain ways that species and communities respond to environmental changes and time.

1 3 5

**Population Ecology**

1. I can describe the major characteristics of animal populations, including their distribution patterns, factors that cause increases or decreases to numbers and age structures

1 3 5

1. I know how populations respond to changes in environmental conditions

1 3 5

1. I can define birth rate, death rate, immigration, and emigration and write an equation to mathematically describe the relationship between these rates and the rate of population change.

1 3 5

1. I can define factors that limit population size or growth rate and give examples of limiting factors.

1 3 5

1. I can define different types of growth rates, growth patterns and limits on a graph.

1 3 5

1. I am able to define r-selected species and k-selected species and compare the two with examples.

1 3 5

1. I can describe the three general types of survivorship curves in nature.

1 3 5

1. I understand and can explain the dynamic of top-down population control theory (trophic cascade theory)

1 3 5

1. I understand and can explain the dynamic of primary producer population control theory

1 3 5

1. I can give a historical account of the interactions between moose and wolves on Isle Royale. I can also use this example to relate to situations in other predator/prey population examinations

1 3 5

**Human Populations**

1. I can describe the history of human population growth (in the world and in the U.S.) and I can make predictions of future population levels based upon present trends

1 3 5

1. I can define and compare how ‘replacement-level fertility’ and ‘total fertility rate differ’

1 3 5

1. I am able to list factors that affect birth and fertility rates and factors that affect death rate.

1 3 5

1. I can explain the high rate of teen pregnancy in the U.S. compared to other industrialized countries.

1 3 5

1. I can make connections between population growth and environmental degradation and impacts on food production.

1 3 5

1. I can explain why infant mortality and life expectancy are indicators of quality of life in a country.

1 3 5

1. I am able to define characteristics of developed and developing countries.

1 3 5

1. I can interpret population age structure diagrams. I can explain how the age structure of a country creates population growth momentum.

1 3 5

1. I can describe key factors used to influence population size such as: immigration policy, family planning, economic rewards and penalties, education and empowering women. I can cite efforts used in China and India to address their population issues

1 3 5

1. I can list and explain the four stages of the demographic transition.

1 3 5

**Sustaining Biodiversity, Ecosystem Approach**

1. I can discuss how human activities have affected the earth’s biodiversity

1 3 5

1. I know ways that rangeland and forests be used and managed more sustainably in the U.S. and the world

1 3 5

1. I can discuss the historical facts surrounding the Yellowstone wolf reintroduction program.

1 3 5

1. I can list reasons why species could/should be protected

1 3 5

1. I know the difference between old growth and second growth forests and approximately how much of each is on the planet and I can describe the goals of tree plantations

1 3 5

1. I know advantages and disadvantages of clear cutting, strip cutting, select cutting and seed tree harvesting

1 3 5

1. I know the ecological benefits of fire in different ecosystems (both wildfires and the role of prescribed burns) and can discuss different types of forest fires.

1 3 5

1. I know the history of our National Park system and can describe pressures that we put on them. I can also discuss ways to make them more sustainable

1 3 5

1. I can use Costa Rica as an example of how some countries manage their natural areas for the preservation of biodiversity as well as economic benefit (ecotourism)

1 3 5

1. I can define and compare the concepts of: Restoration, Rehabilitation, Replacement, Creation of artificial ecosystems

1 3 5

**Sustaining Biodiversity: Species Approach**

1. I know how biologists estimate extinction rates and I know how human activities affect these rates

1 3 5

1. I understand reasons why we should consider saving/protecting wild species

1 3 5

1. I can suggest ways that we can prevent the premature extinction of wild species

1 3 5

1. I can distinguish between local extinction, ecological extinction, and biological extinction.

1 3 5

1. I know the difference between threatened and endangered species. I can give examples of each

1 3 5

1. I am able to list some characteristics that make species extinction prone.

1 3 5

1. I know some root causes of extinction of wildlife and can use the acronym HIPPO to explain reasons for species extinction

1 3 5

1. I can explain the role that invasive species play in extinction rates and I can explain factors that make for a particularly successful invasive species. I can list many invasive species that were either accidentally or purposefully introduced

1 3 5

1. I know the specific stories of the bald eagle, brown pelican, California Condor, Grey Wolf (Yellowstone) Passenger Pigeon and Whooping Crane

1 3 5

1. I am able to describe the concepts of bioaccumulation and biomagnification as they relate to toxins in the environment.

