Water Withdrawal Reporting Program
2003-2004 Annual Report

to the
Joint Standing Committee on Natural Resources
of the
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Submitted by
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Contents

Actions for the Coming Year

Release Discussion Draft of In Stream Flow Rules on March 7

The DEP will move forward with rulemaking in response to Title 38, Section 470-E, which calls for the establishment of water-use standards for maintaining instream flows and GPA lake or pond water levels that are protective of aquatic life and other uses. Standards are to be based on the natural variation of flows and water levels. The DEP has delayed the commencement of this rulemaking process to work with other state agencies to study and learn from the first year of data submitted under the Water Withdrawal Reporting Program, as well as the most recent work done by USGS and MGS on estimating low-flow conditions.

Create Methodology to Identify Watersheds at Risk from Cumulative Withdrawals

The DEP will continue to work closely with the Department of Agriculture and the Maine Geological Survey to administer the Water Withdrawal Reporting Program and to assess the data collected. The agencies will develop methodologies for determining watersheds that are at risk from cumulative water withdrawals per the direction provided in 38 M.R.S.A. Section 470-E. MGS will continue to work with the WWRP database to develop a fully integrated water use data collection process in Maine, which will allow a more detailed analysis of water availability and utilization within watersheds.

Continue Water Management Planning Efforts for Prestile Stream

The DEP, DOA and MGS will provide technical assistance to water management planning efforts in the Prestile Stream watershed in Aroostook county. The Regional Water Management Board in conjunction with the Maine Potato Board and DEP, has been working with farmers in the Prestile Stream area to address water needs. A number of farmers need more water than the stream can provide. McCains Foods has recently agreed to provide water from an artificial pond, Lake Josephine, to help augment supplies for those farms.

Introduction

This is the second annual report of the Water Withdrawal Reporting Program (WWRP). Maine's Water Withdrawal Reporting Program, which is found at Title 38, Sections 470-A through 470-G, requires water users who withdraw quantities in excess of the thresholds contained in the statute to provide public information about their annual water withdrawals from public water resources. September 30, 2004, marked the end of the second "water year" subject to reporting under the Water Withdrawal Reporting Program. Reports of withdrawals made from October 1, 2003 to September 30, 2004 were to be submitted to DEP or the Department of Agriculture, Food and Rural Resources by December 1, 2004.

Prior to the implementation of the Water Withdrawal Reporting Program the best available information on water use in Maine was the national survey conducted every five years by the United States Geological Survey (USGS). The USGS survey is useful for getting the big picture of water use in Maine and across the country, and for identifying long term trends in water use. The USGS recently published its national summary of water use for 2000, noting:

> "Contrary to expectation, reported water withdrawals declined in 1985 and have remained relatively stable since then. Changes in technology, in State and Federal laws, and in economic factors, along with increased awareness of the need for water conservation, have resulted in more efficient use of the water from the Nation's rivers, lakes, reservoirs, and aquifers."

As the DEP has worked with the Department of Agriculture, Food and Rural Resources and the Maine Geological Survey to analyze the data collected in the first year of the WWRP it is finding the site specific data to be valuable in different ways. Knowing the exact location and magnitude of a withdrawal allows for assessment of water availability under various conditions, and the assessment of how potential water use standards might affect that user. It also allows for the assessment of water availability for the filling of storage ponds during high flows for use in dry periods. This work is summarized below.

This past year has also seen a significant effort by the Department of Agriculture to use the data collected in the Agricultural WWRP to assess the potential impact of imposing seasonal withdrawal thresholds on selected farms who withdraw water directly from rivers, streams and brooks. The 2004 Agricultural Water Use Report, submitted jointly with this report, summarizes the results of this assessment as well as the policy and recommendations of the Commissioner of Agriculture's Agricultural Water Management Advisory Committee regarding imposition of low flow standards on farm irrigators in Maine.

As the data continues to come in for the second year of the WWRP the agencies are also noting that short term variations are already showing up, such as a reduction in irrigation water use in Aroostook County in 2004 due to the relatively abundant rains during the growing season, and an increase in withdrawals for bottled water. The agencies will continue to work together in the coming year to further analyze the data. Further effort will be given to seeing how the data can inform the process of developing and implementing water use standards, and focus will also be given to studying water basins with multiple users.

The primary focus in the coming year will be on these water use standards. The DEP has been coordinating with the other interested state agencies in its review of the WWRP data and consideration of how this informs the standard setting process. Based in part on this work and these discussions the DEP plans to release a draft proposal for public discussion on March 7. This preliminary draft will be the subject of discussions with stakeholders in an informal comment process over the next few months. After considering the input of all interested parties, the Department would then develop a revised draft to submit to a formal rulemaking process with the Board of Environmental Protection. It is our hope that these would be provisionally adopted by the BEP in time to be submitted to the Joint Standing Committee on Natural Resources in early 2006.

