

MONTANA EASEMENTS

NARRATIVE REPORTS

JANUARY-DECEMBER 1948

ROUTING SLIP

BRANCH OF WILDLIFE REFUGES

DATE: 1/18 1949

MR. SALYER _____

MR. KRUMMES _____

MR. ~~DUMONT~~ _____

MISS BAUM _____

SECTION OF HABITAT IMPROVEMENT:

~~MR. GRIFFITH~~ REB 4-6

~~DR. BURN~~ 1968 2-9

~~MISS COOK~~ mc 3-10

SECTION OF OPERATIONS:

~~MR. BALL~~ _____

~~MR. REGAN~~ _____
DR. Marley

SECTION OF LAND MANAGEMENT:

MR. KENT _____

~~MR. ACKERMAN~~ 250

SECTION OF STRUCTURES:

MR. TAYLOR _____

MR. JOHNSTON _____

STENOGRAPHERS:

NARRATIVE REPORT

REFUGE: _____

MONTANA EASEMENTS (FORT PECK)

PERIOD: _____

SEPTEMBER - DECEMBER 1948

I N D E X



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HAILSTONE NATIONAL WILDLIFE REFUGE
HALFBREED NATIONAL WILDLIFE REFUGE
LAKE MASON NATIONAL WILDLIFE REFUGE
LAMESTEER NATIONAL WILDLIFE REFUGE
REFUGE NARRATIVE REPORT
September - December
1948

I. GENERAL

A. Weather Conditions.

September and October nice months, November turned cold on the 6th and freezeup took place within a week. December was more severe than normal. Precipitation for the period was far below normal. Detailed weather reports will be found in the back of this report.

B. Water Conditions.

Water levels on the easement areas was as follows at freezeup or on December 31.

Hailstone	-	100" below spill
Halfbreed	-	24" below spill
Lake Mason	-	30" below spill
Miller Lake	-	44" below spill
Lamesteer	-	20" below spill

Because of little precipitation all water areas declined thru this entire period. Water conditions in all areas except Hailstone are better than thru the past 3 years. At Hailstone the decline has been relentless and severe.

C. Fires.

None.

II. WILDLIFE

A. Migratory Birds.

1. Population and Behavior.

Hailstone- Because of the low water in this area its importance as a waterfowl area has declined greatly. Only approximately 20 acres of alkaline water remain. When checked in late September the area carried 300 waterfowl and in mid-November 3 mallards. This contrast sharply with the nearly 5000 birds on the area in 1944 (Sept-Dec) when the area was 8" from spill.

Halfbreed - Runoff thru the year brought this area up to spill. On Sept. 25 it contained about 8000 birds. In mid-November a small open water area contained approximately 15,000 mallards. This area is of considerable importance to our refuge program in Montana.

Lake Mason - Mid year brought the level of this lake well up and its importance to us was evidenced by the 50,000 birds on it. On Sept. 25 The attached N.R. form gives details on the species using the area. On November 15-16 a small open water area in the lake carried 7000 mallards and 8 Canada Geese. Some Whisling Swans use the area each year, about 20 having been observed on it this fall.

Miller Lake - Twelve hundred birds occupied this water area on September 25 and 500 mallards were present in mid-November.

Lamesteer - Thru the time repairs were under way on this spillway 80 mallards, 20 baldpates and 1 cormorant were present. The cormorant left at the end of September.

2. Food & Cover.

Hailstone - A good growth of aquatics existed in the limited water area. Shore line vegetation is entirely absent.

Halfbreed - A luxurant growth of aquatics and a good growth of emmergents supplies food and cover in this area in abundance. This water area needs fencing urgently to bring it into full waterfowl production.

Lake Mason - Aquatics and emergents growth swelled with the water level and by the end of the growing season Lake Mason had an abundance of both food and cover.

Miller Lake - This area produces an excellent stand of aquatics. Fencing the water area would prevent cropping and trampling of the emergents by cattle and would soon result in a good stand of them. Emergents have a good start in the area.

Lamesteer - With a stabilized water level this area continues to develop very well. Both emergents and aquatics are now abundant.

3-4. Disease.

None evident.

B. Upland Game Birds.

None observed on any area this period.

C. Big Game Animals.

Hailstone - No big game animals were observed on this area this report period. Some antelope are on and off the area constantly.

Halfbreed - Fourteen antelope were on Halfbreed on November 15-16. On & off use is high enough to give nearly a constant population.

Lake Mason - While no year around use of this area by antelope exists constant on & off use holds the population at about 55 animals.

Lamesteer - None.

2. Food & Cover.

More than adequate for antelope on each area.

3. Disease.

None evident.

D. Fur Animals, Predator, Rodents & Others.

One dead muskrat was found on Hailstone. This was evidently the only one on the area & cause of death was unknown.

Halfbreed - No Muskrats.

Lake Mason - One muskrat was observed. The muskrat population can be expected to build up some if the lake level remains where it is. This area is too shallow to ever produce many muskrats. Winter kill is extensive when a population exists.

Miller Lake - No muskrats observed.

Lamesteer - Three muskrats were observed on this area. The population is estimated at 15.

E. Predaceous Birds.

The attached N.R. form shows specific observations on numbers, species & dates. There is apparently no excessive predator on any area.

The following excerpt is from Mr. Wolf's Nov. 15-16 inspection of Halfbreed.

"I saw a duck hawk catch a crippled Hen mallard that was barely able to fly. He forced her to land then attacked her on the ground, while he was having his dinner two Bald Eagles came along and took over the duck".

F. Fish.

Lamesteer with brown bullheads is the only water area that contains fish. These are prolific in this area.

III. DEVELOPMENT & MAINTENANCE.

The only work done on any area this period was repairs to the spillway at Lamesteer. On opening up the south sloping apron a vast cavity was found underneath where earth had washed away. Except for sagging, apron was intact.

The old rock and concrete was torn out, the rock salvaged, the lost earth replaced with sand and gravel to add stability and act as a filter and the opening closed with cement and stone.

Repairs required the following.

Man-days labor	42 $\frac{1}{2}$
Sacks cement	34
Yards sand & gravel	14
Dump truck miles	1100
Pickup and panel miles	1250

It appears as tho the same job will be necessary on the north sloping apron next year.

VI PUBLIC RELATIONS

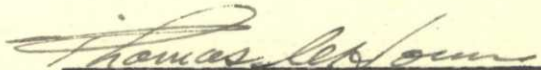
Fishing.

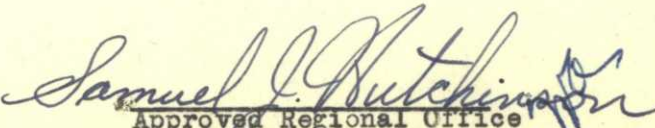
Only a moderate amount of interest is shown in the bullhead fishing at Lamesteer, approximately 500 were taken thru the year.

Hunting.

With the water level higher in Lake Mason this fall, more ducks were taken off the open hunting area than heretofor. An estimated 240 were killed on the open portion of the refuge most of which were mallards.

Submitted on January 6, 1949


Thomas C. Horn, Refuge Manager


Samuel I. Hutchinson
 Approved Regional Office
 Regional Director

NR 2	(Upland Game Birds)	None observed this period
NR 5	(Disease)	None for this period.
NR 7	(Plantings)	None for this period.
NR 8	(Crops)	Not applicable.
NR 8a	(Grain)	Not applicable.
NR 9	(Collections etc)	None for this period.
NR 10	(Haying & Grazing)	Not applicable.
NR 11	(Timber Removal)	Not applicable.

WATERFOWL

Refuge LanesterMonths of Sept.to Dec.1948

(1) Species		(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name		Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u>										
Whistling swan										
II. <u>Geese:</u>										
Canada goose										
Cackling goose										
Brant										
White-fronted goose										
Snow goose										
Blue goose										
III. <u>Ducks:</u>										
Mallard						80	9/28/			350
Black duck										
Gadwall										
Baldpate						20	9/28			100
Pintail										
Green-winged teal										
Blue-winged teal										
Cinnamon teal										
Shoveller										
Wood duck										
Redhead										
Ring-necked duck										
Canvas-back										
Scaup										
Golden-eye										
Buffle-head										
Ruddy duck										
IV. <u>Coots:</u>										

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 1450

Peak waterfowl numbers 100

Areas used by concentrations _____

Principal nesting areas this season _____

Reported by Thomas L. Son

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on an analysis of the rest of the form.

