HANDS DOWN EDUCATION · 6-WEEK UNIT STUDY PLANNER

Ocean & Marine Life unit study

Build a homeschool curriculum around the ocean — marine biology, oceanography and exploration across reading, math, science and geography.

GRADE BANDS K-2 · 3-5 · 6-8 · 9-12
FULL GUIDE https://handsdowneducation.com/homeschool/ocean

How to use this planner

The six weeks below are the guide's authored scope and sequence: one focus, one key activity and one portfolio output per week. Run the activity at the level your child is at (the grade band notes tell you how), keep the output, and by week six you have a portfolio that shows the unit end to end.

Pace is yours. A week here is three to five working sessions; a topic that is going well can take two calendar weeks, and one that has run dry can be closed early. Tick the box when a week's output is in the portfolio.

Six-week scope and sequence

Wk	Focus	Key activity	Portfolio output	Done
1	**The physical ocean**	Ocean zones to scale, the sink-or-float and density-column experiments, and a first look at salinity and temperature by depth.	A scaled zone diagram with a written explanation of why light and temperature change with depth.	☐
2	**Currents, tides and climate**	Model thermohaline circulation with cold and warm colored water; read a tide table and predict tomorrow's low tide; trace the Gulf Stream on a map.	An annotated current map and one week of tide predictions checked against the actual table.	☐
3	**Life in the ocean: classification**	Sort marine organisms by group from plankton to marine mammals; dissect a squid or fish and label the anatomy.	A classification chart and a lab report with a labeled diagram.	☐
4	**Ecosystems and food webs**	Build a food web for a reef or kelp forest; remove one species and trace the effect; model coral bleaching from real temperature records.	A food-web poster with a written cause-and-effect analysis.	☐
5	**Exploration and navigation**	Read about the Challenger Deep dives and Polynesian wayfinding; follow a live expedition stream; write a first-person descent log by depth zone.	A descent log or expedition journal with accurate zone details.	☐
6	**The human ocean**	Fishery debate with data, a plastics or acidification mini-experiment, and a final project — a documentary script, field guide or lab portfolio.	A final project and an evidence-based position on one ocean policy question.	☐

Running it at your child's level

Grades K-2: who lives where, and why

The youngest learners work with the ocean as a set of neighborhoods. What lives near the surface, what lives on the bottom, what lives in a tide pool — and what each creature needs to survive there. The unit is mostly looking, sorting, drawing and describing, with counting and early reading built into the play.

- Make an ocean-zone wall: a tall strip of paper painted from bright blue at the top to black at the bottom, then glue on cut-out creatures where they belong. Talk about why the colors change (sunlight fades with depth) and why the deep animals look so strange.
- Run the sink-or-float test with objects from around the house in fresh water, then in very salty water, and notice what changes. This is the first step toward understanding why the ocean is layered.
- Keep a tide-pool or aquarium-visit sketchbook: draw three animals, label the parts you can see (fins, shell,

tentacles) and write one sentence about how each one moves.

- Sort a set of ocean animal cards into fish, mammals and everything else, using clues: does it breathe air, does it have scales, does it have a backbone? A whale next to a shark is the whole lesson.

  Reading: The Big Book of the Blue by Yuval Zommer, a large-format picture reference that rewards repeated browsing, and Manfish: A Story of Jacques Cousteau by Jennifer Berne as the first ocean-explorer biography.

Grades 3-5: systems, food webs and the physical ocean

Upper elementary students can hold the ocean as a system: light, temperature and salt vary with depth; plankton feed nearly everything; currents move heat around the planet. This is where the unit gains real science content and real math — measurement, percentages and graphs from data the child collects or downloads.

