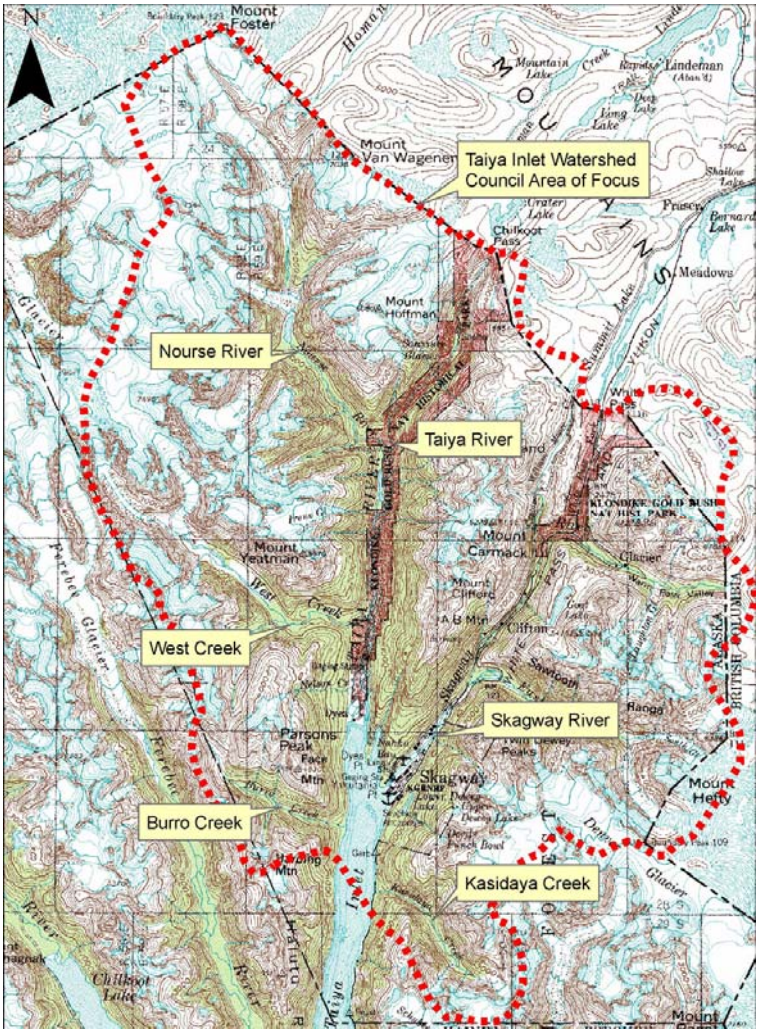
Department of Environmental Conservation
Alaska Clean Water Action (ACWA) Grant
Project:ACWA-06-12
Project Title: Skagway Stormwater Mapping
Grant Amount: $22,000
Match Required: $17,000

Introduction

TIWC is based in Skagway, located at the northern end of the Lynn Canal, in Southeast Alaska. Skagway is an isolated town of slightly more than 800 permanent residents and a population of over 2,000 during the May-September visitor season. Before the town of Skagway was established in the late 1890s, the area was and continues to be a geographically important center for coastal Tlingit and interior First Nations peoples. Today, two National Historic Landmarks commemorate the 1898 Klondike Gold Rush.

The TIWC encompasses upper Taiya Inlet streams and rivers, primary watersheds extend from tidewater to nearly 6,000 feet of elevation, and contain two of the three passes into the Interior in this part of Alaska. Except for the Skagway and Taiya River valleys, most of the land is very steep and mountainous, carved by glaciers and dissected by many streams.



The lower reaches of the Skagway River, the Taiya River, and Pullen Creek are catalogued anadromous fish streams and contain spawning and rearing habitat for chum, pink, and coho salmon, Dolly Varden, sea-run cutthroat trout, and eulachon. Spawning salmon, especially late runs of coho and chum, are an important fall food source for the area's black and brown bears. Productive fisheries attract hundreds of migrating ducks, thousands of gulls, numerous bald eagles and uncounted numbers of marine mammals to the upper Lynn Canal.

Description and Purpose:

Excess stormwater pollutants have caused damage to habitat and reduced water quality in the Taiya Inlet watershed. Currently, there is no stormwater management plan for the community of Skagway or the upper Taiya Inlet watershed. Without a basic understanding of stormwater discharges in our community and the surrounding area, we could not begin to address stormwater through restoration and education.

The main purpose of this project was to gather information necessary for creating and implementing a stormwater management plan. This plan, when completed, will help local, state and federal officials target limited resources by identifying stormwater discharge sites that, if remediated, may result in improved water quality. Such a document will assist government officials and TIWC in identifying restoration opportunities, especially when road and other work are being contemplated. The information in this plan will provide the towns with justification for acquiring grant funds for stormwater projects.

The objectives of this project were to (1) map the Skagway stormwater system and collect baseline information for later integration into a stormwater management plan; (2) educate residents about stormwater and its management; and (3) implement some structural best management practices to reduce impacts of stormwater discharges. By completing these objectives, we will have the necessary information to work with the City of Skagway and other stakeholders to develop a stormwater management plan.

Report on Project Tasks:

OBJECTIVE 1:
Document Skagway stormwater discharges and collect baseline information for stormwater management plan

TASK 1: GPS Skagway stormwater system

The goal of this task of the project was first to develop a plan for mapping the Skagway stormwater system by working with area partners, and second to collect location and survey data in the field for the system.

We developed our mapping plan by utilizing example mapping protocols from other organizations, as well as consulting the TIWC Board of Directors, Klondike Gold Rush National Historical Park (KLGO) staff and other partner organizations. With technical advice from these entities, we developed mapping protocols (see appendices). We used this protocol to collect location and other valuable information about the stormwater system, which including recording the following about each catch basin and/or outfall:

- Size & shape
- Size and direction of pipes entering and exiting basin
- GPS coordinates
- Accessibility of outfalls by juvenile fish
- Condition of drain and of any water present
- Area impervious cover
- Land use

In our original proposal, we intended to work with Skagway City School students to complete the mapping work. We did do this but encountered problems and delays. We had originally proposed to work with our local school science class, but that teacher was unable to cooperate. Instead we worked with the school's fish hatchery class for data collection. Unfortunately, this class only had one student during the 2005-2006 school year, limiting the number of youth that could be involved. We found that short shifts (50 minutes) imposed by working with this student reduced efficiency to the bare minimum. Ultimately, we began working with volunteers in three hour shifts, enabling much more efficient data collection.

We worked with a total of 1 student and 1 teacher from the school during the project. Though this is a small number, we did teach these two about stormwater, careful data collection, how to use the GPS unit and digital camera, and how to assess catch basins.

We worked with ten adult volunteers in the community and taught them to implement the above tasks. Data collection for the project we proposed turned out to be considerably more extensive and time consuming than originally estimated, we were able to complete the bulk of the data collection, but it did take longer than originally expected. We did not collect information on roadside drainage ditches as we ran out of time. In addition, while we collected information on culverts which passed beneath the Dyea road, we did not record culverts that paralleled the roadway (passing beneath driveways and other road entrances). If future data collection was to occur, this might be one priority (depending on future data needs).

Potential Issues

We found a number of catch basins with potential problems, most of which were caused by clogging of leaves and organic material. We believe that this was a result of working in the fall, most of the catch basins had cleared of this debris by spring. Catch basins that were clogged by leaves included CB-24, CB-32, CB-63, CB-97 and CB-271. Catch basins CB-207, CB-208 and CB-211 were clogged with sediment. Catch basins CB-95, CB-138, CB-194, CB-203 and CB-225 were blocked by some combination of leaves and organic material, sediment and gravel, and refuse.

The outfalls surveyed were in relatively good condition, only three had blockage in the form of overgrowth (PC-14), sediment (PC-13), and crushing (PC-12). We identified several outfalls that could potentially be accessed by juvenile fish. These included Pullen Creek outfalls PC-1, 2, 3, 5, 13, 14, 15, 16, and Skagway River outfall SK-03.

Several culverts on the Dyea Road were in poor condition, mostly due to crushing or clogging.

- DR-04 was partially clogged with debris and living shrubs
- DR-05 was partially clogged with sand and silt
- DR-07 was partially clogged with rock and sediment
- DR-11 was completely clogged
- DR-13 was clogged with sediment
- DR-14 was 2/3 blocked with sediment
- DR-20 was partially blocked with rocks
- DR-21 was partially crushed and clogged with sediment, but water was still flowing through it.
- DR-23 was 1/2 blocked for its entire length with organic debris, the inlet was crushed
- DR-24 was 2/3 clogged with debris and sediment
- DR-28 was ¾ filled with sediment
- DR-39 was partially clogged with leaves
- DR-41 was 1/4 clogged with organic debris

Task 1 Conclusions

Overall, we found the stormwater system to be in surprisingly good condition, with less damage and issues that were originally expected. We were surprised to discover that relatively little of the system drained to Pullen Creek, there were only eleven outfalls to Pullen Creek, a small spring fed stream that runs for approximately two miles through the city of Skagway. Understanding the stormwater drainage to Pullen Creek is of particular importance to a future stormwater management plan, as we can implement best management practices that specifically targeted towards preserving water quality in this valuable anadromous fish stream. The (future) stormwater management plan might address the problem of leaf debris build-up by implementing some best management practices in the community to encourage the clean up of leaf litter.

TASK 2: Computer-based stormwater mapping

The purpose of this task was to migrate location data collected using GPS technology and associated catch basin and outfall information to a digital format using ESRI ArcMap software. TIWC worked with project partner KLGO to locate and utilize a ArcMap software extension called DNRGarmin, which was produced by the Minnesota Department of Natural Resources for downloading data from Garmin GPS units to ArcMap software. This extension worked well and we were easily able to import our GPS data points. Using base maps contributed by KLGO (aerial photos, as shown in photo at right), we were able to overlay our information on an excellent base layer.

Catch basins are indicated in red in the example map above, Pullen Creek is shown in blue.

Due to a combination of limited GIS experience within TIWC and a more extensive nature of work than we had realized made the computer-based portion of the project more time consuming and challenging than expected. The products and data that we have produced could be built upon and become more useful by working with GIS experts in the future.

We were able to obtain engineers design drawings and as-built surveys for some areas of town, which made it possible to double check our survey information and improve the overall quality of the data. Where we were not able to obtain these, however, we had some difficulty determining where certain pipes ran to. We have done our best to connect each catch basin as accurately as possible. See (see appendices) for maps of the various catch basin drainages and other map layers.

OBJECTIVE 2:

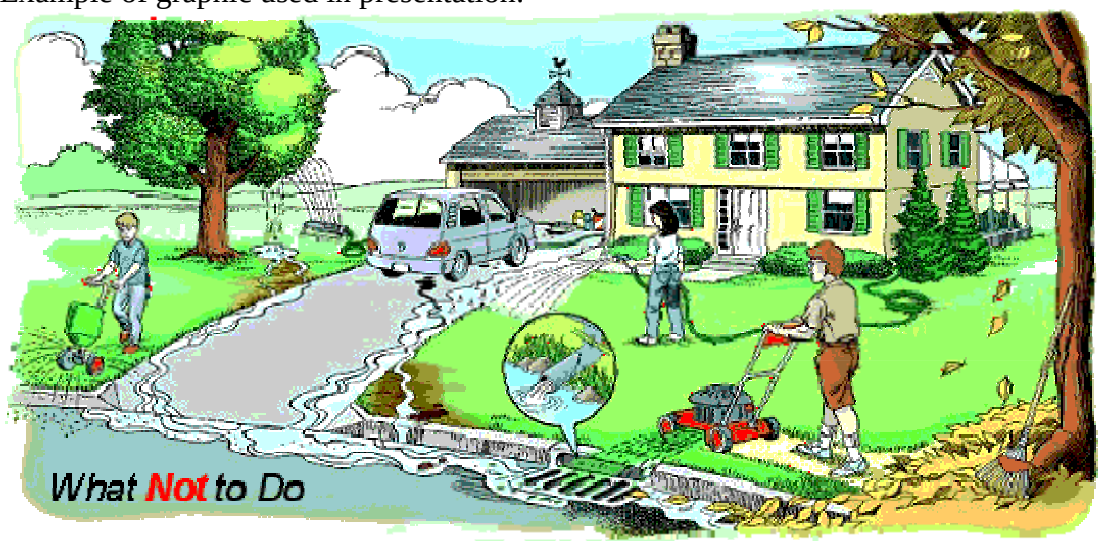
Educate residents about stormwater and its management

TASK 3: Educational presentation about stormwater and its management.

The goal of this task was to educate community residents about stormwater, its impacts on watershed aquatic resources, and stormwater management. We accomplished this by presenting information about specific, local stormwater issues and gathering information about the concerns of community members.

We produced and delivered a presentation about stormwater for this meeting, which was held in October covered the topics of watersheds, explanation of stormwater and what it contains, where it goes and what it contains, its effects, and what residents and landowners can do to make a difference. See appendices for the complete presentation.

Example of graphic used in presentation:



We researched the subject of stormwater and obtained a variety of publications which were distributed at the meeting. These included several handouts, listed below and included in the appendices.

- EPA
  - Bookmark, 10 things you can do to prevent stormwater runoff pollution
  - After the Storm: a citizens guide to understanding stormwater
  - Make your home the solution to stormwater pollution
- Youth/Educational handouts
  - *Water pollution*, adapted from Understanding Water – Activity Book
  - *Water supply*, adapted from Understanding Water – Activity Book
  - *Fresh water*, adapted from Understanding Water – Activity Book
  - *Let's find out about water*, adapted from Understanding Water – Activity Book
  - *Nonpoint source pollution*, adapted from Understanding Water – Activity Book

Some concerns expressed by community members during this educational presentation and discussion included:

- *What kind of stuff goes into stormdrains or runoff from business and industrial areas?*
- *Gravel and sediment from city snow plowing may be entering the creek*
- *Do we have to show that there is a problem before we can get people (regulators, law enforcement, etc) to respond?*
- *What's in the scum on the water at the small boat harbor?*
- *Waterfront is very dirty with plastic bags and other human detritus. Is this dumped by cruise ships?*
- *What happens in Skagway when it rains heavily and the sewage treatment plant floods? Does sewage back up into the stormwater system?*
- *Where does water from local bus washing (during summer visitor season) drain to?*

These concerns have been documented, and will be included as material for reference and focusing of our stormwater management plan, to be written in a future project.