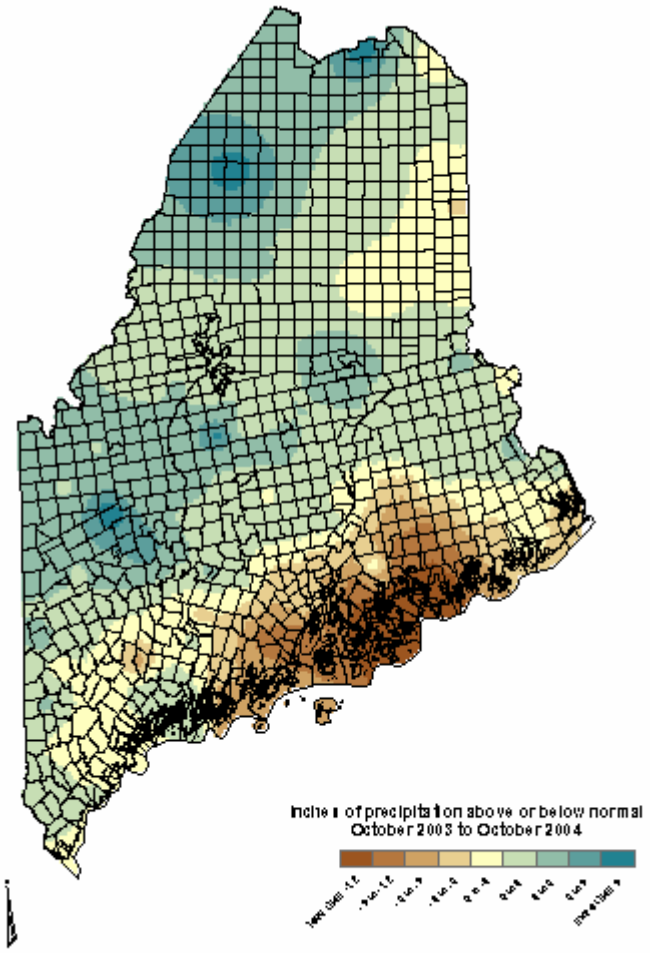
The DEP recognizes contributions and assistance in assembling this report received from the Maine Geological Survey (MGS), the Department of Agriculture, Food and Rural Resources (DAFRR), the Maine Drinking Water Program, the Public Utilities Commission, the Land Use Regulation Commission, and the US Geological Survey (USGS). The data base of the Water Withdrawal Program is maintained by MGS and the agricultural water use database is maintained by DAFRR. The DEP also recognizes the financial support provided by the US Environmental Protection Agency.

Summary of Water Resources Conditions
October 2003 – September 2004

Precipitation towards the end of 2003 eased drought conditions over most of the State, with only the western mountains and the Penobscot Bay region showing significant precipitation deficits. Normal to slightly above normal precipitation in 2004 continued to ease the abnormally dry to drought conditions that persisted from 2003. Only Midcoast region from roughly Bath/Brunswick to western Washington County experienced a significant precipitation deficit for the period.

With respect to literal drought conditions, the U.S. Drought Monitor maps available at (http://drought.unl.edu/dm/archive.html) show abnormally dry conditions (the lowest level of drought) in eastern sections of the State during the periods March 9 to March 30 and June 29 to August 3. Otherwise, the State was drought free for the period October 2003 through October 2004.

Ground-water levels and surface-water runoff reported at U.S. Geological Survey observation wells and gaging stations (http://me.water.usgs.gov) also reflected the normal to above normal precipitation patterns. Ground-water levels and surface-water runoff were in the above normal range over much of the State for the last 3 months of 2003, and only fell into the normal or below normal range in parts of the State for the early part of the year (February 2004 through May 2004). In June 2004 they returned to the normal or above normal range for the remainder of the period.



Inches of precipitation above or below normal for the period October 2003 through October 2004.

Data from National Weather Service stations and the National Weather Service cooperative observer network

Conditions Observed by Public Water Supplies

The Department of Health and Human Services Drinking Water Program (DWP) reports that public water supplies observed conditions in 2004 that continued a trend of generally normal water availability. The easing of the drought in 2003 reduced the number of systems that had to seek supplemental sources or restrict water use significantly.

A significant portion of the water use for large public water systems is for commercial and industrial uses which can represent a substantial component of local economies. An adequate supply of high quality water is important to these industries. Domestic drinking and sanitary water represent the largest portion of the use in most of the smaller systems.

A number of coastal public water systems annually experience late-summer demand peaks, which coincide with seasonal ground and surface water lows. Conservation was required in several communities. These systems continue to work to develop supplemental sources. This is often difficult along Maine's rocky coast and often complicated by regulatory constraints. All Public Water Systems withdraw water at a rate that has been shown over the years to be sustainable. Most large systems utilize a very small fraction of the resource's potential.

The Bulk Water Transport permitting program administered by the DWP showed a significant surge of activity. There are nine long-standing bulk water transport permits have been which renewed by the DWP every three years for a number of years. This year the program received three additional permit applications for bulk water transport. These are generally for the collection of spring water and transport to a bottling plant. If the source wishes to be labeled as spring water, they are required to meet the U.S. Food and Drug Administration's definition, which includes a provision that their extraction cannot cause the spring to cease flowing or change its chemistry. Permits are reviewed by the DWP, MGS, DEP, and the Public Utilities Commission (PUC), for their compliance with applicable laws and environmental impact.

Conditions Observed by Agricultural Water Users

The Department of Agriculture, Food and Rural Resources has published a report on the status of agricultural water use in Maine titled "2004 Agricultural Water Use Report: Summary of Progress and Future Needs To Reduce Risks to Aquatic Habitat and Increase Agricultural Irrigation In Maine" prepared by John Harker, Andrea Lasselle, and Sarah Callnan, dated December 2004. That report is being filed with the Joint Standing Committee on Natural Resources jointly with this report. In its report DAFRR noted that natural rainfall limited the need for irrigation in 2004. The number of irrigation sources using water declined from 78 in 2003 to 37 in 2004. The amount of water used also declined compared to 2003. The DAFRR report also demonstrates that farmers are well on their way to reducing direct impacts on streams, as noted by the hundreds of thousands of dollars of investment made by Wild Blueberry companies and other farmers in developing alternative sources and tapping groundwater by developing wells.

