

# OCEAN IQ FRAMEWORK

## Overview — A Companion to the Ocean Literacy Institute Whitepaper

*From Ocean Literacy to Ocean Understanding, Systems Thinking, and Action*

Ocean Literacy Institute

### Executive Summary

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The Ocean Literacy Institute exists to help the next generation understand the ocean not as a distant environment or a list of species to memorize, but as an interconnected system that sustains life, communities, economies, and the future of the planet. Ocean IQ is the practical educational framework built to accomplish that mission.

The idea behind Ocean IQ is easy to state and harder to deliver: how well does a student actually understand the ocean — how it works, why it matters, how its systems connect, and where they fit into it? Traditional ocean education has leaned heavily on knowledge — naming species, describing habitats, explaining currents, cataloging threats like pollution. That knowledge matters, but it is not the same as understanding, and it rarely produces action on its own.

Ocean IQ extends ocean literacy into systems thinking, application, decision-making, career awareness, and meaningful action. The goal is not to teach students more ocean facts — it is to raise their Ocean IQ, deliberately, across four developmental stages:

| Ages  | Stage       |
|-------|-------------|
| 3–6   | Discover    |
| 7–10  | Understand  |
| 11–14 | Connect     |
| 15–18 | Think & Act |

Together, these four stages form a developmental pathway that carries a student from early wonder and curiosity through to systems understanding and informed action.

### 1. The Role of Ocean IQ

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Ocean IQ operates inside the broader mission of the Ocean Literacy Institute, and it helps to see how the pieces fit together:

- Ocean Literacy Institute — the institution and its mission

- Ocean Literacy & Systems Thinking Initiative — the public umbrella under which every program operates
- Ocean IQ — the educational framework, and the outcome the Institute is trying to produce
- Ocean Adventures with Mike — the book series that builds Ocean IQ through true expedition stories
- Move Toward the Shark — the flagship title, developed in four editions, one for each Ocean IQ stage (3–6, 7–10, 11–14, 15–18)
- Ocean Literacy Education Fellows — the educators and subject-matter experts who help build, validate, pilot, and deliver the model

Ocean IQ is a framework, not a program or a product. The book series and every program keep their own names, as set out in the whitepaper’s brand architecture. What they share is a common standard: every book, lesson, classroom activity, video, presentation, field experience, or student program can be measured against a single question — does this raise a student’s Ocean IQ?

## 2. What Is Ocean IQ?

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Ocean IQ is the ability to understand fundamental ocean concepts, recognize relationships within and between ocean and human systems, think critically about those relationships, and translate understanding into informed decisions and responsible action. It is more than knowledge — it is built from five interconnected dimensions.

| Dimension | Guiding Question                      |
|-----------|---------------------------------------|
| Know      | What do I understand about the ocean? |
| Connect   | How is it connected?                  |
| Think     | What happens when something changes?  |
| Explore   | Where could this knowledge take me?   |
| Act       | What can I do with what I understand? |

In books and classrooms, each dimension is voiced to students as a plain-language question: What is happening? (Know) · How is everything connected, and why does it matter? (Connect) · What happens if something changes? (Think) · Where could this take me? (Explore) · What can I do? (Act). The guiding questions above are the framework-level version educators work from; the student questions are what young readers actually hear.

### Know

Students build a foundation in ocean science — ecosystems, species, habitats, currents, biodiversity, food webs, geology, weather, coastal processes, and the many ways human life intersects with ocean systems. Knowledge is where Ocean IQ starts. It is only the beginning.

### Connect

Students learn to trace relationships across a system: a shark depends on its prey, prey depend on reefs, reefs support fisheries, and fisheries in turn support food, jobs, tourism, and entire communities — often hundreds or thousands of miles from any coastline. This is where isolated ocean facts start becoming systems understanding.

### Think

Students learn to reason about cause and effect, dependencies, feedback, uncertainty, risk, resilience, tradeoffs, and unintended consequences. Rather than stopping at “what is happening to the coral reef,” they learn to ask why it is happening, what else depends on the reef, who is affected if it changes, and whether a proposed fix could create a new problem of its own. That shift — from absorbing information to reasoning through it — is the heart of Ocean IQ.

