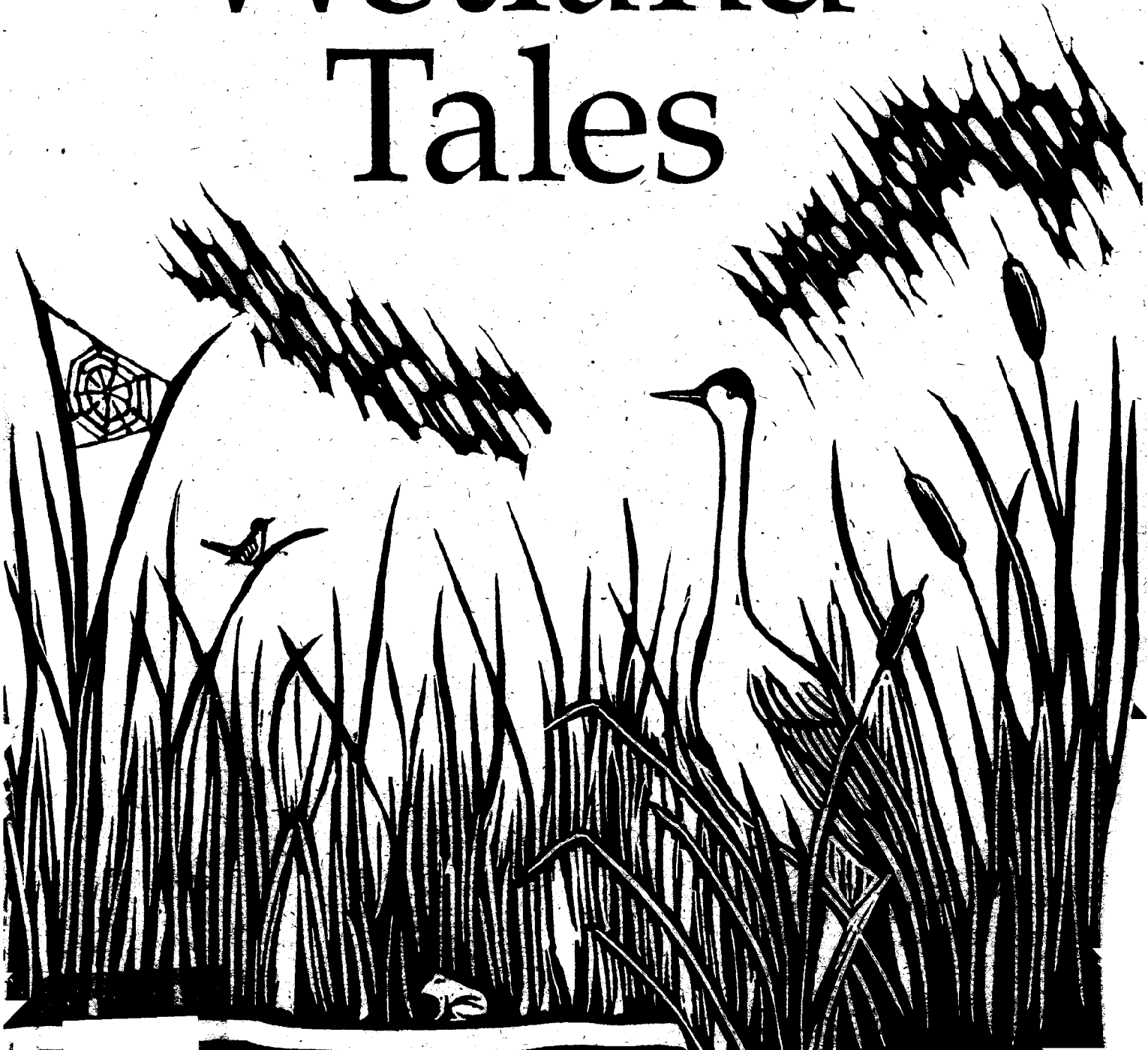


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Wetland Tales



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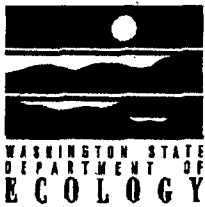


Wetland Tales

A Collection of Stories for Wetland Education

Compiled and Edited by *Jana Dean*

Illustrated by *Nikki McClure*



Produced by
*the Washington State
Department of Ecology*

Publication #92-17

Printed on recycled paper.

Preparation of this document was financially aided through a grant to the Washington State Department of Ecology with funds obtained from the National Oceanic and Atmospheric Administration, and appropriated for Section 306 of the Coastal Zone Management Act.

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Acknowledgements

Thanks to the following individuals who reviewed part or all of this book and provided invaluable feedback:

Margaret Swanson-Vance, storyteller

Cayt Stephens, children's librarian at the Olympia Timberland Library

Larry Beutler, editor, *Clearing Magazine*

Adrian Boomer, fourth grade teacher, East Olympia Elementary School, Olympia

Tessa Cockburn, second grade teacher, Gildo Rey Elementary School, Auburn

Theresa May, artistic director, Theatre in the Wild, Seattle

Bill Fiorilli, storyteller and friend

Cyd Brower, Teri Granger, Bill Leonard, Brian Lynn, and Andy McMillan, Department of Ecology, Wetlands Section

Katherine Ronning, educator, The High Desert Museum, Bend, Oregon

Thanks to the teachers and schools that allowed me to tell these stories to their students while this book was in process.

Also, thanks to the dozens of storytellers who responded to a survey seeking wetland stories and to the people at the Timberland Regional Library who secured countless books through interlibrary loan.

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How to Use this Book

Background

These stories portray muskrat, beaver and otter, eagle, crane and wren, frog, toad and turtle in their habitat. In the tales, we witness toad's heroic dive to the bottom of an ocean to bring up the earth; we see how turtle outwits spider; we chuckle at frog's desire to fly, and at what it brings him; and we learn how raven arranged things so that the tides ebb and flow. All of the stories, by virtue of their origins in the oral traditions of native cultures of three continents, illustrate the long-standing relationship between human culture and wetland creatures.

I began my search for stories by looking for tales that depicted bogs, swamps, marshes and estuaries; however, folklore that depicted the ecological functions and values of wetlands was

difficult to find. I was pleased to discover, however, that wetland inhabitants have enormous positive cultural importance. In nearly every culture, creatures that depend on wetlands for survival hold a prominent place in folklore.

Suitable stories came from the indigenous oral traditions of North America, Asia and Africa. Native cultures, unalienated from their ancestral land, tend to develop a deep relationship with the creatures that share their world. Among many Native American cultures, the world actually rests on turtle's back. The frog or toad as hero and changer is found in stories from all over the world. Heron and crane stand guard over the folkloric marsh, while beaver and tortoise are wise and patient. These animals populate both wetlands and the human imagination.

Tips for using this Book

I have organized this book to integrate the wisdom of the story with an understanding of the natural history of wetlands. The *Introduction* outlines the approach used in developing this resource and gives tips for learning to tell stories. If you just want the stories along with some information about wetlands, the *Table of Contents* serves as a guide to finding the wetland topic that you are interested in exploring. There are ten stories with accompanying text. A brief synopsis precedes each story, which introduces its place in relation to wetland ecology. Following each story a page or two elaborates on the natural history themes that arise in the narrative. I have not formulated complete lessons or units, but rather drawn on the story to identify connections to lessons in wetland ecology and natural history. For a list of available wetland curricula to use in conjunction with some of the stories, turn to the appendix.

One last note about the stories: even though they appear in printed form, they come from oral traditions. In this book, I have reprinted them just as they appeared in the acknowledged sources, but like music, oral traditions are inherently fluid and changing. Just as a symphony interprets a musical score, the storyteller interprets the folktale.

Enjoy!

Introduction

Folklore and Environmental Education

By bringing wetland animals to life through the spoken word, stories engage the children's imagination and bring wetlands as life-filled habitats into the classroom. The stories provide a starting point and a context for teaching wetland ecology by creating common ground in the form of an imagined wetland landscape.

The power of the storyteller is that he or she elicits the full participation of the audience. Using only the human voice, the storyteller requires each member of the audience to create for themselves an inner picture of the story. Although the voice of the teller guides the listeners' vision, each person fabricates his or her own picture of the events that transpire; hence, "story-listening" is itself an active creative exercise.

The exercise of actively listening to and in turn "seeing" a story is internal and requires the child to establish a relationship with the scene envisioned. I have often told the story "Turtle and the Divers" to groups of children. In it, Toad dives to the bottom of the sea

to bring up the earth. Nowhere, as I have written or told the story, do I describe Toad at the moment she grabs the earth; yet, in drawing or painting exercises following the telling, the most common depiction of the story is that moment at which Toad reaches the earth. The pictures that the children draw arise from their own imaginations. Together, the telling of the story and the work the teacher does to revisit the story create a lasting experience that also allows an avenue for self-expression.

Making the Connections

Stories have the potential to redirect our cultural conception of wetlands as waste sites to one in which wetlands harbor a beautiful and mystifying diversity of life essential to the quality of life - human, plant and animal alike. The tales do not take the place of lessons in conservation and ecology; rather, they provide a focus, a context and common ground for the lesson that is about to unfold.

Stories are filled with empathy-evoking images which link understanding of the environment to concern for

the environment. While understanding living systems is important, it does not automatically translate into a deep concern for them. Affective and cognitive understanding must come together to bring about this change in attitude. The turtle in the natural history lesson will occupy a different place in mind and heart if the children have experienced the story's turtle. The story also provides a context in which to envision more abstract concepts such as ecosystem, habitat and niche. That is not to say that the wetland of the story becomes the only wetland experience, but at least it provides an emotional and creative link to wetland science.

The essays that accompany the stories each outline a possible direction for taking the tales after sharing them with your group of children. To come up with the essays, I let my imagination work on the story until I came up with a wetland connection. These are only suggestions and only a few of the dozens of ways to interpret the stories. Several wetland or wetland-related curricula are also available from various organizations. Turn to page 48 for a list of these resources.

To read aloud or tell a story

You can share stories with your class by reading them out loud or by telling them. If you choose to read them aloud, try to familiarize yourself with the language and plot of the story rather than reading it cold. You may even want to make a tape of yourself telling the stories that your students can then listen to. If you want to learn a story, what follows is an outline for one way to go about it.

The stories in this book, although they all come from oral traditions, come to you as printed words. In telling a story from memory, you do not memorize the printed words verbatim, rather, you recall the images that the words have given you. This means that storytellers must both free the stories from the printed page and develop the ability to vividly see and feel the events of the story as they speak.

Book in hand, choose a story that interests you for any reason at all: because of its relevance to a lesson you would like to teach; or just because it strikes your fancy.

Then sit down and write it long-hand, one word at a time. It won't take as long as you might think. The words will have moved from abstract printed symbols to script produced with your own hand. Next, read what you've written out loud. Your voice moves the words from eyes and head to your tongue. Continue to work with your hand-written copy. Keep it in your pocket to read while waiting in line at the bank or post office, during lunch, or on the bus. Try "walking the story." By this I mean find an unobstructed path, start walking, and read the tale out loud to yourself. Reading and walking at the same time will introduce a rhythm to the words that will make them easier to remember. If nothing else, read the story to yourself each night before you go to sleep. When you feel as though you can recall the plot of the story, tell someone about it. Each time you tell it, add more detail and description until your rendition is as full or nearly as full as the written version. Before long, you will be telling the story!

The following techniques may also help you to learn a story:

- On your written copy, circle words that you find poetic or very descriptive.
- Map the story by drawing an outline of the plot, noting when and where the decisive action takes place.
- When you find a story that you would like to learn, try telling someone about the story.
- Draw a sketch of the story.
- Record your own voice reading the story out loud, and listen to that tape in the car.

Beyond that, let your imagination fly — you'll be amazed at what you will experience. Folklorists recorded these stories to save the stories themselves; these stories now saved, may help us to foster an ethic that will allow us to preserve the wetlands that helped to bring the tales to life.



Turtle and the Divers

"Turtle and the Divers" is part of the creation myth of the Wyandot people whose ancestral land is in the Great Lakes Region of North America. The story is one of many Northeast Woodland tales in which Turtle holds the earth on his back for Sky Woman who had fallen into the water world. A tree falls with her, and the inhabitants of the water world — beaver, otter and muskrat among them — dive futilely to gather the earth from among the roots of the tree. Finally, much to the astonishment of her larger companions, ugly little Toad succeeds. Little Turtle then spreads the mud on Big Turtle's back until it creates an island large enough for Sky Woman to stand on. The tale, in its depiction of wetland animals, provides a platform from which to explore humans' dependence on wetlands and the creatures that make wetlands their home.

This is the way it was my friends. The daughter of the chief of the sky people was very sick. Doctor after doctor had come and none knew a cure for her strange disease. In their worry, the sky people ceased harvesting corn. They ceased gathering fruit. They grew hungry.

Finally, they sent a special messenger to fetch a wise man who lived far from the other people. He came, and when he saw the daughter of the sky chief, he immediately pronounced a cure for her. He told the sky people that the cure for her disease lay among the roots of the Great Sky Tree. He told the sky people that they must carry her to the tree and place her near its trunk and that they must dig. "She must be present," he said, "for only she will recognize that thing which will cure her disease."

