

FINAL PROJECT REPORT

FOR

Grant # G0600332

Skokomish Annas Bay Restoration Study

Mason County Public Health

Total Cost of Project: \$142,340

Grant Amount: \$106,755

Project Start Date: June 16, 2006

Project End Date: June 30, 2008

_____/_____/_____
AUTHORIZED SIGNATORY DATE

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Overview Description of Project:

In August of 2005, Washington State Department of Health (DOH) downgraded 300 acres on the east side of Annas Bay growing area from *Approved* to *Prohibited* (Figure 1). The area was downgraded due to high fecal coliform bacteria levels in marine water samples.

State law (RCW 90.72) requires counties to establish Shellfish Protection Districts and programs to curb the loss of shellfish beds due to non-point pollution. On February 14, 2006 Mason County Commissioners formed a Shellfish Protection District surrounding Annas Bay. The Annas Bay Shellfish Protection District is bordered on the west by Hwy 101 and runs south from Potlatch State Park to Brockdale Road; it then follows the ridgeline north to Union. At Union, the new district lies adjacent to the Lower Hood Canal Shellfish Protection District, which extends on both sides of the canal to Belfair (Figure 1).

The Skokomish Annas Bay Restoration Study was established to identify, investigate and monitor fecal contamination in waters flowing from adjacent shoreline and upland slope seeps on Annas Bay. Project staff worked with shoreline and upland property owners in the study area to remediate sources of fecal contamination and educate property owners on related water quality issues. The project worked on reversing the trend of the marine stations to protect shellfish beds from downgrade, and complement and enhance TMDL-related work currently under way. Including K-12 students in the field learning experience involved the next generation of decision-makers by teaching them key water quality priorities.

In addition, project staff monitored surface water runoff from a biosolids application site in the area to assess any runoff that could affect fecal coliform results in the Annas Bay shellfish growing area (figure 2-4).

Outcome:

Task 1- Project Administration/Management

Mason County Public Health (MCPH) administered and managed the grant for the Skokomish Annas Bay Restoration Study. All fiscal forms, payments vouchers, and agreements are housed in the office of the Health Department's Fiscal Manager, Casey Bingham. Environmental Health Specialist Seth Book maintains all maps, letters, handouts, survey forms, and educational materials.

Task 2 – Project Coordination and Meetings

- A.** MCPH facilitated eight meetings of the Annas Bay Shellfish Protection District Closure Response Committee. This committee was formed to gather stakeholders in an effort to draft a Closure Response Strategy in response to the downgrade of commercial shellfish beds. The Skokomish Tribe and Mason Conservation District were essential in the planning of the Closure Response Strategy. The North Mason

School District science educator was unable to attend committee meetings due to scheduling conflicts.

- B.** An Annas Bay Technical Advisory Committee was formed from stakeholders to better assess the technical needs of the project and to better coordinate water quality work in the area. Two meetings have been held at this time.
- C.** MCPH presented information on the progress of the project at seven public meetings. In addition, an article written by MCPH staff was distributed to the WRIA (Watershed Resource Inventory Area) 16 region. This area includes the entire Annas Bay Shellfish Protection District. A one page two-sided final progress report was mailed to all parcels within the Annas Bay Shellfish Protection District excluding the parcels within the Skokomish Reservation. Printed progress reports were given to the Skokomish Tribe to be distributed to Tribal members and property owners. A separate mailer was sent to 38 Annas Bay shoreline residents who did not receive the information during the sanitary survey process. This mailer included a DVD presentation of how residents can become involved with the clean up of Hood Canal, a home fertilizer use fact sheet, a small farm handout and handouts on the shore stewards and Hood Canal watershed pledge programs.
- D.** MCPH worked closely with the Mason County Planning Department on studies of the biosolids application site near Annas Bay. MCPH staff attended multiple WRIA 16 Technical Advisory Committee meetings on the topic to identify problem areas, to develop plans to deal with water quality issues and report on the progress of the biosolids surface water runoff study.
MCPH staff technically assisted Mason County Public Works and Mason Conservation District (MCD) on a potential Mycoremediation project in the Annas Bay Shellfish Protection District. Mycoremediation is a novel method of stormwater treatment that can be described as fungal mycelium filtering fecal coliform and other pollutants from stormwater.
- E.** Required Performance:
 - 1. MCPH facilitated 10 quarterly meetings of the Annas Bay Shellfish Closure Response Committee and Annas Bay Technical Advisory Committee attended by the Skokomish Tribe and MCD.
 - 2. Detailed meeting notes are recorded and held in MCPH files.
 - 3. A list of Agency contacts and issues are held in MCPH files.

Task 3 – Information Collection, Review and Sanitary Surveys

- A.** MCPH utilized the Mason County GIS map database and Mason County Assessor's data to identify parcels in the Annas Bay study area. Field verification was necessary to locate sites and to pair water quality data to particular parcels.
- B.** MCPH staff collected and reviewed water quality data in the area from the Washington State Department of Health (DOH), MCD, the Skokomish Tribe and the Hood Canal Dissolved Oxygen Program (HCDOP). The water quality data was used to monitor trends and highlight problem areas.
- C.** MCPH utilized the Mason County GIS map database and field surveys to refine boundaries of the study area and to aid the Mason County Commissioners in their

creation of the Annas Bay Shellfish Protection District. A map was developed to identify surface water including seeps and drainages in the study area.

