

Michigan Science Content Expectations – Grade 6 & 7 Science for MEECS Water Quality Unit

X = Addresses/Supports

MARCH 2008 - DRAFT

		1. Where Is All the Water in the World?	2. How We Use Water	3. Do You Know Your Watershed?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Groundwater?	6. Would You Drink This Water?	7. How Healthy Is This Stream?	8. Can We Stop Storm Water?	9. Bioaccumulation and the Great Lakes Ecosystem
Science	Grade 6									
	S.IP.M.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation.									
	S.IP.M.1.1 Generate scientific questions based on observations, investigations, and research.	X	X	X	X	X	X	X	X	X
	S.IP.M.1.2 Design and conduct scientific investigations.							X		
	S.IP.M.1.3 Use tools and equipment appropriate to scientific investigations.	X					X	X		
	S.IP.M.1.4 Use metric measurement devices in an investigation.	X						X		
	S.IP.M.1.5 Construct charts and graphs from data and observations.	X					X	X	X	
	S.IP.M.1.6 Identify patterns in data.	X				X	X	X	X	
	S.IA.M.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations.									
	S.IA.M.11 Analyze information from data table and graphs to answer scientific questions.	X				X	X	X	X	
	S.IA.M.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.					X		X		X
	S.IA.M.13 Communicate and defend findings of observations and investigations using evidence.					X	X	X		X
	S.IA.M.14 Draw conclusions from sets of data from multiple trials of a scientific investigation.							X		
	S.IA.M.15 Use multiple sources of information to evaluate strengths and weaknesses of claims, arguments, or data.	X			X			X		X
	S.RS.M1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. Reflecting on knowledge requires careful analysis of evidence that guides decision-making and the application of science throughout history and within society.									
	S.RS.M11 Evaluate the strengths and weaknesses of claims, arguments, and data.									X
	S.RS.M12 Describe limitations in personal and scientific knowledge.	X	X		X	X	X	X		X
	S.RS.M13 Identify the need for evidence in making scientific decisions.					X		X		X
	S.RS.M14 Evaluate scientific explanations based on current evidence and scientific principles.									X
	S.RS.M15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.									
	S.RS.M16 Design solutions to problems through technology (e.g. best management practices).				X					X
	S.RS.M17 Describe the effect humans and other organisms have on the balance of the natural world.	X			X	X		X		X
	S.RS.M19 Describe how science and technology have advanced because of the contributions of many people throughout history and across cultures.						X			
	L.OL.M.5 Life Science - Organization of Living Things									
	L.OL.06.51 Classify organisms (producers, consumers, and decomposers) based on their source of energy for growth and development.							X		X
L.EC.M.1 Life Science - Ecosystems										
L.EC.06.11 List examples of populations, communities, and ecosystems including the Great Lakes region.							X		X	
L.EC.06.21 Describe common patterns of relationships between and among populations (e.g.							X		X	