WATERFOWL

Refuge Miller Lake Months of Sept. to Dec. 1948

(1) Species Common Name	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan									
II. <u>Geese:</u> Canada goose Cackling goose Brant White-fronted goose Snow goose Blue goose									
III. <u>Ducks:</u> Mallard Black duck Gadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck	550	9/25			500 110 580 55 110	11/15 9/25 9/25 9/25			1200 250 650 150 500
IV. <u>Coots:</u>					125	9/25			300

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 2850

Peak waterfowl numbers 1230

Areas used by concentrations West end

Principal nesting areas this season _____

Reported by F. H. Hall

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

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WATERFOWL

Refuge Lake Mason Months of Sept. to Dec. 1948

(1) Species		(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name		Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u>										
Whistling swan						20	11/8			20
II. <u>Geese:</u>										
Canada goose						9	11/15			25
Cackling goose										
Brant										
White-fronted goose										
Snow goose										
Blue goose										
III. <u>Ducks:</u>										
Mallard		20,000	9/25			7,000	11/15			35,000
Black duck										
Gadwall						3,500	9/25			3,500
Baldpate						2,500	9/25			4,000
Pintail						10,000	9/25			20,000
Green-winged teal						2,500	9/25			4,000
Blue-winged teal						2,500	"			4,000
Cinnamon teal										
Shoveller						5,000	"			12,000
Wood duck										
Redhead						10,000	"			2,500
Ring-necked duck										
Canvas-back						1,500	"			2,500
Scaup										
Golden-eye										
Buffle-head										
Ruddy duck										
IV. <u>Coots:</u>						1,000	"			

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 89,555

Peak waterfowl numbers 45,528

Areas used by concentrations _____

Principal nesting areas this season _____

Reported by Thomas L. Brown

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

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WATERFOWL

Refuge HalfbreedMonths of Sept. to Dec. 1948

(1) Species Common Name	(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
	Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan									
II. <u>Geese:</u> Canada goose Cackling goose Brant White-fronted goose Snow goose Blue goose					15	9/25			75
III. <u>Ducks:</u> Mallard Black duck Gadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck	4,000	9/25			15,000 12,00 800 800 400 700	11/16 9/25 9/25 9/25 9/25 9/25			25,000 2500 2000 2500 750 1500
IV. <u>Coots:</u>					800	9/25			1000

3-1750
(July 1946)

(over)

Form NR-1

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 35,325

Peak waterfowl numbers 19715

Areas used by concentrations _____

Principal nesting areas this season _____

Reported by Thomas A. ...

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on an analysis of the rest of the form.

WATERFOWL

Refuge HailstoneMonths of Septto Dec194 8

(1) Species		(2) First Seen		(3) Peak Concentration		(4) Last Seen		(5) Young Produced		(6) Total
Common Name		Number	Date	Number	Date	Number	Date	Broods Seen	Estimated Total	Estimated for Period
I. <u>Swans:</u> Whistling swan										
II. <u>Geese:</u> Canada goose Cackling goose Brant White-fronted goose Snow goose Blue goose										
III. <u>Ducks:</u> Mallard Black duck Gadwall Baldpate Pintail Green-winged teal Blue-winged teal Cinnamon teal Shoveller Wood duck Redhead Ring-necked duck Canvas-back Scaup Golden-eye Buffle-head Ruddy duck						120 75 15 15 80 45	9/25 9/25 9/25 9/25 9/25 9/25			700 300 250 250 400 300
IV. <u>Coot:</u>										

SUMMARIES

Total Production:

Geese _____

Ducks _____

Coots _____

Total waterfowl usage during period 2800

Peak waterfowl numbers 300

Areas used by concentrations _____

Principal nesting areas this season _____

Reported by Thomas A. Brown

INSTRUCTIONS

- (1) Species: In addition to the birds listed on form, other species occurring on refuge during the reporting period should be added in appropriate spaces. Special attention should be given to those species of local and National significance.
- (2) First Seen: The first refuge record for the species during the season concerned in the reporting period, and the number seen. This column does not apply to resident species.
- (3) Peak Concentration: The greatest number of the species present in a limited interval of time.
- (4) Last Seen: The last refuge record for the species during the season concerned in the reporting period.
- (5) Young Produced: Estimated number of young produced based on observations and actual counts on representative breeding areas. Brood counts should be made on two or more areas aggregating 10% of the breeding habitat. Estimates having no basis in fact should be omitted.
- (6) Total: Estimated total number of the species using the refuge during the period. This figure may or may not be more than that used for peak concentrations, depending upon the nature of the migrational movement.

Note: Only columns applicable to the reporting period should be used. It is desirable that the Summaries receive careful attention since these data are necessarily based on an analysis of the rest of the form.

MIGRATORY BIRDS
(other than waterfowl)

Refuge All Easements (A) Months of (2) 1948

[illegible]

(1) NAME (2) ADDRESS (3) CITY (4) STATE (5) ZIP

(1) (2) (3)
None observed on any of the fragment areas 1000 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824

Colonies, Nests, Young, Number
Number Total & Total Estimated

I. Water and Marsh Birds:

Golden eagle
Duck Hawk

Miller Lake
Halfbreed

1 9/26
3 11/16

(Hajfread) Hine Horen

(Laminated) (continued)

Prairie Falcon

as/e Halfbreed

3 9/25

Boxed (Date) (Month)

Bald Eagle

Halfbreed

11/16

Marsh Hawk

Hailstone-Halfbreed

3 9/25

Rough-legged Hawk

Halfred

1 9/25

Sharp Shinned Hawk

MASON

1 9/25

Lanester

Non

II. Shortbridge, Willis and
Torne:

(Haitians) Northern Palatka

NO OTHERS AS OTHER FROM.

3-1753
Form NR-3
(June 1945)

BIG GAME

Refuge Fort Peck Easements Areas

Calendar Year 1942

(1) Species	(2) Density	(3) Young Produced	(4) Removals				(5) Losses			(6) Introductions	(7) Estimated Total Refuge Population		(8) Sex Ratio	
Common Name	Cover types, total Acreage of Habitat	Number	Hunting	For Re- stocking	Sold	For Research	Predation	Disease	Winter Loss	Number	Source	At period of Greatest use	As of Dec. 31	
Hailstone Antelope													22	
Halfbreed Antelope													33	
Lake Mason Antelope													55	
Lamesteer														
Antelope None														

Remarks:

Reported by _____

INSTRUCTIONS

Form NR-3 - BIG GAME

(1) **SPECIES:** Use correct common name; i.e., Mule deer, black-tailed deer, white-tailed deer. It is unnecessary to indicate sub-species such as northern or Louisiana white-tailed deer.

(2) **DENSITY:** Detailed data may be omitted for species occurring in limited numbers. Density to be expressed in acres per animal by cover types. This information is to be prefaced by a statement from the refuge manager as to the number of acres in each cover type found on the refuge; once submitted, this information need not be repeated except as significant changes occur in the area of cover types. Cover types should be detailed enough to furnish the desired information but not so much as to obscure the general picture. Examples: spruce swamp, upland hardwoods, reverting agriculture land, bottomland hardwoods, short grass prairie, etc. Standard type symbols listed in Wildlife Management Series No. 7 should be used where possible. Figures submitted should be based on actual observations and counts on representative sample areas. Survey method used and size of sample area or areas should be indicated under Remarks.

(3) **YOUNG PRODUCED:** Estimated total number of young produced on refuge.

(4) **REMOVALS:** Indicate total number in each category removed during the year.

(5) **LOSSES:** On the basis of known records or reliable estimates indicate total losses in each category during the year.

(6) **INTRODUCTIONS:** Indicate the number and refuge or agency from which stock was secured.

(7) **TOTAL REFUGE POPULATION:** Give the estimated population of each species on the refuge at period of its greatest abundance and also as of Dec. 31.

(8) **SEX RATIO:** Indicate the percentage of males and females of each species as determined from field observations or through removals.

116000

3-1756
Form NR-6
(April 1946)

FISH

Refuge..... **Port Peck Easements** Year 194 **8**

Species	Relative Abundance	Sport Fishing		Commercial Fishing		Restocking		Number removed for Restocking
		Man days Fishing	Number Taken	No. of Permits	Pounds Taken	Number Stocked	Area Stocked	
Lanester Brown Bullheads		100	500					

REMARKS: **None known to be in any other area.**

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

MONTHLY CLIMATOLOGICAL SUMMARY

With Comparative Data

STATION Billings, Montana (Municipal Airport) MONTH September 19 48Phone 5431 ; 105 th Meridian Time; Lat. 45° 48' N, Long. 108° 32' W; Elevation 3570 ft.