- D.** MCPH utilized the Mason County GIS map database and field surveys to develop a map of the surface water runoff from the Biorecycling Corporation's biosolids land application site (figure 2-4). Due to the normally unsaturated soil conditions at the site, surface water runoff patterns were located during periods of extreme rainfall. Surface waters collected during extreme rainfall events were analyzed for fecal coliform and water quality tracers indicative of treated biosolid influence such as specific conductance and pH (figures 3,4).
- E.** MCPH developed a septic system tracker for office sanitary surveys to identify parcels with no records and to identify areas of high potential risk due to age of system, or other factors noted in the record. (appendix A)
- F.** Required Performance:
 - 1. Maps of the study area were developed utilizing the Mason County GIS map database (figures 1-7).
 - 2. Areas with higher than acceptable fecal coliform levels were identified from water quality monitoring results. Maps were developed to keep track of problem areas and for future water quality monitoring use (figures 5-7). Maps were also used in Shellfish Closure Response group meetings to identify completed work along with areas with poor water quality.
 - 3. Maps of surface water flow from the biosolids land application site were produced for this project, the site operator, the Department of Ecology and the Webb Hill biosolid Technical Advisory Committee (figures 2-4). The project observed surface water runoff, impacted by biosolids, flowing into protected areas within the boundaries of the site during extreme rainfall events. This project did not observe any surface waters originating from the biosolids application site flowing to waters that discharge to the Skokomish River or Annas Bay Shellfish Growing Area. MCPH staff observed surface water flow along topographic lines from areas surrounding the Webb Hill biosolids application area. The site lies in a surface water divide with a majority of the water either infiltrating on-site or flowing to the southeast. Some surface water from an area outside the site travels approximately 2 miles to the south and discharges into the northern road ditch of Brockdale Rd. The flow is then split with some flow travelling a short distance towards the west but infiltrated rapidly. The rest of the flow traveled east and discharged to the headwaters of Johns Creek flowing to Oakland Bay in the South Puget Sound. MCPH staff observed no surface water from the biosolids application area flowing into Purdy Creek the Skokomish River or Annas Bay.
 - 4. On-site sewage systems at high risk of contamination were identified through collection and review of parcel information and water quality results. Parcel data was compiled in an excel document called the on-site sewage system (OSS) Tracker (appendix A). Additional fieldwork was conducted to assess fecal contamination from these sites.

Task 4 - Water Quality Monitoring

- A.** MCPH utilized the Mason County Water Quality Standard Operating Procedure Chapter 4.1 to plan and monitor beach seeps, slope base seeps and drainages in the study area.
- B.** MCPH monitored surface water drainages flowing off the biosolids application site and analyzed surface water samples for fecal coliform and water quality tracers indicative of treated biosolid influence, such as specific conductance and pH. Maps were produced to illustrate specific conductance results at specific surface water sites (figures 2-4). The project did not observe any surface waters originating from the biosolids application site flowing to waters that discharge to the Annas Bay Shellfish Growing Area.
- C.** MCPH prepared a Quality Assurance Project Plan (QAPP) and submitted it to the department on October 8, 2007 for approval. MCPH performed preliminary water quality monitoring in the area prior to securing DOE funding. Sampling data collected pre-QAPP was useful in focusing efforts and prioritizing future work in the area. All data analyzed before and after acceptance of the QAPP was submitted to the department's EIM database in June 2008.
- D.** Required Performance:
 - 1. The water quality sampling plan was based on the Mason County Water Quality Standard Operating Procedure Chapter 4.1 and 4.2 and outlined in the QAPP.
 - 2. A QAPP was reviewed and approved by the Department on October 8, 2007.
 - 3. Strategies to remediate fecal contamination from on-site sewage systems are outlined in the Mason County Water Quality Standard Operating Procedure Chapter 4.1 and 4.2.
 - 4. A final water quality monitoring report including a description of sampling methodology, data and laboratory analysis and an inventory of monitoring data is included (appendix B, C).

Task 5 – Implementation

- A.** MCPH identified many sources of fecal coliform pollution during its water monitoring activities. A list of sources can be found in the water quality report and associated data in appendix B, C.
- B.** MCPH conducted 21 sanitary surveys of properties along the eastern shoreline of Annas Bay. Surveys were focused on areas that had a high probability of affecting water quality at DOH marine-sampling stations with degraded water quality.
- C.** MCPH worked with property owners to develop and implement remedial actions at four sites with failing on-site sewage systems.
- D.** MCPH utilized water quality results from surface waters flowing off the biosolids application site to recommend actions to further investigate biosolid contamination of surface waters in the area. Fieldwork suggests biosolid runoff to surface waters does occur within the confines of the site, but is not discharging to the Skokomish River or Annas Bay.

E. Required Performance:

1. MCPH developed a septic system tracker for sanitary survey information in an Excel database format compatible with the Department's standards.
2. MCPH conducted 21 field sanitary surveys along the eastern shoreline of Annas Bay. Eight dye traces of on-site sewage systems were performed. Four were found to be failing.
3. MCPH implemented remedial actions when needed to assure failing on-site sewage systems were repaired or replaced.
4. MCPH conducted meetings with property owners, on the phone or in person, in order to facilitate repairs of faulty on-site sewage systems. Sites with repaired on-site sewage systems were monitored to assure the sites are not contributing to the fecal coliform pollution issues.
5. An on-site survey report is included (appendix A).

Task 6 – Public Involvement, Education, and Training

- A.** MCPH staff worked with North Mason School science educator Brian Staves at the Theler Center in Belfair to help 8th grade students prepare for the Students in the Watershed events. Existing water quality education curriculums were utilized instead of developing new curriculum. Hood Canal Salmon Enhancement Education Director Chris Daniel assisted with adapting the Project Wet “Water Water Everywhere” curriculum to meet student educational needs. MCPH staff guided Six project related field trips with Hood Canal and North Mason Schools.
- B.** MCPH along with faculty provided 10 hands-on experiential learning modules to students from Belfair and Hood Canal Schools that included tribal youth.
- C.** Although MCPH and the Skokomish Tribe worked closely on the Annas Bay Shellfish Protection District work, MCPH and the Skokomish Tribe were not able coordinate boat work or beach seep sampling due to Skokomish staffing and equipment shortages.
- D.** MCPH wrote an article on the Annas Bay Shellfish Protection District and work being conducted by MCPH to be included in a newsletter that was distributed to the residents of the WRIA 16 area, which includes the entire Annas Bay Shellfish Protection District. MCPH was able to contact a majority of homeowners along the shoreline of Annas Bay during site visits, during which a map of the Shellfish Protection District and other information such as Operation & Maintenance (O&M) handouts, sample results or educational brochures were distributed. In addition, A one page two-sided final progress report was mailed to all parcels within the Annas Bay Shellfish Protection District excluding the parcels within the Skokomish Reservation. Printed progress reports were given to the Skokomish Tribe to be distributed to Tribal members and property owners on the Skokomish Reservation. A separate mailer was sent to 38 Annas Bay shoreline residents who did not receive the information during the sanitary survey process. This mailer included a DVD presentation of how residents can become involved with the clean up of Hood Canal, a home fertilizer use fact sheet, a small farm handout and handouts on the shore stewards and Hood Canal watershed pledge programs.