Although we believe we did a thorough job of preparing material for this event and advertising it, turnout was very low. We believe that future educational/outreach efforts will be more effective if they involve a different type of outreach, marking stormdrains is a good example. We believe that the stormdrain marking component of this project provided excellent outreach and education on the stormwater topic. As we work with volunteers for marking stormdrains, we educated them on the topics covered in our stormwater meeting/workshop.

TASK 4: Show video, *After the Storm*

The purpose of this task was to reach out and provide an educational opportunity to a wider audience and to rural Alaska residents through a television venue. We used a video called *After the Storm*. This special half our program was co-produced by The Weather Channel (TWC) and the Environmental Protection Agency (EPA), and originally premiered on TWC in February 2004.

The show highlights three case studies: Santa Monica Bay, the Mississippi River Basin, and New York City – where polluted runoff threatens watersheds highly valued for recreation, commercial fisheries and navigation, and drinking water. Key scientists and water quality experts, and citizens involved in local and national watershed protection efforts provide insight into the problems as well as solutions to today's water quality challenges.

We worked with the television station ARCS, broadcast in rural communities throughout Alaska, to air this program on May 19, 2006, at 8:30 pm. We feel airing the program was a success, though we were unable to obtain feedback from the viewing public on their response.

OBJECTIVE 3:

Implement some structural best management practices to reduce impacts of stormwater discharges.

TASK 5: Gate select Pullen Creek stormwater drains

The purpose of this task was to block juvenile fish from accessing stormwater outfalls which currently have a direct connection to Pullen Creek. During our survey we identified nine outfalls which could allow juvenile fish to enter the stormdrain system through Pullen Creek or the Skagway River. Further research since the writing of this proposal has not revealed technology for blocking stormwater drains appropriate for Skagway. We are very hesitant to install something which would cause future maintenance issues for City of Skagway employees, and a fine enough barrier to prevent juvenile fish passage would certainly cause long-term maintenance issues.

TASK 6: Facilitate community campaign to paint stormwater drains

The purpose of this task was to facilitate a community event to paint stormdrains by working with community members. There are multiple results that can come from an effective and wide spread stormdrain marking project. Most residents are unaware of the reality that pollutants washed down stormdrains are not processed at a waste water treatment plant. People (both residents and non-residents) that see a message “no dumping, drains to water body” may become more aware of the hazards of dumping waste in drains. In addition, local residents can become involved in the process and experience another educational opportunity. In our program, youth and adults were involved in the marking of drains, and door hangers were placed on residential homes in order to further spread the message.

Included in our report you will find copies of the stormdrain markers and door hangers that were used. We had originally planned to paint the drains, but with further research discovered permanent stormdrain markers are manufactured by a two companies. For a reasonable price, we were able to order 300 plastic markers from DAS manufacturing, which we glue to the cement/pavement using a permanent adhesive. These last much longer than paint and will require much less maintenance. We’re excited to be using them and have been getting an excellent response from within the community. We worked with a group of children from the local daycare facility to involve youth in our efforts to mark drains, as well as working with adult volunteers from the community.

Appendices

Appendix 1: Maps of Skagway stormwater system

1. City of Skagway drainage system
2. City of Skagway drainage system ranked by impervious cover
3. Dyea Road culverts
4. City of Skagway drainage system ranked by presence of sediment and/or floatables
5. Pullen Creek outfalls
6. Pullen Creek stormwater drainage
7. Spring Street drainage area, which drains to Pullen Creek

Appendix 2: Data collection manual and data sheets

1. Data collection manual
2. Culvert data sheet
3. Catch basin data sheet
4. Outfall data sheet

Appendix 3: Data collected

1. Stormwater pipes
2. Catch basins
3. Outfalls

Appendix 4: Stormwater meeting information

1. *What's in a Stormdrain*, sign used for advertising
2. *What's in a Stormdrain*, slides from presentation
3. Handouts
    a. Thirstin's water cycle adventure
    b. Stormwater runoff challenge
    c. The solution to stormwater runoff pollution
    d. Thirstin's wacky water adventure
    e. Stormwater stickers

Appendix 5: Stormdrain marking information

1. Round drain marker "Only rain down the stormdrain"
2. Door hanger
3. Proposal to Skagway City Council requesting permission to mark drains

Appendix 1: Maps of Skagway stormwater system

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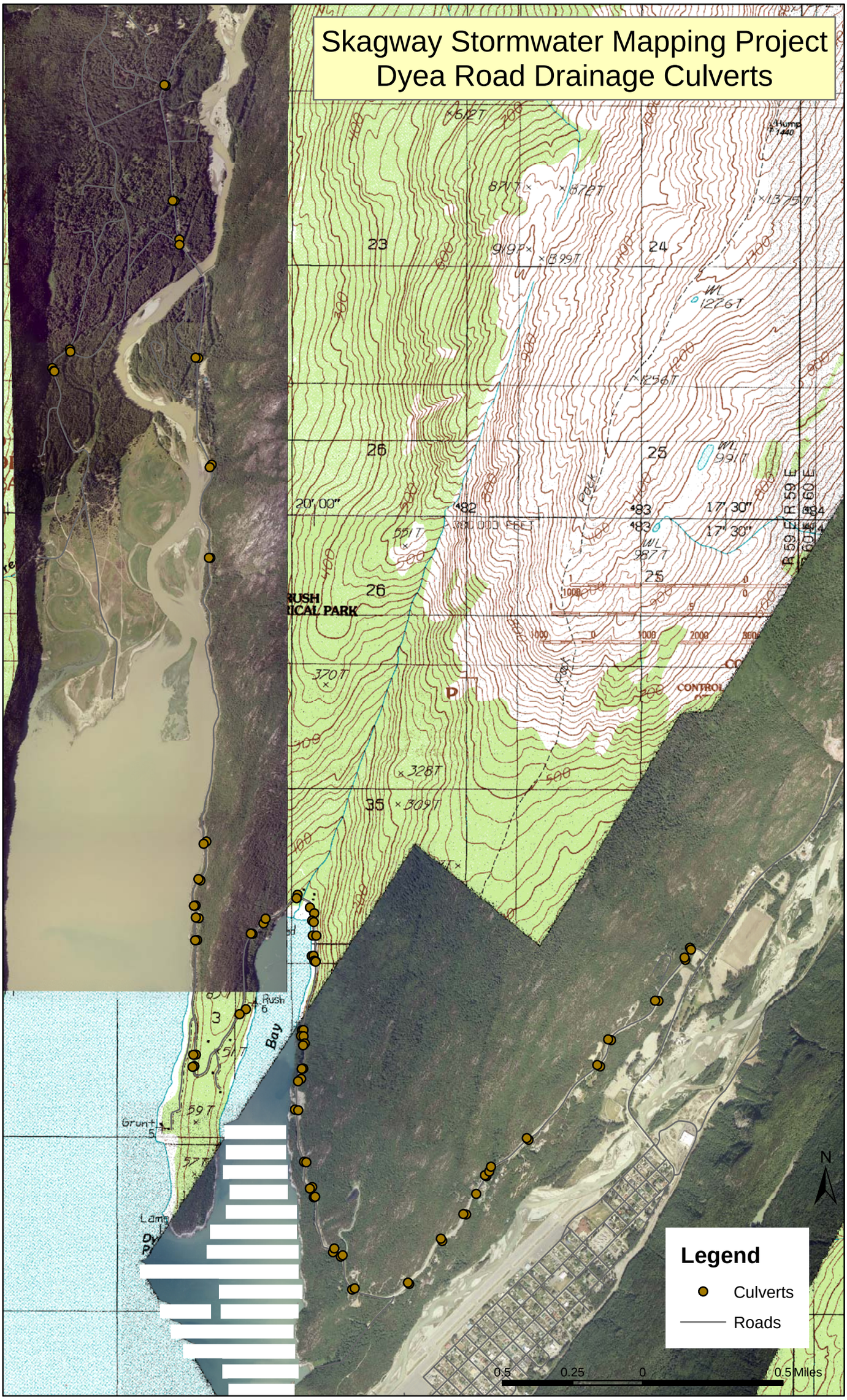
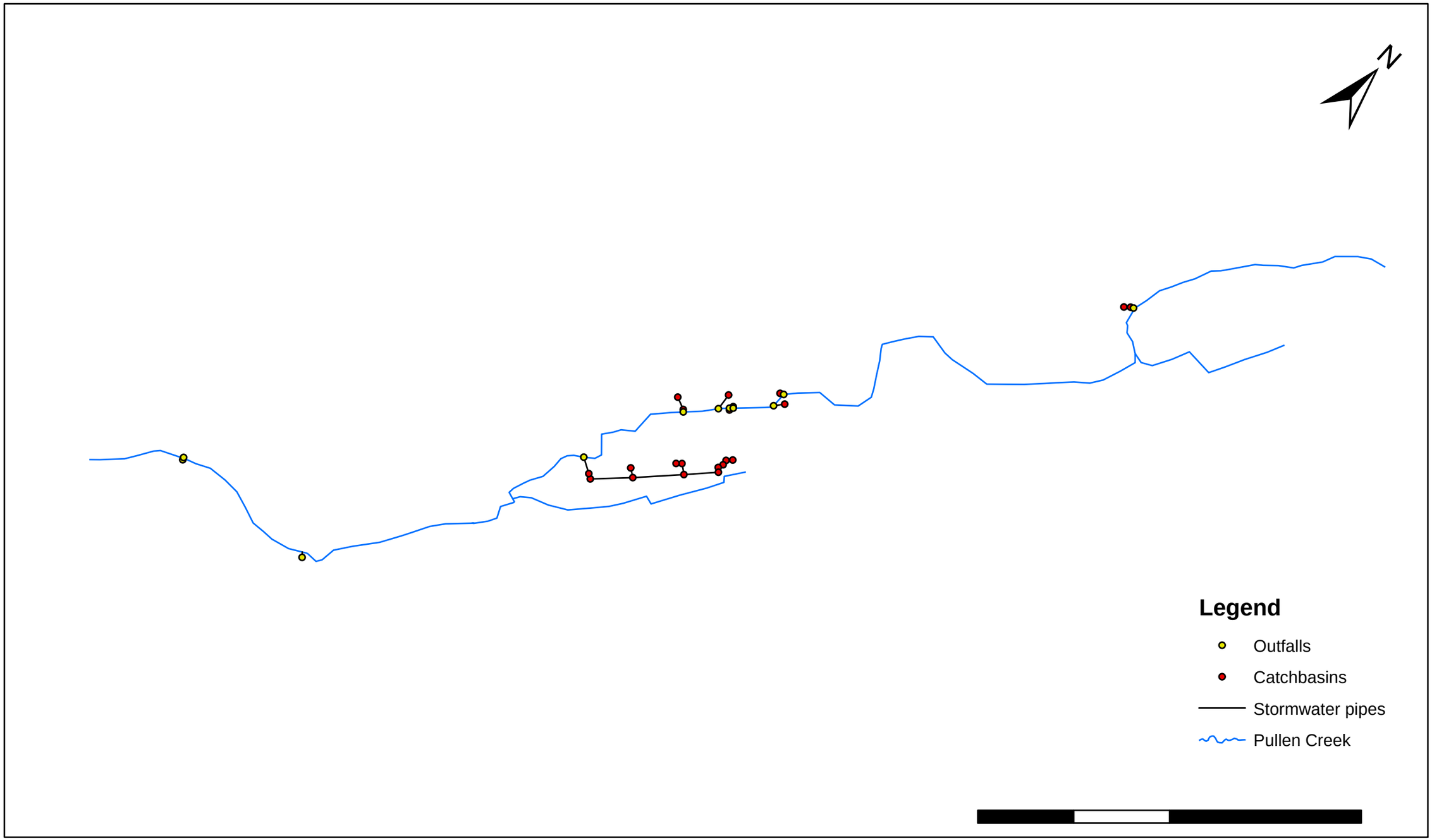
Skagway Stormwater Mapping Project
City of Skagway Drainage System
Legend
Outfalls
Catchbasins
Stormwater pipes
Pullen_Creek
Catch Basins
0.2
0.1
0
0.2 Miles


Skagway Stormwater Mapping Project
City of Skagway Drainage System
Ranked by Impervious Cover Level
Legend
Outfalls
Catch Basins
Impervious Cover Level
0
1 - 25%
26 - 75%
76 - 100%
Pullen_Creek
0.25
0.125
0
0.25 Miles


Skagway Stormwater Mapping Project
Dyea Road Drainage Culverts
Legend
Culverts
Roads
N
0.5 0.25 0 0.5 Miles


Legend
Catch Basins
Sediment or Floatables Present?
None Present
Floatables
Sediment
Sediment & Floatables
Unable to Assess
Pullen_Creek
0.25
0.125
0
0.25 Miles
Skagway Stormwater Mapping Project
City of Skagway Drainage System
Ranked by Presence of Sediment/Floatables in Basin


Skagway Stormwater Mapping Project
Pullen Creek Outfalls
Legend
Outfalls
Pullen_Creek
0.1 0.05 0 0.1 Miles


N
Legend
Outfalls
Catchbasins
Stormwater pipes
Pullen Creek


Skagway Stormwater Mapping Project
Pullen Creek
Spring Street Drainage Area
Legend
Outfalls
Catchbasins
Stormwater pipes
Pullen_Creek
0.04
0.02
0
0.04 Miles

Appendix 2: Data collection manual and data sheets

1. Data collection manual
2. Culvert data sheet
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Alaska Clean Water Action
Skagway Stormwater Mapping

Stormwater Mapping Project
Instructions for Data Collection

September 2005

Taiya Inlet Watershed Council

Project Description: Excess stormwater pollutants can cause damage to habitat and reduced water quality in the Taiya Inlet Watershed. Currently there is no stormwater management plan for the community of Skagway or the upper Taiya Inlet watershed. Without a basic understanding of stormwater discharges in our community and the surrounding area, we cannot begin to address stormwater through restoration and education.