### Explore

Ocean literacy should also open doors. Students should encounter the full range of careers and disciplines connected to the ocean — marine biology, oceanography, engineering, robotics, data science, diving, maritime operations, fisheries, aquaculture, medicine, environmental science, law, public policy, risk management, technology, entrepreneurship, communications, and conservation. The point is not to convince every student to pursue an ocean career; it is to show them how many paths actually intersect with the ocean. For some students, Ocean IQ will become a career. For all of them, it should become a lens.

### Act

Ocean IQ is meant to produce informed agency, not fear, guilt, or helplessness. Students learn that meaningful action takes many forms: changing personal habits, educating others, joining citizen science projects, supporting community initiatives, investigating problems, building solutions, and eventually pursuing careers that manage, protect, restore, or responsibly use ocean systems. Action is how understanding gets applied.

## 3. Ocean IQ and Systems Thinking

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Systems thinking is what separates Ocean IQ from a conventional ocean curriculum. Rather than presenting the ocean as a set of unconnected topics — one unit on whales, another on pollution, another on coral — Ocean IQ treats it as what it actually is: a system of systems, in which biological, physical, chemical, geological, atmospheric, economic, technological, infrastructure, governance, and human factors are constantly interacting.

Ocean IQ introduces these relationships at a level appropriate to each age. A five-year-old does not need systems theory, but a five-year-old can understand a simple chain:

*“The shark needs the fish. The fish need the reef. The reef needs clean water. Everything has a job.”*

A nine-year-old can start mapping food webs and the relationships between species and habitats. A thirteen-year-old can investigate what happens when one part of an ecosystem changes. A seventeen-year-old can

work through cascading effects, competing interests, economic dependencies, conservation tradeoffs, resilience, and policy decisions.

The sophistication changes with age. The underlying idea does not: everything is connected.

## **4. Ocean IQ Across Ages 3–18**

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Ocean IQ is a developmental continuum. The underlying principles stay consistent from early childhood through high school, while the science, vocabulary, systems thinking, personal responsibility, and complexity all increase as students mature.

### **Ages 3–6 — Discover**

Primary objective: wonder, curiosity, and connection. At this stage, students are introduced to the ocean through stories, animals, exploration, and simple relationships — illustrated encounters rather than abstractions. They begin to learn that the ocean is full of life, that different animals and habitats each play an important role, and that people are connected to the ocean even if they do not live anywhere near a coastline. Fear and common misconceptions are addressed gently, through curiosity and simple facts rather than lecture. The central questions at this age are what is it, what lives there, why is it special, and how can I care for it. Ocean IQ begins with wonder.

### **Ages 7–10 — Understand**

Primary objective: knowledge, relationships, and responsible action. Students move beyond simply identifying animals and habitats and start exploring how ocean organisms and physical processes actually work. They learn to tell myths from evidence and begin to understand the relationships among predators, prey, habitats, people, and the environment. This is also where students are introduced to conservation, ocean exploration, and the range of careers connected to the ocean. The central questions become how does it work, why does it matter, what is it connected to, and what can I do to help. Curiosity starts developing into understanding.

### **Ages 11–14 — Connect**

Primary objective: systems awareness, cause and effect, problem-solving, and exploration. Students begin examining the ocean as an interconnected system rather than a collection of separate species and environmental issues — investigating food webs, biodiversity, habitats, human activity, technology, communities, economies, conservation, and changing environmental conditions. They start asking what happens when one part of a system changes, and they work through dependencies, consequences, competing needs, possible solutions, and unintended effects. Career exploration becomes more substantial here, exposing students to scientific, technical, operational, creative, and professional fields tied to the ocean. The central questions shift to how is this connected, what depends on it, what happens if something changes, and what problems could we solve. Understanding develops into systems thinking.