- Build a layered density column with salt water of three different strengths, each colored differently, and pour them carefully so they stack. Then read about how cold, salty water sinks near the poles and drives the global conveyor of currents.
- Draw a food web for one ecosystem — a kelp forest works well — starting with sunlight and phytoplankton and ending with sea otters and orcas. Then remove one link (the otters) and trace what happens to the urchins and the kelp; this is a real historical case.
- Measure the ocean zones to scale on adding-machine tape at one centimeter per 10 meters: the sunlit zone ends at 200 meters, the Challenger Deep is nearly 11,000 meters. Calculate what percentage of the total depth gets sunlight.
- Pick one tagged animal from a public tracking site (great white sharks and sea turtles are both tracked openly), plot a month of positions on a map and write a paragraph about where it went and why it might have gone there.

  Reading: Ocean: The Definitive Visual Guide from DK, a heavily illustrated reference organized by ocean region and habitat that a fourth grader can read independently.

Grades 6-8: ecosystems, data and the human ocean

Middle schoolers are ready for marine ecology as a quantitative subject and for the ocean as a contested place. They can work with real datasets, model how energy and matter cycle through an ecosystem, and take a defensible position on a fishing quota or a marine reserve. The writing shifts from description to argument.

- Download a month of sea-surface temperature or wave height from a NOAA buoy near a coast you choose, graph it, and describe the pattern. Then compare two buoys at different latitudes and explain the difference.
- Model coral bleaching: research what temperature threshold triggers it, find a published reef temperature record, and identify which years crossed the line. Write a short explanation of the mechanism — why the coral expels its algae and why that is fatal if prolonged.
- Dissect a whole squid from a seafood counter, identifying the beak, the pen, the ink sac, the gills and the three hearts, and write a lab report with a labeled diagram and a paragraph on how each organ suits life in open water.
- Stage a fishery debate: one side argues for a lower cod or tuna quota using population data, the other for the fishing community's livelihood. Both must cite numbers. Close with a short essay on what a fair rule would look like.

  Reading: Selected chapters of The Soul of an Octopus by Sy Montgomery for the animal-behavior strand, and NOAA Ocean Service Education pages for the physical-ocean strand.

Grades 9-12: marine biology as a lab science

At high-school depth this becomes a genuine marine biology course: taxonomy, physiology, oceanography, ecology and conservation, with lab reports and data analysis that would satisfy a lab-science credit. Students read working scientists, run real analyses and write in the forms the field uses.

- Conduct a water-quality lab on a local body of water or a saltwater aquarium — temperature, salinity, dissolved oxygen, pH, nitrate — over four weeks, graph the results, and write a full lab report with a hypothesis, method, data and discussion.
- Build a comparative anatomy study of gas exchange across three groups: fish gills, marine mammal lungs and the skin breathing of some invertebrates. Present it as a table with labeled diagrams and a written analysis of

the tradeoffs.

- Analyze a public fisheries dataset (stock assessments are published openly) to graph a population over thirty years against catch limits, then write an evidence-based evaluation of whether management worked.
- Read the introduction of a recent open-access paper on ocean acidification, summarize the study design, and design a small-scale version at home using shells, vinegar solutions of different strengths and a kitchen scale to measure mass loss over a week.

  Reading: The Brilliant Abyss by Helen Scales, a current and readable account of deep-sea science and the mining debate, alongside the Ocean Literacy Principles published through NOAA as the organizing framework for the course.

A sample week, subject by subject

Reading & Writing

Read an account of the Challenger Deep dives, then write a first-person descent log — what the pilot sees, hears, and worries about at each depth zone.

Math

Chart ocean depth zones to scale on adding-machine tape down a hallway; calculate what percentage of the ocean sunlight actually reaches.

Science

Run the classic saltwater density experiment — layered colored columns — then connect it to how thermohaline currents actually circulate the globe.

Social Studies

Trace Polynesian wayfinding across the Pacific and compare it to European instrument navigation: two solutions to the same open-water problem.

Art

Paint one creature from each depth zone, matching palette to available light — bright reef colors up top, bioluminescence in the dark.