The main purpose of this project is to lay the foundation for creating a stormwater management plan. This plan, when completed, will help local, state and federal officials target limited resources by identifying stormwater discharge sites that, if remediated, may result in improved water quality. Such a document will assist government officials in identifying restoration opportunities, especially when road and other work are being contemplated. The information in this plan will provide the community with justification for acquiring grant funds for stormwater projects.

The objectives of this project are to (1) map Skagway stormwater discharges and collect baseline information for later integration into a stormwater management plan; (2) educate residents about stormwater and its management; and (3) implement some structural best management practices to reduce impacts of stormwater discharges. By completing these objectives, we will have the necessary information to complete a stormwater management plan, which is planned for completion in 2007.

Instructions: These stormwater mapping instructions are designed to aid you in identifying storm drain outlets and catch basins in Skagway. Non-point source pollution includes substances from roadways, parking lots, construction areas and lawns and can cause problems in our waterways. The main conduit for these substances to get to our waterways is through stormwater and the municipal storm drain system. A catch basin is a curbside opening that collects rainwater from streets and serves as an entry point to the storm drains system. Water running off your yard, sidewalk or street flows down gutters to these catch basins. By mapping the stormwater system, we will begin to understand it and can begin reducing

Stormwater outfall/discharge

pollution in Pullen Creek, the Skagway River and the Taiya Inlet.

Stormwater catch basin

This guide will help you locate and record information on catchbasins and outlets in our watershed. The information collected will be entered into a Geographic Information System (GIS) database and will be used to create storm drain maps. Specifically, you will be gathering information on the location and condition of storm drains and outfalls and specific conditions of each drain and outfall.

Field work will involve walking city streets to locate and catchbasins, and walking our waterfront, Pullen Creek and the Skagway River to survey outfalls.

Tips for Filling out Survey Sheets:

- Record the number of the outfall or basin on the base map and survey sheet as you survey it.
- The material of a pipe can usually be described at corrugated metal pipe (CMP), plastic (PVC) or concrete.
- Note the slope of the bank under the pipe outlet and whether or not scouring has occurred. Measure the distance from the pipe to the stream channel. Note if pipe is partially or totally submerged
- Estimate the percent of impervious cover immediately upland of the outlet, look at land use around you. Is it a residential area? Commercial? Park? Impervious surfaces are hard surfaces that do not allow infiltration of water. More hard surfaces (roofs, driveways, parking lots) contained in an area will bring a larger, faster flow. This will help assess the amount of contaminants and impacts each outlet could have on the receiving waters.

Land Use	**Estimated % Impervious Cover**
Commercial	85-95
Industrial	75-85
Residential, High Density (< ¼ acre lots) • Average Skagway residential lot is 0.11 acres • 2 Residential lots are 0.22 acres	35-65
Residential, Med. Density (¼ – 1 acre lots)	20-35
Residential, Low Density (>1 acre lots)	10-20
Open areas	0-10

- Be as specific as possible when describing location and access to the outlet or basin. Record road names and intersections whenever possible. If there are several pipes in an area or if they are hard to find, draw a location sketch including road names and street addresses if available or other clues.
- Rating system: information on potential problems at **outlets** will be important when completing their stormwater plans. Use a 0-2 rating system to indicate problem areas to be followed up on. Take photographs of areas that have potential problems.

  0: No observed impairment
    - no dry weather flow
    - no observed sediment deposition or erosion at or near discharge
    - no observed solids, floatables or debris related to outlet
    - pipe in good repair

  1: Potential impairment – needs rechecking
    - dry weather flow, some odor
    - moderate sediment deposition or scouring near outlet
    - moderate floatables, solids, trash/debris or algae at or near outlet
    - pipe in poor condition

  2: Impairment, needs investigation
    - dry or wet weather flow exhibiting wastewater odors, colors, solids, floatables or turbidity
    - dry or wet weather flows exhibiting oily sheen
    - considerable sediment deposition, scouring, trash/debris or algae growth at or near the outlet
    - pipe collapsing or crumbling
    - contributing drains or catch basins blocked by debris or sediment

Appendix A

TAIYA INLET WATERSHED COUNCIL - CULVERT DATA SHEET

Date:_____ Surveyors:_____

Description of Area Surveyed: _____

Photos taken during daily survey: _____

Weather Conditions in Last 24 Hours: Heavy Precipitation Light Precipitation Dry

Culvert ID:

Pipe Material	CMP	PVC	Cement	Unk	Other
Pipe Dimensions					
Condition	Good	Damaged	Clogged	Describe Damage:	
Shape of Pipe	Circular	Rectangular	Arch	Elliptical	
Is the bank scoured below the pipe?	Yes		No		
Outfall from storm drain?	Yes		No	Not sure	
Impervious Land Cover	Low (0-25%)	Medium (26-75%)		High (76-100%)	
Surrounding Land Use	Residential	Industrial		Commercial	
Outfall Rating	0	1		2	

Other Comments (grate issues, damage, possible contaminants, etc): _____

_____

Culvert ID:

Pipe Material	CMP	PVC	Cement	Unk	Other
Pipe Dimensions					
Condition	Good	Damaged	Clogged	Describe Damage:	
Shape of Pipe	Circular	Rectangular	Arch	Elliptical	
Is the bank scoured below the pipe?	Yes		No		
Outfall from storm drain?	Yes		No	Not sure	
Impervious Land Cover	Low (0-25%)	Medium (26-75%)		High (76-100%)	
Surrounding Land Use	Residential	Industrial		Commercial	
Outfall Rating	0	1		2	

Other Comments (grate issues, damage, possible contaminants, etc): _____

_____

TAIYA INLET WATERSHED COUNCIL - CATCH BASIN DATA SHEET

Date:_____ Surveyors:_____

Weather Conditions in Last 24 Hours: Heavy Precipitation Light Precipitation Dry

Description of area surveyed:_____

Photos for the day: _____

Waypoints collected: _____

Comments on survey: _____

_____

_____

Sketch of Area Surveyed

Other Comments: _____

_____

_____

_____

_____

Catch Basin ID: CB - _____ Map Page: _____ Photo Numbers: _____

GPS Coordinates: _____ N _____ W Waypoint #: _____

Description of Location: _____

Physical Description of Catch Basin

Basin Dimensions (at grate)					
Pipe(s) Dimensions (diameter)					
Pipe Material	CMP	PVC	Cement	Unknown	Other:
Depth (to top of pipe)					
Condition (of the cement basin & metal grate)	Good	Damaged	Clogged	Describe Damage/clog:	
Shape of Basin	Circular	Rectangular	Other:		
Floatables or sediment present?	Sediment	Floatables	Description:		
Number of pipes exiting basin:					
Standing water present?	Yes	No			
Condition of water (if known/present)	clear	not clear	with oily sheen		
Impervious Land Cover	Low (0-25%)	Med (26-75%)	High (76-100%)		
Surrounding Land Use	Residential	Industrial	Commercial		

Other Comments (grate issues, damage, associated outfalls/basins, etc): _____

_____

Catch Basin ID: CB - _____ Map Page: _____ Photo Numbers: _____

GPS Coordinates: _____ N _____ W Waypoint #: _____

Description of Location: _____

Physical Description of Catch Basin

Basin Dimensions (at grate)					
Pipe(s) Dimensions (diameter)					
Pipe Material	CMP	PVC	Cement	Unknown	Other:
Depth (to top of pipe)					
Condition (of the cement basin & metal grate)	Good	Damaged	Clogged	Describe Damage/clog:	
Shape of Basin	Circular	Rectangular	Other:		
Floatables or sediment present?	Sediment	Floatables	Description:		
Number of pipes exiting basin:					
Standing water present?	Yes	No			
Condition of water (if known/present)	clear	not clear	with oily sheen		
Impervious Land Cover	Low (0-25%)	Med (26-75%)	High (76-100%)		
Surrounding Land Use	Residential	Industrial	Commercial		

Other Comments (grate issues, damage, associated outfalls/basins, etc): _____

_____

TAIYA INLET WATERSHED COUNCIL - OUTFALL DATA SHEET

Date:_____ Surveyors:_____ Outfall ID:_____

GPS Coordinates:_____°N _____°W Waypoint #: _____

Description of Location: _____

Photos: _____

Weather Conditions in Last 24 Hours: Heavy Precipitation Light Precipitation Dry

Physical Description

Receiving waterbody	Ocean	Pullen Crk	Sgy River	Other:
Pipe Material	CMP	PVC	Cement	Unk	Other
Pipe Dimensions				
Condition	Good	Damaged	Clogged	Describe Damage:
Shape of Pipe	Circular	Rectangular	Arch	Elliptical
Distance from pipe to stream channel				
Is the bank scoured below the pipe?	Yes	No		
Outfall from storm drain?	Yes	No	Not sure	
Could fish access the outfall?	Yes	No	Not sure	
Impervious Land Cover	Low (0-25%)	Medium (26-75%)	High (76-100%)	
Surrounding Land Use	Residential	Industrial	Commercial	
Outfall Rating	0	1	2	

Sketch of Outfall (with dimensions)

Other Comments (grate issues, damage, possible contaminants, etc): _____

_____

_____

Appendix 3: Data collected

1. Stormwater pipes
2. Catch basins
3. Outfalls

Appendix 4: Stormwater meeting information

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2. *What's in a Stormdrain*, slides from presentation
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    c. The solution to stormwater runoff pollution
    d. Thirstin's wacky water adventure
    e. Stormwater stickers

(1) How can you get rid of your used oil, For free?!

(2) Where does rainwater go?

(3) What lurks in those storm drains?

Come learn the answers to these questions and tell us what Skagway could do about the mysterious things lurking in our stormwater and under our streets

come for the ghoulish treats!

What's in a Stormdrain!?

National Park Service Auditorium

October 26, 7:00 PM

What's in a Stormdrain?