Summary of Water Withdrawal Data

USGS Estimated Use of Water in Maine in 2000

Prior to the implementation of the Water Withdrawal Reporting Program the best available information on water use in Maine was the national survey conducted every five years by the United States Geological Survey (USGS). One of the interesting aspects of the 2000 survey for Maine, is the summary of total withdrawals by water-use category. These figures are more inclusive than the results of the Water Withdrawal Reporting Program, as the USGS surveys all water use, even those below the reporting thresholds of the WWRP and does not provide any of the exemptions contained in the WWRP. For 2000 USGS reported the following water use for Maine:

USGS Estimated Maine Water Use by Type (2000)	
Type of Use	**Use (Million gallons/day)**
Industrial	247
Thermoelectric Power Saline	295
Thermoelectric Power Fresh	113
Public Supply	102
Domestic	35.7
Irrigation	5.84

Results of the Second Year of the Water Withdrawal Reporting Program

The largest group in terms of number of users represented are the public water supplies which report through the long established programs administered by the Public Utilities Commission and the Department of Human Services, Drinking Water Program, which are sharing their data with the Water Withdrawal Reporting Program. The 156 water utilities in this database reported annual production of approximately 34.4 billion gallons, in 2003. This data is reported annually and complete data for 2004 will be available in April, 2005. The second largest group in terms of number of users represented are agricultural water users. Agricultural water users report directly to the Department of Agriculture, Food and Rural Resources. The 37 agricultural water users reporting withdrawals in 2004 totaled approximately 719 million gallons for the reporting year. This is down from 78 users reporting 861 million gallons in 2003. The decrease in reportable water withdrawals is largely attributed to adequate rainfall requiring less irrigation.

Reported Water Withdrawals by Type		
Type of Use	**Withdrawals Reported**	
	2003	2004
Water Utilities	33.8 billion gallons	34.4 billion gallons
Paper Mills	70 billion gallons	66 billion gallons
Agriculture	861 million gallons	719 million gallons
Snow Making	590 million gallons	559 million gallons
Bottled Water	365 million gallons	448 million gallons

Public Water Supplies
There are approximately 2200 Public Water Systems (PWS) in Maine, of these, 400 are community water systems with 25 or more users. Data for these systems, including location, source, and population served, is maintained in a GIS database by the Department of Human Services, Division of Health Engineering, Drinking Water Program (DWP).

Production/consumption data for 156 of the larger water utilities comes from an existing reporting program of the Public Utilities Commission (PUC). The water utilities report to the PUC on a calendar year basis, with data due by April of the following year. The production/withdrawal data is broken down into monthly segments, and is also further divided into source, either groundwater or surface water. For calendar year 2003, there were 156 water utilities and of those, 134 (86%) have so far reported. Total annual production reported by water utilities for 2003 was 34.4 billion gallons, or 94.1 million gallons per day. This represents a 1.8% increase over comparable data from 2002. Of the total usage, approximately 23% (7.9 bg) was from groundwater and 77% (26.5 bg) was from surface water. The highest consumption rates occur within the higher populated regions of the state. The table below demonstrates what sort of sources these utilities depend on. (Note that 10 utilities have both groundwater and surface water sources, for a total of 166 sources.)

Water Utility Sources	
Groundwater	104
Surface Water - Lakes	50
Surface Water – Rivers	12

Commercial and Industrial Uses
As noted last year, many commercial and industrial facilities are exempt from the reporting requirements of the WWRP. Many are exempt because they receive their water from a public water system. Many are also exempt because they are located on Maine's larger rivers, and their daily withdrawals are less than one-percent of 7Q10 at the point of withdrawal. This reflects the fact that availability of an abundant, dependable water supply has long been a siting criteria for some of Maine's most important industries. Other major water users, such as Maine's pulp and paper manufacturers, do not report directly to the WWRP because they report their waste water discharges to the DEP and the volume of withdrawal can be calculated from the discharge volume. Analysis of waste water discharge volumes from ten paper mills indicates that they used approximately 66 billion gallons of water in 2004. This is down from approximately 70 billion gallons in 2003, due largely to plant shutdowns. Most of this water is discharged back to the rivers after use and treatment.

Bottled Water Production
There were 28 Maine bottled water producer facilities, either proposed or operational, in 2003. Of these, 19 actually produced bottled water during 2003. Total bottled water production for 2003 was approximately 448 million gallons. This represented a 23% increase over 2002 when total production was 365 million gallons.

Snow Making

Of the 18 Maine ski areas and snow tube parks, 16 had snowmaking capabilities during the 2003 - 2004 ski season. These 16 ski areas derive their water supplies from multiple sources: ponds, wells, streams, and rivers. Of these 16 areas, 6 have reported their 2003-2004 water withdrawals, totaling 559 million gallons. This is down from 8 areas reporting 590 million gallons for 2002-2003.

Agricultural Water Use

The Department of Agriculture, Food and Rural Resources has received water use reports from those farms required to comply with the Water Withdrawal Reporting program and summarized that data for the DEP. DAFRR has summarized this data in their "2004 Agricultural Water Use Report: Summary of Progress and Future Needs To Reduce Risks to Aquatic Habitat and Increase Agricultural Irrigation In Maine" dated January 2004. A copy of that report will be submitted to the Joint Standing Committee on Natural Resources simultaneously with this report. DAFRR noted that natural rainfall limited the need for irrigation in 2004. The number of irrigation sources using water declined from 78 in 2003 to 37 in 2004. The amount of water used also declined compared to 2003.

Agricultural Water Use By County

County	Gallons Used	
	2004	**2003**
Washington	549,439,022	581,965,980
Kennebec	105,136,500	27,760,122
York	48,455,600	77,547,100
Aroostook	8,693,100	69,615,943
Oxford	4,800,000	7,554,094
Cumberland	2,137,200	49,486,200
Franklin	683,760	377,730
Penobscot	0	23,004,000
Androscoggin	0	14,502,796
Lincoln	0	8,116,000
Sagadahoc	0	462,500
Waldo	0	445,350
Somerset	0	251,000
Hancock	0	128,000
Total All Counties	**719,345,182**	**861,216,815**

Assessment of Potential Water Withdrawal Standards

At the request of the DEP the Maine Geological Survey has conducted an analysis of the impact of potential water withdrawal standards on specific water withdrawal points. Knowing the impact of any proposed rule limiting water withdrawals from surface water bodies is an important prerequisite to any rulemaking process. One way to assess the impact of a set of proposed withdrawal thresholds on water withdrawals is to compare the proposed withdrawal threshold to actual flows in rivers and streams.

