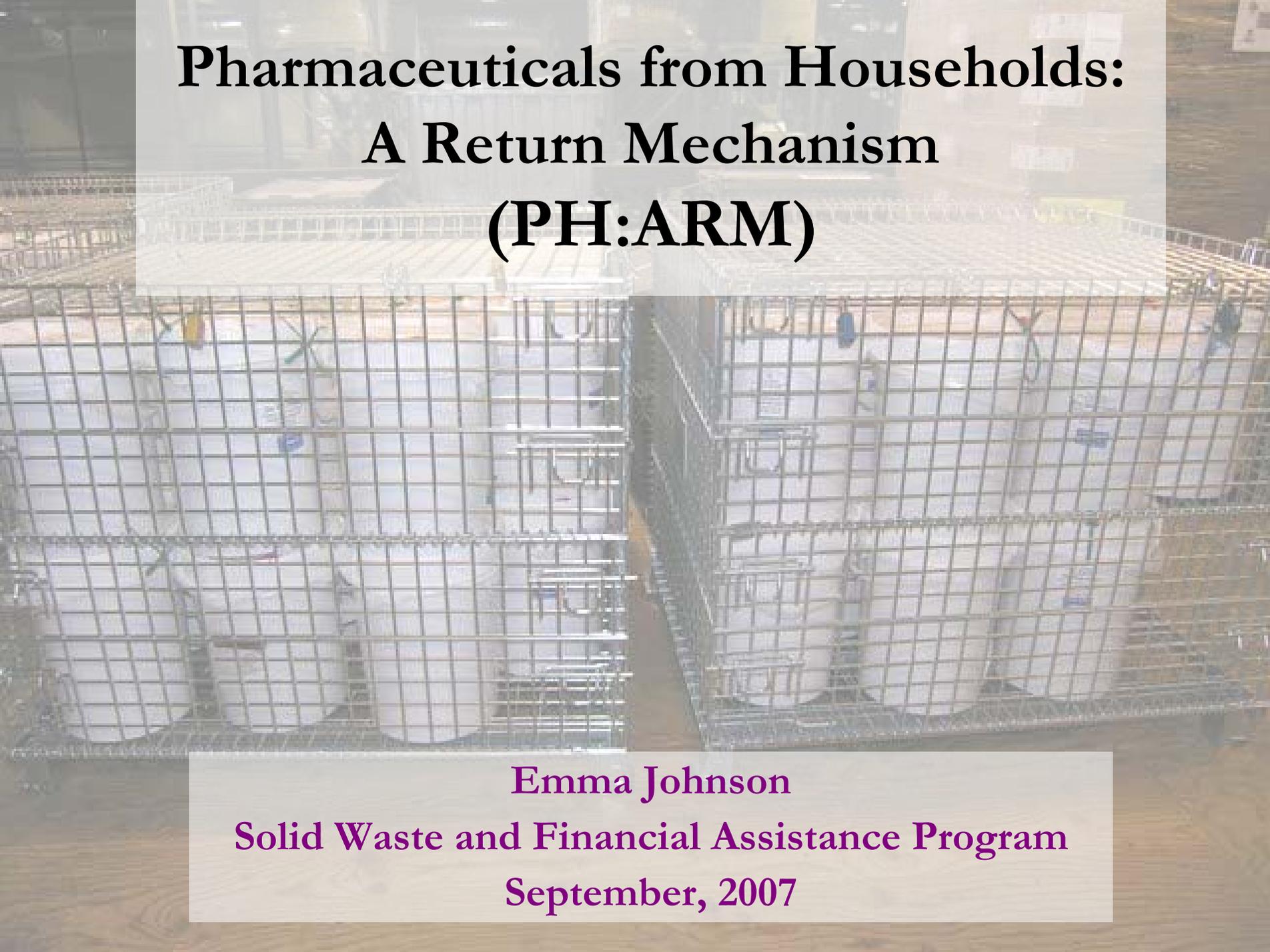


Pharmaceuticals from Households: A Return Mechanism (PH:ARM)



Emma Johnson
Solid Waste and Financial Assistance Program
September, 2007



USGS

Reconnaissance

1999-2000

Steroids, nonprescription drugs, and insect repellent were the chemical groups most frequently detected.