The sky people did as they were told. They carried the woman to the base of the tree and they began to dig. They dug without stopping, but, my friends, they did not all dig at once. They formed parties and as one group of diggers became tired, another took their place. And so they continued for a long time, until the hole around the roots of the tree had grown large, and still the daughter of the sky chief had not found the cure for her strange disease.

Then, as one company of workers withdrew from the hole, and another moved to take their place, all were astonished by a great thundering and crackling. The hole they had dug grew larger and larger and the tree began to sink, carrying with it the daughter of the sky chief, for she had become entangled in its branches. The workers watched in awe as she fell.

Below the sky world, all was water. From horizon to horizon, there was nothing but water. On that water swam two loons. They heard the thunder of the sky tree breaking through the world above. That was the first thunder heard in the world below. They looked up and they saw the tree and the woman tumbling toward the water. They saw that she was not a creature of the water, and they knew that she would perish if they let her fall. One said to the other, "We must save her." The other replied, "Yes, we'll swim side by side and catch her as she falls." And so the loons swam one right next to the other, as though they were one creature, and they placed themselves under the sky woman, and she came to rest gently on their backs.

They stretched their long necks to look at their burden. They had never seen anything like her. She was the most beautiful thing they had ever seen. They could not bear to let her fall into the water, but they would soon grow tired. They could not swim with her on their backs forever. One of the loons said, "We must call Turtle, he will summon all the animals, and together we will decide what to do." With that, the loons began their calling. Their voices echoed across the water. Before long, the Great Turtle surfaced not far from where they swam. The loons told him about the thunder and the falling tree. They showed him the beautiful sky woman who lay across their backs. Turtle summoned the water snake and sent him to gather together all the creatures who inhabited that water world.

When all were present, Turtle related the story of the loons, and asked the council what they should do, for she had been sent to them, and they could not dream of letting the beautiful creature slip off their backs to drown in the endless waves. A questioning murmur spread through the crowd of animals, then someone suggested that if the loons could show them exactly where that tree had fallen, then they could send their best divers to the bottom for some of the earth that surely still clung to its roots. Big Turtle nodded and said, "Yes, that we shall do, even if I must support the earth on my back, we shall send our divers to gather some of that earth from underneath the waters."

So the loons indicated precisely the place where they had seen the tree disappear beneath the waves. Turtle then summoned Otter, the best of the divers. Otter filled his lungs with air and went down. The animals gathered and watched until they could no longer see him beneath the water. The only signs of him were the bubbles from his breath that surfaced and popped when they met the air. They waited and watched a long time in anticipation. Surely Otter had reached the bottom and had some earth between his claws. Then the bubbles ceased, and all looked at one another. Had Otter failed? Finally Otter surfaced, so out of breath, that he gasped once and then died, sinking into the darkness below. Otter had given his life in his attempt to create a home for sky woman.

Then Big Turtle called Beaver. Beaver, too filled his lungs with air, and went down. The animals gathered around the ripples that remained where beaver had had his head out of the water. They watched Beaver until they could no longer see him as he sank into the darkness. Then they watched the bubbles that surfaced above him. And then they too ceased. Beaver had been gone a long time. Those who remained above murmured that he must have reached the roots of the tree. But when Beaver came up to the surface, his paws and mouth were empty. Beaver had failed. And Beaver took one last breath and then sank forever below the waves.

Big Turtle summoned Muskrat next. Again the animals watched as he sank into the darkness, and as the bubbles rose to the surface and broke when they touched the air. He remained below for even longer than Beaver and Otter. "Perhaps Muskrat has reached the bottom," the animals said to one another. "Yes, surely he has," they exclaimed. Muskrat broke the surface of the water, and all the animals rushed to look at his paws and mouth. But they found that he too had failed, and he too died as a result of his attempt.

Big Turtle summoned many other creatures, among them, the best of the divers. But none dove deep enough to obtain the earth from the roots of the tree.

Finally, Big Turtle tired of seeing so many lose their lives, and he refused to call on anyone else. Instead, he asked if anyone would volunteer, for the loons were growing tired. An uneasy silence followed, until a tiny voice rose above the others. It was Toad, tiny, ugly, old Toad. She said, "I'll do it," in her rough voice. "I shall dive to the bottom. I shall come back with the earth to provide the sky woman with a home." All the animals laughed. They mocked Toad. They scorned her. How would she, with her strange long hind legs, and her tiny front legs, not known as a diver, how would she succeed where the best of the divers had failed? But Toad was determined. And Big Turtle agreed to let her try. She filled her lungs until the other animals thought she would burst, and then she dove, working her long, strange hind legs as she swam into the darkness. All the animals waited, doubting that Toad would surface alive, let alone with the earth in her mouth. They waited a long time. They began to wonder if perhaps they had judged Toad too quickly, for she had been gone longer than any of the others. At last, they saw movement in the shadows. Toad was returning, still working the water with her strange hind legs. When she surfaced, she opened her mouth. Inside, she held some of the mud that had clung to the roots of the sky tree. Toad had reached the bottom and returned with the earth, and until this day, some know her as our grandmother.

Little Turtle swam to Toad, and gathered some of the mud into his hands. He spread it on Big Turtle's back. As Little Turtle rubbed, an island grew and grew until finally, Sky Woman was able to step off the backs of the loons and stand on solid ground.

But, my friends, there is one thing that I did not tell you. All this time, Sky Woman had held her hand clasped tightly to her chest. You see, my friends, as she had separated from the tangled roots of the sky tree she had grabbed a handful of seeds. These seeds she let fall, and where they fell there grew the squash, and the sunflower, the bean and the sacred tobacco and corn. That, my friends is how the earth was made ready for our arrival. And, my friends, the way we got here is another story all together.

This story is based on research carried out by ethnologist C. M. Barbeau in the early twentieth century. Barbeau interviewed Huron-Wyandot people in Wyandotte, Oklahoma. For source material see *Huron and Wyandot Mythology* C. M. Barbeau, Canadian Department of Mines, Anthropological Series, Memoir 80, no. 11, (1915); C. M. Barbeau, "Supernatural Beings of the Huron and Wyandot, *American Anthropologist*, no. 16, 1914, pp. 288-313; and Arthur Parker, *Seneca Myths and Legends*, (New York: Ams Press, 1970).

Wetland Dependence

In "Turtle and the Divers," the Sky Woman's peril is that she cannot live in a world of nothing but water; however, she depends on the animals that dwell in the water to save her. Interestingly, all the primary animals in the story are wetland creatures. They must cross worlds and live on both land and water to survive. Working together, the animals provide what both they and the sky woman need: a world with both land and water.

Beavers depend on the bark and wood of willows for food and shelter, and on the water to escape from predators.

Muskrats feed on aquatic vegetation such as cattails, sedges, rushes and water lilies and build their dens along the banks of ponds.

Otters often consume fish along the banks of a body of water and construct dens with both underwater and dry entrances. They line their nests with aquatic and terrestrial vegetation.

Loons depend on the aquatic environment for food and on the terrestrial environment for nesting sites.

Toads begin their lives as tadpoles dependent on algae and become insectivores who spend most of their time on land.

Turtles feed on a variety of wetland plants and animals and cannot escape predators without the protection provided by banks and ledges.

Humans depend less directly on wetlands than the amphibious animals of the story; nevertheless, marshes, riparian zones, bogs and estuaries function in ecosystems and watersheds in ways that we may take for granted.

Flood control: Wetlands slow and store flood waters, reducing the height and speed of floods downstream.

Water quality: Wetlands can improve water quality by filtering out sediments, excess nutrients and human-introduced contaminants.

Fish and wildlife support: Wetlands provide food and shelter for many species of birds, fish and animals that are part of the human diet, as well as providing opportunities to observe wildlife in its native habitat.

Storm and erosion control: Wetlands act as a buffer at the edge of large bodies of water. Wetland plants slow down wind and water currents and they bind and stabilize shorelines with their root systems.

Water supply: Wetlands act as groundwater recharge stations: surface water that collects in wetlands is filtered as it slowly seeps into the underlying aquifer, replenishing this valuable resource.



Hungry Spider and the Turtle

"Hungry Spider and the Turtle" comes from the Akan-Ashanti people of Western Africa. In the tale, greedy spider manipulates popular customs in order to trick turtle out of a meal that, out of courtesy, he must offer. Patient turtle, through the same kind of cunning, takes advantage of his adaptation to water to show spider that "one good meal deserves another". In spite of the story's emphasis on social interaction, it provides a backdrop for a lesson in the relationship between habitat and niche.

Spider was a hungry one, he always wanted to eat. Everybody in Ashanti knew about his appetite. He was greedy, too, and always wanted more than his share of things. So people steered clear of Spider.

But one day a stranger came to Spider's habitation out in the back country. His name was Turtle. Turtle was a long way from his home. He had been walking all day in the hot sun, and he was tired and hungry. So Spider had to invite Turtle into his house and offer him something to eat. He hated to do it, but if he didn't extend hospitality to a tired traveler it would get around the countryside and people would soon be talking about Spider behind his back.

So he said to Turtle:

"There is water at the spring for you to wash your feet in. Follow the trail and you'll get there. I'll get the dinner ready."

Turtle turned and waddled down to the spring with a gourd bowl as fast as he could. He dipped some water from the spring and carefully washed his feet in it. Then he waddled back up the trail to the house. But the trail was dusty. By the time Turtle got back to the house his feet were covered with dirt again.

Spider had the food all set out. It was steaming, and the smell of it made Turtle's mouth water. He hadn't eaten since sunrise. Spider looked disapprovingly at Turtle's feet.

"Your feet are awfully dirty," he said. "Don't you think you ought to wash them before you start to eat?"

Turtle looked at his feet. He was ashamed, they were so dirty. So he turned around and waddled as fast as he could down to the spring again. He dipped some water out of the spring with the gourd bowl and carefully washed himself. Then he scurried as fast as he could back to the house. But it takes a turtle a while to get anywhere. When he came into the house Spider was already eating.

"Excellent meal, isn't it?" Spider said. He looked at Turtle's feet with disapproval. "Hm, aren't you going to wash yourself?"

Turtle looked down at his feet. In his hurry to get back he had stirred up a lot of dust, and his feet were covered with it again.

"I washed them," he said. "I washed them twice. It's your dusty trail that does it."

"Oh," Spider said, "so you are abusing my house now!" He took a big mouthful of food and chewed it up, looking very hurt.

"No," Turtle said, sniffing the food, "I was just explaining."

"Well, run along and wash up so we can get on with the eating," Spider said. Turtle looked. The food was already half gone and Spider was eating as fast as he could. Turtle spun around and hurried down to the spring. He dipped up some water in the gourd bowl and splashed it over his feet. Then he scrambled back to the house. This time he didn't go on the trail, though, but on the grass and through the bushes. It took him a little longer, but he didn't get dust all over his feet. When he got to the house he found Spider licking his lips.

"Ah, what a fine meal we had!" Spider said.

Turtle looked in the dish. Everything was gone. Even the smell was gone. Turtle was very hungry. But he said nothing. He smiled.

"Yes, it was very good," he said. "You are certainly good to travelers in your village. If you are ever in my country you may be assured of a welcome."

"It's nothing," Spider said. "Nothing at all."

Turtle went away. He didn't tell other people about the affair at Spider's house. He was very quiet about his experience there.

But one day many months later Spider was a long distance from home and he found himself in Turtle's country. He found Turtle on the shore of the lake getting a sunbath.

"Ah, friend Spider, you are far from your village," Turtle said. "Will you have something to eat with me?"

"Yes, that is the way it is when a person is far from home — generosity merits generosity," Spider said hungrily.

"Wait here on the shore and I'll go below and prepare the food," Turtle said. He slipped into the water and went down to the bottom of the lake. When he got there he set out the food to eat. Then he came to the top of the water and said to Spider, who was sitting impatiently on the shore, "All right, everything is ready. Let's go down and eat." He put his head under water and swam down.

Spider was famished. He jumped into the water to follow Turtle. But Spider was very light. He floated. He splashed and splashed, kicked and kicked, but he stayed right there on top of the water. For a long time he tried to get down where Turtle was eating, but nothing happened.

After a while Turtle came up, licking his lips. "What's the matter, aren't you hungry?" he said. "The food is very good. Better hurry." And he went down again.

Spider made one more desperate try, but he just floated. Then he had an idea. He went back to the shore, picked up pebbles and put them in the pockets of his jacket. He put so many pebbles in his pockets that he became very heavy. He was so heavy he could hardly walk. Then he jumped into the water again, and this time he sank to the bottom, where Turtle was eating. The food was half gone. Spider was very hungry. He was just reaching for the food when Turtle said politely:

"Excuse me, my friend. In my country we never eat with our jackets on. Take off your jacket so that we can get down to business."

Turtle took a great mouthful of food and started chewing. In a few minutes there wouldn't be anything left, Spider was aching all over with hunger. Turtle took another mouthful. So Spider wriggled out of his coat and grabbed at the food. But without the pebbles he was so light again that he popped right up to the top of the water.

People always say that one good meal deserves another.

"Hungry Spider and the Turtle," from *The Cow-tail Switch and Other West African Stories* by Harold Courlander and George Herzog. Copyright 1947, © 1975 by Harold Courlander.

