

Final Report
Marquette County Solid Waste Management Authority
Clean Lakes U.P.
September 2013 thru September 2015
Project: 430230-13

Executive Summary

The Great Lakes watershed reflects America's rising medication use. In Marquette County alone, 21% of the population is 60 and older. In a U.S. survey of medication practices of people 60 and over, 36.7% had taken five or more different medications, 27.5% had taken three to four, and 24.4% had taken one to two¹. The Marquette County Solid Waste Management Authority's (MCSWMA) goal was to provide information and safe, convenient sites for disposal. This program had a large range of interests including community health, law enforcement, as well as, environmental restoration. Our main interest for getting involved with this grant was to keep the harmful material from being landfilled, therefore polluting our ground waters. Although there were two medication collection sites in Marquette County, there really was no information available to the public about how, why and where to dispose of medication. We, through this grant, wanted to provide this valuable information to our community and also make more collection sites available so the program was easily accessible to the public.

The MCSWMA, was able to partner with some very key organizations in our community. The Forsyth, Negaunee and Chocoday Police Departments were all major partners in this grant project. The Forsyth Police Department volunteered their time to collect, sort (with a pharmacist), and house the other police departments unused medication until the D.E.A had their "National Drug Take Back Day".

The Marquette County Health Department proved exceptionally helpful as they have also done a similar grant in past years. They were a wealth of information and a great resource for networking.

The Alger-Marquette Community Action Board (AMCAB) has a program called "Meals-on-Wheels" where they bring residents of Marquette County in need, a hot meal once a day. They offered their time and services for our elderly focused outreach material by including our brochures as they delivered meals.

We also partnered with Sovereign Communications for our radio advertisements. They did a phenomenal job. Every few months they would change the ads to keep them fresh and new. People stated to the police departments that they learned about this program through the radio ads and how grateful they were to have a safe place to dispose of their unused medication.

The goal for this grant was to install unused medication collection boxes in heavily populated areas of our community in order to divert the material from the landfill and our Great Lakes. We wanted to do a vigorous outreach campaign. It was important to us that the community had knowledge and understanding of what our mission was for this grant. We did this by doing presentations at area senior centers, numerous brochures and posters strategically placed and informative radio advertising.

¹ Center for Disease Control "Percentage of Prescription Drugs used in past month, by age, United States 2007-2008" NCHS Data Brief. No. 42. September 2010

Background

The Marquette County Solid Waste Management Authority is owned by all the municipalities in Marquette County. As a representative of all the cities and townships we have a unique opportunity to provide an effective, yet environmentally-friendly waste management service to our community and this was another way of doing just that.

The MCSWMA realizes that source reduction is critical to managing the stream of municipal solid waste. Source reducing efforts must address both the quantity and quality of waste initially produced, as opposed from trying to manage it when it has already been released into the environment. Our Clean Lakes U.P. grant program did exactly that. Our aim was to divert the medication away from our landfill and waterways by way of education and easy accessibility to collection boxes.

Goals

The main goal for the MCSWMA was to divert the medication from entering the landfill which in turn could enter our waterways creating negative effects for our aquatic life. We wanted to give our community the facts of what improper disposal could do to our environment by giving examples in our colorful and informative brochures. The brochure explained that anti-depressants can cause behavior change in shrimp and fish or metamorphosis delays in frogs. Estrogen, feminizes male fish causing them to produce eggs.

Other goals we had were more health and social related. We explained in brochures and radio advertisements that there could be risk of possible poisoning from accidental ingestion, particularly among children and pets. Illegal use or theft, including identity theft, from discarded containers that could provide personal patient information.

It is important to the MCSWMA that we help provide a creative solution. We could partner with a few local police departments, supply the medication disposal containers, and give the community vital information. The residents of Marquette County would know what exactly is accepted, why it's important to dispose of medication correctly and feel safe doing so knowing that they are at a police station.

At the start of this program it was discussed with the Marquette County Health Department that based on previously collected medications from the city of Ishpeming and City of Marquette Police Departments, this program would be considered a success if we collect an average of 1.25 pounds of medication per month per collection unit. We have well exceeded that amount with a grand total of 421.9 pounds of collected medication.

Activities

Our tasks when the grant was first awarded was to immediately install the unused medication receptacle and cameras in our participating police department lobbies. We met with the police departments so they had a clear understanding of what they will be doing such as, collecting, sorting,

weighing and reporting the medication collected. We also coordinated with the D.E.A. to ensure proper transportation to an incinerator.

Next it was important to begin the design and informational aspects of our brochures and posters. The brochure was designed to provide basic facts about medication pollution, the DO'S and DON'TS of medication disposal, and details on our program including accepted medications and the box locations.

Our posters were designed to draw the public's attention to the issue of medication pollution, while promoting county collection box locations. We also were able to modify a pre-designed D.E.A. pickup poster.

We ran a few different radio ads over the two years. They each presented a different fact regarding child poisoning, pet poisoning or medication pollution and information about where collection boxes are located.

There were also presentations given to area senior centers, township halls and even one at a fair, where they introduced 5th graders to environmental issues and discussed our solution to medication pollution prevention.

We designed Clean Lakes U.P. pages and included it on our website. It offers the same information contained in our brochures and posters. It describes the issues that we're facing with the medication pollution and our solution to the problem. The website provides details about what is accepted and where to bring the unused medications.

Complications

This program was completed and seems to have been successful. We were able to collect a significant amount of unused medication. We did have a few plans that didn't work out quite as well as we had hoped for in the beginning. For example, we made questionnaires for area senior centers to fill out and return. Many were not returned, we think due to age or possible lack of interest.

One area that was a bit frustrating, was relying on others for information. One police department had gone through three different police chiefs in the two year time frame. We tried to explain what they needed to do each time, but there still seemed to be confusion when it came to getting the information from them. Understanding that they are a police department and have other pressing matters to handle, I would tell them my D.E.Q. reports were due sooner than expected, so as to get information on time, but even that rarely worked.

Another major problem for us was when the D.E.A. discontinued their "National Take Back Day". It was difficult to find a place that would take our medication. Then to find an officer that could transport them to Lower Michigan, which seemed difficult due to staffing issues. However, we were able to partner with the Marquette County Health Department because they also had a large amount of medication to have incinerated. A sheriff officer was willing to bring the medication to Petoskey, Michigan for us provided we cover his mileage and the Health Department covered his wages.

Conclusion

Now that the grant is over for us, we feel that this was a great project for us to be involved with. We helped divert unused medications from entering our landfill, waterways and most important, from getting into the wrong hands. We feel that we were able to provide our community with valuable information. We not only addressed a growing national problem, but most importantly provided a viable solution. Our goal since the beginning of this grant was that if just one person changed their behavior when it came to disposing of unused medication, we would be doing great things for our community and its future.

All of our police departments are willing to keep the program going as long as there is a place to properly dispose of the medications. I have given all of the participating police departments networking information. They can call Jennifer McKay, Head Coordinator for Tip of The Mitt Watershed council. Jennifer was instrumental in getting us to Petoskey, Michigan for our last medication collection incineration. Another source for information that I shared with our police departments was Sarah Derwin, Educator of Community Health, from the Marquette County Health Department. She has offered to help coordinate any future disposal of medications, should they need to bring them to Petoskey. She was a wealth of information and happy to help in any way possible.

In conclusion, the MCSWMA feels that this grant project was a success. We were able to greatly exceed our goal for the amount of medication that was collected. We achieved our goals of making the collection boxes readily accessible and communicating the need for this type of program to the public. The local police departments that we partnered with are willing to continue the program. Many businesses such as the home health care, AMCAB, and other medical facilities have agreed to distribute our brochures and display our posters to continue the outreach to our community.

Marquette County Solid Waste Management Authority (/)

Website

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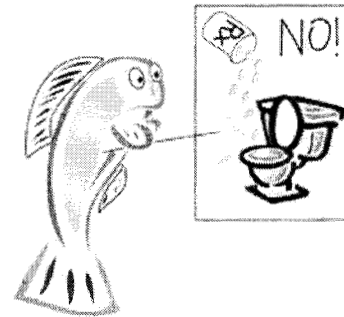


Clean Lakes U.P.