Amber Bethe, Coordinator

Taiya Inlet

Watershed Council

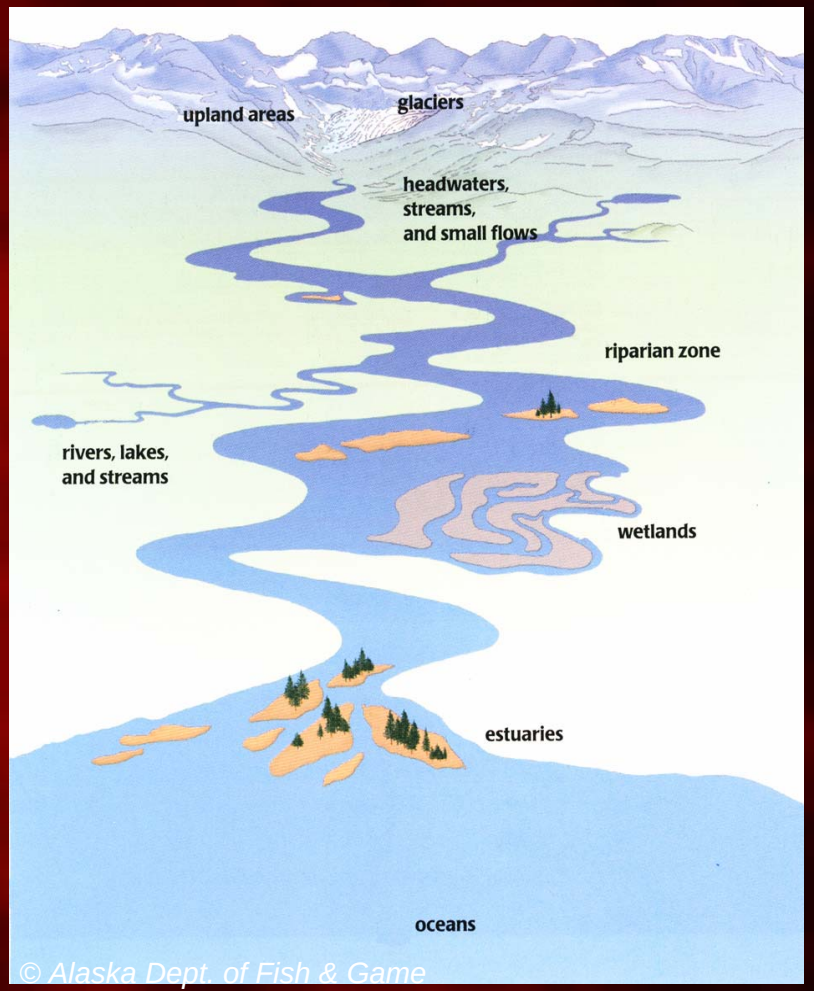
983-2426

Outline

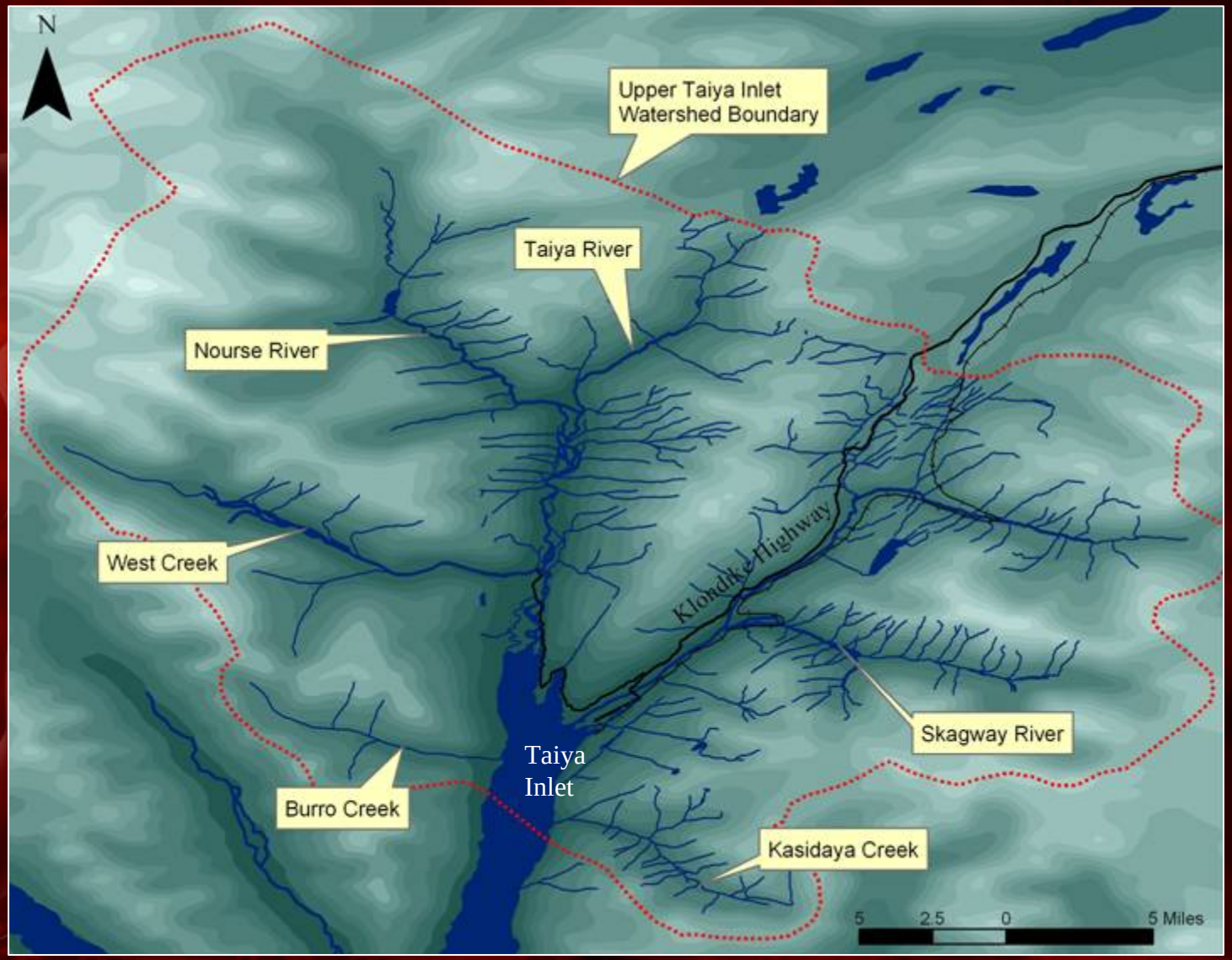
- Watersheds
- Stormwater
- What you can do

What Is a Watershed?

- A watershed is a region (or "basin") which drains to a river or some other point
- Complex systems
- Water, sediment, and dissolved materials



Upper Taiya Inlet Watershed



Stormwater? What's that?

- Stormwater is pure rainwater plus anything the rain picks up and carries along with it.

What happens in Urban Areas?

- Rain falls on roofs or collects on paved areas like driveways or roads
- Stormwater is carried away through a system of pipes
- These pipes lead directly to rivers, streams or the harbor

Why do we care?

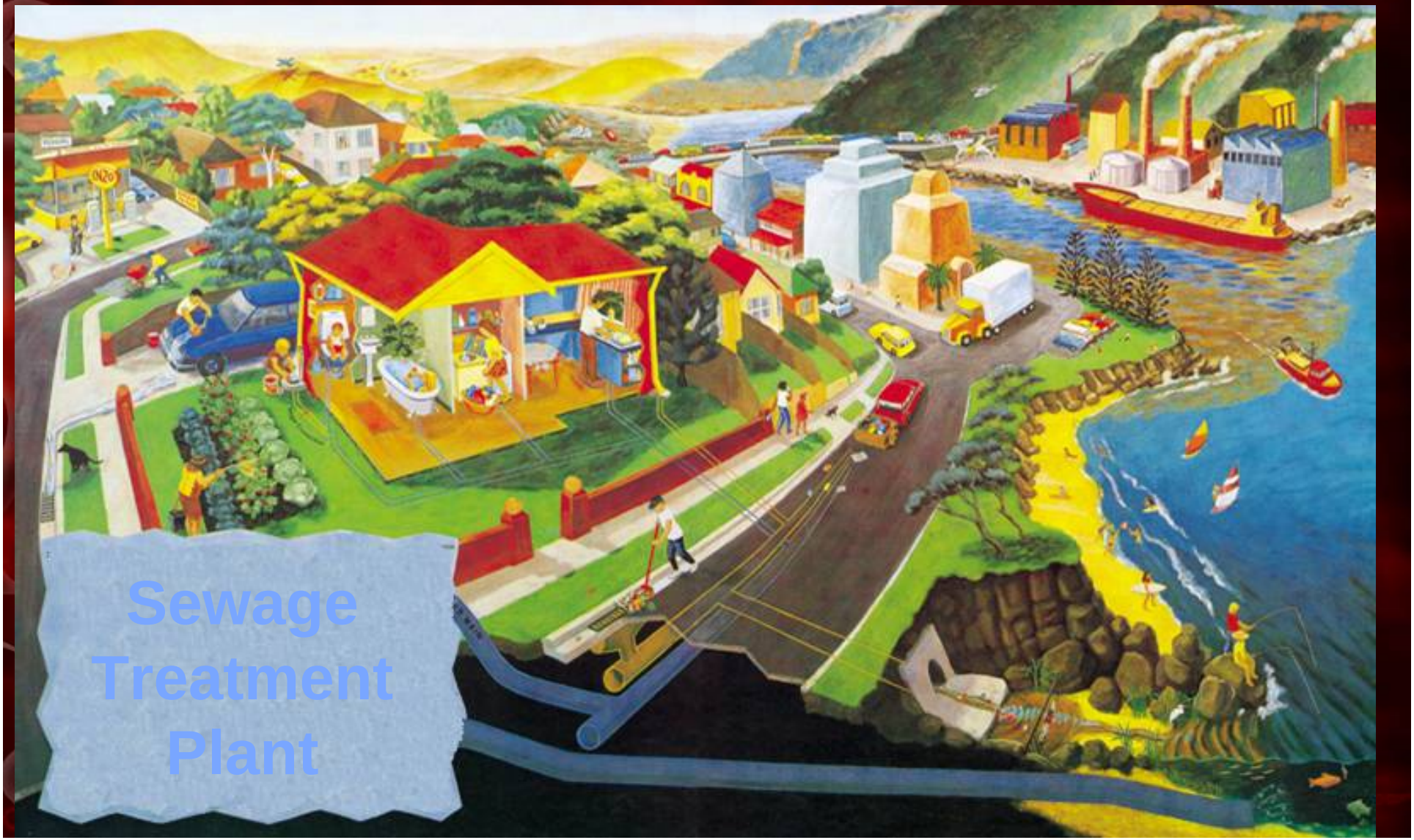
Reason #1
What's in Stormwater?

- Litter
  - Cigarette butts
  - Cans
  - Paper
  - Plastic bags
- Chemical
  - Detergents
  - Oil
  - Fertilizers
- "Natural"
  - Leaves
  - Garden clippings
  - Animal droppings
  - Soil, gravel, sand & salt

Reason #2
Where it goes!

- Pollutants are picked up as water flows through
  - Streets
  - parking lots
  - driveways
- Water then enters stormwater pipe system and eventually our waterways

Reason #3
Stormwater is not treated

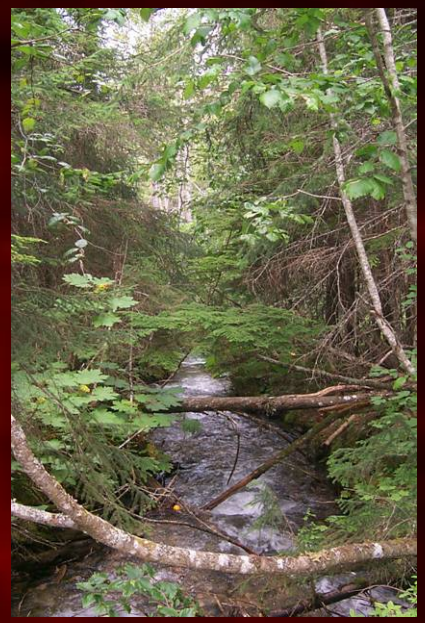


What are the Potential effects?

- Health
  - Health risks from pesticides, bacteria and chemicals
- Environment
  - Plants and animals may be impacted
- Neighborhoods
  - Clogged catch basins
  - "Nests" of trash & debris
  - Localized flooding

Factors affecting stormwater pollution

- Rain
- Development density
- Land use
- Vegetative cover
- Cleanliness of streets
- Local practices



Activities that can cause pollution at home

- Car washing & maintenance
- Disposing of garden waste
- Dropping litter
- Cleaning paint brushes
- Hosing the footpath & driveways
- Pet waste

Pollution at work

- Restaurants: not cleaning out grease trap regularly
- Builders: not shielding street drains
- All work places: letting litter and fluids run into street drains

Effects on plants & Animals

- Sediment
- Decay
- Soil
- litter

You can make a difference!

- Things you do every day can help!
- Changes can be simple
- Activities which are insignificant on a small scale can have an enormous cumulative impact

What can you do in the Garden?

- Sweep gutters and driveways
- Prevent soil or mulch from being blown away
- Grass or re-plant disturbed areas
- Use natural alternatives

What can you do in the street?

- Pick up litter
- Clean up pet droppings

What can you do with the car?

- Maintain your car – no leaks and keep it tuned
- Use minimum amount of detergent for cleaning
- Wash car on the grass or on gravel

What can you do when you're renovating?

- Keep paint, paint thinners and solvents clear of gutters or drains
- Reuse paint thinners & solvents once paint has settled
- Allow unused paint to dry out and then put it in the garbage

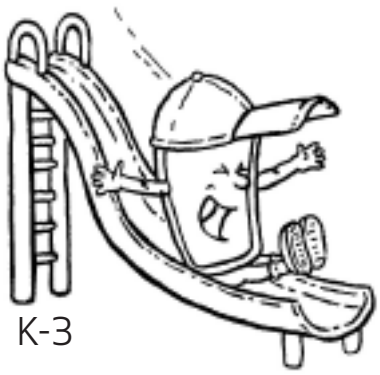
What are your concerns?

This project funded by the Alaska Clean Water Action (ACWA) Program

ACWA brings the State resource agencies, DEC, Fish and Game and DNR, together to deal with our waters in a coordinated and cooperative method, assuring state resources are used on our highest priorities.

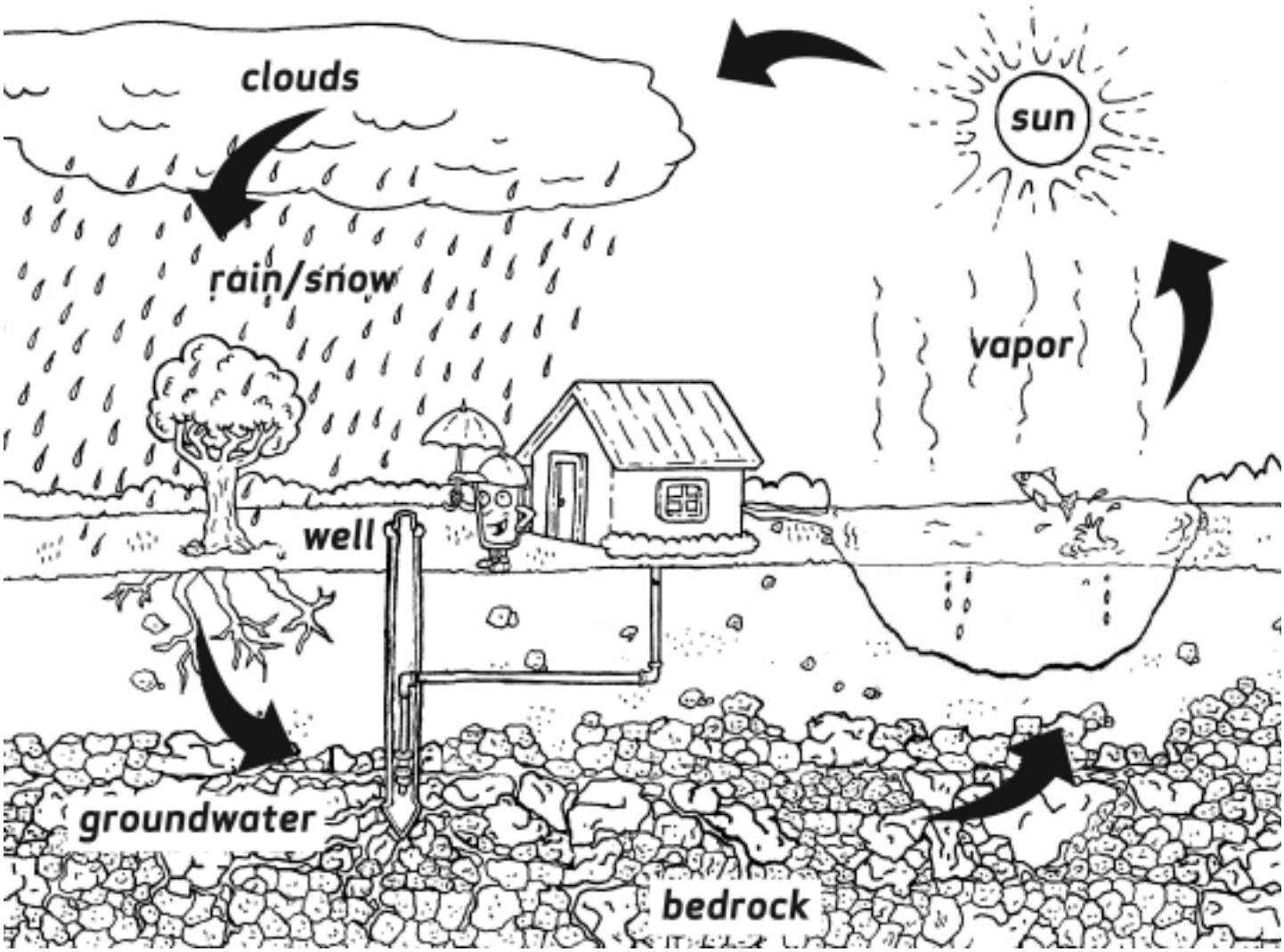
Thank you!