DATE	TEMPERATURE ° F					PRECIPITATION			WIND		WEATHER		
	MAXIMUM	MINIMUM	MEAN	DEPARTURE FROM NORMAL	DEGREE DAYS BASE 65°	TOTAL (INCHES)	SNOWFALL (INCHES) (UNMELTED)	DEPTH OF SNOW ON THE GROUND 5:30 P. M.	PREVAILING DIRECTION	HIGHEST VELOCITY (*)	DIRECTION	PERCENT OF POSSIBLE SUNSHINE	AVERAGE CLOUDINESS SCALE 0 TO 10
1..	91	53	72	+ 6	0	0	0	0	SW	12	SW	100	4
2..	93	51	72	+ 6	0	0	0	0	SW	11	N	100	1
3..	95	52	74	+ 9	0	0	0	0	W	23	N	100	1
4..	78	54	66	+ 1	0	0	0	0	N	28	NW	95	2
5..	73	45	59	- 6	6	0	0	0	N	20	N	89	5
6..	70	46	58	- 6	7	0	0	0	E	12	E	90	5
7..	69	48	58	- 6	7	0	0	0	N	17	E	78	6
8..	73	41	57	- 6	8	0	0	0	E	15	E	92	2
9..	77	47	62	- 1	3	0	0	0	W	15	W	95	8
10..	91	55	73	+11	0	0	0	0	W	18	SW	100	6
11..	92	52	72	+10	0	0	0	0	W	23	NW	100	3
12..	83	57	70	+ 8	0	0	0	0	W	17	NE	87	4
13..	91	49	70	+ 9	0	0	0	0	W	15	SW	99	1
14..	97	54	76	+15	0	0	0	0	W	19	SW	100	1
15..	93	64	78	+18	0	0	0	0	SW	26	SW	81	4
16..	78	56	67	+ 7	0	0	0	0	NE	17	NE	78	8
17..	81	60	70	+10	0	0	0	0	SW	16	NW	67	7
18..	78	61	70	+11	0	0	0	0	SW	20	SW	67	9
19..	65	49	57	- 2	8	.18	0	0	N	22	NE	0	9
20..	71	50	60	+ 2	5	.01	0	0	SW	19	SW	89	3
21..	83	50	66	+ 8	0	0	0	0	SW	17	SW	100	1
22..	84	49	66	+ 8	0	0	0	0	SW	17	SW	92	2
23..	68	47	58	+ 1	7	T	0	0	N, E	27	N	53	9
24..	51	43	47	-10	18	T	0	0	NE	25	E	0	10
25..	51	42	46	-10	19	T	0	0	NE	22	E	0	10
26..	71	48	60	+ 4	5	.14	0	0	NW	15	NW	83	1
27..	69	45	57	+ 1	8	.07	0	0	SW	19	NW	100	2
28..	74	41	58	+ 3	7	0	0	0	SW	12	SW	100	4
29..	73	47	60	+ 5	5	0	0	0	SW	20	NE	100	5
30..	64	43	54	0	11	0	0	0	NE	25	E	82	4
31..													
MEAN	77.6	50.0	63.8	+3.6	124	0.40	0		SW	28	NW	81	4.6
Normal			60.2		223								

* 72101 3-minute period															
PRESSURE		Mean				Highest				Date		Lowest		Date	
Station	26.32	in.	891.3	mb.	26.580	in.	900.1	mb.	30	25.872	in.	876.1	mb.	22	
Sea Level	29.92	in.	1013.2	mb.	30.26	in.	1024.7	mb.	30	29.39	in.	995.3	mb.	22	

TEMPERATURE:—Mean this month last year 59.3. This month since 1935: warmest 67.2 in 1938; coldest 54.0 in 1941. Highest 97 date 14; lowest 41 date 8. This month since 1934 highest 98 date 2, 1940; lowest 24 date 25, 1934. Average daily departure since Jan. 1, 0.4 Degree days: since July 1, 135, normal 268; since Sept. 1, 124, normal 223. Number of days:—Max. 100° or above 0; 90° or above 8;—Min. 32° or below 0; 0° or below 0;—10° or below 0. Normal number:—Max. 100° or above —; 90° or above —;—Min. 32° or below —; 0° or below —;—10° or below —.

PRECIPITATION:—Departure —. Total since Jan. 1 7.08, Dep. —; total since July 1 1.83, Dep. —. Total this month last year 1.39. This month since 1934: wettest 4.99 in 1941; driest 0.22 in 1939. Greatest this month in: Greatest this month since 1941, in: SNOWFALL:—Total since July 1, 0, Dep. —. 5 min. 0.3 date 26 5 min. 1.0 date 16, 1946. Greatest monthly, this month since 1935, 6.0 in 1941; 10 min. 0.3 date 26 10 min. 1.2 date 5, 1943. least monthly this month since 1935, 0 in —. 15 min. 0.4 date 26 15 min. 1.4 date 16, 1946. Greatest in 24 hrs. 0, date —. 20 min. 0.5 date 26 20 min. 1.4 date 16, 1946. this month since 1939, 6.0 date 27, 1941. 30 min. 0.6 date 26 30 min. 1.7 date 2, 1944. Greatest any single storm 0 date —. 1 hr. 0.8 date 19, 26 1 hr. 3.2 date 2, 1944. this month since 1939, 6.0 date 27, 1941. 2 hr. 1.2 date 26 2 hr. 5.2 date 2, 1944. Greatest on ground 0, date —. 24 hr. 2.0 date 26-27 24 hr. 8.1 date 6-7, 1941. this month since 1944, T date 19, 1947. Number of days with precipitation: trace 6; 0.01 inch or more 4; 0.25 inch or more 0; 1 inch or more 0; 2 inches or more 0. Normal number of days with precipitation: trace —; 0.01 inch or more —; 0.25 inch or more —; 1 inch or more —; 2 inches or more —. Greatest number of days this month since 1939 with precipitation: 0.01 inch or more, 10 in 1941; least number 2 in 1940.

CHARACTER OF DAY:—Number of days clear 12; partly cloudy 11; cloudy 7. Normal number clear 9; partly cloudy 11; cloudy 10. SUNSHINE:—Total hours this month 304.4. Total hours possible on 1st 13.3; on 16th 12.5; on last day 11.8; this month 376.3. MISCELLANEOUS PHENOMENA (DATES):—Hail 0; Sleet 0; Glaze 0. Fog: Light 19, 20, 25, 26; Moderate 19, 20, 25; Heavy 20, 25, 26. Frost: Light 0; Heavy 0; Killing 0. Thunderstorms 26th; Duststorms 0; Tornadoes 0; Hurricanes 0.

c. City Office. d. Airport. e. Total. f. Monthly. g. Sunrise to sunset: 2 to 3, clear; 4 to 7, partly cloudy; 8 to 10, cloudy. h. other dates. i. Light fog, visibility 6 miles to 3,300 ft.; moderate, 3,299 to 1,651 ft.; heavy, 1,642 ft. to 0. j. Frosts not recorded in autumn after first "killing," except in Florida and along immediate coast of the Gulf of Mexico. T indicates a trace of precipitation.