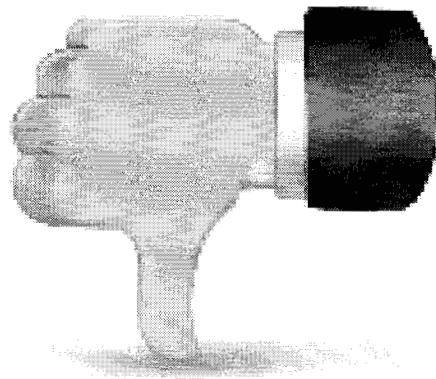
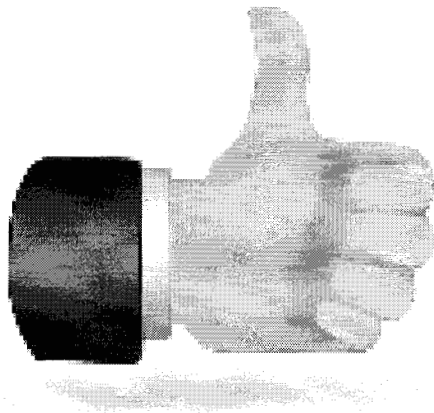
In the summer of 2013, The Marquette County Solid Waste Management Authority (MCSWMA) received a grant from the Michigan Department of Environmental Quality (DEQ) to create a household drug collection program for Marquette County. Our objective is to divert as much medication as possible from Michigan waterways, thereby protecting Marquette County public health and environmental interests.

Household drugs must be diverted from our landfill. Like sewage, landfill drainage is treated and then released back in the waterways. Though our treatment system follows state and national waste-treatment standards, new medication can bypass them. Thrown-out medication collected with your curbside garbage could make its way to Lake Superior.

The MCSWMA works to ensure Marquette County's waste management is up to date with current best practices. Presently, disposing of medication at local police departments is the most convenient form of collection possible. By bringing your medication to these collection boxes, you contribute to the environmental health of Marquette County and the health of communities down stream from the Great Lakes watershed.



Proper Medication Disposal



- Ask your physician for a shorter prescription
- Purchase only the quantity of OTC medications that you will use prior to the expiration date
- Dispose of unwanted and expired medications to one of Marquette County's five collection locations
- Do not flush medications down the drain or toilet
- Do not throw medications in the trash
- Do not leave unused medications around the house

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Drugs in Your Home



Illegal Use or Theft

62% of American teens who abused prescription pain relievers found them in parent's medicine cabinets.

2009: 39% of those admitted to U.P. addiction treatment were prescription drug abusers (source: Northcare Coordinating Agency).

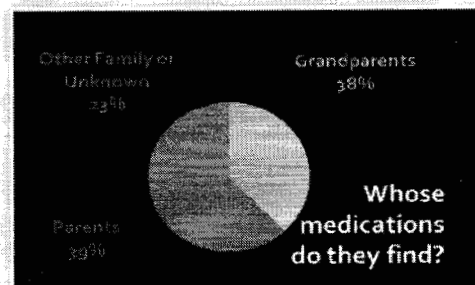
Marquette and Alger Counties: 14% of youth surveyed said they have taken a prescription drug to get high in the past year (source: Great Lakes Center for Youth Development, Sidebar Survey, 2008).

Child Poisoning

Pharmaceuticals (OTC and Rx) account for the majority of poison control center exposure calls for children ages 5 and under. In 2011 over 67,000 children were treated for medication poisoning.

Where are children finding medications?

27% ground or misplaced
20% counter, dresser, table, nightstand
20% purse or bag
15% pillbox or bag of pills
6% drawer or cabinet
12% other



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Source: Safe Kids Worldwide, 2012

Pet Poisoning

Human medication is the most common source of pet poisoning. In 2010 the ASPCA Animal Poison Control Center received 41,700 calls related to pets consuming human medications.



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Drugs in Our Water

Wastewater Treatment Issues

Wastewater treatment plants were not designed to filter medication so any medications flushed down the drain or toilet gets dumped into our waterways. Medication thrown into the trash can also infiltrate our water, as landfills must be drained as their contents decompose. Like sewage, landfill drainage (leachate) is treated and then released in to the waterways. Leachate from the Marquette County Solid Waste Management Authority is released into the Carp River! Leachate treatment systems must meet state and national standards, but are not regulated for the removal of medications.



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Effects of Medications on Wildlife

Steroid Compounds

Estrogens can have feminization effects on male fish, causing them to produce eggs. This can disrupt the male to female ratio of fish populations. A study in Boulder Creek, CO found that female white suckers outnumbered males by 5:1 because of abnormal estrogen levels.

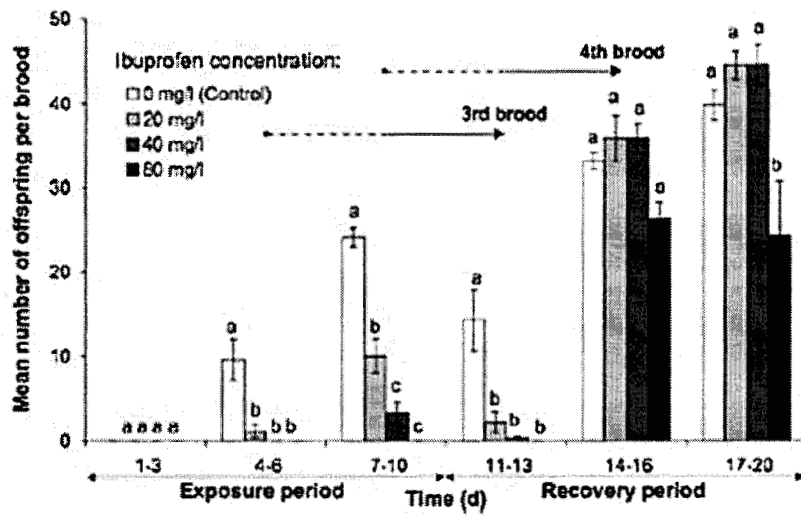
Population Effects: Scientists conducted a seven year whole lake experiment in Ontario, Canada, where they added a small dose of estrogen three times a week. They tracked results primarily through the fathead minnow. Males became feminized, developing female reproductive organs and the population crashed after the second season. (Kidd, 2007)

Non Steroidal Anti-inflammatory Drugs (NSAIDs)

Exposure decreased number of Daphnia magna (water flea) young produced in 10-day exposure to ibuprofen followed by 10-day recovery period.



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10-day exposure to ibuprofen followed by 10-day recovery period in clean water

Selective Serotonin Reuptake Inhibitors (SSRIs)

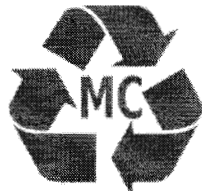
Metamorphosis delays: African frog tadpoles were raised in clean water in tanks of water mixed with 38 ppb fluoxetine. Days after the tadpoles hatched, the control group had begun to develop legs, but the treated tadpoles had none.



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Control Group Treated Group



Changes in fish behavior: Male fish exposed to trace amounts of fluoxetine (Prozac) were found to be slower capturing prey and took less interest in females. (Source: University of Wisconsin-



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Marquette County Solid Waste
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Our Solution

Marquette County Solid Waste Management Authority (MCSWMA) was awarded a D.E.Q. grant to start a household medication collection program in Marquette County. With grant funding, we have added three collections points to the county by installing drug-collection boxes at the Forsyth Township, Chocolay Township, and City of Negaunee police stations. Marquette County residents can drop-off medications at any of our drop-off locations at no charge!

Look for this box at any of Marquette County's participating Police Departments!



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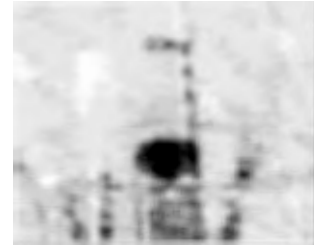
- City of Negaunee Police
- City of Marquette Police
- Chocolay Township Police
- City of Ishpeming Police
- Forsyth Township Police
- Michigan State Police



Accepted: Prescription and over-the-counter PILL medication ONLY!



