Central Mass. Mosquito Control Project
Pesticide Discharge Management Plan

Central Mass. Mosquito Control Project
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A. Pesticide Discharge Management Team. All persons may be contacted at: Central Mass. Mosquito Control Project. 111 Otis Street, Northborough, MA 01532. Phone: (508) 393-3055 Fax: (508) 393-8492 E-mail: cmmcp@cmmcp.org

1. Person(s) responsible for managing pests in relation to the pest management area.

    a. Timothy Deschamps – Executive Director

2. Person(s) responsible for developing and revising the PDMP.

    a. Timothy Deschamps – Executive Director

3. Person(s) responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements.

    a. Timothy Deschamps – Executive Director

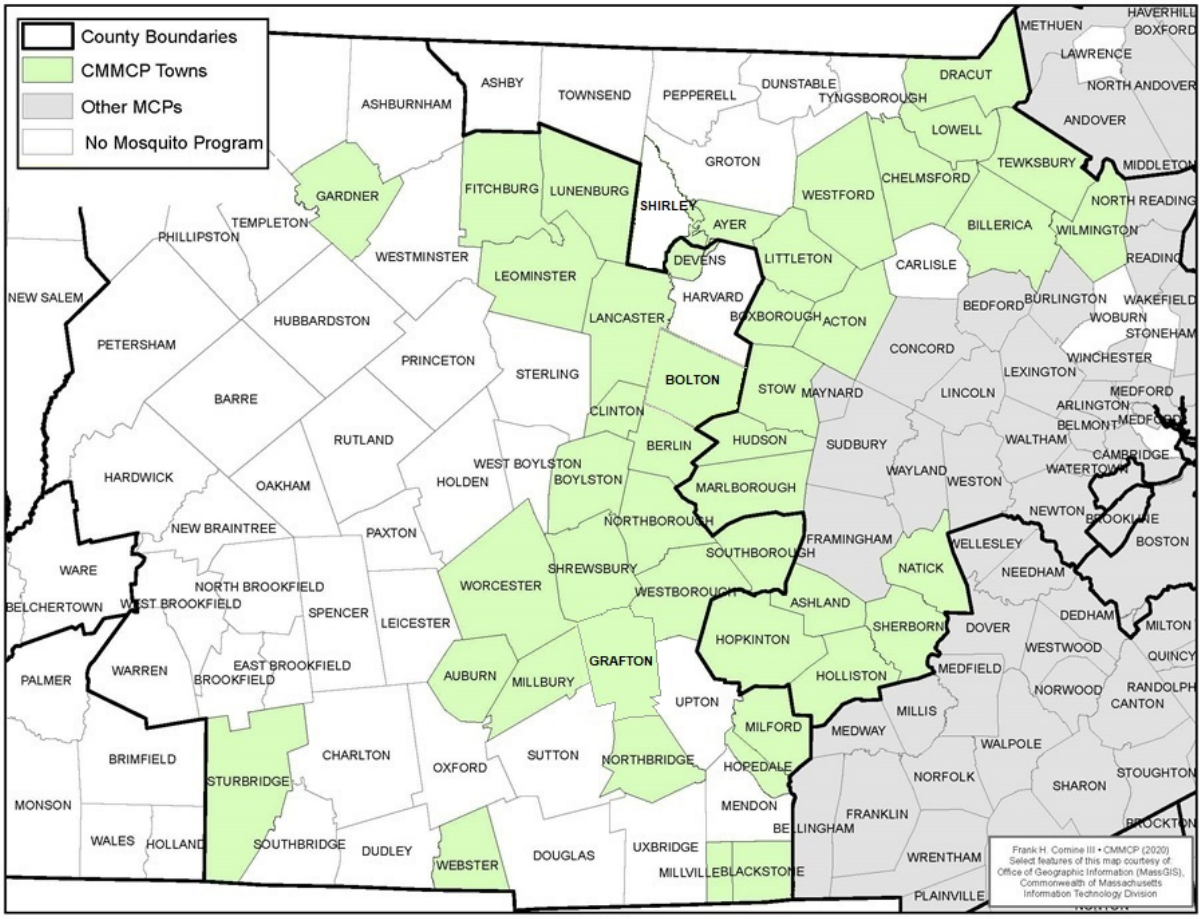
4. Person(s) responsible for pesticide applications (mix, load, apply).

