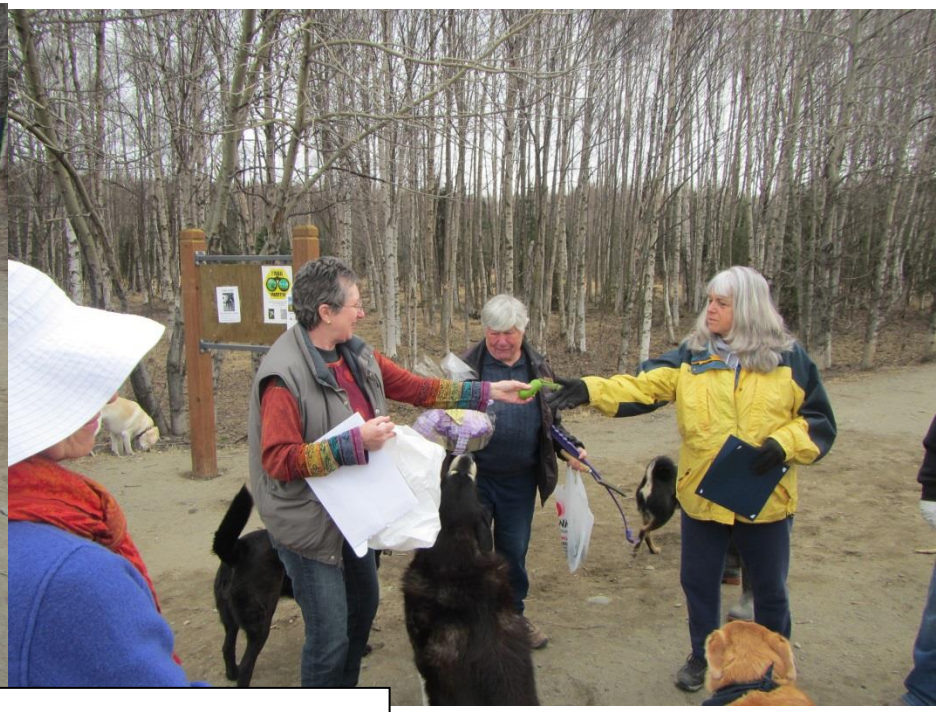
2014 Scoop the Poop Calendar

MONTH	Date	Event Name	Time	Location
January	1/25/2014	Hogs and Dawgs	noon - 4 pm	Harley dealer
February	2/1/2014	Pet New Year	11 am - 3 pm	Alaska Mill & Feed
March	3/10/2014	STP Meeting	1 pm - 3 pm	BP Energy
April	4/26/2014	Earth Day-Scoop the Poop Day	11 am - 3 pm	University Dog Park & Connors Bog
May	5/9/2014	Salmon Release	10 am - 2 pm	Potter Marsh
	5/17/2014	AWC Creek Cleanup Celebration	noon - 4 pm	Cuddy Park
June	6/28/2014	Pawstice	noon - 2 pm	Ruth Arcand Park
July	7/26/2014	Friends of Pets Dog Jog	9 am - 2 pm	Service High
August	8/2/2014	Pet Day at Spenard Farmers	9 am - 2 pm	Spenard
	8/16/2014	Dog Daze of Summer	12 pm - 4 pm	Peratrovich Park
September	9/6/2014	Alaska Botanical Garden Harvest Festival	10 am - 4 pm	ABG
Cancelled	9/27/2014	Pet Expo	10 am - 6 pm	Sullivan
October				
November				
December				



SCOOP THE POOP DAY 4-26-14

http://www.ktva.com/you-have-poop-on-your-shoes/

By KTVA Charlo Greene Alaska 8:16 PM January 22, 2014

ANCHORAGE – If Nicole Churchill is going anywhere, she'll be walking to her destination. Thanks to what she calls unkind or oblivious drivers, she said she ends many commutes soaked with brownish water that pools along roadsides during breakup periods.

"They splash water all over you," Churchill said. "I know I was walking in the store the other day and I was soaking wet from head to toe."

That dingy water can be dangerous, according to Anchorage Waterways Council Executive Director Cherie Northon.

"They're chemical contaminants, there are bacterial and viral and all sorts of nasty things," Northon said.

Beyond being an inconvenience, Northon said, getting splashed with that water can pose major health risks.

"There's several different types of bacterias that we pull out in our water sampling and some of them are streptococcus, things that cause giardia," Northon said.

Over the course of a winter, trash, oil, anti-freeze and other chemicals leaked from vehicles, such as de-icing agents that include everything from chloride to urine-based products, find their way into snow that melts into street slush.

"One of our biggest problems has to do with animal, pet waste, people not picking up after their pets," Northon said. We figure there are probably 20 tons of animal waste a day deposited in Anchorage."

Pet owner Evan Lomeli said he sees the animal waste left in the snow every time he takes his dogs to the dog park.

"Some owners are better than others at picking up after their dogs," Lomeli said. "If you walk around now, especially with the thaw, all the leftover dog poop is beginning to poke out now."

Northon said it comes from dogs, cats, beavers, geese, moose, you name it — traces of animal feces can be found just about everywhere, including in street slush.

The areas with the most contaminated water include parking lots and areas pets frequent to relieve themselves like trail heads or dog parks, she said.

Unfortunately, Northon said, chances are you've already tracked this stuff into your car or home.

"That's where your pets are going out right after breakup and they're running through that and coming back and tracking it into your car," she said.

To reduce the risk of getting sick in the future, Northon suggests minding where kid shoes and pet paws travel.

Like Ashley Huhndrof does with her dog Haru.

"I wipe off his paws really well, and sometimes if it's really gross … and muddy I get a wet wash cloth that's warm," Huhndrof said.

Northon suggests people take off any clothing that comes in contact with the sullied water, but for people like Churchill who commute on foot, that isn't always an option.

"I can't just run home, so basically I just have to deal with it for the rest of the day," Churchill said. "It's horrible."

Churchill hopes drivers will be more mindful of those on foot before breakup season arrives in the spring.

Picking Up the Poop in Anchorage

By Dave Waldron, APRN - Anchorage | March 3, 2014 - 10:22 am

Dog walkers enjoy one of Anchorage's Dog Parks.

Click for the full audio story:

VmP

Today we're picking up after our dogs. Yes, today's topic is dog poop. Not the most glamorous subject, but one that inspires a lot of angst that Cherie Northon hears about all the time.

"It's a very contentious issue because we get a lot of complaints. Some people will just call me up and say, 'what's the hottest topic?' Dog poop."

Northon is the Executive Director of the Anchorage Waterways Council. She says she get's phone calls and e-mails every day from Anchorage residents complaining about people not picking up their dog droppings.

"One gentleman called me a couple years ago complaining about Ship Creek. He said 'why can't we put a person in every park to write tickets?' That's 200 and some odd people. That isn't realistic."

But Northon says something does need to be done. Surveys indicate that there are roughly 70,000 dogs in the Anchorage area, producing 10 tons of waste per day. And irresponsible dog owners are creating a major problem.

"All of our creeks in Anchorage, except for one, have fecal coliform impairments. Which means they're on the EPA's impairment list for fecal coliform."

Cherie Northon poses near one of the posted warning signs.

That's because Anchorage's storm water runoff, basically all of the water on the ground, eventually ends up in our creeks.

"So it doesn't matter if it's a cigarette butt or dog poop, it goes down the storm drain and goes untreated into the creeks. And a lot of people think it goes into the waste treatment plant, but that's just for buildings."

Northon says thankfully, Fish and Game studies haven't found that fecal coliform is harming our fish, but that doesn't mean it can't harm humans. She uses Campbell Creek as an example.

"There's a little beach there, and little kids splash around and play in the sand. And you know toddlers, they may not take a glass of it and drink it, but they splash in it and it's on their hands. You could get Giardia or round worms depending on how bad the situation is."

As far as which spots are problem areas, Northon says dog parks are on the top of the list. Parks like University Lake, which is where we've met today. She says the high concentration of dogs, and the fact they're mostly off leash can be a nasty combination.

"When they're off leash the owner isn't paying 100 percent attention to what their dog is doing. As opposed to when they're on leash, you know when your dog poops, and it's easy to pick up."

The passer bys I did ask about the dog poop problem didn't seem to think there was one. One walker didn't want to be identified, but she did say people take good care of the park.

"People usually pick up pretty well; more when there's no snow of course. But that's why they have the spring clean up days, because a lot of times in the winter it's hard to see where they go when it's snowing. But people do come down and participate in the doggy clean up days," said one dog walker.

Northon says the clean up days do help. And there are some dog owners that go above and beyond to keep the parks clean. Like the people who stock grocery bags at the trail entrances.

"This is someone's trash bags they're bringing here. They're grocery bags; Wal-Mart bags, Fred Meyer bags, vegetable bags. We see bags of poop in the trash can. That's great."

But Northon says extra bags and a few clean up days a year just isn't enough. Her waterway council tries to combat the problem by handing out flyers, and posting signs. Signs that read "be a responsible pet owner, clean up after you pet" and "dog feces fine, 75 dollars." She says even those aren't very effective though, as they are rarely enforced. In order to get an owner fined, someone has to get visual proof of the culprit, and then submit that proof to animal care and control. And getting proof isn't always easy.

"People just drive up to parks and let their dogs do stealth poops. You can take their license number and turn them in, and then they'll usually say 'ok you caught me'."

But for most people, that's just too much work. Northon says nobody wants to be the poop police. Not even her.

"I have a chronic problem in my neighborhood of a fellow who goes across the street with his three dogs by Campbell Creek. He goes about within 20 feet of the creek and lets them poop. And he just stands there with his hands crossed and then walks back to his house."

I asked her if she'd like to mention him by name.

"I don't know his name, but I know what kind of dogs he has, a German shepherd and two Shelties. And he's well known. Even people at Fish and Game know about him, but nobody's been able to stop him," Norton said with a laugh.

Northon doesn't want to sound like a dog hater. She has three of her own, and has lived with dogs her entire life. But Northon says dog negligence needs to stop.

"I don't understand the mentality. It wrecks the creeks, it wrecks the environment, it's unhealthy. It's just gross, and rude."

Alaska Dispatch News

Published on *Alaska Dispatch News* (http://www.adn.com)

April 3, 2014
Main Image Credit:
Main Image Caption:

Ms. Barret's account of Storck Park being impacted by inconsiderate pet owners is, unfortunately, the story of many parks, trails, schoolyards and sidewalks. Anchorage Waterways Council, which oversees the Scoop the Poop program, receives several calls and emails every week about this problem from various parts of town.

In the past six months we have located and mapped over 100 pet waste stations (Mutt Mitts) in the municipality which are funded mostly by the muni to provide pet owners with a solution in case they "forget" their bag. These bags are not inexpensive, and the Parks and Rec crews diligently restock the stations and empty the trash cans. We all need to do our part and get the poop picked up. If not, it sullies trails, sidewalks, fields, and eventually will wash into our waterways.

Yes, with breakup, rain and yard irrigation, pet feces end up in our beautiful creeks as well as those puddles that might splash on you. Take the responsibility that goes with owning a pet — clean up after it!

— *Cherie Northon*

executive director,

Anchorage Waterways Council

Poop picker-upper leads the way in Connors Bog dog park clean-up

Sean Doogan | April 26, 2014

Loren Holmes photo

A local woman was honored by a crowd of people and pets at an Anchorage dog park on Saturday. Tish Kippenhan was presented with a certificate of appreciation – signed by Anchorage Mayor Dan Sullivan – and some dog goodies at the annual Scoop the Poop event. A humble woman, Kippenhan took the honor in stride. Moments later, she was walking through the dog park, picking up poop that had been left behind by careless dog owners. It's a ritual Trish has been doing daily for 34 years. Kippenhan's own dog, a 5-year-old black lab mix named Char, walked slowly behind as the 80-something woman continued her search for unscooped poop.

Anchorage has a lot of dogs – an estimated 74,000 of them, according to the American Veterinary Medical

Association. They lay down a lot of feces – about 8 million pounds per year. That's some 11 tons of poop a day – about the heft of an unloaded school bus. Each year, as the spring sunshine melts Anchorage's snow, the changing season uncovers the dog poop laid down during winter. And each year, a dedicated group of volunteers and dog owners gather to clean it up.

The Anchorage Scoop the Poop Committee, led by the Anchorage Waterways Council, sponsors the annual clean-up at several dog parks in Anchorage. And while the event helps to make the parks clean for a while, more poop inevitably arrives. People like Kippenhan work to keep the park clean, but the dog park supporters hope that Kippenhan will some day be able to retire the rusty gardening spade and bucket she uses. The Scoop the Poop Committee works hard to educate Anchorage about the dangers of unscooped poop. It contains fecal coliform bacteria – which leaches into puddles, streams, and lakes and can cause disease in animals and people. It is difficult to tell if the effort is working – there is almost no way to measure the amount of dog droppings left behind or picked up across town each year. But people like Trish Kippenhan are making a difference in the cleanliness of local dog parks. Kippenhan, though, might describe her efforts in a more understated way.

"I just walk the dog (Char) and pick up the poop," Kippenhan said. "What else is there to do but maybe throw the ball?" she asked.

Diane Lesko has been following Kippenhan to the Connors Bog Dog Park – a 68-acre lot of trails and bog that includes a large lake where a local woman watches over a family of loons that nest there most years. Connors Bog is just one of six designated off-leash dog parks in Anchorage, but because of the nearby loons, it gets much of the attention when it comes to unpicked poop. Lesko said she admires Kippenhan's dedication to keeping the park clean, but worries that others aren't doing their fair share.

"The trouble is people say, ' Well she (Kippenhan) is doing it, so I don't have to pick up after my own dog,'" Lesko said. "People that use the dog parks need to realize that it is a privilege, not a right."

Whether other dog park users get the message or not, Kippenhan remains dedicated to picking up after others.

"It can be 20 below, and you will see her here, with a red, cold face, working to pick up poop," Scoop the Poop member Christine Cikan said.

Contact Sean Doogan at sean(at)alaskadispatch.com

Certificate of Appreciation of

Tish Kippenhan

For your daily trips to our local dog parks, picking up endless piles of dog feces, in our community effort in keeping our local creeks and lakes preserved, you are hereby recognized as our

Scoop The Poop Queen

And I join the Anchorage Waterways Council and all local residents in thanking you for your valued service.

Dan Sullivan

Mayor
Municipality of Anchorage

April, 2014

Anchorage has an estimated 65,000 dogs eliminating approximately 3/4 pounds of waste per dog, per day. That adds up to more than 20 tons of waste produced every day. A significant amount of that fecal matter is deposited into parks, common areas, school yards, and neighborhoods, and is left to break down and run off into our local water bodies – untreated!

The Committee's goal is to educate pet owners about reducing this type of pollution by "scooping the poop" and disposing of it properly.

Go to www.scoopthepoop.org for a list of over 100 poop stations around the city and see a map of their locations. While you're there, check out our STP Public Service Announcements.

OUR MISSION

The Scoop the Poop committee is a collaborative effort, facilitated by the Anchorage Waterways Council, to reduce fecal coliform counts in Anchorage waterways by encouraging the responsible pet ownership practice of picking up after your pets.

COMMITTEE MEMBERS

Anchorage Waterways Council
MOA Parks and Recreation
Anchorage Animal Care & Control Center
BLM Campbell Tract
Alaska Department of Environmental Conservation
MOA Watershed Management Services
Alaska SPCA
Friends of Pets
Alyeska Canine Trainers
Anchorage Unleashed
Kitty K-9 Connection
Drool Central
Alaska Dog Sports
Cooperative Extension Service

FOR MORE INFORMATION, CHECK OUT OUR WEBSITE:

www.scoopthepoop.org

SCOOP THE POOP Anchorage, AK

IT'S YOUR DOOTY!

SCOOPING: IT'S THE LAW

When it comes to poop, it's the law within the Municipality of Anchorage (Girdwood to Eklutna) to pick up after your pet. If you violate the law, you could be fined $100 for each occurrence, and residents can also be fined if pet waste builds up in yards.

E. COLI AND ROUNDWORM

All animal waste is filled with many kinds of bacteria, including *E.coli.* *E.coli* can be the source of many different illnesses from sore throats to diarrhea. You can get this from water polluted with dog waste. Roundworms are microscopic parasitic organisms that can live in the small intestines of dogs. The eggs are passed into the feces, and they then take two weeks to become infective. Old poop becomes a health risk. It's important to pick it up right away!

WHY SHOULD I PICK IT UP NOW?

In the springtime, rainwater and melting snow may wash away the feces, but where does it go? It goes into Anchorage's creeks, streams, and lakes, causing pollution and noxious odors. Before the feces wash away, it is unpleasant to look at and smell. It also poses a hazard that people can step in or slip in.

WHAT CAN I DO?

First, be a responsible pet owner and clean up after your pet, whether it's in your yard, on a local trail, or at one of our off-leash dog parks. Second, encourage your neighbors and other pet owners to Scoop the Poop! And finally, consider sponsoring a Poop Station for a trail head or park near you! **If we all pitch in, Anchorage will become a cleaner and healthier place to live!**

HOW TO PICK UP POOP:

Keep bags handy in your car, purse or pocket. You can use grocery bags, newspaper wrappers or commercial poop scooping supplies.

Step 1 - Place bag over hand like a glove.

Step 2 - Pick up poop.

Step 3 - Reverse bag.

Step 4 - Tie bag and throw away in a trash.

THE POOP CYCLE

So scoop your dog's poop!

ANCHORAGE WATERWAYS COUNCIL

P.O. Box 241774 • Anchorage, Alaska 99524-1774 • 907 272-7335 • anchoragecreeks.org

June 19, 2014

Adam Robinson
c/o Alpine Apartments
5215 Mockingbird
Anchorage, AK 99507

Dear Adam,

Thank you for your interest in helping to control pet waste at the Alpine Apartments. Enclosed you will find 150 Scoop the Poop brochures and 150 door hanger cards for your use. Please let us know if it helps and if you need more.

Sincerely,

Cherie Northon, Ph.D.
Executive Director

Alaska Dispatch News

Published on *Alaska Dispatch News* (http://www.adn.com)

Jeff Lowenfels
January 23, 2015

Where was the snow last week? I actually found myself wandering around the yard last weekend, visiting the summer greenhouse, checking on my tool friends in the shed just in case I need a dandelion tool next weekend, and starting the mower, just for kicks. I mean, who expects hoodie weather and visible lawn in the middle of January? Not this Alaska gardener.

As far as I am concerned, it's pretty hard to concentrate on things winter when there is so much lawn showing. Our entire backyard is exposed as I write this and fortunately, despite being frozen, the grass appears green. I feel like I am in Seattle, not Anchorage.

This fall's leaves are still where I left them, in beds around the trees and shrubs doing their mulch thing. They are starting to unfreeze, dislodge and with the hard, warm Chinook winds, blow around a bit. I started the mower to be sure I could, just in case I have to go out there and mulch them up again -- wishful thinking on my part, I know.

Things are great in the backyard greenhouse. I had to take my sweatshirt off, in fact, as it was pretty warm in there. Of course, outdoor greenhouses can be eerie places this time of year, without plants; the skeletons of Brandywines, Black Krims and Oregon Springs haunt the place. One still had a few fruits, and one of those was covered with the most amazing, thick, white, foamy fungal colony I have seen since, well, since last spring.

OK, I will admit it! I actually tried to stick my index finger into the soil of a couple of containers first in the greenhouse and then on the porch, just to see if it was thawed enough to plant a few sweet peas just for kicks. It wasn't, as some of you who also tried discovered. And of course, we should be thanking the stars for that, instead of feeling just a tad disappointed and wishing for even warmer weather to arrive so we can simple chuck this winter thing and get on with outdoor gardening.

My impulse was to even examine the buds on the birch tree by the back door, the one that I have come to rely on for my phenological observations regarding the arrival of spring, leaves the size of squirrel's ear and all that planting out stuff. Is it my imagination that suggests they actually have started to swell a bit and could pop out way earlier than normal?

Of course, I could not help looking for dandelions in the now visible, green lawn. They were there in spades when I put the lawn to bed, but for the life of me, I couldn't find any signs of the plants. For just a moment, I wanted to call my neighbor over so we could stand there and congratulate ourselves for the purity of our lawns, even though we both know the dandelion roots are safely tucked away. Plants will come back when spring finally and truly does arrive, and most probably with an unbelievable vengeance that will require us to redouble our failing eradication efforts.

I have to say, I was happy to have my faithful hound, Gracie, patrolling the grounds as I pretended it was spring. We live in an area where we worry about bears, and if this gardener is wandering around looking for some sort of confirmation that this really is early spring, then there

has to be a bear doing the same. How can they sleep when it is so warm outside? It feels like spring.

I don't know. Maybe it is a factor of not being able to ski or snowshoe or even safely ice-skate that causes the Alaska gardener's mind to play tricks. After all, this is Alaska and despite great advances in weather -- and with all our faith in Jackie Purcell for so many years -- our weather is not really predictable by any manner of man or beast, except for one simple fact: Spring never comes in January. Never. I have a feeling it will soon be time to get back to the catalogs.

Jeff's Alaska Garden Calendar

Fido cleanup: When there is little snow and warm weather, it is a good idea to get at those dog droppings.

Plantskydd: If you want to apply this wonderful moose repellent, warm weather periods are the only time to do so. This is sticky stuff and it is not fun to apply in the frigid cold.

Houseplants: Some, you will know which, will start to lean toward the light this time of year. Turn pots 1/4 turn every few days to prevent bending.

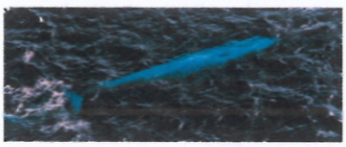
Pelargoniums: If you have any growing indoors, now is a good time to take cuttings. Let them callous over by exposing cuttings for 48 hours before inserting into damp sand or sandy soil mix.

Amaryllis: Get yours out of storage and water.

The Poop Pyramid

8,896 tons/year of dog poop in Anchorage

This annual amount of poop is the equivalent weight of ~60 blue whales (*Balaenoptera musculus*).

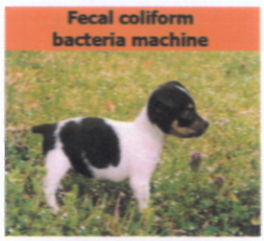


48,750 lbs. or 24+ tons

of dog poop produced by Anchorage pets EVERY DAY.

65,000

The estimated number of dogs in Anchorage.



3 Billion

Coliform bacteria in one average size pile of dog poop.

3/4 lbs.

Amount of poop produced daily by the average dog

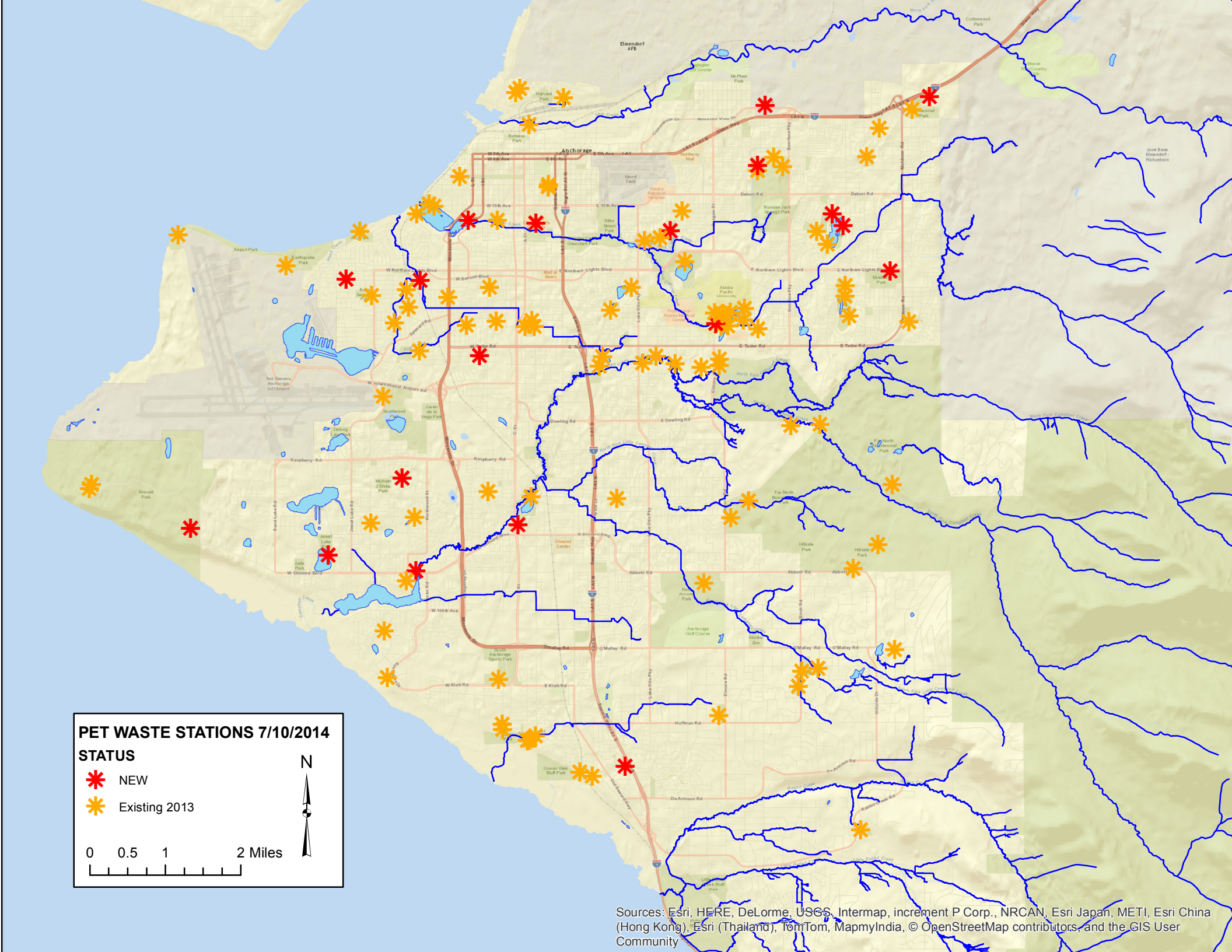
So, Scoop Your Poop and Save a Whale!
And your local waterways too!

ADEC ACWA FY 2014 Grant

"Evaluate Scoop-the-Poop Stations in Anchorage"

Sample of deliverables

1. Map of Pet Waste Stations 7/14
2. Sample inventory sheet for one station
3. Map showing location of the station
4. Map showing placement of rack card holders
5. Photo of rack card holder
6. List of rack card locations
7. Rack card


PET WASTE STATIONS 7/10/2014
STATUS
NEW
Existing 2013
N
0 0.5 1 2 Miles
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Westchester Lagoon Waterfowl Sanctuary

INFORMATION

Location – waterfowl sanctuary (Spenard Road, heading north-past West high school) hole 1, disc golf

Latitude/Longitude 61.2049, -149.9053

Pet Waste, Bag Dispenser (Type) – new Mutt Mitt station replaced old, unused one May 2014

Pet Waste Bags Stocked? – N/A

Condition of Pet Waste Station – new May 2014

Dispenser Accessibility – good

Dispenser Visibility – good

Trash Container – yes, round trash receptacle, secured to cement pad

Trash Container Condition – good

Cleanliness of area – clean

Trails – Campbell & Chester Trails

Watershed – Chester Creek

Park Adopted by – no sign

Station donated by – no sign

Rack Card Holder - yes

Maintained by –Municipality, south maintenance crew

See map for physical location

OBSERVATIONS

- lots of geese, people feeding them, people fishing
- people park cars here, as a starting point to ride bike trails

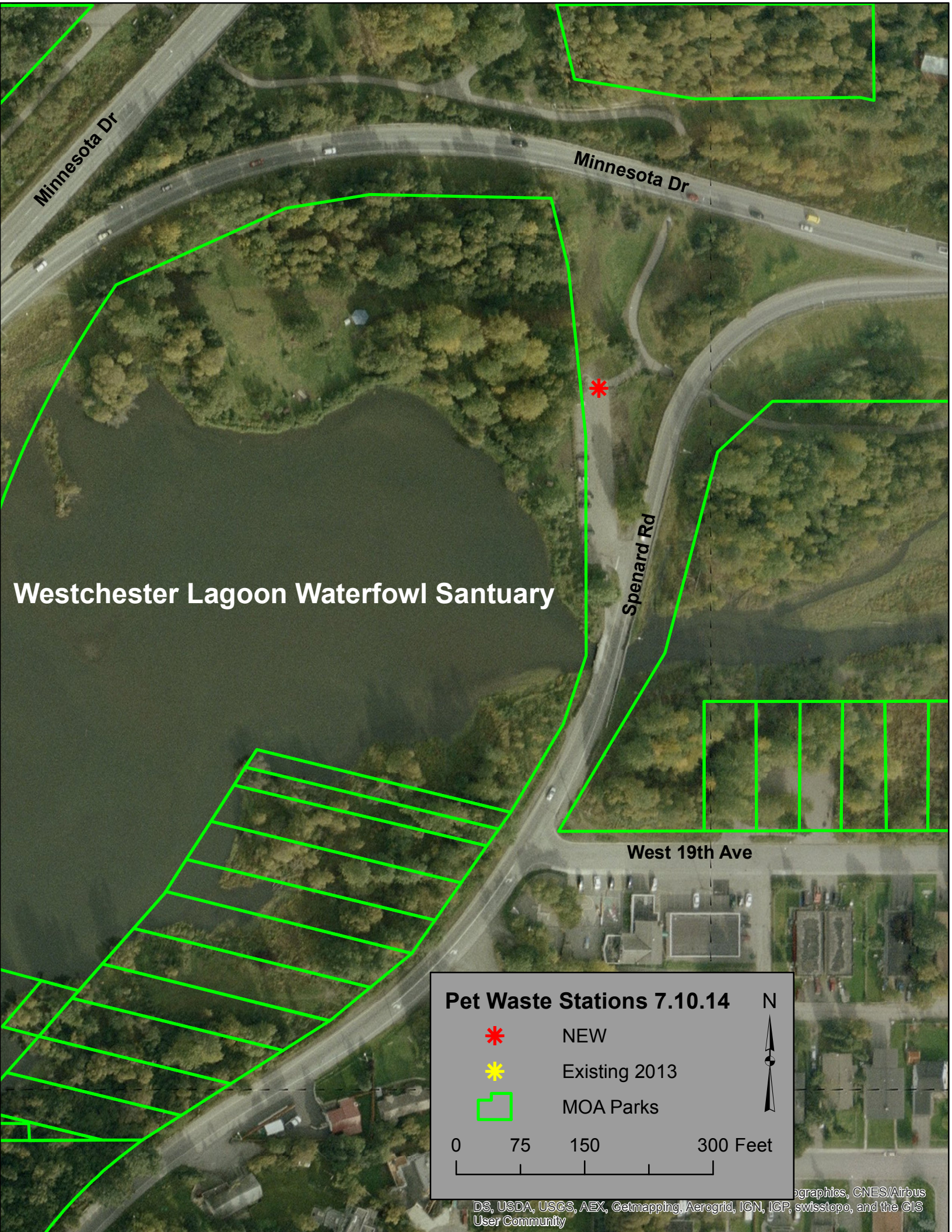
bike trail tunnels, Campbell & Chester intersections

RECOMMENDATIONS

- none

Surveyed by Anchorage Waterways Council
www.anchoragecreeks.org

Date of Surveys – July 28, 2013 & May 24, 2014


Minnesota Dr
Minnesota Dr
Spenard Rd
Westchester Lagoon Waterfowl Santuary
West 19th Ave
Pet Waste Stations 7.10.14
NEW
Existing 2013
MOA Parks
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75
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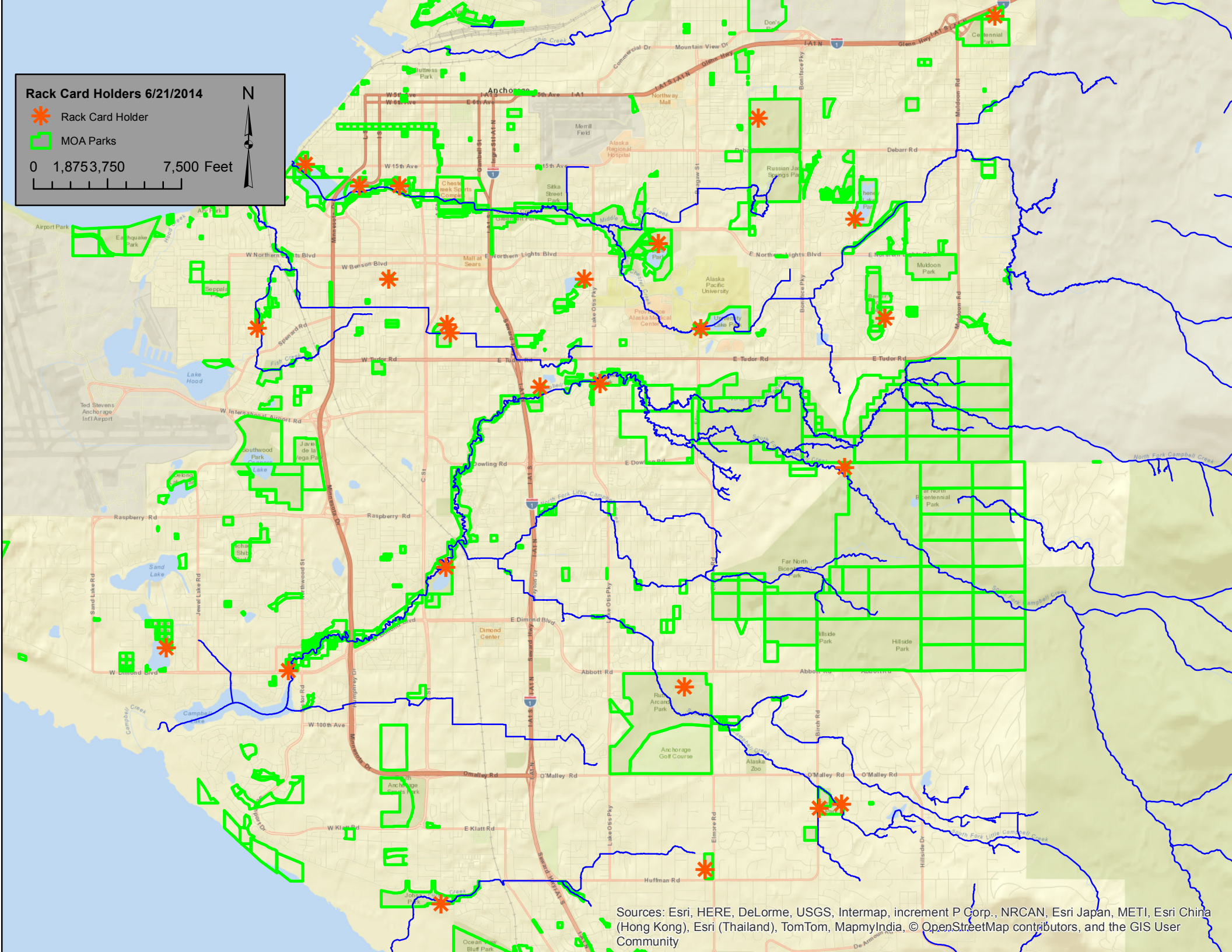
DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community


Rack Card Holders 6/21/2014
Rack Card Holder
MOA Parks
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Anchorage
Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

25. Westchester Lagoon Wildlife Sanctuary

	A	B	C	D	E	F
1		**PARK**	**Rack Install Date**	**Latitude**	**Longitude**	**Initial # of cards**
2	1	Arctic-Benson Dog Park	14-Jun-14	61.19198	-149.89689	40
3	2	Baxter Bog @ Lunar	14-Jun-14	61.18635	-149.75465	30
4	3	Campbell Airstrip Trailhead	14-Jun-14	61.16575	-149.76628	60
5	4	Campbell Creek Trail @ Shelikof	14-Jun-14	61.17695	-149.85356	20
6	5	Campbell Creek Trail, Lake Otis & 48th	13-Jun-14	61.17730	-149.83724	30
7	6	Campbell Greenbelt (Dimond/Victor)	15-Jun-14	61.13783	-149.92622	60
8	7	Carlson Park	13-Jun-14	61.19196	-149.84076	25
9	8	Centennial Park	14-Jun-14	61.22836	-149.72227	40
10	9	Cheney Lake Park	14-Jun-14	61.20028	-149.76292	50
11	10	Cuddy Park--East Parking Lot	13-Jun-14	61.18569	-149.88021	30
12	11	Cuddy Park--Playground	13-Jun-14	61.18452	-149.87945	30
13	12	Forsythe Park (no MMS)	15-Jun-14	61.11910	-149.76733	30
14	13	Forsythe Park at Birch	16-Jun-14	61.11878	-149.77375	50
15	14	Goose Lake	13-Jun-14	61.19693	-149.81949	25
16	15	Hillside at front Parking area	15-Jun-14	61.13806	-149.75325	50
17	16	Jewel Lake (picnic pavilion)	16-Jun-14	61.14089	-149.96104	60
18	17	Johns Park at Bree east of Playground	15-Jun-14	61.10568	-149.88152	40
19	18	Kiwanis Fish Creek Park	14-Jun-14	61.18532	-149.93481	30
20	19	Margaret Eagan Sullivan @ Westchester Lagoon	13-Jun-14	61.20804	-149.92082	50
21	20	Russian Jack Springs North (Cartee Fields)	14-Jun-14	61.21421	-149.79049	40
22	21	Ruth Arcand Park	16-Jun-14	61.13547	-149.81213	50
23	22	Taku Lake (parking lot)	15-Jun-14	61.15182	-149.88045	50
24	23	University Lake (by parking lot)	13-Jun-14	61.18516	-149.80705	60
25	24	Valley of the Moon	13-Jun-14	61.20493	-149.89370	40
26	25	Westchester Lagoon Wildlife Sanctuary	13-Jun-14	61.20494	-149.90535	50

Be a SUPER hero,
SCOOP up after your pets.