For the purpose of the analysis the withdrawal threshold was assumed to be the flow in the river or stream below which no water may be withdrawn, though Title 38, section 470-E calls for variances to be allowed from the standard. As called for in section 470-E, any proposed withdrawal threshold would be seasonal, reflecting the natural variation in stream flow, and would be higher in the spring and fall months and lower in the winter and summer months.

The seasonal thresholds analyzed below are defined in terms of a ***median flow***. On average, the flow in the stream will be above the median 50-percent of the time and below the median 50-percent of the time. The proposed seasonal withdrawal thresholds are:

Season	Proposed withdrawal threshold
Jan 1 to Mar 15	February median flow
Mar 16 to May 15	April median flow
May 15 to Jun 30	June median flow
Jul 1 to Sep 15	August median flow
Sep 16 to Nov 15	October median flow
Nov 16 to Dec 31	December median flow

There are essentially two options for calculating the value of the monthly median flow at a point on a river or stream. Ideally, the value is calculated from 10 or more years of actual gage data for that point. The longer you have measured the flow at a gaged site, the more accurately you will be able to calculate the median. However, since it is unlikely that actual gage data will be available for any given withdrawal point, we must have some way of accurately ***estimating*** the monthly median at an ungaged site. The U.S. Geological Survey has used data from sites where they have operated stream gages for many years to develop **regression equations** that can be used to estimate the monthly median flow at an ungaged site based on the area of the drainage basin above the point on the river or stream, the mean annual rainfall, how much sand and gravel aquifer is present in the drainage basin, and other factors. A summary of the methods used to develop these equation is given in the USGS publication, Estimating Monthly, Annual, and Low 7-Day, 10-Year Streamflows for Ungaged Rivers in Maine. U.S. Geological Survey Scientific Investigation Report 2003-5026 (Dudley 2003).

Streamflow Statistics for Ungaged Streams

Efforts to develop better equations to estimate low-flow statistics, including August median streamflows continued in 2004. This work is an important step in establishing streamflow standards. The U.S. Geological Survey, in cooperation with state, local, and other federal agencies, has recently published equations that can be used by hydrologists, engineers, and managers to estimate characteristic stream flows based on measured hydrologic and climatic basin characteristics including drainage area, precipitation, distance from the coast, and surficial geology. A statewide study, Estimating Monthly, Annual, and Low 7-Day, 10-Year Streamflows for Ungaged Rivers in Maine, was published in 2004, and provides a means for estimating mean and median monthly flows, and 7Q10 in all parts of the state on medium to large basins.

Statewide equations for medium to large basins are complemented by regional equations to estimate August median streamflow in small drainage basins (less than 10 square miles in area) for Downeast and in Aroostook County. The equations for Eastern Aroostook County were published in November, 2003: August Median Streamflow on Ungaged Streams in Eastern Aroostook County, Maine. U.S. Geological Survey Water Resources Investigation Report 03-4225. The equations for Coastal Washington County were published in October, 2004: August Median Streamflow on Ungaged Streams in Eastern Coastal Maine. U.S. Geological Survey Scientific Investigation Report 2004-5157. With these publications our ability to calculate streamflows in Maine has been extended to smaller watersheds in two areas identified as a priority due to increased interest in agricultural irrigation.

A USGS fact sheet, Methods for Estimating Streamflow Statistics for Ungaged Streams in Maine, published in 2004, outlines recent and ongoing work to develop streamflow statistics, and guides water resource managers in the selection of the most appropriate equation to use depending on the streamflow statistic of interest and the basin size. Availability of USGS regression equations statewide is summarized in the following table.

Streamflow Statistic	Basin Size		
	0 to 1 square miles	1 to 10 square miles	10 to 1,500 square miles
Peak flow	Under development	Available	Available
Annual mean/median	Not available	Not available	Available
Monthly mean/median	Not available	Not available	Available
August median Aroostook County	Available	Available	Available
August median Downeast	Available	Available	Available
7Q10 Statewide	Not available	Not available	Available

These estimates of the monthly median flow at an ungaged site are less precise than median flows calculated from actual streamflow. For some of the monthly medians listed in the table above, the uncertainty in the estimated value may be as high as +/-40% of the value. The regression equations used to estimate the monthly median flow and the uncertainties of the estimated values are listed in the following table.

Season	Proposed withdrawal threshold	Regression equation	Uncertainty (in percent)
Jan 1 to Mar 15	February median flow	$36.54\ (A^{1.036})(D^{-0.762})$	-13.4 to 15.5
Mar 16 to May 15	April median flow	$0.227\ (A^{1.010})(10^{0.228*pptA})$	-20.8 to 26.2
May 15 to Jun 30	June median flow	$0.734\ (A^{1.076})$	-22.5 to 29.0
Jul 1 to Sep 15	August median flow	$0.152\ (A^{1.120})(10^{1.31*SG})$	-28.6 to 40.2
Sep 16 to Nov 15	October median flow	$0.307(A^{1.074})(10^{1.11*SG})$	-25.8 to 34.8
Nov 16 to Dec 31	December median flow	$12.00\ (A^{1.000})(D^{-0.513})$	-13.1 to 15.0

where

A = contributing drainage area above the point, in square miles
D = distance from the coast to the center of the drainage basin, in miles
SG = fraction of the drainage basin underlain by sand and gravel aquifer
pptA = mean annual rainfall, in inches

In addition to the uncertainty associated with the regression equations is the issue that the equations were developed from data collected in relatively large drainage basins (greater than 10 square miles). The U.S. Geological Survey does not recommend using the equation from Dudley (2003) for ungaged basins with a contributing area of less than 10 square miles.