### **Ages 15–18 — Think & Act**

Primary objective: systems thinking, critical analysis, decision-making, careers, leadership, and meaningful action. Students take on genuinely complex ocean challenges that span science, ecology, economics, technology, infrastructure, risk, conservation, communities, and governance — weighing uncertainty, competing priorities, tradeoffs, resilience, intervention strategies, and unintended consequences. The bar rises from identifying a problem to analyzing one: what is happening, why is it happening, what systems are involved, who or what is affected, what are the risks of doing nothing, what are the risks and benefits of different interventions, and what evidence would be needed before making a decision. Career exploration becomes concrete, connecting students to pathways in science, engineering, technology, maritime operations, medicine, conservation, entrepreneurship, policy, risk management, communications, and education. Students at this level can take on full Ocean IQ projects — investigating a real problem, mapping the system around it, evaluating potential responses, and building an evidence-based action plan. Systems understanding develops into informed action.

Quick Reference

| Ages  | Stage       | Central Shift                         |
|-------|-------------|---------------------------------------|
| 3–6   | Discover    | Wonder and simple connection          |
| 7–10  | Understand  | Knowledge and relationships           |
| 11–14 | Connect     | Systems awareness and problem-solving |
| 15–18 | Think & Act | Critical analysis and informed action |

5. The Ocean IQ Developmental Progression

The four age groups establish one consistent learning architecture for books, curriculum, classroom activities, assessments, and videos across the Institute. Read together, they trace a single line:

| Wonder → Knowledge → Understanding → Connection → Systems Thinking → Informed Action

The goal is not for students to simply accumulate more ocean facts as they move through school — it is for how they think about the ocean to mature. A young child learns that sharks are important. An elementary student learns why. A middle-schooler investigates how sharks affect food webs and ecosystem relationships. A high-schooler analyzes how predator populations interact with ecological health, fisheries, tourism, public perception, conservation policy, economics, and human behavior. The subject can stay the same from one book to the next — it is the Ocean IQ behind it that deepens.

6. Move Toward the Shark: The Flagship Title

Move Toward the Shark is an ideal introduction to Ocean IQ because the shark is both an ecological subject and one of the most common human misconceptions. Students often approach sharks through fear; the

educational journey moves them toward understanding. The same core subject is presented differently at each of the four Ocean IQ levels.

| Edition · Stage                                   | Edition Focus                                                                                                                                | Primary Message                                                                         |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Ages 3–6 · Discover<br>A First Ocean Adventure    | Sharks introduced through wonder rather than fear — what they are, where they live, how varied they are, and why they belong in the ocean.   | “Sharks aren’t monsters. They have an important place in the ocean.”                    |
| Ages 7–10 · Understand<br>An Ocean Adventure      | Myths versus facts, shark behavior, habitats, adaptations, food relationships, conservation, and the role sharks play in healthy ecosystems. | “Understanding something can change the way we fear it.”                                |
| Ages 11–14 · Connect<br>A True Ocean Adventure    | A systems-thinking case study: predator-prey relationships, food webs, reefs, fisheries, biodiversity, conservation, and human perception.   | “Nothing in the ocean exists by itself.”                                                |
| Ages 15–18 · Think & Act<br>Lessons from the Deep | Ecology, risk perception, media, economics, tourism, fisheries, conservation, human behavior, and decision-making.                           | “Move toward understanding before deciding what to fear, protect, change, or act upon.” |

Across all four editions, the arc is the same: fear gives way to curiosity, curiosity to knowledge, knowledge to connection, connection to understanding, understanding to respect, and respect to action.

The title *Move Toward the Shark* carries two meanings. Physically, it comes from real, first-person ocean experience. Intellectually, it means moving toward what you do not understand — investigating it, learning about it, respecting it, and only then deciding what to think or do. That principle extends well beyond sharks.

Cover subtitles follow the series pattern shown in the table. The Ocean IQ stage appears inside each edition and on its age badge (for example, “Ocean IQ Stage: Discover · Ages 3–6”), so teachers and parents can see at a glance where a book sits in the framework.

The editions launch oldest-first: 15–18 in Year 1 Q2, 11–14 in Q3, 7–10 in Q4, and 3–6 early in Year 2. Think & Act is the stage where the full framework comes through most completely, and each later edition carries the same story to a younger audience. The completed 11–14 manuscript will be piloted with Founding Fellows while the 15–18 edition is written, so it releases already classroom-tested.