Runoff carries untreated dog waste and germs into our community's creeks & lakes.

Bag it! Take it!
Dispose of it in the trash!

Did you know that if you:

- leave your yard covered in pet waste, you can be fined $250?
- leave pet waste in public areas, you can be fined $100?

Scoop the Poop, and do the right thing for our creeks, trails, and parks.

scoopthepoop.org

Fecal Bacteria Contaminates Many Anchorage Waterways

By Joaquin Palomino, KSKA - Anchorage | July 25, 2014 - 10:58 am

Test results from samples at Cuddy Park pond. The blue dots are E. coli (photo courtesy of Anchorage Waterways Council)

It's a beautiful day in midtown, and Thom Eley of the Anchorage Waterways Council circles the perimeter of a pond in Cuddy Park with his intern Robert Veeh.

Robert squats at the lakes edge and measures its temperature; it's about 70 degrees fahrenheit. He then unwraps an eyedropper, sucks up 5 milliliters of water, and drips it into a small vial so it can be tested for fecal coliform, a bacterium found in human and animal feces.

If you find high fecal coliform counts, there's only one way that's getting in there," Eley says, holding back a chuckle. "Some sort of poop is going in the water."

Eley has monitored the pond in Cuddy Park—which is actually a part of Fish Creek—for thirteen years. He has found high levels of e-coli and other fecal bacteria in the waterway. His advice to park visitors: "Don't fall in it, don't get a mouth full of water."

Fecal pollution has many possible sources, such as leaking septic systems, homeless camps, and duck droppings. But Cherie Northon, executive director of the Anchorage Waterways Council, says the most common vector is probably dogs. "There are about 70,000 dogs in urban Anchorage,"

she says. "Every dog is going to poop maybe a half a pound. If you do the math, that's 20, 30 tons a day, not a year but a day, that ends up on the ground."

If dog owners don't pick it up, all of that poop gets washed into the city's streams and rivers. As of 2010, essentially all of Anchorage's waterways were on the EPA's impaired water list for high levels of fecal bacteria. "It's an invisible problem, it's not a floating piece of trash or an oil sheen," Northon says. "The water looks crystal clear, and yet it's carrying all of this bacteria."

Fecal pollution isn't uncommon in urban waterways, and it doesn't harm fish or other wildlife. It can cause nausea, vomiting, and diarrhea if ingested by humans, though, which is why Northon says Anchorage's watershed needs to be cleaned up.

"We've gone down Campbell Creek, my husband fell off the back of our raft once, and in that situation you grab a mouth full of water….You're not planning on it but you still get it in your mouth."

State and local agencies are trying to remove fecal bacteria from Anchorage's watershed in a number of ways, including erecting "mutt mitt stations" near lakes and streams, which hold plastic bags for dog refuse; regulating septic systems more carefully; and, doing regular street sweeps to reduce the amount of bacteria traveling in storm water.

Over the past few years three Anchorage lakes have been removed from the impaired water list, including Lakes Hood and Spenard.

Comments

Please read our comment guidelines.

http://www.ktva.com/?s=midtown%20park%20has%20dirty%20water 8-5-14

Midtown park has dirty water

By Lauren Maxwell Photojournalist: Jared Mazurek - 5:36 PM August 5, 2014ANCHORAGE –

A favorite midtown park where office workers like to take their lunch breaks and families come to feed the ducks may have some of the dirtiest water around.

That's what the Anchorage Waterways Council says about the duck ponds at the Cuddy Family Park behind the Loussac Library.

Council researcher Thom Eley tests the waters regularly and said they contain some of the highest levels of fecal coliform in town. So high, he said, it's unsafe for people and their pets to get too close.

"It's just excessive," said Eley, gesturing toward his latest sample results. " If you have people playing, dogs drinking the water, it's just not a good thing."

Eley blames too many birds and the people who encourage them to gather at the park by feeding them year round. The former wildlife biologist said he suspects a steady diet of bread is no good for the animal's health either.

The state Department of Fish and Game isn't so sure that ducks in the park are only eating bread, or that their diets are causing any health problems. In order to find out, they plan to capture several ducks this winter and take blood and other samples to analyze. They hope the results will tell them more about the animal's habits and their health.

We Alaskans

September 14, 2014

adn.com

Fowl play

Once again, Anchorage is attracting thousands of waterfowl, which leave behind unhealthy bacteria as they munch on a urban bird buffet

BY RICK SINNOTT

Too many waterfowl, too much foul water

BILL ROTH / Alaska Dispatch News

Canada geese take flight at Cuddy Family Midtown Park.

Lured to Anchorage by feeders and grassy areas, ducks and geese leave behind a dangerous concoction of fecal coliform and other bacteria

RICK SINNOTT | Special to ADN

A little more than a decade after a coalition of municipal, state and federal agencies clamped down on waterfowl feeding in Anchorage, the feeders have returned in force.

The concerted effort to stop waterfowl feeding was aimed at reducing urban duck and goose numbers in the wake of a disastrous mid-air collision. Twenty-four people died in September 1995 when an Air Force E-3 Sentry crashed after flying into a flock of Canada geese shortly after takeoff from Elmendorf Air Force Base.

Although air safety was the primary impetus, reducing the number of waterfowl undoubtedly reduced water pollution in the city. Now, with feeding on the upswing, local ponds are once again seething with a foul concoc-

PAGE 4, **FOUL WATER**

FOUL WATER

Continued from Page 3

tion of fecal coliform and other bacteria that can make people sick.

An example is Fish Creek, approximately 4 miles long, all of it flowing through (or under) the middle of Anchorage. The Anchorage Waterways Council, which has monitored water quality in Fish Creek since 2004, recently found high levels of fecal coliform in Cuddy Family Midtown Park.

SUCCESSFUL PREVENTION PROGRAM

Few Anchorage residents remember a time when the city's ducks and geese were wary of humans.

Canada geese were rare or nonexistent in upper Cook Inlet prior to the 1964 earthquake. Beginning in the mid-1970s, their numbers climbed rapidly and geese started nesting and rearing young throughout the Anchorage Bowl. Canada geese eat grass. The explosive growth of Anchorage dramatically increased their food supply, especially for geese habituated to humans. Anchorage inadvertently created a goose paradise through the juxtaposition of wetlands for nesting, lawns for feeding and lakes for molting and rearing goslings. At the time, goose predators were scarce in Anchorage.

As geese started appearing on city ponds and lakes, people began feeding them, making the city even more attractive and increasing their comfort levels in a human-dominated environment. People tossed food wherever the birds congregated, including completely inappropriate locations like along busy roads.

Spenard Lake and Lake Hood, the world's busiest floatplane base, used to be popular feeding sites.

In the early 1970s, only about 100 Canada geese nested in the Anchorage Bowl, mostly in Potter Marsh. A summer count conducted in 1996 found more than 2,600 geese. From 1974 to 1996, the Anchorage goose population increased at an annual rate of 14.6 percent. A model predicted that barring any interventions – natural or man-made – Anchorage might support more than 19,000 geese by 2007.

It never happened. During the late 1990s and early 2000s, state and federal agencies cooperated to reduce goose habitat around airports and haze geese attempting to feed on airport turf. Hundreds of eggs were collected in wetlands during nesting season and donated to

Ponds attracted a few ducks and geese, which attracted a few feeders, which attracted more ducks and geese, which attracted more feeders. Now the ponds are brimming with hundreds of ecologically handicapped waterfowl that have learned to mooch food from humans.

Photos by BILL ROTH / ADN archive

Becky Eckert with the U.S. Fish & Wildlife Service releases a Canada goose at Seeley Lake in the Susitna Flats State Game Refuge on July 21, 2001.

Canada geese flock together in a holding pen after they were rounded up at Campbell Lake on July 21, 2001. Several agencies, including the Alaska Department of Fish & Game, U.S. Fish & Wildlife Service, U.S.G.S. Biological Resources Division and U.S.D.A. Wildlife Services, rounded up geese at local lakes. More than 100 geese and goslings were relocated to Seeley Lake in the Susitna Flats State Game Refuge. The relocation of goslings was intended to reduce the goose population.

Photos by **BILL ROTH** / Alaska Dispatch News

Geese and ducks scarf up white bread fed to them by a constant flow of people at Cuddy Family Midtown Park in Anchorage on Tuesday, Sept. 2.

Arthur Alexie, left, and Danny Hootch feed bread to ducks and geese gathered at Cuddy Family Midtown Park in Anchorage on Wednesday, Sept. 3. Alexie asked them in Yup'ik, "If you're hungry, come and eat." While hand-feeding a gaggle of geese, Alexie said, "They fed me through winter (in his village of Kwethluk); now it's time to feed them."

Alaska Native elders. Because geese tend to return to the location where they learned to fly, unfledged young geese were rounded up and released in the Susitna Flats State Game Refuge. All of these actions were intended to reduce and then maintain Anchorage's goose population at an acceptable level and force geese to abandon areas where they were most likely to endanger aircraft.

Once the population approached a more acceptable level, egg and gosling roundups ended. An increase in goose predators – for example, red foxes and bald eagles – seems to have helped stabilize goose numbers at 2,000 or less.

One of the key elements of the plan was to stop the public from feeding geese and other waterfowl. A variety of public messages were aired and "no feeding" signs were erected at popular feeding locations.

EFFORTS UNDONE

One of the most popular sites for tossing handouts to geese used to be a small wetland south of Loussac Library. The wetland was obliterated and the area was greatly enhanced – for geese – by the creation of the Cuddy Family Midtown Park.

The shallow wetland was dredged deeper and expanded into a 2.3-acre pond. A long-buried section of Fish Creek was briefly freed from its corrugated catacomb – urban renewal specialists call it "daylighting" – by diverting it into the ponds. Acres of grassy turf were planted nearby. And the sign that asked people not to feed geese disappeared.

That was more than a decade ago. Within a year, Cuddy Park became one of Anchorage's premier duck and goose buffets.

Any waterfowl biologist could have predicted what would happen. The ponds attracted a few ducks and geese, which attracted a few feeders, which attracted more ducks and geese, which attracted more feeders. Now the ponds are brimming hundreds of ecologically

PAGE 6, **FOUL WATER**

Some wildlife problems are hard to solve. This one is easy. The solution is to stop feeding the waterfowl. If people stopped feeding waterfowl, fecal coliform levels in Anchorage streams and ponds would decrease.

FOUL WATER

Continued from Page 5

handicapped waterfowl that have learned to mooch food from humans.

Instead of foraging for natural foods, ducks and geese loiter about the Cuddy ponds like homeless people in the vicinity of a soup kitchen. People feed waterfowl all day long in the parking lot.

Meanwhile, the grass around the ponds has been trampled by people and waterfowl, which has caused the banks to slough into the ponds. The bike path, footbridge and parking lot are spattered with bird poop. And the ponds have become a cloudy concoction of sediment and everything that squirts out of a duck's cloaca.

In July, Dr. Thomas Eley, a research biologist with Anchorage Waterways Council , dribbled 10-milliliter samples of pond water, about two teaspoons, onto petri dishes, the small, lidded containers that scientists use to culture and identify bacteria.

Water taken from the culvert entering the ponds grew 44 colonies of fecal coliform, 64 colonies of non-fecal coliform bacteria and two "teal" colonies. "Teal" refers to the color of the colony in the petri dish; fecal coliform sprouts blue or purple colonies and non-fecal coliform colonies are pink or red.

Non-fecal coliform can be bad stuff. Enterobactor infections can necessitate prolonged hospitalization. The "teal" colonies need further testing. But they can be bad, too.

"I mentioned the teal colonies to my doctor," Eley said, "and he knew immediately what they could be. 'I hope that you washed your hands after having them in that water!'"

BILL ROTH / ADN archive 2013

Ducks rest in a parking lot at Cuddy Family Midtown Park on Thursday, Dec. 12, 2013.

KILLING WITH KINDNESS

It's no secret that the water in Fish Creek is polluted. The Alaska Department of Environmental Conservation considers Fish Creek one of eight streams and five lakes in the municipality that are "water-quality-impaired."

According to a 2004 report, in the early 1970s three miles of the original stream were filled and covered with residential and commercial development. Most of Fish Creek was diverted through a culvert. At least 47 stormwater outfalls drain into Fish Creek and most of the fecal coliform appear to come from pet and waterfowl feces.

Fecal coliform counts are highest in summer and early fall. An analysis of fecal coliform levels near the

Photos by BILL ROTH / Alaska Dispatch News

The bike path that encircles the ponds at Cuddy Family Midtown Park is covered with goose droppings on Tuesday, Sept. 2.

With a fist full of bread, 1-year-old Alayna Chang feeds ducks and geese gathered at Cuddy Family Midtown Park.

mouth of Fish Creek conducted by the Municipality of Anchorage in July 1989 found an average of 171 colonies per 100 milliliters. The report assumed that this represented the general water quality of the watershed at that time.

The state has generally set maximum concentrations of fecal coliform at 20 colonies per 100 millimeters for drinking water and 200 colonies per 100 milliliters for water-related recreation. Multiplying Eley's samples by 10, to compare with the state standards, indicates water entering Cuddy ponds had 440 colonies of fecal coliform, far exceeding both drinking water and contact standards.

But wait. That's the water flowing into the ponds. What happens under the ducks and geese? Eley tested that water too. He found over 900 colonies of fecal coliform, 170 colonies of non-fecal coliform and over 8,000 colonies of "teal" bacteria per 100 milliliters.

In other words, the water in Cuddy ponds is poop soup.

SIMPLE SOLUTION

An article written in 2013 for PRB Magazine by Dwayne Adams, a landscape architect and planner with USKH Inc., touted the planning effort that culminated in Cuddy Park. Engineers were searching for a site in Midtown that could store floodwater and runoff from a nearby snow storage area. A lot of lip service was given to improving recreational opportunities and wildlife habitat, but wildlife biologists were not consulted and the engineers won the day.

Adams claimed that the park wasn't attracting much human use until the ponds were created. Writing less than a year ago, he also claimed: "On any summer day, dozens of people are kayaking, floating model sailboats and wading in the pond." I've never witnessed any of those activities, and playing in Cuddy ponds could pose a serious threat to one's health.

Instead of frolicking in the ponds, dozens of people are feeding ducks and geese in and around the parking lot. Egged on by the free food, some birds are getting a little too friendly. Tim Stevens described a recent incident in which a couple with a young child ran out of bread and the geese began giving them the bum's rush. The father kicked the birds away from his daughter.

Everyone's heard wild ducks don't need to be fed. They don't. People feed ducks to scratch a personal itch, not for the ducks' sake. The fact that they may be killing the ducks with "kindness" doesn't seem to matter.

Unnaturally high concentrations of ducks and geese are much more likely to be infected by sick birds. Thousands of waterfowl have died from contagious diseases whose spread was exacerbated by crowded conditions.

Some wildlife problems are hard to solve. This one is easy. The solution is to stop feeding the waterfowl.

If people stopped feeding waterfowl, fecal coliform levels in Anchorage streams and ponds would decrease. Even ducks who linger into winter are capable of flying to open water in Kachemak Bay or Prince William Sound if feeding is curtailed.

Feeding hurts waterfowl. Stopping the feeding will help them. And us.

Rick Sinnott is a former Alaska Department of Fish and Game wildlife biologist. The views expressed here are the writer's own and are not necessarily endorsed by Alaska Dispatch News. Contact him at rickjsinnott@gmail.com.

Readers write: Letters to the editor, Dec. 31, 2014

Alaska Dispatch News

December 30, 2014

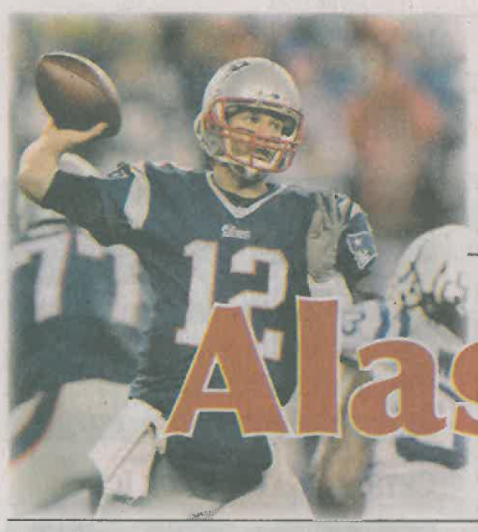
Feeding wild waterfowl creates hazards, disease

Maria Scully is correct that grains specifically designed for ducks and geese are better for the mallards and other waterfowl than bread, popcorn, potato chips and similar junk foods (ADN, Dec. 29). However, feeding waterfowl is a bad thing, as it can cause them to become a nuisance and aggressive if not fed. Congregations of waterfowl can spread diseases to one another, and be a hazard to drivers in the area.

As we see in Cuddy Park, waterfowl concentrations cause severe bank erosion, which adds sediment to the creek. This sediment could be a violation of the Clean Water Act. The Anchorage Waterways Council has shown that the waterfowl congregations in Cuddy Park are contributing excessive fecal coliform bacteria to water, and colony counts are certainly in excess of the state standard for any recreational use of the water. It is particularly important not to feed the Canada geese in the summer as they are migratory and need to build up their energy stores for migration from their natural foods.

Allow waterfowl to stay wild and observe and appreciate them from a distance. Don't feed the waterfowl.

— Thomas Eley
Anchorage Waterways Council
Anchorage



SPORTS > C-1

SUPER BOWL XLIX

Features on Tom Brady, Pete Carroll and the Seahawks' amazing comeback

ALASKA > B-1

SUGAR INTOLERANCE

Researchers identify Inuit gene that is responsible for the disorder

Alaska Dispatch News

Final Editio

75

Tuesday, January 20, 2015 www.adn.com ALASKA'S INDEPENDENTLY OWNED NEWSPAPE

Community leaders fear loss of state revenue sharing

Officials of smaller towns say eliminating funds could spell an end to needed services.

By DERMOT COLE and PAT FORGEY
Alaska Dispatch News

FAIRBANKS — In 2003, the last time the state eliminated community revenue sharing, the City of Nenana had to shut down its police department, according to Mayor Jason Mayrand.

The state reinstituted the program five years later, and while Nenana has never been able to resurrect its police department, the annual infusion of revenue-sharing cash — estimated at $115,000 this year — is essential to keeping what remains of the local government in business, Mayrand said.

"We're a small town and we're very dollar conscious," he said, adding that revenue sharing makes up about one-quarter of the city budget. Nenana, with a year-round population of about 400 to 450 people, is about 55 miles southwest of Fairbanks on the Parks Highway.

He said he was disappointed to hear that Anchorage Sen. Kevin Meyer had suggested cutting revenue sharing in a speech Friday to the Resource Development Council and that the incoming Senate president portrayed the program as a recent addition to the state budget that the state can no longer afford.

Mayrand said he recognizes the challenge facing legislators with a multibillion-dollar deficit but revenue sharing deserves to continue.

"What they should do is find out where they can cut the budget with the least amount of damage to the communities of Alaska," he said.

In his speech, Meyer questioned the need to continue programs that began in 2007-2008, "when the price

See Back Page, REVENUE SHARING

EVERYTHING'S JUST DUCKY AT CUDDY PARK

MARC LESTER / Alaska Dispatch News

Allen Bousari, 6, walks through hundreds of mallards that congregated in the parking lot of Cuddy Family Midtown Park on Monday.

NATHANIEL HERZ / Alaska Dispatch Ne

Alaska Gov. Bill Walker speaks during an interview Monday in Juneau.

Governor: Budget situation not 'crisis' because of savings

Walker calls for changes to fiscal structure amid downtur caused by low oil prices.

By PAT FORGEY and NATHANIEL HERZ
Alaska Dispatch News

JUNEAU — Gov. Bill Walker says Ala ka will tap its savings and cut budgets t get through low oil prices, but in an inte view on the eve of next legislative sessio he was unwilling to call the state's multibi lion-dollar deficits a "crisis."

"I don't use the word 'crisis' having bee through some crisis in Alaska," Walk said. "This is a downturn, this is a seriou time to sit down and make some change within our fiscal structure."

Walker spoke with Alaska Dispatc News on Monday, making his first sub stantive comments on the state's budg in advance of this week's dual legislativ addresses, first the State of the State Wednesday and the State of the Budget

Readers write: Letters to the editor, Jan. 22, 2015

Alaska Dispatch News

January 22, 2015

Resist the urge to feed the ducks

The Jan. 20 front-page photo of a child walking through a huge flock of mallards with the caption "Everything's just ducky at Cuddy Park" is one of those "awwww" pictures. However, everything is not ducky in the Cuddy ponds, where these ducks are living year-round in large numbers because humans feed them. Feeding waterfowl — or any wildlife for that matter — is not good for them nutritionally, and it's not good for us.

Neighborhoods downstream on Fish Creek, of which these ponds are a part, are the recipients of high levels of fecal coliform in their creek water that comes, in part, from excessive duck poop. Anchorage Waterways Council regularly tests local creeks for fecal coliform which could indicate pathogens that can be harmful to humans. Hundreds of ducks are now crowded into small areas of water where the possibility exists of them contracting or spreading diseases rapidly due to close contact, and there is increased fecal contamination to our waterways.

We need to look at the ducks (and geese during the summer), enjoy them, take pictures, but stop feeding them entirely. Wild creatures know how to fend for themselves.

— Cherie Northon
executive director
Anchorage Waterways Council

http://www.ktva.com/anchorage-creek-cleanup-coming-up-773/

By Lauren Maxwell
8:14 PM April 25, 2014 Email @KTVA

This year event has been expanded to an entire week

ANCHORAGE –

You don't need to look far to see that Anchorage could use a good cleaning.

There's trash on the ground but also in the water. Fortunately, the citywide Creek Cleanup is right around the corner.

That's good news for Patty Reid. She lives right by the south fork of Chester Creek and can see the water from her front door. But lately what she is seeing more of is trash.

Reid said the creek has become a dumping ground for all kinds of trash, from stolen bikes to shopping carts.

"The shopping carts are a big problem," Reid said. "Because it seems that no matter how many times people pull them out [of the creek] the kids just push them back in for fun."

The trash is more than an eyesore. Cherie Northon with the Anchorage Waterways Council says most of the garbage on the ground will end up in the creeks and keep on going.

"It will end up in Westchester Lagoon and then on to Cook Inlet and then into the Gulf of Alaska and then the Pacific Ocean," Northon said.

Northon says the only way to stop that journey is to pick trash up off the ground and in the water. The Anchorage Waterways Council is making that easier this year by extending the annual Creek Cleanup for an entire week. This year it runs from May 10-17. You can find more information at www.anchoragecreeks.org.

Gmail by Google

Cherie Northon <cherie@anchoragecreeks.org>

Thanks for Your Letter Re: Cuddy Park

Beverly Churchill <beverlychurchill51@gmail.com> Thu, Jan 22, 2015 at 9:00 PM
To: cherie@anchoragecreeks.org

Dear Cherie,

I share your concern about the feeding of the birds at Cuddy Park. I used to walk in that park for several years and watched as it was developed. I became horrified as I saw parents bringing children down to feed bags of white bread to the wild geese and ducks. I even approached some of them and tried to explain why it was bad, but to no avail. I contacted the city Parks and Rec and they were not interested in doing anything. I begged them to at least post some signs discouraging the practice, but still nothing. More recently Rick Sinott wrote a feature article about this in the ADN, and yet still no response from the city?!

What can I do? Do I contact my assembly person and ask them to create some ordinance outlawing this practice? Can we at least post signs and educate folks? I am busy and have other volunteer programs I am committed to, but our natural environment and wild animals are precious to me. Writing letters does not good, although I appreciate that you did if you can give me some possible solutions.

I am also at a loss over dog-owners who continue to leave their dogs waste along the trails. I just saw one today release his dog into the woods between the parking lot and Northern Lights next to the Spenard Post Office, allowing the dog to relieve himself with no cleanup. I was headed over to hand him a bag to do so but the dog jumped in the car and they headed off!

I will be gone until February 3 but I just had to contact you before I got too busy. I hope to hear from you but just know I won't be able to reply till I return. Thanks for your attention,

Beverly Churchill

907-244-4987

30th Annual Creek Cleanup Flier

Overall sponsor banner at Creek Cleanup Celebration 5-17-14

Individual sponsor banners at Creek Cleanup Celebration 5-17-14

Volunteers roll up sleeves for Day of Caring

By Lauren Maxwell (http://www.ktva.com/authors/lauren-maxwell/)

8:44 PM September 10, 2014

Estimated Read Time 1m 10s

ANCHORAGE – More than 500 people rolled up their sleeves and got to work on Tuesday, but they weren't exactly doing their regular jobs. They were volunteering their time for United Way's Day of Caring.

The annual corporate volunteer day is in its 21st year in Anchorage. According to United Way, the number of nonprofits that benefit continues to grow. The Alaska Botanical Garden hosted a crew from BP that pulled weeds, spread compost and harvested vegetables. The garden's executive director Julianne McGuinness says she and her team depend on the volunteer effort.

"We look forward to Day of Caring every year," said McGuinness. "We are so thrilled to have BP out here. They are very hardy souls. They don't mind the rain, and they are willing workers to do anything that we ask them."

Workers at Alyeska Pipeline Service Company were also active, working with the Anchorage Waterways Council. Their Day of Caring project involved removing thousands of yards of used fishing line from around local creeks. Workers said the line can be lethal for birds.

Another crew from ConocoPhillips sewed hats for children in the hospital who were undergoing surgery or cancer treatments. Sue Brogan, vice president of the United Way of Anchorage, says there were more than a dozen projects and more than 1,600 volunteer hours committed in a single day. Brogan said the volunteer work has saved the community more than $42,000.

Former Governor Tony Knowles speaking at the Creek Cleanup celebration on 5-17-14

Creek Cleaners at Cuddy Park 5-17-14

ALPAR's Mary Fisher and AWC's Marilyn Houser tabling at the Creek Cleanup celebration on 5-17-14

Some of the trash award submissions

Alyeska Pipeline Services volunteers on Day of Caring, Campbell Creek, 9/10/14

Discarded Fishing Line at Ship Creek, 9/10/14

Monofilament Fishing Line on Storm Drain Grate by Ship Creek, 9/10/14

Alyeska Pipeline Services Volunteer at Ship Creek, 9/10/14

Some Monofilament Line Collected at Ship Creek 9/10/14

Program

6:00 pm – 6:15 pm AWC Business Meeting, Election of Board of Directors and Vote on Bylaw change by AWC Members

6:15 pm – 6:30 pm—Refreshments, exhibits, seating

6:30 pm – **1984 to 2014, Have our Creeks Improved?**

Cherie Northon: "The Early Years: Anchorage"

Peg Tileston, "Looking Back, Moving Forward"

Cathy Gleason and Maureen McCrea, "The Early Years: AWC"

Meagan Krupa, "Ship Creek Plugged: Why Some Things May Never Change"

Thom Eley, "AWC Today"

Cherie Northon, "Epilogue"

Questions, comments, stories from the audience

Adjournment

Anchorage Waterways Council
P.O. Box 241774
Anchorage, AK 99524
Anchoragecreeks.org
907 272-7335

1984 – 2014

Have Anchorage's Creeks Improved?

Anchorage Waterways Council's

Annual Meeting

October 14, 2014

BP Energy Center

Cherie Northon

Cherie has a master's and doctorate in geography from the University of California Berkeley, where she taught for 19 years. She is also a cartographer--working in GIS, remote sensing, and GPS-acquired data. Her areas of interest are habitat protection and improvement of the natural environment (flora and fauna), student outreach (K-12), and generating public participation in environmental issues. Much of her work in Anchorage has been on managing human-wildlife conflicts along creeks and in greenbelts (most often beaver). She oversaw the development and construction of the AWC fish refuge on Little Campbell Creek at 68th and Meadow, began the Creeks as Classrooms program in local schools, and is now the Executive Director. She currently is a commissioner on the Municipality's Watershed and Natural Resources Commission.

Peg Tileston

Shortly after arrival to the state in 1972, Peg Tileston began volunteering at the Alaska Center for the Environment. During the ensuing years, she served on the ACE board and as staff, co-founded Trustees for Alaska, Alaska Conservation Foundation, Alaska Women's Environmental Network, and Alaska Common Ground. Peg was on the board of Chugach Electric Association and the national board of Sierra Club and has served on a number of state and local advisory boards and commissions. She serves on the Alaska Center for the Environment, Alaska Conservation Voters and Alaska Common Ground boards. Peg has produced *What's Up*, a weekly calendar of natural resource/conservation events, since 1999 which is distributed statewide to nearly 2500 email addresses. Peg and Jules have been married for 60 years and have three daughters and two granddaughters.

Cathy Gleason

A 32-year resident of Anchorage, when she and her husband, Dan, arrived in Alaska in 1982, these Kansas-born and raised "kids" thought, "We're definitely not in Kansas anymore!" Cathy received her undergraduate degree in Journalism/Advertising from the University of Kansas in 1980 and decided to put her skills to use when recruited to join the all-volunteer AWC Board as the first newsletter editor in 1986. Although resigning from the Board in 1996, she continued doing the newsletter until 2002. During her entire 10 years on the Board, Cathy was Publicity Chair for the AWC Creek Cleanup & Celebration, served on the Waterway Watch and Issues Committees, and, at times, took on Membership and Treasuer responsibilities. She also assisted fellow Board Member Larry Rundquist during the 15-year run of AWC's Annual Amateur Photo Contest. Cathy and Dan received an appreciation plaque last May from AWC, in recognition of their 30 years of dedication to AWC. Cathy also volunteered as an Anchorage Audubon Society Board member for almost 20 years and continues to be heavily involved with her community council in Turnagain, serving the previous three years as president.

Maureen McCrea

Maureen McCrea received her Ph.D. in Coastal Zone Management at the University of Washington, Seattle in 1980. That became the cornerstone of her career thereafter. Between February 1981 and September 1981, she worked for Woodward Clyde Consultants preparing natural resource inventories for two of the new coastal management programs. In October 1981 she became a coastal management specialist for the Dept of Interior offshore oil and gas program, assessing potential conflicts between the proposals and the statewide standards and district coastal policies. In 1994 she was hired as the senior project review coordinator for the Alaska coastal management program. It was while serving in that capacity that the Governor's office determined there was a conflict between her job and serving on the board of the AWC and she was forced to resign her official participation, although she continued to help organize Creek Cleanup through the early 2000's. She moved to the U.S. Army Corps of Engineers, Regulatory Division in Anchorage in June 2003, retiring in 2008. She now spends her time between her home in Anchorage and farm in New Zealand. She was on the initial board of the AWC, serving as the 1st Secretary – and ergo responsible for putting together the first bylaws. She was president of the AWC from 1987-1990 and from 1992-1993.

Meagan Krupa

After completing her Masters of Science degree at the University of Montana, Meagan Krupa directed the Ship Creek Unplugged program for the Anchorage Waterways Council from 2002 to 2005. She left AWC to pursue a Ph.D. in Biological Science at the University of Fairbanks. She graduated in 2009 with competencies in Natural Resource Economics, Stream Ecology, Political Science, Fisheries Ecology, and Complex Systems Theory. She then worked as a Professor of Environmental Science at Alaska Pacific University for five years. Meagan now works part time as a researcher in the Biology Department at the University of Alaska Anchorage, where she studies the complexities of the Kenai River watershed. She lives with her husband and two adventurous children in Eagle River and is always looking for opportunities to head downstream.

Thom Eley

Thom has M.S. degrees in wildlife ecology and oceanography and a Ph.D. in resource geography from the University of California Berkeley. During his 35+ years in Alaska, he has worked for the Alaska Department of Fish and Game and the U.S. Fish and Wildlife Service. Part of his experience involves management of lands and waters of several Interior watersheds. Included among his duties were dealing with the impacts of arsenic, mercury, and petroleum products, particularly those involved with mining operations. Currently he is overseeing the Creeks as Classrooms program, the CEMP program, and working on issues involving monofilament line left in fishing areas and the effects of feeding waterfowl which encourages overwintering, crowding, and excessive coliform loads in waterways.

Silver salmon stage a revival in urban Chester Creek

Craig Medred | October 21, 2014

Marc Lester / ADN

Downstream from Wellness Drive in the heart of Anchorage's busy and ever-expanding University-Medical District, the city's most abused creek was showing signs of healing itself this fall.

In the greenbelt behind the Providence Alaska Medical Center, where Chester Creek was left intact and undisturbed within its natural channel, coho salmon seemed to be everywhere. By threes and fours or half-

dozens, spawning fish worked the gravels in the riffles at the ends of the many deep pools where the clear water meandered through the cottonwood and spruce forest.

Blown-down trees reminiscent of wilderness Alaska creeks hung across the swirling water in many places and woody debris filled a creek between banks untrampled by human feet. But the volume of litter in the woods and the human flotsam on the water made it clear this was not your normal Cook Inlet tributary.

There was no hiding that this was very much an urban stream. The salmon didn't care. They were everywhere in this stretch.

But even where humankind has tried hard to destroy the coho homeland in Chester Creek, the salmon were coming back. There was an unconfirmed report of at least one of them making it into the remnants of the Chester Creek Middle Fork in Russian Jack Park, which would require the fish transit an underground pipe about a half-mile long.

Bypassing garbage in creek

Elsewhere, there were salmon obvious in stretches of long-channelized creek -- the places where humans had tried to turn the stream into a ditch -- from Muldoon at the north end of the city all the way back to near Westchester Lagoon at tidewater.

"We saw a pair spawning basically in the mouth of a culvert across from East High School," said Doug O'Harra, a one-time newspaper reporter turned aspiring novelist who has lived in the Chester Creek drainage for two decades. "I've lived here 21 years, and in all that time, I've seen only one salmon in the Middle Fork."

This year, there were lots of them. Curious, O'Harra and his wife, Helen, a school teacher whose students raise salmon in class as part of a state education project, hiked much of the Middle Fork. They were shocked at the number of fish.

"They had to go up a friggin' ditch that in places you can jump across," Doug said. "Several times, I said, 'Look at all this crap in the creek. Salmon couldn't go beyond this. And then we'd go a little father and there would be more salmon.

"I saw one coho one time near Tikishla Park" on East 20th Avenue, Doug said. "My impression was that it was a stray, but there's always been a few salmon in the South Fork."

By this summer, the few in the South Fork had become the thousands. Nobody knows exactly how many, but the evidence was pretty clear that the stream is still building on the salmon boom that began when an old, buried fish pass at the outlet of Westchester Lagoon was in 2009 replaced by an artificial stream reconnecting the creek to Knik Arm.

Salmon return

"The last year in which salmon had to move upstream though the weir to escape into Westchester Lagoon was

2008," wrote Rusty Myers, an Alaska Pacific University professor involved in a Chester Creek rehabilitation project. "Visual counts conducted in 2008 indicated 497 cohos escaped into Westchester, while corresponding counts from video footage indicated 388 cohos escaped."