predator/prey).										
L.EC.06.23 Predict how changes in one population might affect other populations based upon their relationships in the food web.								X		X
L.EC.06.31 Identify the living (biotic) and nonliving (abiotic) components of an ecosystem.			X	X				X		X
L.EC.06.32 Identify the factors in an ecosystem that influence changes in population size.								X		X
L.EC.06.41 Describe how human beings are part of the ecosystem of the Earth and that human activity can purposefully, or accidentally, alter the balance of the ecosystem.				X				X		X
L.E.C.06.42 Predict possible consequences of overpopulation of organisms, including humans (for example: extinction, resource depletion, climate change, pollution)		X						X		X
Earth Science – Solid Earth										
E.SE.06.11 Explain how physical and chemical weathering lead to erosion and the formation of soils and sediments.				X				X		
E.SE.06.12 Explain how waves, wind, water, and glacier movement shape and reshape the land surface of the Earth by eroding rock and deposition sediments (stream turbidity and channel bottom materials).				X				X		
E.SE.06.14 Compare different soils samples based on particle size and texture (e.g. carried by water).								X		
Grade 7										
S.IP.M.1 Inquiry involves generating questions, conducting investigations, and developing solutions to problems through reasoning and observation. (See GLCEs listed for Grade 6 above)	X	X	X	X	X	X	X	X	X	X
S.IA.M.1 Inquiry includes an analysis and presentation of findings that lead to future questions, research, and investigations. (See GLCEs listed for Grade 6 above)					X			X		X
S.RS.M1 Reflecting on knowledge is the application of scientific knowledge to new and different situations. (See GLCEs listed for Grade 6 above)	X	X		X	X	X	X	X		X
Physical Science – Properties of Matter										
P.Pm.07.11 Classify substances by their chemical properties (e.g. pH, acid-base indicators, water quality testing)								X		
P.PM.07.23 Illustrate structure of molecules using models or drawings (e.g. water molecule).	X									
P.PM.07.24 List examples of physical and chemical properties of elements and compounds.								X		
P.CM.07.21 Identify evidence of chemical change through color, gas formation, solid formation, and temperature change (e.g. water quality testing).								X		
Life Science – Organization of Living Things										
L.OL.07.63 Describe evidence that plants make, use and store food e.g. algal blooms as a result of an abundance of nutrients added to the aquatic ecosystem).				X				X		X
Earth Science – Earth Systems										
E.ES.07.11 Demonstrate, using a model or drawing, the relationship between warming by the sun and of the Earth and the water cycle as it applies to the atmosphere.	X									
E.ES.07.41 Explain how human activities change the surface of the earth and affect the survival of organisms.				X	X			X	X	X
E.ES.07.42 Describe the origins of pollution in the atmosphere, geosphere, and hydrosphere (car exhaust, industrial emissions, acid rain and natural sources) and how pollution impacts habitats, climatic change, threatens or endangers species.			X	X	X	X	X	X	X	X
E.ES.07.81 Explain the water cycle and describe how evaporation, transpiration, condensation, cloud formation, precipitation, infiltration, surface runoff, ground water, and absorption occur within the cycle.	X				X					X
E.ES.07.82 Analyze the flow of water between components of a watershed , including surface features (lakes, streams, rivers, wetlands) and groundwater.	X		X					X	X	X

Michigan Science Content Expectations - HS Earth Science for MEECS Water Quality Unit

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	1. Where Is All the Water in the World?	2. How We Use Water	3. Do You Know Your Watershed?	4. How Do Land Uses Affect Water Quality?	5. Why Care About Groundwater?	6. What Has Been Done About Air Pollution?	7. What Can We Do About Air Pollution?	8. Can We Stop Storm Water?	9. Bioaccumulation and the Great Lakes Ecosystem
E1.1 Scientific Inquiry									
E1.1A Generate new questions that can be investigated in the lab or field.			X	X	X		X	X	X
E1.1B Evaluate the uncertainties or validity of scientific conclusions			X	X	X		X	X	X
E1.1C Conduct scientific investigations using appropriate tools and techniques.						X	X		
E1.1D Identify patterns in data and relate to theoretical models.							X	X	
E1.1E Describe a reason for a given conclusion using evidence from an investigation.							X	X	X
E1.1f Predict what would happen if variables, methods, or timing were changed.							X		
E1.1g Based on empirical evidence, explain and critique the reasoning used to draw a scientific conclusion.							X		
E1.1h Design and conduct a systematic scientific investigation.							X		
E1.1i Distinguish between current consensus on scientific explanations and emerging questions that active researchers investigate.							X		X
E1: SCIENTIFIC REFLECTIONS AND SOCIAL IMPLICATIONS									
E1.2A Critique whether specific questions can be answered through scientific investigations.	X	X	X	X	X	X	X	X	X
E1.2B Identify and critique arguments about personal or scientific issues based on scientific evidence.									X
E1.2C Develop an understanding of a scientific concept by accessing information from multiple sources. Evaluate the scientific accuracy and significance of the information.									X
E1.2D Evaluate scientific explanations in a peer review process or discussion format.							X		X
E1.2E Explore future career and occupational opportunities of science fields.			X	X	X	X	X		X
E1.2f Critique solutions to problems, given criteria and scientific constraints.				X				X	X
E1.2g Identify scientific tradeoffs in design decisions and choose among alternative solutions (e.g. best management practices, resource quantity and quality trade-offs).				X			X	X	X
E1.2k Analyze how science and society interact from a historical, political, economic, or social perspective.	X	X			X	X	X		X
E2: EARTH SYSTEMS									
E2.1B Analyze the interactions between the four major Earth systems (geosphere, atmosphere, hydrosphere, biosphere).	X		X				X		X
E2.3b Explain why small amounts of some chemicals may be beneficial for life but are poisonous in large quantities (dead zone in Lake Erie).							X		X
E2.4B Explain how the impact of human activities on the environment can be understood through the analysis of interactions between the four major Earth systems.			X				X		X
E3.p1B Explain how physical and chemical weathering leads to erosion and the formation of soils and sediments.			X	X			X		
E3.p1C Describe how coastal features are formed by wave erosion and deposition.									X
E4: THE FLUID EARTH									
E4.p1A Describe that the water cycle includes evaporation, transpiration, condensation, precipitation, infiltration, surface runoff, groundwater, and absorption.	X		X	X	X		X	X	
E4.p1B Analyze the flow of water within a watershed, including surface features (lakes, stream,			X	X			X	X	