1 3 5

1. I can define CITES and what its goals are. I can also explain how it works and some of the drawbacks.

1 3 5

1. I can explain in detail the Endangered Species Act (1973-1982-1988-2006). I know threats to it, its goals and some of its drawbacks.

1 3 5

1. I can detail The Lacey Act, The Migratory Bird Act and the Marine Mammal Protection Act

1 3 5

**Sustaining Aquatic Biodiversity**

1. I can explain the economic and ecological importance of sustaining aquatic biodiversity.

1 3 5

1. I can explain how human activities are impacting aquatic biodiversity

1 3 5

1. I can suggest ways that we may be able to manage and sustain the world’s marine fisheries

1 3 5

1. I can suggest ways that we may be able to manage and sustain the world’s wetlands and estuaries

1 3 5

1. I know what corals are and I can explain their economic and ecological value.

1 3 5

1. I can discuss examples of deliberate or accidental introduction of nonnative species and the roles they have played in the decline of native fish populations. Use as example…. The Great Lakes

1 3 5

1. I am able to describe how overfishing and invasive species have affected the populations of many marine and freshwater aquatic species. Explain how most commercial marine fishing can be termed ‘tragedy of the commons’.

1 3 5

1. I know what the IWC is and what it controls and what it does not control. I also know the nations that have signed onto the IWC and those that have not (and why).

1 3 5

**Food**

1. I can describe ways that the world’s food is produced.

1 3 5

1. I can discuss issues of erosion, salinization and desertification as they pertain to soil management

1 3 5

1. I can define The Green Revolution, the Dust Bowl and other historical events or time periods specific to food production

1 3 5

1. I can outline the practice of Integrated Pest Management as an alternative to conventional pest management strategies

1 3 5

1. I am able to distinguish between different classes of pesticides

1 3 5

1. I am able to give characteristics of food and food production techniques that would classify a food item as organically produced versus traditionally produced.

1 3 5

1. I can identify toxins in food and I can identify sources of these toxins

1 3 5

1. I can suggest ways that the world can move towards a more sustainable future in terms of agriculture and food distribution.

1 3 5

1. I can distinguish between the terms: food security, food scarcity, under nutrition, malnutrition and over nutrition

1 3 5

**Water Unit**

1. I can describe the importance of water to life, the availability of freshwater and how much of it humans are using

1 3 5

1. I understand what groundwater is, where it is and the advantages and disadvantages of drawing it out

1 3 5

1. I understand the advantages and disadvantages of using dams to provide both power and water

1 3 5

1. I know the process as well as advantages and disadvantages of desalination techniques used to supply drinking and irrigation water

1 3 5

1. I am able to suggest ways that we can manage and use our water resources more sustainably; both drinking water and agricultural (irrigation) supply and management issues.

1 3 5

1. I can give detailed information on the issues surrounding major water issues around the world such as Lake Chad, The Aral Sea, Three Gorges Dam, The Columbia River, The Colorado River and Hetch Hetchy

1 3 5

1. I can suggest ways that countries and cities might reduce threats or impacts from floods

1 3 5

**Geology and Nonrenewable Minerals**

1. I can describe the major geologic processes that occur within the earth and on its surface

1 3 5

1. I understand what nonrenewable resources are and how some are formed and extracted

1 3 5

1. I understand the major classifications of rocks and I understand how they are cycled through the rock cycle

1 3 5

1. I know some of the harmful environmental effects associated with the extraction, processing and using nonrenewable resources

1 3 5

1. I can suggest ways that we can use nonrenewable resources more sustainably

1 3 5

1. I can identify and describe different commercial mining techniques and list advantages and disadvantages of each technique