By last year, with the new creek in place, more than 2,000 of the fish were counted returning. This year, Myers went on sabbatical and no one counted salmon, but indications are that population was continuing to build toward historic levels, said Cherie Northon, executive director of the Anchorage Waterways Council.

All indications are that the creek had its biggest salmon return since the 1970s, she said.

Myers has reported that counts done on the creek then -- before the waterway was channelized in the center of the city and then dammed near the tideflats to create Westchester Lagoon -- found a population of 217 coho per mile.

The creek drains 38 miles of Anchorage. Theoretically then, it could be home to more than 8,000 salmon. That is, however, a big "could be" because much has changed in Anchorage since the early 1970s.

Alaska's largest city was home to less than 50,000 people when that decade began. The JC Penney store was the biggest building downtown. The George Parks Highway connecting Anchorage to Fairbanks was still under construction. Only eight years earlier, Providence Hospital -- now the sprawling Providence Alaska Medical Center -- had opened the doors on a 92-bed facility carved out of a big patch of forest.

Today?

"Chester Creek watershed is (now) home to about 109,000 residents, several businesses, two universities, two major hospitals, elementary, middle, and secondary schools, and Merrill Field, a commercial service airport," says a draft Chester Creek Watershed Plan published in September. "Its area is almost 20,000 acres, which drains nearly 38 river miles.

"Settlement in the watershed was early in Anchorage's history, which has resulted in a fairly dense population of which much is literally along Chester Creek. Unfortunately many of the rules and regulations that apply to more recent development were not in place during much of the early construction, so there are spots where Chester Creek is hemmed in tightly by homes and businesses."

Feces from pets, ducks

The 77-page plan sets out steps for continuing creek restoration. It concedes the salmon are back, but other problems persist. Asked if the creek could be called recovered, Tom Eley, the biologist for the Waterways Council, said, "I'm not comfortable with that. It's still fecal coliform contaminated."

He blames runoff from feces from pets that wash into the creek. The city's University Dog Park sits in a prime spot to drain into the creek. And there are people feeding ducks in places all along the creek, Eley said, creating unnatural clusters of defecating birds.

creating unnatural clusters of defecating birds.

Not to mention all the storm-water runoff that makes it unfiltered into the creek.

No matter how wild Chester Creek might still look in places within its greenbelt, it's an urban creek with all the problems of urban creeks.

The creek "has received considerable mistreatment, the watershed plan summarizes. Besides an interruption in fish passage (which was reversed around 2008 by removal of the dam), there are several undersized culverts that freeze and clog and need replacement, straightened sections which enhance water velocity, sections that flood property, and storm-water runoff, which has led to it being categorized as an impaired water body."

Dissolved oxygen levels in the creek sometimes fall dangerously in the summer due to "the decomposition of yard wastes dumped into the creek," Eley also noted in a Chester Creek report card. "A number of residents are dumping yard wastes into the creek, and some residents are cutting their lawns right to the edge of the creek removing the natural vegetation that protects the creek's banks.

"Chester Creek is suffering from severe bank trampling particularly in the Valley of the Moon Park area…Bank trampling is also severe in the Chester Creek Greenbelt between Lake Otis and the New Seward Highway.

"Considerable trash was found in and along the creek, including bicycles, luggage, tires, construction materials, pallets, household and yard debris, cups, aluminum cans, fast food debris and plastic bags. In addition, homeless camps appear to be another major source of trash and well-worn trails lead from the homeless camps to the creek."

Basically, Chester Creek has all the problems that come when large parts of a natural creek are turned into a drainage ditch to solve the problems that running water creates for development and a greenbelt becomes a de facto campground because no one knows exactly what to do with the urban poor looking for a free place to live.

But the salmon clearly don't care.

If you provide them access to a place they can spawn, and if people don't kill them before they get there, they will come.

And they have come.

Contact Craig Medred at craig(at)alaskadispatch.com

RELATED:

Alli Harvey: A January paddle down Chester Creek

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Add a comment...

Also post on Facebook Posting as Cherie Northon (Change) Comment

Cherie Northon · Works at Executive Director of Anchorage Waterways Council

Campbell Creek had the canoe race and it was "sunk" in 1985 because Campbell Creek was deemed a sewage pit. It was then held in Goose Lake--to everyones' dismay.

Reply · Like · Unfollow Post · about a minute ago

Dave Robinson · Top Commenter

Didn't they use to have a canoe race back in the 80's?

Reply · Like · Unfollow Post · 31 minutes ago

Ron Thorne · Alaska Methodist University

Thanks for the update, Craig. This is very promising news, but there is much more work to be done. We must also educate about the importance of the wonders of such a resource within our city, and keep it clean for future generations. An annual visit to our schools by concerned citizens and ADF&G would be a smart investment.

Reply · Like · 1 · Unfollow Post · Edited · 2 hours ago

David McGraw · Follow · Top Commenter

In the early-1960's I used to watch a big septic truck flush into Chester creek almost every day. There were two dumping spots that were used, and there was a great amount of toilet paper along the banks downstream from the dumping sports. Also, people used to wash their cars using buckets in Chester creek just off of Airport Heights Road, and the banks were very sudsy in that area.

Reply · Like · 1 · Unfollow Post · 3 hours ago

Anchorage Waterways Council

Oh, no!

Reply · Like · about a minute ago

Peter Hall · Information Assistant at The State of Alaska

I remember working with a creek clean up somewhere around my senior year in high school. We A LOT of crap out of Chester Creek, but the worst thing was finding 2 mostly full buckets of driveway tar. They had their lids mostly popped off and were plunked in just about the middle of the creek. Hopefully the community around the creek has changed enough that crap like that doesn't happen any more....probably not...

Reply · Like · 1 · Unfollow Post · 6 hours ago

Tim Huffman · Follow · Top Commenter · Truman High Indep. Missouri

Great article Craig. Curious if you saw any bear sign; they'll surely figure out the fish

have returned.

Reply · Like · 1 · Unfollow Post · 8 hours ago

James Mason · Top Commenter

This good news is all the more reason for us to work hard at preserving the creek as close to its natural state as possible.

Reply · Like · 2 · Unfollow Post · 17 hours ago

Gary Snyder · Top Commenter · Anchorage, Alaska

Thanks for the story. I definitely have seen more salmon in Chester Creek since they fixed the outlet at Westchester. It will be interesting to see if we get more eagles and bears soon too.

Reply · Like · 1 · Unfollow Post · 18 hours ago

Gavin Kentch · Owner at Law Office of Gavin Kentch

Indeed. Nature always bats last.

Reply · Like · 2 · 17 hours ago

2014 Creeks as Classrooms Database

DATE	EVENT/LOCATION	PARTICIPANTS	CHEMICAL TESTING	MACROINVERTEBRATES	HYDROLOGY	Other	WHO
1/24/2014	Rogers Park Explorations	22	x	x			MK
3/4/2014	Romig Middle School	75		x			MK
3/20/2014	Trailside Elementary Math/Science Night	40		x			MK
3/21/2014	East High School Environmental Club	15	x				MK
4/10/2014	Yakutat students at Girdwood School	13		x			MK
4/18/2014	Chester Valley Elementary	90	x	x	x		MK
4/29/2014	East High School Environmental Science Class	24	x				MK
5/24/2014	Creek Critters - Eagle River Nature Center	20		x			MK
5/27/2014	Trailside Discovery Camp	30		x			MK
6/3/2014	Anchorage School District Summer Academy	28		x			MK
6/3/2014	Trailside Discovery Camp	30		x			MK
6/4/2014	ADF&G Outdoor Youth Days - Cheney Lake	50		x			MK
6/6/2014	ADF&G Potter Marsh Discovery Days	300		x			MK
6/7/2014	ADF&G Potter Marsh Discovery Days	200		x			MK
6/11/2014	ADF&G Outdoor Youth Days - Cheney Lake	50		x			MK
6/17/2014	Trailside Discovery Camp	30		x			MK
6/24/2014	Trailside Discovery Camp	30		x			MK
6/25/2014	MOA Adventure Camp	20		x			MK
7/1/2014	Trailside Discovery Camp	30		x			MK
7/8/2014	Trailside Discovery Camp	30		x			KS
7/9/2014	MOA Adventure Camp	20		x			KS
7/22/2014	MOA Adventure Camp	20		x	x		TE
Summer 2014	Robert Veeh--Intern oversight on Chester Creek Assessment	1	x				TE
8/26 - 8/29/2014	Steller	20	x		x	GIS	TE
9/13/2014	Girl Scouts - Wonders of Water - Kiwanis Park	100	x	x		Invasives	TE
9/10-9/12/14	Water Discovery Days Campbell Creek Science Center	800		x			TE
9/29-30-14	Polaris K-12	30	x		x		TE
10/10-10/11/14	Chugach Optional	50	x	x	x	Ted-Ex style	TE
10/20-10/21/14	Chinook	60	x		x		TE
9/23-9/25/14	East High	90	x				TE
9/30/2014	East High	60	x	x			TE
10/14-10/15/2014	East High	20	x	x	x		TE
12/12/2014	Romig H2O Day	125					TE
Total		2523					

Water Discovery Days at Campbell Creek Science Center 9/12/14 - Macroinvertebrates

SEARS GARDEN SHOW

1- At your residence, do you or a gardening service apply any of the following lawn or garden products?

Please check ALL that apply.

	Conventional	Organic	Both	None	N/A	Response Unchecked	Total
Fertilizer	6	10	4	4	0	0	(24)
Weed killers/herbicides	2	6	1	12	0	3	(24)
Pesticides	2	4	0	14	0	4	(24)

2- Which of the following statements represent(s) your gardening preferences (you can answer more than one)?

	Question:	RESP		Comment:
A	*I prefer the look of a manicured yard w/ grass & flowers.*	0	.	
B	*I prefer a yard with natural/native vegetation.*	2	.	
C	*I have a vegetable garden, berries, fruit trees, etc.*	5	C	& grass
D	*Other*	0	.	
A,B		0	.	
A,C		5	A,C	mix, grass, veggie garden, annuals in pots &
.				perennials in beds
A,B,C		3	A,B,C	can't we all just get along (lawn)
B,C		8	B,C	I like a mix of flowers & veggies
B,C,D		1	B,C,D	Like colorful garden-"English"
B,D		0	.	
** Response Unchecked*		0	.	
		24		

3- How do you typically dispose of green waste (lawn clippings, leaves, etc.)? Please answer all that apply.

.	Question:	RESP		Comment:
A	*Bag it and put it out with the garbage*	3	A	composting-->difficult
				mulch--> have not found it to work
B	*Compost it in the yard*	8	.	
C	*Mulch onto lawn*	2	.	
D	*Dispose of it in a wetland area or water body (creek or lake)*	0	.	
E	*Dispose of it along a creek bank or lake edge*	0	.	
F	*Gardener takes it*	0	.	
G	*Other*	0	.	
A,B		1	.	
A,C		0	.	
A,B,C		1		
B,C		9	B,C	not real compost-around edges of lawn in alders
** Response unchecked*		0	.	
		24		

April 19, 2014

How to Live With a Lake

The Municipality of Anchorage is about 2,000 sq. mi. and has over 170 ponds and lakes. These waterbodies are some of Anchorage's premier amenities. Housing and other developments are adjacent to nearly half of them. This handout provides information on good practices for those who live near or recreate on lakes.

- Be a steward for your lake and keep an eye on it. Report any issues or concerns on our "Citizen's Reporting" form at anchoragecreeks.org

- If you are on a septic system, make sure it is properly and regularly maintained, keep it up to code, and ensure that harmful items don't enter it.

- With lakes most often downhill of a surrounding land surface, they become a perfect catchment for a variety of pollutants including yard chemicals, ice melt products, trash, litter, and pet waste runoff. Reduce or eliminate chemicals and make sure trash and pet waste are cleaned up. If you must apply yard or ice melt chemicals, read and follow directions and warnings.

- Dispose of vehicle fluids, old paint, and excess household and yard chemicals properly. The Municipal Solid Waste Services (SWS) has several options for recycling paints and collecting hazardous products. See muni.org/departments/sws/pages/default.aspx

- If possible, wash your vehicle at a car wash (where water is often recycled and conveyed to the sanitary sewer--not the storm drain system). When washing a vehicle at home, use phosphate-free soap, a hose with a nozzle that can be turned off, work on a level area of grass or gravel, and keep washwater from storm drains which convey it untreated into our creeks and lakes.

- Good landscape practices include keeping a natural plant buffer at the shoreline to capture runoff, not planting lawns right up to the water's edge, preventing bank trampling, and never disposing of yard clippings in the lake.

- Enjoy the wildlife and waterfowl, but please do not feed--especially ducks and geese. This encourages them to take up residence on your lake, and human food, which is not their natural diet, can be harmful. In addition, large populations of waterfowl create increased nutrient loads from their feces, which cause high bacteria loads and excess aquatic plant blooms.

- NEVER introduce non-native vegetation, i.e. aquarium plants, or animals, i.e. fish or turtles, to lakes. Known as invasive species, they typically have no enemies and can decimate existing plant and animal populations. Keep an eye out for these invaders, and report any invasive species to 1-877-INVASIV (468-2748) or www.adfg.alaska.gov/index.cfm?adfg=invasive.report

- Be a respectful recreational user, whether you are swimming, fishing, boating, or flying a float plane. Know and follow rules and regulations; dispose of fishing line, hooks or weights properly; minimize wakes to reduce shoreline erosion; watch for unintentional transport of aquatic plants; and do not allow fuel or oil to spill. Report spills to dec.alaska.gov/spar/spillreport.htm

BE THE GUARDIAN OF YOUR LAKES!

Anchorage Waterways Council is a 501 (c) (3) non-profit dedicated to the health and preservation of our water resources. Its work is funded by memberships, donations, and grants. Follow us on Facebook or at

anchoragecreeks.org

907 272-7335

STORMWATER EDUCATION PUBLIC PERCEPTION SURVEY – 2014 SUMMARY

Developed by the Anchorage Waterways Council for the Municipality of Anchorage APDES Permit AKS-052558 January 22, 2015

I. EXECUTIVE SUMMARY

The "2014 Stormwater Education Public Perception Survey" was developed and completed to satisfy a requirement for the APDES Permit No. AKS-052558 held by the Municipality of Anchorage (MOA) and the Alaska Department of Transportation and Public Facilities (AKDOT&PF). This survey, to a random sample of citizens within the Municipality, was designed, presented, tabulated, and analyzed in the fall and winter of 2014. Its structure was built around a similar survey completed in fall of 2010 titled "*2010 Stormwater Education Public Perception Survey*." Several of the earlier survey questions were used as they were written, although a few modifications had to be made. Additionally, a few new questions and response choices were added. The objective was to try and make a comparison of the perceptions, actions, interests, and responses of Anchorage citizens over the past 4 years in regard to water quality and to identify issues that should be included or emphasized in a public education program. The number of respondents was 681 which is greater than a 95% confidence level, 4% confidence interval when based on a base population of 280,000 (adults in the Municipality).

Figure 1. Map of zip codes and numbers of respondents, 2014.

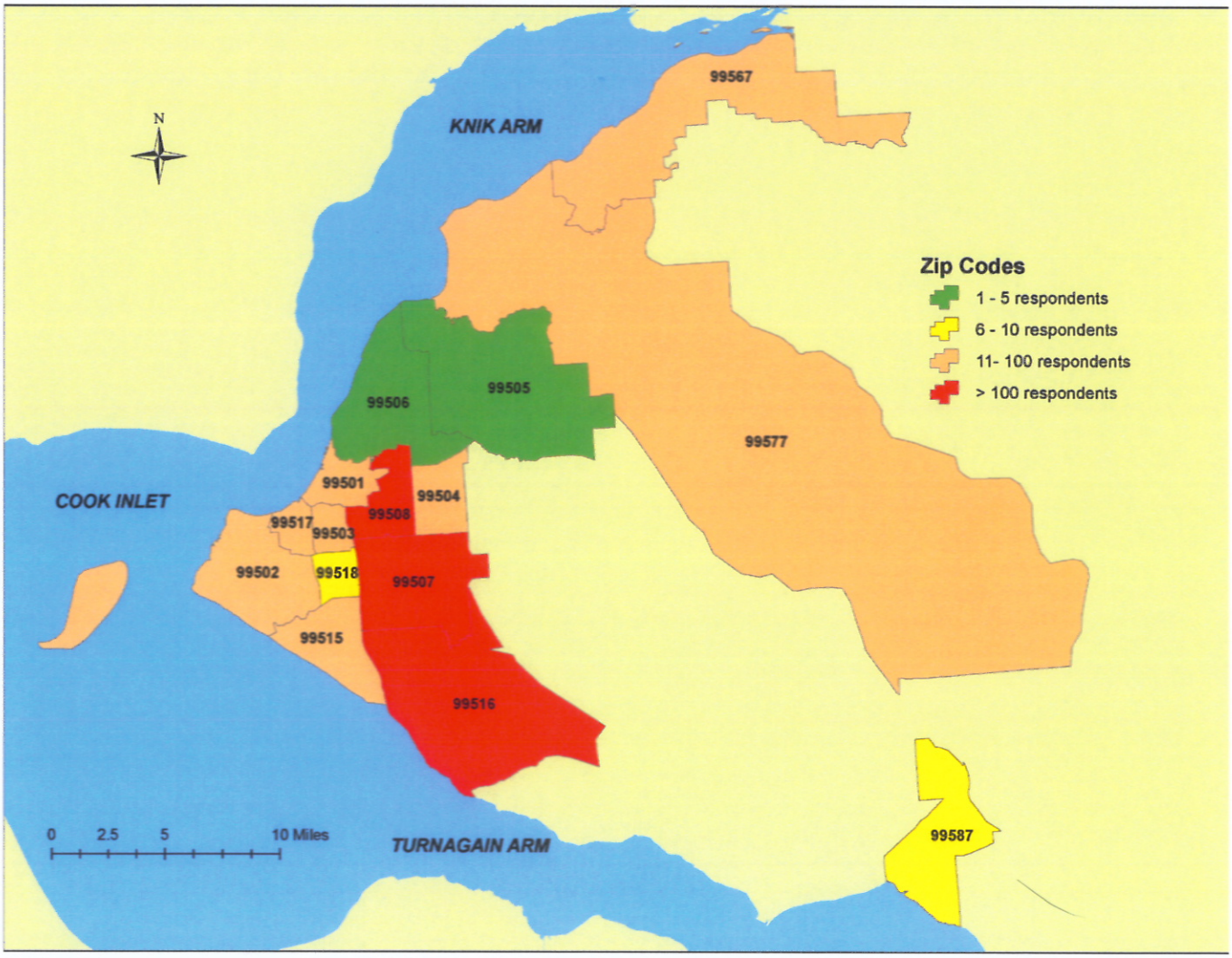

Table 1. Responses by zip code, 2014.

Answer Options	Response Percent	Response Count
99501	8.5%	58
99502	5.4%	37
99503	4.0%	27
99504	9.3%	63
99505	0.1%	1
99506	0.3%	2
99507	15.7%	107
99508	14.8%	101
99513	0.0%	0
99515	5.9%	40
99516	14.8%	101
99517	10.0%	68
99518	1.3%	9
99529	0.0%	0
99530	0.0%	0
99540	0.0%	0
99577	4.7%	32
99567	4.0%	27
99587	1.0%	7
99599	0.1%	1
TOTAL		681

IV. CONCLUSION

The 2014 survey had a broader cohort of respondents than previous years. The populated areas of Anchorage, based on zip codes, were represented at levels proportional to their population, and we had respondents from all zip codes, including JBER, except the Indian area. The bulk of the respondents (86.2%) lived in single-family residences that are owned and not rented, and consisted primarily of two individuals. Females made up 56.9% of the respondents, and respondents were generally highly educated individuals, 35 years of age and older, who had lived in Anchorage from 1 to 77 years. Respondents reported an exceptionally broad array of occupations (101), with Retired, Science/Technology/Environmental and Education/Teacher being the most commonly reported occupations.

Based on the 2014 responses and a comparison of them with some of the 2010 survey answers, there was significant improvement in many areas, no noticeable change in other others, and, fortunately, there were few important negative losses. More respondents, who stated that they lived in a watershed, were able to correctly identify the watershed. However, the number of people who did not know if they lived in a watershed or thought that they didn't live in a watershed remained high. The survey indicated that out of 642 respondents, only 34.0% were interested in finding out more about watersheds. The remaining 66% were not interested. This was a significant decline from previous years.

The assessment of water quality yielded interesting results. Most respondents think that the quality of the creeks and streams is "Very good," "Somewhat good," or "Moderate." Between 2010 and 2014, those thinking that local waters are "Very good" and "Somewhat poor" have increased, whereas the other categories of assessment remained about the same. The biggest threats, as viewed by respondents, were stormwater runoff, animal waste, lawn and household chemicals, and sewage and leaking septic systems.

These threats have been major focus areas of our education programs, and we are pleased to see that the program is making positive strides.

Most respondents understand whether their sewage goes to the sewage treatment plant or into a septic system. The majority of respondents recognize that stormwater is not treated at the sewage treatment plant but flows directly into creeks and streams, which is an important concept. Some respondents thought that sedimentation basins and infiltration through the soil provided a significant cleaning of stormwater. The majority of respondents recognize that stormwater carries sediment, fecal coliform bacteria and other pollutants into our creeks, which we feel indicates a significant success in our education programs. The respondents believe that the Municipality, State of Alaska, Anchorage Waterways Council and businesses were primarily responsible for water quality; yet they were overwhelmingly adamant that individual citizens had an obligation for good water quality.

Dog owners constituted 48.6% of the respondents while non-owners were 51.4%, which is close to a 1:1 ratio; however it is a complete switch from the 2010 survey. Dog owners tend to "always" or "most of the time" clean up after the dogs around their residence—8 individuals reported they "never" cleaned up after their dogs. Once away from the residences, dog owners were slightly less prone to "always" pick up pet waste and more selected "most of the time." The individuals who "never" pick up after their pet decreased to 4 after they were away from their residences. The bulk of pet waste is bagged and placed in the garbage. Based on observations of Anchorage Waterways Council staff, dog owners are more inclined to pick up their pet waste in the summer and less so in the winter even though pet waste is more visually obvious in winter.

Lawn care and gardening have become more "green" and environmentally sound. People prefer natural vegetation or gardens to manicured lawns. Most don't use conventional chemicals or do use organic fertilizers, herbicides or pesticides. Those respondents that used the conventional kinds of these products did so either because they found it more convenient or they've always done it that way. Green waste is primarily either being mulched onto their lawns or composted. Bagging the waste and putting it in the garbage was still practiced by about 28.5% of respondents, however many of these individuals reported that they did this because their Home Owners' Association required it or that was the practice of their gardeners.

It is encouraging to see that more respondents are disposing of snow by putting it in their yards. Respondents reported using less chemical and ice melt around their homes. Those that use some sort of product on their driveways and walkway are using salt and ice melt products in about equal numbers. A few people are using sand, which certainly will enter the stormwater system and increase turbidity. Melt chemicals also enter the stormwater system, so in both cases local waterways are impacted.

The number of individuals not doing repairs on vehicles at their residence has increased from 65% to 70%, and the percentage of individuals who wash their vehicles in car washes has increased. The number of people washing their cars in driveways remains high though, and it is unclear whether this number includes "group car washes" at gas stations, malls, and fast food sites. More respondents noted that they try to use "green" or safe soaps when they wash vehicles at home. Recycling or taking to the landfill are the most common method of disposing of household chemicals and fluids and represents a dramatic increase since 2010. One issue brought up by respondents is that the disposal of used motor oil is difficult as few places will take it. Mapping out some motor oil recycling sites would be a good endeavor for Anchorage Waterways Council.

When asked what could be done to improve water quality of our creeks, the top choices were the reduction in the use of chemicals and fertilizers; "nothing" as we're doing all we can; clean up dog waste; code enforcement; and maintain and enhance natural vegetation

Members of the Anchorage community enjoy their waterways and participate in a diverse variety of activities with walking, enjoying nature, and biking being the most common. These activities occurred overwhelmingly along Campbell and Chester Creeks because of their well-developed trail system. Surprisingly, the Municipality's lakes were highly used with Goose Lake, Jewel Lake, and University Lake being the most common. Goose Lake is important for swimming, Jewel Lake for fishing, and University Lake for the off-leash dog park. The lakes need to receive more attention as many issues have been reported by respondents in recent months—invasive species, fertilizers and other chemicals being placed or leached into the lake, and high waterfowl concentrations.

Most respondents have "heard of" many cleanup programs, such as Spring Clean-up, Creek Clean-up and Scoop-the-Poop, but a smaller number have actually participated in these activities. Similarly with environmental organizations, most of the organizations have been "heard of," but again a smaller percentage are actually members. Respondents do, however, pride themselves on their volunteer activities with 70.7% reporting some kind of volunteer activities.

With environmental terminology, over 50% of the respondents had "heard of" some or most of the terminology, and the percentages for some categories have increased dramatically since 2010, such as wetlands, stormwater runoff, fecal coliform bacteria, invasive plants, water quality standards, and rain gardens. This is encouraging as these are areas we have focused on in our education program. Surprisingly, the number of respondents who have heard of Low Impact Development, macroinvertebrates, bioinifiltration, stormwater retention and green roofs has decreased significantly. Additionally, having "heard of" an environmental term does not indicate that the individual knows what it means. Assessing the extent of knowledge of these terms should be considered as a topic for a smaller survey.

The 2014 survey was useful and it shows that we are getting many positive results from our education programs. It also indicates that we have a way to go to ensure that our creeks and the stormwater that enters them are of the highest quality. For the future, there is a need to review and change some of the questions, and perhaps do smaller surveys that are focused on specific issues. By using Survey Monkey, we do have a faster means of completing surveys and analyzing the data.

The creeks and lakes are a great asset to Anchorage , its residents, and its business community, and because of this our waterways should receive proper care to ensure their sustainability. The education program is an essential tool to safeguard the Municipality's waters and is making a significant impact. The education program should be retained and enhanced using these findings.

MUNICIPALITY OF ANCHORAGE

WATERSHED & NATURAL RESOURCES ADVISORY COMMISSION
RESOLUTION NO. 2014-04

A RESOLUTION SUPPORTING THE ADOPTION OF THE *CHESTER CREEK WATERSHED PLAN* AS PROPOSED BY THE WATERSHED MANAGEMENT SERVICES SECTION OF THE MUNICIPALITY OF ANCHORAGE.

(WNRC Case No. 2014-01)

WHEREAS, The Alaska Pollutant Discharge Elimination Plan Permit ("Permit") that is held jointly between the Municipality of Anchorage and the State of Alaska Department of Transportation and Public Facilities is effective from February 1, 2010, to January 31, 2015; and

WHEREAS, the "Permit" requires under Section II-Stormwater Management Program Requirements, Section II.A.3., Watershed Planning, that permittees complete at least two individual watershed plans for specific water bodies before the expiration date of this permit; and the planning process must provide an opportunity for public input.

WHEREAS, each plan must identify priority resources within the watershed, and potential opportunities for storm water infiltration, evapotranspiration or rainfall harvesting/reuse, or other site-based low impact development practices.

WHEREAS, the "Permit" states that: "Each watershed plan should include consideration and discussion of the following principles:

a) Minimize the amount of impervious surfaces (roads, parking lots, roofs) within each watershed, by minimizing the creation, extension and widening of roads and associated development.

b) Preserve, protect, create and restore ecologically sensitive areas that provide water quality benefits and serve critical watershed functions. These areas may include, but are not limited to; riparian corridors, headwaters, floodplains and wetlands.

c) Prevent or reduce thermal impacts to streams, including requiring vegetated buffers along waterways, and disconnecting discharges to surface waters from impervious surfaces such as parking lots.

d) Seek to avoid or prevent hydromodification of streams and other water bodies caused by development, including roads, highways, and bridges.

e) Preserve and protect trees, and other vegetation with important evapotranspirative qualities.

f) Preserve and protect native soils, prevent topsoil stripping, and prevent compaction of soils."; and

WHEREAS, the Municipality of Anchorage has adopted the *Little Campbell Creek Watershed Management Plan* (2007), which will account for one of the two plans; and

WHEREAS, the updated *Chester Creek Watershed Plan* has been completed as of September 2014, which includes the principles required in the "Permit" and provides the second required plan; and

WHEREAS, the Anchorage Watershed & Natural Resources Advisory Commission has reviewed and commented on the *Chester Creek Watershed Plan.*

NOW, THEREFORE, BE IT RESOLVED that the Watershed & Natural Resources Advisory Commission recommends that the Anchorage Assembly adopt the 2014 *Chester Creek Watershed Plan.*

PASSED AND APPROVED by the Watershed & Natural Resources Advisory Commission on this 22nd day of October, 2014.

Jerry T. Weaver, Jr.
Secretary

10/31/14

Tamás Deák
Chair

(WNRC Case No. 2014-01)

Prepared for: The Municipal Planning Department and Watershed Management Services
Prepared by: Anchorage Waterways Council
(Draft)

Rev. 5, November 7, 2014

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Executive Summary

Chester Creek watershed is home to about 109,000 residents, several businesses, two universities, two major hospitals, elementary, middle, and secondary schools, and Merrill Field, a commercial service airport. Its area is almost 20,000 acres, which drains nearly 38 river miles. Settlement in the watershed was early in Anchorage's history, which has resulted in a fairly dense population of which much is literally along Chester Creek. Unfortunately many of the rules and regulations that apply to more recent development were not in place during much of the early construction, so that there are spots where Chester Creek is hemmed in tightly by homes and businesses. Regardless, the creek is a popular recreation area that has miles of multi-use trails, lakes and lagoons, and parks and greenbelts which attract a variety of recreational users.

Early on, Chester Creek ran unimpeded to Knik Arm, but in the late 1960s and early 1970s a dike and tidal gate were constructed at its mouth, which greatly altered the flow regime as well as the annual spawning migration of a once strong salmon population. This, coupled with development and channel alterations, resulted in major changes to the creek and its tributaries. In barely 100 years, Chester Creek has been transformed dramatically.

It remains a very popular waterway, but it has received considerable mistreatment. Besides an interruption in fish passage (which was reversed around 2008 by removal of the dam), there are several undersized culverts that freeze and clog and need replacement, straightened sections which enhance water velocity, sections that flood property, and stormwater runoff which has led to it being categorized as an impaired waterbody—primarily from fecal coliform.

This plan addresses the issues confronting Chester Creek Watershed as well as a variety of general and specific actions to improve the creek's water quality so it can remain one of Anchorage's urban assets.

Acknowledgements

The *Chester Creek Watershed Plan* was developed through a collaborative effort with help by many individuals from the following groups and agencies:

- **Alaska Department of Environmental Conservation (ADEC)**
- **Alaska Department of Fish and Game (ADF&G)**
- **Alaska Department of Natural Resources (ADNR)**
- **Alaska Department of Transportation and Public Facilities (AKDOT&PF)**
- **Alaska Pacific University (APU)**
- **Alaska Railroad Corporation (AKRR)**
- **Anchorage Park Foundation (APF)**
- **Anchorage Watershed Task Force**
- **Anchorage Watershed Roundtable**
- **Anchorage Waterways Council (AWC)**
- **Bureau of Land Management, Anchorage Field Office (BLM)**
- **HDR Alaska, Inc. (HDR)**
- **Joint Base Elmendorf-Richardson (JBER)**
- **KPB Architects**
- **Municipality of Anchorage (MOA), Watershed Management Services (WMS), Department of Parks and Recreation, Planning Department**
- **National Oceanic and Atmospheric Administration (NOAA)**
- **U.S. Army Corps of Engineers (USACE)**
- **U.S. Environmental Protection Agency (USEPA)**
- **U.S. Fish and Wildlife Service (USFWS)**

1. Introduction

A watershed is an area whose topography collects and routes water that falls as rain, melts from snowpack, flows from springs, and collects by gravity into a drainage system. Chester Creek watershed is the nearly 19,540 acres (30.5 mi^2) [1] that are drained by Chester Creek and its tributaries. The Chester Creek drainage system predominantly occupies northeast Anchorage and flows west through the Anchorage Bowl. Natural features that include flowing water, wetlands, fish, and wildlife, alongside a world-class trail and park system make the Chester Creek watershed an attraction and an asset to the Municipality of Anchorage (MOA). A unique urban Alaska amenity, this watershed is also home to many residents, businesses, two universities, three hospitals, a variety of schools, and even an airport (Merrill Field).

This document, the *Chester Creek Watershed Plan*, is a tool for planners, scientists, community members, and others to make decisions that will slow further declines and enhance the positive characteristics of the watershed. The plan describes the area's resources, addresses social and environmental concerns, and identifies development and activities that are most beneficial to the watershed as a whole. It recommends policies and objectives compatible with maintaining urban development and preserving a healthy watershed that is a centerpiece of the community.

Chester Creek watershed is composed of the land area and waterbodies that drain Chester Creek to Cook Inlet. This area is home to about 109,000 residents[2] (or 37% of Anchorage's official population). The watershed supports a wide range of fish and wildlife species from salmon to bears. Approximately 10% of the land area (exclusive of trails) within the watershed is devoted to parks and open spaces[3]. Some of these areas support trails for walking, running, hiking, biking, skiing, skijoring, and horseback riding.

In addition to its many positive attributes Chester Creek also has a multitude of problems that harm the creek's biotic community, limit recreational and economic opportunities, and impair its aesthetic qualities. Degradation of water quality and important habitats along with loss of natural productivity and biodiversity are concerns for the entire watershed. And, in several areas of the watershed, development has encroached upon creek-side habitat, which increases the probability of flooded property.

[1] *MOA Hydrography Geodatabase*, 2012.
[2] U.S. Department of Commerce, Bureau of the Census, *United States Census, 2010.*
[3] *LANDUSE_MOA*, 2004-2005. MOA planner, Thede Tobish, reports that this is the most recent GIS data on MOA land use. (personal communication, July 8, 2013).

Importance of Watershed Planning

Watershed planning is essential for many reasons. As local areas develop and grow (often quickly), the result can be a degradation of water resources. It has become more evident that protecting local water resources must be viewed from and happen at the watershed level. From this scale, it is possible to identify specific issues or problems that are the sources of and contribute to degradation and work towards solutions. Watershed planning also provides local governments with a framework to prioritize valuable and sometimes scarce resources, such as funding and internal staff time, and work cooperatively with other agencies and organizations. This helps ensure compliance with federal, state and local regulations. The following lists some of the benefits of watershed planning:

Local Government Benefits

- Enables analyses that are most meaningful at a watershed or subwatershed scale (e.g., nutrient and sediment loadings, impervious cover estimates, low impact development (LID) potential, etc.)
- Enables management at a scale necessary to ensure consistency with TMDLs (Total Maximum Daily Loads)
- Provides a framework for prioritizing resources (staff, funding, etc.)
- Provides educational opportunities for citizens to understand how natural resource management interacts with existing and future development
- Gives citizens an active voice in protecting and restoring natural resources that are important to the community

Administrative Benefits

- Provides a structure for communities to target geographic areas for land conservation and development to maximize the efficiency of community planning efforts including LID
- Enables more efficient management of permitting programs
- Focuses data collection and analysis for environmental assessments
- Provides benchmarks for measuring the success of management efforts

Environmental and Health Benefits

- Improves quality of water from a variety of aspects, i.e. non-point source pollution, thermal impacts, and sedimentation
- Enhances water supply and recreational contact safety
- Protects wildlife habitat and improves natural resources and ecologically sensitive areas, such as riparian corridors, headwaters, floodplains, and wetlands
- Controls flooding by retaining and/or restoring riparian and wetland areas

Financial Benefits

- Avoids development in sensitive areas and can help minimize compliance and mitigation costs
- Provides a framework and rationale to pursue various funding opportunities
- Prevention and planning is less costly than restoration

Regulations and Plans

There are a number of existing regulations and permit requirements that infer or specifically call for watershed planning in Anchorage. These include:

- Alaska Administrative Code Title 18, Chapter 70[4] provides standards for water quality that must be maintained in Alaska.

- Anchorage Municipal Code, especially Title 21[5], outlines regulations related to land use, including setback areas for stream protection, water quality protection, pollution, and construction requirements[6].

- The National Pollutant Discharge Elimination System (NPDES) Permit No. AKS-052558 held jointly by the Municipality of Anchorage and the Alaska Department of Transportation and Public Facilities (AKDOT&PF) was transferred from the Environmental Protection Agency (USEPA) on February 1, 2010, to the Alaska Department of Environmental Conservation (ADEC). Known as the Alaska Pollutant Discharge Elimination System (APDES) permit, it calls for the development of two watershed plans during the first five years of the newly transferred permit's implementation (by 2015).