    a. Curtis Best — Staff Entomologist
    b. John Briggs — Crew Leader
    c. Jonathan Briggs — Operations Foreman
    d. Frank Cornine III — Staff Biologist
    e. Edward Croshaw — Crew Leader
    f. James Cunningham — Field Technician
    g. Richard Demers — Field Technician
    h. Timothy Deschamps — Executive Director
    i. Timothy Hackley — Field Technician
    j. Sean Healy — Crew Leader
    k. Timothy McGlinchy — Director of Operations
    l. David Mullins — Field Biologist
    m. John Neusch — Field Technician
    n. Katrina Proctor — Wetland Project Coordinator
    o. Jeffrey Provost — Crew Leader

p. Nicholas Ragozzino Crew Leader
q. Michael Tagg Crew Leader
r. Daniel Topliffe Field Technician
s. David Walsh Field Technician
t. Timothy Welch Facility Manager
u. Other field staff hired, trained and licensed after implementation of this plan

B. Pest Management Area Description

1. Pest Problem Area Description: Central Mass. Mosquito Control (CMMCP) is charged with managing mosquito populations in 44 communities in both Middlesex and Worcester counties. Cities and towns in our service area lie in the following watersheds: Blackstone, Charles, Merrimac, Nashua, Shawsheen and SuAsCo. The CMMCP service area encompasses 810 square miles, or 518,400 acres. Pest problem areas can best be separated into 2 broad types within our service area that can be further divided into more specific groups based on habitat type.



i. Natural Environments

1. Woodland ponds, pools, and depressions are isolated wetlands occurring throughout the CMMCP service area within forested uplands and pasture areas. Examples of these habitats include bogs, shrub swamps, fens, wooded coniferous/deciduous swamps, and depressions caused by uprooted trees. Many of these sites only contain water during the wet seasons of the year, and serve as excellent nurseries for most species of mosquitoes found in our region.

2. Other natural environments include springs, seeps, tree holes, tree cavities, burrows made by various species of wildlife

ii. Man-made Environments

1. Ditches and canals are frequently suggested as sources of mosquito problems by the general public. However, these structures may contain fish, and are seldom the primary source of a mosquito infestation, especially if these systems tend to hold water on a permanent basis. On the other hand, shallow, roadside ditches do contribute to mosquito populations at times. Such sites often remain dry throughout much of the year or because of temperature, oxygen content, or other factors do not support fish life. Mosquito species encountered in such sites include *Aedes vexans*, *Culex salinarius*, *Cx. restuans*, and many species of *Ochlerotatus*.

2. Fallow cranberry bogs serve as habitat for a number of species of mosquitoes in our area. These shallow acidic wetlands can produce high numbers of mosquitoes.

3. Storm drains and catch basins are found throughout areas of the county, and provide a pristine environment for *Culex pipiens*, our primary WNV vector.

4. Containers come in all sorts of shapes and sizes. These may be represented by something as small as a bottle top to something as large as a discarded or unkempt boat. Containers serve as the primary larval site for *Culex pipiens* which is frequently associated with mosquito problems in our more urban and suburban areas of the county.

5. Other man-made sites include retention and detention ponds.

2. Pest Problem Description

a. Central Mass. Mosquito Control (CMMCP) is charged with managing mosquito populations in 44 communities in both Middlesex and Worcester counties. Cities and towns in our service area lie in the following

watersheds: Blackstone, Charles, Merrimac, Nashua, Shawsheen and SuAsCo. The CMMCP service area encompasses 730 square miles, or 467,200 acres. The CMMCP service area is known to contain nearly 50 species of mosquitoes, although CMMCP actively surveys and conducts control efforts primarily on 12-14 species.

i. *Aedes vexans* is a common woodland mosquito that has the potential to fly up to 5 miles. It is generally encountered in the spring, but can be found at other times of the year as well after flooding rains. This species has been implicated as a vector of eastern equine encephalitis (EEE), West Nile virus (WNV), and dog heartworm.

ii. *Coquillettidia perturbans* is a fairly large mosquito that is often associated with aquatic habitats containing cattails, *Typha* spp. It is generally considered a bridge vector of EEE to mammals, but has also tested positive for WNV in the United States. It commonly takes blood meals from both bird and mammal species (including humans).