Detergent metabolites, steroids, and plasticizers generally were measured at the highest concentrations.

US Geological Survey tested 139 streams for presence of 95 chemicals, including pharmaceuticals

80% contained 1+ of these chemicals





Its Not Just in the Water

- EWU, USGS analyzed nine biosolid products from seven states (2006)
- 25-55 compounds detected in each sample
 - *Antidepressants and antihistamines, disinfectants and plasticizers, fire retardants and fragrances*
- Concentrations in biosolids were higher than in water and treated wastewater



Environmental Side Effects

- Uptake by aquatic and terrestrial organisms
- Endocrine disruption
- Anti-microbial resistance

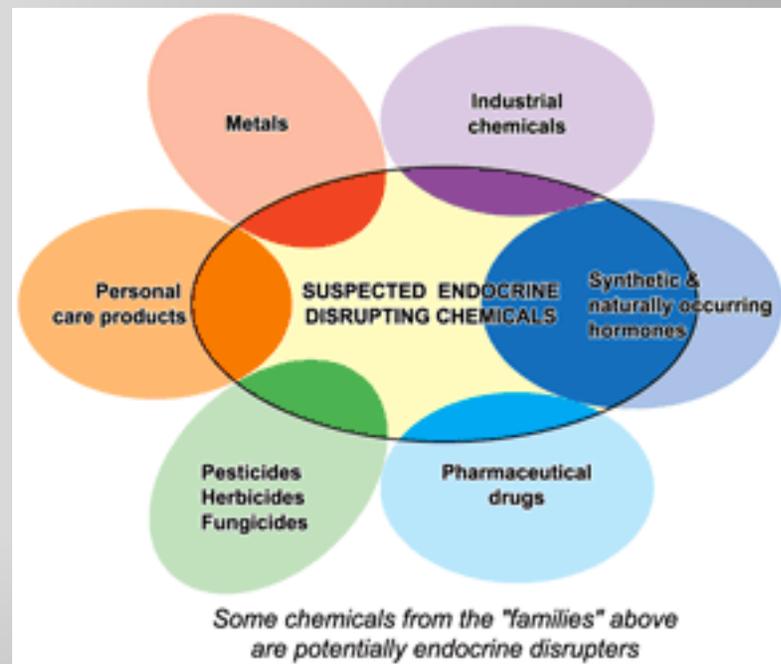


Photo: Two tadpoles after 57 days of development in the lab. The one on the right, **which has yet to sprout limbs**, was exposed to fluoxetine, also known as **Prozac**, at **50 parts per billion**. Credit: Emily Rogers, University of Georgia in Athens, aquatoxicologist



Evidence of Harm

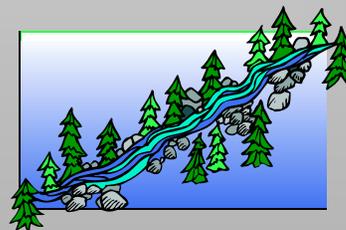
Is it enough to act?

- Endangered fish species experience *hormonal changes* after being immersed for three months in Tucson's treated wastewater, the *Arizona Daily Star* reported on Dec. 19, 2005
- 2006 Italian Study investigated the effects of 13 drugs merged to mimic both the association and low concentration (ng/L) detected in the environment.
 - At environmental exposure levels, the drug mix *inhibited the growth* of human embryonic cells



A 'Persistent' Class of Chemicals

- Virtual persistence of certain chemicals due to constant use and disposal.
- Use of barbiturates peaked more than 3 decades ago in Germany, yet drugs are still being detected. No barbiturate was degraded biotically or abiotically. *Science News* –July 26, 2006
- Sweden has started rating drugs for PBT qualities.