- ACWA
- Skagway City School Fish Hatchery Class
  - Ryan Ackerman
  - Tyler Forrester
- TIWC Board of Directors, especially
  - Dan Fangmeier
  - Elaine Furbish
  - Sandy Snell-Dobert and the NPS



K-3

Thirstin's Water Cycle Adventure



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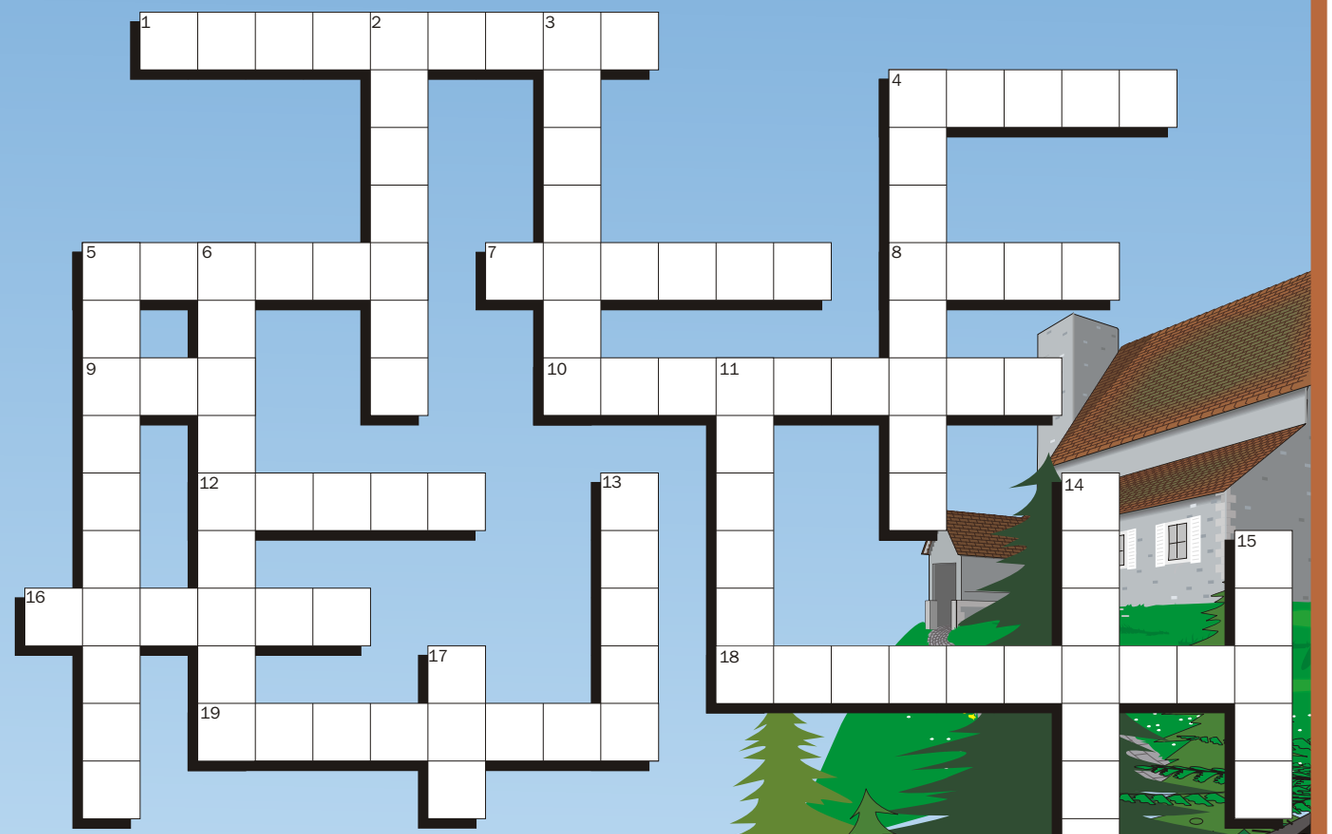
Take the Stormwater Runoff Challenge

Across:

1) The area of land that drains into an estuary, lake, stream, or groundwater is known as a _____.
4) The _____ of speeding boats can erode shorelines.
5) Maintaining your _____ tank will help to prevent bacteria and nutrients from leaking into groundwater and surface waters.
7) Wetland plants act like a natural water _____, removing harmful pollutants from stormwater runoff.
8) Leave your grass clippings on your _____ to reduce the need for commercial fertilizers.
9) A single quart of motor _____, if disposed of improperly, can pollute 2 million gallons of water.
10) Fertilizers and animal wastes contain _____ that "feed" algae and other aquatic plants harmful to water quality.
12) Polluted runoff from both rural and _____ sources has a significant impact on water quality.
16) Storm _____ don't always connect to sewage treatment plants, so runoff can flow directly to rivers, lakes, and coastal waters.
18) Follow directions carefully when applying _____ on your lawn—more isn't always better.
19) Polluted runoff (also called_____ source pollution) comes from so many places that it's hard to "pinpoint" a source.
20) Yard and vegetable food waste are suitable additions to a _____ pile.

Down:

2) Don't dump used motor oil into storm drains. _____ it!
3) _____ of soil from barren land can cloud nearby streams.
4) _____ prevent flooding, improve water quality, and provide habitat for waterfowl, fish, and wildlife.
5) Marking "Do Not Dump, Drains to Bay" on a _____ is one way to educate people about polluted runoff.
6) Excess sediment, nutrients, toxics, and pathogens are all types of runoff _____.
11) Polluted _____ is the nation's #1 water quality problem.
13) The cattail is one wetland _____ that helps purify polluted runoff.
14) Too much _____ in water can harm aquatic life.
15) Proper crop and animal management on _____ helps to control water pollution.
17) _____ impact development helps control stormwater pollution through conservation approaches and techniques.



Choices:

compost	nonpoint	sediment
drains	nutrients	septic
erosion	oil	storm drain
farms	plant	urban
fertilizer	pollution	wakes
filter	recycle	watershed
lawn	runoff	wetlands
Low		

EPA United States Environmental Protection Agency

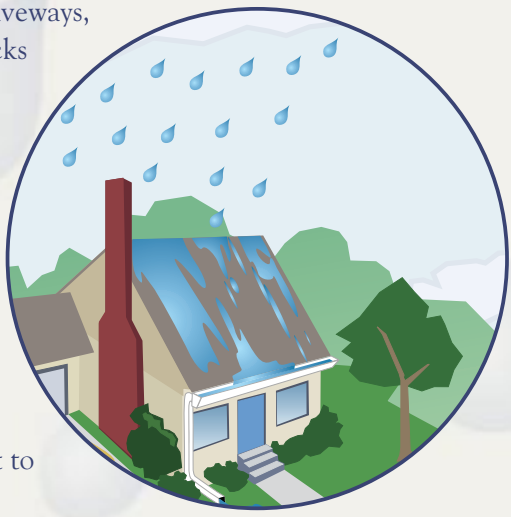
For more information, please visit EPA's Polluted Runoff web site at www.epa.gov/nps

Contact name and agency

Contact phone number and e-mail

Printed with soy based inks on recycled paper.

As stormwater flows over driveways, lawns, and sidewalks, it picks up debris, chemicals, dirt, and other pollutants. Stormwater can flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Anything that enters a storm sewer system is discharged untreated into the waterbodies we use for swimming, fishing, and providing drinking water. Polluted runoff is the nation's greatest threat to clean water.



By practicing healthy household habits, homeowners can keep common pollutants like pesticides, pet waste, grass clippings, and automotive fluids off the ground and out of stormwater. Adopt these healthy household habits and help protect lakes, streams, rivers, wetlands, and coastal waters. Remember to share the habits with your neighbors!

Healthy Household Habits for Clean Water

Vehicle and Garage

- Use a commercial car wash or wash your car on a lawn or other unpaved surface to **minimize** the amount of dirty, soapy water flowing into the storm drain and eventually into your local waterbody.

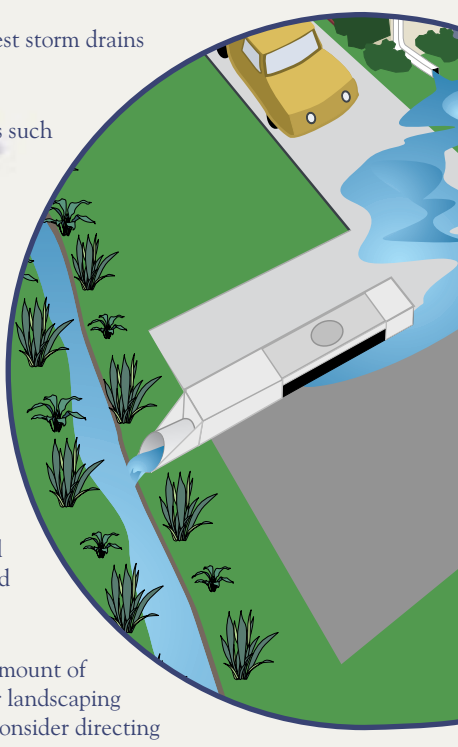
- Check your car, boat, motorcycle, and other machinery and equipment for leaks and spills. Make repairs as soon as possible. Clean up **spilled fluids** with an absorbent material like kitty litter or sand, and don't rinse the spills into a nearby storm drain. Remember to properly dispose of the absorbent material.
- **Recycle** used oil and other automotive fluids at participating service stations. Don't dump these chemicals down the storm drain or dispose of them in your trash.

Lawn and Garden

- Use pesticides and fertilizers **sparingly**. When use is necessary, use these chemicals in the recommended amounts. Avoid application if the forecast calls for rain; otherwise, chemicals will be washed into your local stream.
- Select **native** plants and grasses that are drought- and pest-resistant. Native plants require less water, fertilizer, and pesticides.
- **Sweep up** yard debris, rather than hosing down areas. Compost or recycle yard waste when possible.
- Don't overwater your lawn. Water during the **cool** times of the day, and don't let water run off into the storm drain.
- Cover piles of dirt and mulch being used in landscaping projects to prevent these pollutants from blowing or washing off your yard and into local waterbodies. **Vegetate** bare spots in your yard to prevent soil erosion.

Home Repair and Improvement

- Before beginning an outdoor project, locate the nearest storm drains and **protect** them from debris and other materials.
- **Sweep up** and properly dispose of construction debris such as concrete and mortar.
- Use hazardous substances like paints, solvents, and cleaners in the **smallest amounts possible**, and follow the directions on the label. Clean up spills **immediately**, and dispose of the waste safely. Store substances properly to avoid leaks and spills.
- Purchase and use **nontoxic**, **biodegradable**, **recycled**, and **recyclable** products whenever possible.
- **Clean** paint brushes in a sink, not outdoors. Filter and reuse paint thinner when using oil-based paints. Properly dispose of excess paints through a household hazardous waste collection program, or donate unused paint to local organizations.



- **Reduce** the amount of paved area and increase the amount of vegetated area in your yard. Use native plants in your landscaping to reduce the need for watering during dry periods. Consider directing downspouts away from paved surfaces onto lawns and other measures to increase infiltration and reduce polluted runoff.

Pet Care

- When walking your pet, remember to **pick up** the waste and dispose of it properly. Flushing pet waste is the best disposal method. Leaving pet waste on the ground increases public health risks by allowing harmful bacteria and nutrients to wash into the storm drain and eventually into local waterbodies.

Swimming Pool and Spa

- **Drain** your swimming pool only when a test kit does not detect chlorine levels.
- Whenever possible, drain your pool or spa into the **sanitary** sewer system.
- Properly store pool and spa chemicals to **prevent** leaks and spills, preferably in a covered area to avoid exposure to stormwater.

Septic System Use and Maintenance

- Have your septic system **inspected** by a professional at least every 3 years, and have the septic tank **pumped** as necessary (usually every 3 to 5 years).
- Care for the septic system drainfield by **not** driving or parking vehicles on it. Plant only grass over and near the drainfield to avoid damage from roots.
- Flush responsibly. Flushing household chemicals like paint, pesticides, oil, and antifreeze can **destroy** the biological treatment taking place in the system. Other items, such as diapers, paper towels, and cat litter, can **clog** the septic system and potentially damage components.

Storm drains connect to waterbodies!

Internet Address (URL) • HTTP://www.epa.gov
Recycled/Recyclable • Printed With Vegetable Oil Based Inks on 100% Postconsumer, Process Chlorine Free Recycled Paper

United States Environmental Protection Agency
EPA 833-B-03-003
January 2003

Contact phone number and e-mail

Contact address1

Contact address

Contact organization

Contact name

www.epa.gov/nps

THE YEAR OF CLEAN WATER

Celebrate Restoration!

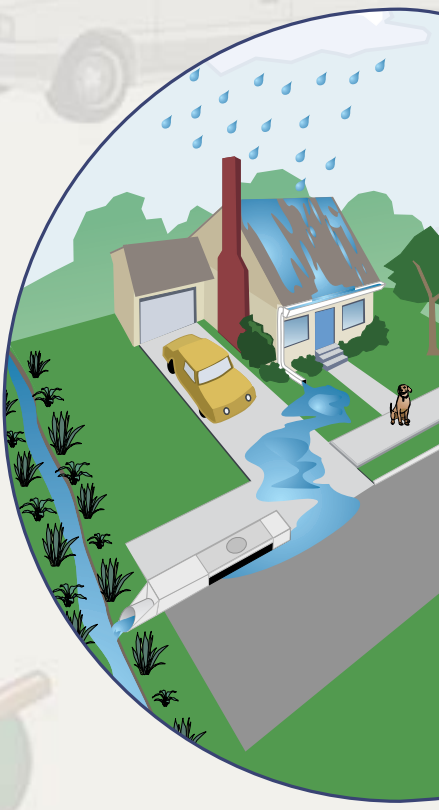
Remember: Only rain down the drain!