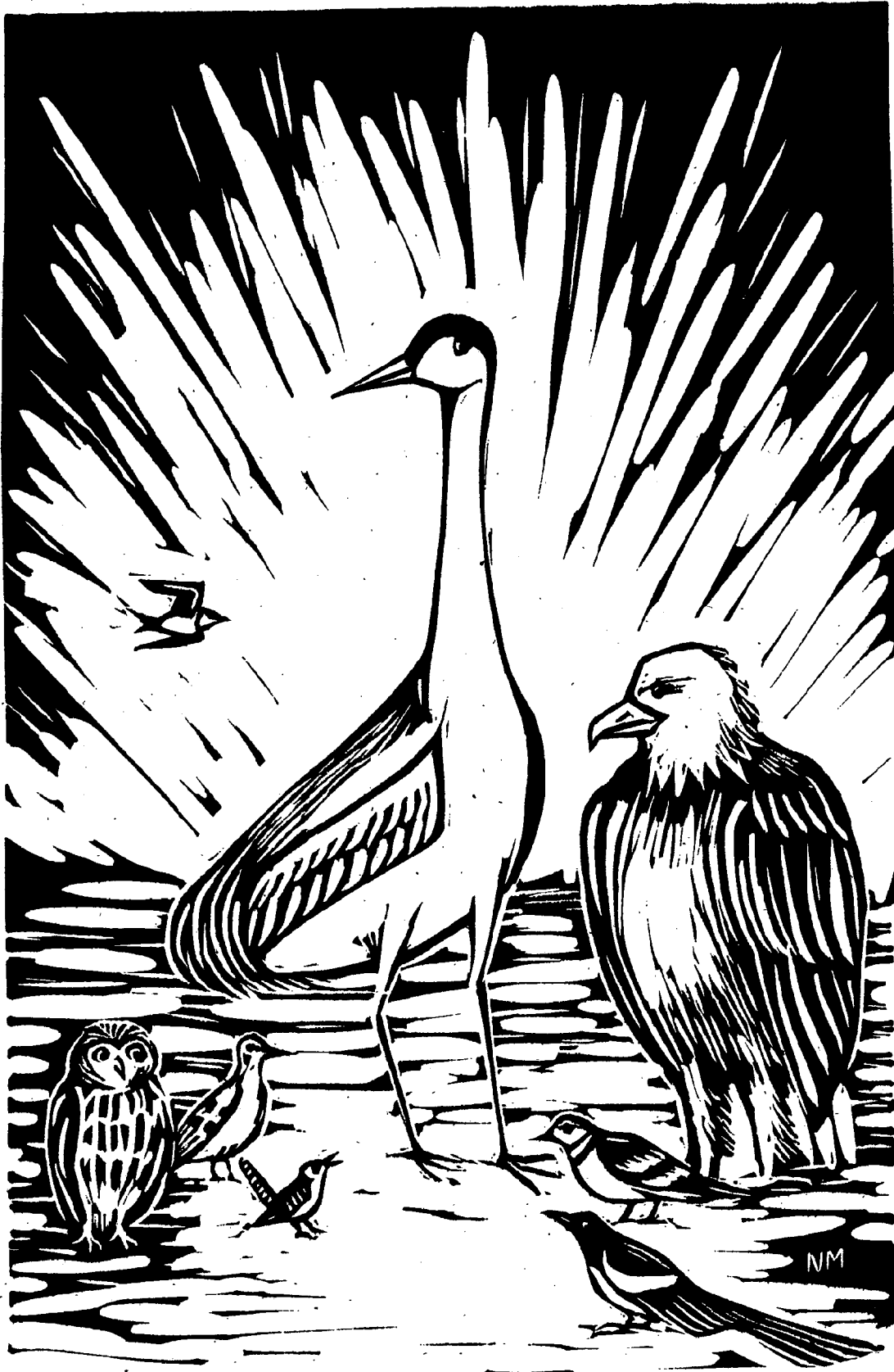
Home for Dinner: Habitat and Niche

A habitat is the place in which an animal or plant lives. In the story, Hungry Spider's "house" and Turtle's spot on the shore of the lake are parts of the animals' habitats. A turtle and a spider *can* share a habitat (a spider may spin a web on a plant that grows on a turtle's bank) but place alone does not determine diet. Even though spiders and turtles can live in the same neighborhood, that does not give them the ability to sit down to a meal together. The set of relationships that an animal has to its habitat determines how and when it will

eat. That set of relationships is called a niche. A creature's niche determines with whom it can share its meals.

Turtles and spiders, while they may live in the same wetland, occupy different niches. In the story, Turtle and Hungry Spider, as occupants of different villages, follow different rules and customs that determine their relationship to the beings around them. Likewise, in nature, turtles and spiders follow different laws that determine their place in their environment. Turtles obtain food by

diving into the water. Spiders spin webs to catch air-borne insects. In the story as in the wild, Turtle and Spider can not share a meal because they hold different niches in the wetland. The two species would never settle down to an identical meal at the same time and place. Each can only find nourishment at their own home, and because of custom, or the laws of nature, cannot find food at a table outside their habitual position in the ecosystem.



Where the Birds Build

In this Shoshoni-Bannock story from the sagebrush plateau, the birds gather together to decide where each shall live. They each choose a place to their own liking. The marsh wren, uncomfortable as it may seem, chooses the marsh among the cattails. All the birds mock her, but she insists. After hearing her defend her decision, Koontex the crane sees her wisdom and follows suit by also building his nest in the marsh. The text that follows the story elaborates on the descriptions of the nesting sites that appear in the tale.

Long ago when things were not yet settled, the birds held a powwow to decide where each one should live.

After a big supper around the campfire, the tall blue crane, Koontex, who was chief of the birds, said, "Now, we shall divide the land and the rocks and the trees and the streams, so that each bird family has the very best place for its nest."

"Please, O Chief," screamed Kwinaa, the eagle, "let us build at the top of the highest cliff. We have strong wings to fly to such high places, and our children will be safe from prowlers there."

"That is all right with me," sniffed Pantii, the killdeer. "What a bother it would be to fly so high."

"Very well," said the crane. "Kwinaa may build on the cliffs, while you, Pantii, will put your nest on the ground."

"No one has the willow thickets. Let me build my nest there," squawked Kwitawyon, the magpie. "There are plenty of dry sticks for a nest under the willows."

"The willows for the magpies," said Chief Koontex.

"Let us build our nests of mud on the sides of banks and cliffs," chirped Pasokompin, the swallow.

"A good, safe place that will be," agreed the Chief. "Your sturdy houses will protect your children from wind, rain, and hunters."

The owl, Pittisi, asked for the tall pine and the dove for a nest on the ground. Koontex, the crane, agreed with all these requests.

But one little bird with a tiny voice like a willow whistle asked to have his home in the marsh among the reeds and cattails.

"You can't build there. You'll drown, shouted the birds. "Oh, no, I won't," chirped Tentsuki, the marsh wren. "Let me tell you how I'll build."

"How? How?" chirped, squeaked, and squawked all the other birds.

"I'll weave the tall slender leaves of the cattails together to make a snug wikiup. Then I'll put in a floor of grass and make my nest on that. My children will rock in the breeze as the reeds blow high above the water."

"But how will you get into your nest?" asked the crane.

"I'll have a hidden entrance," said the wren. "I shall fly under the nest, close to the water, and up through the reeds to the entrance. No one will see my nest because it will look just like the cattails around it."

"How clever," said Koontex. "You may certainly build in the marsh."

Now, since that day, all the birds have built in their chosen places. And Chief Koontex, the crane, followed the wisdom of the wren and chose to make his nest on a platform of reeds in the marsh. He stands on his stilt legs and watches as the other birds come and go. Because he guards everyone, the birds call him Ata, or Uncle.

And the rat's tail dropped off.

Desert Marshland Homes: Wetland Habitat

In the desert, wetlands are even more critical for wildlife habitat than they are in wetter areas, for the presence of water supports many species that could not otherwise survive on the arid sagebrush plateau. Many desert inhabitants need dense wetland vegetation for cover; others use wetlands as resting places, or indirectly rely on the aquatic or damp environment to furnish a steady supply of prey, which may range from fish and insects to rodents and small birds. While not all of the birds in "Where the Birds Build" make wetlands their home, they all depend on wetlands in some way.

Bald Eagle: The Bald Eagle builds an enormous nest perched high in the branches of a tree or on a cliff overlooking a waterway. The bird rarely builds its nest far from water, for fish nurtured in the shade of shoreline vegetation are a principle part of its diet. In fact, the body of water itself, be it a pond, lake or river with its shoreline wetlands, becomes part of the eagle's territory.

Killdeer: The Killdeer, a member of the plover family, scarcely builds a nest at all; rather, it lays its eggs in a small depression on flat gravelly ground. Near open bodies of water, the birds run over the mudflats on their long thin legs, snatching insect meals from the mud and the water. While not actually living in the

marsh, the Killdeer depends on wetlands' capacity to nurture insects. Even the terrestrial insects that make up part of its diet likely spent their first weeks as aquatic larvae feeding in the plant- and detritus-rich wetland.

Magpie: Magpies need thickets for nesting. Magpies build bulky nests in the midst of the brush to protect their young from predators and the hot desert sun, and even incorporate a roof into the structure to provide extra protection. Although thickets are not limited to wetland environments, in the desert, most are found where water is present for at least part of the year.

Bank Swallow: The Bank Swallow builds its sturdy nest by burrowing a long cavity in the soil of cliffs and river banks. The nests are so durable that they outlast the swallows themselves, and are used by many generations. Swallows spend almost all of their time diving through the air catching seemingly invisible insects. While the swallow's food source is airborne, most of the insects it eats breed and develop in the water.

Short-eared Owl: The Short-eared Owl builds its nest on the ground in open country. Although not confined to marshlands, in desert climates the owl is most often seen hunting for small birds and rodents near water.

Mourning Dove: The Mourning Dove is the most common dove in North America. Its habitat ranges from open woodlands and agricultural fields to suburban neighborhoods. In the desert, however, the Mourning Dove is confined to areas near water. The doves build flat nests either on the ground or in small trees, and feed on the seeds of marshland and agricultural grasses.

Marsh Wren: The Marsh Wren makes its home in the wetland itself. The male wren builds elaborate nests of cattails suspended inside the marsh. He will sometimes build several nests in one mating season in his attempt to attract a mate. Sometimes he succeeds well enough to attract more than one female and fathers two nests full of chicks. The marsh homes are nearly invisible and plenty of wetland-raised insects fly and swim right by the wren's doorstep.

Sandhill Crane: The Sandhill Crane, like the Marsh Wren, makes the wetland its home. The crane builds its nest in a location surrounded by water to ensure the protection of its eggs and young. Standing tall on long legs, the crane searches for its prey of aquatic insects, worms and small fish that flit between the marsh sedges and grasses.



Why Crayfish has his Eyes on a Stalk

In this Oneida tale, flood waters carry Crayfish far from the river bed, stranding him on high ground. Not only is he stuck, but his eyes dry up so that he loses his sight. Luckily for Crayfish, he can still talk, and as he crawls blindly banging into trees, he asks each one to identify itself. Because Crayfish knows his trees — which ones grow near water and which ones prefer high ground — he knows when he is close to home. As soon as he reaches a willow, he gets so excited that he throws himself into the water. He labors so hard to see that his eyes pop out of his head and wave around in the water. Crayfish can see better than ever before, and he commends himself for not having given up. Traveling with Crayfish, we see which trees prefer high ground, and which can withstand water against their roots, and in turn explore why they can take roots in wetlands.

Once, long ago, after many days of heavy rain there was a big flood. It swelled the waters of the stream where Crayfish lived far beyond the usual banks. Crayfish was very happy and went from place to place, finding all kinds of good things to eat where the water had risen.

"Be careful," said Minnow. "This water may go away again."

But Crayfish did not listen. He was too busy going around from here to there and eating all he could. Finally he had eaten so much that he grew sleepy.

"I shall just rest for a little while," he said. Then he crawled under a rock and fell fast asleep. While he slept the flood waters began to drain away. The hilltops appeared again and then the slopes of the hills like the heads of swimmers popping up out of a pond. More and more of the waters drained away and now the stream had gone back to its usual bed.

But, far away from the water now, Crayfish still slept on. The sun shone hotter and hotter and still he slept. Finally, late in the afternoon, Crayfish woke. He felt very stiff and dry. It was hard even to move. He tried to look around, but he could see nothing. His eyes had dried up.

"Yo hoh!," said Crayfish. "I should have listened. What can I do now.?" Then, his legs creaking as he moved, he began to crawl. He had not gone far before he bumped into a tree. Then he sang this song:

What kind of tree

What kind of tree

What kind of tree

Is this before me?

And the tree answered, "I am an oak."

"Oh-oh," said the Crayfish, "I am still very far from water." Then he began to crawl again. On and on he went until he bumped into another tree. Once again he sang his song:

*What kind of tree
What kind of tree
What kind of tree
Is this before me?*

And the tree answered, "I am a maple."

"Oh-oh," said the Crayfish, feeling very discouraged, "I still have so far to go!" But still he kept crawling, even though his legs were stiff as dry twigs. After he had gone a long ways further he bumped into another tree. Once more he sang:

*What kind of tree
What kind of tree
What kind of tree
Is this before me?*

And the tree answered, "I am an alder."

"Eh-heh!" cried Crayfish, feeling very excited now. "Then I do not have that far to go." He began crawl faster and soon bumped into another tree. With great excitement he sang his song another time.

*What kind of tree
What kind of tree
What kind of tree
Is this before me?*

And the tree answered, "I am a willow."