MEV:m

L. T. Pierce, Meteorologist.

Official in Charge, Weather Bureau

STATION Billings, Montana MONTH September, 19 48

PSYCHROMETRIC DATA taken at Municipal Airport

	5:30 a.m. MST				11:30 a.m. MST				5:30 p.m. MST				11:30 p.m. MST			
Date	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.
1.	58.2	47.4	37	46	71.8	55.8	44	37	89.3	59.3	36	15	75.1	53.8	38	28
2.	55.4	46.2	37	51	78.4	56.7	40	25	92.7	59.2	31	11	75.0	53.6	35	23
3.	55.8	44.2	31	59	88.3	55.0	21	8	94.9	62.8	41	15	75.0	51.2	27	16
4.	57.4	44.1	29	33	68.7	50.0	32	25	76.0	54.0	35	22	69.0	51.0	34	28
5.	46.6	41.8	37	68	67.7	49.9	33	27	70.0	50.0	30	22	57.5	46.0	34	41
6.	50.6	44.0	37	61	65.3	48.3	31	27	68.0	49.0	30	23	59.8	48.0	37	43
7.	52.6	42.8	32	45	62.7	46.9	30	29	66.1	47.3	28	23	57.0	43.5	28	32
8.	42.8	36.5	29	56	65.2	49.0	33	30	71.9	51.2	31	22	55.0	43.0	29	36
9.	47.5	42.0	36	65	64.7	51.8	41	42	74.7	54.0	36	25	57.9	47.8	39	49
10.	55.9	44.1	31	38	76.0	54.6	37	24	89.8	57.0	27	10	62.1	47.3	32	32
11.	57.6	44.0	29	32	81.1	56.0	35	19	89.2	56.2	25	9	68.7	46.3	18	13
12.	66.3	47.8	28	23	76.6	55.1	38	24	80.0	57.1	40	24	70.6	48.9	25	18
13.	51.4	43.6	35	54	74.6	54.5	38	26	90.9	58.0	29	11	63.9	50.0	38	38
14.	59.0	44.0	27	28	80.8	56.1	36	20	94.8	60.0	32	11	71.8	49.7	26	18
15.	69.7	47.2	21	15	89.9	56.3	24	9	81.7	55.3	32	16	79.3	51.8	22	11
16.	59.7	44.0	26	26	69.8	50.0	30	23	76.8	53.8	33	20	68.1	49.8	32	26
17.	60.3	45.3	29	29	72.4	52.3	34	24	75.0	56.9	44	33	64.0	47.8	31	29
18.	65.7	54.2	46	49	75.6	59.3	49	39	72.0	56.4	45	39	64.0	54.0	47	53
19.	61.3	47.5	34	35	59.1	48.3	38	46	51.9	49.8	48	87	67.0	52.1	40	37
20.	51.4	51.2	51	99	61.9	54.0	48	61	69.9	55.9	46	43	51.1	50.8	51	98
21.	52.1	47.0	42	69	73.2	56.8	45	37	80.5	57.3	40	23	60.8	52.3	46	58
22.	52.2	47.0	42	69	71.8	54.5	41	33	80.2	58.3	43	27	62.8	50.1	39	41
23.	54.3	46.0	38	54	62.1	52.1	44	52	65.6	51.8	40	39	67.7	50.9	36	31
24.	44.2	39.8	35	69	46.9	40.5	33	59	48.7	41.8	34	57	47.8	41.9	36	62
25.	43.6	41.8	40	87	45.3	43.4	42	87	49.9	46.4	43	78	45.8	43.6	42	85
26.	48.3	48.2	48	100	61.9	50.5	41	46	70.0	52.2	37	30	47.3	47.0	47	98
27.	47.3	45.8	45	90	62.1	49.0	37	39	68.2	49.0	29	23	58.6	52.0	47	66
28.	44.7	40.8	37	73	60.2	49.4	40	47	73.2	54.8	40	30	56.3	45.3	34	44
29.	50.8	44.7	39	63	68.1	51.1	36	30	66.8	51.2	37	34	60.0	51.1	44	55
30.	45.1	40.0	34	65	56.9	47.3	38	50	59.8	48.0	37	44	48.6	42.4	36	62
31.																
MEAN	53.6	44.8	35	54	68.6	51.8	37	35	74.6	53.4	36	29	62.2	48.8	36	42
Normal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WIND:—Number of hours this month below 10 mi. 402; 10 mi. and over 318; 15 mi. and over 111; 20 mi. and over 13; 25 mi. and over 1; 30 mi. and over 0; 40 mi. and over 0.

This Month:—Dir.	N	NE	E	SE	S	SW	W	NW	DI	Month
Aver. Hrlly. Vel.	11.1	13.1	9.0	4.9	4.9	9.2	9.0	10.6	0.0	9.5
Percent of Time	13	12	14	3	8	29	17	4	0	100

Maximum velocity this month since 1939, 47 miles from NW on 8 in 1945.
15 1946.

CEILING AND VISIBILITY FREQUENCIES (Based on hourly record observations) at Municipal Airport

Visibility (miles)	Ceiling (feet)									
	0	100- 200	300- 400	500- 900	1000- 1900	2000- 2900	3000- 4900	5000- 9500	Over 9500	Total
0 to 1/8	5									5
1/8 to 3/8			1				1			2
1/2 to 3/4	1	1	1		1	1				5
1 to 2 1/2			3							3
3 to 6		1	2		1					4
7 to 15		1		9		2	1	7	17	37
20 to 30				3	6	7	6	16	107	145
35 or more							13	19	487	519
Total	6	3	7	12	8	10	21	42	611	720

Frequencies for larger classes can be derived by addition, i.e., "Under 500 feet" from sum of 0, 100-200 and 300-400 classes; "7 miles or more" from sum of classes 7 to 35 miles or more inclusive.

FROST DATA:—Average date of last killing frost in spring May 15; first in autumn September 24

Latest date of last killing frost in spring June 23, 1903; earliest in autumn August 25, 1910

Average growing season 132 days; longest 168 days in 1937; shortest 66 days in 1903

NOTE: 1894-1945, inclusive, observations made at Cooperative Station, City of Billings.

GENERAL SUMMARY:—

September, 1948, was a warm dry month with the mean monthly temperature 3.6 degrees above normal. Measureable amounts of precipitation were recorded on only 4 days, namely - 19th, 20th, 26th, and 27th. Only a trace of precipitation fell between the 1st and the 19th.

No excessive wind velocities were registered during the month. The maximum velocity of 28 miles an hour from the northwest was recorded on the 4th.

Faint Auroras were observed on the 1st, 11th, 13th, 29th and 30th.

STATION Billings, Montana MONTH September 1948

HOURLY TEMPERATURES FOR Municipal Airport

Readings made 20 minutes past the hour

Date	A. M.												P. M.												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1	64	65	60	59	58	59	61	60	65	69	72	80	86	88	88	91	89	88	81	79	79	76	75	71	1
2	66	65	62	58	55	53	56	58	67	73	78	85	88	90	92	92	93	89	86	81	80	79	75	68	2
3	66	59	58	53	56	57	59	68	75	81	88	91	94	93	92	94	95	89	85	82	75	72	69	68	3
4	64	63	62	58	57	58	60	59	60	65	69	70	75	74	76	78	76	70	67	64	62	58	58	54	4
5	52	52	50	50	47	48	50	52	59	65	68	70	71	70	70	69	70	68	66	65	63	62	60	57	5
6	57	53	52	51	51	48	49	53	58	64	65	67	68	69	70	69	68	66	62	61	59	57	57	55	6
7	53	52	52	52	53	53	53	54	60	63	63	67	68	67	67	67	66	63	60	59	57	56	55	52	7
8	51	47	48	41	43	43	46	50	58	60	65	69	69	71	72	72	72	68	64	60	59	59	58	56	8
9	54	53	51	50	48	48	48	49	56	62	65	69	72	75	75	75	75	73	71	68	66	67	62	67	9
10	65	60	61	57	56	56	58	61	68	73	76	82	84	87	90	90	90	86	78	78	78	73	69	64	10
11	62	61	62	54	58	57	62	61	70	78	81	87	90	90	88	87	89	84	80	79	75	71	71	69	11
12	69	65	66	66	66	64	60	62	67	75	77	79	79	81	82	82	80	78	76	71	67	65	64	62	12
13	61	60	57	54	51	53	52	54	62	69	75	81	86	90	91	91	91	87	83	80	77	76	72	68	13
14	67	66	61	63	59	55	57	63	72	78	81	88	95	97	97	96	95	92	88	86	82	80	79	76	14
15	76	72	69	69	70	68	71	72	79	87	90	91	93	93	89	87	82	77	74	73	72	70	68	66	15
16	65	63	61	59	60	57	60	62	65	68	70	73	74	77	78	78	77	73	72	70	66	65	64	63	16
17	62	61	61	61	60	61	63	64	66	69	72	77	81	79	78	76	75	71	70	69	67	65	64	62	17
18	62	64	61	65	66	67	67	66	69	70	76	77	77	77	74	73	72	71	71	69	68	67	67	65	18
19	64	63	63	62	61	60	60	60	61	61	59	58	55	53	52	53	52	51	51	50	50	50	51	51	19
20	51	51	51	51	51	51	51	53	57	59	62	65	68	68	71	71	70	67	65	62	61	61	61	60	20
21	58	56	52	53	52	50	54	57	63	69	73	78	79	80	82	81	80	75	72	70	67	65	63	62	21
22	60	57	56	54	52	51	51	52	60	67	72	79	82	83	82	80	80	77	74	72	70	69	68	67	22
23	66	65	60	57	54	52	52	55	58	60	62	63	65	66	67	66	66	60	55	51	49	48	48	46	23
24	46	47	46	45	44	45	46	46	46	47	47	48	49	50	50	51	49	48	47	47	47	46	46	44	24
25	43	44	44	44	44	44	43	43	45	45	45	47	49	50	50	50	50	49	47	47	48	48	47	48	25
26	48	48	48	48	48	48	49	50	55	60	62	67	69	69	71	70	70	65	62	62	61	58	59	57	26
27	55	50	50	48	47	46	48	51	55	58	62	66	67	67	68	68	68	65	64	60	58	58	56	52	27
28	51	50	49	45	45	42	43	48	51	56	60	66	70	72	74	73	73	69	68	68	65	62	60	59	28
29	52	52	53	52	51	51	50	51	56	64	68	71	72	72	71	70	67	61	58	56	53	51	49	46	29
30	45	44	45	45	45	44	45	47	51	55	57	60	63	63	62	60	60	56	53	48	47	44	43	43	30
31																									31