Not Accepted: Vitamins, Liquids, Patches, Syringes, or Bandages



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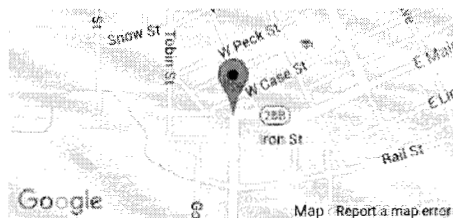
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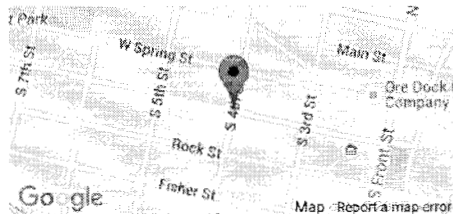
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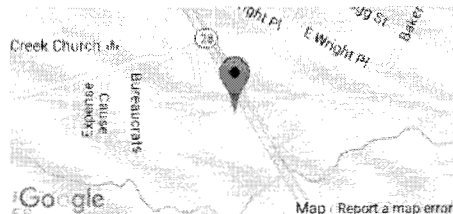
Drop-Off Locations



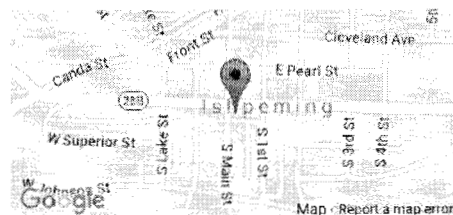
City of Negaunee Police
(<http://www.cityofnegaunee.com/police.html>)
100 Silver St.
Negaunee, MI
Hours: 9 am - 5 pm M-F
906-475-4154



City of Marquette Police
(<http://www.mqtcty.org/police.php>)
300 West Baraga Ave, Marquette, MI
Hours: Open 24 hours
906-228-0400



Chocolay Township Police
(<http://www.chocolay.org/police/police.php>)
5010 US 41 South
Marquette, MI
Hours: 8 am - 4 pm M-F
906-249-4040



City of Ishpeming Police
(<http://ishpemingcity.org/departments/police-department/>)
100 South Lake St., Ishpeming, MI
Hours: 10 am - 5 pm M-F
906-486-4416



Forsyth Township Police
(<http://www.forsythtwpmi.org/FT%20POLICE%20DEPT.htm>)
99 North Pine St, Gwinn, MI
Hours: 7 am - 3 pm M-F
906-346-9224



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More Information

Marquette County Solid Waste Management Authority

(<http://www.weebly.com/weebly/mcswma.com>)(<http://www.superiorwatersheds.org/>)

It is our duty to provide Marquette County with the most effective, efficient, and environmentally and health-conscious waste disposal. Visit our website to find how else you can help keep Marquette County safe and clean. We can help with recycling, compost, sharps disposal, and household hazardous waste.

Superior Watershed Partnership and Land Trust

The Superior Watershed Partnership and Land Trust is a non-profit organization who works tirelessly to protect our beautiful Lake Superior. Visit their website to find out about more conservation efforts in the Lake Superior region.

Michigan DEQ: Community Pollution Prevention Grants

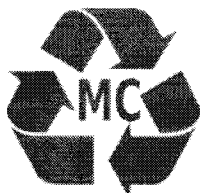
To learn more about Community Pollution Prevention Grants or to inquire about starting a program in your community, visit the Michigan Department of Environmental Quality (http://www.michigan.gov/deq/0,4561,7-135-3307_3515-314503--,00.html).

U.S. Environmental Protection Agency

Visit the U.S. Environmental Protection Agency (epa.gov/ppcp/) (EPA) for more information on Pharmaceuticals and Personal Care Products (PPCPs) and the environmental issues associated with them.

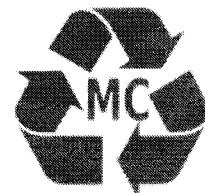
U.S. Geological Survey

The U.S. Geological Survey (toxics.usgs.gov/regional/emc) has published several studies on the pharmaceuticals found in American waterways. Their studies and reports can be found here.



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Public Service Announcements



Recent studies show increased amounts of over-the-counter and prescription drugs in the Great Lakes. How did these medications get there? Treatment plants cannot remove medications from our waste water. This means the medications you flush down the toilet or throw in the trash end up in Lake Superior. So don't flush or toss your medications. Help Marquette County Solid Waste Management keep medications out of our lake, and bring old or expired medications to Marquette County's five household drug collection boxes. New locations include the Forsyth, Negaunee, and Chocolay police stations.



Did you know human medications are the top cause of pet-poisoning? Getting rid of old medications decreases the likelihood of your dog or cat ingesting the wrong pills. But don't throw them in the trash! Help Marquette County Solid Waste Management prevent pet poisonings and bring unused or expired medications to one of Marquette County's five household drug collection boxes. Locations include the Forsyth, Negaunee, and Chocolay Township police station.




In 2011, more than 67,000 children were treated in Emergency Rooms for medication poisoning. Getting rid of old medication decreases the likelihood of your child ingesting the wrong pills. But don't throw them in the trash! Help Marquette County Solid Waste Management prevent child poisonings and bring unused or expired medications to one of Marquette County's five household drug collection boxes. New locations include the Forsyth, Negaunee, and Chocolay Township Police stations.

D.E.A. take-back advertising copy

Ad 1: 

Leaving expired or unwanted medications around the house is dangerous. Between 2001 and 2008 Emergency rooms saw over 430,000 children five years and younger with poisoning from self-ingested medication. Help Marquette County Solid Waste Management prevent child poisonings and participate in the D.E.A. household medication take-back event. On April 26 from 10 a.m to 2 p.m the Forsyth Township Police, Marquette Police, and State Police stations will accept unwanted medication free of charge.

Ad 2: 

Scientists have detected prescription and over-the-counter medications in the Great Lakes. Flushing unwanted medications, or tossing them in the trash, causes medication to enter our water supply. Help Marquette County Solid Waste Management keep medication out of our Lake and participate in the D.E.A. household drug take-back event. On April 26 between 10 a.m. and 2 p.m the Forsyth Township Police, Marquette Police, and State Police stations will accept unwanted medication free of charge.

Clean Lakes U.P. Medication Disposal Survey

I want to thank all the police departments for participating for the past two years in our grant program, Clean Lakes U.P. Everything has gone smoothly and now we're nearing the end. Please know that if there is anything I can do for you in the future, do not hesitate to call me. Please fill out this survey and return by September 21, 2015.

1.) Do you think there is a need for this Clean Lakes U.P. medication disposal program in our community?

Yes, I was surprised at the quantity of medications that was turned into this department.

2.) Did you find it beneficial to our community?

Yes

3.) What could have been improved upon?

The collection of the medications that was collected. It would have been nice if someone would have picked up the collected medications from the PD in stead of having an officer transport it to a collection location.

4.) Do you plan to continue with the medication collection after September 30, 2015?

As long as there continues to be a place to properly discard the collected medications we will continue this program.

5.) What were the pro's and/or cons of this program?

It was all good.

6.) Is there a way to expand this program?

7.) Comments:

Clean Lakes U.P. Medication Disposal Survey

I want to thank all the police departments for participating for the past two years in our grant program, Clean Lakes U.P. Everything has gone smoothly and now we're nearing the end. Please know that if there is anything I can do for you in the future, do not hesitate to call me. Please fill out this survey and return by September 21, 2015.

- 1.) Do you think there is a need for this Clean Lakes U.P. medication disposal program in our community? **Yes there is a large need for the medication disposal program.**
- 2.) Did you find it beneficial to our community? **It is. It gives residents a way to safely dispose of medication keeping it out of the landfill, water system and out of the hands of prescription medication abusers.**
- 3.) What could have been improved upon? **A clearer way for agencies to have the medications picked up when a large amount starts to accumulate.**
- 4.) Do you plan to continue with the medication collection after September 30, 2015? **Yes.**
- 5.) What were the pro's and/or cons of this program? **The pros would be have a place for residents to feel confident that they are doing the proper disposal method to preserve our resources and education to the citizens on why the collection site is available to them. The only con we feel there is would be the collection from agencies when space becomes an issue storing for long periods of time.**
- 6.) Is there a way to expand this program? **Unsure**
- 7.) Comments: **Thank you to the people who have been handling the program to date.**

Clean Lakes U.P. Medication Disposal Survey

I want to thank all the police departments for participating for the past two years in our grant program, Clean Lakes U.P. Everything has gone smoothly and now we're nearing the end. Please know that if there is anything I can do for you in the future, do not hesitate to call me. Please fill out this survey and return by September 21, 2015.