## 7. Real Stories as the Learning Vehicle

Ocean IQ uses authentic ocean stories as the entry point into learning, rather than starting with abstraction. A shark encounter opens into predator ecology. An underwater cave introduces geology, pressure, buoyancy, decision-making, and risk. A current introduces ocean circulation. A coral reef introduces biodiversity and interconnected ecosystems. A rescue dive introduces preparation, responsibility, teamwork, and human physiology. A sargassum bloom introduces ecosystem complexity, coastal impact, innovation, economics, and unintended consequences.

The story captures attention. The science explains what happened. Systems thinking reveals how it connects to everything else. Reflection draws out the lesson. Careers show who does this work. Action gives the student something to do with it. That sequence repeats throughout the curriculum, and its depth grows as students move through the four age groups:

*Experience → Investigate → Connect → Think → Explore → Act*

## 8. Measuring Ocean IQ

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A meaningful long-term goal for the Institute is to make Ocean IQ measurable, not just aspirational. Age-appropriate assessments could be developed for each of the four stages — 3–6, 7–10, 11–14, and 15–18. Rather than testing memorization, they would evaluate whether a student can:

- Explain fundamental concepts
- Recognize relationships
- Distinguish evidence from misconception
- Identify cause-and-effect relationships
- Analyze systems
- Weigh consequences
- Identify potential solutions
- Recognize relevant careers
- Translate understanding into an appropriate action plan

A simple pre/post structure — a short activity or assessment before an Ocean IQ learning experience, and again afterward — would let educators and the Institute see whether the experience actually produced measurable improvement, rather than assuming it did.

Any of this should be developed with the Education Fellows Program, working alongside qualified educators and subject-matter experts, before Ocean IQ is presented anywhere as a standardized or scientifically validated measure.

## 9. Ocean IQ Learning Pathway

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As the Institute develops, students could progress through identifiable Ocean IQ stages that mirror the developmental framework:

| Level                 | Ages | Description                                          |
|-----------------------|------|------------------------------------------------------|
| Ocean IQ Explorer     | 3–6  | Discovering the ocean through curiosity and wonder   |
| Ocean IQ Investigator | 7–10 | Understanding how the ocean and its inhabitants work |

| Level                    | Ages  | Description                                                           |
|--------------------------|-------|-----------------------------------------------------------------------|
| Ocean IQ Connector       | 11–14 | Recognizing relationships, dependencies, and consequences             |
| Ocean IQ Systems Thinker | 15–18 | Analyzing complex ocean challenges and evaluating potential responses |

Older students who reach the upper levels could also join the Institute’s Ocean Ambassador Program, applying what they have learned through leadership, communication, mentoring, research, or community action. Over time, these levels could support certificates, classroom recognition, student portfolios, and challenges — not for the sake of competition, but to give students a visible sense of their own progression.

## 10. Role of the Education Fellows

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The Ocean Literacy Education Fellows Program is essential to building Ocean IQ. Educators understand how students learn; scientists and ocean professionals understand the subject matter. For the framework specifically, Fellows will help:

- Establish Ocean IQ competencies for each stage (3–6, 7–10, 11–14, 15–18), beginning with Ocean IQ Framework v1.0
- Advise on developmental appropriateness
- Align learning experiences with educational standards
- Develop assessment methods
- Measure learning outcomes and collect educator feedback
- Pilot the completed 11–14 edition of *Move Toward the Shark* in classrooms during Year 1
- Identify accessibility and inclusion needs

Who can become a Fellow, how the tiered Fellowship (Founding, Education, and Student Fellows) is structured, and how Fellows contribute to books and programs are set out in the Ocean Literacy Institute whitepaper.

## 11. Ocean IQ and Career Awareness

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Career awareness is the Explore dimension of Ocean IQ, and it should broaden what students think an “ocean career” even means — far beyond marine biology. The whitepaper describes how every title spotlights a profession; this section describes how that exposure should deepen by stage.

Career exposure should grow with the student. For younger students, the goal is simple discovery — people really do this for a job? By ages 7–10, students start exploring what different ocean professionals actually do day to day. By 11–14, they begin connecting those careers to their own interests and strengths. By 15–18, career exploration becomes actionable, through education pathways, mentorship, internships, field experiences, college and vocational options, and direct exposure to working professionals.