iii. *Culex pipiens*, the house mosquito, is our region's primary WNV vector. It prefers somewhat stagnant or polluted water conditions as larval habitat, and can be a common species in storm drain systems, especially in drainage lines equipped with sumps in the catch basins that tend to hold water on a permanent basis.

iv. *Culex restuans* is an early season mosquito. Larval habitats for this species typically include a variety of semi-permanent waterways, including roadside ditches and woodland pools. It has been reported to carry both EEE and WNV, and may be an important vector in the initial amplification of these viruses in bird populations as birds appear to be its primary blood hosts.

v. *Culex salinarius* is a common *Culex* mosquito throughout much of the year in our region. Adults are readily attracted to light traps, and larvae are found in both freshwater and somewhat saline environments. This species has been recorded to carry dog heartworm, EEE, SLE, and WNV. It appears to be an opportunistic feeder of birds, mammals, and even reptiles, and may serve as an important bridge vector in the transmission of arbovirus in the southeastern United States.

vi. *Culiseta melanura* and *Cs. morsitans* are swamp mosquitoes that occur in Atlantic White Cedar Swamps – hardwood floodplains and other aquatic habitats characterized by low pH. The larvae often are found within subterranean pockets that are difficult to treat with conventional larvicide agents. *Cs. melanura* almost exclusively obtains its blood meals from birds, and is our primary vector in the amplification of EEE in our area. It has also been found to carry WNV.

vii. *Ochlerotatus canadensis* and *Oc. excrucians* are freshwater mosquitoes. Larvae develop in temporary or semi-permanent woodland pools. The females will bite in the woods any time of day, but are most active in the evening. They are aggressive and long-lived.

viii. *Ochlerotatus abserratus* is a very common early spring to early summer mosquito pest of humans and other mammals. Larvae are found in temporary spring pools and margins of permanent waters in April. Readily bites in shaded areas during the day.

ix. *Anopheles punctipennis* is found occasionally in the spring and summer. This pest of humans and other mammals has a mildly annoying bite. The larvae are found in a wide variety of wetlands including permanent swamps and along the edges of ponds and slow moving streams.

x. *Anopheles quadrimaculatus* is a common summer mosquito. A pest of humans and other mammals that readily enters houses and has a mildly annoying bite. The population increases during the summer. The larvae are found in clear water amongst low vegetation or floating debris, in permanent swamps, and along the edges of ponds and slow moving streams.

xi. *Ochlerotatus japonicus* is a pest of humans and other mammals. Its preferred habitat is artificial containers and discarded tire casings. It is not believed at this time to be a voracious biter of man, however research done by CMMCP has shown it can be a pest. West Nile Virus has been isolated from this species.

xii. *Ochlerotatus triseriatus* is also a pest of humans and other mammals. Most of these larvae actually are found in old rimless tires, although some are found in other shaded artificial containers and in tree holes. When this mosquito is a pest, its breeding source is usually close by.

3. Action Threshold

a. Recently the following thresholds were established to trigger larviciding missions within our service area:

i. Treatments of larval mosquito habitat may be conducted in areas that are found to contain an average of at least 1 larva per dip (using a standard 12 oz. dipper) over 5 dips. Actual treatments will be based on local demographics, mosquito species present, and other historic and current conditions.

ii. The storm water system (catch basins) may be treated in selected areas of the county where vector species have been found or there is a history of arbovirus activity.

4. Water Quality Standards - Waterways in the CMMCP service area are not impaired with any pesticides used by CMMCP.

C. Control Measure Description.

1. A description of the control measures to demonstrate how the operators specifically plan to meet the applicable technology-based or water quality-based effluent limitations.

    a. Prevention, mechanical/physical methods and cultural methods are by definition very similar in nature and share many characteristics. These methods can be as basic as simply emptying water from containers or as complex as repairing broken water lines which often require the involvement of other county departments, such as Public Works. Educational programming at local schools and area events allow CMMCP staff the opportunity to suggest ways that residents can assist in the prevention of mosquito problems by removing containers and articles from their yards that provide larval habitat, and to be mindful that birdbaths and pet water bowls could serve as mosquito sanctuaries when not properly maintained. CMMCP does have a tire recycling program available in its service area to all member communities.