- E.** MCPH will enclose two copies of any tangible educational products distributed to homeowners during the grant period in the final grant report package. A one page two-sided final progress report was mailed to all parcels within the Annas Bay Shellfish Protection District excluding the parcels within the Skokomish Reservation. Printed progress reports were given to the Skokomish Tribe to be distributed to Tribal members and property owners on the Skokomish Reservation. Existing products were utilized for education purposes. MCPH staff discovered homeowners were interested in site-specific information and educational pamphlets. Mason County's new Septic System User's Manual developed by the MCPH on-site department was utilized to educate homeowners about septic O&M. MCPH also worked towards fulfilling the informational needs of homeowners by providing site-specific water quality results and parcel information held by the county, if available. Descriptions and photos of displays and educational programs will be submitted with the final grant report package.
- F.** Required Performance:
1. MCPH will enclose two copies of any tangible educational products distributed to homeowners during the grant period in the final grant report package. Products include: WRIA 16 newsletter, Shellfish Protection District update mailer, Living on the water pamphlet, Imperiled waters DVD, Shellfish Protection District Q and A, Shore stewards pamphlet, Watershed pledge booklet, Fertilizer fact sheet, Shorebank septic loan program information, Mason Conservation District small farms handout, and an example of a letter sent to a homeowner.
 2. No products were developed for this specific project as MCPH staff discovered homeowners were interested in site-specific information and educational pamphlets. Examples will be included in the final grant report package.
 3. MCPH will enclose copies of the field experience modules with written narratives in the final grant report package.
 4. Although MCPH and the Skokomish Tribe worked closely on the Annas Bay Shellfish Protection District work, MCPH and the Skokomish Tribe were not able coordinate boat work or beach seep sampling due to Skokomish staffing and equipment shortages.

Education Event Narratives:

Kids With Conservation Knowledge (KWICK)

KWICK was a field event held on June 5, 2007, for 3rd graders from local schools including Hood Canal schools. Students rotate through six stations at a site owned by Little Skookum Shellfish Growers. Through hands-on activities and presentations by partner groups, students learned about stream ecology, habitats, beach ecology, water quality, forestry, and composting.

MCPH staff illustrated the importance of picking up pet waste to reduce fecal coliform pollution in surface waters. Staff talked about where fecal coliform bacteria come from and how many bacteria are in a gram of different types of animal waste.

Staff handed out 3 small landscape flags and a plastic bag to the students. Staff then showed the students how to safely pick up wrapped candies that represented pet waste. The students demonstrated their skill at picking up pet waste in the surrounding

area and at the end of the activity were helping each other learn how to pick up the candies without touching them. More photos are included in the paper copy of the final report.



KWICK

Environmental Explorations (EE)

Environmental Explorations (EE) is an 11 year old annual event that occurs in mid May at Belfair State Park on the north shore of the Hood Canal. Middle school students from the entire Hood Canal watershed attend including North Mason and Hood Canal school students. This event hosts approximately 900 students and about 150 students rotate through each station.

MCPH staff attended EE in 2006-2008. In 2006, MCPH had a station that illustrated the importance of fresh, clean drinking water. MCPH staff first would show the students a liter of water to represent all the water in the world (glaciers, rivers, lakes, oceans, soil pore water). Staff would remove 30 mL from the liter and placed it another container, describing the water in this container as representative of all the freshwater on earth (77% is ice, and another 22% is groundwater and soil moisture). Staff would remove about 18 mL from the final container representing all the inaccessible freshwater. This leaves about 1% of the original amount which is representative of the fresh water available to drink, cook with and bathe in. We would emphasize water is a precious resource that must be conserved and protected. Students were asked to explain why drinking water is a limited resource and what percentage of freshwater is available for human use in a pamphlet handed out at the start of the event.

In 2007 and 2008 EE had an abundance of water quality educators and a lack of event managers. MCPH staff filled the gap by managing the Nearshore section of the environmental fair. MCPH staff also asked questions at the end of the wildlife presentations that brought up issues related to water in order to relay to the students the importance of good stewardship in the watershed.



“Water Water Everywhere” presentation



Environmental Explorations Nearshore presentation

Americorp “Coastal America” Program

On April 12, 2006, MCPH staff attended a native plant installation event along Hood Canal with Americorp volunteers. This demonstration project illustrates how homeowners can practice shoreline friendly practices. Americorp “Coastal America” program volunteers worked with MCPH staff on a sampling event along Annas Bay to give them experience with proper water quality sampling techniques.



Americorp volunteers planting native riparian vegetation

Youth Summit 2006

Youth Summit 2006 was held on May 31 at Twanoh State Park. Hood Canal and North Mason 8th graders gathered at the park to learn more about environmental work and to coordinate environmental education efforts by students. MCPH spoke about how fecal coliform pollution closes shellfish beds and swimming areas. Twanoh State Park was a good location for this exercise because the camping area was closed at the time due to fecal coliform pollution. MCPH staff showed students how to collect fecal coliform samples and water quality field measurements using a multi-parameter probe. Samples collected by students were analyzed for fecal coliform and results were forwarded to the

respective teachers in order for the students to see the data and assess if the stream met water quality standards of 50 fecal coliform per 100 mL of sample.



Youth Summit 2006

Students in the Watershed

Students in the Watershed is an annual environmental education event sponsored by Washington Department of Natural Resources. On May 18, 2007, the event was held at the Theler Center in Belfair. The Students in the Watershed program is an internationally recognized program that has drawn more than 4,200 elementary school students since 1994. The program uses North Mason Middle School 8th graders to design and teach activities to 4th graders about the watershed around them and how to protect it.

MCPH mentored 8th graders who wanted to teach the complex idea of pH to North Mason 4th grade students. A sign was produced that illustrated the pH scale and the pH of common substances. The 4th grade students were briefly educated on the pH range that is necessary to sustain aquatic life. The students were given litmus paper and shown how to use it to determine the pH of a substance. The students tested the substances: soap, seawater, Strawberry Creek water (located at the site), and soda pop; they then recorded the pH result. A question was asked such as, “What do you think would happen if soap was put in Strawberry Creek that you just tested?” Students answered and many suggested that we not put anything in the creek that would change the pH of the water to protect the salmon.