When he heard that, Crayfish began to move as fast as he could. In only a few more steps he fell into the water. He felt it wash over his head and he strained so hard to see that, as the water moistened his eyes and softened the mud which had dried over them, his eyes shot right out of his head, each one on a long stalk. Crayfish waved them around. He could look in any direction he wanted. This was even better than before and so, though he had gone through much hardship, Crayfish felt that he had been rewarded for not giving up.

And so it came to be that Crayfish has his eyes on the end of a stalk, and so it is with all other crayfish to this very day.

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Trees with Wet Feet

Like Crayfish, we can get to know which trees can tolerate wet feet for long periods of time and by them learn to recognize wetlands. In river- or stream-associated systems like Crayfish's, the oak will grab the high ground; maple, who can handle the occasional flood finds a high spot on the floodplain; alder, who has yet more tolerance for water picks a spot near the stream; and willow, who doesn't mind wet feet year round, lives right on the bank. Positively identifying wetlands, however, is not as simple as merely recognizing the trees that grow in them. Some trees that can tolerate wetland conditions will also appear in drier areas; however, they may be less common upland where there is more competition. Instead of competing for limited space, sunlight and nutrients, they will take advantage of special adaptations that allow them to live with their roots surrounded by water.

One of the challenges for trees that take root in wetlands is to survive in oxygen-poor soil. Wetland soils, called hydric soils, lack oxygen be-

cause the oxygen content of water is so much less than the oxygen content of the air that would otherwise be present between soil particles. In order to survive in soils that are soaked with water during the growing season, trees must develop an alternative means to obtain enough oxygen. Some species such as the willow have extremely porous roots which allow them to actually absorb oxygen present in the water and transport it to the rest of the plant. Flooding also stimulates the willow to grow new roots to replace those that the flooding has killed. Other plants, such as the water lily have special cells on their leaves that provide a direct oxygen link from leaf to root.

When the option presents itself, many trees avoid oxygen-poor situations even while growing in hydric soils. In order to get the most from the thin upper layer of dry soil, the roots will grow laterally to absorb oxygen. The dry-season oxygen however doesn't come without cost: shallow roots render large trees unstable. The Douglas Fir, although not a wetland tree, sends out lateral

roots to avoid too much water in the rain-soaked soils of Western Washington. The next time you go walking in the forest examine the upended roots of wind fallen Douglas Fir. Other trees such as the Western Red Cedar and Alder compensate for shallow root systems by widening the base of their trunk. Such a swollen trunk, called a buttress, serves the tree in much the same way the wide base on a floor lamp keeps it from falling over.

Why, you may wonder, with these challenges, would a tree even bother to root in the mud? The answer comes in two parts. First, the harsh wetland conditions limit competition. Not all plants can grow in wetlands, and those that can do not face the stiff competition for sunlight, space and nutrients that they might upland. Second, wetland soils are extremely rich in nutrients because of the life they support and because of sediment-rich flood waters. So next time you go walking, and feel your feet getting wet, ask yourself, "What kind of tree is this before me?"



The Beaver's Tail

This Shoshoni-Bannock story portrays two well-known wetland mammals in a most unlikely interaction that results in beaver's flattened tail. The tale depicts Beaver doing what Beaver does best: working. Otter, often the beaver's natural enemy, taunts Beaver, and challenges him to slide down a hillside. Beaver begrudgingly accepts the challenge. Whereas in the wild, otter generally challenges beaver by threatening his babies, this challenge endows Beaver with a tail that will identify him as the marsh-builder that he is.

Once very long ago in the time when animals could talk together, Hanee, the beaver, and Tindui, the otter, lived near each other in a big river that flowed at the foot of a high rocky hill.

Tindui built a mud slide into the river, a short slide, not too far up for him to climb on his stubby legs. What fun he had struggling up beside it and then slipping down it into the clear water.

One day Hanee came paddling by with a big stick in his mouth.

"Hello there, Hanee, my brother," called the otter. "Why do you work so hard? Build yourself a slide like mine and have a little fun."

The beaver said nothing, for his mouth was busy carrying the stick. But he thought about the otter's suggestion.

The next morning Hanee swam up the river on his way to a big grove of aspen where he did his logging.

Tindui spotted the beaver's brown head as he glided smoothly through the water.

"Hey, there," called the otter. "Still working?"

"I certainly am. You might do better if you'd work a little yourself." Then Hanee continued on up the river. Later, carrying a huge aspen stick in his mouth, he swam downstream.

The otter watched as the industrious beaver carried the stick to repair his dam. Tindui called out again, "Hello, brother Hanee. Why don't you build a slide and have fun like I do?"

Hanee ignored the otter. Then Tindui called once more, "I'll bet you can't build a good side like mine."

Hanee dropped his stick. "Of course I can," he snapped. "But beavers only build slides when they need them to pull logs into the water."

"Work, work, nothing but work," sniffed the otter. "You never do anything for fun."

"Of course I do," said Hanee. "We beavers have fun in spring and early summer when we go to visit our relatives. But now it is nearly winter, and we must repair our dams and build our houses so we can be snug and safe during the long cold time."

"You sound so serious," teased Tindui. "No time to play, no time it all."

"All right, brother Tindui. I'll build a slide and show you what I can do. My slide will be longer and better than any other you have ever seen."

So the beaver climbed out of the water and went way up the stony mountain. He slid down once. "Ouch," he said. "Those rocks hurt. I know what I'll do."

Up he climbed again. This time he sat on his big tail as he slid. That worked better, so he did it over and over again. Then he jumped back into the river.

"How's that for a slide, brother Tindui?" he called.

"Perfect," said the otter. Then he began to laugh. "What's the matter? Don't you like my slide?"

"Yes, I said it was perfect, but look what you've done to your tail."

Then Hanee looked over his shoulder. Alas, his beautiful tail had no hair left on it. Besides that, it was flat like a paddle from so much sitting and sliding on it.

To this very day, the beaver and all his children and grandchildren and great-grandchildren have smooth, flat tails.

That's all. The rat's tail dropped off.

From *Sage Smoke: Tales of the Shoshoni-Bannock Indians* by Eleanor Heady (Cleveland: Modern Curriculum Press, 1991)
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Beavers Build Marshes

The beaver is the only wetland animal capable of actually creating habitat. That ability, along with efforts on the part of conservationists have allowed for the return of an animal that had disappeared from much of the United States by the end of the nineteenth century.

The beaver was once one of the most prolific creatures in North America. By some estimates, five hundred years ago the beaver population exceeded in number that of the buffalo. Before long, however, the fur trade had become the basis of the economy of newly colonized North America. With an enormous population to exploit, French, English and Spanish traders set up posts throughout eastern North America, but the beaver was no match for the voracious European market for pelts. The early depletion of the East Coast beaver population drew trappers and traders further and further west until the Hudson's Bay Company opened forts on the Puget Sound in the 1820s and 1830s. The fort at the mouth of the

Nisqually River reported taking in as many as 450 skins in a single day in 1833.

The beavers' building skill has contributed to the animals' survival in spite of the tragic losses it had experienced by the twentieth century. The ability to create habitat allows the beaver to survive with little more than a waterway and a food supply, and a pond.

If a pond is available, a beaver family will engage in a little habitat enhancement by obstructing the outlet in order to increase its size. If no other pond exists nearby, they will start from scratch in an area that contains an ample food supply.

As a result, one pair of beavers is capable of creating acres and acres of associated wetlands.

The animal comes outfitted with all the building implements it needs. The beavers' large front teeth permit them to cut down trees. Their broad flat tails propel stocky bodies under the water and keep them stable on land while they are working. To enable the beaver

to carry building material underwater without choking, it has lips behind the teeth close that close to block off the entry of water. And an enormous and efficient digestive system enables them to extract nutrients from almost any plant matter, so building and eating are closely integrated activities.

The adaptations to life on a waterway along with a concerted effort on the part of conservationists has allowed the beaver to return to regions where at one time it had ceased to exist. The reintroduction of beaver into the eastern states began, in the early twentieth century. Animals were moved eastward and set free. Even though hundreds of individual strains of beavers were lost, the three races that remain have done remarkably well, and now are maintaining viable populations in suitable habitats across the United States. Those modern beavers build wetlands as stubbornly as did their ancestors.



Mr. Frog's Dream

This Central American story from the Nicarao people of Nicaragua depicts what happens one springtime to talkative Mr. Frog. In a strange winter dream, Mr. Frog he sees himself flying. Obsessed by his dream he gets the idea that the ducks of the pond can help him to realize it. It occurs to him that he can accompany on their migration to their summer breeding grounds. He calls them and they come to his aid. High in the air, suspended between the ducks by his mouth clenched to a reed, Mr. Frog becomes frightened and begs to be let down. Of course, as soon as he opens his mouth, he tumbles to the ground. When asked what happened, he refuses to talk about it. Likely he's learned that frog don't fly, nor do they migrate. Even though only frogs in cold climates actually sleep through the winter, frog life cycles depend as heavily on the seasons as do the life cycles of migrating birds.

Ag es ago there lived, in a pond near Lake Managua, a handsome young frog who had many talents. He could jump farther, swim faster, and sing more sweetly than any other frogs who inhabited the pond. So highly respected was this gifted creature that his friends and relatives addressed him as "Mister" Frog.

This encouraged the frog to add unto himself another accomplishment—that of speaking.

Of course he had always been able to talk, but only in a modest, quiet way. Now he spoke loudly and almost unceasingly, and always about his own achievements, which he considered spectacular.

Before long, even the most patient grew weary of Mister Frog's harangues and avoided him as much as possible. Determined to have an audience, Mister Frog sought out birds who paused for refreshment at the pond during their long migratory flights. Unlike the frogs, these birds were entertained and amused by Mister Frog's speeches. They encouraged his noisy boastings. Of course they did not have to listen day and night, for they would stay but a short while before joining their companions in the sky.

Soon the summer ended. All the birds had flown south. Mister Frog welcomed the winter, but he missed his audience. However, he was quite exhausted from his efforts and was glad to hibernate in the mud at the bottom of the pond until spring.

One morning Mister Frog was awakened by the chirping of many birds. He rose from his muddy bed and swam to the top of the pond, stretching his legs as far as they would reach. He saw that the sky was blue and the sun bright and warm. It was spring.

Mister Frog ordinarily would have leaped enthusiastically but instead he remained strangely quiet. He had no desire to jump or swim or sing. Neither did he wish to talk. He sought out a fresh lily pad and sat on it contemplating. He only nodded to the other frogs who surfaced the pond after their long sleep. Occasionally, out of need and habit, his sticky tongue would dart forth to capture a meal of insects, but he didn't really relish the food. Mister Frog's mind was on something else. The frogs and birds wondered why he remained so quiet.

Mister Frog was obsessed by a dream he had while sleeping through the winter. He had seen himself in grand escapades. But the most startling part of the dream was that he had seen himself flying to strange ponds in faraway lands. So real did this flight seem that Mister Frog found himself examining his body for visible means of flying. Alas, he was disappointed to find that he still had only four legs which could get him no more than a short distance from the ground.

He breathed a heavy sigh, which could be heard throughout the pond. This brought his perplexed friends and relatives around him. They knew something was troubling him, and they hoped to be of help.

"Mister Frog, what is the matter?" asked one of his cousins.

All Mister Frog needed was an invitation to speak, for he had not lost his habit or enthusiasm for chatter. It had been a long time since he had such an audience and he made the most of this opportunity.

He sat up regally and exclaimed, "I had the most wonderful dream anyone ever had! Come hear about it!"

Although the others knew there would be no stopping him, they chorused politely, "Do tell us what you dreamed!"

"You'll hardly believe it," said Mister Frog gazing skyward—pausing to add to the suspense—"but I dreamed I was flying through the sky like a bird." Suddenly Mister Frog's face brightened as though he were inspired. "Yes . . . yes . . . I was flying like a bird, and NOW I know how I can really do it!"

"Wonderful! Stupendous!" the frogs cried. "Tell us how!"

"No, I shall not!" answered Mister Frog haughtily; "for as you know, there is no frog my equal. Only I can fly."

With these boasting words, Mister Frog took a flying leap off the lily pad over the heads of the others and landed at the edge of the water. There he called to some birds resting in the trees.

"Good morning, Swallow," he cried, "are there any ducks farther down the pond?"

"We do not know," answered the mother swallow, who was busily feathering her nest. "Ask the chorlos, who have come from Argentina. They would have passed that way."

The chorlos, resting nearby, heard and replied in unison, "We are sorry, Mister Frog, but we did not stop to look. We are on our way to the North Pole. The journey is long, so we must be on our way at once." And off they flew, their wings causing a rustling through the air.

Poor Mister Frog was disappointed. He was wondering what to do next when overhead he heard the harsh *cua, cua, cua* of two wild ducks. They swooped down and lighted on the water beside him.

While they were quenching their thirst, Mister Frog swam hurriedly toward them, calling greetings to his old friends.

"We're glad to see you again, Mister Frog," they said. "Did you sleep well this winter?"

"Very well," Mister Frog answered. He was so concerned with his mission that he neglected to inquire how they had fared during the winter. Instead, he blurted out excitedly, "I dreamed that you took me flying through the air! Will you help me make my dream come true?"

The ducks laughed good naturedly. "How can we do this?"