Additionally, planning documents for Anchorage contain recommendations for creating and adopting watershed plans.

- In February 2001, the Municipality of Anchorage adopted the *Anchorage 2020 Anchorage Bowl Comprehensive Plan*, which is a guide to address 21st century development. *Anchorage 2020* emphasizes the need for watershed management plans. Under "Policy" it states, "*Integrate water resource and land use planning through watershed planning and [d]evelop watershed plans for all Anchorage creeks*"[7]. It also calls for aquatic resources to be protected and restored where feasible[8].

[4] At http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2070.pdf ,April 8, 2012.
[5] At http://library.municode.com/index.aspx?clientId=12717.
[6] Note: Title 21 is being revised and reader should check the latest version, revisions, and adoptions on the Municipality of Anchorage's website at http://www.muni.org .
[7] Municipality of Anchorage Planning and Development, *Anchorage 2020, Anchorage Bowl Comprehensive Plan*, March 2000, p. 85.
[8] Ibid, p. 86.

- *Anchorage Bowl Park, Natural Resource, and Recreation Facility Plan*[9]. Park Strategy 7 refers to Stewardship of Natural Resources. Both short-term and long-term strategies contain elements for conserving existing natural resources (water being one) as well as adjacent habitat.

Finally, the USEPA listed Chester Creek, University Lake and Westchester Lagoon as Section 303 (d) impaired waters in 1990 due to fecal coliform which identified urban runoff as the pollutant source[10]. A Total Daily Maximum Load (TMDL)[11] for urban runoff was completed in 2005 for these waters.

2. Creation of the Plan

History of the Plan and Participants

Early on, the Chester Creek watershed was selected as the logical choice for a comprehensive watershed plan because of long-standing issues with pollution. In 2003 the MOA, agencies, and the public came together to synthesize data into a draft plan[12]. Although a draft watershed plan was completed in 2005—it was not put through the formal adoption process by the Municipal Assembly.

The data in the 2005 report were nearly a decade old in 2011 when an advisory committee was created by a grant from the U.S. Fish and Wildlife Service (USFWS) to the Anchorage Waterways Council (AWC) to facilitate a review of the existing plan with a goal to bring the information up to date and prepare a document for adoption by the Municipal Assembly. The 2005 draft included years of collected data, literature reviews, and public and agency participation. A mission statement and vision statement had been drafted; forums for public and agency input were created; desired outcomes and results were defined and placed in categories; policy and objectives were reviewed which could be tied to the categories; and consensus building was used to bring the public and agency interests together for acceptance. A considerable amount of work had already been accomplished.

When the newly established group began to meet in January 2011, the funded project was titled, "Watershed Planning in the Municipality of Anchorage." As part of the evaluation process, several meetings were held, 3 field trips were taken along Chester Creek by group members, and there was careful review of the earlier vision, mission statement, and goals set forth in the 2005 plan. Some projects had been completed so they could be removed from the list, other alterations had taken place, and new issues had developed. The 2005 *Chester Creek Watershed Plan's* original vision and mission statement were retained. The goals were evaluated in conjunction with the *Little Campbell Creek Watershed Plan* (December 2007), which was adopted by the Municipal Assembly in June 2008. The advisory group found the *Little Campbell Creek*

[9] Municipality of Anchorage Planning Department & Parks and Recreation Department, *Anchorage Bowl Park, Natural Resource, and Recreation Facility Plan*, April 2006, pp. 50-51.
[10] *Total Daily Maximum Load for Fecal Coliform in Chester Creek, University Lake, and Westchester Lagoon, Anchorage, Alaska*, Alaska Department of Environmental Conservation, May 2005.
[11] A TMDL or Total Daily Maximum Load is defined by the EPA as "a calculation of the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards". See http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/ for more information.
[12] From Municipality of Anchorage Planning Department & Watershed Management Division. (Prepared by HDR Alaska, Inc.). *Chester Creek Watershed Plan Draft.* June 2005.

Watershed Plan to be more streamlined with less detail—leaving more latitude on objectives and a good model. The *Little Campbell Creek Watershed Plan* goals were: water quality, water quantity, terrestrial habitat, aquatic habitat (in the Chester plan these two had been combined), recreational and economic opportunities, communication and coordination, and the addition of two new objectives: open space and data acquisition. The 2005 plan also provided a starting point for evaluation of issues, improvements, and actions, which resulted in prioritized lists that will be provided later in this plan.

Participants in the latest revision included: the MOA Watershed Management Services (WMS), the MOA Planning Department, the MOA Parks and Recreation Department, the Alaska Department of Environmental Conservation (ADEC), Joint Base Elmendorf-Richardson (JBER), the U.S. Fish and Wildlife Service (USFWS), the Alaska Railroad (AKRR), the Alaska Department of Fish and Game (ADF&G), Anchorage Waterways Council (AWC), HDR, Alaska Inc. (HDR), the U.S. Army Corps of Engineers (USACE), National Oceanic and Atmospheric Administration (NOAA), Anchorage Park Foundation (APF), Alaska Department of Transportation and Public Facilities (AKDOT&PF), the Environmental Protection Agency (USEPA), Alaska Department of Natural Resources (ADNR), Bureau of Land Management (BLM), Alaska Pacific University (APU), and KPB Architects.

Vision, Mission, and Goals for the Chester Creek Watershed Plan:

The **Vision** is, "*The Chester Creek Watershed is a system that promotes and enhances healthy neighborhoods, businesses, and habitats*".

The **Mission Statement** is, "*The mission of the Chester Creek Watershed Plan is to guide community decisions within the Chester Creek Watershed in order to sustain and enhance environmental, social, and economic functions and values of the land and watercourse*".

The **Goals** are:

	GOAL	OBJECTIVE
Water Quality	*Meet state standards for water quality in Chester Creek.*	*Reduce pollution from point and non-point sources.*
Water Quantity	*Return Chester Creek to a more natural hydrologic scheme.*	*Eliminate flood hazards, maintain flows for habitat, preserve and/or widen existing floodplains where necessary.*
Wildlife Habitat	*Provide habitat for diversity of wildlife along Chester Creek.*	*Maintain and enhance existing wildlife corridors, riparian habitat, greenbelts, and parks.*
Fish Habitat	*Provide for healthy fish and other aquatic organism populations in Chester Creek.*	*Provide habitat connectivity, quality, and diversity for all aquatic life stages.*
Social and Economic Opportunities	*Foster a high degree of social and economic opportunities.*	*Establish and build a connection between a healthier watershed and social and economic benefits to the community.*
Communication and Coordination	*Have a highly motivated and dedicated community and Municipality in maintaining the health of Chester Creek.*	*Promote community and municipal awareness and stewardship of Chester Creek.*
Data Acquisition	*Improve our understanding of the watershed.*	*Evaluate research needs, conduct studies, gather data, and share information.*

3. Watershed Characterization

Chester Creek, one of Anchorage's three major urban creeks, bisects the Anchorage Bowl, with approximately one-third of the city north of the creek and two-thirds south. Before Anchorage was built in 1914, the local indigenous people were the *Dena'ina*, and this area was popular for fishing. The *Dena'ina* name for Chester Creek is *Chanshtnu*, or Grass Creek, which later was transliterated into "Chester"[13]. At that time, the watershed consisted of forest, peat bogs, glacial residue, and wetlands. In the 100 years since the birth of Anchorage, a growing population and expanded development have transformed the Chester Creek watershed into the most developed watershed in the Municipality with the highest human population (~37%) of Anchorage's urban watersheds.

This characterization of the Chester Creek watershed includes summary information ranging from geographical and physical characteristics to land use and biotic quality. References for this information should be utilized to obtain more detailed information.

Location and Watershed Features

The Chester Creek watershed extends 21 miles from the Chugach Mountains to the creek's mouth on Knik Arm at Westchester Lagoon. Its four subwatersheds and seven drainages (Table 3.1) consist of 37.8[14] river miles. Each drainage has its own headwaters. The watershed consists of

[13] Kari, J. and J.A. Fall, 2003, *Shem Pete's Alaska*, Fairbanks: University of Alaska Press, p. 332.
[14] *MOA Hydrography Geodatabase*, 2012.

approximately 19,532 acres (30.5 mi^2)[15]. An estimated 12,583 acres are contained within the municipal boundaries and the remaining portion lies within Joint Base Elemendorf—Richardson (JBER) and Chugach State Park.

Figure 3.1. South Fork Chester Creek Leaving JBER (Military Lands) (2011)

Figure 3.2. Chester Creek Flowing out of Westchester Lagoon to Knik Arm (2013)

[15] *MOA Hydrography Geodatabase*, 2012.

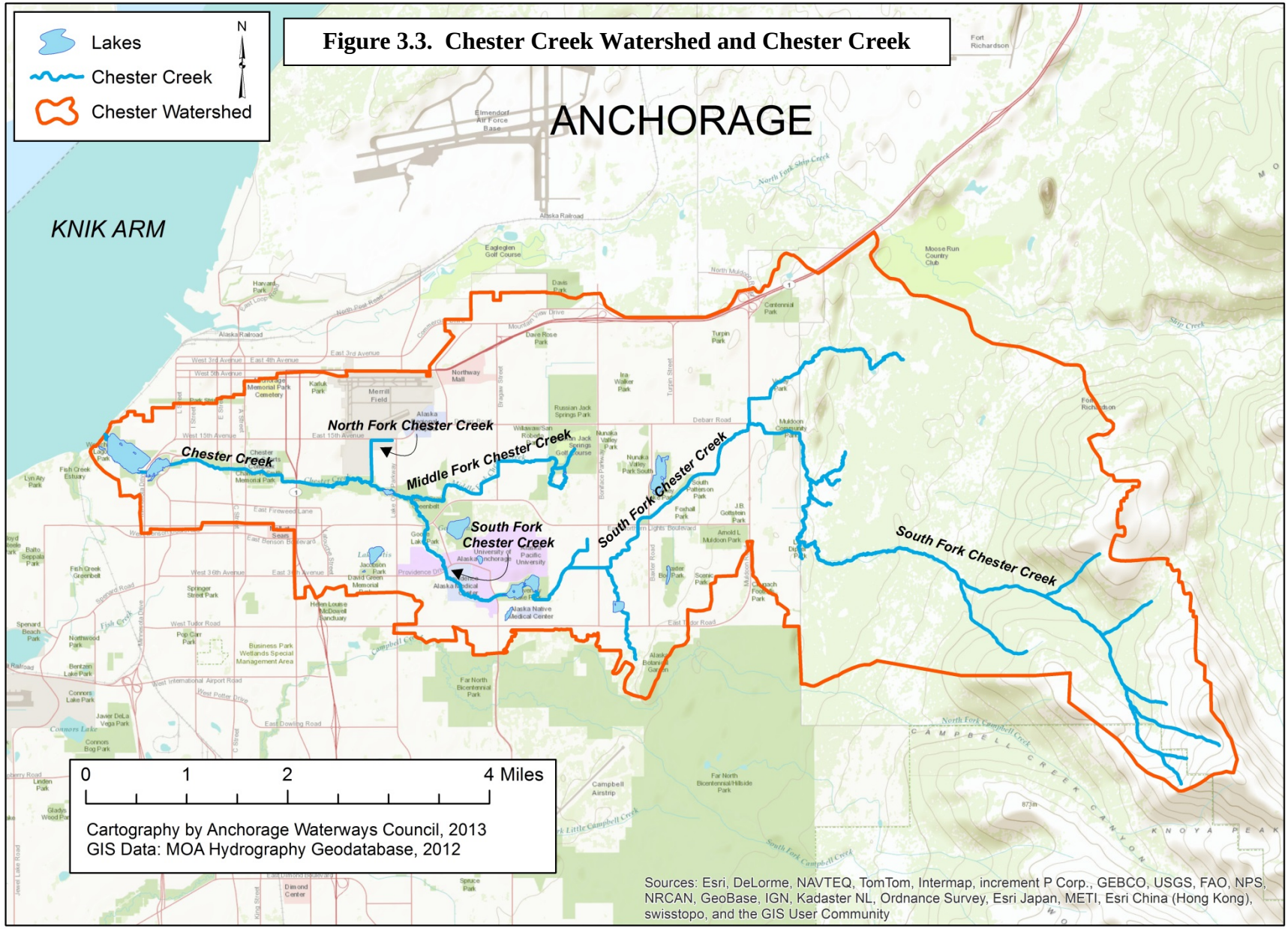


Figure 3.3. Chester Creek Watershed and Chester Creek

Subwatersheds and Creek Sections

- **Lower Chester Creek**, often called the "main stem", begins where the North and South forks meet, and flows west through Anchorage. Lower Chester Creek creates an approximate division between the downtown and midtown areas of Anchorage. It flows to Westchester Lagoon and ultimately into Knik Arm, the northernmost branch of Cook Inlet.
- **North Fork** begins near Lake Otis Parkway, 15th Avenue, and Sitka Street by Merrill Field. The North Fork joins Chester Creek at the Chester Creek Greenbelt just west of Lake Otis Parkway and Hillstrand Pond, between Maplewood and E. 20th Avenue.
- **Middle Fork** emerges as a spring at Russian Jack Springs Park. It flows both south like a large "U", then north where a reach of it flowing west joins it. It runs into the South Fork in an area just east of Lake Otis Parkway by the Davenport (ball) Fields.
- **South Fork** forms the main headwaters of Chester Creek. It originates in the Chugach Mountains on the Fort Richardson portion of JBER and drains a relatively undeveloped portion of the watershed in the Chugach foothills before reaching the Anchorage Bowl. The South Fork actually comprises two branches (north and south) that join near Muldoon Road and Debarr Road. From here, the South Fork flows southwest to University Lake, adjacent to Alaska Pacific University (APU). From the lake, the South Fork flows northwest through part of the University of Alaska Anchorage (UAA) campus until it joins the Middle Fork. Reflection Lake drainage is located near the southeast reach of the South Fork drainage. For management purposes, the Reflection Lake drainage has been combined with the South Fork in this plan. Reflection Lake itself is a small lake located just north of E. Tudor Road between Boniface Parkway and Baxter Rd. Reflection Lake does not appear on the 1962 U.S. Geological Survey Anchorage and Vicinity topographic map (1:24,000), and is a human-made lake.

Subwatershed	Drainage	Area in acres
Lower Chester Creek	Westchester	2,798.2
North Fork Chester Creek	North Fork	1,187.4
Middle Fork Chester Creek	Lower Middle Fork	1,203.0
Middle Fork Chester Creek	Upper Middle Fork	1,513.3
South Fork Chester Creek	Lower South Fork	6,265.3
South Fork Chester Creek	Upper South Fork	6,182.4
South Fork Chester Creek	Reflection Lake	382.11
Total		**19,531.7**

Table 3.1. Subwatersheds and Drainages of Chester Creek Watershed

Within Anchorage, all forks of Chester Creek are affected by development, channelization, and parts of certain forks are routed through the Municipal storm drain system. The South Fork has been straightened and diverted to a new channel through University Lake, which was created from a gravel pit. The Reflection Lake drainage appears to have been created after 1962.

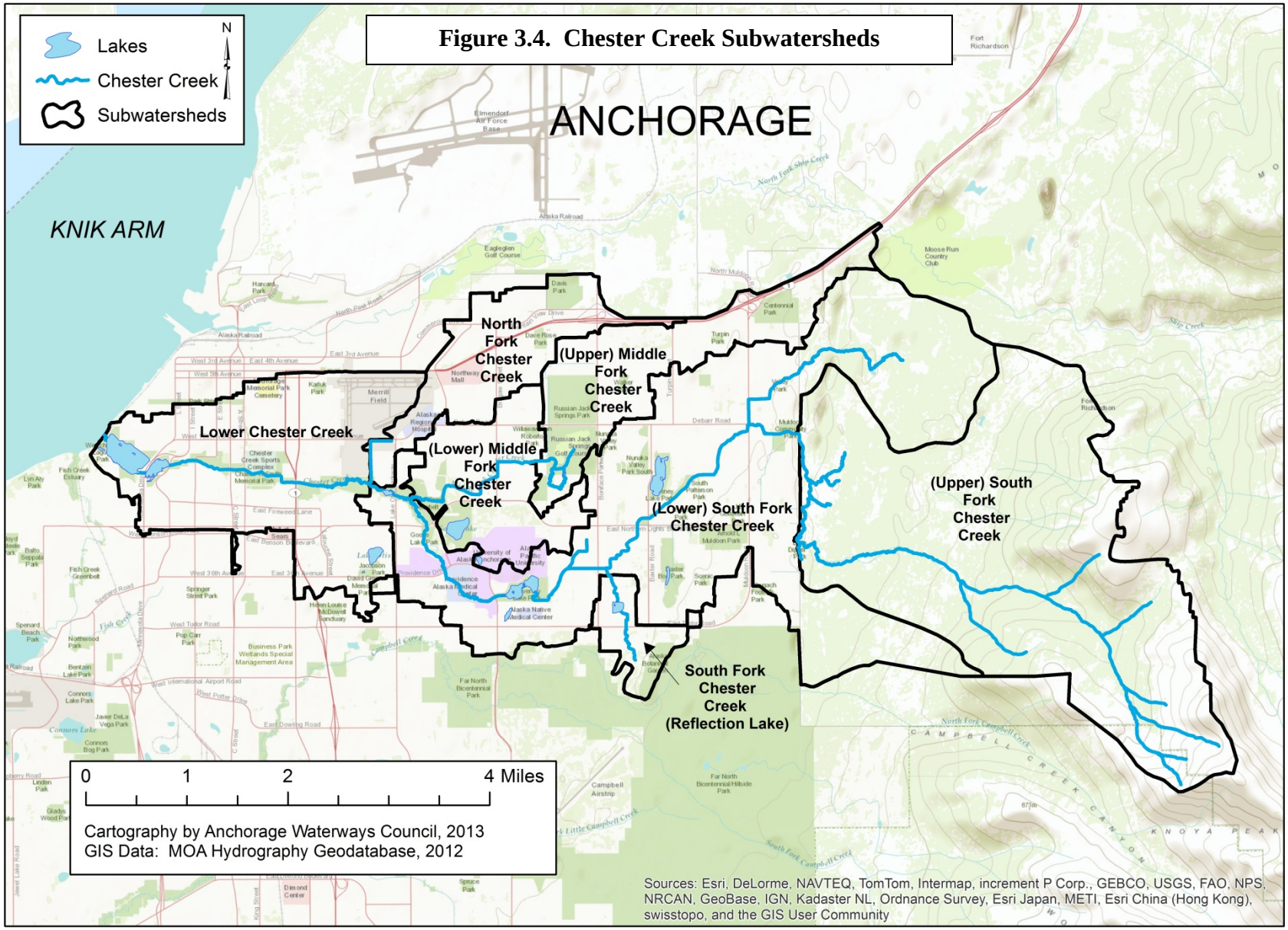


Figure 3.4. Chester Creek Subwatersheds
Lakes
Chester Creek
Subwatersheds
N
ANCHORAGE
KNIK ARM
North Fork Chester Creek
(Upper) Middle Fork Chester Creek
Lower Chester Creek
(Lower) Middle Fork Chester Creek
(Lower) South Fork Chester Creek
(Upper) South Fork Chester Creek
South Fork Chester Creek (Reflection Lake)
0 1 2 4 Miles
Cartography by Anchorage Waterways Council, 2013
GIS Data: MOA Hydrography Geodatabase, 2012
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Lakes

Lakes are another significant characteristic of the Chester Creek watershed. Nine named lakes are found within the watershed (Table 3.2). Four of the lakes are connected to Chester Creek: Westchester and East Westchester Lagoons, Hillstrand Pond, Reflection Lake, and University Lake (Figure 3.6), although several are human-made. In the 1980's Chester Creek was diverted to flow through a former gravel pit to create University Lake. Westchester Lagoon was created in the late 1960's and early 1970's by building a dike and then a tide gate at its mouth. In July 2008, the mouth of Chester Creek was redesigned with the tide gate removed, and a more natural outflow system that would enhance fish passage was installed.

Lake Name	Acreage	Origin
Westchester Lagoon/Eastchester Lagoon	75.4	Human-made (weir)
Cheney	24	Human-made (gravel extraction)
University (formerly Behm)	21.1	Human-made (gravel extraction)
Goose	19.0	Natural
Lake Otis	10.1	Natural
Reflection	6.6	Human-made (gravel extraction)
Baxter Bog	2.8	Natural
Unnamed 1	2.7	Human-made
Hillstrand Pond	2.5	Channel constriction (cause unknown)
Mosquito	2.0	Human-made ?
Unnamed 2	0.8	Human-made
Unnamed 3	0.2	Human-made
Unnamed 4	0.2	Human-made

Table 3.2. Chester Creek Watershed Lakes

Figure 3.5. Westchester Lagoon Looking East (2005)

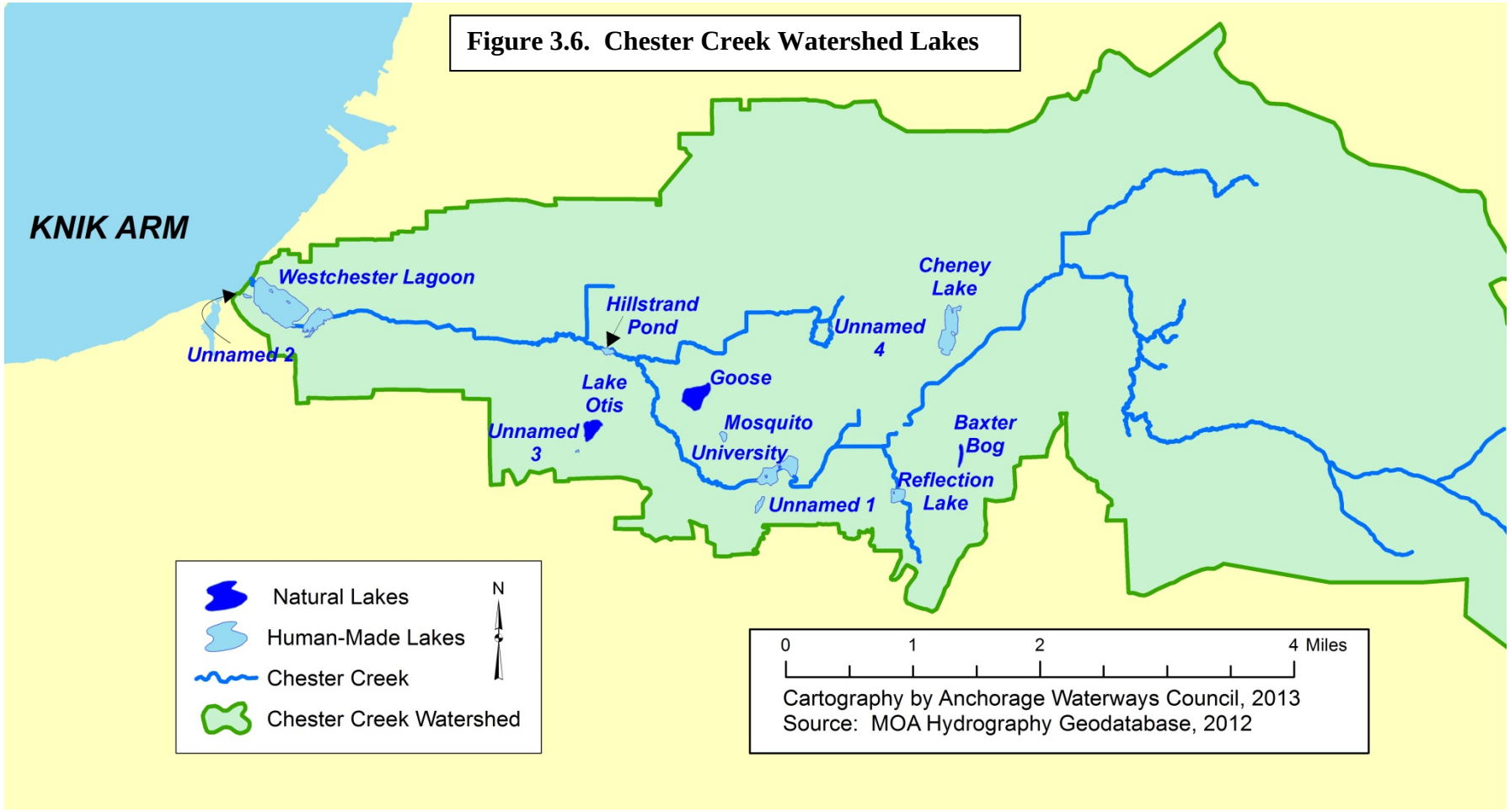


Figure 3.6. Chester Creek Watershed Lakes

Climate and Soils

The MOA has conducted analyses of climate for watershed planning and stormwater management, and the results have been incorporated within the MOA Design Criteria Manual[16]. Climate variation within the Chester Creek watershed is significant, as temperature and precipitation change dramatically with elevation gain. For example, municipal design criteria compensate for precipitation intensity variation by elevation using a multiplication factor up to 2.0 times the precipitation intensity that falls at the Anchorage airport compared to the upper reaches of Chester Creek[17]. Winter snowfall and lower temperatures can stay up to a month longer at elevations above 1,000 feet. Climate summaries are available from various sources such as the National Weather Service in Anchorage.

[16] Municipality of Anchorage. Project Management and Engineering, 2007. *Design Criteria Manual.* The Municipality is currently seeking comment for updating the manual.
[17] Dilley, L. and T. Dilley. *Guidebook to Geology of Anchorage, Alaska*. Anchorage: Publication Consultants, 2000.

From its headwaters, the creek flows through various landscape features of glacial origin before reaching its mouth at Knik Arm. Glaciation has been the major geological process in the watershed. Soils in the Chester Creek watershed are primarily the result of historic glacial processes. In the eastern section of the watershed where the creek flows down the foothills of the Chugach Range, thin layers of soil cover bedrock. The mid-portion of the watershed has soils that are primarily glacial in origin[18]. Parent materials are mostly sand, loess and other silts, and over-lying gravel, that have been deposited by eolian processes. In the flatter lowlands to the west, soils can be deeper than 30 feet and loamy in nature. The tidal plains at the mouth are clayey and silty sediments deposited by Chester Creek. Poorly drained bogs and fens occupy broad depressions throughout the watershed.

Natural Vegetation

Natural undeveloped areas of the Chester Creek watershed are important for moderating water flow, improving and protecting water quality, evapotranspiration, providing wildlife habitat, and enhancing quality of life. During rainfall and breakup, water runs into natural low lying areas before reaching creeks or lakes. Natural vegetation, especially in wetlands, holds water and releases it slowly over time into the creek and lakes. Thus, natural areas moderate stream flow by providing flood storage and energy dissipation during storm events. Because natural vegetation slowly releases water to streams and lakes, it provides base flow during periods when the creek is low. These areas also improve water quality by acting as a natural treatment system—trapping sediment, retaining or removing nutrients, and increasing the amount of dissolved oxygen in the water column.

Vegetation in the Chester Creek watershed varies with elevation, soil type, aspect, water table level, and drainage. Mixed coniferous (primarily white and black spruce) and deciduous (willows, birch, cottonwoods, and aspens) forests dominate the well-drained soils in the upper reaches of the eastern part of the watershed. Dwarf dogwood, moss, and grasses and sedges are found on the ground below. In other areas, cottonwood and birch trees grow above willow and alder shrubs. Fireweed, grasses, and sedges provide the primary ground covers in these areas. In many places, as native vegetation has been removed, invasive plant species, such as White Sweetclover (*Melilotus alba*), Bird Vetch (*Vicia cracca*), and Common Toadflax (*Linaria vulgaris*), have increased.

Wetlands were commonly found in the more poorly drained lowland areas to the west, but few remnant wetlands are still present, mainly along creeks. These wetlands have been delineated and documented in the *Anchorage Wetlands Atlas*, 2008[19], as well as in Municipal GIS shapefiles.[20] A variety of wetland types are found in the Chester Creek watershed, including the following:

- **Shrub bogs** with willows, alders, and other shrubs. The wetlands near the North Fork south of Merrill Field are a good example of this wetland type.
- **Spruce bogs** (or needleleaf forest wetlands) with black and white spruce. This type is evident near the University of Alaska Anchorage and Alaska Pacific University campuses.
- **Bog meadows** (or wet graminoid herbaceous wetlands) with grasses and sedges. Such wetlands are found near Westchester Lagoon.

[18] U.S. Department of Agriculture. *Soil Survey of Anchorage Area, Alaska*. 2001.
[19] At http://anchoragewatershed.com/datalibrary.html . It has been updated to 2012, but that has not been approved by the MOA Assembly as of this writing.
[20] *MOA Hydrography Geodatabase*, 2012.

As Anchorage has grown, wetlands have been filled or drained to provide land for development. In 1950, wetlands made up 42% of the Chester Creek watershed area. Steer estimated that of the wetlands extant in 1950, by 1999 they had been reduced by 74% or 2,831 acres[21]. Today, wetlands account for just 5% or about 1,065 acres of the entire Chester Creek watershed[22] (Figure 3.7).

The riparian zone is the interface between land and a river, stream or lake, and it, along with wetlands, are essential to the survival of salmon and other fish. Riparian areas often correspond with the active floodplain, the lowland bordering a waterbody that is subject to flooding. Although the riparian zone makes up a relatively small percentage of a watershed, it is a crucial component of the ecosystem. The riparian zone provides important fish and wildlife habitat, areas of ground water recharge, flood control, and water quality protection. In undeveloped areas, riparian zones are wide enough to allow the channel to meander naturally. This riparian buffer area is typically seven to ten times the width of a stream or creek. It accommodates the winding of the stream as it travels toward its mouth.

Riparian quality varies drastically within the Chester Creek watershed. The creek is considered a medium-sized stream and is estimated to need a 125-foot wide riparian buffer zone on each side of the stream channel. The current Anchorage Municipal Code protects a 25-foot stream setback area, although there has been much citizen and scientist involvement trying to expand this in the Municipal Code's Title 21. In areas where a stream is directly associated with a wetland, this setback may be wider, up to 100 feet. Along many areas of Chester Creek, development extends right to the edge of the creek. However, in the Municipal greenbelt within the Chester Creek watershed, there are many areas that provide buffer zones and protect the riparian corridor.

Although highly modified, the Middle Fork drainage retains decent riparian quality. Functioning riparian zones are almost non-existent in the upper two-thirds of the South and North Forks of Chester Creek. The headwaters of the Reflection Lake tributary have a significant amount of undeveloped riparian area remaining. The riparian zone along the lower end of Chester Creek, where dense development predominates, contains only a few isolated, undeveloped riparian areas.

[21] Steer, M. Anjanette, 1999, pp. iv.
[22] *MOA Hydrography Geodatabase*, 2012.

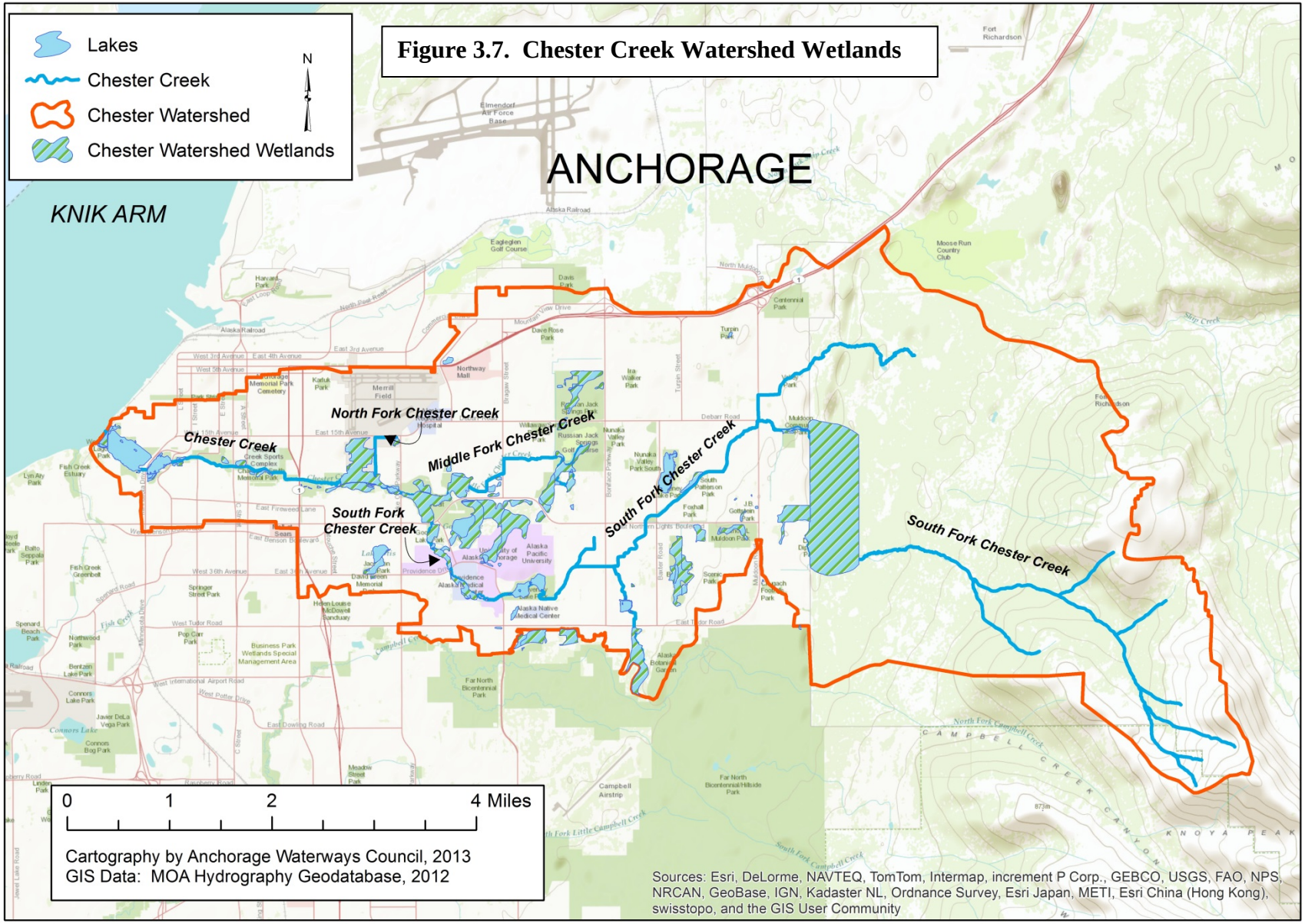


Figure 3.7. Chester Creek Watershed Wetlands

Fish and Wildlife

Anchorage residents enjoy the diversity and abundance of fish and wildlife that are present in the Chester Creek watershed. Wildlife makes living in Anchorage interesting and special. The Chester Creek watershed contains many of the mammals and birds typical of Anchorage. As these animals move through the watershed, they encounter roads and development where there are conflicts and vehicular collisions. Providing corridors for these animals is important to maintain population numbers and to reduce accidents. Some information on these corridors is provided in the Alaska Department of Fish and Game's (ADF&G) *Living with Wildlife in Anchorage: A Cooperative Planning Effort* (2000), and *Technical Report on Significant Open Space in the Anchorage Bowl: A Survey of Biologically Important Habitat and Areas Identified As Important to the Anchorage Community*[23].

A variety of fish, wildlife, and bird species inhabit the watershed. These include moose, coyote, red fox, lynx waterfowl, songbirds, and four native salmon species. Chester Creek wildlife not only adds to the quality of life for residents of Anchorage, it also boosts the economy. Many visitors come to Anchorage to experience the city's unique wildlife. Most Anchorage residents have had the experience of trying to find a moose to show visiting friends or relatives.

Westchester Lagoon provides some of Anchorage's first open water in the spring, attracting many migratory birds. Canada Geese (*Branta canadensis*), Great Scaup (*Aythya marila*), Barrow's Goldeneye (*Bucephala islandica*), Mew Gull (*Larus canus*), Green-winged Teal (*Anas carolinensis*), and American Wigeon (*Anas americana*) are just some of the birds that rest, nest or rear young on the lagoon. The lagoon is the most prolific site for Red-necked Grebes (*Podiceps grisegena*) and the second most productive site for Mallard Duck (*Anas platyrhynchos*) nesting in the Anchorage area. It provides a fall and early winter home for the large number of mallards that reside year-round in the Anchorage area. The diversity and concentration of birds around the lagoon draw birders from across the country.