In 2008 the 8th graders in the water quality group were quite advanced and were able to take charge of their project and MCPH assistance was not needed.



Preparing for event



8th grade student educator



Teaching 4th graders about pH



Analyzing pH of various substances

Hood Canal School 8th Grader Water Quality Field Experience

Hood Canal 8th grade school teacher Laurie Byrd and MCPH staff worked together to assist Hood Canal school students on an environmental education project. Laurie Byrd was given the Hood Canal Environmental Achievement Award in 2000 for her environmental education efforts in the Skokomish Watershed.

The first contact MCPH had with Mrs. Byrd was when MCPH staff was working on the Kennedy Creek Salmon Trail in south Mason County. MCPH Staff taught Hood Canal students the importance of water quality and good land management to protect salmon. From this experience, the students chose a project to describe the water quality differences between local streams, the Skokomish River and the Hood Canal. MCPH staff met the students and Mrs. Byrd at the Hood Canal School and educated them on what parameters could be used to describe the water quality of different water bodies and how to measure them. MCPH staff then went into the field with the students to test the local water they had chosen. Students were trained how to correctly collect fecal coliform and nutrient samples and how to use a multi-parameter probe to collect field measurements.



Training students how to sample



Training students how to use WQ probes



Students training students how to sample

Working with Hood Canal School environmental educator Laurie Bird

Kid's Day at Oysterfest

In 2006 and 2007 MCPH staff attended Kid's Day at Oysterfest that is attended by local schools including Hood Canal and North Mason Schools. A water quality tabletop display and pamphlets were available.

Clean Water Festival

On one of the hottest days in 2007, MCPH staff attended the Clean Water Festival hosted by the Lower Hood Canal Watershed Coalition at the Theler Center in Belfair. A water quality tabletop display and pamphlets were available. Due to the greater than 90 degree weather, turnout was less than expected.



Water Quality display

Earth Day at Shelton Civic Center

In 2007 MCPH staff attended Earth Day celebration at the Shelton Civic Center that is attended by local schools. A water quality tabletop display and pamphlets were available.

Earth Day at Olympic College Shelton

In 2007 MCPH staff attended Earth Day celebration at the Olympic College in Shelton. A water quality tabletop display and pamphlets were available.

Evaluation:

The Skokomish Annas Bay Shellfish Restoration Study successfully reduced fecal coliform contamination in Annas Bay by identifying four failing septic systems and assisting homeowners with corrective actions. Washington State Department of Health (DOH) marine sample results show a decrease in the 90th percentile statistic used to classify the Annas Bay shellfish growing area. All DOH Marine sample stations in the Annas Bay growing area now meet the standards for approved harvest status. Further marine water sampling will occur to assure the decreasing trend in fecal coliform concentrations will continue.

A total of 728 samples from over 341 unique sites have been collected to focus sanitary survey and water quality monitoring work. Parcel research indicates 43 developed parcels along the eastern shoreline of Annas Bay. MCPH staff conducted 21 sanitary surveys of inhabited residences and eight dye tests of suspect sewage systems along the Annas Bay Shoreline. Currently six septic systems have been repaired and six septic systems have been replaced.

MCPH facilitated eight meetings of the Annas Bay Shellfish Protection District Closure Response Committee. This committee gathered stakeholders and drafted a Shellfish Closure Response Strategy in response to the downgrade of commercial shellfish beds. An Annas Bay Technical Advisory Committee was formed from stakeholders to better assess the technical needs of the project and to better coordinate water quality work in the area. Two meetings have been held at this time.

Citizens' concerns that the biosolid application site was contributing to the Annas Bay fecal coliform pollution problem have been raised. MCPH staff observed no surface water connection between the biosolid application site and Annas Bay during the study period. Localized overland flow influenced by biosolids application was visually observed entering surface water within the boundaries of the biosolids application site during extreme weather events.

MCPH staff mentored 10 youth education events attended by North Mason and Hood Canal Schools. Six public meetings were attended by MCPH to report on progress of the study.

This project has answered water quality questions about a biosolids application site near the Hood Canal, educated local youth and homeowners in water quality topics, and reduced fecal coliform pollution in Annas Bay.

Follow up:

Work on the sanitary survey portion of the project will continue until the June 30th 2008 funding cutoff. MCPH will continue to attend Environmental Education events and answer question from the public on the Shellfish Protection District. Repairs of on-site sewage systems in the area will be tracked by the Mason Counties computerized permit tracking system. Degraded water quality sites with known or unexplained fecal coliform pollution problems were passed onto DOH and the Skokomish Tribe for future monitoring. A report will be made available to the public on work conducted under this grant. Tribes along with state and local agencies will continue work that supports water quality efforts in the area.

General comments:

MCPH staff, in addition to the reported tasks above, attended Webb Hill Biosolids Monitoring Technical Advisory Committee, WRIA 16 and Hood Canal Dissolved Oxygen Program meetings to report on work conducted by MCPH on the Webb Hill Biosolids application area.

MCPH staff performed preliminary water quality monitoring in the area prior to securing DOE funding and completing the QAPP. This sampling data has been useful in focusing efforts and prioritizing work in the area. All project water quality data has been submitted to the department's electronic information management system.

DOH Marine sample station 197 triggered the closure of shellfish beds along the eastern shoreline of Annas Bay. Recent sanitary survey work identified a broken sewage line that was found to be discharging sewage to the surface of the ground above a culvert that discharges to waters that directly influences this sample station. Other septic systems in the immediate area were also surveyed and found to not be contributing to the fecal coliform pollution.

MCPH compared sanitary survey sites completed by DOH in 2001 with sites studied under this grant. A report on the findings was presented to the Annas Bay Shellfish Closure Response Committee.

Sanitary Survey work was focused on parcels in close-proximity to the shoreline and parcels with degraded water quality results. Many homes along the shoreline of Annas Bay are currently vacant or are occupied for short periods of time in the summer.. Changes in the occupancy of these properties may impact improperly functioning septic systems and as a result may affect water quality. Parcels in the Annas Bay Shellfish Protection District have been flagged in Mason County's septic system O&M database.

MCPH staff attended Oysterfest festivals, Earth Day events at the Shelton Civic Center and Olympic College and the Lower Hood Canal Watershed Coalition Clean Water Festival. Conversations with the public and a tabletop display were used to convey work done by MCPH in Mason County and Annas Bay.