1.) Do you think there is a need for this Clean Lakes U.P. medication disposal program in our community? absolutely

2.) Did you find it beneficial to our community? Very much so

3.) What could have been improved upon? nothing

4.) Do you plan to continue with the medication collection after September 30, 2015? yes

5.) What were the pro's and/or cons of this program? Temporary confusion on disposal caused a hiccup, but, everything is fine now.

6.) Is there a way to expand this program? More locations

7.) Comments



Clean Lakes U.P.

Household Medication Collection Program



**Marquette County Solid
Waste Management Authority**



OUR AIM AT MCSWMA:

- Protect Marquette County land and waters
- Promote the health interests of County Residents



THE PROBLEM

- What we know about pharmaceuticals
- Origin of Pharmaceuticals in the Environment
- Potential Impact on People and Pets



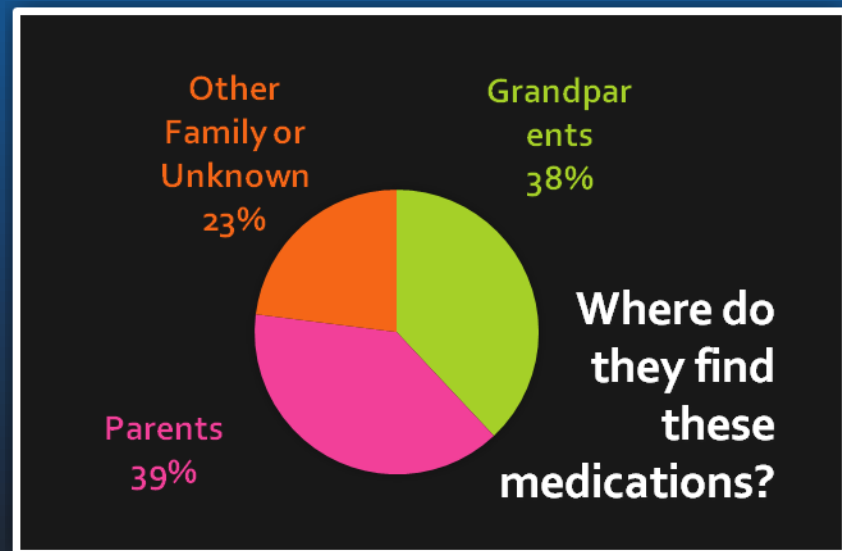
RISKS OF IMPROPER DISPOSAL

Accidental Ingestion



86% of ER visits for medication poisoning were due to children getting in to adult medications!

In 2011, over **67,000 children** were treated for **medication poisoning**.





RISKS OF IMPROPER DISPOSAL

Accidental Ingestion

Pharmaceuticals (OTC and Rx) account for the majority of poison control center exposure calls for children ages 5 and under

Where can children find medication in the house?

- 27% on the ground or misplaced
- 20% counter, dresser, table, nightstand
- 20% purse or bag
- 15% pillbox or bag of pills
- 12% other
- 6% drawer/cabinet





RISKS OF IMPROPER DISPOSAL

Accidental Ingestion

Human medications are the most common cause of pet poisoning

In 2010, the ASPCA Animal Poison Control Center received over 41,700 calls related to pets consuming human medications





RISKS OF IMPROPER DISPOSAL

Environmental Impacts

- Fertility and behavior in aquatic animals
- Impacts to species on land





RISKS OF IMPROPER DISPOSAL

Illegal Use or Theft

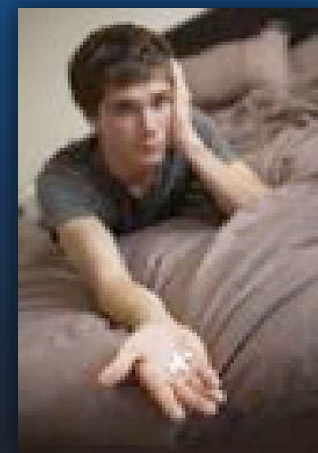


62% of American teens who abused prescription pain relievers found them in parent's medicine cabinets

2009: 39% of those admitted to U.P. addiction treatment were prescription drug abusers

Source: Northcare Coordinating Agency

Marquette and Alger counties: 14% of youth surveyed said they have taken a prescription drug to get high in the past year





PHARMACEUTICALS IN THE ENVIRONMENT

- What pharmaceuticals have been found?
- How do they reach the environment?





PHARMACEUTICALS IN THE ENVIRONMENT

Types of human and animal pharmaceutical chemicals identified in water bodies:

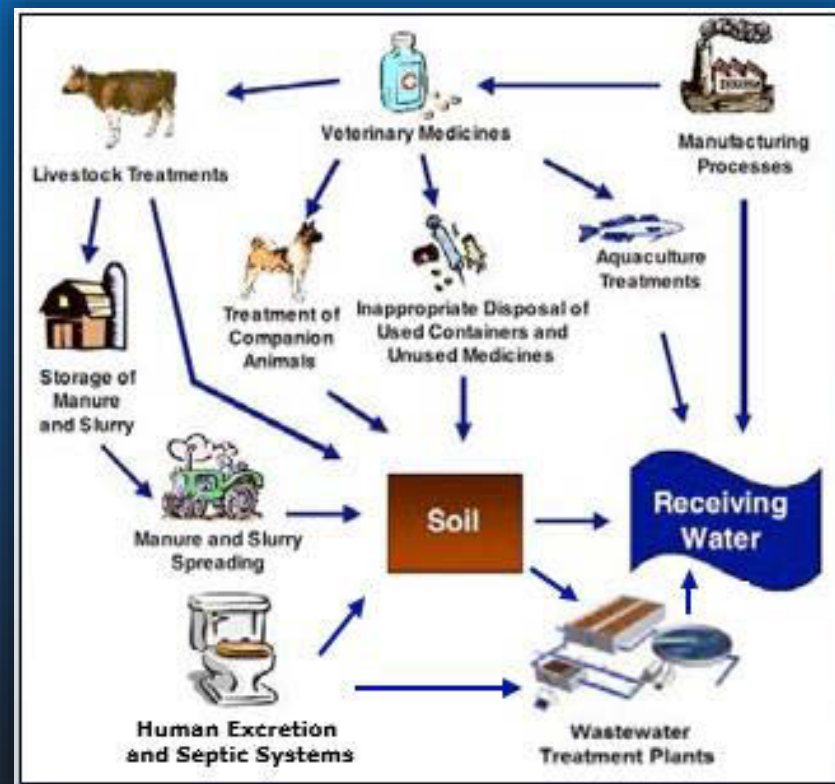
- Hormones
- Antibiotics
- Blood lipid regulators
- Analgesics and anti-inflammatories
- Beta-blockers
- Antidepressants
- Antiepileptics
- Antineoplastics (used in chemotherapy)
- Tranquilizers
- Retinoids
- X-ray contrast media





HOW DO PHARMACEUTICALS REACH THE ENVIRONMENT?

- Landfill leachate
- Effluent from wastewater treatment plants
- Septic systems





TREATMENT TECHNIQUES

Septic systems and wastewater treatment facilities were NOT designed to remove pharmaceuticals





WHERE ARE PHARMACEUTICALS FOUND?

In 1999-2000, the USGS surveyed 139 streams in 30 states for pharmaceuticals, hormones, and other organic contaminants. (Kolpin *et al.* 2002)

Medications were found in 80 % of the sampled streams!





WHERE ARE PHARMACEUTICALS FOUND?

Since 2000: pharmaceuticals found in

- rivers
- ponds
- lakes
- ground water
- wastewater effluent
- treated drinking water
- plant and animal tissue

www.epa.gov/ppcp/lit.html



WHERE ARE PHARMACEUTICALS FOUND?

- ▶ 2001: the USGS and CDC conducted a study at a drinking water facility to determine if 106 contaminants could survive the treatment process (Stackleberg *et al.* 2004).
- ▶ Several prescription and OTC drugs were detected in the finished drinking water





WHERE ARE PHARMACEUTICALS FOUND?

2008 Associated Press series

Antibiotics, anti-convulsants, mood-stabilizers and hormones were found in the drinking water supplies of at least 46 million Americans in 24 major metropolitan areas





WHERE ARE PHARMACEUTICALS FOUND?