Coho (*Oncorhynchus kisutch*), Pink (*Oncorhynchus gorbuscha*), Dolly Varden (*Salvelinus malma*) and Rainbow Trout (*Oncorhynchus mykiss*) have been documented in Chester Creek[24] and much of Chester Creek is classified by the ADF&G as anadromous fish habitat (Figure 3.12). Reports have been made of Chinook (*Oncorhynchus tshawytscha*), and Sockeye (*Oncorhynchus nerka*) salmon as well.

In the early 1970s when the weir and culverts were built at the mouth of Chester Creek, an ineffective fish ladder was also placed in the area, and the result was a great reduction in a once strong return of Coho Salmon and Dolly Varden[25]. In the intervening years, pipelines owned by the Anchorage Water and Wastewater Utility (AWWU), Tesoro Alaska Petroleum Company, and the Anchorage Fueling and Service Company (AFSC), which is now known as Aircraft Services International Group (ASIG), were constructed in the fill over the culverts that connected the dam and weir. The result of all this construction and constriction at Chester Creek's mouth was "severely restricted fish passage between Cook Inlet and Chester Creek"[26]. It had a cascading effect due to fill in the upstream channel which restricted salinity changes [needed by fish] that had occurred previously in

[23] Great Land Trust, December 1999, Anchorage, AK.
[24] Johnson, J. and M. Daigneault. 2013. *Catalogue of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes—Southcentral Region, Effective July 1, 2013*
[25] U.S. Army Corps of Engineers, 2004. *Section 206 Ecosystem Restoration Report and Environmental Assessment, Chester Creek, Anchorage, Alaska*, p. 1.
[26] Ibid., p. 5.

the intertidal zone, leading to a loss in species diversity, increased colonization of salt-tolerant "weedy" plants, and the likelihood of decreased bird use and diversity[27]. The primary issue for the previous large runs of Coho Salmon, Dolly Varden, and probably Pink Salmon, was their near extinction in Chester Creek from the dam and weir[28]. Using Section 206 of the Water Resources Development Act of 1996, the degraded aquatic ecosystem was studied to see if this area could be returned to a more natural condition which would improve anadromous fish passage. The results were a set of alternatives, with the preferred alternative being the construction of an open channel from the lagoon under the trestle bridge to Cook Inlet[29]. Several agencies coordinated the effort, and in 2009 the "Chester Creek Aquatic Restoration Project" was completed.

It is important to note that although Chester Creek has a multitude of problems upstream that need to be fixed, it was decided that there was basically no point to focus on them until some sort of solution had taken place at the mouth since so few fish were able to get upstream, and this usually only occurred during extreme high tides. In 2008, Dr. Rusty Myers of Alaska Pacific University (APU) was funded to set up a video monitoring station at Westchester before construction began to establish a baseline of fish numbers escaping into Westchester Lagoon[30]. By 2009, estimates were that four times the number escaped into Westchester Lagoon during the first year alone[31].

Table 3.3 Salmon Counts for Sampled Years[32]

Year	Salmon Count
2008	481
2009	1704
2010	No count
2011	1743
2012	1752
2013	2481

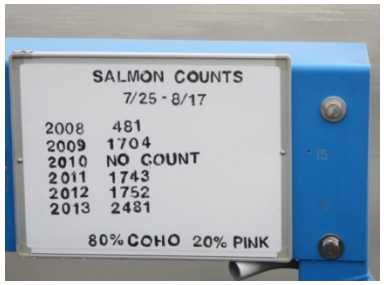


Figure 3.9. Salmon Counts by APU

Figure 3.8. Outflow of Westchester Lagoon Where Fish Escapements Were counted by APU

[27] Ibid.
[28] Ibid., p. 1.
[29] Ibid., p. 39.
[30] Amman, E., NOAA. "Chester Creek Video Monitoring and Habitat Restoration". 2008 http://alaskafisheries.noaa.gov/habitat/restoration/chestercreek_videoprj.pdf .
[31] Myers, R., 2010. "Salmon Escapement into Chester Creek Before and After Habitat Restoration", paper presented at the 2010 AWRA Alaska Section Conference.
[32] These figures are taken from the sign posted by Alaska Pacific University at the counting area (the outflow of Westchester), and were confirmed by Dr. Rusty Myers, (personal communication, January 21, 2014). See Figure 3.9.

Other fish found in the creek include stickleback, both Threespine Stickleback (*Gasterosteus aculeatus*) and Ninespine Stickleback (*Pungitius pungitius*)[33], Slimy Sculpin *(Cottus cognatus),* and Pacific Lamprey *(Lampetra tridentata).* Alaska Blackfish (*Dallia pectoralis),*[34], apparently have been introduced into the Chester Creek watershed, contrary to state law, and have been found in University Lake, Goose Lake, and Lake Otis. Because blackfish are found in University Lake, they have the potential of spreading through the whole Chester Creek system.[35] To date, Northern Pike *(Esox lucius)* have only been found in Cheney Lake, and an eradication program was conducted in 2008 although 4 pike were found in 2011. It is believed that they were illegally introduced and ADF&G still believes Cheney Lake to be pike-free[36]. The ADF&G introduced Rainbow Trout into Chester Creek between 1971 and 1973 to establish a reproducing population, which was estimated at 7 fish per stream mile in 1974 and 368 per stream mile in 2001[37].

Figure 3.10. Coho Fry in Chester Creek

Figure 3.11. Spawning Coho in Chester Creek[38]

[33] Dr. Frank von Hippel, (personal communication, December 24, 2013).
[34] Alaska Department of Fish and Game. 1994. *Alaska Blackfish.* http://www.adfg.alaska.gov/static/education/wns/alaska_blackfish.pdf .
[35] Chlupach, R.S. 1975. *Studies of introduced blackfish in waters of southcentral Alaska*. Annual Performance Report for Sport Fish Studies, volume 16, study G-II-K. Alaska Department of Fish and Game.
[36] Dunker, K. (ADF&G), (personal communication, November 8, 2013).
[37] Davis, J.C. and G. A. Muhlberg, *Chester Creek Stream Condition Evaluation*, Alaska Department of Fish and Game, Technical Report No. 01-7, July 2001, p. 29.
[38] Both photos courtesy of Shawna Nieraeth.

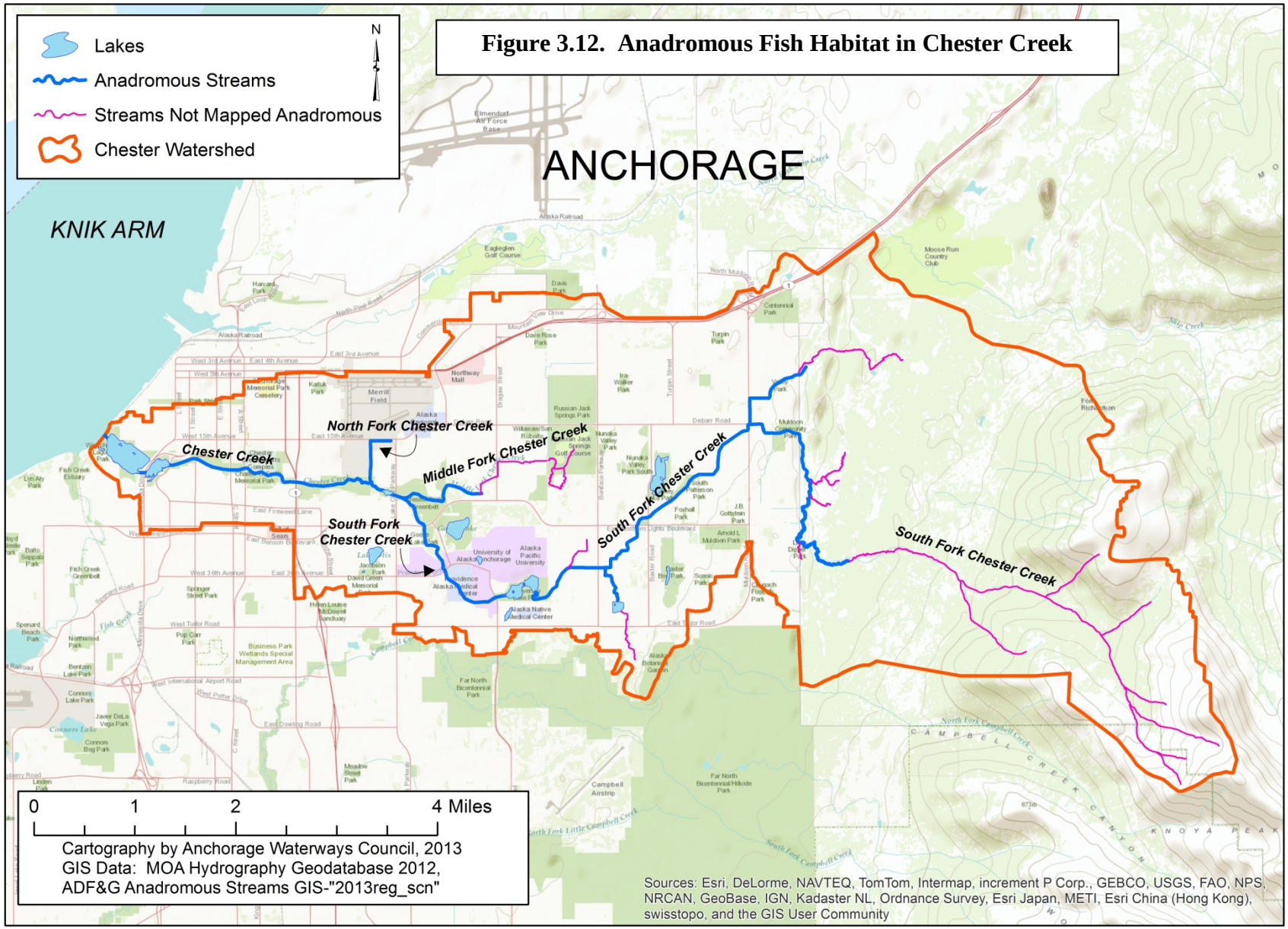


Figure 3.12. Anadromous Fish Habitat in Chester Creek

Aquatic Macroinvertebrates: Aquatic macroinvertebrates are good indicators of stream quality because they are affected by the physical, chemical, and biological conditions of the stream, and are unable to escape pollution and can show the effects of short- and long-term pollution events as well as cumulative impacts. The effects of habitat loss which might not be detected by traditional water quality assessments may be apparent. Macroinvertebrates are important because they are a critical part of the stream's food web, and some are very intolerant of pollution—thus will be absent or in low numbers when doing an assessment. Finally, they are relatively easy to sample and identify at a very reasonable expense[39]. Available studies on Chester Creek macroinvertebrates conclude, as would be expected, that the less pollution-tolerant species are found further upstream, and the more pollution-tolerant reside downstream. Results from Ourso's and Frenzel's[40] determinations were that there was a fairly even distribution of the five major macroinvertebrate groups near Tank Trail[41], but the non-insect group (worms especially), were predominant downstream at their Arctic Blvd. test location. Davis and Muhlberg's report[42] states that there were no longitudinal trends in the metrics except for the percent of Ephemeroptera (mayflies) at their upstream monitoring stations compared to the lower stations around Arctic Blvd. Additionally, they found that there was a significant difference between the communities found at channelized sites vs. non-channelized sites. Oligochaeta (a class of worms that live in terrestrial and aquatic environments) were highly prevalent at channelized sites (40%-70%), but never more than 30% in non-channelized sites[43].

Hydrology, Water Quantity, and Flooding

Stream flow in Chester Creek varies on a seasonal basis. During winter, stream flow is sustained by groundwater that seeps into the creek. Several areas of the creeks are prone to frequent icing, and MOA maintenance staff document these areas for regular maintenance. Snowmelt in the mountains, beginning in May and continuing through summer, contributes considerably to flow. Flow declines throughout summer until rainfall in July and August increases flow. Base flow occurs during the frozen winter months and summer months. Figure 3.13 shows the mean monthly flow (cubic feet per second) for the years 1966 to 2012[44].

[39] For more information, see U.S. Environmental Protection Agency. http://water.epa.gov/type/rsl/monitoring/vms40.cfm
[40] Results are reported in Glass, R.L. and R.T. Ourso, 2006, *Water Quality Conditions of Chester Creek, Anchorage, Alaska, 1998-2001*. U.S.G.S., Report 2006-5229, p. 25.
[41] Tank Trail is considerably upstream on the S. Fork of Chester Creek about a mile east of Muldoon Rd.
[42] Davis, J.C. and G. A. Muhlberg, *Chester Creek Stream Condition Evaluation*, Alaska Department of Fish and Game, Technical Report No. 01-7, July 2001, pp. 17 & 23.
[43] Ibid., 17
[44] U.S. Geological Survey. *USGS 15275100 CHESTER C AT ARCTIC BOULEVARD AT ANCHORAGE AK.* 2014. http://waterdata.usgs.gov/usa/nwis/uv?site_no=15275100 .

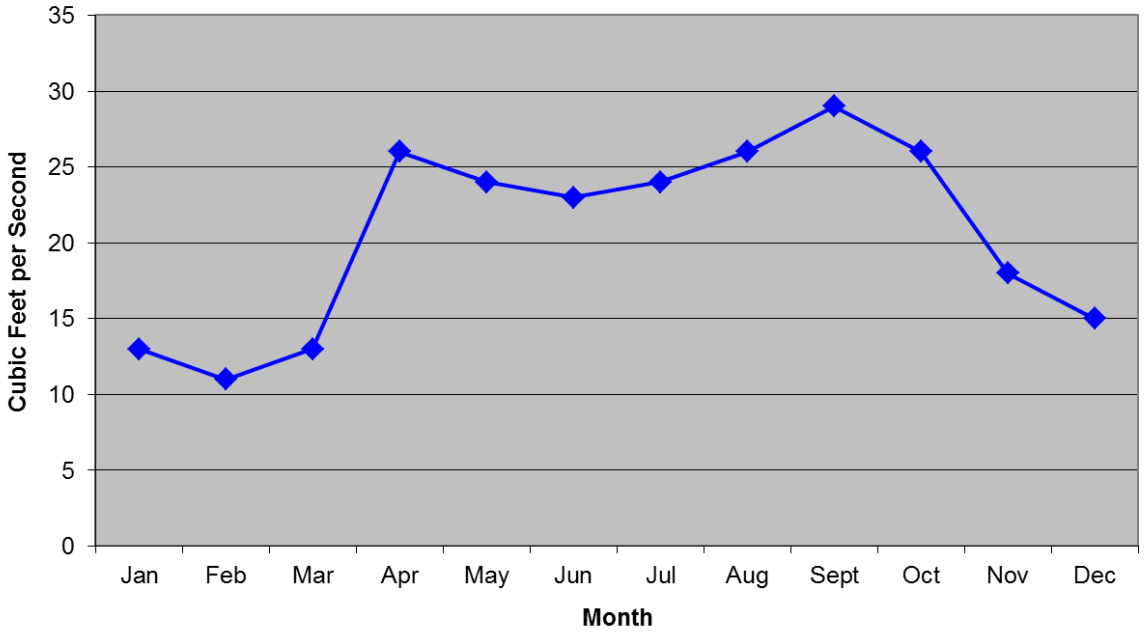


Figure 3.13. Mean Monthly Discharge of Chester Creek at the Arctic Blvd. Gage Station (USGS15275100), 1966 to 2012

Figure 3. 14 graphs the USGS annual flow data for Chester Creek by year from 1967 to 2011[45], which shows high water in 1989 and 1990[46].

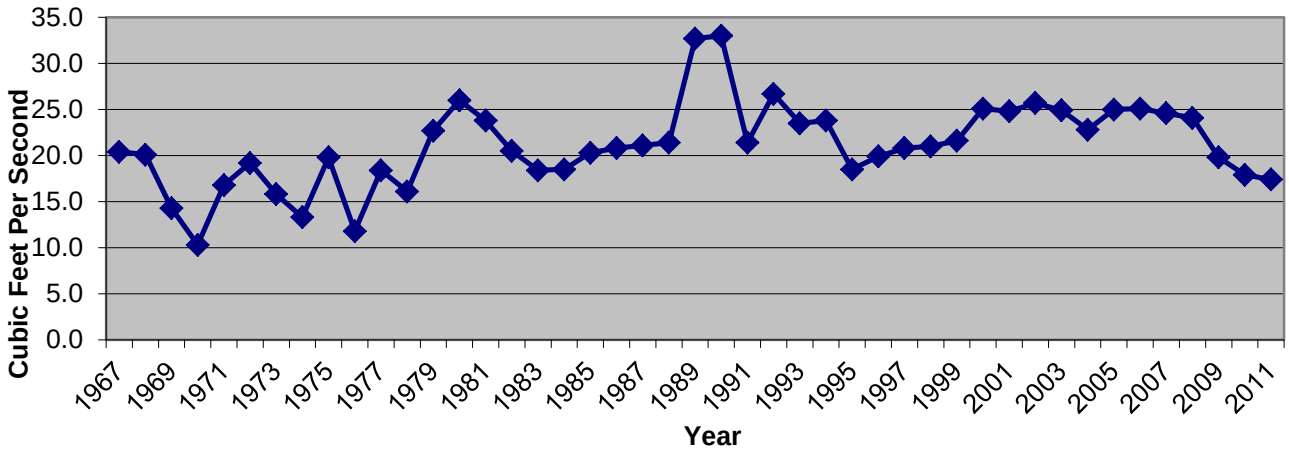


Figure 3.14. Mean Yearly Flow in Chester Creek at the Arctic Blvd. Gage Station, 1967 to 2011

Water quantity refers not just to the amount of water that flows down a stream, but also to the frequency, duration, timing, and rate of change of that flow. Such variations in water quantity are often referred to as the "flow regime". Flow regimes are a defining factor in ecosystems and an integral part of stream health. Flows increase after a rain or during breakup into the creek especially because of increased impervious surfaces. In drier times, the creek relies on base flow from its headwaters, wetlands, and groundwater. Currently, there are no instream flow reservations for aquatic habitat[47], although water discharges, mostly from drilled wells, have been permitted within the Chester Creek watershed by ADNR[48]. According to documents provided by ADNR, well water is used for cooling several buildings (primarily institutional users, such as UAA, Providence Hospital, and the Alaska Native Medical Center, in the "U-MED" district[49]). The discharged water goes either directly into the MOA's storm drain system where it will "commingle with other storm water, with eventual outfall (via overland flow) to Chester Creek"[50] as noted on the 2013 permit issued for UAA's Allied Health Science Building or into Chester Creek or University Lake, which is a permitted outfall from the Alaska Native Medical Center that discharges directly at the south shore of University Lake. The new UAA Sports Arena, under construction at Elmore and Providence, applied for a Temporary Water Use Permit (TWUP)[51] in 2013. Overall there are 11 permits that have been issued or are pending. ADNR has provided a map, Figure 3.15, that depicts wells and injection points as of Feb. 25, 2014.

[45] U.S. Geological Survey *USGS 15275100 CHESTER C AT ARCTIC BOULEVARD AT ANCHORAGE AK.* 2014. http://waterdata.usgs.gov/usa/nwis/uv?site_no=15275100 .
[46] Ibid.
[47] Thomas A. Cappiello, ADF&G, (personal communication May 11, 2011).
[48] For discussion on water rights and temporary use authorizations, see *Water Rights and Temporary Use Authorizations.* 2013. http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm.
[49] The "U-Med" area is an 1,130 acre planning district composed of 2 universities and 2 hospitals. www.muni.org/Departments/OCPD/Planning/Documents/UMedExecSum.pdf
[50] ADNR Case Abstract: TWUP, File A2013-38. This is for the UAA Allied Health Science Building. Search at: http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm.
[51] ADNR Case Abstract: TWUP, File A2013-28. Search at: http://dnr.alaska.gov/mlw/mapguide/wr_intro.cfm.

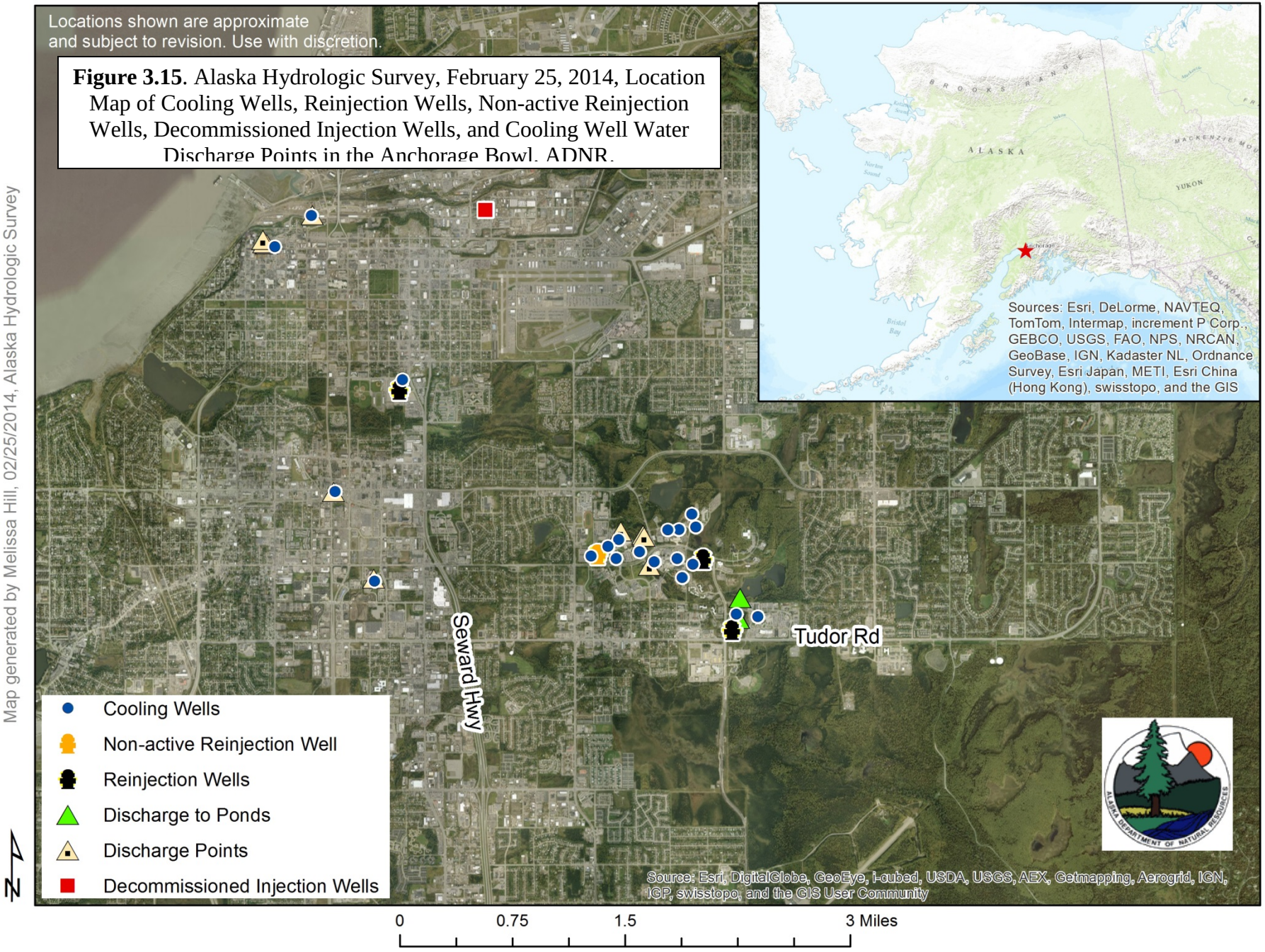

Locations shown are approximate and subject to revision. Use with discretion.
Figure 3.15. Alaska Hydrologic Survey, February 25, 2014, Location Map of Cooling Wells, Reinjection Wells, Non-active Reinjection Wells, Decommissioned Injection Wells, and Cooling Well Water Discharge Points in the Anchorage Bowl, ADNR.
Map generated by Melissa Hill, 02/25/2014, Alaska Hydrologic Survey
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS
Seward Hwy
Tudor Rd
Cooling Wells
Non-active Reinjection Well
Reinjection Wells
Discharge to Ponds
Discharge Points
Decommissioned Injection Wells
Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
0
0.75
1.5
3 Miles

Fig 3.16 Discharged water from the Alaska Native Medical Center Outflow Bubbling into University Lake, (2010)[52]

As the Chester Creek watershed became urbanized, much of its natural vegetation and top soil were replaced by impervious surfaces such as roads, parking lots, and pavement, or has been compacted for lawns. These surfaces reduce the ability of the land to absorb and filter incoming rain and pollution, and allow water to flow quickly to the creek, altering the flow regime. Additionally, development has typically diverted the creek to the margin of properties. Some of these developments have changed the dimension, pattern and profile of certain creek reaches, and it has had to reach a new equilibrium with the speed and volume of water it experiences. The altered regime in urbanized areas consists of higher and more frequent peak flows that can cause higher rates of bank erosion and lower base flows. The urbanized hydrology also likely contributes to increases in bank erosion as easily erodible peat streambanks are common in the Chester Creek watershed. Preserving and protecting native soils and the prevention of topsoil stripping and soil compaction are important aspects for watershed planning.

Residents and resource agency representatives are concerned about both high and low flow levels in Chester Creek. Flooding is a concern in some parts of the watershed because it can negatively affect fish, wildlife, habitat, property, access, and aesthetic quality. About 1.7%[53] of the watershed falls within the 100 year flood hazard area designated by FEMA[54] (Figure 3.17). Current flood hazard mapping is available for areas that have been mapped, but the user is cautioned to obtain the most recent information from the Municipal Flood Hazard Program[55].

[52] Dan Southard, MOA Street Maintenance Superintendent (personal communication, September. 21, 2010).
[53] Jeff Urbanus, MOA Watershed Management Services, (personal communication, January 24, 2014).
[54] Federal Emergency Management Agency
[55] See *Floodplains* at http://www.anchoragewatershed.com/floodplains.html .

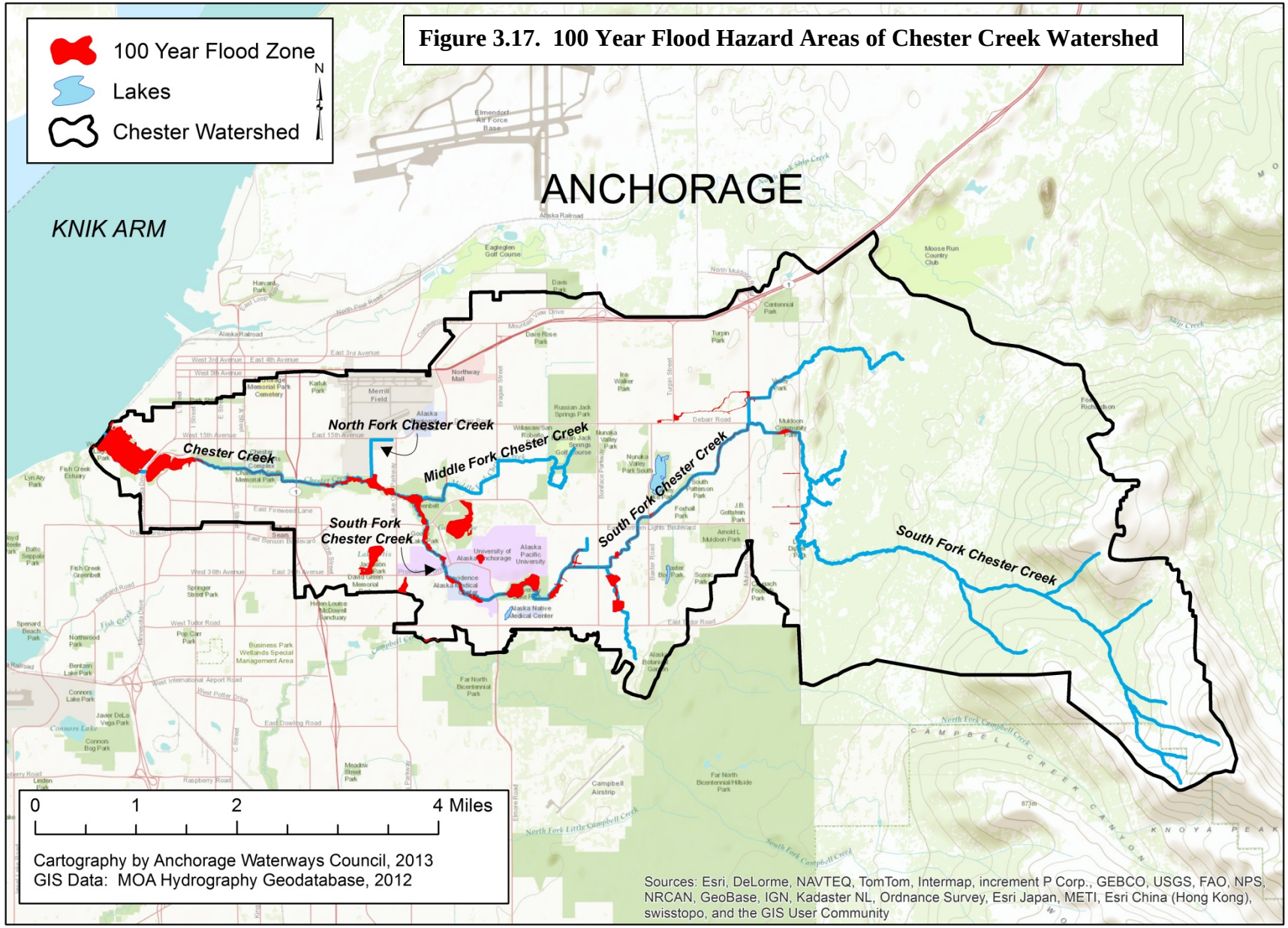
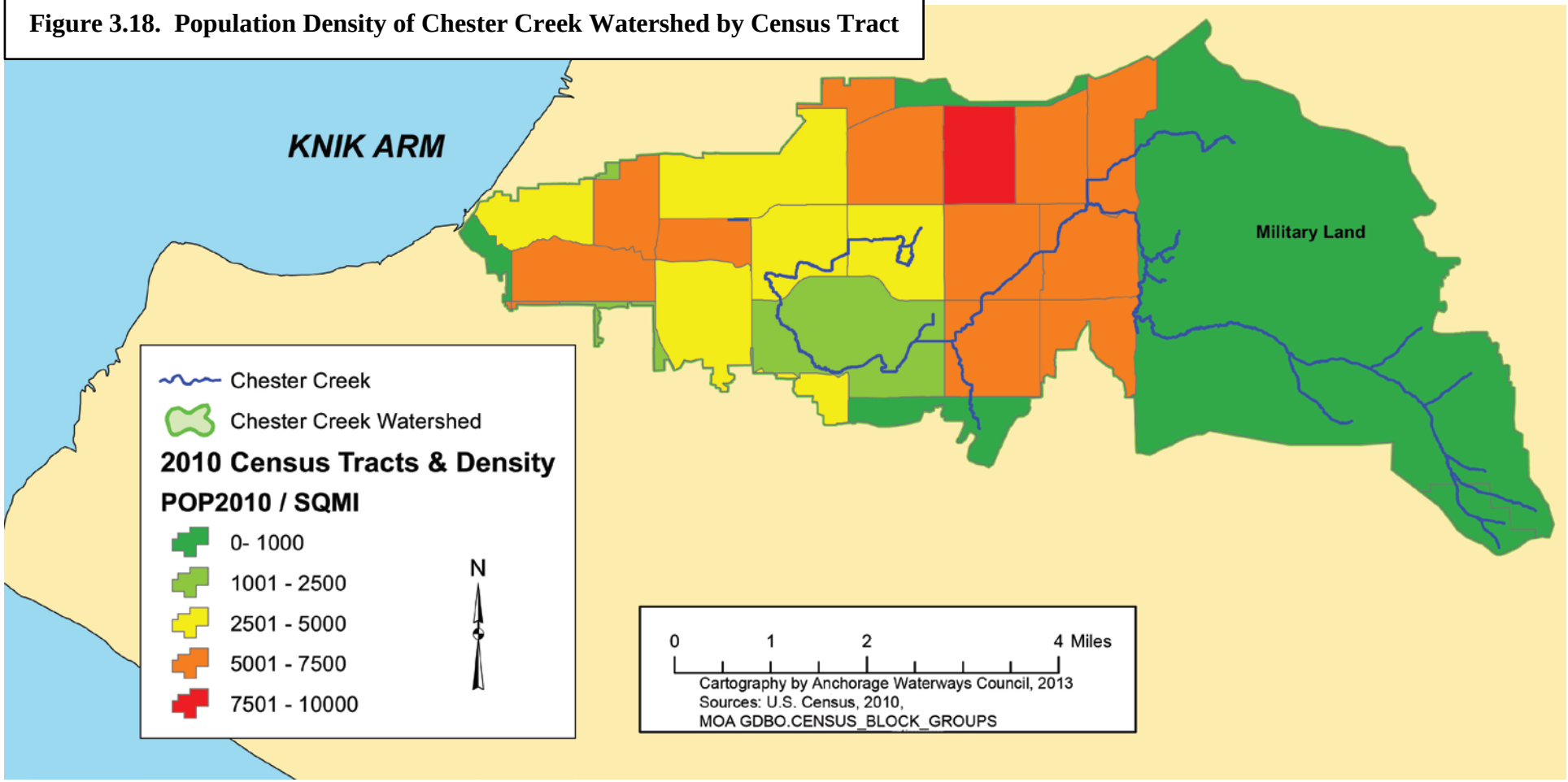


Figure 3.17. 100 Year Flood Hazard Areas of Chester Creek Watershed

Human Population

The 2010 U.S. Census [56] statistics show that approximately 108,985 people lived in the Chester Creek watershed or approximately 37.3% of Anchorage's population. This percentage is up about 25% as indicated by the 2000 U.S. Census. Figure 3.18 shows the estimated density by square mile by Census Tract.

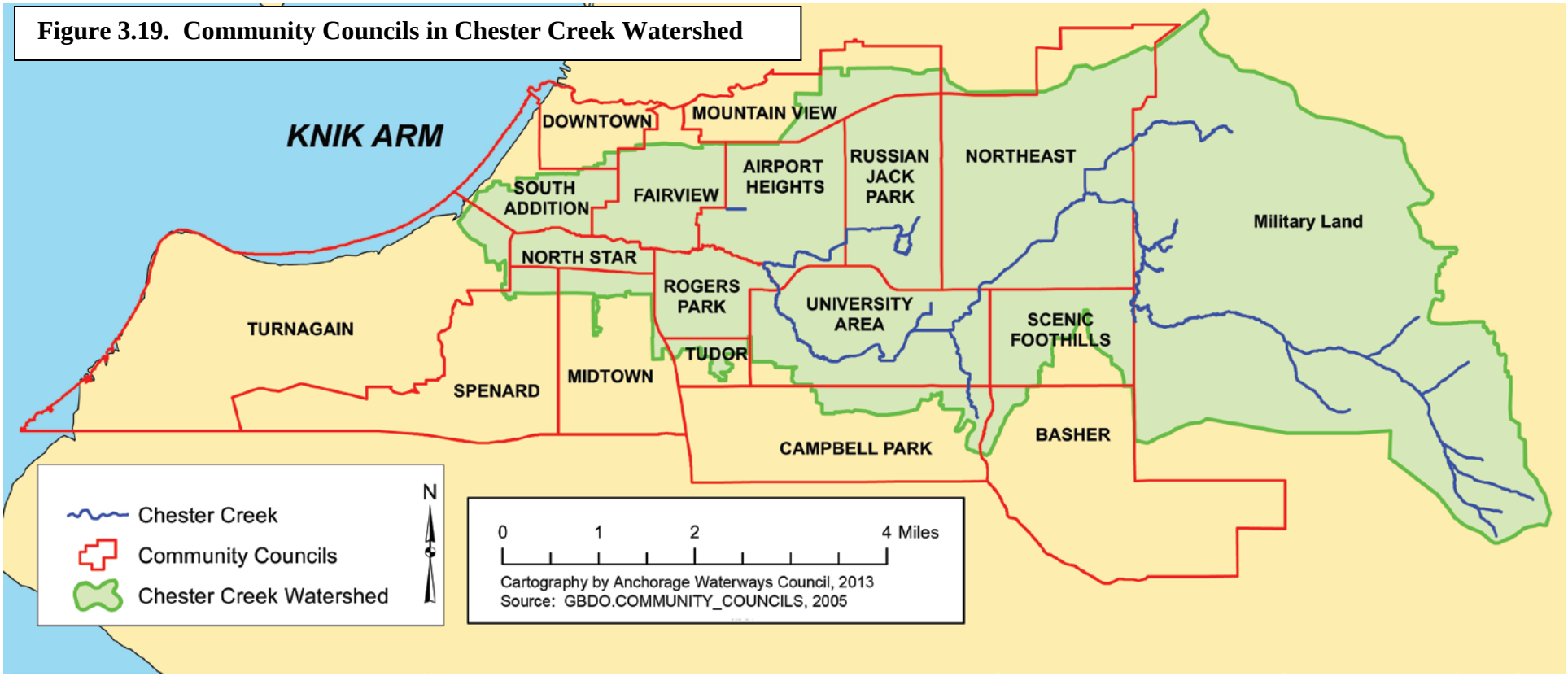
Figure 3.18. Population Density of Chester Creek Watershed by Census Tract



[56] U.S. Department of Commerce, Bureau of the Census, *United States Census, 2010.*

The Chester Creek watershed is covered by 13 Community Councils (Figure 3.19).