MCPH staff offered technical support in forming a Clean Water Foundation in Mason County to assist citizens and local government with water quality issues.

MCPH staff attended a native plant installation event along Hood Canal with Americorp volunteers. This demonstration project illustrates how homeowners can practice shoreline friendly practices. Americorp "Coastal America" program volunteers

worked with MCPH staff on a sampling event along Annas Bay to give them experience with proper water quality sampling techniques.

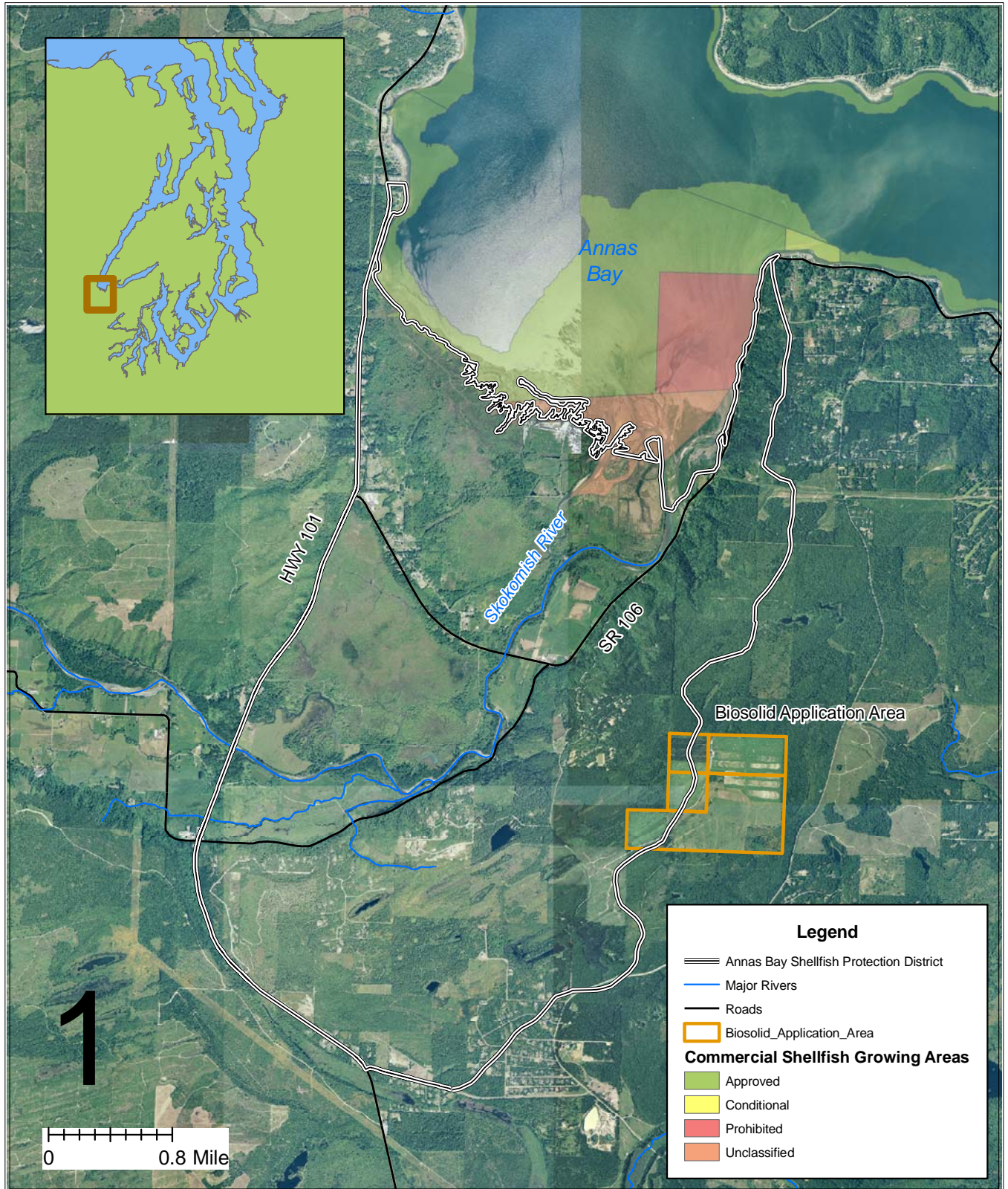
MCPH staff attended six Hood Canal Watershed Education Network meetings to report on educational events mentored by staff.

Three off-reservation parcels owned by tribal members with high fecal coliform results flowing off the site were turned over to the Skokomish Tribe for correction.

A public meeting on the biosolids application site was attended by MCPH to answer questions about the surface water flow assessment being conducted under this grant.

“Funding for this project has been provided in part through EPA Grant No. C9-000449-04 to the Department of Ecology from the United States Environmental Protection Agency. The Department of Ecology allocates and administers funding for this project. The contents of this document do not necessarily reflect the views and policies of either the United States Environmental Protection Agency or the Department of Ecology, nor does the mention of trade names or commercial products constitute endorsement or recommendation for their use.”