Poison Control Calls

- 2004 American Association of Poison Control Centers– 62 participating centers serving 294 M
 - 2.4 M total exposures reported
 - 58% were pharmaceutical exposures

Table 17A Substances most frequently involved in human exposures

Substance	No.	%*
Analgesics	279 955	11.5
Cleaning substances	229 040	9.4
Cosmetics and personal care products	224 792	9.2
Sedatives/hypnotics/antipsychotics	129 885	5.3
Foreign bodies	122 011	5.0
Topicals	113 489	4.7
Cough and cold preparations	108 814	4.5
Antidepressants	103 155	4.2
Pesticides	102 754	4.2
Bites/envenomations	97 263	4.0
Plants	74 811	3.1
Alcohols	74 268	3.0
Cardiovascular drugs	74 145	3.0
Antihistamines	72 762	3.0
Food products, food poisoning	69 915	2.9
Antimicrobials	64 768	2.7
Vitamins	62 562	2.6
Hydrocarbons	54 766	2.2
Hormones and hormone antagonists	48 359	2.0

Despite a high frequency of involvement, these substances are not necessarily the most toxic, but rather may be the most readily accessible.

* Percentages are based on the total number of human exposures (2 438 644) rather than the total number of substances.



New Risks to Teens

- Use of Xanax, Oxycontin, and Ritalin by teens (ages 12 – 17) increased 212% between 1992 and 2003.
- One in 10 teens reports having abused OTC cough medicines to get high.





Poisoning and Suicide Risks of Medicine

- 71.2% of poisoning suicides were caused by drugs—both legal and illegal (2003)
- Drugs caused 94.3% of the unintentional and undetermined poisoning deaths (2003)
- Poisonings led to \$26 billion in medical expenses and made up 6% of the economic costs of all injuries in the United States (2000)



-CDC, 2006





Where Diversion Happens



“...70 to 80 percent of those 12 years or older said they got their drugs from a friend or relative...

... Parents and other caregivers should *store their prescription drugs carefully and dispose of any unused drugs* before they can fall into the wrong hands.”



Assistant Surgeon General Eric Broderick, D.D.S., M.P.H., the Substance Abuse and Mental Health Services Administration Acting Deputy Administrator



Increasing Sales = More Exposure

- From 1993 to 2003 the US population increased 13%
 - The number of prescriptions purchased increased 70% (from 2.0 billion to 3.4 billion)
 - The average number of prescriptions per capita increased from 7.8 to 11.8.
- Kaiser Family Foundation, October 2004

“A rough estimate of PPCP concentration in raw wastewater is directly proportional to the amount of PPCPs sold.”

Poseidon, EU





Who is PH:ARM?

- **Interagency Resource for Achieving Cooperation (IRAC)**
- **Local Hazardous Waste Management Program in King County**
- **Snohomish County Solid Waste Management Division**
- **Public Health- Seattle & King County**
- **Northwest Product Stewardship Council**
- **Washington Citizens for Resource Conservation**
- **Pacific Northwest Pollution Prevention Resource Center**
- **Washington State Department of Ecology (SWFAP)**
- **Washington State Department of Social and Health Services (advisor)**
- **Washington State Board of Pharmacy (advisor)**
- **EPA region X (supporter)**





Waste Generation Rate: Households

- 3 Billion prescriptions filled in US in 2005, 53 million in Washington
- Germany and Austria studies estimate 25% to 33% of prescribed drugs are wasted. PhRMA estimates of 3% of all meds go unused
- 2005 British survey:
 - 82% do not finish antibiotics
 - 50% “ ” antidepressants
 - 50% “ ” beta-blockers
 - 20% “ ” pain meds
- Only 1% of Households in King County had no medicine containers (2006)
 - 10% are using or will use none
 - Only 33% will use all medication





Ongoing, provincial, industry-financed program: British Columbia



- Ongoing, permanent program since 1996
- Administrated by the Residuals Management Group Ltd., with funding by the Post Consumer Pharmaceutical Stewardship Association (industry association)
- Collected **44,092 lbs in 2006**
- Total cost is \$248,000/year
- Serves 4 million people





Ongoing, national, government-financed* program: **Australia**



- Ongoing, permanent program since 1998
- *Wholesaler discounts delivery and collection, government pays for disposal and advertising
- Collected **696,241 lbs in 2005**
- US \$737,000 a year in costs
- Serves 21 million people