Comparing Statistics with Stream Hydrographs

The following example shows the use of these regression equations in estimating the monthly median flow and, consequently, the proposed withdrawal thresholds for a withdrawal site on a stream. For the example, we will use a site with a U.S. Geological Survey gaging station so that we can compare the proposed withdrawal threshold to the actual measured flow in the stream. The site is on Kingsbury Stream near Abbot Village in Penobscot County. The drainage basin characteristics (drainage basin area, etc.) are:

	Area (sq. mi.)	Percent aquifer	Distance from coast (miles)	Mean annual precipitation (inches)
Kingsbury Stream near Abbot Village	94.5	0.008	105.8	45.9

The estimated monthly median flows are:

Season	Proposed withdrawal threshold	Estimated value (cubic feet per second)	Uncertainty (cubic feet per second)
Jan 1 to Mar 15	February median	58.9	-7.9 +9.1
Mar 16 to May 15	April median	433	-90.0 +113
May 15 to Jun 30	June median	98.0	-22.0 +28.4
Jul 1 to Sep 15	August median	25.4	-7.3 +10.2
Sep 16 to Nov 15	October median	41.5	-10.7 +14.4
Nov 16 to Dec 31	December median	104	-13.6 +15.6

The graphs on the next page are hydrographs of the streamflow in Kingsbury Stream as measured by the U.S. Geological Survey stream gage near Abbott Village. A ***hydrograph*** shows the average streamflow (in cubic feet per second) on each day of the year. In this case a year is a ***water year***, which runs from October 1 to September 30. The 3 graphs are for the 2001, 2002, and 2003 water years, spanning October 1, 2000, through September 30, 2003. The 2001 and 2002 water years were dry years with periods of significant drought throughout the State, while the latter half of the 2003 water year was normal.

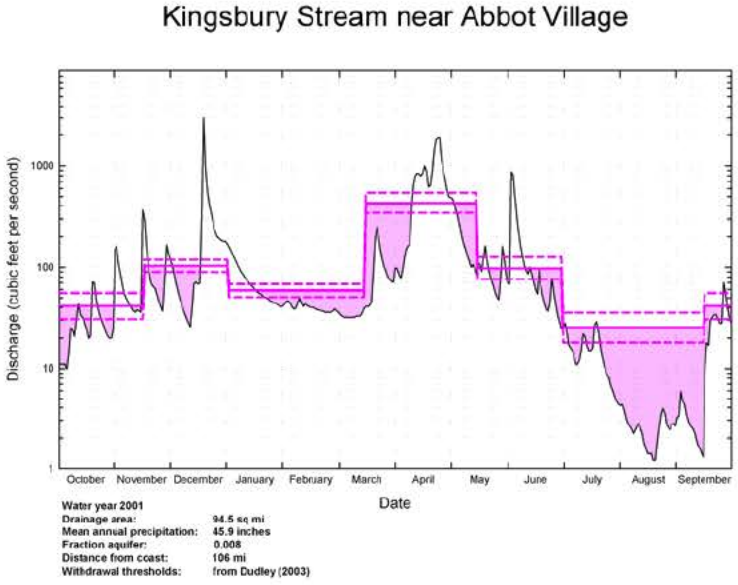
The dark purple lines are the proposed withdrawal thresholds derived from the monthly median streamflow estimated using the equations in Dudley (2003) and listed in the table above. The solid line is the estimated median flow; the dashed lines above and below the solid line represent the uncertainty in the estimated median flow, and therefore the uncertainty in the withdrawal threshold.

The area shaded light purple represents days when the flow in Kingsbury Stream fell below the proposed withdrawal threshold for the season. These are days when water could not be withdrawn from Kingsbury Stream at this location.

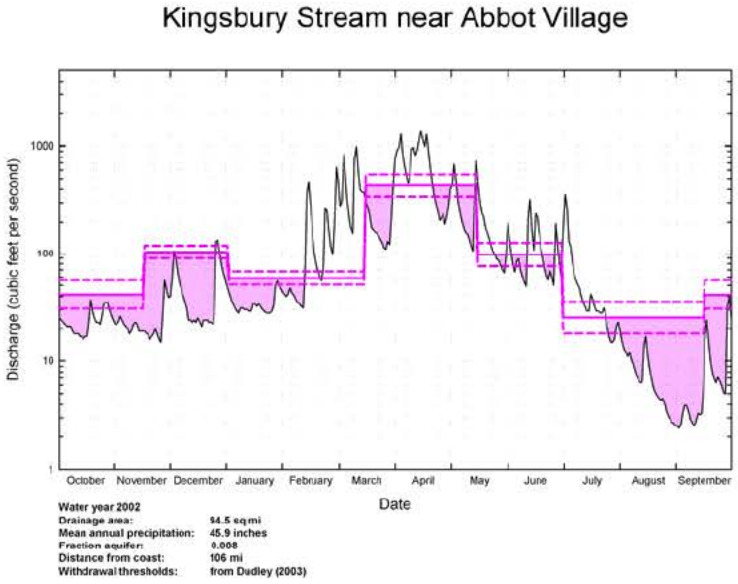
Streamflow in 2001, 2002, and the first half of 2003 was below normal, falling below the proposed withdrawal thresholds much of the time. Streamflow in the second half of 2003 was more normal, with fewer periods when it was below the proposed withdrawal thresholds.

In general, however, selection of a ***median*** value as a withdrawal threshold will lead to situations where, on average, the actual streamflow is below the proposed withdrawal threshold approximately 50-percent of the time.