Lake Michigan - 2013 University of Wisconsin Study

- 14 of chemicals “were found to be of medium or high ecological risk”
- Anti-diabetic drug, Metformin, and the antibiotic sulfamethoxazole were among the most common chemicals found



<http://www.scientificamerican.com/article.cfm?id=drugs-contaminate-lake-michigan>



EXAMPLES OF ENVIRONMENTAL IMPACTS

- Steroid Compounds
- Anti-depressants (SSRIs)
- Non-steroidal anti-inflammatories (NSAIDs)



STEROID COMPOUNDS

- Estrogens can have feminization effects on male fish, causing them to produce eggs (Nash et. al. 2004, Jobling et al. 1998)
- Example: Boulder Creek, CO: Female white suckers outnumber males by > 5 to 1; 50% of male have female sex tissue (David Norriss: University of Colorado-Boulder)

♀



♂

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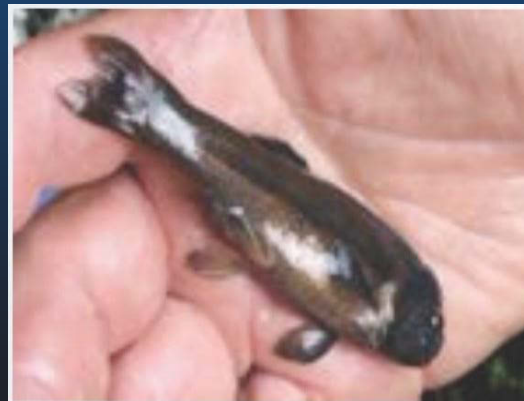
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POPULATION EFFECTS

- Population effects (Kidd 2007)
- 7 year, whole lake experiment in Ontario, Canada
- Added estrogen 3xs per week
- Male fathead minnows became feminized
- After the second season, the population crashed

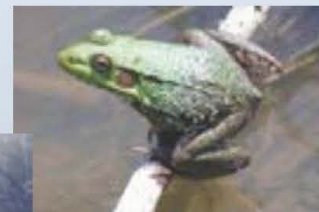






SEROTONIN REUPTAKE INHIBITORS (SSRI'S)

- Changes in fish and shrimp behavior (Fluoxetine)
- Metamorphosis delays in frogs (Fluoxetine)
- Induce mussel spawning (Norfluoxetine/Fluvoxamine)



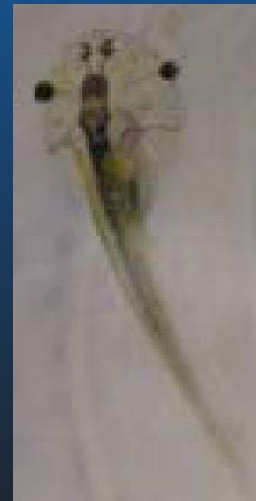


SEROTONIN REUPTAKE INHIBITORS (SSRI'S)

- African frog tadpoles were raised in clean water and in tanks of water mixed with 38 ppb fluoxetine (Prozac)
- Days after the tadpoles hatched, the control group had begun to develop legs, but the “treated” tadpoles had no legs.



African frog (*Xenopus laevis*)
tadpole in clean water



African frog (*Xenopus laevis*)
tadpole in treated water



NON-STEROIDAL ANTI-INFLAMMATORY (NSAIDS)

- In the early 1990s, vultures experienced dramatic population declines (around 95%) Diclofenac (Voltaren, Cataflam) was heavily used in cattle
- Cattle carcasses were a major food source for the vultures
- Birds died of acute kidney failure





POTENTIAL IMPACTS ON PEOPLE

- Concerns about antibiotic resistance
 - Antibiotic resistance in wild animals: crows, whales, fish, and flies
- Concerns about fetal exposure
 - Ex: Diethylstilbestrol (DES), a non-steroidal estrogen and known endocrine-disruptor



TAKE HOME MESSAGE:

- Greatest environmental concern is affects to the fertility and population-level of aquatic and terrestrial life over generations.



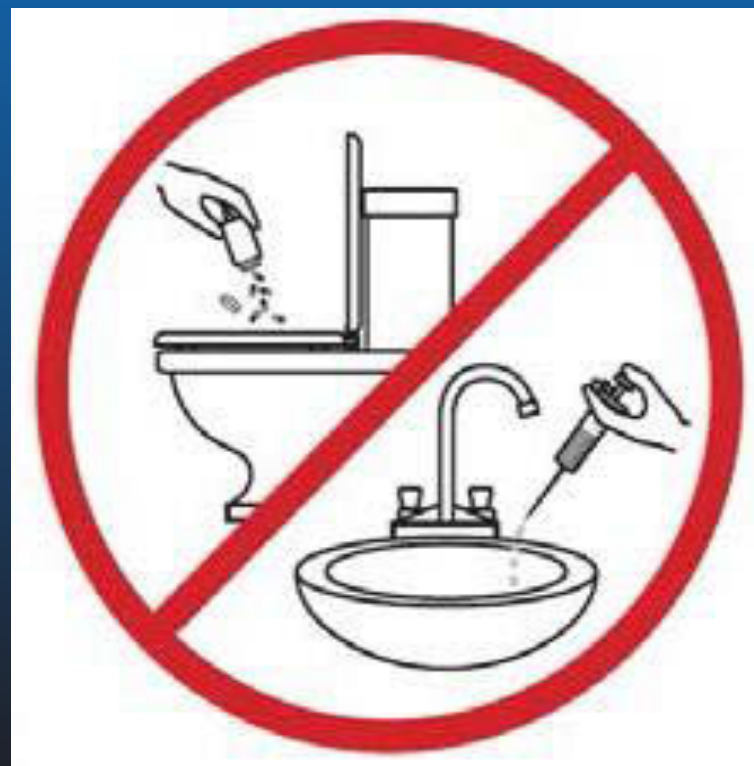
- These medications can have dramatic affects on living things.



TAKE-HOME MESSAGE: MEDICATION DISPOSAL DON'TS

DO NOT

- *Do not* flush medications down the drain or toilet
- *Do not* throw medications in the trash
- *Do not* leave unused medications around the house





TAKE-HOME MESSAGE: MEDICATION DISPOSAL DO'S

DO

- Ask your physician for a shorter prescription or a sample prescription when taking a new medication
- Purchase only the quantity of OTC medications that you will use prior to the expiration date
- Dispose of unwanted and expired medications to one of Marquette County's five collection locations





COLLECTION BOX LOCATIONS

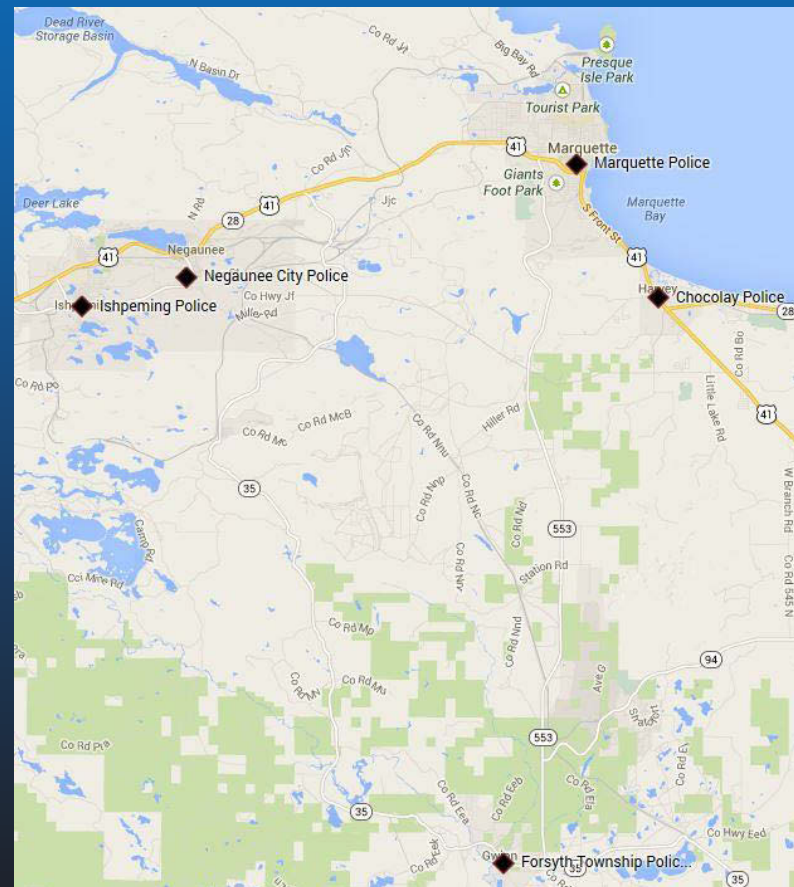
Negaunee City Police

Chocolay Township Police

Forsyth Township Police

Marquette City Police

Ishpeming Township Police





ADDITIONAL INFORMATION

EPA database of Published Literature

www.epa.gov/ppcp/lit.html

Drug Enforcement Administration (DEA)

http://www.dea diversion.usdoj.gov/drug_disposal/index.html

U.S. Geological Survey

<http://toxics.usgs.gov/regional/emc>

Marquette County Solid Waste Management

www.mcswma.com



Thank you!