For more information, visit www.epa.gov/npdes/stormwater or

Make your home

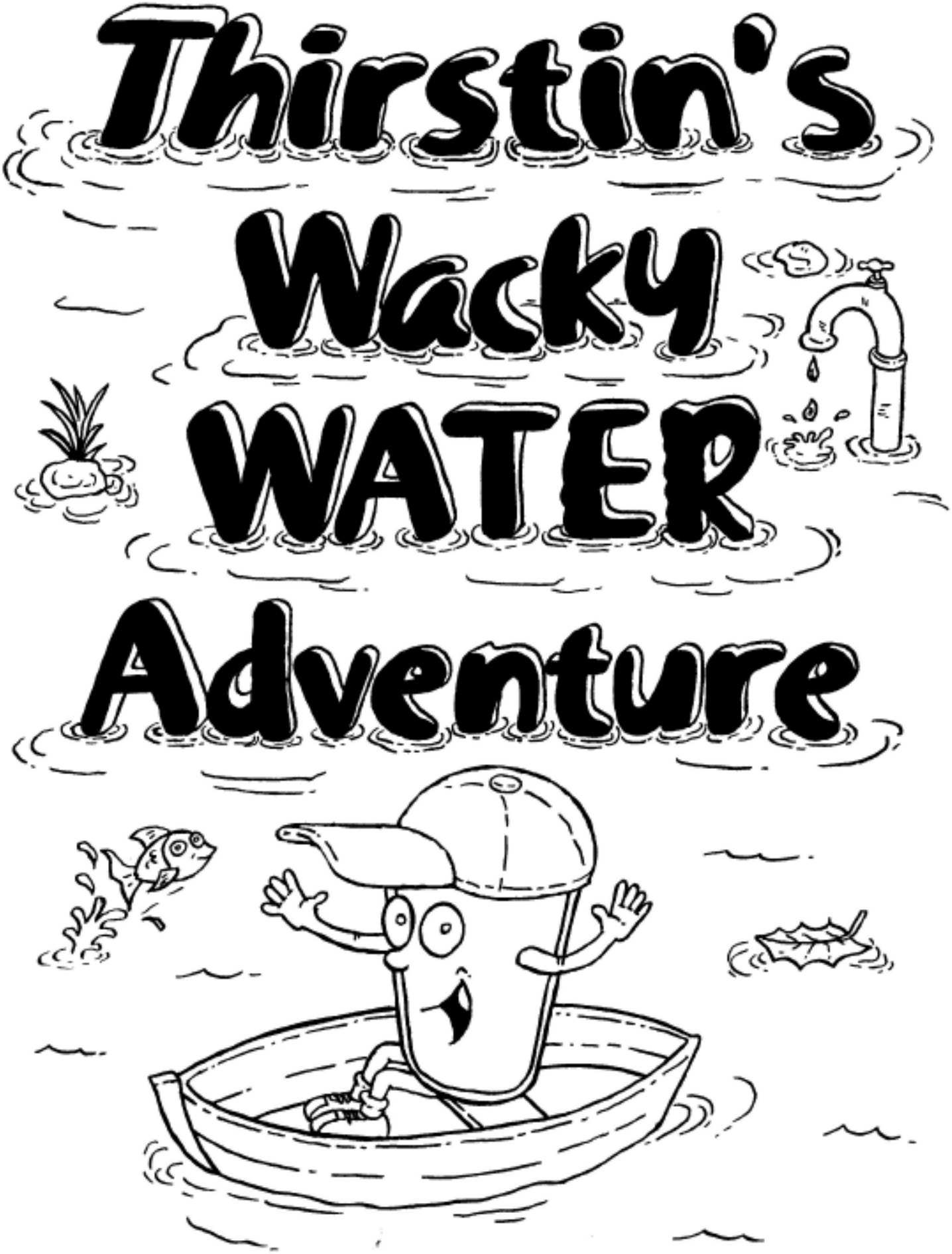
The SOLUTION TO STORMWATER POLLUTION!

A homeowner's guide to healthy habits for clean water



United States Environmental Protection Agency

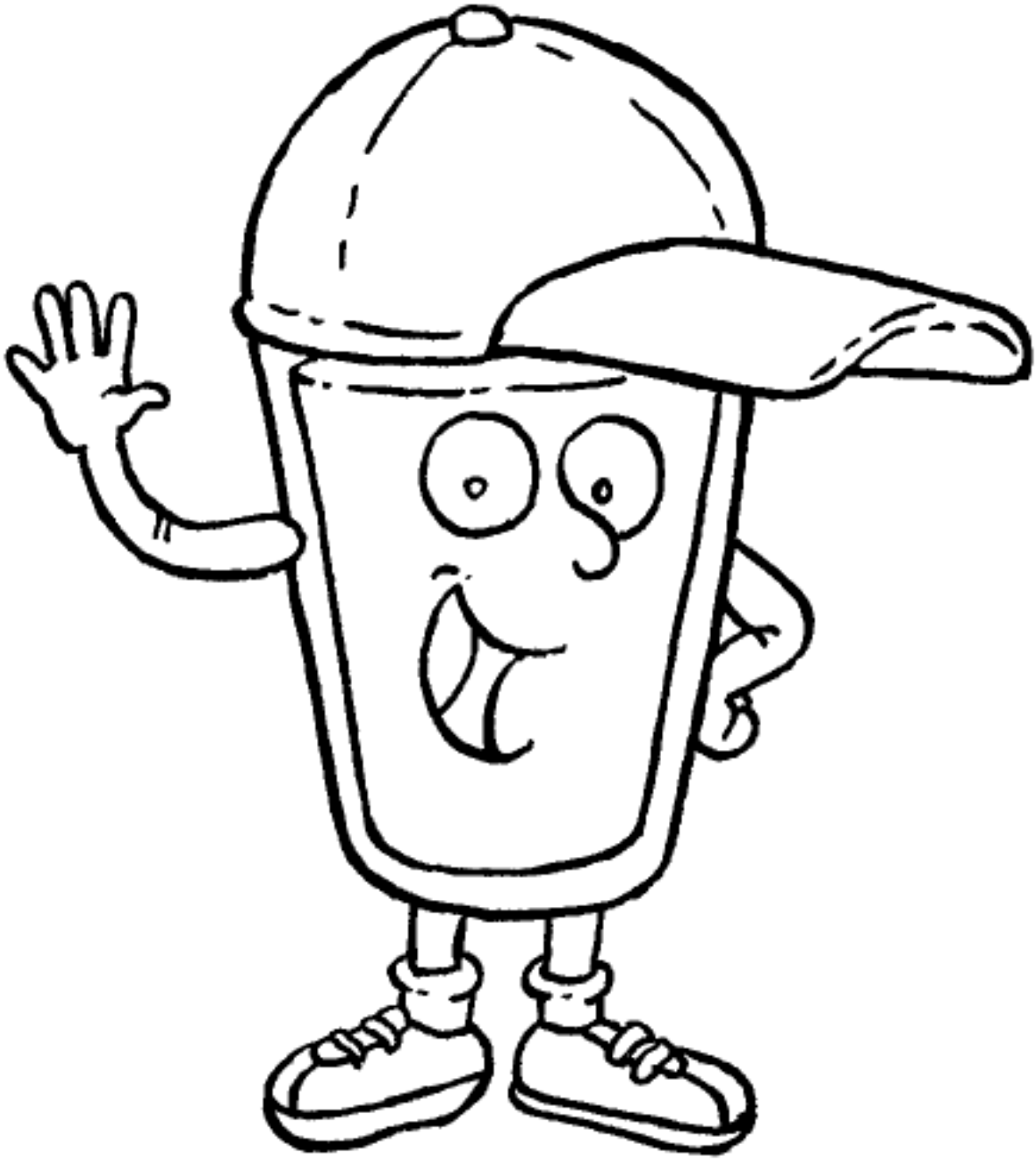
Thirstin's Wacky WATER Adventure



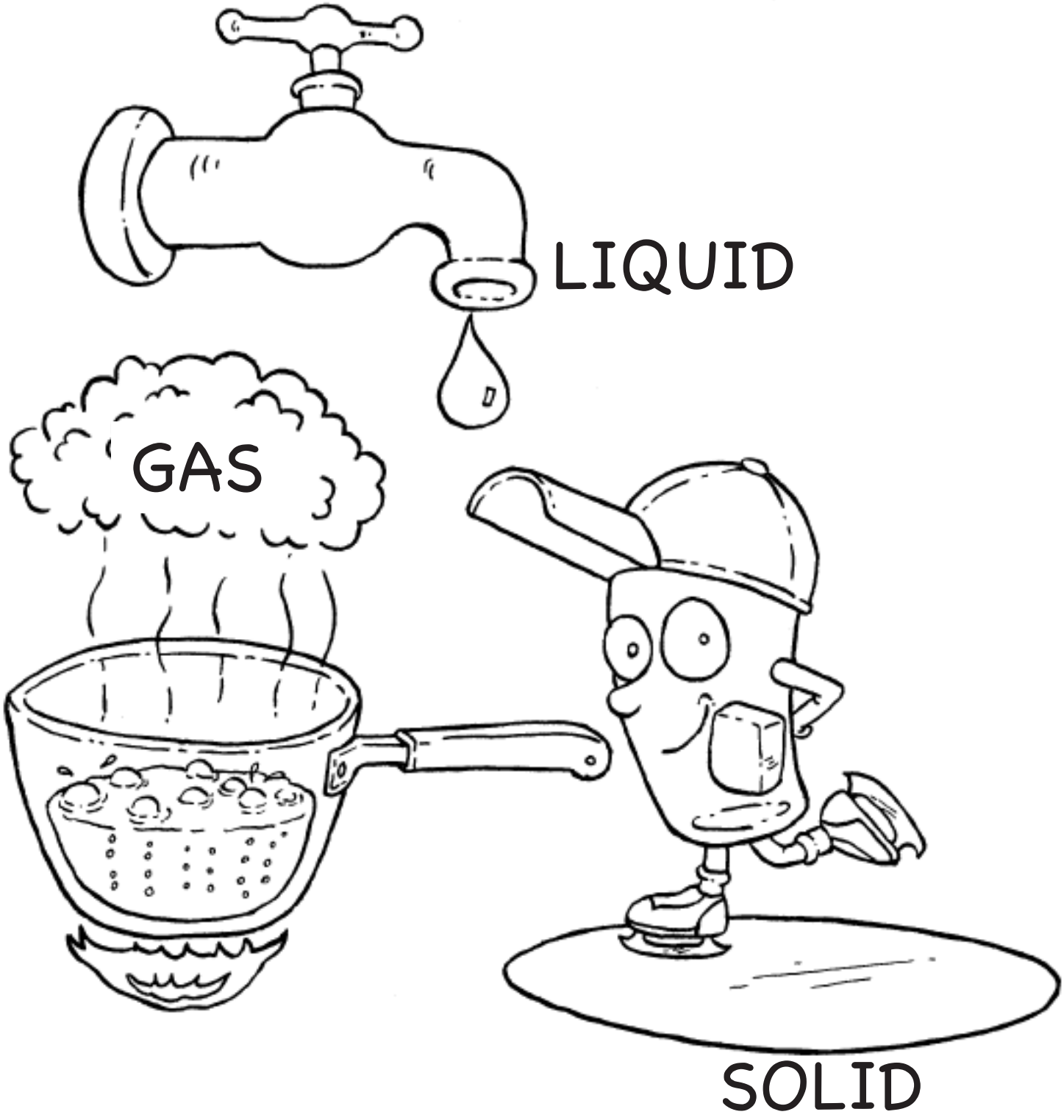
Office of Water (4606M) • EPA 816-K-04-002 • 06/2004 • www.epa.gov/safewater

Hello, my name is Thirstin. I am here to talk about protecting and conserving DRINKING WATER.

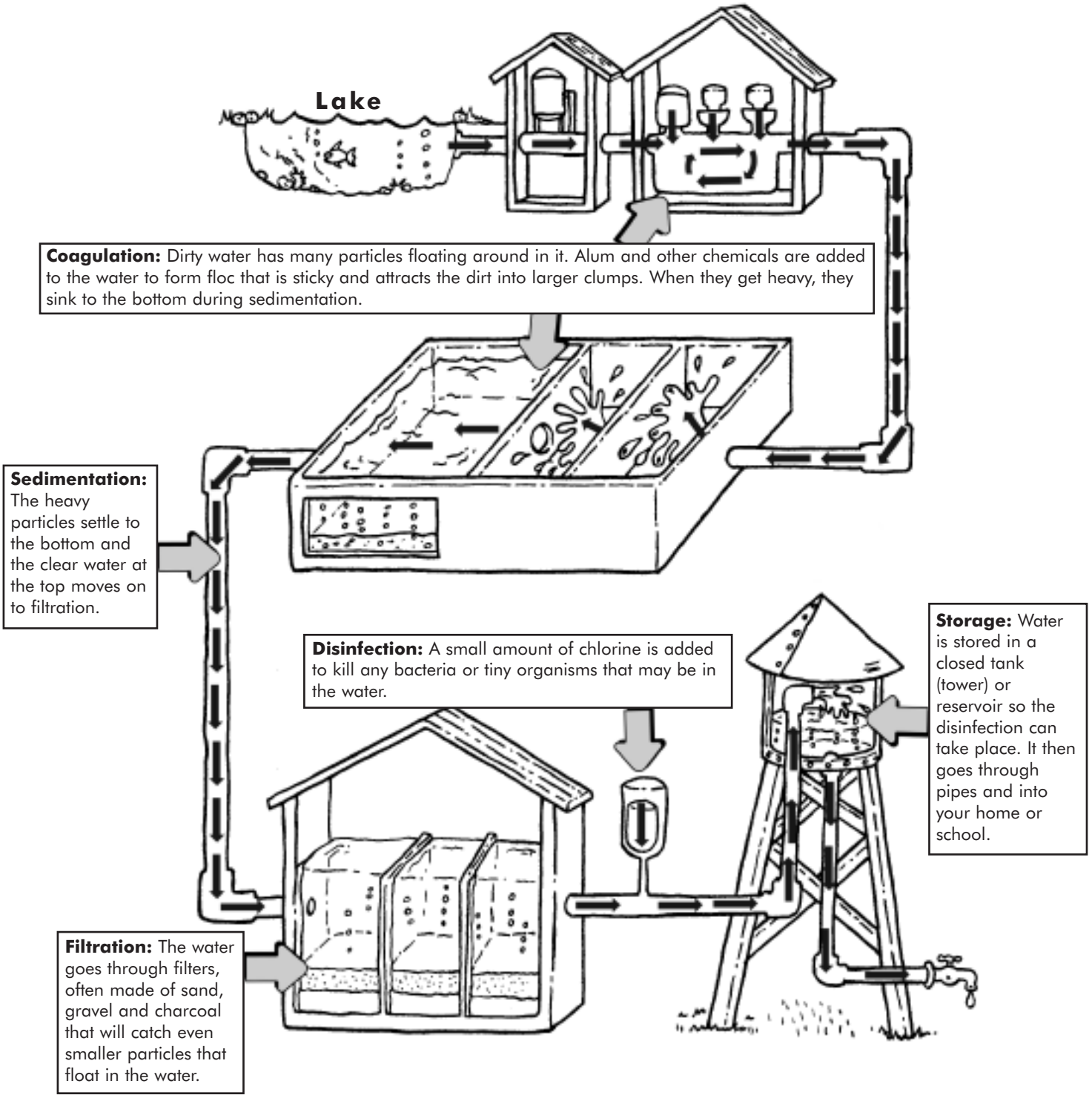
Follow me and I'll show you some fun facts and activities about water.