    b. Physical manipulation of environments such as removing blockages in ditches that serve as barriers to natural predators of mosquitoes are sometimes quick and effective means for our Field Technicians to resolve problems on a localized level.

    c. CMMCP uses various biological control agents for the control of larval stages of mosquitoes. Formulations containing *Bacillus sphaericus* and/or *Bacillus thuringiensis israelensis* are used to treat freshwater larval habitats. Hormone mimics such as methoprene is used in to treat catch basin/storm drains, as a precaution against our primary WNV vector species.

    d. Pesticides often are any abatement agency's last choice of control measures. These products are applied as directed by their respective label, and all equipment used in this process is closely monitored and calibrated by staff.

    Operators will consider impact to non-target organisms, impact to water quality, pest resistance, feasibility, and cost effectiveness when evaluating and selecting the most efficient and effective means of pest management to minimize pesticide discharge to waters of the U.S.

2. A brief explanation of the control measures used at the site to reduce pesticide discharge, including evaluation and implementation of the six pest management tools:

    a. no action

b. prevention

c. mechanical/physical methods

d. cultural methods

e. biological control agents

f. pesticides

Operators will consider impact to non-target organisms, impact to water quality, pest resistance, feasibility, and cost effectiveness when evaluating and selecting the most efficient and effective means of pest management to minimize pesticide discharge to waters of the U.S.

3. Control measures are evaluated separately on the basis of mosquito life stage as follows:

   a. Efficacy can be determined from pre and post treatment trap counts when a trap site is located in the vicinity of a treatment area. In addition, landing rates taken by staff are used to supplement this data when trap sites are not located near a treatment area.

   b. Larval control efficacy is easy to access. Post-treatment surveys verify successful treatments when using larvicide oils and films, or biological control measures, such as Bti products

D. Schedules and Procedures.

1. Pertaining to Control Measures Used to Comply with the Effluent Limitations in Part 2.

   a. Application Rate and Frequency Procedures.

      i. Application Rate Determination

         1. Determine species and age of target mosquito(es)

         2. Evaluate environmental conditions

         3. Consider target area flora and fauna

         4. Determine appropriate application rate based on product label recommendations, previous experience and efficacy tests.

      ii. Frequency Determination

         1. Determine target site treatment history with selected pesticide

2. Evaluate effect of selected pesticide use on frequency and quantity thresholds for active ingredient.

3. Consider alternate treatment options

iii. Resistance Considerations

1. Consider documented resistance of target species to selected pesticide and/or any other compounds that are in the same class or exhibit similar modes of action. Also consider the possibility of cross resistance. CMMCP performs resistance management testing each year.

2. Consider the use of alternate control options and/or product rotation.

b. Spill Prevention Procedures.

i. Perform daily inspections of pesticide storage areas.

ii. All applicators in the field are all equipped with cell phones, and are given a list of the following contact names & numbers in case of an emergency situation or if any questions arise:

1. Police Dept. phone number for each town they are working in.

2. Poison Control Center phone number.

3. Home and cell phone numbers of the Executive Director and the Director of Operations of CMMCP.

4. Cell phone numbers of other CMMCP employees on shift.

5. Phone numbers for emergency spill response for Mass. Dept. of Environmental Protection and spill response contractors.

iii. All trucks are equipped with a 3-ring binder with laminated pesticide MSDS sheets & labels, as well as other fact sheets. This information is also available at the CMMCP headquarters, and from the CMMCP website. All trucks are equipped with an emergency spill response kit if a pesticide spill were to occur. All emergency phone numbers are included on the face of these kits.

iv. Chemical spill response plan:

1. Contain spill then notify a supervisor.

2. Isolate contaminated area.

3. Soak up spill with absorbent pads and/or absorbent granules. Collect material for disposal.

4. Clean contaminated vehicles and equipment according to label instructions.

5. Dispose of contaminated material according to label.

CMMCP Chemical List and PPE Requirements attached.

c. Pesticide Application Equipment Procedures.

i. Backpack Sprayer - larviciding

1. Operations:

a. Application equipment must be calibrated annually to confirm application rate is according to the label of the pesticide being used.

b. A visual inspection of spray equipment for leaks or wear in the lines, tanks and nozzle is done prior to the start up of spray equipment.

c. Routine cleaning and maintenance of the spray system must be performed to ensure system is operating properly.