Results of a BC-type Program

	British Columbia	Washington Full Program (Potential Results from a BC Model)
Total lbs of medicines	44,092 lbs (2006) 36 million pills	66,000 lbs (population estimate) 54 million pills
Packaging	Not collected	28 % by weight is packaging
Cost	\$248,000 annually \$5.60 per lbs	\$473,000 annually (assume \$5.60 per lbs)
# of Sites	802 pharmacies	1,301 pharmacies





A Simple Program Gets Results

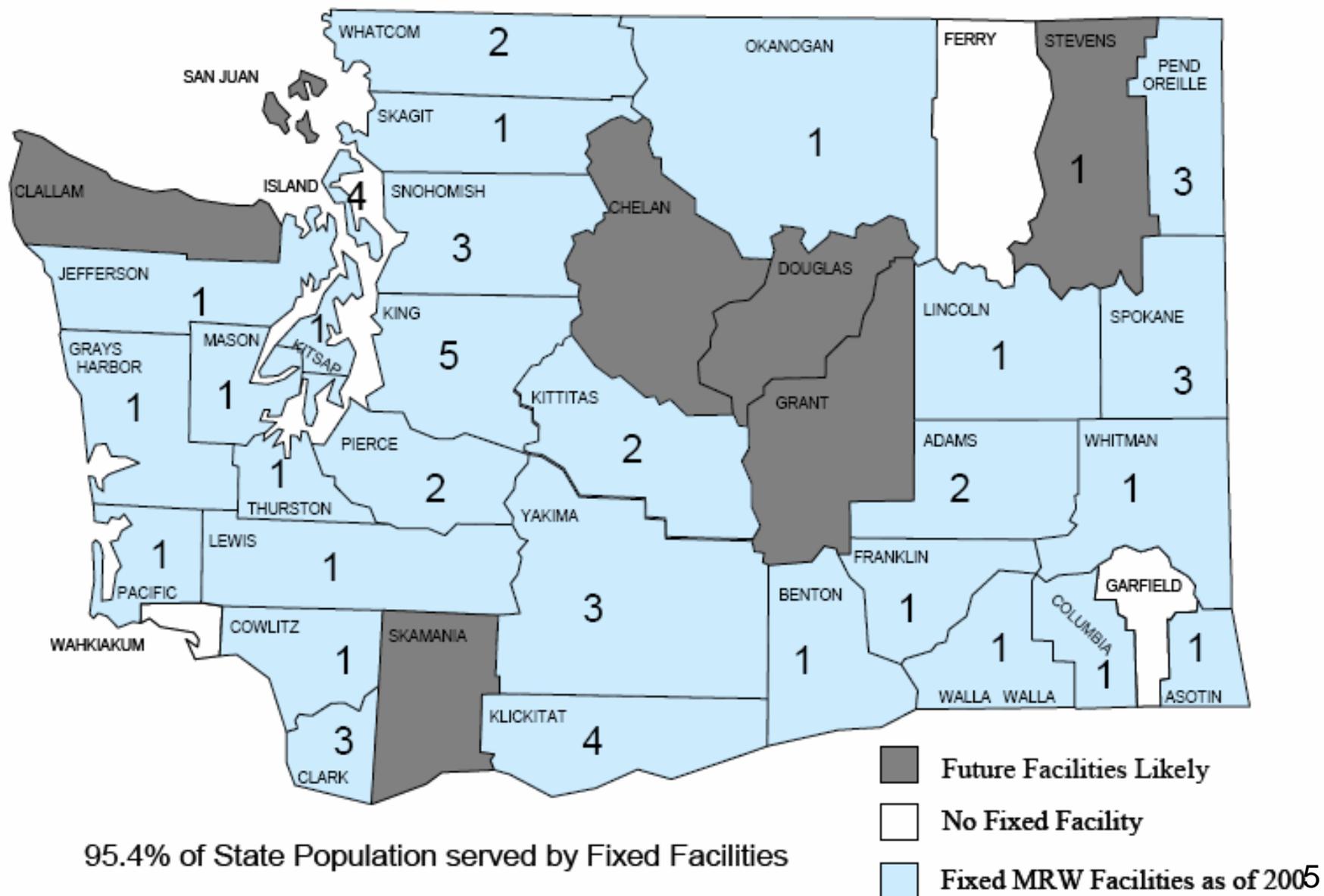
It should be as easy to safely dispose of unwanted medications as it is to purchase them.