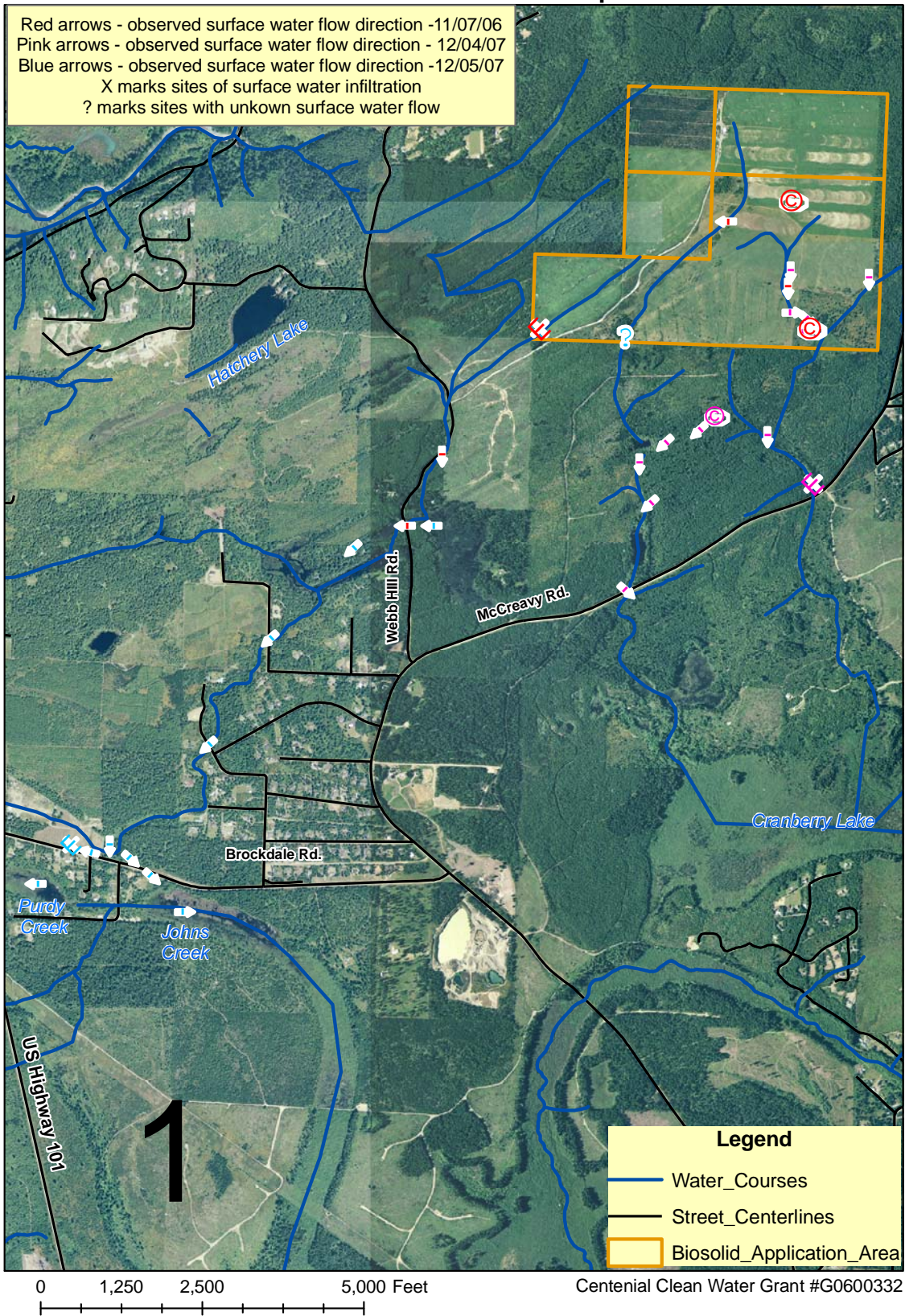
Figure 1 Annas Bay Shellfish Protection District



Map Created by A. Georgeson on June 2, 2008

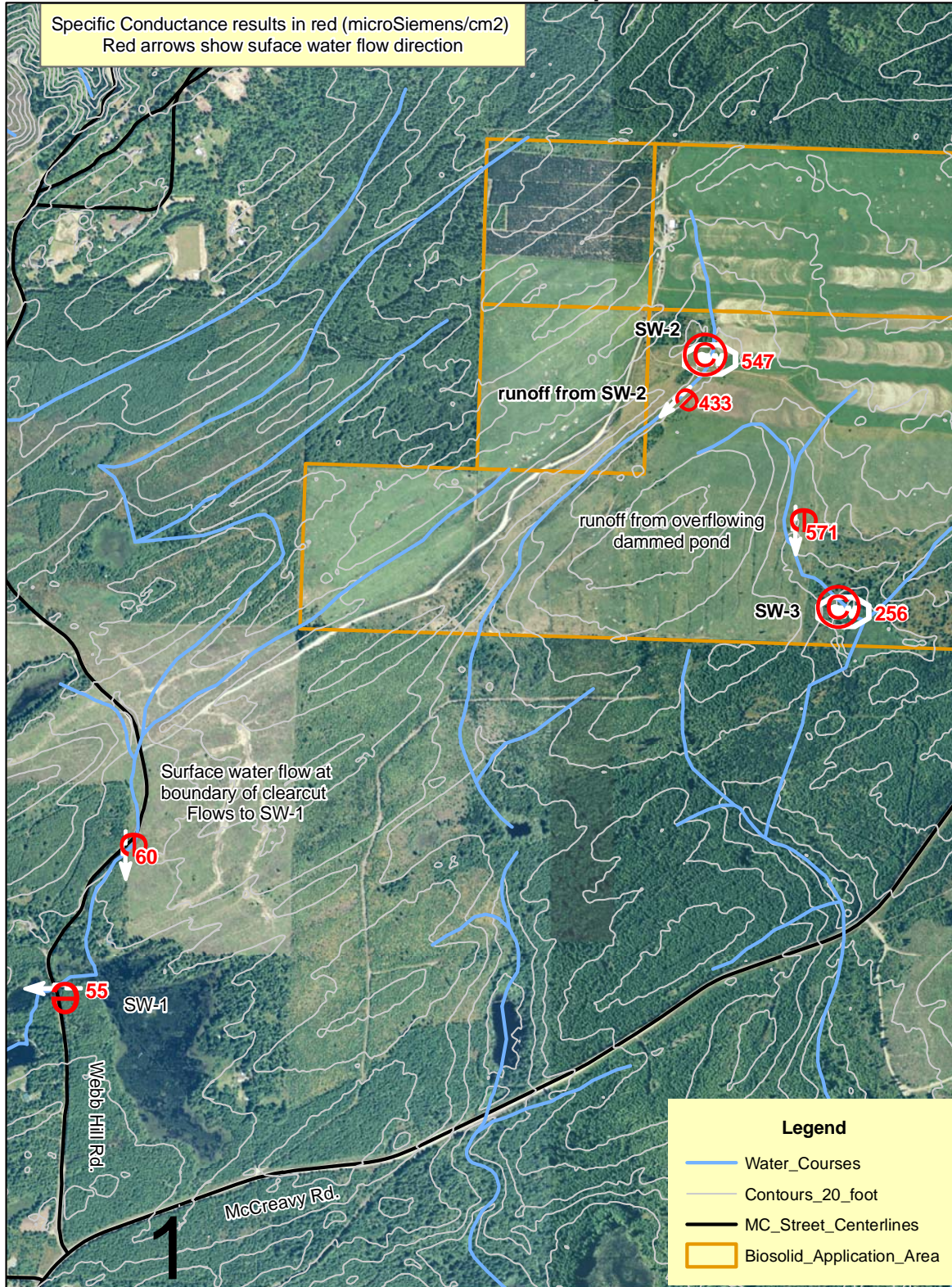
Webb Hill Biosolids Application Site Surface Water Runoff Report