Water comes in three different forms:



Water can get dirty, so before we can drink it, it must be clean. Water is cleaned at a Treatment Plant and then sent to our homes through pipes.



P M A E R T S B G T

X O B F L A K E H R

W T L I D J O Q T E

P A X L L L E W L A

I N T T U G V P U T

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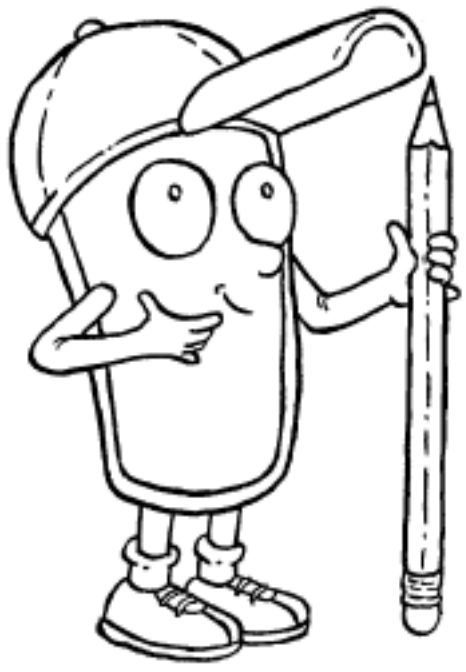
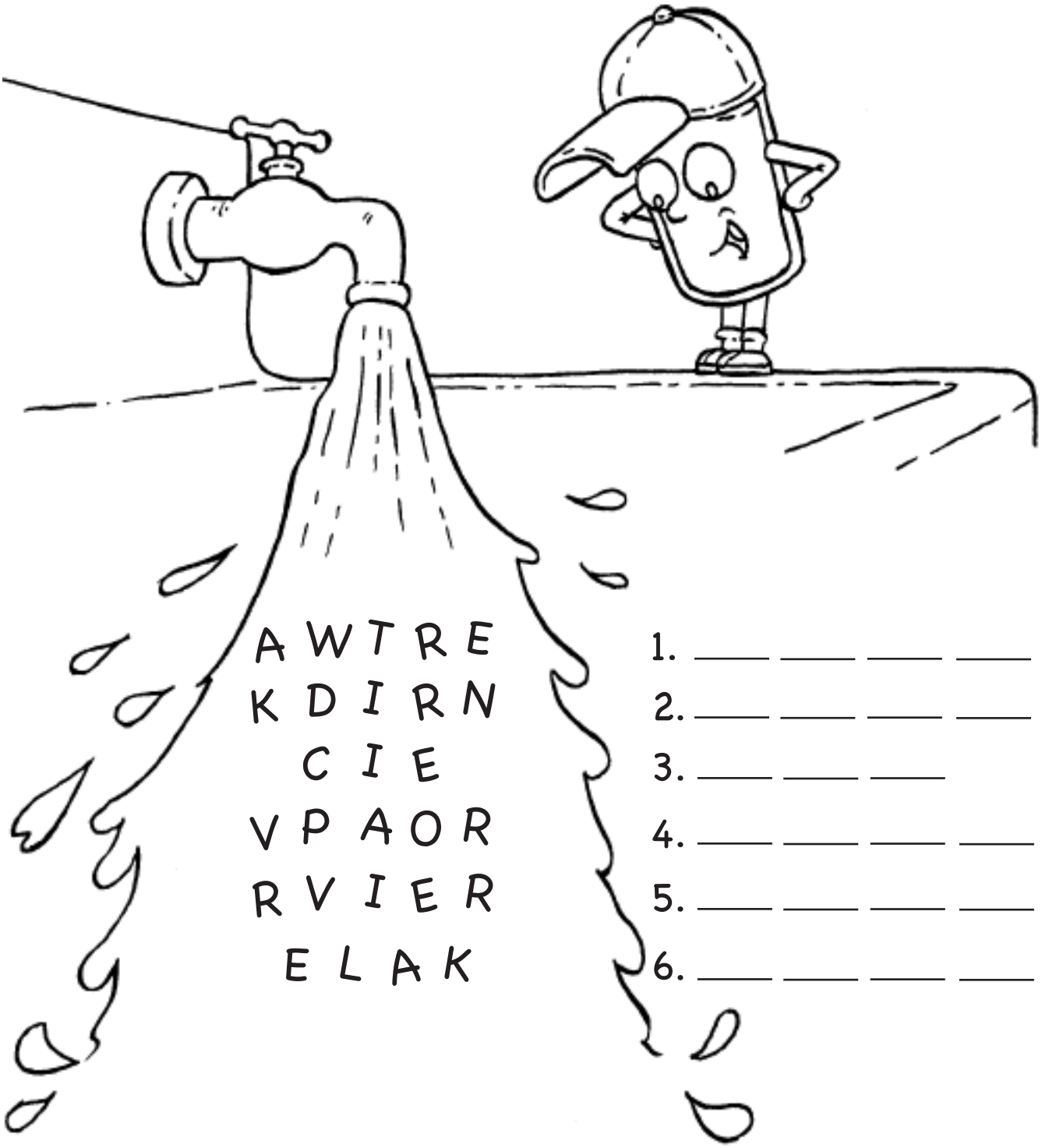
N E F A S K W A N T



Find and circle these words:

STREAM	WELL
FILTER	TREATMENT
PIPES	TANK
SAFE	POLLUTION
WATER	LAKE

Unscramble the letters:



A W T R E

K D I R N

C I E

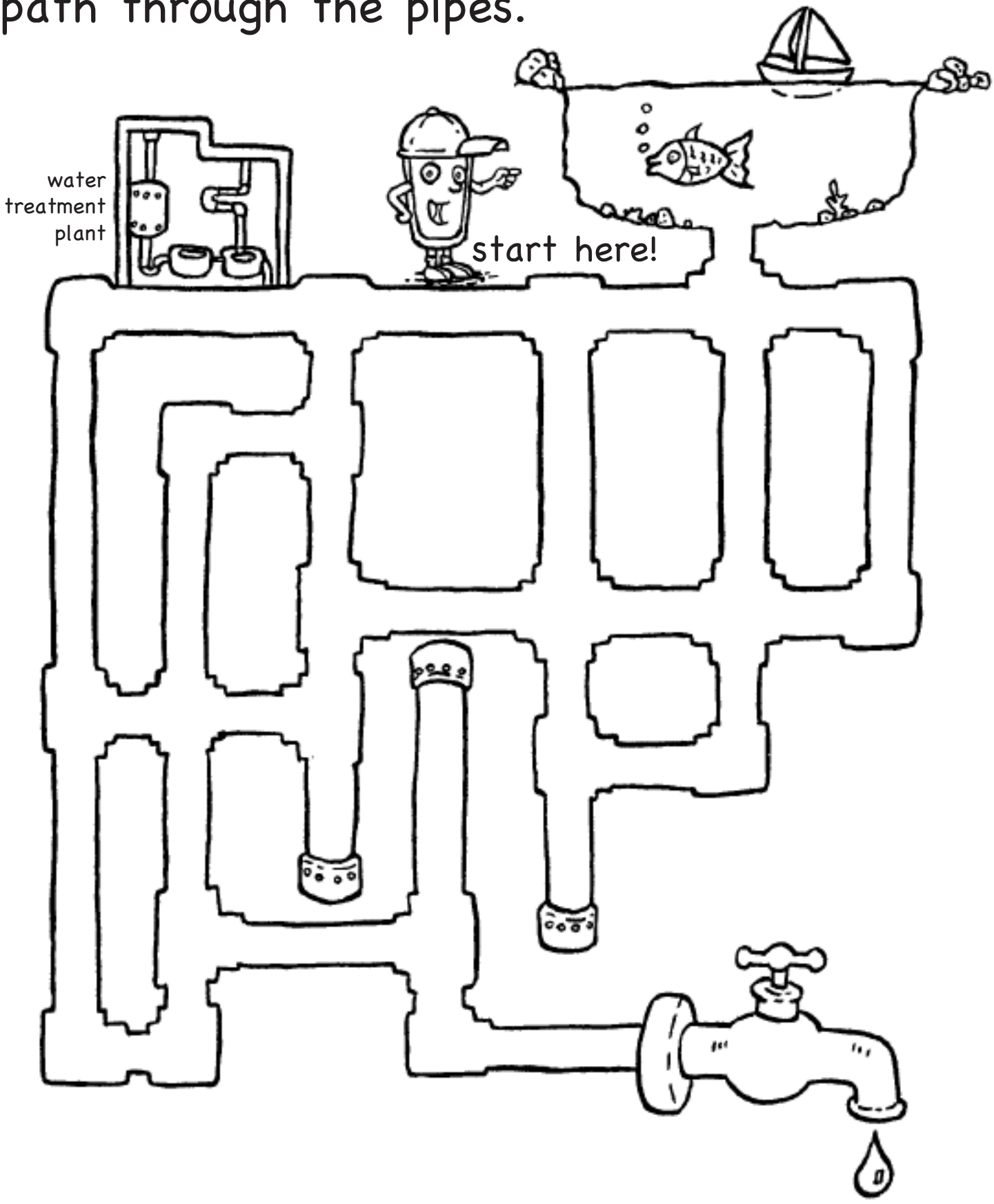
V P A O R

R V I E R

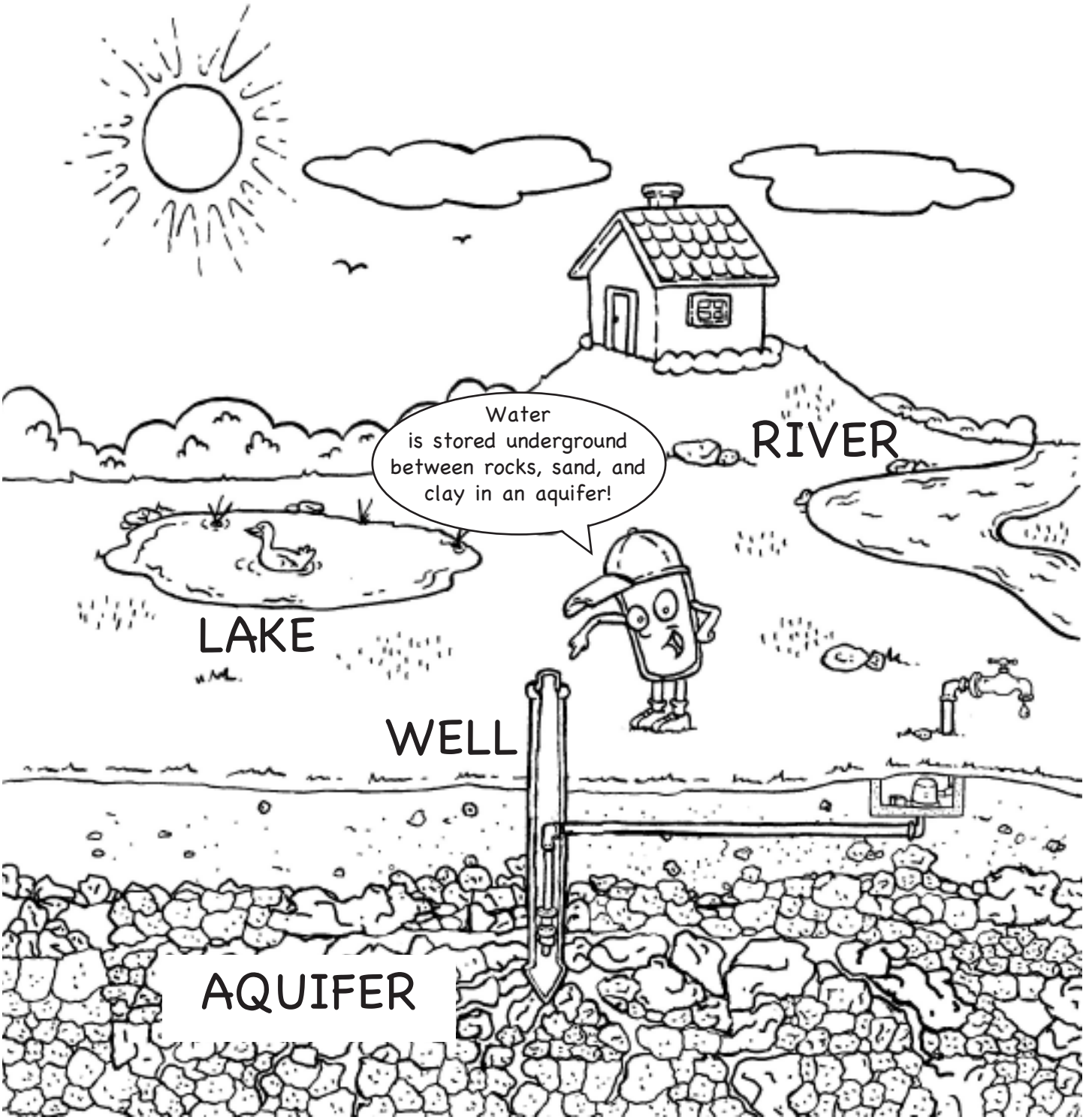
E L A K

1. ____ ____ ____ ____ ____
2. ____ ____ ____ ____ ____
3. ____ ____ ____
4. ____ ____ ____ ____ ____
5. ____ ____ ____ ____ ____
6. ____ ____ ____ ____