- 74% are willing to properly dispose of their unwanted medicines if a convenient location is offered.
- 80% said they'd likely return their unwanted medicines to a secure drop box at their pharmacy.

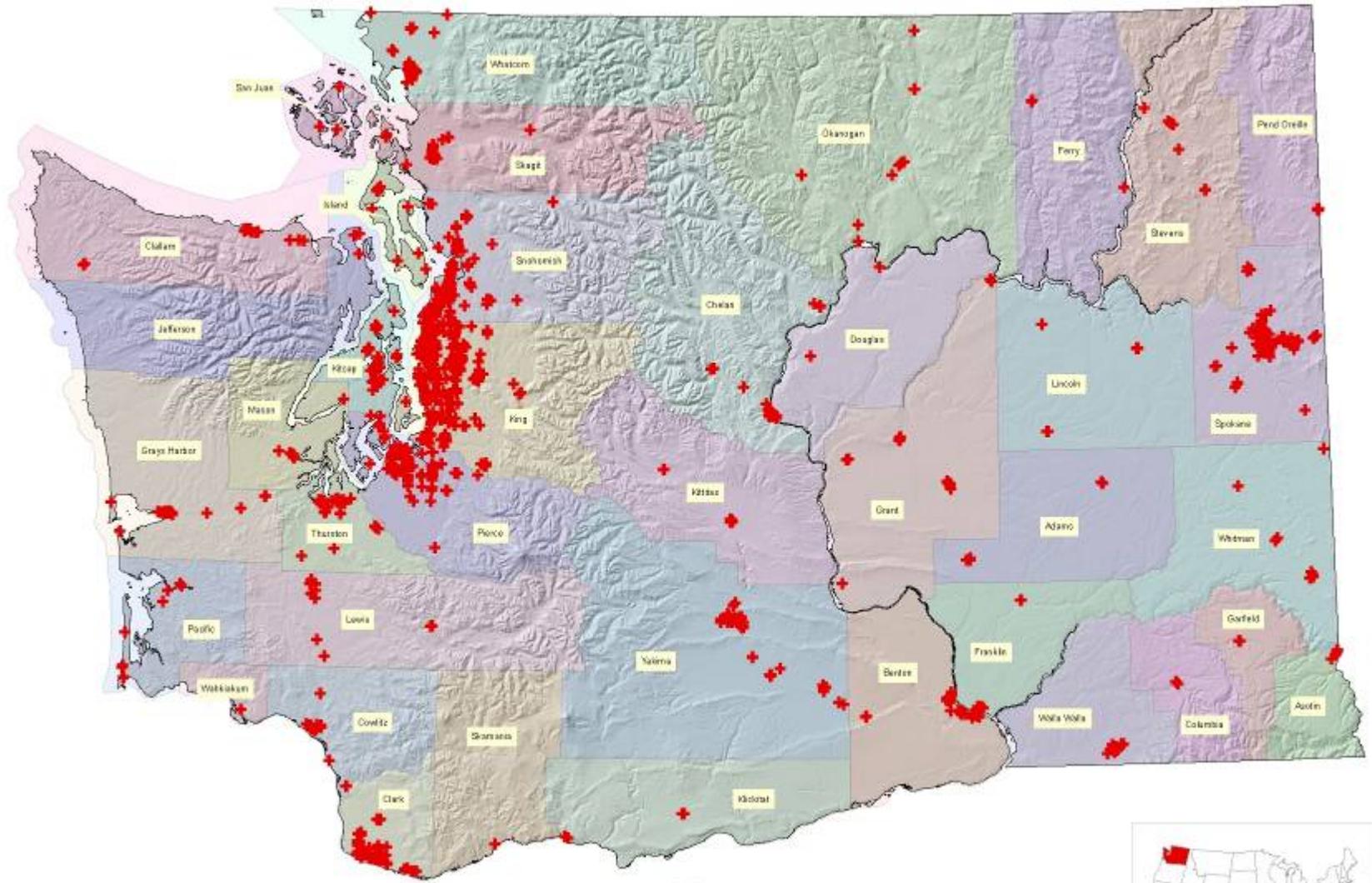
-SoundStats Survey of King County, 2006



Figure 6.2
54 MRW Facilities as of 2005



Washington State Pharmacy Locations



Snohomish County
 Public Works -
 Solid Waste Management Division
 April 22, 2007