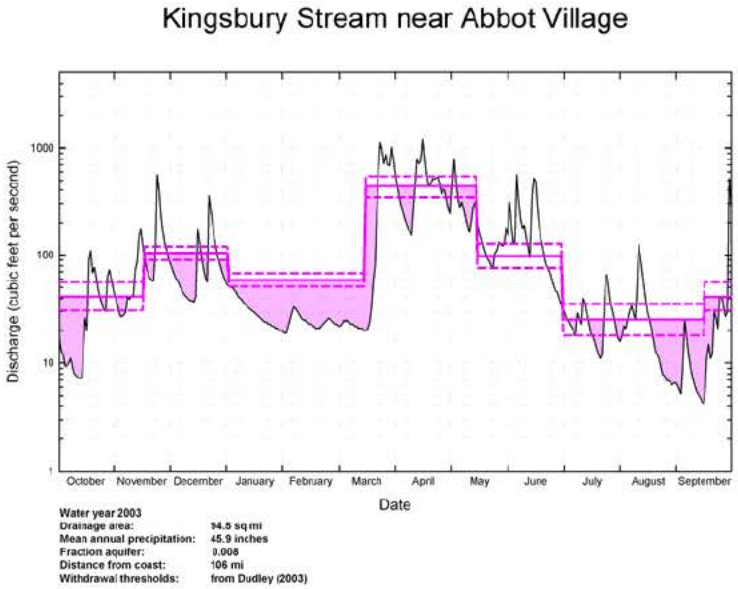
2001



2002



2003



Assessment of Peak Flow Storage Capacities

As an alternative to direct withdrawals from a river or stream during the growing season, many farmers are considering building storage ponds to provide water during low flow periods. At the request of DEP, MGS looked at the volume of water available during the spring high flows relative to the proposed withdrawal threshold. MGS examined six selected potential agricultural surface water withdrawal points, and compared the volume of water available for withdrawal to proposed storage pond capacities obtained from water management plans submitted to the Department of Agriculture, Food and Rural Resources.

For the six potential withdrawal points, MGS determined the extent of the drainage basin above the withdrawal point, obtained the basin characteristics described above, and estimated the April median flow at that point on the stream. Because actual streamflow has not been gaged at the potential withdrawal points, MGS estimated the streamflow at the point by reference to a nearby U.S. Geological Survey stream gage. This estimation of the streamflow at the point adds some uncertainty to the analysis, but was the best available alternative.

The basins above the potential withdrawal points ranged in size from 64 square miles to 0.93 square mile and were located throughout the State. In all cases, it appears that the proposed spring season withdrawal threshold – the April median flow applied during the period March 16 to May 15 – provided for more than adequate water for withdrawal and storage in a pond for later use, even in the dry years of 2001 and 2002. The results of this analysis are shown on the three hydrographs on the following page.

MGS examined the possibility of farmers being able to refill their ponds during the late spring and summer months. While streamflow will, on average, be below the proposed withdrawal threshold 50-percent of the time, during the periods it is above the proposed withdrawal threshold water may be withdrawn and put into storage ponds.

Unlike the situation in the early spring, there are periods in the late spring/early summer and summer seasons when there may be inadequate water to fill the holding ponds. As would be expected, conditions will be worst in the summer months and during abnormally dry years such as 2001 and 2002. However, during years with normal precipitation, in many basins there appears to be adequate water for refilling storage ponds during the late spring and summer seasons.

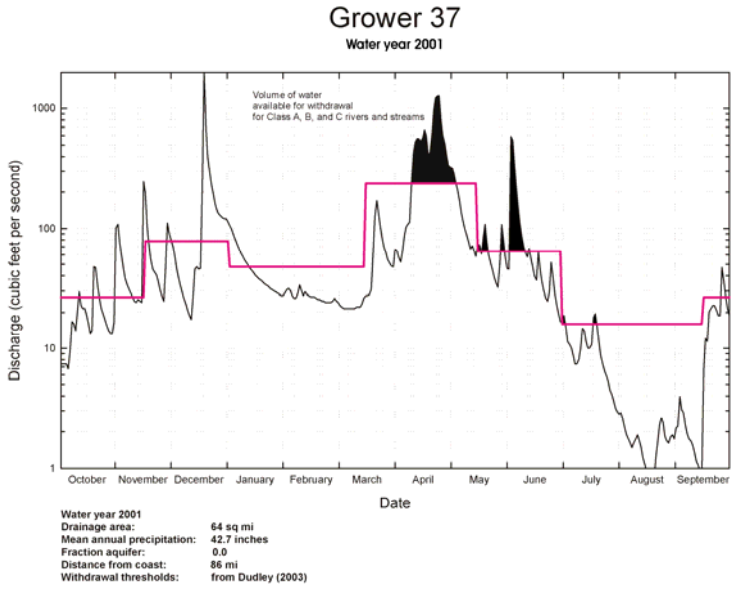
References

Dudley, Robert W., 2003, Estimating Monthly, Annual, and Low 7-Day, 10-Year Streamflows for Ungaged Rivers in Maine. U.S. Geological Survey Scientific Investigation Report 2003-5026, 22 p.

Lombard, Pamela J., 2004, August Median Streamflow on Ungaged Streams in Eastern Coastal Maine. U.S. Geological Survey Scientific Investigation Report 2004-5157, 15 p.

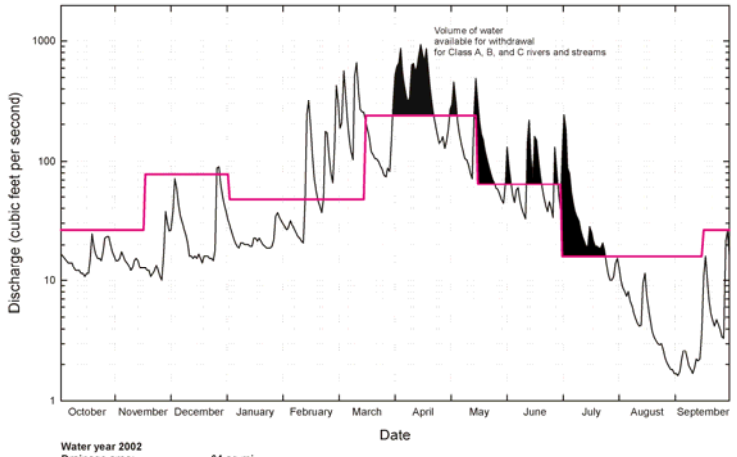
Lombard, P. J., Tasker, Gary D., and Nielsen, Martha J., 2003, August Median Streamflow on Ungaged Streams in Eastern Aroostook County, Maine. U.S. Geological Survey Water Resources Investigation Report 03-4225, 20 p.