2. Maintenance:

a. Daily Checks - Visually check the sprayer each day before use and make any necessary adjustments and /or repairs.

ii. Ground Adulticiding

1. Operations:
2. Application equipment must be calibrated annually to confirm the Volume Median Diameter is according to the label of the pesticide being used.
3. A visual inspection of spray equipment for leaks or wear in the lines, tanks and nozzle is done prior to the start up of spray equipment.
4. Routine cleaning and maintenance of the spray system must be performed to ensure system is operating properly.
5. Maintenance:
6. Daily Checks - Visually check the fog generator each day before use and make any necessary adjustments and /or repairs. Before making any repairs ensure that required PPE is worn.

7. Check all gasoline hoses, insecticide lines and fittings for cracks, leaks or wear. Replace if needed.
8. Check all bolts and fasteners and tighten as necessary.
9. Ensure that pesticide tanks have sufficient chemicals for assigned spray mission.
10. Check all nozzle parts for wear or physical damage. Replace damaged parts.
11. Inspect blower air filter for cleanliness and serviceability.

d. Pest Surveillance Procedures.

i. Adult Surveillance

1. Service request inspections are taken during normal working hours from telephone messages or emails outside of the normal work day. Many of these are simple requests for treatments, although occasionally such calls lead to finding problems needing attention. Technicians generally will check for mosquito larvae and determine if adult populations warrant treatment during these inspections from observed densities.

2. Gravid trap collections are paramount to our WNV surveillance. This trap type is particularly effective in catching gravid *Culex pipiens/restuans,* which is our primary WNV vector. 30-50 gravid traps are deployed throughout the CMMCP service area each week during the mosquito season.

3. Carbon dioxide baited light trap collections are used for nuisance mosquito census. Currently, 30-50 CDC light traps are deployed on a weekly basis.

4. Resting boxes are used by our staff to aid in earlier detection of any possible EEE threat in the county. A resting box is a passive trap that attracts certain species of mosquitoes after they have taken a bloodmeal. All *Culiseta melanura*, *Cs. morsitans*, and *Oc. japonicus* captured from these traps are pooled based on location and sent for virus testing.

ii. Larval Surveillance

1. Service request inspections performed by our Field Technicians will check for mosquito larvae. Generally, these requests for service stem from localized, container-breeding species of mosquitoes that are easily remedied by simply dumping water from articles such as buckets, birdbaths, tarps, and other items that are holding water. Occasionally, service requests investigations uncover larger scale problems, like blocked drainage systems, leaking septic tanks,

broken water lines, etc. that may require further action by either the land owner or other town departments to correct.

2. Larval habitat site inspections are conducted by our Field Technicians following flooding events caused by rain or in permanent water habitats. Larval surveillance entails locating the larval source (if not already known), sampling for larvae and estimating larval density, determining larval developmental stage(s), and collecting larvae for identification purposes in some instances. Other factors considered during larval inspections include the water depth at the specific location, current extended forecast, water temperature, and if any natural predators are present.

iii. Disease Surveillance

1. Mosquito pool analysis is a most useful indicator of the presence of WNV (and occasionally EEE) in our service area. Up to 50 adult *Culex sp.*, *Oc. japonicus*, *Cs. morsitans* or *Culiseta melanura* mosquitoes are grouped to form a single sample for WNV or EEE virus analysis, respectively.

2. Dead bird lab work during our early history with WNV played a role in the initial detection of areas of high concern. However, this aspect of viral detection has been diluted over the years as we have become more familiar with the ecology of this virus and our local bird populations. More recent work conducted throughout the US has established that three groups of birds (crows, blue jays, and raptors) are more susceptible to WNV than others. Herd immunity is assumed to be a factor in this data type.

e. Assessing Environmental Conditions Procedures.

i. Larval mosquito treatments. Two major environmental considerations are tree canopy and the amount of aquatic vegetation present within the treatment site. Tree canopy may deflect or otherwise prevent the penetration of pesticide from reaching the target area. Heavy vegetation within a wetland can interfere with the migration of the larviciding agent through the water column.

ii. Adult mosquito treatments. Treatments for adult mosquitoes occur in both urban and rural areas of the county. Applicators are always aware of listed exclusion areas, and turn spray equipment off when necessary to avoid drift into such areas. Similarly, equipment is also turned off when approaching large bodies of water, such as lakes and ponds to avoid any adverse reactions to non-target organisms in these environments. Exclusion areas are outlined in a binder carried by each

technician, and also loaded on GPS units in each spray vehicle. Exclusion areas are updated as needed under 333CMR13.03.