"I remember exactly how it was done in my dream. First, we must find a firm reed. Then, each of you will take one end in your mouth, I shall hold on to the center with my strong upper teeth, and away we shall go. That's just the way I dreamed it."

"Where do you want to fly?" asked one of the ducks.

Mister Frog considered a moment. "Could I go to your summer home?" he asked.

"That's too long a trip," the ducks answered. "But we will take you over the pond several times and maybe over the adjoining fields."

"But I want to go to other ponds in faraway lands!" he cried.

"It will be too burdensome for us," said the ducks impatiently.

"Very well," agreed Mister Frog quickly, for he was afraid they would fly off and desert him. He had hoped for a longer trip, but on second thought he decided that if the flight were viewed by all the creatures in the pond, it would provide more for him to brag about.

"One thing you must remember," cautioned the older and wiser duck, "under no circumstances must you speak during the flight."

"I know that!" advised Mister Frog with an air of importance. "I always know what to do!"

While Mister Frog searched for a suitable reed, the news of his flight spread quickly.

Everyone assembled to see the takeoff.

Each duck took hold of the reed and Mister Frog grasped the center with his mouth. They left the ground and circled just above the water. Then up and down they swooped over the heads of the ogling creatures in the pond.

Never had Mister Frog been happier. Never had he felt more brazen. He wished he could fly forever!

Mister Frog could not help but notice how pleased the two ducks were with their performance. He felt a wee bit jealous that they should be stealing some of his fine act. He saw they were enjoying the praise from the onlookers just as much as he was, so he thought: "Perhaps now they will take me with them. We will be the talk of the ponds and meadows wherever we go!"

Each time the ducks flew around the pond they became more and more daring. They boldly swooped faster and faster, whirling Mister Frog until he became too dizzy to think.

"Slow down . . ." he pleaded.

Alas! With these words he let go of the reed and fell from the sky.

A gasp of horror came from the crowd below him. They scattered in every direction. Some took to the shore. Others dove for safety to the bottom of the pond.

Mister Frog tumbled round and round and then went headlong into the pond.

The large splash sent ripples right to the water's edge. The lilies bobbed. The cattails bent low with the unexpected tide.

When everything stilled, there was Mister Frog, the wind knocked out of him, floating on the water. His ego was really deflated.

The first of his cousins who reached his side asked, "What happened?"

Mister Frog would not look at him, but simply answered, "I just don't want to talk about it."

And he didn't.

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Frog Life Cycles

Seasonal changes influence the life cycles of most creatures. Frogs, however, as cold blooded animals, respond directly to air and water temperatures because the body temperature of the frog roughly equals that of its environment. Air and water temperature play a role in determining the frog's movement from one phase of life to another.

Frogs living in climates with severe winters, such as the Cascade Mountains, spend the winter deep in sleep and clamorously awaken in the springtime. In milder climates, like the Puget Sound region the frogs' metabolism slow enough that they are able to survive the winter with its scarce food supply without going into hibernation. In either instance, as spring arrives and warms the air and water, males gather in choruses and sing together. The females respond to the frog song by selecting mates. In most cases the eggs are fertilized externally. The female deposits her eggs in shallow marsh or pond waters, and her mate subsequently fertilizes them while clutching her from behind.

As the days lengthen and temperatures begin to rise, the night clamor of the frogs dies down and tadpoles emerge from the fertilized eggs. The newly hatched tadpoles take advantage of the summer sun as they metamorphose into young frogs. Because the warm

weather actually increase the body temperature of tadpoles, they grow quickly during the summer months. Often they will even congregate in inherently warmer shallow waters, and raise the temperature of the water by allowing the sun to heat their bodies. Not only does the warmth of the sun quicken tadpole growth; its light nourishes the algae which make up most of the their diet.

Even though the tadpole grows all summer, curiously, it appears to "shrink" in size. In much the same way as a baby chick consumes its yolk sac before it hatches, the tadpole absorbs energy stored in the tissue of its own body as it undergoes transformation. Tiny hind legs appear first: little stubs at the top of the tail. Little forelimbs follow. When the tail becomes little more than a stump, the tadpole is ready to step onto land. Our tadpole turned frog however, doesn't always take his first step in solitaire, but rather may ventures out of the comfort of water in tandem with hundreds or thousands of brothers and sisters and cousins.

The great numbers of brand new froglets make up for the thousands that succumb to dehydration and predation in their first days or weeks on land. Young frogs have very thin skin newly adapted to air, and they haven't yet the

strength and speed to escape many predators.

All this while, lively adult frogs have kept well fed on insects nurtured by the shallow marsh waters. All summer long they slip in and out of the water to escape predators and to keep their skin moist and supple.

As the days shorten and grow colder, activity wanes. The tadpoles that still have not emerged from the water continue their eating, but their growth slows. Frogs living on land become sluggish as their body temperatures drop with that of the air. Finally, in mild climates, the frogs enter a slowed state in which they scarcely will so much as croak. In colder climates, the time comes to consider hibernation. Although some frogs winter buried on land, most burrow into the thick debris that lines the bottom of pond or marsh. Where winter temperatures dip below freezing, the layer of ice along with the underlying earth insulate the muddy bottom and almost always ensure that the sleeping frogs do not freeze. In the same under-ice world, many tadpoles survive until they are able to metamorphose the next summer.

As soon as the sleeping or sluggish frogs feel springs' first warmth, they come to life. The tadpole resume their eating and the frogs, in the tradition of Mr. Frog, take up their song.



Raven and the Goose

In this story from northern North America, Raven creates a companion for himself. To his surprise, she turns out to be a goose instead of a raven. In spite of their differences, Raven and the goose come to love one another. Then, one day, Anana, the goose, catches sight of a flock of geese and knows that she must join her people. Raven joins her and is content in his life with the geese, but finally the day comes when the flock must fly south for the winter. Even though he tries to accompany them, Raven can't keep up. Anana hangs back with him for as long as she can, but finally Raven slips into the water. A great wave in turn casts him ashore, Raven begins to dance, and by dancing all night, he washes his loneliness and sorrow away. Anana's urge to fly south illustrates the strength of the yearly pattern of migration that links wetlands from Northern Canada to Mexico.

Raven flew above the earth and he liked what he had made. He saw the men hunt and the women gather berries, and he rejoiced in their happiness. He watched the boys and girls grow into splendid men and women. The men and the women married, and Raven took delight in their children.

The people and the animals flourished, and they lived together in harmony. The trees and plants and flowers spread across the earth, and the oceans were full of whales and seals and fish. All the living creatures that Raven made knew happiness and love. Each creature found its mate, and both grew old together until they died. But Raven was immortal. He lived on and on, and all the things he loved grew old and died.

Raven was lonely, and one day he returned to earth to live among his people and to share in their happiness. Raven wanted to marry. He searched everywhere for a girl who would become his wife. At last, he saw a little sparrow. The sparrow was crying, and Raven settled down beside her.

"Why are you crying?" he asked her.

"I am crying for my husband, who is lost," she answered. "I love him because he catches worms for me."

"It's not right for you to cry," said Raven. "Take me for your husband. I have a high forehead and a big beak. You will sleep under my wing, and I will give you dainty centipedes to eat."

"No, thank you," said the little sparrow to Raven, who towered above her. "My husband may yet return. Besides, centipedes are too pretty to eat."

So Raven flew away.

Raven flew on and soon he saw a small snowbird. The snowbird was crying and Raven asked her why she wept.

"I am crying for my husband," she said. "He has been away such a long time. He flew off to look for food for me, and he hasn't yet come back."

"Your husband is probably gone forever," Raven said. "But don't worry, I will marry you. You can sleep under my wing. Take me for a husband! I have a pretty beak, and a handsome chin. I have good nostrils and eyes, and my wings are strong and broad."

But the little snowbird said, "Thank you for your kindness, but I'm sure my husband will return."

Raven grew sad and flew off again.

One summer day Raven decided that, if he could not find himself a wife, he would make one. And so he took some clay and molded it into an egg. He set the egg down in soft grass and cared for it. He warmed the egg when the air was cold, and he turned it over from time to time. At last, the egg began to move. Raven watched it jiggle and shake until a little beak pushed through the top of the egg. He watched with joy, for at last he would have the woman he wanted. The beak sawed up and down and opened the top of the eggshell. A little head pushed through and Raven stared in amazement. Instead of a raven, it was a goose!

Raven looked after the little goose, brought her food, and watched her grow up. He named her Anana. He helped her pluck her gray, downy feathers and watched beautiful, white feathers grow in their place. Her wing feathers grew in slender and strong, and soon she was able to fly. Then Raven and Anana flew off together across the cold northland.

One day, they saw a flock of geese, and Anana said, "These are my people. I must join them. Come with me." Raven loved Anana, and together they joined the flock of geese and lived with them.

When the days became shorter and colder, the leader of the flock came to Anana and Raven, and said, "Tomorrow we must begin our long journey south. We will fly across the land and the waters until we reach the warmer country where we may live." Raven wanted to fly with Anana, but she said, "You are too heavy to come with us. You will not be able to follow us when we fly across the sea. There is no place for you to rest. If you grow tired, you will fall into the water and drown."

But Raven was obstinate. "Nothing in the world can tire me," he said loftily. And so, in the end, Anana agreed.

Before they left, Raven put his wing tenderly around Anana. But she drew away, and said, "I have grown too fond of you, and my grief will be too heavy when I lose you during our flight across the sea."

"Don't worry," said Raven proudly. "I once flew for an eternity of time without tiring!"

"True," said Anana, "but you haven't flown much lately. You've been so busy making the world and looking after it."

Raven smiled knowingly at Anana and put his wing around her again.

The next day, the geese set out and Raven flew with them. Soon they came to the end of the land and stopped. They, settled down to rest before their journey across the great sea.

Anana said to Raven, "Now rest here so that you will not be tired while you cross the sea."

"I thrive on activity," said Raven boastfully. And he flew up high above the geese to admire the sweep of the coast.

After the geese had rested, they rose and flew out across the sea. When they were half-way across, Raven became very tired. Sometimes he beat his wings wildly and almost fell into the sea. But his wings were still strong enough to raise him again.

They had not far to go to land, when Raven cried out for help. He was very tired, and could go no further.

Anana and another goose then swam on the water, and each spread out her wing. Anana's right wing covered her friend's left wing, and both together made a bridge on which Raven rested.

Raven was tired, and after a little while he dropped slowly through the wing-bridge: not all at once, but little by little. First his feet slipped through. Then the water came up to his chest, then to his wings, to his neck, to his chin.

"I must go," called Anana's friend, "before our flock is out of sight." And she flew off.

Anana pulled Raven to a piece of ice which floated in the water. Raven rested his chin on it, while she, weeping, tried to hold up his head.

But Raven was too heavy and too tired. The ice gave way and many bubbles rose up when Raven sank. Anana wept. She wanted to stay with Raven, but the honking calls of the flock were irresistible. "Good-bye," she called to Raven. And she went on her way with the other geese.

Raven felt himself sinking deeper into the water. With all his strength, he flapped his wings and pushed himself towards the surface. He breathed again and looked around. Wistfully, he watched Anana and all the geese flying away from him. He struggled to rise from the water, to join his Anana, but his wings were soaked, and he drifted back and forth. After a long time, a great wave cast him on shore.

The water ran in streams from Raven's soaked feathers, and his wings dragged on the ground. He fell several times, until at last he reached some bushes. He held on to a bush for a moment and then, with one wing, pushed up his beak. His wing-cape fell off his shoulders and he stood on the beach, shivering in the cold. He draped his wing-cape across a bush. He found some driftwood, and soon he had a fire burning. He searched the horizon, but there was no sign of Anana.

Raven felt sad and lonely as he stood in front of the fire. He jumped slowly up and down, trying to warm himself. And, as he jumped, his feet danced out a little rhythm on the rocks. Raven danced faster and faster and, as he warmed up, he felt happier. He began to sing to himself, as he danced around the fire, and his arm swayed gracefully in time with his feet. He lifted his wing-cape and it swirled around and around as he danced. Soon he swept his cape across shoulders, and his wings rose high as he danced a wild and happy rhythm in the loneliness of the beach.

When the fire went out, Raven lowered his beak, and flew off to return to his people.

"Raven and the Goose" from *Raven: Creator of the World Eskimo Legends* retold by Ronald Melzack, with illustrations by Leslo Gal. Copyright © 1970 by Richard Melzack. By permission of Little, Brown and Company.

Wetland Resting Places

Early in the twentieth century, naturalist W. H. Hudson watched a flock of Canada geese begin their southward migration. The birds had gathered and taken flight, the strongest of them cleaving the air while the others followed in their wake. Two geese - one male and one female - remained behind. The female had broken her wing and flapped futilely as her partner flew ahead. He would land a hundred feet ahead of her, and then fly back while she walked southward to join him. Endlessly, he flew ahead, beckoning and then waiting for her. The pair migrated on foot for several days until finally the female succumbed to a predator. Once he had lost his mate, the male flew off to catch up with the rest of the flock.

Alongside Hudson's account, the behavior of Anana in "Raven and the Goose" closely reflects the mating behavior of the wild geese. Geese mate for life, and once they lose their partner, will often not take another. Hudson's incident and the story both also convey the overwhelming urge to migrate in flocks which coexists with the bond between individuals.