Across every stage, students should keep encountering one question: could you see yourself doing this? That question is what turns ocean literacy from something students learn into something some of them go on to do.

## 12. One Framework Across Every Program

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Ocean IQ gives the Institute a common framework capable of connecting its future programs. Each program keeps its own name; what they share is the framework they are built and measured against:

| Program                          | Description                                                                                                                                                                    |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ocean Adventures with Mike       | Age-specific books built on authentic ocean experiences, led by Move Toward the Shark                                                                                          |
| Ocean Explorer Classroom         | Teacher guides, lessons, activities, and curriculum resources, including hands-on Ocean Explorer Labs for STEM and systems thinking                                            |
| Ocean Innovation Challenge       | Student problem-solving and action projects                                                                                                                                    |
| Ocean Career Pathways            | Career exploration and professional profiles                                                                                                                                   |
| Ocean Literacy Education Fellows | Educator-led development, validation, and classroom implementation                                                                                                             |
| Ocean Ambassador Program         | Leadership and community-engagement opportunities for older students                                                                                                           |
| Ocean IQ Assessment              | Developmentally appropriate tools for evaluating learning and systems understanding — the one program that carries the Ocean IQ name, because it measures the framework itself |

Taken together, these are not simply a publishing program. They are an educational ecosystem capable of following a student from early childhood all the way through high school.

## 13. The Strategic Role of Ocean IQ

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Ocean literacy describes the mission. Systems thinking describes the approach. Ocean IQ is what makes both of those understandable, teachable, repeatable, developmental, and — eventually — measurable. It gives the Institute a simple public-facing goal: raise the Ocean IQ of the next generation. And it gives every program a common architecture to build against — Discover (3–6), Understand (7–10), Connect (11–14), Think & Act (15–18).

That architecture can unify books, curriculum, school programs, educator development, student experiences, career exploration, partnerships, and future research under one throughline: a shift from knowing facts about the ocean, to understanding how it works, to seeing how ocean systems connect to our lives, to thinking critically about change, to making informed decisions and taking meaningful action.

## Conclusion

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The Ocean Literacy Institute starts from a simple premise: the ocean cannot be understood one fact, one species, or one problem at a time. It is interconnected, and so is our relationship to it.

Young people need more than awareness of ocean problems — they need the ability to understand relationships, investigate complexity, tell fact from misconception, recognize consequences, explore solutions, and see real opportunities to participate. Ocean IQ is the developmental framework for building that ability, from a three-year-old's first sense of wonder to an eighteen-year-old's capacity to analyze a genuinely complex ocean challenge and decide how they might contribute.

That is the purpose of Ocean IQ: know it, connect it, think about it, act on it — and through authentic stories, exploration, education, and experience, raise the Ocean IQ of the next generation.

## Appendix A: One Topic, Four Levels of Ocean IQ

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The framework's central claim — that the subject can stay the same while a student's Ocean IQ deepens — is easiest to see in practice. The table below applies it to a single topic, coral reefs, at each of the four stages. This is illustrative rather than final; the Education Fellows should treat it as a starting template when they build out the full competencies matrix.

| Ages  | Sample Inquiry Question                                                                                                |
|-------|------------------------------------------------------------------------------------------------------------------------|
| 3–6   | What lives on a coral reef, and why is it so colorful?                                                                 |
| 7–10  | What does a coral reef need to stay healthy, and what happens to the fish that live there if it gets sick?             |
| 11–14 | If a reef declines, what else in the system is affected — fish populations, local fishing, tourism?                    |
| 15–18 | What tradeoffs come with a proposed reef-restoration project, and what evidence would you want before recommending it? |

## Where This Fits

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This Overview is the second of six documents in the Ocean Literacy Institute set: Institute Whitepaper → Ocean IQ Framework — Overview → Educational Framework → Ocean IQ Framework v1.0: Competencies & Learning Outcomes → Curriculum & Standards Alignment Framework → Move Toward the Shark Curriculum Crosswalk. Educators should turn next to the Educational Framework, the master reference for Education Fellows, and then to Ocean IQ Framework v1.0: Competencies & Learning Outcomes, which defines exactly what students should know, connect, think, explore, and be able to do at each stage.