1. Ground Adulticiding Procedures

2. Apply when insects are most active and meteorological conditions are conducive to keeping the spray cloud in the air column close to the ground. Applications are done after astronomical sunset per a State Reclamation & Mosquito Control Board (SRMCB) policy dated August 20, 2007 but can be performed before astronomical sunrise if conditions warrant and a waiver has been granted by the SRMCB.

3. Do not apply when ambient temperature is less than 50F, unless otherwise specified on the pesticide label.

4. Apply when ground wind speeds are equal to or greater than 1 mph but less than 20 mph, unless otherwise specified on the pesticide label.

5. Do not apply over bodies of water (lakes, rivers, permanent streams, natural ponds, commercial fish ponds, swamps, marshes or estuaries), except when necessary to target areas where adult mosquitoes are present, and weather conditions will facilitate movement of applied material away from the water in order to minimize incidental deposition into the water body unless otherwise specified on the pesticide label.

6. Pesticide is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply product or allow drift when bees are actively visiting the treatment area, except when applications are made to prevent or control a threat to public and/or animal health determined by a state, tribal or local health or vector control agency on the basis of documented evidence of disease causing agents in vector mosquitoes, or the occurrence of mosquito-borne disease in animal or human populations, or if specifically approved by the state or tribe during a natural disaster recovery effort unless otherwise specified on the pesticide label.

7. No spray exclusion areas are maintained on a list with all applicators and are also placed on a GPS unit for a visual and audible reminder when the sprayers are in use.

8. To help minimize adverse incidents, CMMCP applicators turn off spray equipment when approaching areas with high human activity, such as outdoor sport practices, games, or other events. Technicians look for open windows and doors in residential areas

and will turn off the spray equipment to minimize exposure to residents.

2. Pertaining to Other Actions Necessary to Minimize Discharges.

   a. Spill Response Procedures.

      i. Chemical Spill Response training is required for staff handling, loading or applying pesticides.

   b. Adverse Incident Response Procedures.

      i. Procedures for responding to any incident resulting from pesticide applications

      ii. Procedures for notification of an incident:

         1. Operator notifies supervisor of incident.

         2. Supervisor will notify town where incident occurred to coordinate any needed remediation.

   c. Pesticide Monitoring Schedules and Procedures.

      i. For application by, or under the supervision of, personnel certified/trained in public health pest control or mosquito control. For each application, a record must be kept of:

         1. Date, time and areas where application occurred.

         2. Name and EPA registration number for the product being applied.

         3. Type and size of spray nozzle used.

         4. Dilution and application rate.

         5. Employees involved in mixing, loading and applying larvicide.

         6. These records must be kept by the responsible public agency or their designee for a minimum of three years using storage methods that will allow the records to be easily retrieved.

Pesticides and Required PPE*

Pesticide	EPA Registration Number	PPE Requirement
Altosid WSP	2724-448	Under ordinary use conditions, no special protection is required.
Altosid XR briquets	2724-421	Under ordinary use conditions, no special protection is required.
AquaBac 200G	62637-3	Dust Mask (N-95, R-95, P-95)
BVA2 mosquito larvicide oil	70589-1	Long-sleeved shirt and long pants, shoes plus socks, and chemical-resistant gloves
FourStar briquets	83362-3	Under ordinary use conditions, no special protection is required.
Mavrik Perimeter	2724-478	Long-sleeved shirt and long pants, shoes plus socks, and chemical-resistant gloves
Natular G	8329-80	Protective eyewear
Natular G30	8329-83	Protective eyewear
Suspend SC	432-763	Maintain exposure levels below the exposure limit through the use of general and local exhaust ventilation.
VectoLex WSP	73049-20	Air purifying respirator with dust/mist filter (N95), if needed.
Zenivex E4	2724-807	Long-sleeved shirt and long pants, shoes plus socks