For the Canada Goose, the push south begins as days shorten and begin to grow colder. As yet, no one knows if temperature, day length, or

some unknown sense tells the pairs to gather into a flock to make ready for their journey. Regardless of where the message comes from, year after year geese begin to gather in the autumn. They will have accumulated thick layers of fat as stored energy for their long flight. Beating their wings one hundred strokes per minute, they fly in formation for thousands of miles. The strongest of the geese break the wind for the rest allowing their weaker companions to ride the draft created by their powerful wings. The weather determines the speed of a flock's journey. Warmer weather compels them to take their time while cold snaps push them south more quickly.

As the birds fly south they take refuge in wetlands. While the flock may alight on farm ponds, in highly degraded wetlands, and in city parks - in fact anywhere open water exists alongside a food supply - nothing equals the native marsh for pit stops en route. Much of the fall migration occurs during the hunting season, and the geese are well aware of it. Marsh grasses provide the birds with critical visual protection. Their mottled gray backs blend with the vegetation, and their black necks lowered to the surface of the water are nearly invisible. Also, native marsh

plants offer their own store of grain, and rich marsh-grown greens supplement the diet. The birds replenish their stores of fat before moving on.

Most of the travelers that fly through Washington end up in California's Central Valley which has lost ninety-four percent of wetlands. The broad flat valley once had four million acres of wetlands. In 1985, only 270,000 acres of habitat remained, much of it contaminated by the chemical and mineral by-products of modern agriculture. Remarkably, the Canada Goose has shown resilience in an atmosphere of extreme adversity, and more geese will fly south this fall than did in the 1920s when unregulated commercial hunting had nearly wiped them and other migrating birds out of the skies.

The goose in part owes its survival to the relatively pristine condition of its northern breeding grounds, but if the geese are to continue to announce the change of the seasons in Washington skies, the network of wetlands that sustain them while travelling must remain intact. As W. H. Hudson's account and Anana's story both attest, the geese *will* fly south every year, but they will not know until they arrive what food and rest they will find along the way.



Why the Tides Ebb and Flow

In this Tahltan story from Northern British Columbia, Raven perceives the abundance that the coastal waters could provide for the people, if only they had access to what lived under the water. In the beginning, though, there were no tides. Raven had to fix things so that the tides would ebb and flow. It turns out that a man is sitting on a rock so that the water won't all drain away into a hole into the earth. By making his perch uncomfortable, Raven convinces the old man that he would be better off sitting only half the time, thus, the tides thereafter have come and gone twice a day. The action of the tides still makes estuaries some of the most productive areas on the face of the earth.

This happened long ago when the people were learning how to live in the world. The people had no food. They were starving.

One day when Raven was out on the ocean in his canoe, following along the shores and beaches, he saw fish swimming under the water. He saw crabs crawling, mussels lying in their beds, little clams sticking their necks out. Starfish rambled around on their strange circular advance.

"The people could eat these things if they could get them," said Raven.

Raven, culture hero of all Northwest Pacific Coast peoples, was fixing up the world and teaching people how to live. He thought all people should have enough to eat. He was the one who fixed the earth so it would not tip. He put a big piece of ice across the north of it, and since then it has not tipped. Raven fixed the world and taught the people everything.

The people could eat these things if they could get them, he kept thinking, but the water is too deep.

Raven paddled along, paddled along, wondering what to do. Then he saw a great big man sitting on the shore.

"What are you doing there?" said Raven.

"Sitting," said the man.

"Why?"

"If I get up the ocean will go dry," said the man. "So I sit."

The man was sitting on a hole in the earth. If he got up, the ocean poured into the hole.

"Get up and let me look," said Raven.

"No," said the man. He would not budge.

So Raven grabbed him by the hair and pulled him up. Sure enough, there was a bottomless hole in the earth, and when the man stood up, the ocean waters poured and roared into it.

Raven slid a sharp stone alongside the hole with his foot. When the man sat down, the stone jabbed him and he jumped up. Raven slipped another sharp-pointed stone under him, so that when the man sat, this hurt worse, and the man leaped into the air again.

While this was going on, the waters poured into the hole; the ocean receded, and the beach was uncovered.

Yes. The people can get food here, Raven decided.

"From now on," said Raven to the man, "you must stand up twice every day, long enough to let the waters recede as far as they are now, so that the people may find food."

"All right," said the man. "All right."

Thus it is that the tides began to ebb and flow and people gathered seafood on the shores.

"Why the Tides Ebb and Flow" from *How the People Sang the Mountains Up* by Maria Leach. Copyright © 1967 by Maria Leach. Used by permission of Viking Penguin, a division of Penguin Books USA Inc.

Tide's Out, Dinner's On

As the tide slips away from the shores of the Puget Sound, it uncovers in many places vast expanses of mud. At first glance that mud appears lifeless. But if you look closely you'll see that not only do birds congregate to peck at mud and sand, but innumerable mud-dwelling creatures send up bubbles from below. In estuaries, where rivers and streams meet the salt water, life between the range of high and low tides, called in the intertidal zone is even more abundant because of the influx of nutrients from upstream. At the same time, only certain organisms can tolerate the changing salinity of estuarine waters: as the tide ebbs, the water can become nearly as salty as the outer marine waters; as the tide flows, the incoming fresh water takes over. Here are a few of the plants and creatures that can withstand such variable conditions. They, along with others, make estuaries among the most productive ecosystems in the world.

Ghost shrimp burrow through the rich top layer of estuarine sediments, ingesting mud as they go. The mud provides the shrimp with decaying plant and animal matter, called detritus. Because of their constant digging, ghost shrimp can smother small oysters by covering them with sediment, but their larvae are an important source of nourishment for juvenile salmon on their way to open marine waters.

Barnacles prefer the salinity of full sea water, but they can tolerate some influx of fresh water. More than anything, barnacles need something to hold onto. Pilings, pieces of shell and rocks will all do the trick. Tightly affixed, they busily kick nearly invisible plankton and detritus into their digestive tracks with their tiny feet. Their primary predator is the sea star.

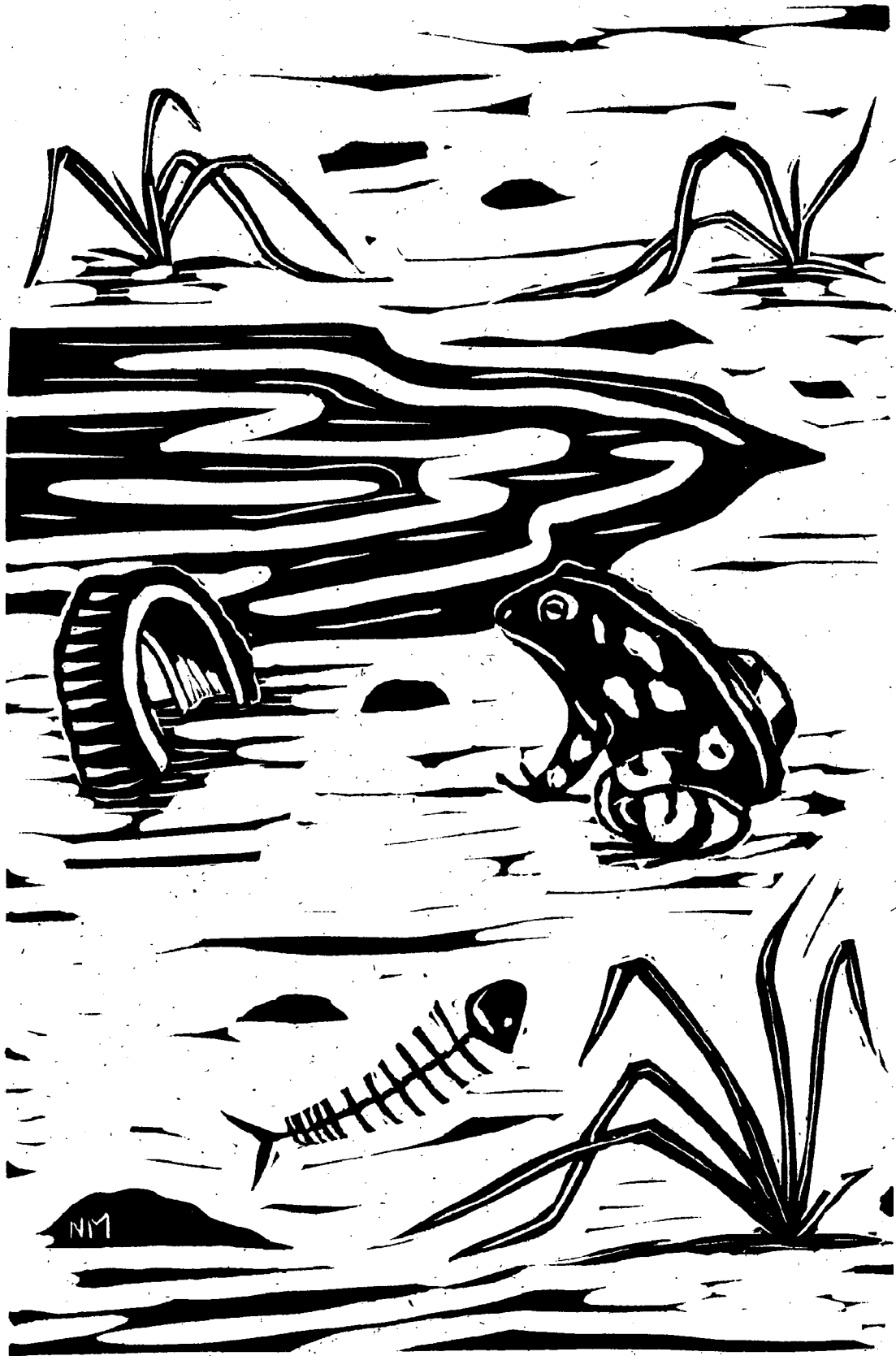
Sea stars, with their agile arms, move throughout the intertidal zone. Some species can actually find and dig out clams, while another turns its stomach inside out to envelope prey. The sea star has few predators other than sea gulls and curious humans.

Bent-nosed clams get their name from the graceful curve of the end of their shell. While most clams prefer relatively salty water, the bent-nosed clam can tolerate extreme variations in salinity. This adaptation provides the clam with access to nutrient rich estuarine mud. The bivalve pushes its two siphons up through the mud: One tube sucks down the mud's film at low tide, and the other blows out indigestible material.

Heart cockles, who require relatively salty water, often lay exposed on the beach at low tide, making them easy prey for shorebirds and human beings. When the water covers them, they can escape predators by moving extremely quickly. A large single foot allows them to flip themselves out of harm's way.

Eel grass is a flowering plant that actually creates habitat for many other creatures. Snails, sea slugs and anemone hang onto the blades of grass as the tides flow in and out around them. Crabs and fish hide in clumps of eel grass. Many tiny mud-dwelling organisms take advantage of the stability provided by the roots. The grass not only provides habitat, it also furnishes an extremely abundant supply of nutrients, both while it grows and after it dies. In fact, an eel grass meadow nurtures so much life that it produces more organic matter than a healthy forest seven times its size. And Washington State, with its Padilla Bay National Estuarine Research Reserve, has the second largest eel grass meadow on the entire Pacific Coast of the Americas.

These estuarine inhabitants along with countless others provide vital links in many food chains. Brandt Geese make two stops a year at Padilla Bay to fill up on eel grass before continuing south to winter or north to breed. Young salmon all stop in the estuary of their native stream to acclimatize to salt water before moving on to the open ocean. Juvenile Dungeness crabs can grow 280 times larger in just one season by feeding in estuaries. As the tides ebb and flow in Washington's estuaries, they cover and uncover a bounty even greater than Raven realized.



The Toad is Heaven's Uncle

This Vietnamese story tells of a lowly toad that dared to go straight to the top when times got tough for inhabitants on the earth. Toad sees that his pond is drying up, and knows he must go to the king of heaven and have a talk with him. Other animals see his wisdom, and join him en route. When the King of Heaven sees the little toad before him, he is outraged, but the animals soon discover that there is strength in numbers. Together they defeat the King of Heaven and all his forces. The great king learns that he must treat the toad with respect, and vows that from that moment on, he will respond to the toad's every request for rain. In the story, draught imperils toad's wetland, but in reality, human intervention most commonly causes wetlands to dry out.

When heaven was close to Earth long, long ago, and all the animals spoke with human voices, a terrible drought descended upon the Earth. It lasted many months, and all the rivers, lakes, ponds, streams, and wells went dry.

Among the Earth's diverse inhabitants there was an ugly toad who lived near a pond. He saw the pond shrinking in size from day to day and finally determined to do something about it. He did not relish a slow, lingering death which seemed inevitable. After thinking it over for some time, the toad decided that the only course was to go directly to Heaven and interest the gods in what was happening on Earth. Alone, he set off on the long journey.

The toad had traveled only a few miles when he met a group of honey bees and stopped to chat with them. During the conversation he told them of his resolve to seek the King of Heaven's help. The bees were enthusiastic about his venture, for they too were seeing bad times; without the flowers there was no honey at all. They decided to join the toad and together the party set out.

When the bees and the toad had continued for some distance, they came upon a cock who was in very low spirits. The harvest had been affected by the drought and there was no grain or insects. It was quite easy for the toad and the bees to convince the cock that he would have nothing to lose by joining forces.

The enlarged party had hardly resumed the journey, when they encountered an ill-tempered tiger. He was especially angry because the drought was killing all the game on which he had been accustomed to prey. He too became a member of the party. Soon a fox and a bear joined up. The group journeyed on, inspired by the worthy purpose that had brought them all together.