MEAN TEMPERATURE AND TOTAL PRECIPITATION THIS MONTH IN

Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.
1851			1876			1901			1926		
1852			1877			1902			1927		
1853			1878			1903			1928		
1854			1879			1904			1929		
1855			1880			1905			1930		
1856			1881			1906			1931		
1857			1882			1907			1932		
1858			1883			1908			1933		
1859			1884			1909			1934		
1860			1885			1910			1935	63	0.29
1861			1886			1911			1936	62	1.52
1862			1887			1912			1937	64	1.33
1863			1888			1913			1938	67	0.56
1864			1889			1914			1939	60	0.22
1865			1890			1915			1940	66	1.09
1866			1891			1916			1941	54	4.99
1867			1892			1917			1942	59	1.66
1868			1893			1918			1943	60	0.55
1869			1894			1919			1944	59	2.01
1870			1895			1920			1945	57	1.33
1871			1896			1921			1946	59	1.68
1872			1897			1922			1947	59	1.39
1873			1898			1923			1948	64	0.40
1874			1899			1924			1949		
1875			1900			1925			1950		

Note:—The warmest, coldest, driest, and wettest months are underscored.

STATION Billings, Montana

MONTH September, 1948

HOURLY PRECIPITATION (Inches) FOR Municipal Airport

Date	A. M.												P. M.												Total	Date
	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12		
1																									0	1
2																									0	2
3																									0	3
4																									0	4
5																							T	T	T	5
6																									0	6
7																									0	7
8																									0	8
9																									0	9
10																									0	10
11																									0	11
12																									0	12
13																									0	13
14																									0	14
15																									0	15
16																									0	16
17																	T								T	17
18				T	T																				T	18
19		.01			T	T	T				T	.01	.03	.08	.02	.01	.01	T	T	.01	T	.01			.18	19
20		.01				T	T																		.01	20
21																									0	21
22																									0	22
23																			T	T					T	23
24																								T	T	24
25	T	T	T		T	T	T	T	T	T	T	T							T	T	T		T	T	T	25
26	T	T	T	.01	T	T																T	.04	.09	.14	26
27	.05	.01	.01																						.07	27
28																									0	28
29																									0	29
30																									0	30
31																									0	31

"T" Indicates a trace, or amount too small to measure.

Monthly Total..... 0.40

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

MONTHLY CLIMATOLOGICAL SUMMARY

With Comparative Data

STATION Billings, Montana (Municipal Airport) MONTH November, 1948
 Phone 5431 ; 105th Meridian Time; Lat. 45° 48' N, Long. 108° 32' W; Elevation 3570 ft.

DATE	TEMPERATURE °F					PRECIPITATION				WIND		WEATHER	
	MAXIMUM	MINIMUM	MEAN	DEPARTURE FROM NORMAL	DEGREE DAYS BASE 65°	TOTAL (INCHES)	SNOWFALL (INCHES) (UNMELTED)	DEPTH OF SNOW ON THE GROUND 5:30 P.M.	PREVAILING DIRECTION	HIGHEST VELOCITY (*)	DIRECTION	PERCENT OF POSSIBLE SUNSHINE	AVERAGE CLOUDINESS SCALE 0 TO 10
1	51	36	44	+3	21	T	0	0	NE	15	NW	60	8
2	54	34	44	+3	21	T	0	0	NE	17	NW	74	4
3	53	37	45	+5	20	.05	0	0	SW	32	NW	13	9
4	44	31	38	-2	27	.02	0	0	NW	42	NW	18	9
5	49	21	35	-5	30	0	0	0	SW, W, NW	29	W	73	8
6	40	29	34	-5	31	0	0	0	SW	21	NW	24	9
7	37	21	29	-10	36	0	0	0	SW	18	NW	70	5
8	39	19	29	-9	36	0	0	0	SW	27	NW	9	9
9	44	30	37	-1	28	T	0	0	W	28	NW	40	9
10	42	26	34	-4	31	T	0	0	NW	47	NW	66	7
11	45	25	35	-2	30	T	0	0	W	26	W	55	6
12	53	27	40	+3	25	T	T	0	SW	24	NW	49	9
13	51	36	44	+8	21	T	0	0	NW	45	W	76	6
14	64	32	48	+12	17	0	0	0	SW	26	SW	64	8
15	57	35	46	+10	19	T	T	0	SW	29	NW	5	9
16	48	27	38	+3	27	0	0	0	SW	26	W	23	9
17	41	30	36	+1	29	T	T	0	NW	34	NW	66	5
18	40	23	32	-2	33	0	0	0	NW	17	NW	78	4
19	40	18	29	-5	36	T	T	T	SW	21	W	72	9
20	38	29	34	0	31	.02	0.5	T	SW	14	NW	0	9
21	42	30	36	+3	29	T	T	0	SW	17	SW	78	4
22	43	30	36	+3	29	T	T	0	SW	34	W	0	9
23	44	32	38	+6	27	T	0	0	SW	21	SW	44	9
24	48	34	41	+9	24	T	T	0	SW	35	NW	39	8
25	41	29	35	+3	30	0	0	0	W	25	W	41	5
26	35	22	28	-3	37	0	0	0	SW, NW	24	NW	5	9
27	32	18	25	-6	40	0	0	0	SW	27	W	96	2
28	46	26	36	+6	29	0	0	0	SW	34	SW	57	8
29	38	24	31	+1	34	0	0	0	W	36	NW	68	5
30	43	16	30	0	35	0	0	0	SW	26	SW	1	9
31													
MEAN	44.7	27.6	36.2	+0.8	863	0.09	0.5		SW	47	NW	45	7.3
Normal	-	-	35.4	-	889	-	-		-	Nov. 10	-	-	-
(*) For 5-minute period													
PRESSURE	Mean					Highest				Date		Lowest	
Station	26.250	in.	888.9	mb.	26.645	in.	902.1	mb.	18	25.735	in.	871.7	mb.
Sea Level	29.98	in.	1015.2	mb.	30.45	in.	1031.2	mb.	18	29.36	in.	994.2	mb.

TEMPERATURE:—Mean this month last year 30.9. This month since 1934: warmest 42.8 on 1934; coldest 29.0 on 1940. Highest 64 date 14; lowest 16 date 30. This month since 1934: highest 74 date 6, 1934; lowest 7 date 21, 1946. Average daily departure since Jan. 1, 0.7. Degree days: since July 1, 1443; normal 1687; since Sept. 1, 1432, normal 1642. Number of days:—Max. 100° or above 0; 90° or above 0;—Min. 32° or below 0; 0° or below 0;—10° or below 0. Normal number:—Max. 100° or above —; 90° or above —;—Min. 32° or below —; 0° or below —;—10° or below —.