2001



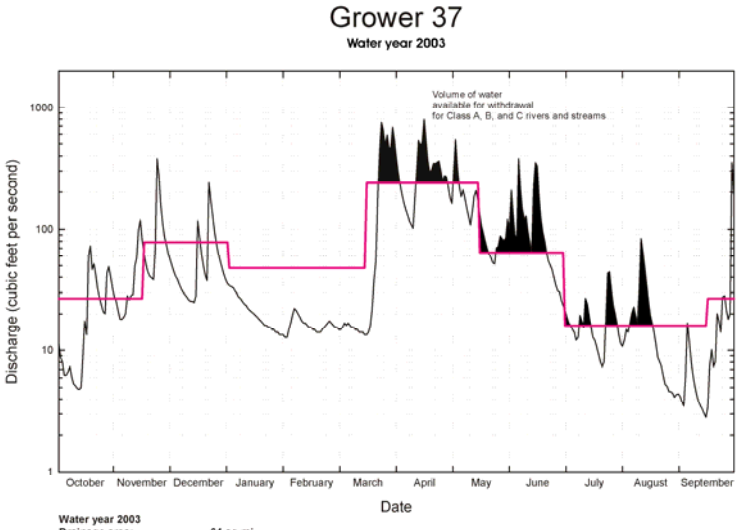
Water year 2001
Drainage area: 64 sq mi
Mean annual precipitation: 42.7 inches
Fraction aquifer: 0.0
Distance from coast: 86 mi
Withdrawal thresholds: from Dudley (2003)

2002



Water year 2002
Drainage area: 64 sq mi
Mean annual precipitation: 42.7 inches
Fraction aquifer: 0.0
Distance from coast: 86 mi
Withdrawal thresholds: from Dudley (2003)

2003



Water year 2003
Drainage area: 64 sq mi
Mean annual precipitation: 42.7 inches
Fraction aquifer: 0.0
Distance from coast: 86 mi
Withdrawal thresholds: from Dudley (2003)

Basins with Multiple Water Withdrawals

During 2004 an attempt was made to look at regions within the state where multiple water use occurred within drainage basins, and to see if it could be determined if actual water use exceeded calculated withdrawal thresholds in these multiple use basins. To accomplish this, the Maine Geological Survey gave Maine's Department of Agriculture (DAFRR) a digital map of drainage basins where Public Water Supplies were located. DAFRR then compared their database of agricultural surface water users to that of the MSG, to see where any areas/basins of multiple water use occurred. Actual locations for agricultural water users/irrigators are to remain confidential as per Maine's Water Withdrawal Reporting Program, thus the reason for DAFRR to maintain their own database of agricultural water users. DAFRR found only two areas where agricultural water use overlapped that of the Public Water Supplies. One was in the area of Prestile Stream/Mars Hill, and the other near Whitney Pond, in Oxford, Maine. Estimated median flows were then calculated by the MGS for these two areas and the results compared to actual cumulative water use. Since the Prestile Stream and Whitney Pond drainage basin areas were 69 sq. mi. and 15 sq. mi. respectfully, withdrawal threshold equations from the USGS for basins greater than 10 acres were used to calculate the median flows. Due to the basin sizes, in both instances the actual average daily water use never exceeded the calculated values, and actually were magnitudes less. Though other multiple water use basins exist where a threshold problem could exist, in most instances, small drainage basins are the areas where problems are most likely due to the smaller volumes of water available. More detailed evaluation of these basins should continue.

Also in 2004, the Maine Geological Survey delineated and calculated the drainage basin areas for all of the large Public Water Supplies within Maine, and for all of agricultural water users for which DAFRR released information. These numbers are necessary to calculate USGS's stream flow statistics, both for small and large basins in Maine.

Pending Policy Questions
For Water Use Standards

There are several policy questions that remain to be answered prior to the release of the in-stream flow rules in March. These include:

Grandfathering of Existing Withdrawals?
Should existing public water supplies, agricultural withdrawals, or facilities such as ski resorts with Site Location of Development permits qualify as grandfathered uses?

Allocation of Available Water?
When there are multiple users of a watershed and need exceeds availability, how is water to be allocated among users? Are certain users, such as public water supplies, given precedence over other users such as ski resorts? Do drought conditions allow certain users such as public water utilities to withdraw in excess of seasonal thresholds?