After many days of jumping from star to star the party arrived at Tien Dinh, the very Gates of Heaven. The toad asked the others to remain outside until he called them. Then he hopped through the gates and into the palace. He crossed the polished floors of many empty chambers and finally entered the impressive Hall of Audience. Laughter was audible from somewhere inside, and the toad made his way toward the sound.

Finally he came to a room where the King of Heaven was seated at a table playing cards with a number of angels and fairies. The toad was very indignant to see

them engaged in this idle pastime. Inhaling deeply, his bulging eyes wide open, he leapt in a great high hop to land plop in the middle of the players. There was a stunned silence as the smile gradually left the King of Heaven's face. He frowned angrily and spoke in a thundering tone.

"Insolent toad," he roared, "how dare you defile our august company?"

Now the toad, who had already faced death on Earth, did not flinch a bit. He had a quiet courage that comes from extreme desperation.

"Your Majesty," he began, but could say no more.

"What?" shouted the King of Heaven. "How dare you speak in my presence?"

At that moment the guards rushed in, intending to throw the toad out. But a toad is not so easily captured. He hopped away from the guards and called aloud for the bees, who swarmed in and attacked the guards, who retreated in panic to avoid being stung.

The King of Heaven watched these proceedings in utter amazement. Then he called on the Thunder God to silence the insolent toad, but the cock was more than a match for that deity. The King of Heaven then called for the Captain of the Hounds, but the tiger took care of him and the bear and the fox ripped the stomachs of the dogs. Slowly a look of great respect came to the eyes of the King of Heaven and a reasonableness entered his mind.

"Sire," said the toad, "my friends and I came here respectfully, to bring to your celestial attention the sad plight of the inhabitants of the Earth. There has been no rain for many months, the river-beds have dried up and the fields are parched. Animals are dying everywhere and all the plants have wilted. Sire, we must have rain."

"Yes," nodded the King of Heaven, and added uncle, "so overpowered had he been with the toad's personality. And he promised to look into the matter immediately.

The celestial sluices opened and rain came at last to the Earth. But by that time three-fourths of the population were dead. Some animals of each species survived however, and soon new generations began to populate the earth again. Life was reborn in every corner of the earth.

So that a similar expedition of earthly beings would not again appear in his palace, the King of Heaven told the toad: "From now on, it will not be necessary to make such a long trip with your friends. If there is a drought in the future or whenever you need rain, remain there on Earth and simply call me."

Since that time the toad, "Heaven's uncle," and his progeny have watched over the Earth's supply of water and have never failed to croak loudly and effectively whenever rain is needed.

When the toad died, his sons and the other animals built a fitting memorial to his memory, and they began to commemorate the day on which he made, his heroic journey to Heaven. Thus, the toad's great deed is remembered to this day in Vietnam, and the expression "the toad is Heaven's uncle" has entered Vietnamese parlance.

"The Toad is Heaven's Uncle" from *Vietnamese Legends* by Charles F. Schultz. Copyright © by Charles E. Tuttle, Inc. Reprinted by permission of Charles E. Tuttle.

Wetlands Drying Up

Wetlands depend on many different sources for their water supply, among them, rain, ground water and spring snow melts. While natural draught can threaten the health of a wetland, far more commonly, human intervention, either for land use or to use the water itself, can destroy the habitat of toad and countless other creatures. In fact, the permanent loss of water can destroy the wetland.

Although rain is always an essential link in water systems, many wetlands receive water from high aquifers or water tables. In wetlands that rely on ground water for their water supply, surrounding deep or shallow wells can inadvertently deplete the wetland's water supply.

Other wetlands are actually a part of the drainage system of

a watershed, and depend on high waters during the rainy season or spring melt to sustain wetland wildlife. Their water level fluctuates with the seasons and they can even dry up in the summer; nevertheless, they depend on an upstream supply of water. Often farms, industry and communities also depend on that water. Diversion of water for human use can, as a side effect, change the hydrology of a watershed enough to threaten wetlands that depend on an annual flow of water for survival. In wetlands associated with rivers and streams, often dikes or levees constructed to protect structures or agricultural land from flooding can block a wetland's access to water. It can work like this: when the river rises to flood stage, the water may flow over a bank to flood low land some

distance from the ordinary water way. With the construction of physical barriers the wetland loses that water supply.

The construction of ditches has been perhaps the most common way people remove water from either kind of wetland. Ordinarily, water moves through wetlands slowly. The construction of ditches drains that slow moving water into a channel by creating a low spot, and moves it out of the wetland altogether. Whether the ditches render a flooded wetland soggy, or a soggy wetland dry, habitat has been lost to create developable or arable land.

Whatever the reason, the loss of water destroys the delicate balance of organisms that make wetlands their home, and may set animals like toad to wondering just what has gotten into the King of Heaven.



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Gombei and the Wild Ducks

This Japanese story portrays the transformation of a man from a glutton who takes more than he needs from his marsh to one with a profound respect for the lives of the ducks that the wetland nurtures. It happens like this: one day, Gombei gets the idea that if he takes one hundred ducks at once, he won't have to work for the next hundred days. The first ninety-nine ducks are easy to capture, but the hundredth eludes him. When finally it steps into his trap, the hundred ducks have the strength to fly away with Gombei. He hangs suspended from the rope traps for a little while, but when he becomes exhausted, he lets go and tumbles to the ground. As he falls, he is transformed into a duck only to land in the trap of another hunter. So sorry for what he tried to do to the ducks, he begins to cry, and his tears wash away his feathers and he regains his human form, and vows to thereafter protect the marsh and its inhabitants. Like many of the today's environmentalists, Gombei is a marsh protector, and Gombei's transformation mirrors a slowly growing awareness of the importance of wetlands to the quality of life in Washington State.

Once long ago, in a small village in Japan, there lived a man whose name was Gombei. He lived very close to a wooded marsh where wild ducks came each winter to play in the water for many long hours. Even when the wind was cold and the marsh waters were frozen, the ducks came in great clusters, for they liked Gombei's marsh, and they often stayed to sleep on the ice.

Just as his father had done before him Gombei made his living by trapping the wild ducks with simple loops of rope. When a duck stepped into a loop, Gombei simply pulled the rope tight and the duck was caught. And like his father before him, Gombei never trapped more than one duck each day.

"After all, the poor creatures come to the marsh never suspecting that they will be caught," Gombei's father had said. "It would be too cruel to trap more than one at a time."

And so for all the years that Gombei trapped, he never caught more than one duck a day.

One cold winter morning, however, Gombei woke up with a dreary ache in his bones. "I am growing too old to work so hard, and there is no reason to continue as my father did for so many years," he said to himself. "If I caught one hundred ducks all at once, I could loaf for ninety-nine days without working at all."

Gombei wondered why he hadn't done this sooner. "It is a brilliant idea," he thought.

The very next morning, he hurried out to the marsh and discovered that its waters were frozen. "Very good! A fine day for trapping," he murmured, and quickly he laid a hundred traps on the icy surface. The sun had not yet come up and the sky was full of dark clouds. Gombei knelt behind a tree and clutched the ends of the hundred rope traps as he shivered and waited for the ducks to come.

Slowly the sky grew lighter and Gombei could see some ducks flying toward his marsh. He held his breath and watched eagerly as they swooped down onto the ice.

They did not see his traps at all and gabbled noisily as they searched for food. One by one as the ducks stepped into his traps, Gombei tightened his hold on the ropes.

"One- two- three-" he counted, and in no time at all, he had ninety-nine ducks in his traps. The day had not even dawned and already his work was done for the next ninety-nine days. Gombei grinned at his cleverness and thought of the days and weeks ahead during which he could loaf.

"One more," he said patiently, "just one more duck and I will have a hundred."

The last duck, however, was the hardest of all to catch. Gombei waited and waited, but still there was no duck in his last trap. Soon the sky grew bright for the sun had appeared at the rim of the wooded hills, and suddenly a shaft of light scattered a rainbow of sparkling colors over the ice. The startled ducks uttered a shrill cry and almost as one they fluttered up into the sky, each trailing a length of rope from its legs.

Gombei was so startled by their sudden flight, he didn't let go of the ropes he held in his hands. Before he could even call for help, he found himself swooshed up into the cold winter sky as the ninety-nine wild ducks soared upward, pulling him along at the end of their traps.

"Stop! Let me down!" Gombei shouted, but the ducks soared on and on. Higher and higher they flew over rivers and fields and hills, and beyond distant villages that Gombei had never seen before.

"Help! Save me!" Gombei called frantically, but there was no one to hear him high up in the sky.

Gombei was so frightened his face turned white and then green, but all he could do was hold on with all his strength to the ninety-nine pieces of rope. If he let go now, all would be over. He glanced down and then quickly clamped his eyes shut. The land below was whirling about like a toy top.

"Somebody! Help!" he shouted once more, but the only sound that came back to him was the steady flap-flap, flap-flap of the wild ducks' wings.

Soon one hand began to slip, a little at first, and then a little more. He was losing his grip on the ropes! Slowly Gombei felt the ropes slide from his numb fingers and finally, he was unable to hold on any longer. He closed his eyes tight and murmured a quick prayer as he plummeted pell-mell down to earth. The wild ducks, not knowing what had happened, flew on trailing their ropes behind like ribbons in the sky.

As Gombei tumbled toward the ground, however, a very strange thing began to take place. First, he sprouted a bill, and then feathers and wings, and then a tail and webbed feet. By the time he was almost down to earth, he looked just like the creatures he had been trying to trap. Gombei wondered if he were having a bad dream. But no, he was flying and flapping his wings, and when he tried to call out, the only sound that came from him was the call of the wild duck. He had indeed become a wild duck himself. Gombei fluttered about frantically, trying to think and feel like a duck instead of a man. At last, he decided there was only one thing to do.

"If I am to be a wild duck, I must live like one," he thought, and he headed slowly toward the waters of a marsh he saw glistening in the sun. He was so hungry

he simply had to find something to eat, for he had not even had breakfast yet. He swooped down to the marsh and looked about hungrily. But as he waddled about thinking only of his empty stomach he suddenly felt a tug at his leg. He pulled and he pulled, but he could not get away. Then he looked down, and there wound around his leg was the very same kind of rope trap that he set each day for the wild ducks of his marsh.

"I wasn't harming anything. All I wanted was some food," he cried. But the man who had set the trap could not understand what Gombei was trying to say. He had been trapped like a wild animal and soon he would be plucked and eaten.

"Oh-h-h-h me," Gombei wailed, "now I know how terrible it is for even one wild duck to be trapped; and only this morning I was trying to trap a hundred poor birds. I am a wicked and greedy man," he thought, "and I deserve to be punished for being so cruel."

As Gombei wept, the tears trickled down his body and touched the rope that was wound tightly about his leg. The moment they did, a wonderful thing happened. The rope that was so secure suddenly fell apart and Gombei was no longer caught in the trap.

"I'm free! I'm free!" Gombei shouted, and this time he wept tears of joy. "How good it is to be free and alive! How grateful I am to have another chance," he cried.

As the tears rolled down his face, and then his body, another strange and marvelous thing happened. First, his feathers began to disappear, and then his bill, and then his tail and his webbed feet. Finally he was no longer a duck, but had become a human being once more.

"I'm not a duck! I'm a man again," Gombei called out gleefully. He felt his arms to be sure they were no longer wings. Yes, there were his fingers and his hands. He felt his nose to be sure it was no longer a duck's bill and he looked down in astonishment at the clothes that had reappeared on his body. Then he ran down the road as fast as his two human legs would carry him, and hurried home to his own village by the wooded marsh.

"Never again will I ever trap another living thing," Gombei vowed when he reached home safely. Then he went to his cupboard and threw out all his rope traps and burned them into ash.

"From this moment on, I shall become a farmer," he said. "I will till the soil and grow rice and wheat and food for all the living creatures of the land." And Gombei did exactly that for the rest of his days.

As for the wild ducks, they came in ever-increasing numbers, for now they found grain and feed instead of traps laid upon the ice, and they knew that in the sheltered waters of Gombei's marsh they would always be safe.

"Gombei and the Wild Ducks" from *The Sea of Gold* by Yoshiko Uchida, Creative Arts Books, © 1965 by Yoshiko Uchida. Used by permission of the author.

Marsh Protectors

Until recently, few in the United States have recognized the importance of wetlands. People saw them as wastelands, as breeders of disease and mosquitoes, and not as incredibly productive and essential links in the food chain and water cycle. For more than a hundred years public and private policy facilitated and even mandated the wholesale filling, dredging and draining of marshes, bogs, swamps and estuaries. In the process, more than half of the United States' wetlands had succumbed to agriculture and urban and industrial development by 1990, with some states losing over ninety percent of their wetlands. Washington has lost more than one-third of its wetlands, with the fraction much higher in urban areas. Luckily, like Gombei, we began to awaken to the importance of wetlands before they were gone. Now, government agencies and nonprofit organizations have come to focus a great deal of attention and effort on the preservation of wetlands.

Our societal shift from destruction to conservation, however, has not occurred as completely nor as suddenly as did Gombei's transformation. We are still losing wetlands, and the change in attitude has transpired over several generations. The following three individuals, *John James Audubon*, *Aldo Leopold* and *Rachel Carson* all contributed in

their own way to our understanding of wetlands as vital to the planetary ecology on which we depend. Audubon turned the eyes of North America and Europe to birds as inhabitants of wetland habitats. Leopold recognized those habitats as extensive, complex systems with an inherent balance. Carson revealed the extent to which human beings could upset that delicate equilibrium. Now the time has come to turn our eyes to re-establishing the balance, and that takes all of us, including you.