Books, sites and kits

- The Big Book of the Blue by Yuval Zommer (Book (K-2)) — A large-format illustrated introduction to ocean creatures that young children browse on their own for weeks.
- Ocean: The Definitive Visual Guide (DK) (Book (3-8)) — An illustrated reference covering physical oceanography, habitats and species; the family shelf copy for the whole unit.
- The Soul of an Octopus by Sy Montgomery (Book (6-12)) — A narrative about octopus intelligence and the people who study it; strong for the animal-behavior strand and for reluctant readers.
- The Brilliant Abyss by Helen Scales (Book (9-12)) — Deep-sea biology and the deep-sea mining debate by a marine biologist; the high-school reading spine.
- NOAA Ocean Service Education (Website) — Free tutorials, lesson plans and live data on tides, currents, coral reefs and estuaries from the US ocean agency.
- Monterey Bay Aquarium live cams and learning resources (Website) — Live kelp-forest, jelly and sea-otter cams plus free lesson plans; the landlocked family's aquarium.
- Nautilus Live (Ocean Exploration Trust) (Website) — Live-streamed deep-sea ROV dives with scientists narrating; watch a real expedition during week five.
- Blue Planet II (BBC) (Video series) — The documentary standard for marine ecosystems; one episode per habitat maps neatly onto the weekly focus.

Standards this unit covers

- K-ESS3-1 (NGSS) — Use a model to represent the relationship between the needs of different plants or animals and the places they live — the ocean-zone wall and habitat sorting.
- 5-ESS2-1 (NGSS) — Develop a model using an example to describe ways the geosphere, biosphere,

hydrosphere and atmosphere interact — currents, climate and the ocean as a system.

- MS-LS2-3 (NGSS) — Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem — the reef and kelp-forest food webs.
- MS-LS2-4 (NGSS) — Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations — coral bleaching and the otter-urchin-kelp case.
- MS-ESS2-6 (NGSS) — Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates.
- HS-LS2-7 (NGSS) — Design, evaluate and refine a solution for reducing the impacts of human activities on the environment and biodiversity — the fisheries and acidification work.
- CCSS.ELA-LITERACY.W.7.1 (CCSS ELA) — Write arguments to support claims with clear reasons and relevant evidence — the fishery debate essay and policy position.

Common questions

We're landlocked — is an ocean curriculum practical?

Yes. Public buoy data, aquarium webcams, documentary footage and density experiments in the kitchen make distance irrelevant for everything except the field trip — and lakes teach half the same concepts.

How does this cover history and civics?

Navigation history, the age of sail, maritime trade routes, and modern law of the sea are core social-studies content that most standard curricula touch only briefly.

Sharks are the whole obsession. Can that carry a unit?

Sharks alone can carry six weeks: sensory biology, evolutionary age, tracking data from tagged individuals, media myth versus attack statistics — the data literacy lesson hiding in there is excellent.

What does a homeschool marine biology curriculum cover?

A solid homeschool marine biology curriculum covers four strands: the physical ocean (zones, salinity, currents, tides), marine organisms by group (plankton, invertebrates, fish, marine mammals, seabirds) and how they are classified, ecosystems (reefs, kelp forests, estuaries, the deep sea) and how energy moves through them, and the human relationship — fishing, pollution, exploration and law. The six-week scope and sequence above touches all four; a full-year course spends a quarter on each.

Is there a marine biology curriculum for high school that counts as a science credit?

Yes. A high-school marine biology course earns a lab-science credit when it has roughly 120-150 hours of work, a textbook-level reading spine, and a written lab component — dissections, water-quality testing, data analysis from public buoy or fisheries datasets, and lab reports. The 9-12 activities above are written as that kind of lab work. Keep a portfolio of the reports and a course description listing the topics; that is what most transcripts and umbrella schools ask for.

How do I add real labs to a homeschool marine biology course?

Use the kitchen and the internet. Density and layering experiments need only salt, food coloring and glasses; a squid or fish dissection costs a few dollars at a seafood counter and teaches more anatomy than a diagram; plankton can be observed from a pond sample with an inexpensive microscope; and NOAA buoy and tide data supply endless real-world graphing. If you can reach a coast, a single tide-pool survey with a quadrat and a species list is a complete field lab.