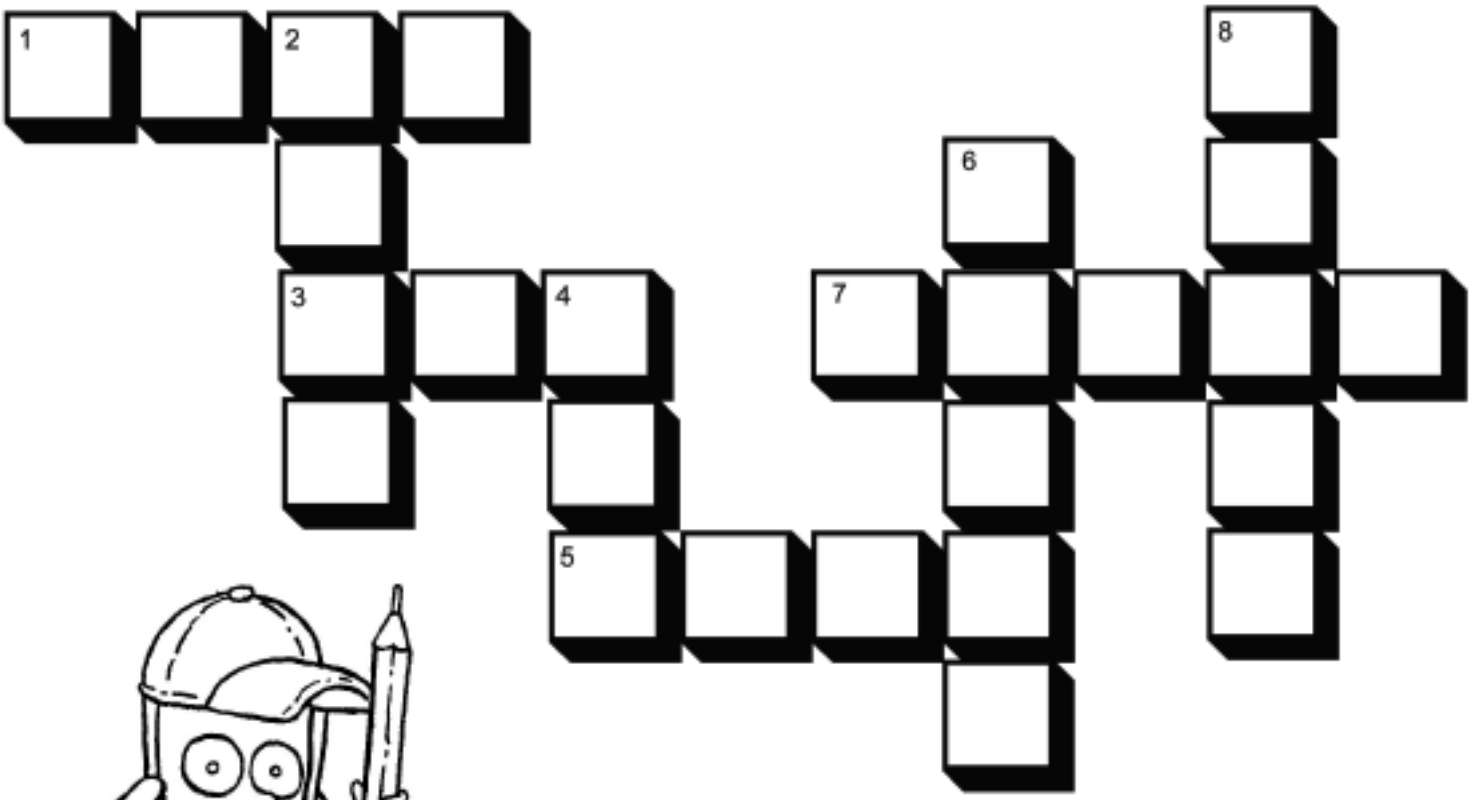
Help the water find its way from the lake to your faucet by following the correct path through the pipes.



Drinking water comes from lakes, rivers, streams, or under the ground (ground water).



Complete the crossword puzzle to test your knowledge of water.



ACROSS

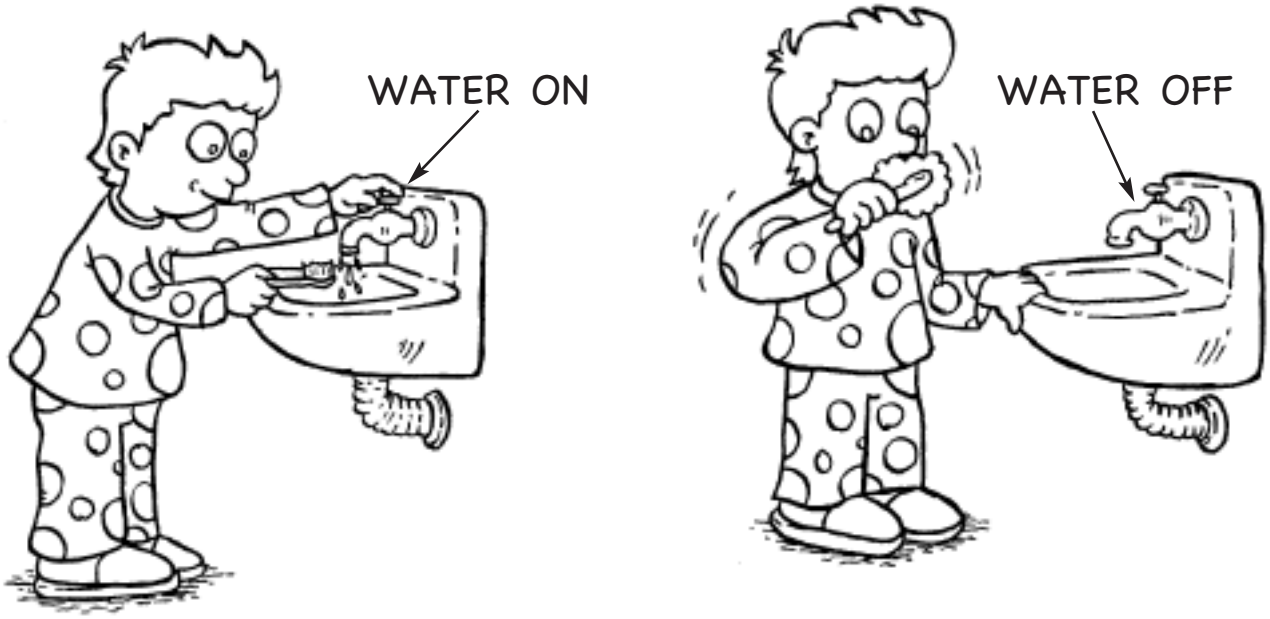
1. Always _____ your hands before dinner.
3. Add this to water to make it cold.
5. Big body of water.
7. If you have a leaky faucet, get it _____.

DOWN

2. People go to the beach to _____.
4. Snake-like fish.
6. Water travels through these.
8. When you boil water, _____ rises out of the pan.

Because we need water to live, it is important to conserve as much water as we can. You can help by:

turning off the water when you're not using it, and . . .



telling an adult when you see a leak.

WATER TRIVIA!

Fun Facts About Water . . .

1. How much water does it take to cook a Hamburger?
   Approximately one gallon.

2. How long can a person live without food?
   More than a month.

3. How long can a person live without water?
   Approximately one week, depending upon conditions.

4. How much water is used to flush a toilet?
   2-7 gallons.

5. How much water is used to brush your teeth?
   2 gallons.

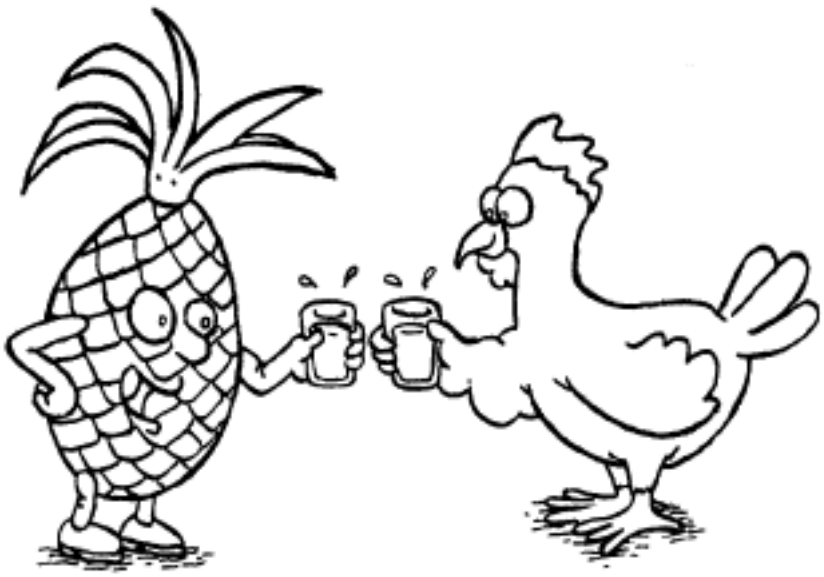
6. How much water does an individual use daily?
   50 gallons.

7. How much of a chicken is water?
   75%

8. How much of a pineapple is water?
   80%

9. How much of an elephant is water?
   70%

10. How much of an ear of corn is water?
    80%



REMEMBER!

Your help is needed to keep drinking water clean!

Keep rivers, lakes and streams free of trash!

Never allow oil or gasoline to be poured on the ground!

Make a list below of other things you can do to help:

_____ _____

_____ _____

_____ _____

_____ _____

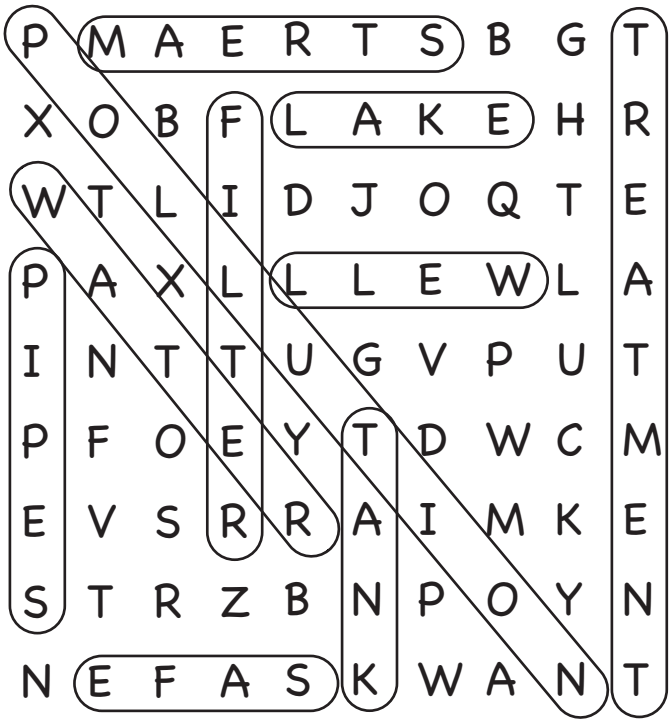
FOR MORE INFORMATION AND ACTIVITIES, VISIT OUR WEBSITE AT:

www.epa.gov/safewater

Click on Kid's Stuff and submit an art project!

GAME ANSWERS

Word Search Game



Word Scramble Game

1. WATER
2. DRINK
3. ICE
4. VAPOR
5. RIVER
6. LAKE

Crosswords Game

ACROSS	DOWN
1. WASH	2. SWIM
3. ICE	4. EEL
5. LAKE	6. PIPES
7. FIXED	8. STEAM

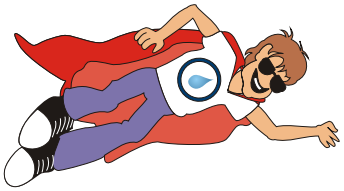
Oil & Water

Please Don't Mix!

WHEN IT RAINS
IT DRAINS

Leaves don't belong in the stormdrain

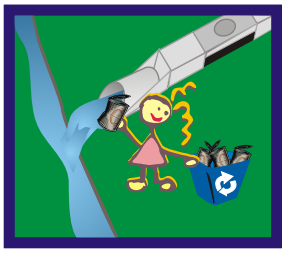
GIVE WATER A HAND



I'm a

CLEAN WATER ACTION HERO

MAKE A SPLASH



CLEAN UP YOUR TRASH

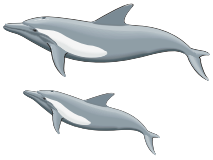
Junk from the Gutter

Makes us Sputter

Clean Water

I Can Help!

Please Don't Pour

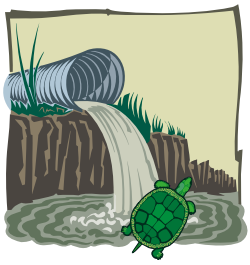


That's Our Front Door

Muck! Yuck!

Sad Duck

DIRT IN THE DRAIN



TURTLES COMPLAIN

Wave of the Future!

Will We Swim In It?

Appendix 5: Stormdrain marking information

1. Round drain marker “Only rain down the stormdrain”
2. Door hanger
3. Proposal to Skagway City Council requesting permission to mark drains