Figure 3.19. Community Councils in Chester Creek Watershed



Land Use

As shown in Table 3.4, the dominant land use in 2008 in the watershed is Rights of Way (ROW) followed by residential. Residential, institutional, vacant and industrial densities tend to be evenly distributed throughout the watershed, while commercial density is highest in the Midtown area. Military land use is in the northeast section and consists of JBER lands. Relatively little open space was identified in 2008 within the Chester Creek watershed with about 15.3 % of the total area undeveloped (Park and Vacant). Only 5.3% of the land in the watershed is considered vacant, and whether or not it is developable would be on a case by case basis.

Land Use Category	Acreage	% of Watershed Area
Residential	4,252	26
Commercial	813	5
Industrial	319	2
Institutional	1,922	11
Park	1,586	10
Transportation	260	2
Right-of-way	5,772	35
Military	718	4
Vacant	829	5
TOTAL	**16,471**	**100%**

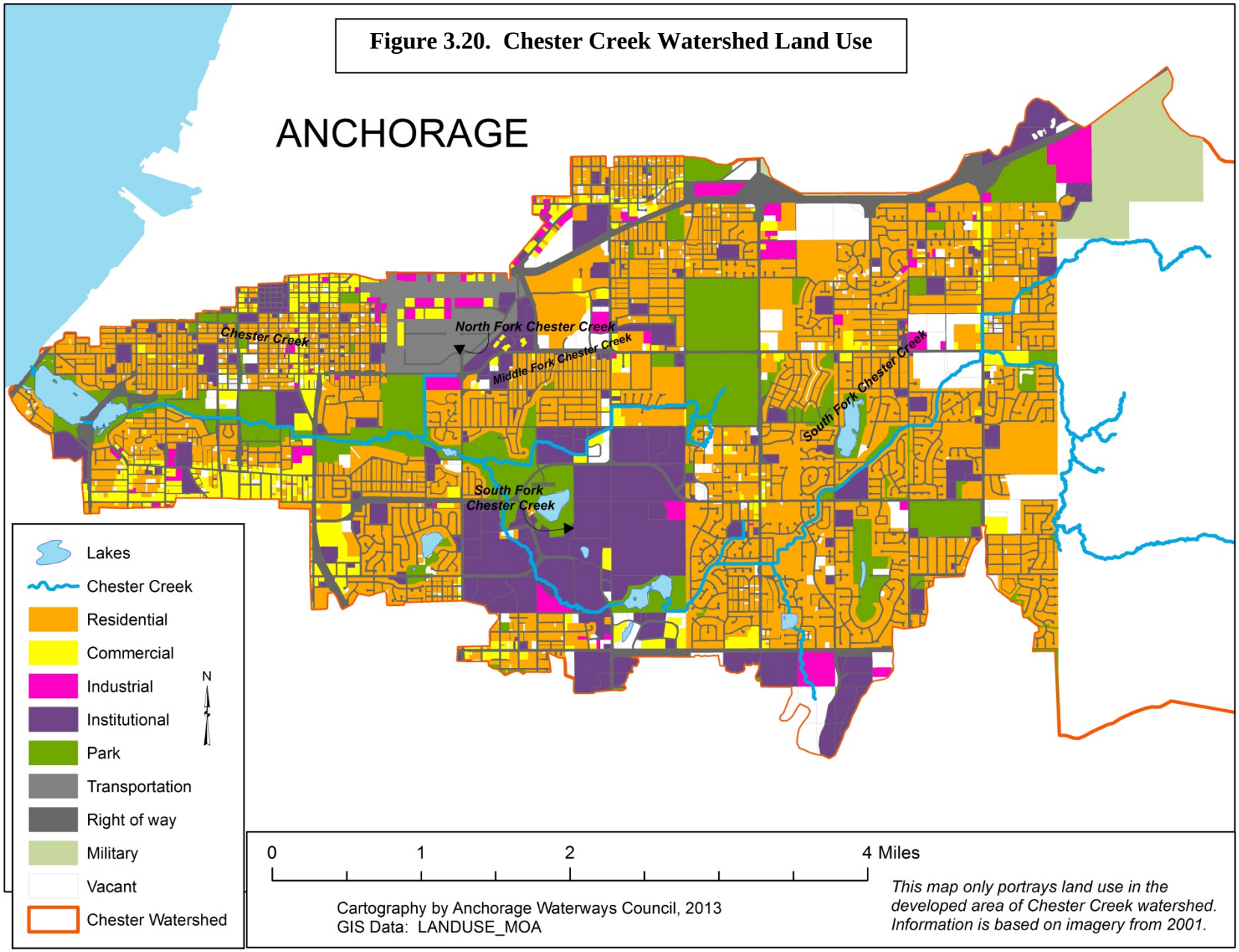
Table 3.4. Land Use in Chester Creek Watershed[57]

Around 20,000 dwellings are found in the watershed and account for nearly 26% of the land use. Residential housing is primarily single-family, interspersed with two-family and multi-family dwellings such as apartments, condominiums, university housing, and trailer courts. Elementary, middle and secondary schools, and churches are found in association with residential development. Larger developments within the watershed include three major hospitals, medical buildings[58], two major universities, the Sullivan Arena, the new University of Alaska Anchorage arena, Mulcahy Stadium, Russian Jack Golf Course, and Merrill Field. Commercial and industrial properties located within the watershed consist of roughly 900 businesses including car dealerships, gas stations, large grocery stores, restaurants, and strip malls. The watershed boasts some of Anchorage's most popular social areas. It is heavily used for recreation and is well known for its greenbelt and multi-use trail system. Over 50 parks, including Westchester Lagoon, Valley of the Moon, Tikishla, Goose Lake, University Lake, and Russian Jack Springs, are found there.

[57] Municipality of Anchorage *LANDUSE_MOA*. 2008. Thede Tobish, MOA Planner reports that this is the most recent data on MOA land use, (personal communication, July 8, 2013).

[58] Considerable development in the "U-Med" (University-Medical) District, which is bounded by Northern Lights, Lake Otis Parkway, Tudor Road, and Bragaw, has been occurring over the past several years and is most likely not reflected in the Institutional land use category in the 2008 data.

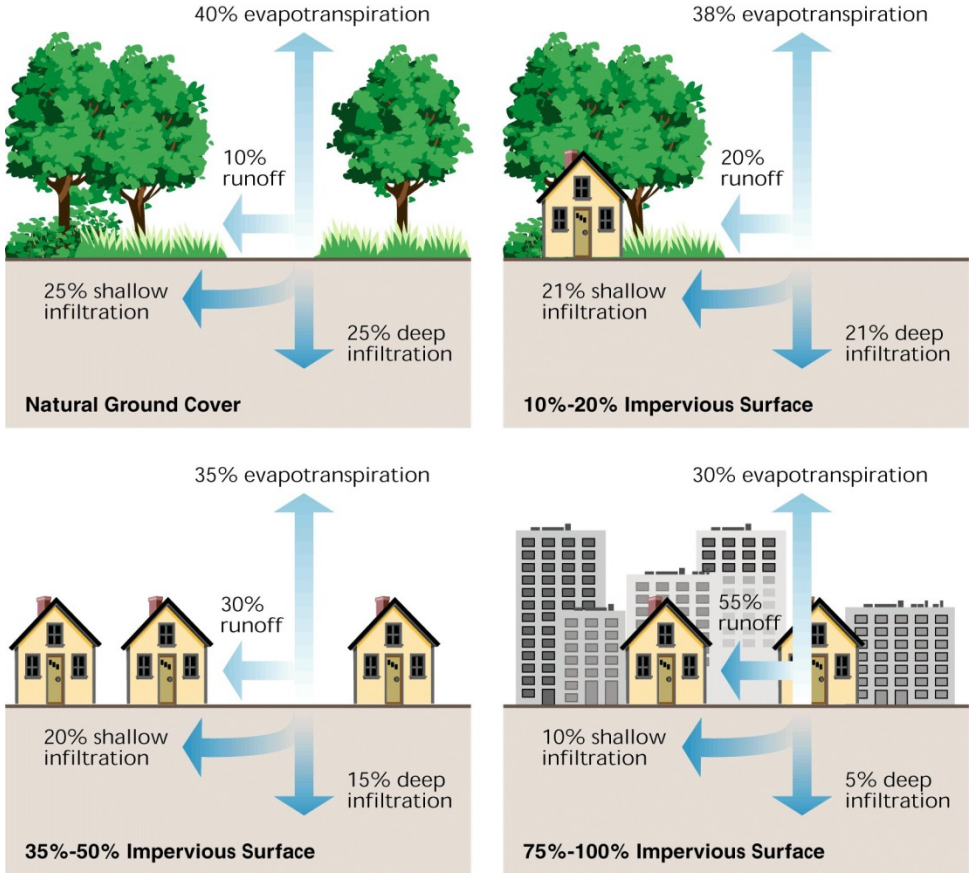
Figure 3.20. Chester Creek Watershed Land Use



Impervious Surfaces and Stormwater System

Impervious surfaces, such as paved areas, roofs, or compacted soil and lawns, reduce the natural infiltration of water back into the earth as part of the hydrologic cycle. As depicted in Figure 3.21, impervious surfaces increase the amount of surface runoff. In Anchorage, stormwater runoff (including snow melt) is commonly transported through a Municipal Separate Storm Sewer System (under an MS4 permit) that is often discharging directly untreated into local waterbodies.

Figure 3.21. Illustration of the Effect of Increased Urbanization on Impervious Surfaces and Surface Runoff[59]



As cities grow and watersheds are urbanized, much of the vegetation is replaced by impervious surfaces, which reduces the area where infiltration to groundwater can happen. Thus, an increase in stormwater runoff occurs—runoff that must be collected by extensive drainage systems that

[59] From *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Working Group, October 1998, Fig. 3-21.

combine curbs, storm sewers, and ditches that carry it directly to streams. Simply put, in a developed watershed, more water arrives into a stream considerably faster, resulting in a greater likelihood of frequent and more severe flooding that can carry increased levels of pollutants. As cities grow and more development occurs, the natural landscape is replaced by roads, buildings, housing developments, and parking lots (Figures 3.22 and 3.23).

This was recognized nearly 50 years ago in a 1968 report by the U.S. Army Corps of Engineers, "[each] new subdivision and each new residence in the upper reaches of the drainage area increases the possibility of floods and flood damage in the lower areas of the drainage basin" [60]. The report also points out areas of flood concern: "in the upper reaches near the border of the military reservation due to the flatter terrain; housing and trailer parks downstream of Alaska Methodist University [now Alaska Pacific University] are not only subject to flooding but health hazards from cesspools and contaminated wells; the area between C St. and the Minnesota By-pass; and two areas east of C St."[61]. Concern also exists at the easterly portion of Tudor Road and the military reservation [62].

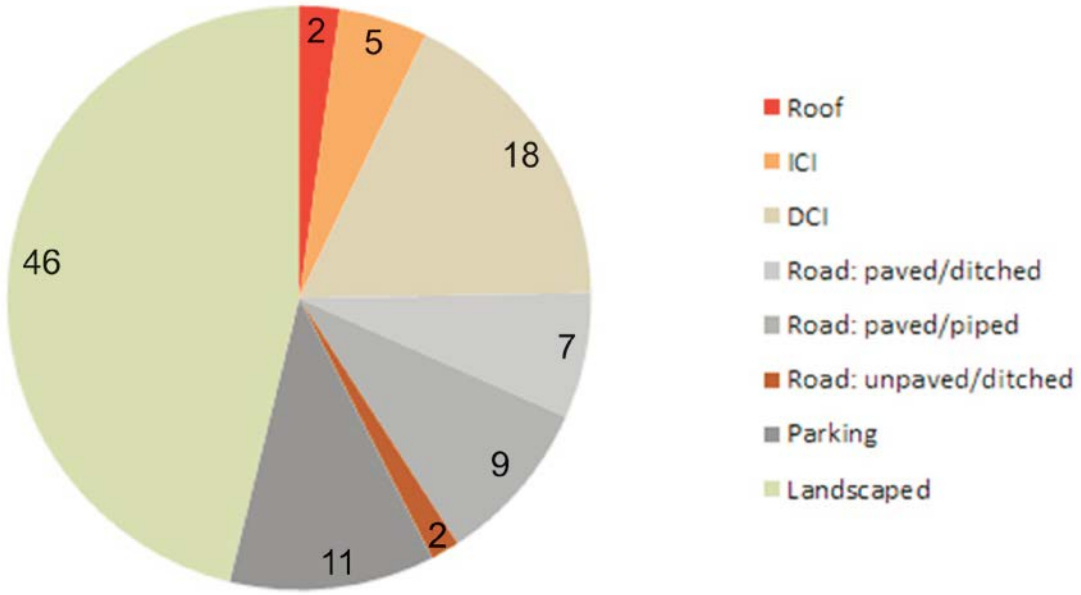
Urban Anchorage has experienced dynamic growth over the last 50 years, and, along with it, large amounts of impervious surfaces have replaced the natural landscape. With a greater volume of water entering Chester Creek during a storm event, if it exceeds the collection rate of the stormwater system then flooding often occurs. Sediment flow into streams is also increased by an expansion in impervious surfaces as increased water volume and velocity cause sediment and other particulates that collect on surfaces to be washed away into creeks.

One means of reducing stormwater runoff is the Anchorage Rain Gardens program[63]. The Municipality has offered grants to assist homeowners and businesses install them. To date, there are 40 rain gardens in the Chester Creek Watershed (see Figure 3.24).

In order to minimize the impact to streams, stream setbacks nationally can be up to at least 150 m for impervious areas along water bodies[64]. The current 25' stream setback requirement in Anchorage can create challenges for maintaining water body health in some of the reaches and watersheds in Anchorage. As Low impact Development (LID) becomes incorporated more into planning and development, some of the deleterious effects of runoff can be reduced. A 2012 report by HDR, Inc. titled "Chester Creek Watershed Subbasin Prioritization for LID Stormwater Projects" lists 13 LID projects that were underway in the Chester Creek watershed (at the time of the report) and also suggests 20 priority potential LID projects that should be considered in the watershed[65]. These projects and 20 priorities are listed in the Appendix, Tables 6.2 and 6.3 along with a map.

[60] U.S. Army Corps of Engineers, *1968. Flood Plain Information, Chester Creek, Anchorage, Alaska*. p. 16
[61] Ibid., p. 17.
[62] Ibid.
[63] http://www.anchorageraingardens.com/
[64] Garfield, S.J. et al, 2003, "Public Health Effects of Inadequately Managed Stormwater Runoff" in *American Journal of Public Health*, pp. 1527-1533.
[65] These lists can be found in this report's Appendix.

Figure 3.22. Percentage of Various Impervious Landcover Surfaces in Chester Creek Watershed[66]

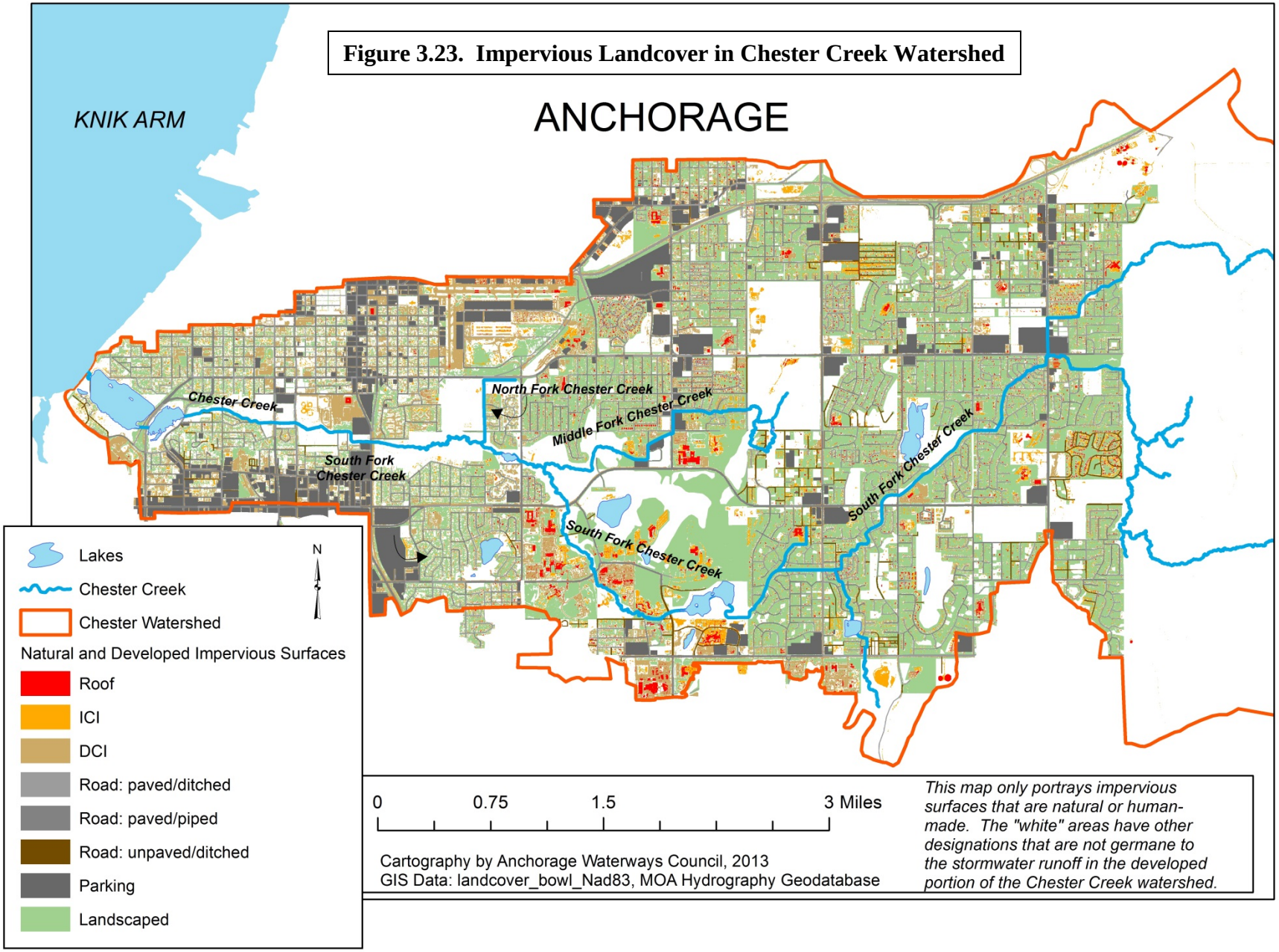


Surface Type	Acreage	% of Impervious Area[67]	Description
Roof	164.0	2	Roof drainage (DCI)
ICI	366.9	5	Other Indirectly connected impervious surface[68]
DCI	1,303.0	18	Other Directly connected impervious surface[69]
Road: paved/ditched	516.3	7	Paved road drained by ditching (ICI)
Road: paved/piped	684.2	9	Paved road drained by storm water pipes (ICI)
Road: unpaved/ditched	117.9	2	Dirt or gravel road drained by ditching (ICI)
Parking	845.9	11	Large paved surface, paved parking (DCI)
Landscaped	3,427.0	46	Deep water table, maintained vegetation (ICI)

Table 3.5. Impervious Landcover Surfaces in Chester Creek Watershed

[66] Data were derived from Ikonos imagery dated 2000 according to the *landcover_bowl_Nad83* Data Dictionary.
[67] Percentage of natural and human-made impervious surfaces in the Chester Creek watershed.
[68] ICI-Indirectly connected impervious surface is used to designate parcels where runoff is first detained or directed across permeable surfaces before entering piped drainage systems or natural waters (*landcover_bowl_Nad83* Data Dictionary, v. 1).
[69] DCI-Directly connected impervious surfaces means that runoff drains directly into pipes and receiving waters (*landcover_bowl_Nad83*, v. 1).

Figure 3.23. Impervious Landcover in Chester Creek Watershed



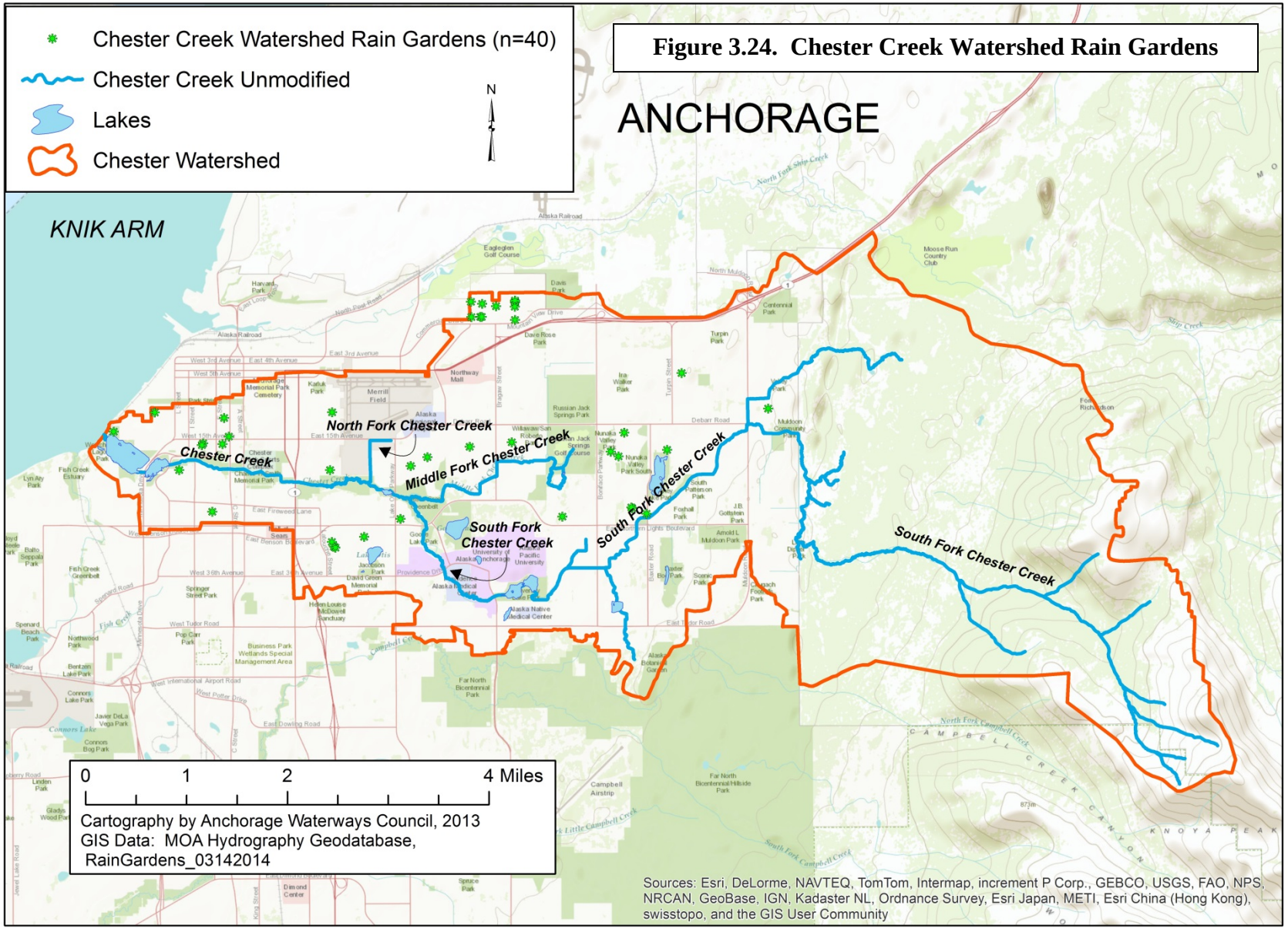


Figure 3.24. Chester Creek Watershed Rain Gardens

Channel Habitat

In an undeveloped state, stream channels are bordered by natural vegetation and can meander across their flood plain. Natural channels include diverse depths and configurations. In such systems normalization can occur because numerous wetland areas store precipitation and release it slowly into the creek. Often as development or urbanization occurs in a watershed, creek channels are straightened, deepened, realigned, put in culverts, or directed underground. Changes in flow regimes can cause biological impairment. Low flows can result in more "drought-tolerant" taxa, while high flows and increased peak flows may result in increased scouring and displacement of biota—again changing the taxa[70]. Sometimes, stream bank (or riparian) vegetation is removed or trampled. These activities can cause the loss of fish and wildlife habitat, stream bank erosion and land loss, and water quality problems from sedimentation. As Chester Creek was developed, such impacts have occurred.

Before development in the Chester Creek watershed, the creek channel was braided, undercut, and meandering. By straightening, deepening, and channelizing the creek, the groundwater table was lowered and more developable land was created. Today, approximately 41% of the Chester Creek channel has been human-modified in some form whether by straightening, ditching, diverting, or placing it in a culvert or pipe[71]. The reshaping is especially apparent between L Street and the Seward Highway in midtown Anchorage (Figure 3.25). The instability of the channel is also apparent in natural sections between modified sections of the creek, where many meander bends have cutoffs in various stages of development. These cutoffs are a natural geomorphic response to changes in the hydrologic regime and modifications within the channel. A good example is found on Chester Creek from Hillstrand Pond west to the New Seward Highway—either by walking it or using Google Earth®.

The earlier creek modifications resulted from development, and an approximation of where this took place can be seen in Figures 3.26 and 3.27, which show current stream delineations (MOA GIS stream delineations) and historic stream channels as interpreted from USGS topographic maps from 1962 with 1965 revisions at 1:25,000 scale. Care must be used when determining changes between the years because of the differences in scales or resolution drawn. Some of the larger changes are very apparent, such as shrinkage of stream miles, straightening of the channel, and channel relocation. Note that some changes to the stream (straightening and relocation) had already occurred by 1962 when the USGS published this map.

[70] See U.S. Environmental Protection Agency. *Caddis Volume 2: Sources, Stressors & Responses—Flow Alteration* at www.epa.gov/caddis/ssr_flow4d.html
[71] Calculations from the MOA Stream Attributes and Values GIS Dataset per Scott Wheaton, (personal communication, February 14, 2014).

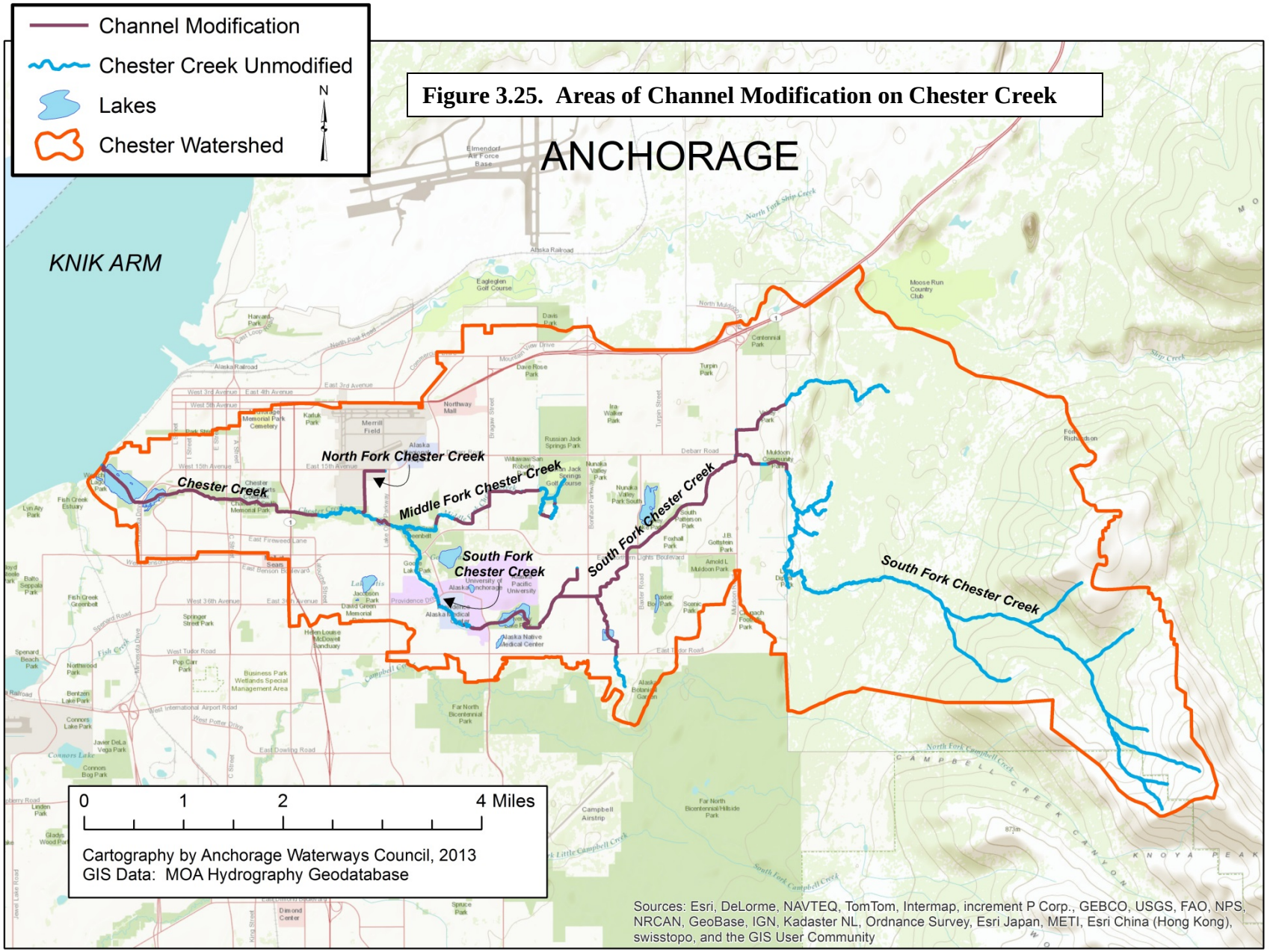
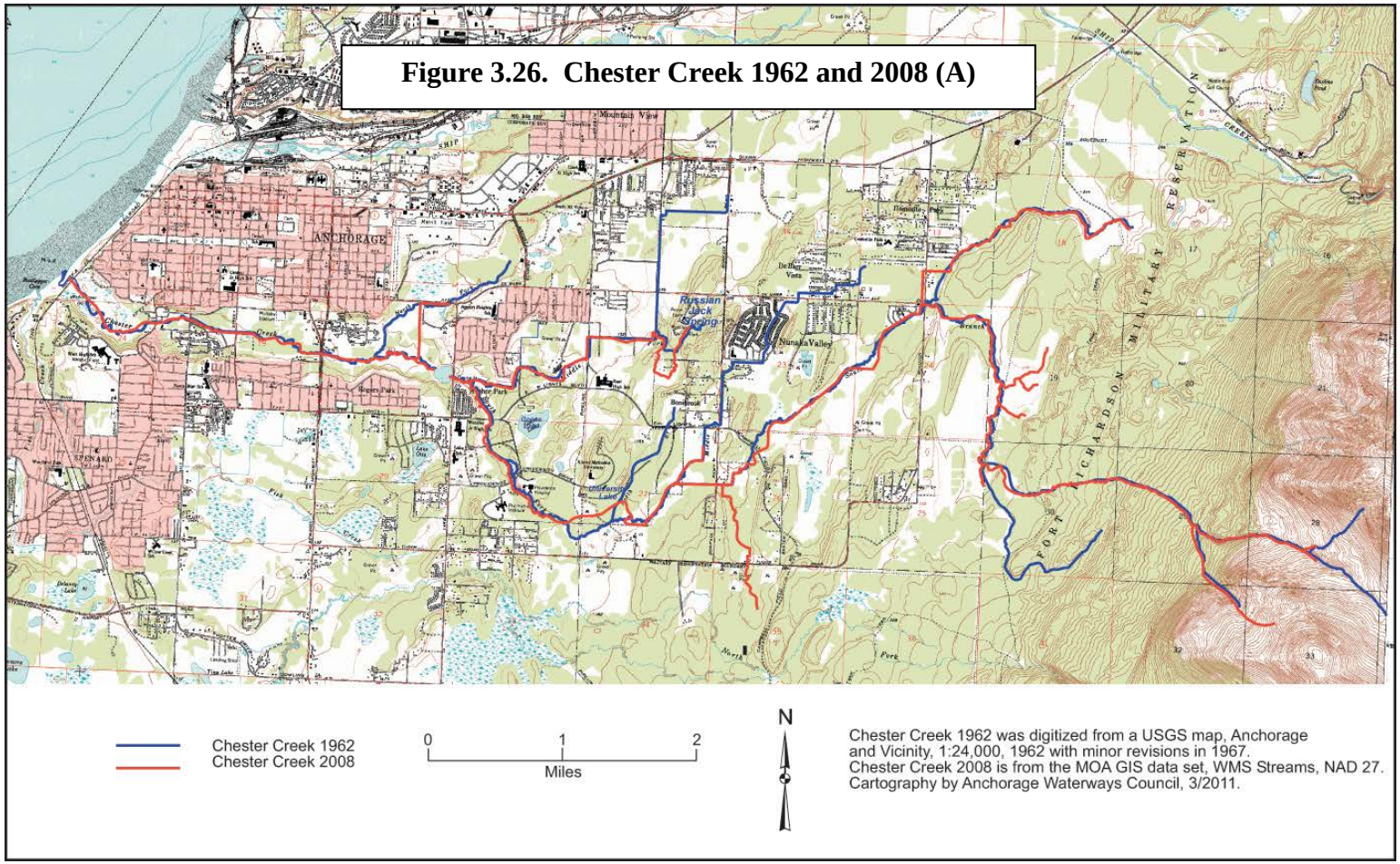
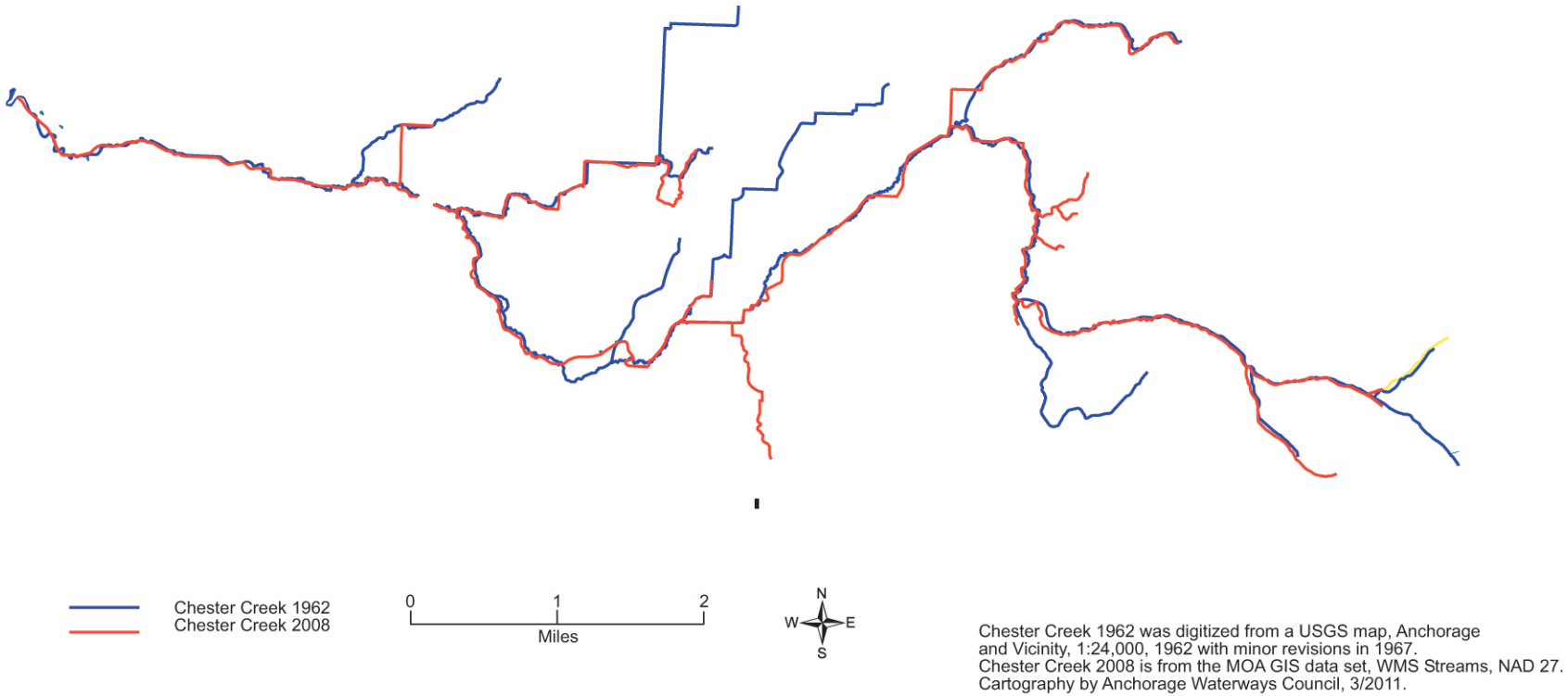


Figure 3.25. Areas of Channel Modification on Chester Creek



Originally, the creek had numerous small tributaries. To accommodate development, some of these tributaries were filled, and others were cut off and abandoned or combined into storm drain pipes. These changes confined Chester Creek to the three forks in which it flows today. In addition, wetland areas in and adjacent to the creek have been lost. As noted above, between 1950 and 1997, there was a net loss of over 2,800 acres of wetlands, and this has resulted in barely 1,000 acres remaining today. Besides loss, many of the wetlands in the watershed have also been modified.