Pharmacy location data generated 7/12/2004
 Washington State Department of Health
 Map based on the geographic coordinate data
 Snohomish County website. It is not responsible for the accuracy or completeness of the information displayed on this map. Any errors or omissions are the responsibility of the user. The map is provided as a service to the public and is not intended to be used for any other purpose.





HHW Facilities and Collection Events

- Need BOP license
- Security measures need to be in place
- Need pharmacist-type training
- Need to contract with BOP licensed disposal vendor
- *2% were willing to use a municipal hazardous waste site to dispose of drugs*

(SoundStats survey of King County residents, 2006)





PH:ARM Pilot

- Includes all pharmaceutical products*
- Retail pharmacy locations (Bartell Drug)
- Clinical pharmacy locations (Group Health)
- Boarding homes/ assisted living facilities (in development)
- 2 years in length





1st Phase: Group Health Cooperative



- **Washington State HMO (1 location in Idaho)**
- **500,000 Customers**
- **1 central warehouse, 25 total pharmacies**
- **Started with 7 pilot locations in 5 counties (King, Snohomish, Thurston, Kitsap, and Spokane)**
- **11 locations as of September, 2007**





Group Health Collection Container



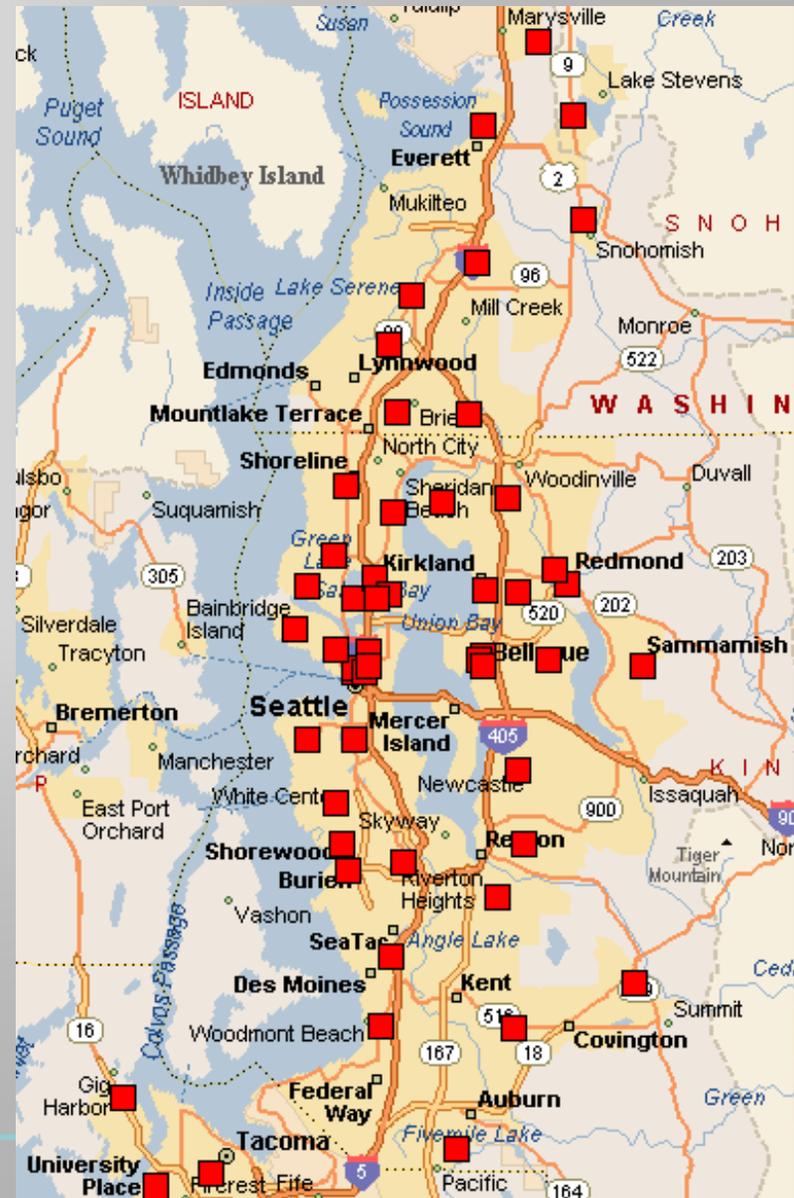
Results (thus far) of GHC Pilot

- 445 buckets from October 2006- September 2007 (2,225 gallons)
- 2,972 lbs of medication
- Estimate: 1.5 lbs a day per pharmacy site on average
- If this return rate holds: 600,000+ lbs in WA



Next Phase: Retail Pharmacy

- Bartell Drug Company
- 1 central warehouse
- 54 total locations
- Potential to collect more material than GHC—retail setting





Bartells Prototype Collection Container (Future)





Barrier: DEA Controlled Drugs

- Controlled substances are about 10% of waste in other collection programs (could be 60,000 lbs in WA)
- Diversion is key issue for DEA
- Controlled Substance Act creates closed system of inventory
 - Can only be transferred to exempt agencies

DEA Regulations don't acknowledge the presence of waste or need for proper disposal



Some Items Can't Be Identified





DEA Waiver Request