PRECIPITATION:—Departure —. Total since Jan. 1, 7.19, Dep. —; total since July 1, 1.94, Dep. —. Total this month last year 0.63. This month since 1934: wettest 1.20 in 1941, driest T in 1934. Greatest this month in: Greatest this month since 1941, in: SNOWFALL—Total since July 1, 0.5, Dep. —.
 5 min. T date ✓ 5 min. 02 date —, 1942 Greatest monthly, this month since 1935, 14.9 in 1936;
 10 min. 01 date 3 10 min. 03 date —, 1942 least monthly this month since 1935, 0 in 1935.
 15 min. 01 date 3 15 min. — date —, — Greatest in 24 hrs. 0.5, date 20;
 20 min. 02 date 3 20 min. 05 date 5, 1945 this month since 1939, 4.5 date 29-30, 1942.
 30 min. 02 date 3 30 min. 07 date 29, 1942 Greatest any single storm — date —;
 1 hr. 04 date 3 1 hr. 10 date 29, 1942 this month since —, date —.
 2 hr. 04 date 3 2 hr. 18 date 29, 1942 Greatest on ground 0.4, date 20;
 24 hr. 07 date 3-4 24 hr. 49 date 17, 1941 this month since 1939, 5.0 date 29, 1942.
 Number of days with precipitation: trace 14; 0.01 inch or more 3; 0.25 inch or more 0; 1 inch or more 0; 2 inches or more 0.
 Normal number of days with precipitation: trace —; 0.01 inch or more —; 0.25 inch or more —; 1 inch or more —; 2 inches or more —.
 Greatest number of days this month since 1939 with precipitation: 0.01 inch or more, 11 in 1947; least number 1 in 1939.
 (✓) Trace on 1, 2, 3, 4, 9, 10, 11, 12, 13, 15, 17, 19, 20, 21, 22, 23, 24.

CHARACTER OF DAY:—Number of days clear 1; partly cloudy 10; cloudy 19. Normal number clear 6; partly cloudy 9; cloudy 15.
 SUNSHINE:—Total hours this month 130. Total hours possible on 1st 10.1 on 16th 9.5; on last day 9.0; this month 285.2.
 MISCELLANEOUS PHENOMENA (DATES):—Hail —; Sleet —; Glaze —.

Fog: Light —; Moderate 20; Heavy 20.
 Frost: Light —; Heavy —; Killing —.
 Thunderstorms —; Duststorms —; Tornadoes —; Hurricanes —.

a. City Office. b. Airport. c. Total. d. Monthly. e. Sunrise to sunset: 0 to 3, clear; 4 to 7, partly cloudy; 8 to 10, cloudy. f. other dates, g. Light fog, visibility 6 miles to 3,300 ft.; moderate, 3,299 to 1,650 ft.; heavy, 1,649 ft. to 0. h. Frosts not recorded in autumn after first "killing" except in Florida and along immediate coast of the Gulf of Mexico. T indicates a trace of precipitation.

MEV:m

L. T. Pierce, Meteorologist.

Official in Charge, Weather Bureau

STATION Billings, Montana MONTH November, 1948

PSYCHROMETRIC DATA taken at Municipal Airport

	5:30 a.m. MST				11:30 a.m. MST				5:30 p.m. MST				11:30 p.m. MST			
Date	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.
1	39.5	38.2	37	90	44.2	40.8	37	76	48.2	40.8	32	53	48.0	41.3	34	58
2	39.1	36.7	34	81	44.1	40.0	35	71	50.1	43.0	36	57	42.5	37.8	32	67
3	48.9	39.1	27	41	50.6	41.4	31	46	43.0	37.2	30	59	38.2	35.4	32	78
4	36.2	31.1	24	57	39.9	35.0	28	63	41.1	33.9	24	48	37.1	31.7	24	56
5	26.4	22.5	14	55	41.8	32.5	18	35	43.3	34.8	23	42	31.8	26.4	16	48
6	33.0	26.0	12	36	36.7	29.7	18	42	37.5	30.0	17	40	34.2	28.5	19	49
7	25.1	22.2	16	65	32.8	27.6	18	51	33.6	27.0	14	41	30.9	27.1	21	62
8	21.8	19.0	12	65	35.1	28.9	18	46	36.6	28.5	13	34	24.0	21.0	14	63
9	31.2	25.7	15	46	38.0	30.3	17	39	40.5	31.2	15	32	31.0	27.0	20	60
10	39.0	34.2	28	63	37.7	32.8	26	61	34.7	29.0	20	50	41.4	33.0	20	39
11	30.1	26.1	19	59	40.8	32.4	19	39	40.0	31.6	18	38	26.0	23.2	18	68
12	28.8	27.8	26	89	34.4	31.4	27	73	44.8	37.1	27	48	40.1	34.0	26	54
13	43.9	39.0	33	65	49.5	37.0	19	27	45.0	34.1	17	29	42.6	35.9	27	52
14	34.0	27.9	17	45	50.9	39.0	23	32	58.4	42.8	24	25	39.6	32.8	23	48
15	53.8	43.0	31	41	43.2	34.3	21	39	41.2	34.2	25	50	50.4	39.3	25	35
16	31.9	26.1	15	44	32.6	27.1	17	48	43.8	33.5	17	31	35.0	29.8	22	55
17	36.8	32.2	26	63	39.2	30.5	15	34	35.0	27.3	12	34	41.1	34.0	24	48
18	30.3	25.3	15	49	35.0	28.0	15	39	36.1	28.9	16	40	31.4	26.0	16	47
19	21.1	19.1	14	71	33.4	27.0	15	40	33.6	31.9	30	85	23.1	20.0	13	61
20	30.4	30.2	30	98	35.0	33.5	32	87	36.6	34.2	31	81	28.8	28.5	28	96
21	32.4	31.4	30	91	39.4	34.5	28	62	37.1	30.7	21	48	34.1	32.0	29	81
22	34.1	29.2	21	56	39.2	32.5	23	49	42.7	37.8	32	65	31.8	28.2	22	64
23	34.2	31.3	27	73	39.6	34.2	27	59	41.1	35.0	27	55	36.9	34.2	31	78
24	42.6	34.2	22	42	47.8	38.1	26	40	37.8	31.8	23	53	42.8	35.0	24	45
25	31.8	26.9	18	52	38.2	30.5	18	40	33.8	26.5	11	35	35.0	28.7	18	45
26	29.1	22.4	5	32	30.0	25.2	16	51	31.4	24.0	6	29	30.6	26.0	17	53
27	20.3	16.8	7	50	29.3	23.0	8	35	26.2	20.4	4	34	23.0	18.8	7	47
28	30.5	24.0	9	35	41.6	31.2	12	27	39.8	30.4	14	31	26.1	21.9	12	51
29	31.8	24.8	9	33	35.4	27.5	12	33	30.7	23.3	4	29	36.8	30.0	19	44
30	17.3	14.7	7	59	35.4	26.7	8	27	37.8	28.0	7	24	25.2	20.2	7	41
31																
MEAN	32.8	28.2	20	58	39.0	32.1	21	47	39.4	32.0	20	44	34.6	29.6	21	56
Normal																

WIND:—Number of hours this month below 10 mi. 231; 10 mi. and over 489; 15 mi. and over 333; 20 mi. and over 163; 25 mi. and over 55; 30 mi. and over 12; 40 mi. and over 0.

This Month:—Dir.	N	NE	E	SE	S	SW	W	NW	DI	Month
Aver. Hrlly. Vel.	8.6	8.2	4.6	6.2	4.3	12.4	17.4	17.7	0	13.9
Percent of Time	4	4	1	1	4	41	20	25	0	100

Maximum velocity this month since 1939, 56 miles from NW on 30 in 1939

CEILING AND VISIBILITY FREQUENCIES (Based on hourly record observations) at Municipal Airport

Visibility (miles)	Ceiling (feet)									Total
	0	100- 200	300- 400	500- 900	1000- 1900	2000- 2900	3000- 4900	5000- 9500	Over 9500	
0 to 1/8	2	3								5
1/8 to 1/4										0
1/4 to 1/2										0
1 to 2 1/2			1							1
3 to 6			1	2		1				4
7 to 15				3	3	5	5	3		19
20 to 30				1	2	10	32	60	77	182
35 or more							14	101	394	509
Total	2	3	2	6	5	16	51	164	471	720

Frequencies for larger classes can be derived by addition, i.e., "Under 500 feet" from sum of 0, 100-200 and 300-400 classes; "7 miles or more" from sum of classes 7 to 35 miles or more inclusive.

FROST DATA:—Average date of last killing frost in spring May 15; first in autumn September 24
 Latest date of last killing frost in spring June 23, 1903; earliest in autumn August 25, 1910
 Average growing season 132 days; longest 168 days in 1937; shortest 66 days in 1903

GENERAL SUMMARY:— November, 1948 was cloudy and windy. The mean temperature of 36.2 degrees was 0.8 degree above the monthly normal. Temperatures ranged from a high of 64 on the 14th to a low of 16 on the 30th. Precipitation was very light - only 0.09 inch being recorded. A trace of precipitation was reported on 14 days with measurable amounts being recorded on only 3 days. Half an inch of snow fell early the morning of the 20th, but most of it had melted before noon.