John James Audubon

Audubon's journals tell of many a hunting expedition during which he shot birds that he would later meticulously and lovingly paint as though they had sat still in the midst of activity. Rather than shooting film (which was unavailable in the early nineteenth century) he shot bullets in order to get his avian subjects to sit for their portraits. His paintings, unlike those of many of his predecessors not only depicted birds, but also placed them in the context of their environment, thus introducing marshlands as habitat to the popular culture of America and Europe.

Although Audubon was not the first ornithologist to paint the birds of North America, he became one of the best known. He strove to paint all the birds of North America, and although he never traveled

west of the Mississippi, he managed to complete 435 portraits. His work, bound in volumes sold in both Europe and America touched a wide-ranging audience. Audubon's paintings would later inspire George Bird Grinnel to found the Audubon Society in the name of preserving birds and the environments that sustain them.

Aldo Leopold

Born thirty-five years after Audubon's death, Aldo Leopold was one of the first scientists to combine ecology and ethics. He began his career as a game manager for the Forest Service, advocating the removal of predators in order to protect game. Before long, however, he had come to see nature as a complex biotic system that needed all of its parts in order to function smoothly, predators included.

His observations of the effects of reclamation policy, which in effect meant draining marshes to plant agricultural crops, combined with his holistic understanding of complex ecosystems, led Leopold to combine science and ethics in the name of preserving biological diversity. Through his writings, he popularized the notion of a land ethic, by which he meant stewardship not just for the products the earth provides for human consumption, but caretaking and respect for environments as integral systems best left untouched.

Rachel Carson

Rachel Carson remarked near the end of her life, "... by becoming a biologist I have given myself something to write about." While Carson's achievements as a scientist working for the United States Bureau of Fisheries inspired women in the sciences and conservationists alike, her passion for nature and her ability to bring it to life in poetic prose contributed more than anything to people's understanding of the importance of wetlands.

Beginning with stories and descriptions of open waters, she eventually came to write about estuaries. In 1955 she published *The Edge of the Sea*. In the book, she described in accessible and beautiful language the abundant life of the shoreline. She said, "If there is poetry in my book about the sea, it is not because I put it there, but because no one could write truthfully about the sea and leave out the poetry."

Perhaps Carson's most significant contribution to ecological awareness was the publication of *Silent Spring*. Already a best-selling author, Carson's new work reached an eager audience with its message that the proliferation of pesticides spelled disaster for humans and wildlife alike. Only a few years later, Carson herself died of cancer. In a climate of atom-splitting and

ever more specialized science, Carson, like Leopold never ceased to see nature as a whole system in which each part is intimately connected with the whole. And she brought Leopold's wisdom one step further to the realization that each individual has a role to play in the destruction and protection of environments.

You

Even though we continue to lose our wetlands at an alarming rate, citizen groups and government agencies have formed to slow the losses. With a concerted effort on the part of everyone, we may be able to transform the values of those who continue to destroy wetlands for economic gain.

Many of the citizen groups are volunteer member organizations. Many local groups take an active role in assisting government agencies in wetlands preservation. Funds may even be available for local groups to initiate wetland restoration projects. The educator's guide *WOW: The Wonders of Wetlands*, listed in the appendix contains a section of ideas for individual and group involvement in wetland preservation. The Department of Ecology has published a booklet entitled *Wetland Preservation: An Information and Action Guide* (#90-5) which provides a list of organizations

and land trusts involved in wetland preservation in the state of Washington.

Wetland preservation involves more than just joining an organization, however. Our everyday activities affect water quality and in turn the survival of wetland plants and animals. Many everyday products are poisonous to human beings; likewise they are poisonous to flora and fauna if they enter the food chain. Choose products that are safe for the environment. *Turning the Tide on Toxics in the Home* is an Ecology publication providing detailed information on toxic products, disposal methods, and less toxic alternatives. (See page 51 to order.)

Let your family, friends and neighbors know how important wetlands are to you and the animals that live in them. Not all of us can be Rachel Carsons, Aldo Leopolds or James Audubons, but by working together we can save the wetlands for ourselves and for the animals.

Some Wetland-Related Curricula

Fresh Water Wetlands

Discover Wetlands

An interdisciplinary curriculum guide for upper elementary and middle school students. Focuses on what wetlands are, why they are important, and how human actions affect them. Workshops available. Curriculum available for \$10.00 each.

Washington State
Department of Ecology
Wetlands Section
Mail Stop PV-11
Olympia, WA 98504-8711
(206) 438-7538 or 459-6774

Project Home Planet

Whole language curriculum based on the book *Wonders of Swamps and Marshes* by Stephen Caitlin. Grades 4 - 6.

Susan Vanderburg
Project Home Planet
617 Carlyon Ave. SE
Olympia, WA 98501
(206) 357-6561

WOW: The Wonders of Wetlands

A comprehensive educator's guide containing plenty of information and activities for all grade levels.

Environmental Concern, Inc.
P.O. Box P
Saint Michaels, MD 21663

Adopting a Stream (and) Adopting a Wetland

Thorough resources covering the 5 steps involved in adopting a stream or wetland. Useful in the classroom and in the field. Workshops available for both curricula. Cost is \$11.95 for *Adopting a Stream* and \$6.00 for *Adopting a Wetland*.

Tom Murdoch
Adopt-a-Stream Foundation
Box 5558
Everett, WA 98206
(206) 388-3313

Project WILD - Aquatic WILD

Guidebook from a National curriculum program that includes a variety of water-related activities. Currently overseen in Washington by the Department of Wildlife. Workshops available. Guidebooks free to workshop participants.

Brad Wood, Wildlife
Education Coordinator
Department of Wildlife
Eastern Region Office
8702 N. Division Street
Spokane, WA 99218

Stream Walk Activity Guide

A stream corridor survey method designed for volunteers. Requires limited training and produces useful data. No charge for curriculum, workshops available.

Gretchen Heyslip
Environmental Protection Agency
1200 6th Avenue ES-097
Seattle, WA 98101
(206) 553-1685

Clean Water Streams and Fish

Elementary

An interdisciplinary curriculum for upper elementary and middle school grades. Focuses on watersheds, water quality, salmonids, habitat, and other basic concepts in ecology. Workshops available. Curriculum is \$12.00 plus \$2.00 for shipping and handling.

Secondary

An interdisciplinary secondary curriculum with units on salmonids, watersheds, and the many social issues relating to these subjects. Workshops available. Curriculum is \$12.00 plus \$2.00 for shipping and handling.

Washington State Office of
Environmental Education
17011 Meridian Ave N.
Room 16
Seattle, WA 98133
206)542-7671

Marine and Estuarine

Project Home Planet

A whole language curriculum based on the book *Seashores* by Joyce Pope. Grades 2 - 3

Susan Vanderburg
Project Home Planet
617 Carlyon Ave. SE
Olympia, WA 98501
(206) 357-6561

Coastal Zone Studies

Junior High

Curriculum on coastal areas, including estuaries, with sections on geology and biology. Curriculum costs \$5.00 plus \$2.00 shipping and handling.

Senior High

Provides activities to acquaint students with the coastal zone: physical and biological processes; estuaries; shoreline issues; and case studies. Each guide is \$5.00 plus \$2.00 shipping and handling.

Washington State Office of Environmental Education
17011 Meridian Ave N.
Room 16
Seattle, WA 98133
(206)542-7671

Project ORCA

Ocean Related Curriculum Activities (ORCA) are a collection of curriculum booklets, targeting grades 4-12, that cover a variety of topics in aquatic education. Examples include "Marshes, Estuaries and Wetlands" (Senior High) and "Beaches" (Junior High). Guides are \$6.00 each.

Pacific Science Center
200 Second Ave. N.
Seattle, WA 98109
(206)443-2870

Turning the Tide

Teacher's guide that targets middle school level and focuses on point and non-point pollution in Puget Sound — as seen from the perspective of industry, environmentalists, and others. Comes with an accompanying video. Free.

Wetland Tales

Washington State Office of Environmental Education
17011 Meridian Ave N.
Room 16
Seattle, WA 98133
(206)542-7671

Puget Sound Habitats

A handbook on the variety of habitats found in Puget Sound. Includes information on mud, sand, rocky, open water, and mixed coarse habitats. 11" X 17" charts of each habitat also available. Also available is a coastal zone ecology simulation program designed to run on any computer in the Apple II series. Handbook is \$5.00, charts are \$2.00 each, and computer simulation program diskettes are available on loan. Shipping charges not included.

Washington State Office of Environmental Education
17011 Meridian Ave N.
Room 16
Seattle, WA 98133
(206)542-7671

The Estuary Guide - Level I

Designed for use by teachers of primary grades to complement a visit to the Padilla Bay National Estuarine Reserve. Includes pre-trip, on-site, and post-trip information, ideas, and activities. (\$5.62 plus \$2.90 shipping and handling).

Padilla Bay National Estuarine Research Reserve
1043 Bayview-Edison Road
Mount Vernon, WA 98273
(206) 428-1558

The Estuary Program - Level II

Designed for use with the on-site, all day program at the Padilla Bay Reserve (upper

elementary and middle school). Includes pre-trip, on-site, and post-trip information, ideas, and activities. (\$7.22 plus \$2.90 shipping and handling).

Padilla Bay National Estuarine Research Reserve
1043 Bayview-Edison Road
Mount Vernon, WA 98273
(206) 428-1558

Water Quality for our Salmon and Shellfish

Lessons for student understanding of the needs of salmon and bivalves as well as impacts and threats to the Puget Sound Environment. Shelton School District.

Mason County Water Quality Education Team
WSU Coop Extension,
WA Sea Grant
9 Federal Building
Shelton WA 98584
(206) 427-9670

Puget Sound Project - The Changing Sound

Three separate curricula: High School level focuses on human interactions with Puget Sound through the context of the catastrophic decline of the native Olympic oyster. Middle School level studies Puget Sound issues through understanding of Pacific Salmon. Elementary K-6 studies the relationship between humans and the natural environment. Workshops are available and each curriculum costs \$35.00.

Laurie Dundie
Poulsbo Marine Science Center
1771 Fjord Dr. NE
Poulsbo, WA 98370
(206) 779-5549

For Sea Marine Science

Presents the broad science of the sea in a sequenced, hands on curriculum. Grades 1-2: Interaction between marine plants & animals and their protection, grades 3-4: Highlights responsible commercial & recreational use of marine environment, grades 5-6: Intertidal habitat using Pagoo, plus physical properties of marine environment, grades 7-8: various marine topics viewed through the lens of gray whale migration, grades 9-12: In-depth look at biological and physical factors influencing the sea, readings and labs on current ocean issues. Workshops available. Each curriculum costs \$35.00.

Laurie Dumdie
Poulsbo Marine Science Center
1771 Fjord Dr. NE
Poulsbo, WA 98370
(206) 779-5549

State of the Sound - Marine Science Curriculum

Focuses on understanding Puget Sound environmental issues and how we can best care for the waters upon which we all depend. Summer workshops available for grades 4-6 and 7-12. Curriculum is \$4.00.

Janet Criscola
Seattle Aquarium
Pier 59, Waterfront Park
Seattle, WA 98101
(206) 386-4353

Alaska Oil Spill Curriculum

K-12 curriculum addresses oil spills and goes on to concentrate on the positive steps everyone can take to help prevent future oil spills. Hands on experiences. Pre-school, K-3, & 4-6 curriculum guides are \$5.00. 7-12 guide is \$7.50. 2 videos are \$10.00. The whole set is available for \$30.00.

Belle Mickelson
*Prince William Sound
Science Center*
P.O. Box 705
Cordova, AK 99574
(907) 424-5800

Resources from the Department of Ecology

Booklets

Washington Wetlands, #89-24

A booklet briefly describing the functions and values of wetlands.

Wetland Walks, #89-30

A guide to publically accessible wetlands in Washington State.

Wetlands Regulations Guidebook, #88-5

A clear and concise overview of the regulations affecting wetlands.

Wetlands Preservation An Information and Landowners Guide, #90-5

Describes methods private citizens and public agencies can use to preserve wetlands.

At Home with Wetlands A Landowners Guide, #90-31

Describes ways landowners can protect or enhance wetlands.

Turning the Tide on Toxics in the Home

A comprehensive guide to common toxic products, their disposal and less harmful alternatives.

Videos

Fabulous Wetlands, VHS, 7 minutes

A wacky and entertaining video featuring Bill Nye "the Science Guy" talking about the importance of wetlands.

Washington's Wetlands, VHS, 15 minutes

A video of still images that provides an overview of fresh and saltwater wetlands in Washington.

Yellowlegs, Eelgrass and Tideflats VHS, 28 minutes

A look at the fragile abundance and beauty of Washington's wetlands.

Order booklets from Ecology's Publications Office by writing or calling:

*Publications Office
Washington State
Department of Ecology
PO Box 47600
Olympia, Washington
98504-7600
(206) 438-7472*

Obtain videos by contacting:

*Department of Ecology
Wetlands Section
PO Box 47600
Olympia, Washington
98504-7600
(206) 438-7538*



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