**Marquette County Solid
Waste Management**

Marquette County Household Medication Collection Locations

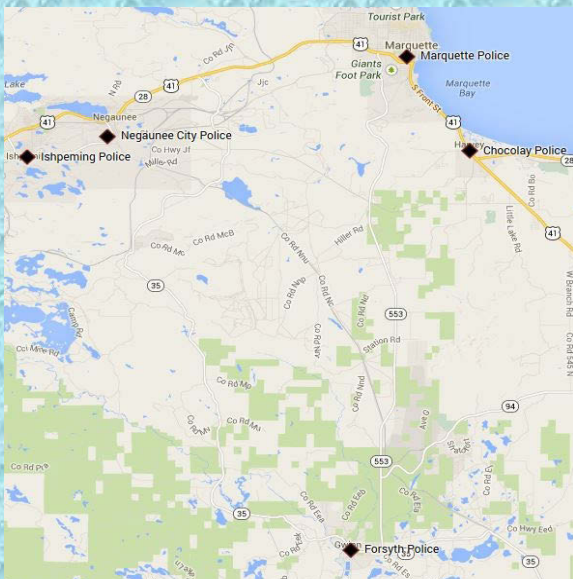
Marquette City Police Department
300 W. Baraga Ave., Marquette, MI
Hours: Open 24 hours
906-228-0400

Chocolay Township Police Department
5010 US 41 South, Marquette, MI
Hours: 8 am - 4 pm M-F
906-249-4040

Negaunee Police Department
100 Silver St., Negaunee, MI
Hours: 8 am - 4 pm M-F
906-475-4154

Ishpeming Police Department
100 South Lake St., Ishpeming, MI
Hours: 10 am - 5 pm M-F
906-486-4416

Forsyth Police Department
99 N. Pine St., Gwinn, MI
Hours: 7 am - 3 pm M-F
906-346-9224



Resources

U.S. Environmental Protection Agency
Environmental impacts of pharmaceuticals
www.epa.gov/ppcp/

U.S. Geological Survey
Pharmaceuticals in the environment
<http://toxics.usgs.gov/regional/emc>

For more information on Marquette County's household medication collection and waste management program:

Marquette County Solid Waste Management

www.cleanlakesmqt.com

www.mcswwma.com

906-249-4125

600 County Road NP
Marquette, MI 49855



MCSWMA

Clean Lakes



U.P.



Household Medication Collection Program



Marquette County Solid Waste Management

Pharmaceuticals Enter Michigan Waterways

When flushed down the drain, unwanted medicines pollute our waters. Wastewater treatment plants are not equipped to properly filter these medications. As a result, the medication you flush will travel to the Great Lakes watershed.

Effects on Aquatic Life:

Antidepressants

cause changes in fish and shrimp behavior as well as metamorphosis delays in frogs.



Estrogen feminizes male fish causing them to produce eggs.



Anti-inflammatory

medications decrease fish fertility rates.

Other hazards of improper medication disposal

- Possible poisoning from accidental ingestion if medicines are thrown in the trash, particularly among young children and pets.
- Illegal use or theft, including identity theft, from discarded container providing personal patient information.

Dos and Don'ts of Medication Disposal

DO NOT

- **Do not** flush medications down the drain or toilet
- **Do not** throw medications in the trash
- **Do not** leave unused medications around the house



DO

- Ask your physician for a shorter prescription or a sample prescription when taking a new medication for a trial basis
- Purchase only the quantity of non-prescription medications that you will use prior to the expiration date
- Dispose of unwanted and expired medications to one of Marquette County's five collection locations

How to Dispose of Your Medication:

Permanent collection boxes are located at the Chocolay, Gwinn, Negaunee, Ishpeming and Marquette police departments.



Accepted Items

Prescription and over-the-counter medications

Non-Accepted Items

Non-medication, non-pill medication of any kind including:

- Liquids
- Aerosols
- Patches
- Vitamins
- Needles

Clean Lakes U.P. is made possible by a Community Pollution Prevention Grant from the Michigan Department of Environmental Quality.

Got Drugs?

Turn in your unused or expired
medication for safe disposal
Saturday, April 26th,
10 a.m. – 2 p.m.

Brought to you by the Marquette
County Solid Waste Management
Authority, Michigan Department of
Environmental Quality (DEQ),
and participating
Marquette County law
enforcement
officials.

**Bring your old and
unused pills to:**

Forsyth Township Police Department

99 Pine St. Gwinn

State Police, Negaunee Post

180 U.S. 41, Negaunee

Marquette Police Department

300 W. Baraga St. Marquette

dispose
unused
Rx

For more
information,
please visit
www.dea.gov



Marquette County Solid Waste Management Authority
T: (906) 249-4125 • F: (906) 249-9377 • Web: www.mcswma.com





Clean Lakes U.P.



Marquette County Household Drug Collection Program

Do you have leftover or expired medications sitting around the house? Don't throw them away or flush them down the drain! Medications flushed or tossed end up in our waterways. Prevent medication pollution, and bring your old medications to Marquette County's household drug collection boxes.

COLLECTION BOX LOCATIONS

Marquette Police Station

Chocolay Police Station

Negaunee Police Station

Ishpeming Police Station

Forsyth Police Station

Accepted Items

Prescription and over-the-counter **PILL** medications

Items NOT Accepted:

Liquids, Aerosols, Patches
Vitamins, Needles



**Marquette County
Solid Waste Management**

www.mcswma.com

Clean Lakes U.P.



**Marquette County Solid
Waste Management
Authority**

**A guide to Marquette County's
household drug collection
program and the effects of
medication pollution in the
United States**

The Clean Lakes U.P. Guidebook for Participating Entities

In the summer of 2013, The Marquette County Solid Waste Management Authority (MCSWMA) received a grant from the Michigan Department of Environmental Quality (DEQ) to create a household drug collection program for Marquette County. Our objective is to establish proper medication disposal as common practice. As a part of our project, we have installed medication disposal boxes in Negaunee, Forsyth, and Chocolay Township. In addition to providing the necessary resources, we have prepared this booklet in the hopes that it will help raise awareness about this important issue. This booklet and other promotional materials have been distributed to townships, police stations, and community centers in Marquette County disseminate information to county residents.



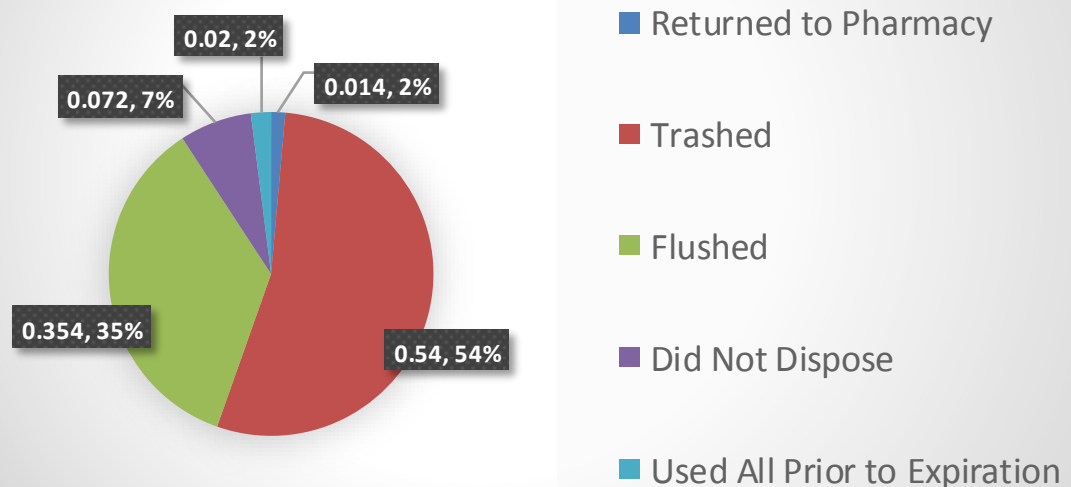
Why are Medications not Consumed?