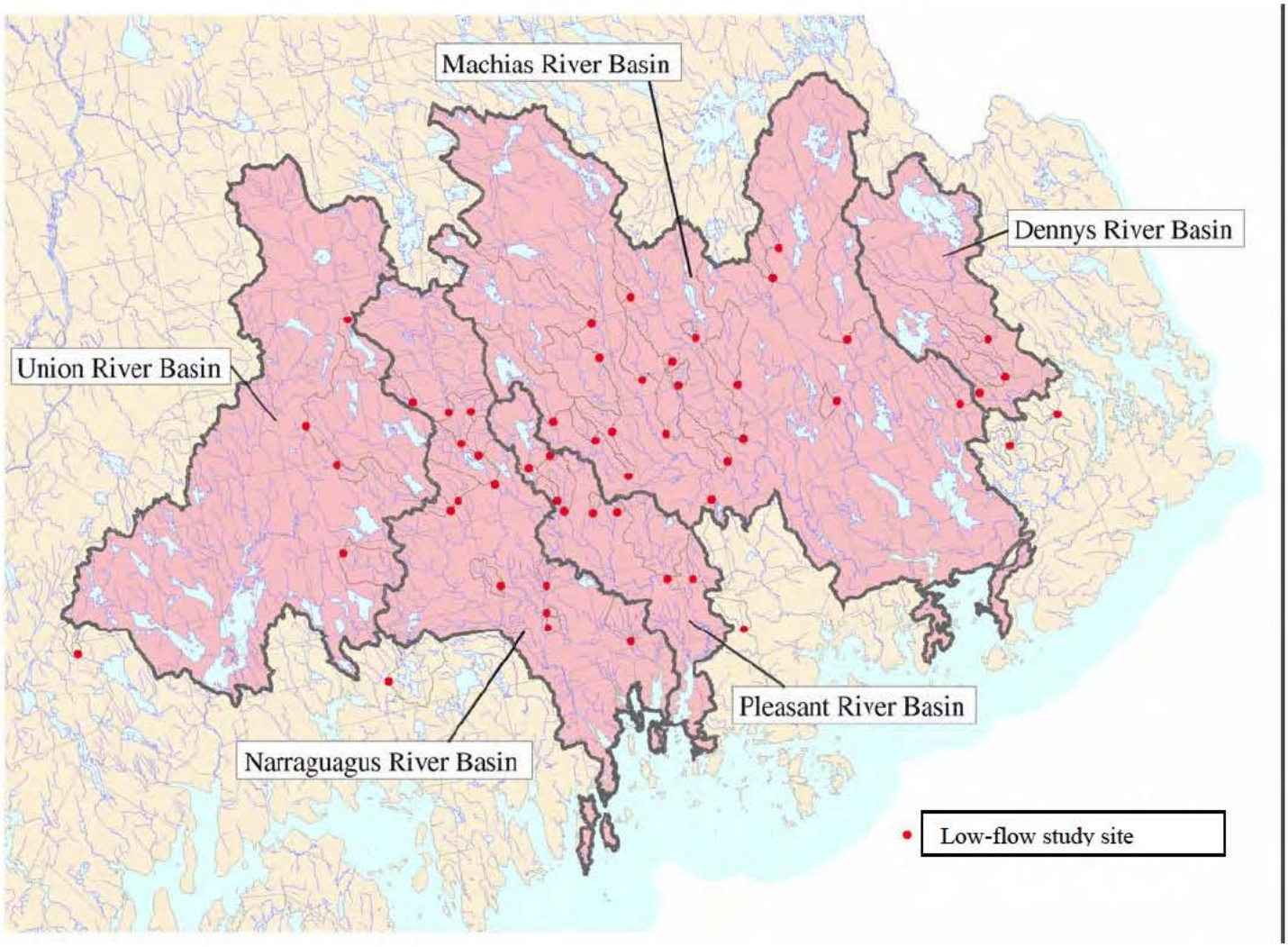
Implementation of In-Stream Flow Rule?
Over what timeframe will existing water users have to come in to compliance with any finally adopted in-stream flow standards? Will small agricultural users be required to immediately comply with standards without regard to the cost of attainment?

Regional Water Use Management Efforts

Completion of Eastern Maine Rivers Low-flow study

The Maine Geological Survey (MGS) and the U.S. Geological Survey completed a 5-year study of low-flow conditions on eastern Maine rivers in order to understand base flow conditions critical to aquatic habitat and to support permitting of water withdrawals. This project directly supports the Atlantic Salmon Conservation Plan. The project is a collaborative effort with funding from DOC, DOT, SPO, DEP, DARR, IFW, ASC, and USGS. The final report was published in 2004 and includes equations for estimating August median flows in small eastern Maine watersheds that lack stream gages. The fraction of the watershed underlain with sand and gravel aquifers is a key factor in determining August median flows.

Eastern Rivers Low-Flow study area



Aroostook Water and Soil Management Board
As reported by the DAFRR, the Regional Water Management Board in Aroostook County has been active in the past year assisting farmers in applying for cost share funds for new equipment technology with the USDA-NRCS EQIP and AMA program. In addition, the Board, in conjunction with the Maine Potato Board and DEP, has been working with farmers in the Prestile Stream area. A number of farmers need more water than the stream can provide. McCains Foods has been solicited by MEDEP to work with the Dept. of Agriculture cost share program to provide water from a 500,000,000 gallon former waste treatment pond, Lake Josephine, to help augment supplies for those farms and remove direct withdrawals from streams. Finally, the Board has developed a plan of work for the next few years and included in the plan is to find additional funds to help farmers find high yield aquifer wells as a possible solution where no locations exist for pond development.

Sand and Gravel Aquifer Mapping
In 2004 the Maine Geological Survey reached a milestone with the completion of its mapping of significant sand and gravel aquifers for all organized towns in Maine. Significant sand and gravel aquifers are those that are capable of yielding 10 gallons per minute or more of water to a well. Because of their value as water resources and concerns for maintaining water quality, the Maine Geological Survey has been directed to map these aquifers statewide. During the summer of 2004, the MGS mapped aquifers in the Ellsworth area of the central coastal region. With the completion of the 2004 project, all the organized towns in Maine have been mapped. Only some unorganized towns in western Aroostook and northern Piscataquis and Somerset Counties have not been mapped.

The value of these sand and gravel deposits as water resources cannot be overstated. In many parts of the state they are drawn on heavily for municipal water supplies. Where they are available in agricultural areas, they are used extensively for irrigation. Furthermore, the percentage of a watershed that is underlain with sand and gravel aquifers is a significant factor in determining low-flow conditions in streams. This mapping effort provides a valuable basic data layer for analysis of numerous water resource issues.