Figure 3.27. Chester Creek 1962 and 2008 (B) (background removed)



Water Quality

Clean water is critical to the health and enjoyment of the Chester Creek watershed. Monitoring water quality is an important assessment tool (as well as a requirement for the Federal Clean Water Act [CWA]) that provides information on whether or not a waterbody's condition is sufficient to maintain multiple designated uses. Alaska Water Quality Standards (WQS) designate seven uses for fresh waters (drinking water; agriculture; aquaculture; industrial; contact recreation; non-contact recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife)[72]. Alaska's process for listing an individual waterbody for failure to meet WQS, as required in the CWA Section 303(d), begins with an internal review of existing and new information to determine (1) the presence of pollutants, (2) whether persistent exceedances of WQS are occurring, (3) whether impacts on the designated uses are occurring, and (4) the degree to which WQS and the other criteria are attained[73].

[72] See Alaska Department of Environmental Conservation. *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report July 15, 2010. At* http://dec.alaska.gov/water/wqsar/Docs/2010_Integrated_Report_Final_20100715_corrected_july_19.pdf, p. 90.
[73] Ibid., 4.

Chemicals: Chemical pollutant runoff into the creek has been noted in several studies—mostly completed in 2001[74]. Water quality parameters including alkalinity, conductivity, and pH all tended to increase from upstream to downstream, with conductivity doubling between the JBER boundary near Early View Drive and Arctic Blvd., and pH increasing by roughly 0.4 units over the same area[75]. Both these findings were similar to the USGS 1998-2001 NAQWA test results[76] . Inorganic constituents including sodium and chloride showed increased levels in tests conducted. Sources for these are most likely road deicers used in the winter for street and private driveway maintenance. In addition, trace metals were studied in both the creek and sediment which showed varying effects—mostly downstream—the concern is that they could be impacting sensitive populations of invertebrates in the lower reaches of the creek[77].

Bacteria: Chester Creek was placed on the Section 303(d) list in 1990 for non-attainment of the fecal coliform (FC) bacteria standard. In April 1993, a water quality assessment was completed on the Chester Creek drainage. Although the assessment identified several parameters of concern for Chester Creek, it was concluded that the waterbody is water quality limited only for FC bacteria. A TMDL for FC bacteria was developed and approved by the EPA (dated May 2005). This listing covers 4.1 miles and the pollutant source is thought to be urban runoff and industrial pollution.

Additionally, Westchester Lagoon and University Lake were listed under Section 303(d) in 1990 for non-attainment of the FC bacteria standard. The 1993 Chester Creek Drainage Water Quality Assessment indicated both are impaired only for FC bacteria. A TMDL for FC bacteria was developed for each and was approved by the EPA (dated May 2005). The pollutant source is considered urban runoff.

FC bacteria are the most common microbiological contaminants of natural waters, typically living in the digestive tracks of warm-blooded animals, including humans, and excreted in the feces. Although most of these bacteria are not harmful and are part of the normal digestive system, some are pathogenic to humans. Those that are pathogenic can cause diseases, such as gastroenteritis, ear infections, typhoid, dysentery, hepatitis A, and cholera[78].

A FC test is used to determine whether water has been contaminated with fecal matter. The presence of FC indicates the possible presence of organisms that can cause illness. The EPA has set acceptable limits for FC in water based upon its use as has the State of Alaska (noted above).

How do fecal coliforms get into streams and lakes? In urban areas, FC contamination commonly originates from dog and waterfowl waste that is carried into storm drains, creeks, and lakes during storms, excessive yard watering, powerwashing impervious areas, or snowmelt. FC can also enter streams from illegal or leaky sanitary sewer connections and poorly functioning septic tanks.

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[74] See Glass, R.L. and R.T. Ourso, 2006, *Water-Quality Conditions of Chester Creek, Anchorage, Alaska, 1998-2001*, U.S. Geological Survey, Scientific Investigations Report 2006-5229, and Davis, J.C. and G.A. Muhlberg, 2001. *Chester Creek Stream Condition Evaluation*, Alaska Department of Fish and Game Technical Report No. 01-7.
[75] Davis, J.C. and G.A. Mulhlberg. 2001. p.6.
[76] Glass, R.L. and R.T. Ourso, 2006. p. 18.
[77] Ibid., 12.
[78] Jolley, L W. and W.R. English, 2013. *What is Fecal Coliform? Why is it Important?* at www.clemson.edu/extension/natural_resources/water/publications/fecal_coliform.html .

The largest and most frequent exceedances of the water quality criteria for FC occur during summer months (July-September) due to increased rain events, the resulting stormwater runoff, and increased temperature and source activity (e.g., domestic animals and wildlife). Conversely, FC concentrations in the creek are lower during colder winter months because of less stormwater runoff. Concentrations steadily increase during spring months, with increased surface runoff during spring thaw and breakup. Because of the substantial seasonal variation in FC levels, the Chester Creek TMDL was developed on a seasonal basis to isolate times of similar weather, runoff, and in-stream conditions.

As noted, the water quality of Chester Creek and two of its lakes is considered impaired by federal standards for FC bacteria. It is likely that this listing is the result of pet, wildlife, waterfowl[79] and human feces[80]. Although estimates vary, it is thought that the minimum daily load of pet waste in Anchorage is at least 20 tons if not more[81]. Educating pet owners and convincing them to clean up after their pets can reduce a major portion of this problem. In response to this issue, the Municipality and ADEC are funding a variety of outreach programs to assist pet owners in understanding the impact of not cleaning up after their pets and also by providing more amenities, such as pet waste stations, to make it easier for pet owners. Wildlife can also contribute significantly to FC levels, although they are natural inhabitants of Anchorage. One issue that has arisen at Westchester and Eastchester Lagoon involves people feeding the waterfowl. In this area and others (e.g. Cuddy Park), the waterfowl are tending to overwinter and congregate in open water—thus creating increased waterfowl crowding and FC in smaller areas of streams and ponds. And, it has been noted that over the past decades as land use has changed to more urban development with inviting lawns and open water areas for waterfowl, the number of Canada geese has also steadily increased in the Anchorage area. Modification of human behavior in terms of not feeding wildlife, having areas of more natural vegetation and less landscaping, and fewer athletic fields could reduce waterfowl numbers, but these actions are not too likely to occur.

Failing septic systems also have the potential to contribute FC to receiving waters through surface breakouts and subsurface malfunctions. Regular maintenance (every 5 years is suggested) and water quality testing may reveal these potential problem areas.

Sedimentation and Turbidity: A report by Davis and Muhlberg in 2001 noted that sedimentation was one of the limiting factors of water quality in Chester Creek[82]. Fine sediments impact spawning and rearing in Coho habitat. Their conclusions were that deposition of sediment in areas of reduced velocity implies there is a large transport of sediment in Chester Creek. Besides altering stream morphology to allow sediment to pass through, they call for a reduction of its introduction through increased Best Management Practices (BMPs). Improvement of riparian vegetation and wetland retention would also aid reduction of high sedimentation rates, although with Anchorage being a northern city the control of aggregate on roads, parking lots, and walkways for safety will always be an issue.

[79] Counts of Canada Geese (*Branta canadensis)* were ongoing until about 10 years ago. The original reason that spurred counts was the 1995 crash of an AWACS plane in Anchorage that apparently was caused by roosting geese that were sucked into the plane's engines. Twenty-four people were killed. This incident sparked better tracking of geese and numbers in Anchorage, however extensive research in 2013 shows that the most recent data is over 10 years old (personal communications from USFWS, ADF&G, and others—December 2013).

[80] The source of human feces can be from homeless camps to broken sewer lines or malfunctioning septic systems.

[81] Municipality of Anchorage. Animal Care and Control. http://www.muni.org/Departments/health/Admin/animal_control/Pages/scoop.aspx.

[82] Davis, J and G.A. Muhlberg, 2001. p. 1.

Dissolved Oxygen (D.O.): Dissolved Oxygen is another critical component for the biological health of a stream. Fish and other aquatic organisms require a minimum level in order to survive. The ADEC standards for the amount of D.O. in Water Supply/Aquaculture and for the Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife must be greater than 7 mg/l in surface waters[83]. Looking at AWC's recent data for Chester Creek monitoring sites, there were no instances in 2011 or 2012 where the D.O. was below 7 mg/l.

Temperature: Temperature is another important indicator of stream health. ADEC WQS for Water Supply/Aquaculture and Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife are not to exceed 20° at any time, and the following maximum temperatures may not be exceeded, where applicable[84]:

Spawning areas	13° C
Rearing areas	15° C
Migration routes	15° C
Egg & fry incubation	13° C

Table 3.6. Alaska Water Quality Maximum Temperatures for Specific Areas and Activities

The highest water temperature data in Chester Creek recorded during Davis and Mulhberg's study was 15.2°C just south of Mulcahy Stadium in August 2000[85], which is quite a contrast from the highest water temperature of 12.5°C in the upper reaches during May 2001[86]. Similar conclusions resulted from the Glass and Ourso study—temperatures are cooler at the upstream sites, and on two occasions water temperatures were as great as 17°C at the Arctic Blvd. site and 15°C at the Boniface Parkway site[87], which they feel could provide occasional stress to fish from the elevated stream temperatures. Water quality monitoring data from 2011 and 2012 by AWC show temperature exceedances ranging from 13.0°C to 17.0°C during the months of June, July and August at lower Chester Creek sites (see Table 4.2 and Fig 4.1)[88]. Finally, the U-Med area, as suggested earlier, might be more carefully monitored to see if the cumulative effects of groundwater discharge from cooling systems into Chester Creek and University Lake could raise the temperature in various locations that would exceed state WQS.

[83] Alaska Department of Environmental Conservation.*Department of Environmental Conservation, 18 AAC70, Water Quality Standards, Amended April 8, 2012*. http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2070.pdf . p. 6
[84] Ibid., p. 11.
[85] Davis, J and G.A. Muhlberg, 2001.*Chester Stream Condition Evaluation*, p. 17.
[86] Ibid., p. 11
[87] Glass, R.L. and R.T. Ourso, 2006, *Water Quality Conditions of Chester Creek, Anchorage, Alaska, 1998-2001*, U.S.G.S., Report 2006-5229, p. 8
[88] Available data from AWC only alerts managers that there may be a problem, and an updated watershed temperature study would need to be conducted to assess the current temperature conditions.

Monitoring Date	Monitoring Site	Substrate	Flow	Temperature in Celsius
6/11/2011	MaChe01v	Cobble	Riffle	14.00
8/14/2011	MaChe01v	Cobble	Riffle	15.00
6/11/2012	MaChe01v	Gravel	Riffle	13.00
6/22/2012	MaChe01v	Cobble	Riffle	15.00
7/9/2012	MaChe01v	Gravel	Riffle	13.00
7/24/2012	MaChe01v	Cobble	Riffle	14.00
8/9/2012	MaChe01v	Cobble	Riffle	16.00
8/15/2012	MaChe01v	Gravel	Riffle	17.00
8/26/2012	MaChe01v	Cobble	Riffle	13.50
6/26/2011	MaChe02v	Gravel	Riffle	14.00
8/26/2012	MaChe02v	Sandy	Riffle	13.00
6/25/2011	MaChe05v	Cobble	Riffle	15.00
7/25/2011	MaChe05v	Cobble	Riffle	13.50
6/26/2011	MaSFChe03v	Gravel, Cobble	Pool	16.30
7/10/2011	MaSFChe03v	Gravel, Cobble	Pool	16.00
8/14/2011	MaSFChe03v	Gravel, Cobble	Pool	14.50
8/29/2011	MaSFChe03v	Gravel, Cobble	Pool	15.00
6/24/2012	MaSFChe03v	Cobble	Riffle	14.50
7/11/2012	MaSFChe03v	Cobble	Riffle	13.00
7/22/2012	MaSFChe03v	Cobble	Riffle	13.50
8/12/2012	MaSFChe03v	Cobble	Riffle	14.00
8/27/13	MaSFChe03v	Cobble	Riffle	13.00

Table 3.7. 2011-2013 Water Temperature Data for Selected Sites on Chester Creek that Meet or Exceed State Standards[89]

[89] Data were collected by volunteers from Anchorage Waterways Council's Citizens Environmental Monitoring Program (CEMP).

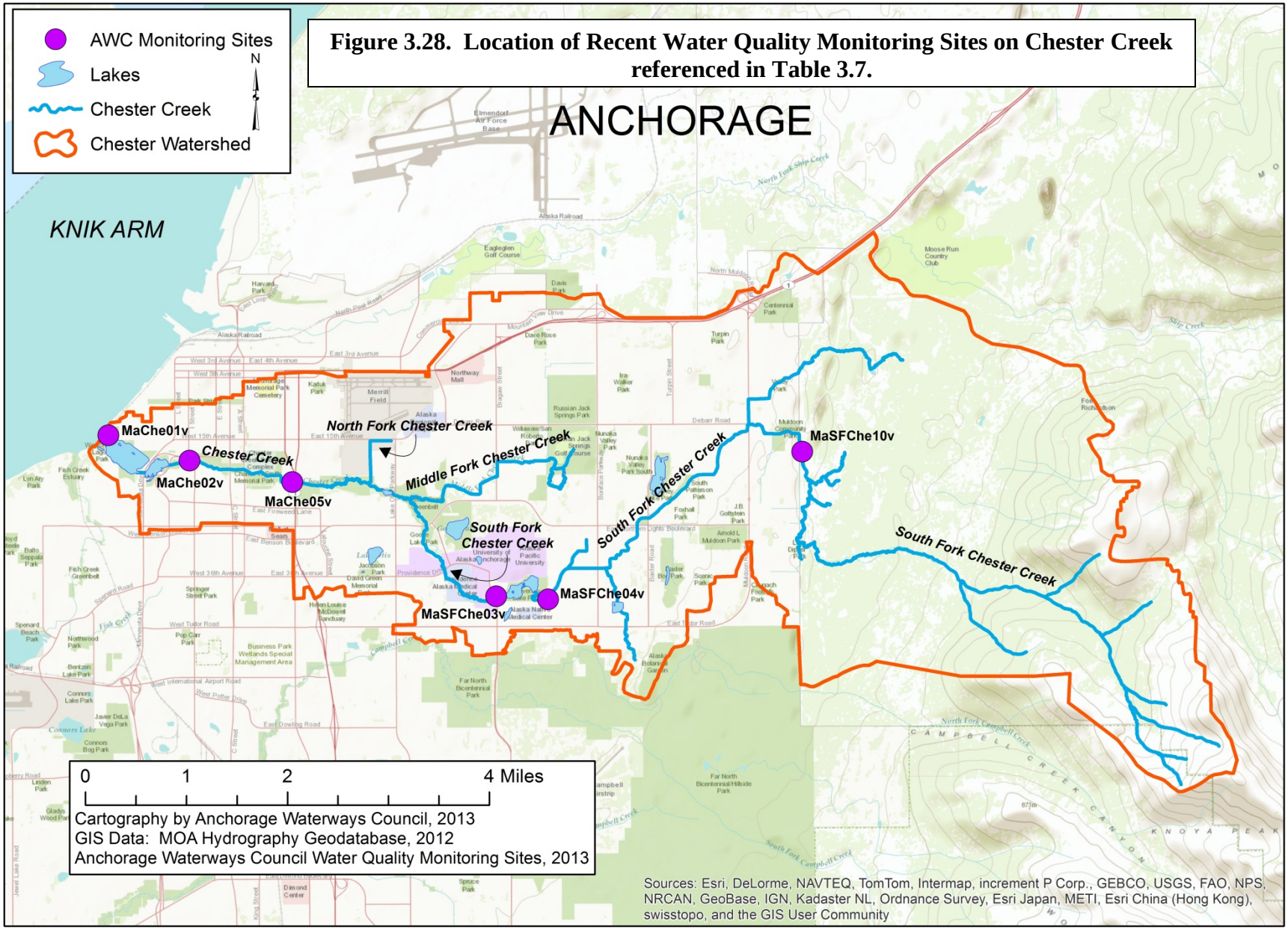

Figure 3.28. Location of Recent Water Quality Monitoring Sites on Chester Creek referenced in Table 3.7.

4. Watershed Issues

To identify the important watershed issues concerning Chester creek, the planning group looked at scientific investigations and past studies, community and stakeholder input, and other planning efforts, and most issues within the watershed fell into the following categories:

- Water Quality
- Water Quantity
- Wildlife Habitat
- Fish Habitat
- Social and Economic Opportunities
- Communication and Coordination
- Data Acquisition

Water Quality:

Chester Creek provides habitat for fish and wildlife and recreational opportunities for residents and visitors year-round, however poor water quality may increase associated human health risks, make the creek unsafe for recreation, reduce the aesthetic benefits of the creek and watershed, and adversely affect fish and wildlife habitat. The factors that affect water quality include natural components, such as nutrients, bacteria, and level of dissolved oxygen (DO); human-introduced pollutants including pesticides, herbicides, trace metals, vehicle fluids, de-icing chemicals, and pet waste; and some physical characteristics, such as geology, temperature, pH, sediment load, vegetation, and stream bed and channel configuration. As stated above, water quality monitoring of the Chester Creek watershed is important in order to conform to ADEC's WQS[90] for compliance with federal water quality standards while supporting safe and beneficial uses of waterways for fish, wildlife, and humans. Because of Anchorage's MS4 designation, much of the water quality degradation can be attributed to untreated stormwater runoff from storm drains as well as from a high level of impervious surfaces.

Water Quantity:

As the Chester Creek watershed has become urbanized, much of the natural vegetation and soil has been replaced with impervious surfaces, such as roads, parking lots, pavement, compacted lawns, and building roofs. These surfaces reduce the ability of the land to absorb and filter incoming rain and snowmelt, thus allowing water and any pollutants picked up to flow quickly to the creek as sheet flows or through the storm drain system. This alters the flow regime as well as the creek's morphology and water quality. According to a 2007 Federal Emergency Management Agency (FEMA) report, "[w]hen rain falls in a natural setting, as much as ninety percent of it will infiltrate the ground; in an urbanized area, as much as ninety percent of it will run off"[91]. With expanded impervious surfaces, more water drains into Chester Creek which can cause high-water events such as flooding and bank erosion (which is also a natural phenomenon). As more culverts have been placed in the creek, the likelihood of

[90] Alaska Department of Environmental Conservation. *Department of Environmental Conservation, 18 AAC70, Water Quality Standards, Amended April 8, 2012*. http://dec.alaska.gov/commish/regulations/pdfs/18%20AAC%2070.pdf .

[91] Federal Emergency Management Agency, 2007, *National Flood Insurance Program, Floodplain Management Requirements, A Study Guide and Desk Reference for Local Officials, Federal Emergency Management Agency*. p. I-20.

them being constricted due to inadequate size or barriers that back them up, such as debris and ice, can change the flow regime dramatically. Water quantity in the exceedingly developed lower Chester Creek watershed is highly impacted from a variety of causes.

Natural phenomena can also exacerbate flooding situations as a combination of non-human factors and the presence of housing and infrastructure create the circumstances under which flooding becomes problematic. A major windstorm on September 5, 2012 hit Anchorage and the Chester Creek watershed particularly hard. It came early in the season when leaves were mostly still on trees, the ground was wet but not frozen, and many trees fell into and across Chester Creek (as well as other creeks in the MOA), and their presence caused flooding especially to the neighborhood east of University Lake where the creek is tightly bordered by homes. Another issue that has caused some flooding in several areas has to do with beaver dam construction—particularly in the east Anchorage neighborhood near Windsong Park. Two sediment settlement ponds were built before 1993 (when the area was acquired by MOA Parks and Recreation), and the combination of culverts and beavers has led to basement flooding in adjacent residences. It's a fairly natural area that borders JBER which provides a nice environment for beavers. Unfortunately, their presence and activities impacted some of the housing in the area, and many had to be removed

Wildlife Habitat: A goal of the 2000 ADF&G report, *Living with Wildlife in Anchorage: a Cooperative Planning Effort* was to document wildlife, hazards, nuisances, impact on urban habitats, and the challenge to manage human population growth with expanded development. Terrestrial habitat in watersheds remains an important concern especially if it becomes fragmented and corridors for wildlife movement are disrupted by development.

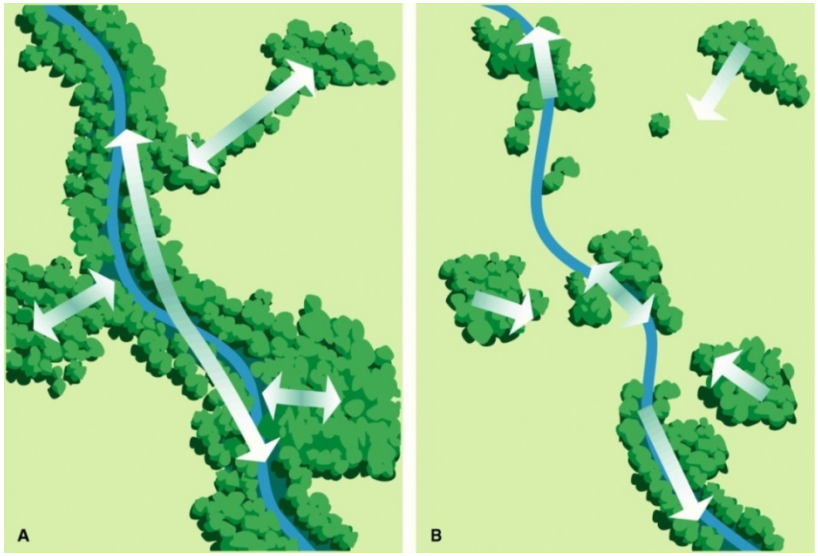

Figure 4.1. "A" shows a high degree of habitat connectivity and "B" is one of low connectivity which makes movement more perilous[92]

[92] From *Stream Corridor Restoration: Principles, Processes, and Practices*. Federal Interagency Working Group, October 1998.

The destruction and filling in of wetlands can also greatly impact wildlife. Many of the iconic species that are part of Anchorage, such as beaver, moose, bears, grebes, loons, Sandhill cranes, geese, ducks, shorebirds, gulls, terns, and bald eagles, live or spend part of their lives in wetlands or along waterways. And yet wetlands, as noted above, have been reduced to a small percentage of what were originally in the Chester Creek watershed.

Lastly, the *Anchorage 2020 Plan,* also published in 2000, confirms that Anchorage residents desire a city that lives in harmony with its natural setting; natural spaces should remain as a "network" throughout the community to preserve and enhance fish, wildlife and plant habitats and their ecological functions and values; wetlands should be a system where their functions and values are preserved and enhanced, and a wide diversity of fish, wildlife and habitats throughout the Municipality be able to thrive and flourish in harmony with the community[93].

Fish Habitat:

Nieraeth[94] also addressed the various life stages of Coho salmon in terms of the physical characteristics of Chester Creek, although most water quality parameters (except D.O. and temperature) were excluded despite their importance in salmon habitat. Her conclusions were based on existing models that suggest that Chester Creek could have a high carrying capacity, however there are several limitations that affect these numbers. These include: culverts that impede fish passage, eroding banks and sediment deposition, presence/absence of woody debris, and presence of enough overwintering habitat. This is an interesting study in that it highlights the need to consider and work on a combination of habitat factors in order to increase the fish carrying capacity of Chester Creek. Many of these issues are part of this watershed plan as restoration projects.

Water quality is also impacted by the introduction of invasive plant species. These are defined as exotic plants that produce viable offspring in large numbers and have the potential to establish and spread in natural areas[95]. Invasive plants impact both the terrestrial and aquatic environment. Efforts to control invasive species follow the Anchorage Invasive Species Management Plan within the MOA's Parks and Recreation Department. The following examples have been found in the Chester Creek watershed and are of concern:

- European Bird Cherry (*Prunus padus*) is a small deciduous tree that can grow to 30' rather quickly. Frequently spread by birds that eat the fruit and excrete the seeds, it is successfully spreading along Anchorage streams and altering the riparian community composition[96]. Over the years, efforts have been made to control their density along Valley of the Moon Park by removing younger trees.
- Purple Loosestrife (*Lythrum salicaria*) can be found in open bogs, along streambanks, riverbanks, lake shores, ditches and other disturbed wet soils. It is a prolific seed producer, and because it lacks natural enemies in Alaska, it can invade intact wetlands and deeper water, and often closes out open water species. Similar to Japanese knotweed, it can offset timing of nutrients into streams and impact salmon food sources[97]. Purple Loosestrife has been found in Eastchester Lagoon just upstream of Spenard, and is being controlled and monitored as the only area of known presence.

[93] Municipality of Anchorage. Department of Community Planning and Development, 2000. *Anchorage 2020, Anchorage Bowl Comprehensive Plan*, p. 39.
[94] Nieraeth, S., 2010, *An Examination of the Carrying Capacity of Coho Salmon in the south fork Chester Creek, Anchorage, Alaska*.
[95] Alaska Exotic Plant Information Clearinghouse (AKEPIC), 2005. *Invasive Plants of Alaska*. Alaska Association of Conservation Districts Publication. Anchorage, Alaska, p. 230.
[96] Ibid., 179.
[97] Ibid., 128.

- Reed Canarygrass *(Phalaris arundinacea*) forms dense, persistent stands in wetlands that displace other plants and may also slow stream flow and eliminate the scouring action needed to maintain the gravel river bottoms for salmon reproduction. Additionally it promotes silt deposition and can therefore constrict waterways. Stands of it have been discovered in the Debarr and Muldoon area near Grass Creek Village. Similar stands have been burned and tarped at Westchester Lagoon in the past few years. Recent removal of the tarps at Westchester Lagoon shows that this can be a cumbersome although partially effective manner of attacking Reed Canarygrass (RCG). Since using herbicides is problematic close to water, "mechanical methods", such as burning and tarping or just double tarping, may be the only way to attempt eradication in areas adjacent to creeks[98]. Education about RCG and other invasives is also important in controlling their introduction and spread.

Social and Economic Opportunities: Chester Creek watershed contains residential, business, educational, medical, tourism, and recreational areas. These enhance the local economy and quality of life for Anchorage. Maximizing these opportunities while not degrading the watershed presents some unique challenges. A major asset to the watershed is the Lanie Fleischer Chester Creek Trail that runs through the Chester Creek greenbelt approximately 4 miles from Westchester Lagoon (connecting to the Tony Knowles Coastal Trail) to Goose Lake. From the trail are majestic views of the Chugach Mountains, and it provides access to several parks. At the eastern end, smaller trail connections can be used to access various other locations in the watershed, such as Russian Jack Springs Park, University Lake Park, and Cheney Lake. In 2014 there are plans to resurface the trail during the summer[99].

Salmon fishing is not allowed in Westchester Lagoon or Chester Creek, however the ADF&G does stock Chester Creek, Cheney Lake, and University Lake with Rainbow Trout[100], and fishing for them and Dolly Varden is allowed except during periods of closure (April 15-June 14) [101].

Having this type of access can be a two-edged sword. It has been said that Anchoragites love their creeks to death. While it is fabulous to have Chester Creek running through a greenbelt where trail users are not impinged by homes and fences, the access points can receive an exceptional amount of foot traffic that results in bank trampling. This removes vegetation and speeds up erosion. One such area that has been particularly difficult to manage is adjacent to Valley of the Moon Park, where the main stem of Chester Creek is bounded on one side by the Lanie Fleischer trail and a large grassy area and playground that can attract hundreds of users on a single day. Dogs and children play along and in the creek for about a quarter mile starting at Arctic Blvd. and moving north. Exposed tree roots and vegetation that was worn away leaving bare soil resulted in the potential for trees to fall during windstorms and a scouring of soil during high water times and runoff[102].

[98] Tim Stallard, Invasive Plant Program Coordinator, Anchorage Park Foundation, (personal communication, October 9, 2013).
[99] Municipality of Anchorage. Parks and Recreation. Lanie Fleischer Chester Creek Trail Improvements. 2014. http://www.muni.org/Departments/parks/Pages/ChesterCreekTrailImprovements.aspx .
[100] Alaska Department of Fish and Game. *Stocked Lakes in the Cook Inlet/Kenai Peninsula Area*. 2013. http://www.adfg.alaska.gov/static/regulations/fishregulations/PDFs/southcentral/2013scstockedlakes.pdf .
[101] See Alaska Department of Fish and Game. *2013 Sport Fishing Regulations.* http://www.adfg.alaska.gov/index.cfm?adfg=fishregulations.sc_sportfish for current regulations.
[102] This reach has been of great concern for years. In 2012 ADF&G and AWC embarked on a plan for bank restoration. Other groups became involved, and in 2013 much of the area was "fenced" off and specific access points with rock stairs were put into place by the Anchorage Park Foundation's "Youth Employed in Parks" (YEP) program. New vegetation was planted, and time will tell if the directed access to the creeks reduces bank erosion.

There are other locations along the bike trail that are inviting to the many walkers, runners, cyclists, and skaters that recreate along the creek. One area that contains a memorial bench alongside the trail attracts people to the creek and provides a nice resting place to view the natural surroundings. But it also has turned into a popular entry point where children can play in the creek while their parents sit on the bench. At the eastern end of Westchester Lagoon at Spenard is a parking area where adults and children feed the ducks. Besides not being healthy for the waterfowl, it tends to increase duck numbers and their desire to overwinter[103]. As these areas freeze up, more ducks crowd into the open water and their fecal waste increases in that location.

During 2012 the task force working to update this plan and the Anchorage Waterways Council's Creek Report Card project noted that homeless camps are prevalent along the creek, which undoubtedly contributes to some of the trash found in the creek as well having the potential for FC from human waste. These are some of the conundrums that have to be dealt with in balancing the amenities and use of our creeks with their health. Creeks are a natural feature that people are drawn to, and development and maintenance along the creek should occur in ways that respect the natural features of the watercourse. Residents, businesses, and users alike will need education about their unique location and uses in order to protect and enhance the character of the community and Chester Creek.

Communication and Coordination: Numerous public and private entities have a special interest or control over certain activities occurring in the Chester Creek watershed as well as other watersheds. Central coordination and communication are essential to decrease redundancy and to enhance efficiency in data gathering and information sharing. Two past coordinated group efforts, the Watershed Task Force and the Watershed Round Table, are a good method for keeping the various stakeholders informed of issues and problems. Additionally, sharing plans by one agency or organization will often result in a beneficial synergy that might not be known by the other stakeholders.

Education is also an important aspect to help assist in watershed health. Thoughtful and appropriately placed signage can make citizens aware that what looks like a ditch could really be a creek, there are health benefits to creeks by picking up pet waste, and avoiding bank trampling reduces erosion and results in healthier fish habitat.

Data Acquisition: There are many agencies and organizations that collect data in the Chester Creek watershed. Some of these include water quality monitoring data; abundance and distribution of fish populations and invasive species (plant and animal); habitat assessments for rearing, spawning and wintering fish; loss of wetlands; obstructions to fish passage; wildlife, waterfowl and macroinvetebrate surveys; degraded bank areas; stream course changes; impacts on recreational areas and trails; and trash and debris problems. If all the existing data on the Chester Creek watershed were to be placed in a central clearinghouse and evaluated, it would allow agencies and organizations to focus on data gaps. This could be a useful means for compiling information, acquiring data that is missing, comparing it, looking for trends, cause and effect, and solving issues and conserving resources in a more efficient manner. As an example, if the MOA or AKDOT&PF were going to replace part of a road which has a culvert, coordination with ADF&G and their list of culverts that need replacing would make good economic sense. Hand in hand with data gathering and compilation is the need for funding.

[103] Ducks do overwinter in Anchorage, but feeding them encourages more to stay in areas where the water can freeze up to fairly small openings.

Following are some examples of data that should be obtained or listed from one access point in a Chester Creek clearinghouse:

- One of the longest running set of data records on Chester Creek is being captured by the USGS at the Arctic Blvd. gage station (USGS 15275100). Information begins in 1966 until the present[104], and encompasses a variety of parameters.
- AWC has been collecting water quality data on several Chester Creek locations since 1999 (temperature, pH, D.O., turbidity, etc.)
- UAA's Alaska Natural Heritage Program has 50 records dating between 2000 and 2009 on benthic macroinvertebrates for Chester Creek[105]
- There are publications from short studies by various researchers at USGS and from the Aquatic Restoration & Research Institute (ARRI)
- Theses and dissertations from APU and UAA students, i.e. Nierath, Steer, Moffat, Wilson, Whitman, Burich, et al.
- GIS data on Anchorage watersheds, drainageways, lakes, and biological information from the MOA WMS and ADF&G
- EPA and State of ADEC TMDL reports on Chester Creek, Westchester Lagoon, and University Lake[106]

[104] U.S. Geological Survey.,*USGS 15275100 CHESTER C AT ARCTIC BOULEVARD AT ANCHORAGE AK.* 2014. http://waterdata.usgs.gov/usa/nwis/uv?site_no=15275100 .
[105] University of Alaska Anchorage. Environmental and Natural Resources Institute. *Stream Team Online.* http://astdatabase.uaa.alaska.edu/search/searchpage.asp.
[106] Alaska Department of Environmental Conservation. *Total Daily Maximum Load for Fecal Coliform in Chester Creek, University Lake, and Westchester Lagoon, Anchorage, Alaska*". May 2005. http://www.epa.gov/waters/tmdldocs/chestercrwatershedTMDLEPAFinal.pdf .

5. Plan Implementation

The following general strategy has been created to address the highest priorities that accomplish the vision, mission, and goals of the *Chester Creek Watershed Plan.* These guidelines were developed through stakeholder and planning team input. This list is not exhaustive of all activities that could, or need to be, performed in the watershed, those listed by the planning team are projects that are considered top priorities.

The goals, objectives, and actions in the implementation plan are initially organized by issue category: Water Quality, Water Quantity, Wildlife Habitat, Fish Habitat, Social and Economic Opportunities, Communication and Coordination, and Data Acquisition. The strategy is rather generic and includes actions that can help accomplish the objectives and goals. Following in this report's appendix is a more specific listing of priorities based on overall and subwatershed delineations in the Chester Creek watershed as well as a prioritization of LID projects.

1.0 WATER QUALITY

Goal: Meet State standards for water quality in Chester Creek.

Objective: Reduce pollution from point and non-point sources.