A maximum wind velocity of 47 miles and hour from the NW occurred on the 10th.

STATION Billings, Montana MONTH November 1948

HOURLY TEMPERATURES FOR Municipal Airport

Readings made 20 minutes past the hour

Date	A. M.												P. M.												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1	43	42	39	39	40	39	39	37	41	44	44	48	48	50	50	49	48	45	45	43	43	43	42	42	1
2	42	42	41	39	39	36	35	36	38	41	44	48	52	51	54	52	50	48	45	44	43	40	38	41	2
3	44	45	44	45	49	43	46	46	49	51	51	53	45	46	43	41	43	43	40	39	39	38	37	37	3
4	37	36	35	35	36	35	37	36	36	39	40	41	42	43	44	42	41	39	37	36	35	33	32	32	4
5	31	31	30	29	26	25	22	25	33	40	42	47	48	48	46	45	43	39	39	39	38	36	34	32	5
6	33	33	33	33	33	32	32	31	32	34	37	39	40	40	39	39	38	37	37	34	33	32	31	30	6
7	28	27	27	27	25	23	22	24	27	30	33	37	35	35	36	35	34	33	33	27	25	24	24	23	7
8	21	20	19	21	22	22	22	23	26	30	35	38	39	38	38	39	37	36	35	34	33	32	31	31	8
9	32	32	32	31	31	31	31	33	35	38	38	39	42	43	42	41	40	40	42	42	42	42	41	40	9
10	41	41	41	40	39	36	36	35	36	38	38	40	40	40	39	37	35	32	30	30	30	30	26	25	10
11	27	28	29	30	30	30	30	30	33	38	41	43	43	43	42	41	40	40	40	40	40	40	40	40	11
12	38	28	28	29	29	28	27	28	30	30	34	44	49	51	49	46	45	42	43	42	42	42	43	45	12
13	47	45	44	43	44	43	45	46	48	49	50	50	50	49	49	46	45	43	42	43	41	39	40	37	13
14	36	35	36	33	34	33	33	36	42	45	51	62	63	64	64	60	58	58	56	51	53	54	50	56	14
15	56	54	54	54	54	52	43	43	43	43	43	42	39	42	42	42	41	39	38	38	38	37	35	36	15
16	36	35	35	32	32	30	32	27	28	32	33	38	42	43	48	46	44	43	42	41	41	40	41	35	16
17	36	41	37	37	37	38	36	35	36	37	39	40	40	40	39	37	35	34	33	31	31	31	31	30	17
18	30	30	31	31	30	29	29	28	32	34	35	37	38	39	39	38	36	31	30	29	26	24	23	25	18
19	25	25	20	21	21	21	19	19	24	31	33	38	38	40	38	35	34	32	32	31	30	29	29	29	19
20	30	30	30	30	30	31	32	32	32	34	35	35	36	36	37	37	37	36	36	35	35	34	34	34	20
21	33	34	33	33	32	32	32	32	33	36	39	40	40	41	42	38	37	34	34	31	31	32	32	33	21
22	33	34	34	34	34	34	34	35	37	39	39	40	39	40	39	40	43	38	40	38	38	37	37	37	22
23	37	38	38	34	34	34	34	34	34	37	40	43	43	43	43	41	41	42	42	42	42	43	43	43	23
24	42	42	41	42	43	43	41	38	41	46	48	48	45	44	42	40	38	38	37	36	36	36	35	34	24
25	35	33	33	33	32	32	33	33	36	36	38	40	41	39	39	36	34	34	34	32	30	32	31	29	25
26	28	28	29	28	29	27	26	27	25	30	30	32	35	34	34	33	31	30	29	27	25	24	23	22	26
27	24	20	20	20	20	19	21	23	27	28	29	31	32	31	32	29	26	24	24	21	19	24	26	27	27
28	28	29	30	32	30	32	32	32	33	39	42	45	45	46	45	42	40	39	38	37	37	37	37	38	28
29	38	36	34	32	32	31	30	31	33	35	35	36	36	35	33	33	31	30	29	29	27	26	25	25	29
30	24	19	20	16	17	17	17	21	23	29	35	42	42	41	43	39	38	38	38	35	34	36	37	36	30
31																									31

MEAN TEMPERATURE AND TOTAL PRECIPITATION THIS MONTH IN

Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.
1851			1876			1901			1926		
1852			1877			1902			1927		
1853			1878			1903			1928		
1854			1879			1904			1929		
1855			1880			1905			1930		
1856			1881			1906			1931		
1857			1882			1907			1932		
1858			1883			1908			1933		
1859			1884			1909			1934	43	T
1860			1885			1910			1935	33	0.51
1861			1886			1911			1936	37	0.56
1862			1887			1912			1937	36	0.75
1863			1888			1913			1938	34	1.15
1864			1889			1914			1939	43	0.05
1865			1890			1915			1940	29	0.71
1866			1891			1916			1941	40	1.20
1867			1892			1917			1942	35	1.02
1868			1893			1918			1943	40	0.51
1869			1894			1919			1944	35	0.29
1870			1895			1920			1945	35	0.57
1871			1896			1921			1946	32	0.65
1872			1897			1922			1947	31	0.63
1873			1898			1923			1948	36	0.09
1874			1899			1924			1949		
1875			1900			1925			1950		

Note.—The warmest, coldest, driest, and wettest months are underscored.

STATION.....Billings, Montana.....

MONTH.....November....., 1948.....

HOURLY PRECIPITATION (Inches) FOR.....Municipal Airport.....

Date	A. M.												P. M.												Total	Date
	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12		
1	T				T	T		T	T																T	1
2			T	T																					T	2
3					T	T	T						T	T	T	.03	.02								.05	3
4						T	T	.01	.01	T	T														.02	4
5																									0	5
6																									0	6
7																									0	7
8																									0	8
9																						T	T		T	9
10		T				T	T			T															T	10
11																					T	T	T	T	T	11
12	T	T	T	T	T	T																			T	12
13						T																			T	13
14																									0	14
15											T	T	T	T											T	15
16																									0	16
17			T	T																					T	17
18																									0	18
19	.01	.01	T	T	T	T	T	T	T	T						T	T	T	T	T	T	T	T	T	T	19
20																	T	T		T	T	T	T		.02	20
21		T	T		T																				T	21
22														T	T	T		T	T	T					T	22
23																						T	T		T	23
24																	T	T	T						T	24
25																									0	25
26																									0	26
27																									0	27
28																									0	28
29																									0	29
30																									0	30
31																										31

"T" Indicates a trace, or amount too small to measure.

Monthly Total..... 0.09

U. S. DEPARTMENT OF COMMERCE, WEATHER BUREAU

MONTHLY CLIMATOLOGICAL SUMMARY

With Comparative Data

STATION Billings, Montana (Municipal Airport) MONTH October, 1948Phone 5451; 105th Meridian Time; Lat. 45° 48' N, Long. 108° 32' W; Elevation 3570 ft.

DATE	TEMPERATURE °F					PRECIPITATION			WIND		WEATHER	
	MAXIMUM	MINIMUM	MEAN	DEPARTURE FROM NORMAL	DEGREE DAYS BASE 65°	TOTAL (INCHES)	SNOWFALL (INCHES) (UNMELTED)	DEPTH OF SNOW ON THE GROUND P. M.	HIGHEST VELOCITY (*)	DIRECTION	PERCENT OF POSSIBLE SUNSHINE	AVERAGE CLOUDINESS SCALE 0 TO 10
1	62	36	49	-5	16	0	0	0	13	N	89	2
2	71	36	54	0	11	0	0	0	12	SW	91	2
3	84	45	64	+11	1	0	0	0	12	SW	79	9
4	76	56	66	+13	0	0	0	0	31	SW	66	9
5	58	35	46	-6	19	0.02	0	0	29	NW	51	9
6	50	36	43	-9	22	0	0	0	27	NW	76	5
7	66	28	47	-5	18	0	0	0	24	SW	82	8
8	62	40	51	0	14	0	0	0	17	NE	83	8
9	69	32	50	-1	15	0	0	0	14	SW	100	1
10	69	37	53	+2	12	0	0	0	12	N	100	2
11	74	34	54	+4	11	0	0	0	13	SW	100	0
12	72	38	55	+5	10	0	0	0	18	SW	100	1
13	77	43	60	+11	5	0	0	0	18	SW	100	1
14	75	38	56	+7	9	0	0	0	29	SW	93	5
15	62	32	47	-2	18	T	#T	0	34	NW	8	9
16	41	26	34	-14	31	0	0	0	27	N, NW	100	1
17	57	20	38	-10	27	0	0	0	31	SW	100	1
18	69	37	53	+6	12	0	0	0	22	SW	100	1
19	74	34	54	+7	11	0	0	0	21	SW	100	3
20	69	34	52	+6	13	0	0	0	13	SW	100	3
21	75	42	58	+12	7	0	0	0	29	SW	84	7
22	69	37	53	+7	12	0	0	0	16	SW	95	3
23	79	47	63	+18	2	0	0	0	23	SW	100	4
24	77	47	62	+17	3	0	0	0	27	SW	100	6
25	60	40	50	+6	15	T	0	0	29	NW	84	3
26	61	31	46	+2	19	0	0	0	17	SW	95	5
27	51	35	43	0	22	0	0	0	16	NE	100	1
28	55	26	40	-3	25	0	0	0	14	NE	100	3
29	48	32	40	-3	25	T	0	0	13	SW	2	10
30	61	31	46	+4	19	0	0	0	21	SW	100	2
31	55	34	44	+2	21	T	0	0	15	SW	17	9