1 3 5

1. I can interpret a resource depletion curve

1 3 5

**Nonrenewable Energy**

1. I can explain the advantages and disadvantages of using:
   1. oil as an energy source

1 3 5

* 1. natural gas as an energy source

1 3 5

* 1. coal as an energy source

1 3 5

* 1. nuclear materials as an energy source

1 3 5

1. I can describe how each of these fuel sources are acquired and the impact of these methods

1 3 5

1. I can describe how these fuel sources are refined and the impact of these processes

1 3 5

1. I can identify general trends in each type of fuel usage in the United States and the world

1 3 5

1. I can discuss the political implications of using nonrenewable resources as a fuel source

1 3 5

1. I can explain why a country’s nuclear energy program could be threatening to other countries

1 3 5

**Energy Efficiency and Renewable Energy**

1. I can explain the advantages and disadvantages of:
   1. improving energy efficiency

1 3 5

* 1. using solar as an energy source

1 3 5

* 1. using flowing water as an energy source

1 3 5

* 1. using wind as an energy source

1 3 5

* 1. burning plant material as an energy source

1 3 5

* 1. extracting heat from the earth’s interior as an energy source

1 3 5

* 1. using hydrogen as an energy source

1 3 5

1. I can describe how each of these energy sources are acquired and the impact of these methods

1 3 5

1. I can describe the implications of reducing energy waste

1 3 5

1. I can identify methods of utilizing renewable energy in the United States and the world

1 3 5

1. I can discuss the economic implications of using renewable resources as a fuel source

1 3 5

1. I can explain how governments can encourage the growth of renewable energy

1 3 5

**Environmental Hazards and Human Health**

1. I can define in detail and give examples of:
   1. biological hazards

1 3 5

* 1. chemical hazards

1 3 5

* 1. physical hazards

1 3 5

* 1. cultural hazards

1 3 5

1. I can describe a risk and techniques in risk management

1 3 5

1. I can identify vectors involved in each class of hazard

1 3 5

1. I can interpret a dose response curve

1 3 5

1. I can explain how scientist use data to identify risk factors

1 3 5

1. I can explain how society/governments attempt to control each class of hazards

1 3 5

**Air Pollution Health**

1. I can identify 4 layers of the atmosphere, and describe characteristics of each

1 3 5

1. I can identify major outdoor air pollutants and where they come from

1 3 5

1. I can discuss how two types of smog are formed

1 3 5

1. I can describe the economic, ecological, and human health concerns relating to photo-chemical smog.

1 3 5

1. I can use figures in the text to discuss the migration of acid into environment

1 3 5

1. I can explain how society/governments attempt to control each type of air pollution

1 3 5

**Climate Change and Ozone Depletion**

1. I can describe historical patterns in global climates

1 3 5

1. I can hypothesize future patterns in global climates based upon human activities

1 3 5

1. I can interpret the economical/ecological effects of climate change

1 3 5

1. I can outline the ways in which individual/corporations/business/governments can address climate change

1 3 5

1. I can describe the chemistry of ozone production and depletion

1 3 5

**Water Pollution**

1. I can identify water pollutants, where they come from, and what are their effects

1 3 5

1. I can distinguish between point and non-point pollutants in streams, lakes, groundwater, and ocean systems

1 3 5

1. I can use the Biological Oxygen Demand (BOD) model to make predictions of ecosystems in a river

1 3 5

1. I can trace the flow of water through typical water treatment and sewage treatment facilities

1 3 5

1. I can describe the ways in which individuals/corporations/business/governments can address issues concerning the quality of ground water, surface water, and drinking water

1 3 5

**Solid and Hazardous Waste**

1. I can recognize solid waste and where it comes from

1 3 5

1. I can outline ways in which certain materials can be reused or recycled in order to reduce solid waste

1 3 5

1. I can identify advantages and disadvantages of burying and burning solid wastes

1 3 5

1. I can diagram the structure of a sanitary landfill

1 3 5

1. I can define what constitutes a hazardous waste and the economical, ecological, and human health issues associated with hazardous waste

1 3 5

1. I can discuss ways in which individuals/corporations/government can address issues concerning solid and hazardous (including electronic) wastes

1 3 5

**Politics, Environment and Sustainability**

1. I can recognize some major environmental laws and the ways in which they address environmental issues

1 3 5