Actions:

1.1 Evaluate and quantify streambank erosion.

1.2 Install strategic storm water infrastructure projects to maximize water quality improvement in storm water discharge.

1.3 Conduct feasibility assessments and install priority low impact development (LID) projects to reduce storm water discharge and improve water quality.

1.4 Conduct riparian improvements to improve vegetated buffers along creeks.

1.5 Conduct water quality monitoring to validate improvements, note changes and trends in the creek.

1.6 Preserve and/or utilize wetlands for water quality improvement purposes.

1.7 Incorporate BMPs and apply Municipal design criteria to future drainage projects and retrofits.

1.8 Develop protocols and monitor Municipal BMP's for effectiveness in maintaining and improving water quality, and improve BMP's where necessary.

1.9 Reduce fecal coliform, turbidity sources and other pollutants from entering the creek.

2.0 WATER QUANTITY

Goal: Return Chester Creek to a more natural hydrologic regime.

Objective: Eliminate flood hazards, maintain flows for habitat, preserve and/or widen existing floodplains where applicable.

Actions:

2.1. Preserve existing floodplain and restore or re-create historic floodplain in selected locations.

2.2. Remove identified FEMA flood hazards that inundate existing neighborhoods.

2.3. Model storm water flow for a watershed-wide storm water drainage study.

2.4. Gage creek continuously at current USGS gage location and select upstream points for understanding tributary inputs.

2.5. Reduce and attenuate peak flows from stormwater discharge.

2.6. Reduce the amount of existing and proposed impervious surface within the watershed by way of LID; set thresholds/priorities.

2.7. Preserve and/or maintain wetlands within the floodplain for attenuation of peak flows.

2.8 Evaluate and analyze impacts of increasing groundwater withdrawals and subsequent thermal and flow discharge into the creek within the U-MED and UAA area.

2.9 Apply for a water reservation for fish habitat maintenance flows.

3.0 WILDLIFE HABITAT

Goal: Provide habitat for a diversity of wildlife along Chester Creek.

Objective: Maintain and enhance existing wildlife corridors, riparian habitat, greenbelts, and parks.

Actions:

3.1. Support GLT conservation easements of priority wildlife habitat.

3.2. Improve animal passage along creek corridors.

3.3. Support and create programs that offer assistance for restoration and protection of riparian habitats.

3.4. Manage existing invasive species and prevent new introductions.

3.5 Preserve and/or enhance wetlands for wildlife habitat values.

4.0 FISH HABITAT

Goal: Provide for healthy fish and other aquatic organism populations in Chester Creek.

Objective: Provide habitat connectivity, quality and diversity for all aquatic life stages.

Actions:

4.1. Upgrade culverts identified in ADF&G culvert survey that impede fish passage.

4.2. Maintain adequate fish passage and habitat.

4.3. Protect existing wetlands and open water habitats.

4.4. Increase riparian vegetation for thermal control, cover and food sources.

4.5. Improve instream diversity and quality of modified channels.

4.6. Manage existing invasive species and prevent new introductions.

4.7 Obtain a water reservation for minimum flows that support fish habitat.

4.8 Evaluate and maintain creek water temperatures for aquatic life.

4.9 Improve water quality within the creek, as per Goal 1.

4.10 Control excessive erosion and sediment inputs to the creek.

5.0 SOCIAL AND ECONOMIC OPPORTUNITIES

Goal: Foster a high degree of social and economic opportunities.

Objective: Establish and build a connection between a healthier watershed and social and economic benefits to the community.

Actions:

5.1. Conduct a cost/benefit analysis of a healthy Chester Creek watershed

5.2. Engage individuals, businesses and schools in efforts to protect and restore the watershed.

5.3. Incentivize wetland preservation for individuals and businesses.

6.0 COMMUNICATION AND COORDINATION

Goal: To have a highly involved and dedicated community and municipality in maintaining the health of Chester Creek.

Objective: Promote community and municipal awareness and stewardship of Chester Creek.

Actions:

6.1. Promote implementation of the Chester Creek Watershed Plan within the community and Municipality.

6.2. Increase community understanding of the watershed problems and solutions.

6.3. Increase Chester Creek outreach and education program within the Municipality.

6.4 Identify major uses, community perceptions, and community values associated with Chester Creek.

6.5 Increase stewardship by the local community to care for the creek.

6.6 Build local stewardship for overseeing and maintain existing public access points in order to lessen the impact to the creek's banks.

6.7 Support green infrastructure and LID planning.

6.8 Promote coordination between departments within the Municipality.

7.0 DATA ACQUISITION

Goal: Improve our understanding of the watershed.

Objective: Evaluate research needs, conduct studies, gather data, and share information.

Actions:

7.1. Plan and conduct a data gap analysis.

7.2 Conduct habitat and water quantity monitoring to fill data gaps.

7.3 Manage data and make accessible to the public.

7.4 Coordinate data acquisition and management across interested agencies.

6. Appendix

I. RESTORATION PRIORITIES FOR CHESTER CREEK WATERSHED[107]

The following table (Table.6.1.) is divided into five drainage areas that begin at the mouth of Chester Creek and can be located on the accompanying map (Figure 6.1):

C = Overall Watershed
CW = Westchester/Eastchester Drainage
CMF = Middle Fork Drainage
CSF = South Fork Drainage
CRL = Reflection Lake Drainage

Also on the table, the 7 goals from the watershed plan are listed for each drainage. The priorities were listed in geographic order for the most part, and some priorities fall under multiple goals.

Goal 1 – WATER QUALITY: Meet State standards for water quality in Chester Creek.
Goal 2 – WATER QUANTITY: Return Chester Creek to a more natural hydrologic regime.
Goal 3 – WILDLIFE HABITAT: Provide habitat for a diversity of wildlife along Chester Creek.
Goal 4 – FISH HABITAT: Provide for healthy fish and other aquatic organism populations in Chester Creek.
Goal 5 – SOCIAL and ECONOMIC OPPORTUNITIES: Foster a high degree of social and economic opportunities.
Goal 6 – COMMUNICATION and COORDINATION: To have a highly involved and dedicated community and municipality in maintaining the health of Chester Creek.
Goal 7 – DATA ACQUISITION: Improve our understanding of the watershed.

[107] This list was created from by recommendations from the "Watershed Planning in the Municipality of Anchorage" group, which met between 2010 and 2012.

Figure 6.1. Restoration Priority Locations for Chester Creek Watershed

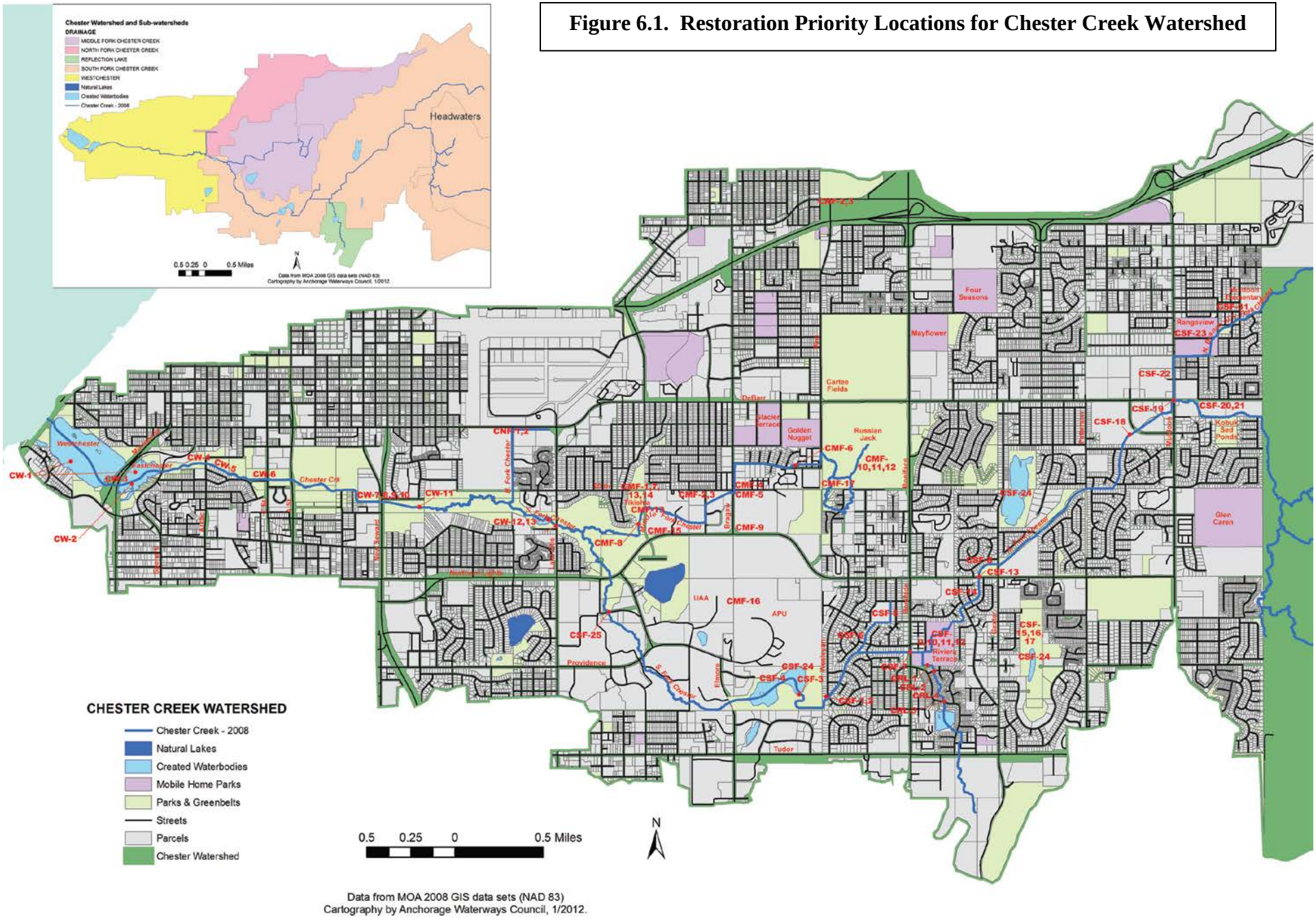

Table 6.1. Restoration Priorities Shown on Map

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
C-1		X	X	X		X	X	All				Conduct update to flood mapping for watershed.
C-2	X	X	X	X	X	X	X	All				Create and implement invasive removal and control strategy for Bird Cherry, Purple Loosestrife and Reed Canarygrass.
C-3	X		X	X	X	X		All				Work with MOA Parks Dept and landowners to keep vegetation buffer between lawns and stream banks.
C-4	X	X	X	X	X	X	X	All				Implement an LID/OGS strategy watershed-wide.
C-5			X	X	X	X	X	All				Conduct salmon monitoring on a yearly basis.
C-6	X		X	X	X	X		All				Place signs at all creek crossings identifying creek.
C-7	X	X	X	X	X			All				Protect privately-owned wetlands throughout drainage.
C-8	X		X	X	X	X		All				Create interactive walking tours of greenbelt.
C-9	X		X	X	X	X		All				Conduct educational campaign on tossing household/greenhouse plants into the creek and riparian area.
WESTCHESTER LAGOON AREA												
CW-1	X	X	X	X	X	X	X	CW				Control Reed Canarygrass, Purple Loosestrife and other invasives around Westchester and Eastchester Lagoons
CW-2	X	X	X	X				CW		Eastchester	Sediment has accumulated, filling in old channel as a natural process.	Active street sediment source removal in stormwater system to reduce rate of accumulation by reducing sediment input by streets upstream.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CW-3	X	X	X	X	X	X		CW	61.2050, -149.8979	Arctic Blvd.	Boulders backwater culvert and upstream creek, increasing sediment deposition and eroding banks. Culvert backwaters local area during 100-year flood event. ADF&G 20400056 culvert green.	Model culvert to review capacity, impact to homeowners for flooding concerns and fish passage. Replace Arctic Blvd. culvert top pass 100 year flood and minimize backwater effects to homeowners, remove or retrofit rocks to decrease sedimentation and backwater through area.
CW-4	X		X	X	X	X	X	CW		Valley of the Moon Park along creek and bike trail	High use by public causing extensive streambank trampling and erosion.	Area was revegetated in 2013 and access stairs were placed to direct people and pets to creek in specific locations. Monitor progress.
CW-5	X		X	X	X	X		CW		Valley of the Moon Park along Chester Creek	Rock lined banks and lawn to water's edge of houses along south side of bike path and creek	Work with property owners to remove rocks and install more diverse habitat through bioengineering techniques and create a vegetated buffer of riparian vegetation between creek and lawn.
CW-6	X	X		X	X		X	CW	61.20144, -149.8875	C Street Bridge	Channel widened to accommodate construction, local slope may have been reduced, increasing sediment deposition rates.	Evaluate current condition and produce a feasibility study of potential options to consider the magnitude of the problem and to increase sediment transport and habitat features as well as riparian vegetation.
CW-7	X	X				X	X	CW		Seward Highway	Untreated stormwater from a 42-inch diameter storm drain southwest corner of crossing.	Evaluate AKDOT&PF record drawings showing a petroleum separator in first manhole from outfall and if it is in service. Evaluate potential to connect part of storm network to other storm drains, reducing flows.
CW-8	X			X				CW		Seward Highway	Untreated stormwater from a 42-inch diameter storm drain southwest corner of crossing.	Construct stormwater treatment area at Chester Creek at Eagle Street and connect with 1300 feet of storm drain.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CW-9		X						CW		Creek downstream of Seward Highway	High velocities from culvert during floods erode streambanks, banks are too steep, gabions eroding into creek, river left bank too steep for vegetation establishment, storm drain flow erodes creek/banks.	Remove/reinforce gabions - install root wads on both sides of creek revegetate, install boulder erosion protection to dissipate energy from storm water flows from storm drain outlet.
CW-10		X	X	X	X			CW	61.20162, -149.8681	Seward Highway	ADF&G 20400033 fish passage issue. Culvert too small, constricted, debris and fish barrier, ice jacking compromised upstream 20-25 feet of culvert.	Replace Seward Highway culvert with bridge for fish, animal and pedestrian passage
CW-11	X		X	X				CW		Karluk Street Bike Trail Bridge	An exposed telephone cable is causing the creek to erode the channel banks.	Work with utility to bury utility line below streambed
CW-12	X	X	X	X				CW	61.20044, -149.8424	Hillstrand Pond	ADF&G 20400035 fish passage issue. Perch and velocity issues at culvert outlets.	Replace Hillstrand Pond culverts with bridge, weir and rocky riffle
CW-13	X		X					CW		Hillstrand Pond	Stormwater pipe from Cliffside Drive is not treated prior to discharge to creek near Hillstrand Pond	Install end-of-pipe controls at Cliffside Drive
CW-14				X				CW	61.19961, -149.8382	Lake Otis Parkway	ADF&G 20400036 fish passage issue. Velocity and perch issues at culvert outlet	Replace culvert and wood fish ladder with bridge or large, embedded pipe.
CW-15	X			X				CW	61.19961, -149.8382	Lake Otis Parkway	Runoff from road is not treated prior to discharge to creek.	Install pretreatment basin for Lake Otis runoff.
CHESTER MIDDLE FORK												
CMF-1								CMF		Middle Fork at Tikishla Park	Channel widening and habitat loss from utility work at ditch confluence	Reconstruct creek and ditch banks to increase depth and available habitat.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CMF-2								CMF		Middle Fork at Nichols Street	Middle Fork was culverted in this area during development for about 500 feet.	Construct an open channel. Channel would have one road and two driveway crossings with steep, deep sides.
CMF-3		X		X			X	CMF	61.20126, -149.8128	Middle Fork at Nichols Street	ADF&G 20400038 fish passage issue for slope.	Evaluate and replace culvert.
CMF-4	X			X				CMF	61.20223, -149.8087	Middle Fork at Bragaw Street	Untreated stormwater input	Construct a water treatment pond to improve water quality prior to discharge from approximately 1800 acres, including Russian Jack Springs which is located in an area bounded by Bragaw, Northern Lights and Nichols Street.
CMF-5		X		X				CMF	61.20223, -149.8087	Middle Fork at Bragaw Street	ADF&G 20400039 culvert fish passage issues at culvert, maintenance of culvert and stormwater piping of stream upstream.	Replace culvert for fish passage and hydraulic conductivity as a maintenance issue for flows.
CMF-6		X		X			X	CMF	61.20433, -149.7978	Middle Fork at Reka Street	ADF&G 20400043 fish passage issue and upstream driveway culverts small, banks mowed to edge, lack of habitat.	This area is cut off from rest of creek by 2400 feet of storm drain. Perform study of fish use, enlarge pipes, add riparian vegetation and instream logs and boulders for habitat diversity, replace fish passage issue at culvert.
CMF-7								CMF		Middle Fork at Tikishla Park	Floodplain disconnect and untreated stormwater flows.	Install pretreatment facilities and reconnect flows to adjacent lowlands in Tikishla Park.
CMF-8								CMF		Middle Fork at Alder Drive	Untreated stormwater flows.	Install end-of-pipe pretreatment at Alder Drive.
CMF-9	X	X			X			CMF		Middle Fork near East High School	Untreated stormwater flows.	Disconnect storm drains near East High School and Wesleyan to natural wetlands.
CMF-10	X	X			X			CMF		Middle Fork near Russian Jack Park	Protection of wetlands for stormwater buffer	Protect uplands and wetlands north of Northern Lights and west of Wesleyan Drive.
CMF-11	X	X			X			CMF		Middle Fork near Russian Jack Park	Protection of wetlands for stormwater buffer	Protect privately owned wetlands near Russian Jack Park.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CMF-12								CMF		Middle Fork headwaters above Russian Jack Park	Untreated stormwater flows.	Construct LID at Glacier, Mayflower and Four Seasons mobile home parks.
CMF-13								CMF		Middle Fork at Tikishla Park	Middle Fork runs orange and highly turbid during rain events and springmelt.	Create a report that evaluates the history, conditions and feasibility of various options to decrease the amount of turbidity caused by groundwater input into the local stormwater system and creek. Implement suggestions.
CMF-14				X				CMF		Middle Fork/drainage tributary	Fish Passage is blocked under trail - no ADF&G name or location in database.	Lower culvert or replace with larger, embedded pipe.
CMF-15				X				CMF	61.19512, -149.8293	Northern Lights Blvd.	ADF&G Culvert 20400047 fish passage issue as constriction/velocity	Replace with a larger, embedded culvert.
CMF-16								CMF		Middle Fork at University Area	Untreated stormwater flows.	Install end-of-pipe pretreatments at UAA and APU.
CMF-17								CMF	61.1926, -149.8296	Mallard Drive	ADF&G Culvert 20400250 fish passage issue as a constriction to creek	Replace with a larger, embedded culvert.
CMF-18	X							CMF		Middle Fork at Pine Street	Untreated stormwater flows.	Disconnect Pine Street outfall that drains to Cartee Softball Fields.
CHESTER SOUTH FORK												
CSF-1				X				CSF		South Fork - University Lake and Wesleyan Drive	Creek is over-widened and straight with little habitat diversity as it is a rerouted section of creek to fill University Lake	Increase habitat diversity in stream between University Lake and Wesleyan Drive, potentially add bankfull banks to bring to a more representative cross-section area for riffles, add boulders for scour pools. This area has the potential to re-create meanders for the creek and a floodplain in undeveloped area to the north of creek.
CSF-2	X	X			X			CSF		South Fork - University Lake and Wesleyan Drive	To keep the potential for remeandering creek in this area.	Protect Uplands and Wetlands north of Northern lights and west of Wesleyan Drive

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CSF-3	X	X		X				CSF		South Fork at inlet to University Lake	Low flow issues over sediment delta at creek inlet to lake, potentially exacerbated when Chester was rerouted into the lake, causing significant erosion upstream.	Remove sediment from inlet, create sediment trap to capture estimated additional sediment from further bank erosion, narrow creek mouth downstream of bridge, consider habitat diversification in eroded section of channel.
CSF-4								CSF		South Fork at University Lake	Dog park introduction of fecal coliform into lake and trampling of lakeshore is high.	Create directed access to lake and maintain vegetated buffer outside of access areas, restore vegetated buffer in impacted locations.
CSF-5								CSF		South Fork at College Gate Elementary	Channel is overwidened with a gabion wall along the west bank. Backwatering and severe icing occurs due to slope grade breaks in creek.	Replace gabion with bioengineering and replant riparian vegetation, potential to create wetland marsh while narrowing channel or regrade stream to eliminate backwater and create habitat diversity riffles and pools.
CSF-6				X				CSF	61.18994, -149.7863	South Fork at Emmanuel Street	ADF&G 20400056 fish passage issue - set at wrong grade creating a velocity chute at inlet of culvert.	Evaluate flows, at minimum remove mitered end of culvert and restore site unless flow calculations indicate complete replacement for hydraulic capacity.
CSF-7				X				CSF	61.18921, -149.7784	South Fork at Boniface	ADF&G 20400063 fish passage issue. Gradient grey, constriction ration grey, rock weir at inlet increase velocities.	Evaluate fish passage flows for crossing, take out rock weir (looks to be fallen rock from riprap sides) and replace. Evaluate large opening for large animal passage under Boniface.
CSF-8	X							CSF		South Fork between Boniface and Beaver	Untreated stormwater flows.	Install End of pipe controls in Nunaka Valley
CSF-9				X				CSF	61.18926, -149.7759	South Fork at Riviera Terrace Trailer Park - Lee Street	ADF&G 20400057 fish passage issue. Gradient and constriction issues for double pipe and velocity gradient, backwaters a large length of creek.	Evaluate for fish passage flows and replace pipe with one large pipe to comply with MOA Standard Design Criteria and ADF&G fish passage for embedded pipes, slope so no backwater of creek upstream.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CSF-10				X				CSF	61.1905, -149.7736	South Fork at Riviera Terrace Trailer Court - Sylvia Drive	ADF&G 20400058 fish passage issues. Perch, velocity issues at this culvert. Triple culvert does not conform to MOA design criteria.	Replace with a larger, embedded culvert.
CSF-11				X				CSF	61.19068, -149.7729	South Fork at Riviera Terrace Trailer Court - Sylvia Drive	ADF&G 20400060 fish passage issues. Velocity issues and triple culvert does not conform to MOA design criteria.	Replace with a larger, embedded culvert.
CSF-12	X					X		CSF		South Fork at Riviera Terrace Trailer Court	Debris in creek and riparian areas, general encroachment into buffer zone and backwater issues due to culverts or rock weirs at culverts.	Clean up area, education outreach needed, removal of rock weirs put there by locals, improve tossing of house plants into creek.
CSF-13				X				CSF	61.1954, -149.7667	South Fork at Northern Lights Blvd.	ADF&G 20400064 fish passage issue. Obstructions in pipe, barrier potential at outlet.	Clean obstructions and outlet barrier, evaluate for hydraulic and fish passage criteria, replace if necessary.
CSF-14	X					X	X	CSF		South Fork along Ambergate	General erosion along fences, lawns, issues with tree cutting.	Walk creek to evaluate extent of issues, form an approach to address erosion, educate local homeowners on value of riparian area.
CSF-15	X							CSF		South Fork at Baxter Road	Untreated storm water runoff	Detention and treatment at discharge of basin Baxter Road and Northern Lights.
CSF-16	X							CSF		South Fork at Baxter Bog	Untreated storm water runoff	Sediment removal and hydraulic dampening all basins into Baxter Bog.
CSF-17	X	X			X			CSF		South Fork at Baxter Bog	Drying of Baxter Bog wetlands	Reconnect storm water flow to Baxter Bog.
CSF-18				X				CSF		South Fork at Begich Middle School	Invasives, rock weir formation by children to cross stream	Perform invasive removal and design/construct small bridges for children to cross creek.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CSF-19				X				CSF	61.20953, -149.7337	South Fork at Muldoon Road	ADF&G 20400249 fish passage issue. Gradient in culvert makes perch and velocity barrier, long-term maintenance issue for hydraulics, does not pass 100-year flood well, backwaters upstream businesses.	Replace culvert, evaluate current (2012) design to move creek to new location and crossing under Muldoon road.
CSF-20								CSF		South Fork upstream of Muldoon Road	Creek is modified with low habitat diversity and at-risk of road and development.	Create more natural creek on South Fork east of Muldoon Road. Align to Hill with a 100 foot corridor.
CSF-21								CSF		South Fork upstream of Muldoon Road	Creek has significant debris in it up to halfway to military land	Take debris out of creek.
CSF-22				X				CSF		North Fork of the South Fork Muldoon Road	Creek is culverted under Muldoon Road for 1,500 feet	Remove North Branch of South Fork from Muldoon Road and put into open channel in a 100 foot ROW.
CSF-23						X		CSF		North Fork of the South Fork Rangeview Trail Court	Encroachment and debris issues in the creek, dog use, trampling of banks.	Remove debris, install access points, revegetate other access points.
CSF-24						X		CSF		South Fork at lakes and bogs	No education signage for public	Install kiosks at University Lake, Baxter Bog, Cheney Lake.
CHESTER REFLECTION LAKE												
CRL-1				X				CRL	61.18798, -149.7744	Reflection Lake at Sapien Ave.	ADF&G 20400212 fish passage issue. Perch and gradient issues.	Replace with a larger, embedded culvert.
CRL-2				X				CRL	61.18745, -149.7740	Reflection Lake at Image Drive	ADF&G 20400214 fish passage issue. Gradient, constriction and velocity issues.	Replace with a larger, embedded culvert.
CRL-3				X				CRL	61.18494, -149.7723	Reflection Lake at Reflection Drive	ADF&G 20400215 fish passage issue and flow capacity. Gradient, velocity.	Replace with a larger, embedded culvert and investigate outlet of Reflection Lake for open channel if necessary.

Map ID	Goal 1	Goal 2	Goal 3	Goal 4	Goal 5	Goal 6	Goal 7	Drainage	Lat/Long (if known)	Approximate Location	Issue	Action Item
CRL-4		X	X	X				CRL		Reflection Lake between Image and Reflection Drive	Area could be made into a wetland marsh to enhance habitat.	Image Drive and Reflection Drive area turn greenbelt to marshy profile for creek.
CHESTER NORTH FORK												
CNF-1	X	X	X	X	X	X		CNF		Sitka Street Park	The North Fork was diverted from this area in the 1960s. The original channel was dewatered but still exists through the park. Approximately 2,200 feet of prime Coho salmon rearing habitat exists in the dewatered channel and can be restored.	Construct a diversion at Sitka Street to route the North Fork base flow to the channel through Sitka Street Park while bypassing peak flood flows down the current ditched channel.
CNF-2					X	X		CNF		North Fork at Sitka and Davis Parks	No educational information available	Place kiosks at Sitka Street Park and Davis Park on LID, pesticide use, fertilizers and pets.
CNF-3	X			X				CNF		North Fork at Mountain View	Headwaters are highly developed curb and gutter, increasing runoff and pollutants into creek	Evaluate, prioritize and construct headwater street retrofits in Mountain View to improve stormwater.

II. RECENT LID PROJECTS IN CHESTER CREEK WATERSHED (as of 12/12)[108]

According to the HDR report, LID has been implemented on a number of sites within Chester Creek watershed, which are listed on the following table.[109]

Table 6.2. LID Implementation in Chester Creek Watershed

Subwatershed	Name of Project	Description
Middle Fork	New Providence Health Building	Detention pond for runoff. Still under construction (as of 12/12)
	Cartee Softball Fields	Porous pavement with underground detention and infiltration gallery. Accepts runoff from the parking lot. Pilot project to see how porous pavement works in Alaska conditions.
	Ace Hardware	Complete underground infiltration gallery. Connected to storm drain.
	New 4-plex at 20th and Wesleyan	Development was graded so that runoff from parking lot drains to the adjacent wetland for treatment.
South Fork	UAA Sports Arena	When this development is completed, a large area of the roof and parking lot will be directed to a constructed depression.
	State Crime Lab	Low impact design features were incorporated into the new development.
	Providence Day Care	A constructed pond receives runoff.
	UAA Health Science Building	Runoff from the roof is directed to the west to a large infiltration building. Overflow goes to constructed pond. On south of the building, runoff from parking
	New Providence Extended Care, under construction (as of 12/12)	Runoff from building and parking will go to a constructed pond when completed.
	Medical Office Building – Alaska Heart Institute and Cancer Center Building	Runoff from parking lot goes to a constructed pond. Water discharges into the adjacent wetland. There is no direct connection to the creek.
	Creekside Drive Development	A constructed pond collects runoff from the roofs and parking lot. The pond drains to the west, towards the creek.
	MHLT-Mental Health Trust Fund	A constructed detention pond accepts runoff from this currently-vacant land.
	Alaska Native Tribal Health Consortium Building	A constructed pond to the east of the building receives runoff from the entire parking lot and roof. The area on the east side of the pond also drains to the pond.

[108] This table was part of a report to Watershed Management Services. (Prepared by HDR Alaska, Inc.). *Chester Creek Watershed Subbasin Prioritization for LID Stormwater Projects.* Dec. 17, 2012. http://www.anchoragewatershed.com/Documents/AppA4ChesterCreekWatershedSubbasinPrioritizationforLIDStormwaterProjects.pdf , p.3.
[109] Some projects may still be under construction or completed.

Table 6.3. List of LID Opportunities in 20 Priority Subbasins (see Figure 6.2 for map of subbasins referenced)

Priority	Subbasin	Watershed	Potential LID Projects
1	575	North Fork	Investigate infiltration options that can be achieved without any risk of open water near Merrill Field.
2	475	North Fork	Investigate LID opportunity in Penland Park area drainage plan.
3	549	Lower	Look for LID integration into 36th Ave. improvements.
4	523	Lower	In the Highway-to-Highway project, assess LID/storm drain improvements to various areas.
5	594	Lower	Divert flow from storm drain at C St. and 22nd Ave. to nearby wetlands as well as other improvements along C St.
6	527	South Fork	Review several parcels and large parking areas for capturing runoff from 2 schools, several residences, large stores, and the Anchorage School District parking lot.
7	1253	Middle Fork	Investigate ways to disconnect this urban area (Wonder Park School, Carrs Shopping Center, and areas along Muldoon Rd.) from the storm drain system.
8	175	South Fork	Possibly disconnect catch basins at Municipal Tudor Road Complex (school bus barn), look at strip mall parking along Tudor, LID opportunities for the MOA building on Elmore, and evaluate State Crime Lab and Office of the State Veterinarian.
9	515	Middle Fork	Look at Costco parking lot and Williwaw Elementary School for a multi-use vegetated infiltration area.
10	616	Lower	Vegetated area near North Star School could be used for onsite stormwater management, and review areas along Arctic Blvd. and Northern Lights for parking lot pavement reduction.
11	133	Lower	Evaluate potential for disconnecting catch basins near First National Bank between Gambell and Ingra, and be involved when the Sullivan Arena area is redone.
12	623	South Fork	Look at the many disconnected impervious areas with vegetated buffers on the UAA and Providence Medical campuses.
13	504	Lower	Review Spenard Road planned improvements for LID, consider vegetated buffers at Romig Middle School parking lot, and look at areas along Northern Lights and Spenard for reducing paved lots.
14	1251	South Fork	Investigate parking requirements for the Alaska Native Medical Center, Anchorage Native Primary Care Center, and the Diplomacy Building to determine if pavement could be removed for infiltration.
15	992	South Fork	Have the Alaska Department of Public Safety building use a wetland buffer on its southeast side, and look at the Alaska Housing and Finance Corporation for retaining stormwater onsite.
16	130	South Fork	Implement LID at 3 schools and better manage stormwater runoff from the Carrs Center at Muldoon.
17	479	Middle Fork	Look for opportunities to disconnect and consider parking lot sizes for pavement reduction.
18	554	Lower	Investigate directing stormwater drainage to wetlands in the west and review CIRI's plans for LID in redevelopment
19	127	South Fork	Investigate LID opportunities for Wendler Middle School and Lake Otis Elementary.
20	167	South Fork	Investigate opportunities to divert runoff from Providence Hospital parking areas to adjacent wetlands.

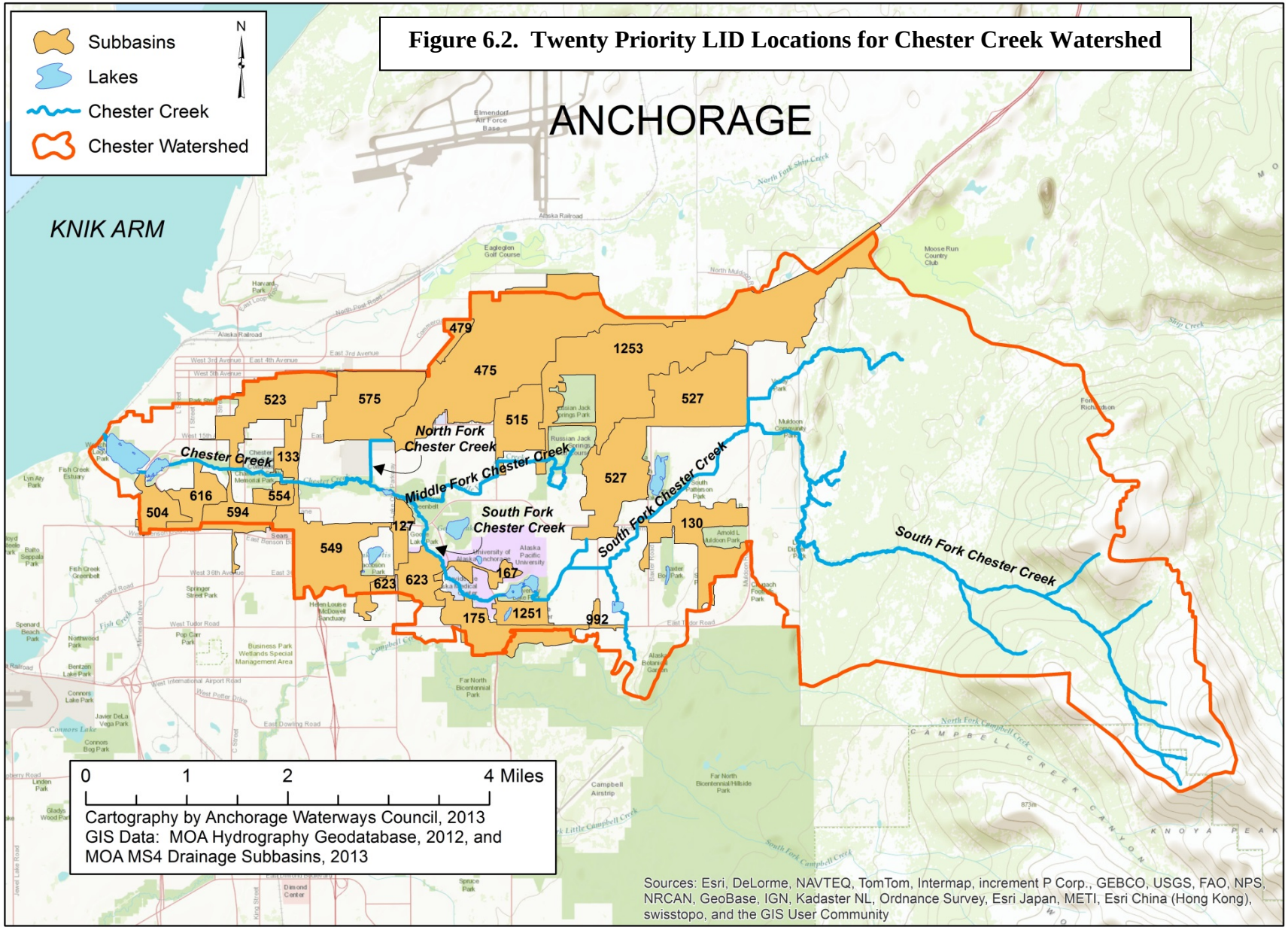
Figure 6.2. Twenty Priority LID Locations for Chester Creek Watershed
Subbasins
Lakes
Chester Creek
Chester Watershed
N
ANCHORAGE
KNIK ARM
479
475
1253
523
575
527
515
133
616
554
504
594
549
127
623
623
167
175
1251
992
130
North Fork Chester Creek
Chester Creek
Middle Fork Chester Creek
South Fork Chester Creek
South Fork Chester Creek
South Fork Chester Creek
0
1
2
4 Miles
Cartography by Anchorage Waterways Council, 2013
GIS Data: MOA Hydrography Geodatabase, 2012, and
MOA MS4 Drainage Subbasins, 2013
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

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