In some cases medicines are not entirely consumed due to:

- Change in prescription
- Patient's health improves before finishing medicine
- Patient death
- Patient non-compliance
- Expiration date reached
- Bulk "economy size" containers of over-the-counter medicines contain more than is needed



Expired Medication Disposal Habits
(500 individuals surveyed)



Kuspis and Krenzelok. 1996. "What happens to expired medications? A survey of community medication disposal." Vet Hum Toxicol. 38(1):48-9

Risks of Improper Medication Disposal

ILLEGAL USE OR THEFT



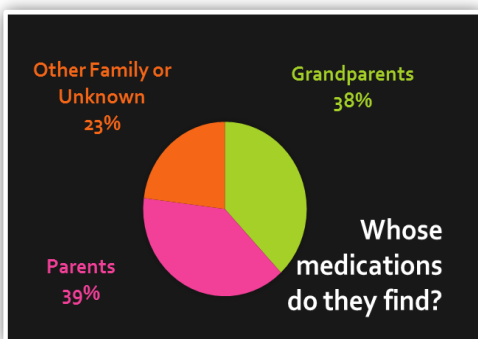
62% of American teens who abused prescription pain relievers found them in parent's medicine cabinets.

2009: 39% of those admitted to U.P. addiction treatment were prescription drug abusers (source: North-care Coordinating Agency).

Marquette and Alger Counties: 14% of youth surveyed said they have taken a prescription to drug to get high in the past year (source: Great Lakes Center for Youth Development, Sidebar Survey, 2008).

Child Poisoning

Pharmaceuticals (OTC and Rx) account for the majority of poison control center exposure calls for children ages 5 and under. In 2011 over 67,000 children were treated for medication poisoning.



Source: Safe Kids Worldwide,

Where are children finding medicine?

27% ground or misplaced
20% counter, dresser, table, nightstand
20% purse or bag
15% pillbox or bag of pills
6% drawer or cabinet
12% other



Pet Poisoning

Human medication is the most common source of pet poisoning. In 2010 the ASPCA Animal Poison Control Center received 41,700 calls related to pets consuming human medications.

How do Pharmaceuticals Reach the Environment?



Wastewater treatment plants were not designed to filter medication. Medication flushed down the drain or toilet will make it to our waterways. Medication thrown into the trash can also infiltrate our water, as landfills must be drained as their contents decompose. Like sewage, landfill drainage (leachate) is treated and then released in to the waterways. Leachate treatment systems must meet state and national standards, but are not regulated for the removal of medications.

Other Sources of Medication Pollution

Manufacturing

Processes:

Pharmaceutical manufacturers produce wastewater containing trace pharmaceuticals.

Industrial Agriculture:

2 trillion pounds of animal waste are produced from poultry and livestock farming, all of which contains traces of the antibiotics and hormones used on them.

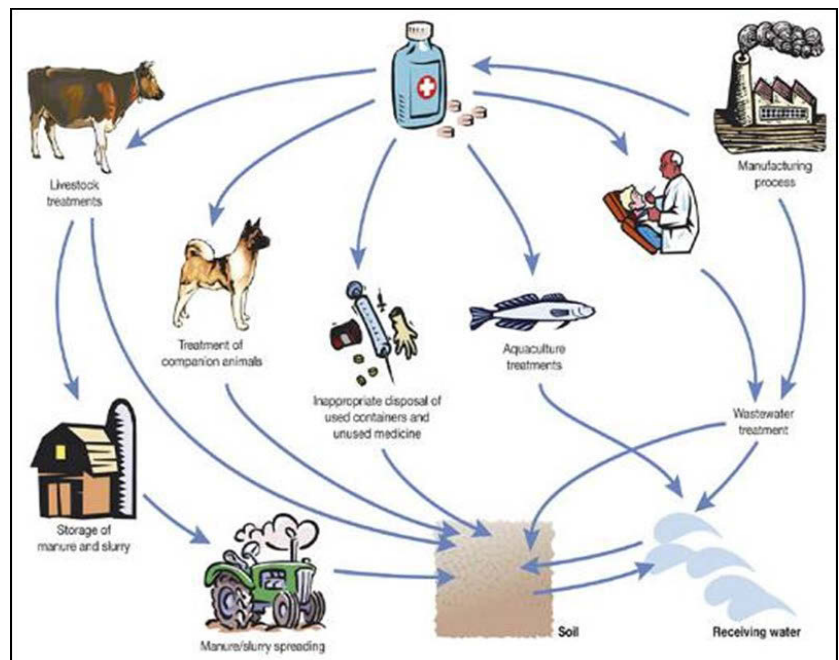
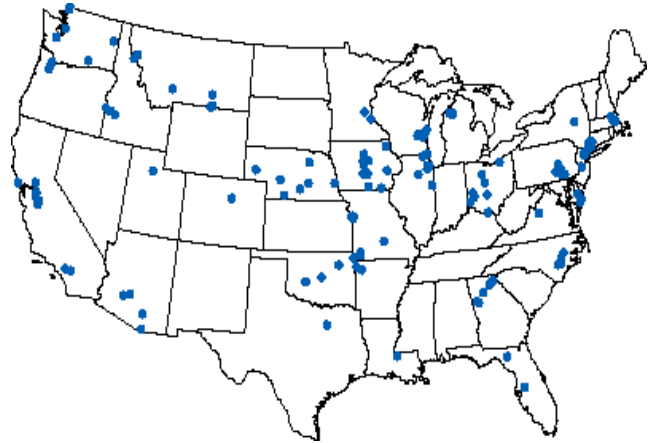


Figure adapted from A. Boxall, EMBO reports Vol. 5 , No. 12, 2004

Where are Medications Found?

2000: The United States Geological Survey (USGS) tested 139 streams in 30 states for pharmaceuticals, hormones, and other organic contaminants. Medications were found in 80 % of the sampled stream. (Kolpin *et al.* 2002)

Since the USGS testing, medications have been found in rivers, ponds, lakes, groundwater wastewater effluent, treated drinking water, sediment, plant, and animal tissue. (Epa.gov/ppcp/lit.html)



2001: The USGS and Center for Disease Control conducted a study at a drinking water facility to determine if 106 contaminants could survive the treatment process. 40 contaminants were detected in one or more samples of stream water or raw-water. Several prescription and OTC drugs were detected in the finished water. (Stackleberg *et al.* 2004)

2008: An Associated Press investigation found pharmaceuticals in 24 major metropolitan areas. Antibiotics, anti-convulsants, mood-stabilizers, and hormones were found in the drinking water of 46 million Americans.



2013: A University of Wisconsin-Milwaukee study of Lake Michigan found 14 chemicals of “medium or high ecological risk” including the antibiotic Sulfamethoxazole (marketed as Bactrim) and antidiabetic Metformin (Glucophage).

Effects of Medication on Wildlife

Steroid Compounds

Estrogens can have feminization effects on male fish, causing them to produce eggs. This can disrupt the male to female ratio of fish populations. A study in Boulder Creek, CO found that female white suckers outnumbered males by 5:1 because of abnormal estrogen levels.