Figure 2



Webb Hill Biosolids Application Site Surface Water Runoff Report 11/07/06

Figure 3

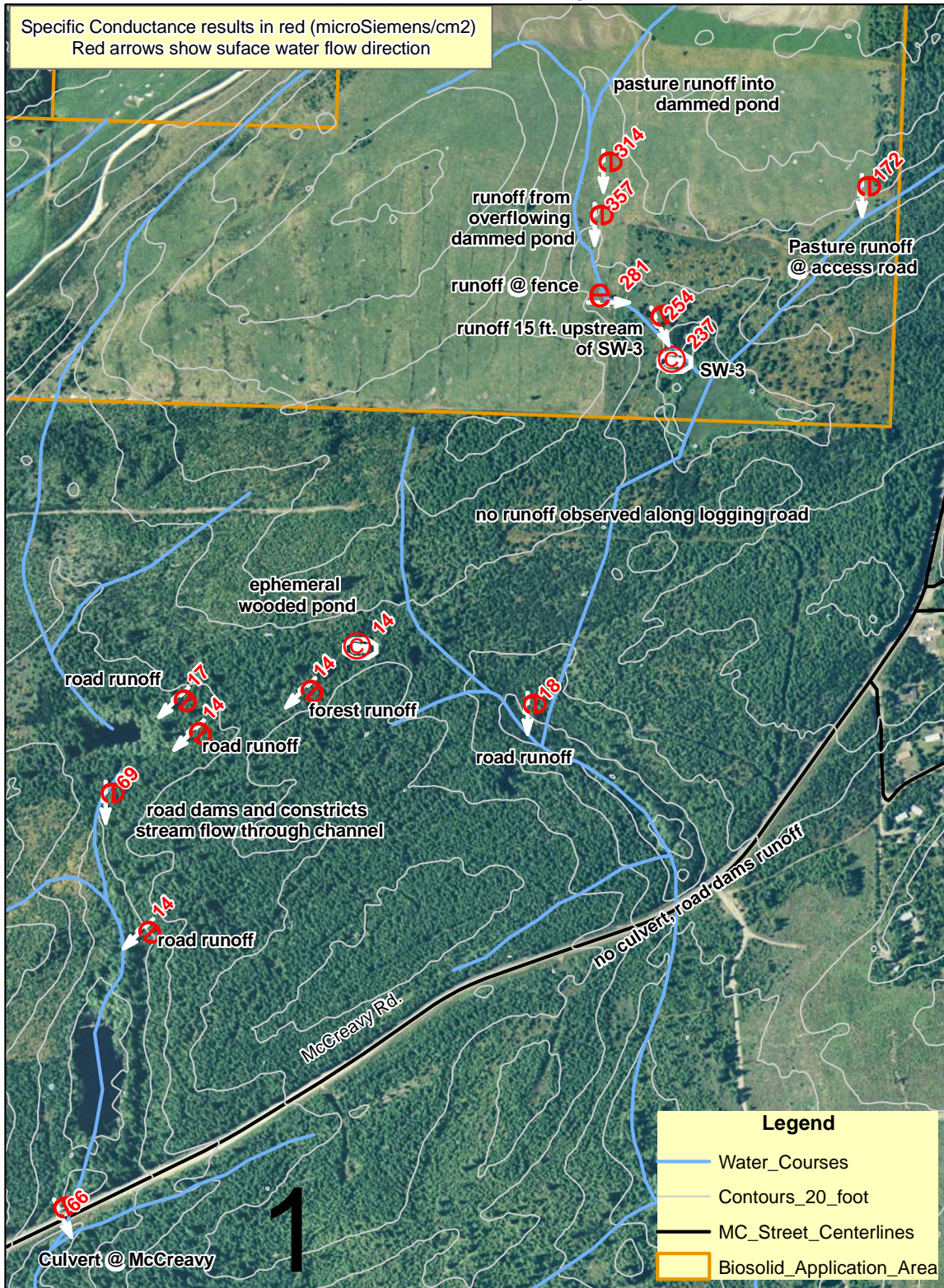


0 650 1,300 2,600 Feet

Centennial Clean Water Grant # G0600332

Webb Hill Biosolids Application Site Surface Water Runoff Report 12/04/07

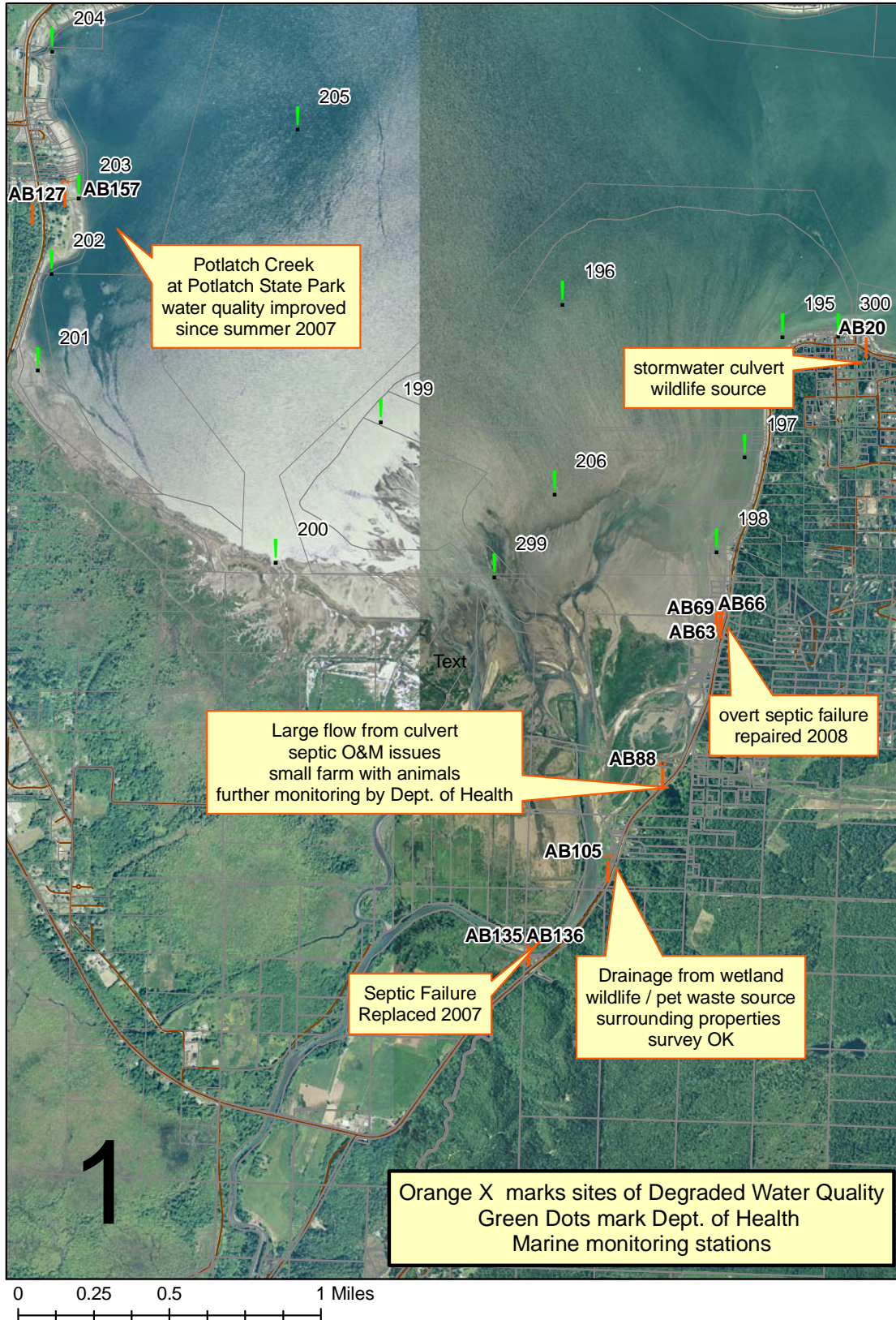
Figure 4



0 370 740 1,480 Feet

Centennial Clean Water Grant # G0600332

Figure 5 Annas Bay Degraded Water Quality Sites



Appendix A Annas Bay on site sewage tracker See attached CD

Appendix B Annas Bay Skokomish Restoration Study Water Quality Report

Mason County Public Health (MCPH) conducted a two-year water quality study of Annas Bay and the Skokomish River Valley downstream of the Highway 106 bridge. This project was conducted to reduce non-point pollution of shellfish beds in Annas Bay. Side grab water samples were collected from shoreline seeps, the Skokomish River and upland surface water drainages. Samples were analyzed at the Mason County Water Quality Lab utilizing the Most Probable Number (MPN) method for numeration of Fecal coliform (FC) bacteria concentrations.

MCPH collected 728 water samples from 341 unique sites in the study area since October 2005. We attempted to collect five samples at each site in order to calculate a geometric mean (geomean) but many water sources were ephemeral and a geomean could not be established or were sites with excellent water quality. Four sites with greater than five samples and one site with four samples was found to be greater than the 50 FC/100 mL criteria establish by WAC 173-201A.

Two consistently elevated FC sites located on Potlatch Creek in Potlatch State Park had geomeans of 87 and 178 FC/100 mL. FC concentrations at these sites have decreased dramatically since summer 2007.

A site discharging to the Skokomish River had a geomean of 318 FC/100 mL. A sanitary survey including a dye test found the septic system at the nearest house was failing. The septic system was replaced along with the next door neighbor's septic system.

A site with a geomean of 107 FC/100 mL was located in an area identified by a Washington Department of Health (DOH) water circulation study to directly affect the degraded water quality stations in Annas Bay. The site was found to have a broken sewage pipe on a hillside directly above a culvert that discharges near the degraded marine water quality stations. The site was corrected and FC concentrations have been significantly reduced.