- **Wa. Board of Pharmacy** submitted request to **DEA** in **March 2007** to waive DEA regs.
 - Numerous support letters to DEA administrator, including **Governor Gregoire**, **Federal Senators**, **EPA Region X**





Barrier: Final Disposal

- **Recycling/ reuse of waste extremely difficult at this time**
- **Lack of vendors with the right permits, or permission to assist with waste problem**
 - Possibility of DEA drugs prevent vendor participation
- **Mixture of hazard classes in drugs and medicine cabinets**
 - Flammable, Toxic, Biomedical, Hg thermometers, glucose meters, aerosol cans



Return: YES!

- ✓ Prescription medications
- ✓ Over-the-counter medications
- ✓ Medication samples
- ✓ Medications for pets



- ✓ Vitamins
- ✓ Medicated ointments/lotions
- ✓ Inhalers
- ✓ Liquid medication in glass or leak-proof containers



Return: NO!

- ⊘ Needles
- ⊘ Thermometers
- ⊘ Narcotics (controlled substances)
- ⊘ IV bags
- ⊘ Bloody or infectious waste



- ⊘ Personal care products
- ⊘ Business waste
- ⊘ Empty containers
- ⊘ Hydrogen peroxide
- ⊘ Aerosol cans



Items Found



Copaxone, worth \$1,500?



Meds from 1960s





Acetylsalicylic Acid, Very old



Nitroglycerin



Vitamins



Albuterol Sulfate





Short term Financing

- **Grants from foundations and governments (\$250,000+) to non-profits and local governments through 2007**
 - Russell Family Foundation
 - King County Waterworks (07 and 08)
 - Group Health Community Foundation
 - Puget Sound Action Team
 - Washington State Department of Ecology
 - Snohomish County Solid Waste Division
 - King County Department of Natural Resources Solid Waste Division
 - Seattle Biotech Legacy Foundation
 - Seattle Public Utilities
- **Governments and pharmacies (in-kind)**
- **Purdue manufacturer settlement?**





Long term Financing

- Estimated \$1-\$3 million annually to collect current return rate at every pharmacy in Washington
- Cost of disposal not easy to absorb by retail outlets, long term care facilities, or local government budgets.
 - Estimated \$150,000 for 100 pilot locations/ yr
- Requires manufacturer support and stewardship (may be voluntary or legislated)





www.medicinereturn.com

Emma Johnson

Solid Waste and Financial Assistance Program

ejoh461@ecy.wa.gov

425-649-7266