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	rivers, wetlands) and groundwater.								
	E4.p1C Describe the river and stream types, features, and processes (e.g. cycles of flooding, erosion, deposition) as they occur naturally and as they are impacted by land use decisions.			X	X			X	X
	E4.p1D Explain the types, process, and beneficial functions of wetlands.			X	X			X	X
	E4.1A Compare and contrast surface water systems and groundwater in regard to their relative sizes as Earth's freshwater reservoirs and the dynamics of water movement (inputs, outputs, residence times, sustainability)	X		X		X			X
	E4.1B Explain the features and processes of groundwater systems and how the sustainability of No. American aquifers has changed qualitatively using the concepts of recharge, residence time, inputs and outputs.					X			X
	E4.1C Explain how water quality in both groundwater and surface systems is impacted by land use decisions.			X	X	X	X	X	X

lithosphere and hydrosphere.	X	X	X	X	X	X	X	X	X
7-G5.1.2 Describe how variations in technology affect human modifications of the landscape.	X		X	X	X	X	X	X	X
7-G5.1.3 Identify the ways in which human-induced changes in the physical environment in one place can cause changes in other places (e.g. cutting forests upstream can cause flooding downstream).	X		X	X	X	X	X	X	X
7-G5.2.1 Describe the effects that a change in the physical environment could have on human activities and the choices people would have to make in adjusting to the change.	X	X	X	X	X	X	X	X	X
7-G6.1.1 Contemporary investigations – Conduct research on contemporary global topics and issues, compose persuasive essays, and develop a plan for action.							X		X
7-C4.3.1 Explain how governments address national issues and form policies, and how the policies may not be consistent with those of other countries.		X				X	X		X
7-C4.3.2 Explain the challenges to governments and the cooperation needed to address international issues.		X							X
7-E1.1.2 Describe the circular flow model and apply it to a public service (e.g. education, <water>, military protection).		X							
7-P3.1.1 Clearly state an issue as a question of public policy, trace the origins of the issue, analyze various perspectives, and generate and evaluate alternate resolutions.		X				X	X		X
7-P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness							X		X
7-P4.2.2 Engage in activities intended to contribute to solving a national or international problem.		X		X	X	X	X	X	X
7-P4.2.3 Participate in projects to help or inform others (e.g. service learning projects).		X		X	X	X	X	X	X
8-P3.1.1 Clearly state an issue as a question or public policy, trace the origins of the issue, analyze various perspectives, and generate and evaluate alternate resolutions.						X	X		X
8-P4.2.1 Demonstrate knowledge of how, when, and where individuals would plan and conduct activities intended to advance views in matters of public policy, report the results, and evaluate effectiveness		X					X		X
8-P4.2.2 Engage in activities intended to contribute to solving a national or international problem.		X		X	X	X	X	X	X
8-P4.2.3 Participate in projects to help or inform others (e.g. service learning projects).		X		X	X	X	X	X	X