A site with high water flow has a geomean of 73 FC/100 mL and was a water quality issue throughout the study. The site had a horse in a pasture with standing water that flowed to a roadside ditch, a pond with a large goose, and four goats. The goats had also been damaging the septic system by standing on the above ground drainfield. The owner worked with us by fencing the drainfield area, removing the goose and horse from the site and repairing their Glendon septic system. FC pollution was reduced for a short time but has returned to unacceptable levels. The owner has not kept up on the increased operation and maintenance the Glendon septic system requires and has been contacted by staff to correct this issue. Monitoring of this site will continue by DOH in the future.

43 developed parcels are located in the study area. 21 sanitary surveys of parcels and 8 dye tests of septic systems were conducted. Four septic systems were found to be failing. A total of six septic systems were replaced and another six were repaired during the study period. Three parcel owners denied access, two parcel owners allowed access but did not participate in the study. Three parcels owned by tribal members were turned over to the Skokomish Tribe. Eight parcels were vacant during the study period. Other developed sites had excellent water quality results, no water on the site or recently replaced their septic system.

MCPH staff monitored surface water flowing from a biosolids application area near Annas Bay to assess if runoff could effect FC results in Annas Bay marine water quality results. MCPH staff visually observed surface water runoff impacted by biosolids flowing into protected surface waters on the site during extreme rainfall events. MCPH staff did not observed surface waters leaving the boundaries of the site.

MCPH staff observed surface water flow along topographic lines from areas surrounding the Webb Hill biosolids application area. The site lies in a surface water divide with a majority of the water either infiltrating on-site or flowing to the southeast. Some surface water from an area outside the site travels approximately 2 miles to the south and discharges into the northern road ditch of Brockdale Rd. The flow is then split with some flow travelling a short distance towards the west but infiltrated rapidly. The rest of the flow traveled east and discharged to the headwaters of Johns Creek flowing to Oakland Bay in the South Puget Sound. MCPH staff observed no surface water from the biosolids application area flowing into Purdy Creek the Skokomish River or Annas Bay.

Appendix C
Annas Bay Water Quality Data
See attached CD