Population Effects: Scientists conducted a seven year whole lake experiment in Ontario, Canada, where they added a small dose of estrogen three times a week. They tracked results primarily through the fathead minnow. Males became feminized, developing female reproductive organs and the population crashed after the second season. (Kidd, 2007)

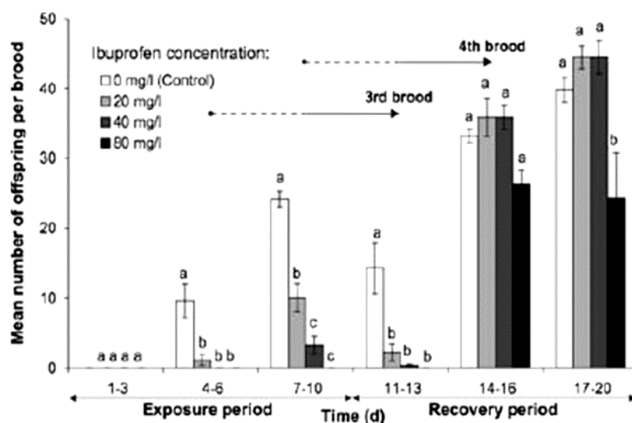


Selective Serotonin Reuptake Inhibitors (SSRIs)

Changes in fish behavior: Male fish exposed to trace amounts of fluoxetine (Prozac) were found to be slower capturing prey and took less interest in females. (Source: University of Wisconsin-Milwaukee)

Metamorphosis delays: African frog tadpoles were raised in clean water in tanks of water mixed with 38 ppb fluoxetine. Days after the tadpoles hatched, the control group had begun to develop legs, but the treated tadpoles had none.

Non Steroidal Anti-inflammatory Drugs (NSAIDs)



Exposure decreased number of *Daphnia magna* (water flea) young produced in 10-day exposure to ibuprofen followed by 10-day recovery period

Exposure to Ibuprofen

10-day exposure to Ibuprofen followed by 10-day recovery period in clean



DOs and DON'Ts of Medication Disposal



- ♦ Do not flush medications down the drain or toilet
- ♦ Do not throw medications in the trash
- ♦ Do not leave unused medications around the house



- ♦ Ask your physician for a shorter prescription or a sample prescription when taking a new medication
- ♦ Purchase only the quantity of OTC medications that you will use prior to the expiration date
- ♦ Dispose of unwanted and expired medications to one of Marquette County's five collection locations

ACCEPTED MEDICATION

Prescription and over-the-counter **PILL** medication
ONLY!

We *DO NOT* Accept

Vitamins
Liquids
Patches
Syringes
Bandages



Collection Box Locations



Negaunee Police

100 Silver St.

Negaunee, MI

Hours: 9 am - 5 pm M-F

906-475-4154

Marquette Police

300 West Baraga Ave,

Marquette, MI

Hours: Open 24 hours

906-228-0400

Chocolay Township Police

5010 US 41 South

Marquette, MI

Hours: 8 am - 4 pm M-F

906-249-4040

City of Ishpeming Police

100 South Lake St.,

Ishpeming, MI

Hours: 10 am - 5 pm M-F

906-486-4416

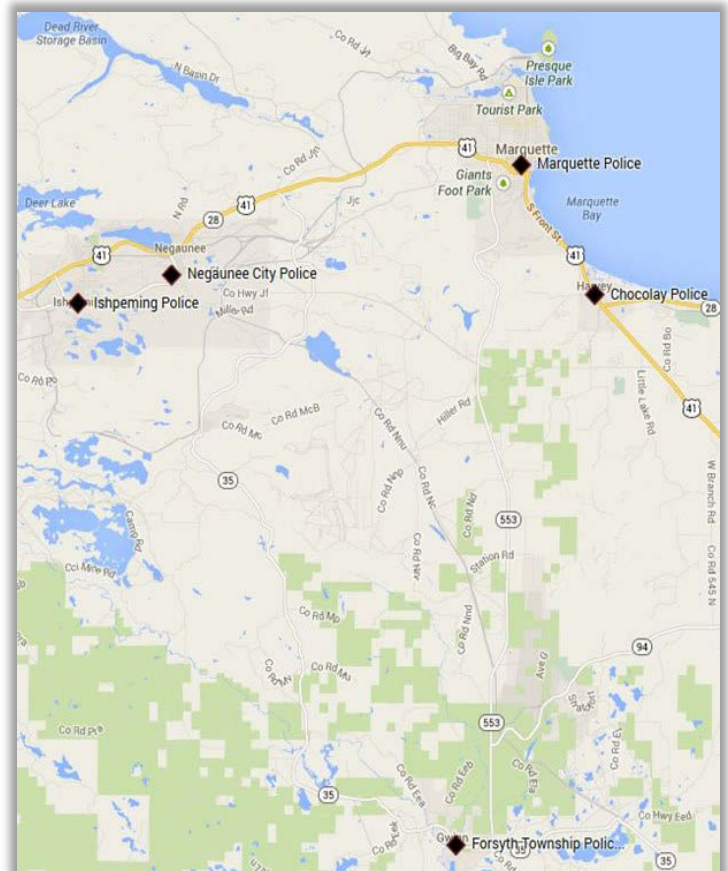
Forsyth Police

99 North Pine St,

Gwinn, MI

Hours: 7 am - 3 pm M-F

906-346-9224



Other Resources

U.S. Environmental Protection Agency:

Environmental Impacts of pharmaceuticals

epa.gov/ppcp/

US. Geological Survey:

Documentation of pharmaceuticals in the environment

toxics.usgs.gov/regional/emc

Marquette County Solid Waste Management Authority

Waste management for Marquette County

www.mcswma.com

**Thank you for
lending your
support to this
important cause!**

NEWS RELEASE

MARQUETTE COUNTY SOLID WASTE MANAGEMENT AUTHORITY TAKING BACK UNWANTED PRESCRIPTION DRUGS April 26 at Negaunee, Forsyth, and Chocolay Township Police Stations

Marquette, Mich. – On April 26 from 10 a.m. to 2 p.m., the Drug Enforcement Administration, in collaboration with the Forsyth, Marquette, and State Police departments will give the public its eighth opportunity in three years to prevent pill abuse and theft by ridding their homes of potentially dangerous expired, unused, and unwanted prescription drugs. Bring your unused or unwanted pills for disposal to any of these local police stations:

Forsyth Township Police Department - 99 Pine St. Gwinn
State Police, Negaunee Post - 180 U.S. 41, Negaunee
Marquette Police Department - 300 W. Baraga St. Marquette

(The DEA cannot accept liquids or needles or sharps, only pills or patches.) **The service is free and anonymous, no questions asked.**

Last October, Americans turned in 324 tons (over 647,000 pounds) of prescription drugs at over 4,114 sites operated by the DEA and its thousands of state and local law enforcement partners. When those results are combined with what was collected in its seven previous Take Back events, DEA and its partners have taken in over 3.4 million pounds—more than 1,700 tons—of pills.

This initiative addresses a vital public safety and public health issue. Medicines that languish in home cabinets are highly susceptible to diversion, misuse, and abuse. Rates of prescription drug abuse in the U.S. are alarmingly high, as are the number of accidental poisonings and overdoses due to these drugs. Studies show that a majority of abused prescription drugs are obtained from family and friends, including from the home medicine cabinet. In addition, Americans are now advised that their usual methods for disposing of unused medicines—flushing them down the toilet or throwing them in the trash—both pose potential safety and health hazards.

DEA is in the process of approving new regulations that implement the Safe and Responsible Drug Disposal Act of 2010, which amends the Controlled Substances Act to allow an “ultimate user” (that is, a patient or their family member or pet owner) of controlled substance medications to dispose of them by delivering them to entities authorized by the Attorney General to accept them. The Act also allows the Attorney General to authorize long term care facilities to dispose of their residents’ controlled substances in certain instances.

4/23/2014

Clean Lakes U.P.

Request for Additional FREE Materials

We would like to thank you for your time and effort in helping us educate Marquette County citizens and keep our county safe from pollution and prescription drug abuse. If you would like to receive more materials, please e-mail the following information to **jaime.mcswma@gmail.com**. You can also complete this order form and fax to **(906) 249-9377** or mail to the Marquette County Solid Waste Management Authority at, **600 County Road NP, Marquette, MI 49855**.

In my next shipment, I would like to receive:

Material	How many would you like?
Clean Lakes U.P. Brochures <i>(Increments of 20 only, please)</i>	
Clean Lakes U.P. 11X17 Posters	
Clean Lakes U.P. Informational Packet	

Please provide the following contact information so we can send your materials.

Contact Name

Company or Organization

Street Address

City

State

Zip Code

Thank you for your kind support and dedication!