MEAN 65.4 36.1 50.8 -2.8 445 0.02 #T SW 34 NW 84 4.3
 Normal: 48.0 33.0 45.5 -1.5 530 0.02 #T SW 34 NW 84 4.3

(*) for 5-minute period (#) melted as it fell Oct. 15

PRESSURE	Mean				Highest				Date		Lowest				Date	
Station	26.356	in.	892.7	mb.	26.810	in.	907.9	mb.	16	25.892	in.	876.7	mb.	5		
Sea Level	30.03	in.	1016.9	mb.	30.63	in.	1037.3	mb.	16	29.44	in.	997.0	mb.	5		

TEMPERATURE:—Mean this month last year 52.9. This month since 1934: warmest 54.2 in 1944; coldest 42.6 in 1946.
 Highest 84 date 3; lowest 20 date 17. This month since 1934 highest 86 date 4, 1943; lowest 4 date 31, 1935.
 Average daily departure since Jan. 1 0.6. Degree days: since July 1, 580; normal 728; since Sept. 1, 569; normal 753.
 Number of days:—Max. 100° or above 0; 90° or above 0;—Min. 32° or below 9; 0° or below 0;—10° or below 0.
 Normal number:—Max. 100° or above —; 90° or above —;—Min. 32° or below —; 0° or below —;—10° or below —.

PRECIPITATION:—Departure —. Total since Jan. 1 7.10, Dep. —; total since July 1 1.85, Dep. —.
 Total this month last year 0.52. This month since 1934: wettest 2.47 in 1940, driest 0.02 in 1948.

Greatest this month in: Greatest this month since 1941 in: SNOWFALL:—Total since July 1, T, Dep. —.
 5 min. T date 3 5 min. 03 date 11, 1947. Greatest monthly, this month since 1935 7.3 in 1946.
 10 min. T date 3 10 min. 04 date 11, 21 1947. least monthly this month since 1935, T in 1943.
 15 min. T date 3 15 min. — date —. Greatest in 24 hrs. T date 15, 1948.
 20 min. 01 date 5 20 min. 06 date 21, 1947. this month since 1935, 5.0 date 15, 1946.
 30 min. 01 date 5 30 min. 07 date 21, 1947 (f) Greatest any single storm T date 15.
 1 hr. 01 date 5 1 hr. 13 date 13, 1945. this month since 1935, 5.0 date 15, 1946.
 2 hr. 02 date 5 2 hr. 21 date 13, 1942. Greatest on ground 0 date —.
 24 hr. 02 date 5 24 hr. 99 date 4-5, 1941. this month since 1935, 4.0 date 15, 1946.

Number of days with precipitation: trace 5; 0.01 inch or more 1; 0.25 inch or more 0; 1 inch or more 0; 2 inches or more 0.
 Normal number of days with precipitation: trace —; 0.01 inch or more —; 0.25 inch or more —; 1 inch or more —; 2 inches or more —.
 Greatest number of days this month since 1939 with precipitation: 0.01 inch or more, 9 in 1940; least number 1 in 1944.
 (✓) T on 4, 5, 15, 25, 29, 31

CHARACTER OF DAY:—Number of days clear 17; partly cloudy 6; cloudy 8. Normal number clear 2; partly cloudy 11; cloudy 11.
 SUNSHINE:—Total hours this month 284. Total hours possible on 1st 11.7; on 16th 10.9; on last day 10.2; this month 338.6.

MISCELLANEOUS PHENOMENA (DATES):—Hail —; Sleet —; Glaze —.

Fog: Light —; Moderate —; Heavy —.
 Frost: Light —; Heavy —; Killing 7.
 Thunderstorms —; Duststorms —; Tornadoes —; Hurricanes —.

a. City Office. b. Airport. c. Total. d. Monthly. e. Sunrise to sunset: 0 to 3, clear; 4 to 7, partly cloudy; 8 to 10, cloudy. f. Frost not recorded in autumn after first "killing" except in Florida and along immediate coast of the Gulf of Mexico. T indicates a trace of precipitation.

MEV:m

L. T. Pierce, Meteorologist.

Official in Charge, Weather Bureau.

STATION Billings, Montana MONTH October, 1948

PSYCHROMETRIC DATA taken at Municipal Airport

Date	5:30 a.m. MST				11:30 a.m. MST				5:30 p.m. MST				11:30 p.m. MST			
	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.	Dry	Wet	Dew Pt.	Rel. Hum.
1	38.5	34.1	28	65	53.0	42.2	30	40	60.0	46.3	32	35	43.4	36.5	28	52
2	38.4	35.1	31	74	60.1	48.2	37	42	63.3	52.2	38	33	48.6	40.8	32	52
3	46.3	42.0	37	71	71.4	53.9	40	32	76.9	54.9	37	23	55.1	46.7	39	53
4	61.4	50.6	42	48	71.7	53.5	38	30	69.8	52.0	36	29	67.0	48.8	30	25
5	47.8	42.2	36	64	50.0	39.0	25	36	49.7	37.2	19	27	58.3	46.9	36	43
6	38.7	30.8	18	40	45.7	34.2	16	27	48.4	34.4	9	18	36.3	31.2	24	58
7	30.1	25.0	15	48	57.7	42.2	23	24	61.8	45.0	26	24	39.3	30.1	13	31
8	54.8	42.8	29	37	57.6	41.2	19	20	56.9	42.3	24	27	58.3	44.8	30	34
9	34.8	29.4	21	52	51.3	39.8	25	35	66.7	48.9	31	26	41.6	33.2	21	40
10	39.7	31.0	16	34	56.6	42.1	24	27	67.1	47.4	26	20	52.2	40.1	25	33
11	39.4	33.0	24	51	58.0	45.3	32	36	71.4	50.4	30	21	49.4	37.7	22	31
12	45.8	38.1	29	50	56.4	44.1	31	37	70.6	50.0	29	21	58.0	43.8	28	31
13	46.3	38.8	30	51	66.2	49.2	32	28	72.6	50.5	28	19	58.9	43.9	26	28
14	41.0	36.2	30	64	58.2	45.3	32	36	69.7	50.9	33	26	50.7	40.9	29	43
15	57.9	47.7	38	48	44.8	35.8	23	41	33.6	32.0	30	86	60.7	51.0	43	52
16	29.6	26.3	21	65	37.3	31.8	24	55	38.2	30.7	18	41	32.9	30.7	28	79
17	30.2	24.8	14	45	48.9	36.0	14	22	54.0	39.1	18	22	26.2	22.7	15	58
18	41.8	33.2	20	39	56.1	42.5	26	30	64.1	44.7	20	17	47.3	36.0	19	30
19	40.8	33.3	22	45	65.1	46.1	24	20	68.0	45.5	16	12	46.1	35.0	18	30
20	39.4	31.9	21	43	56.9	42.8	26	29	64.5	46.0	25	21	48.1	35.8	17	26
21	42.5	34.7	24	46	65.8	46.3	24	19	70.1	47.9	22	16	45.2	36.0	23	40
22	41.1	34.1	24	49	52.9	41.7	28	38	63.9	46.5	27	24	56.6	43.5	29	33
23	47.2	38.0	26	42	68.4	49.0	29	23	72.9	48.8	21	13	54.0	41.0	29	38
24	56.8	41.4	21	23	71.1	48.4	23	15	70.9	48.5	23	16	63.2	44.6	22	19
25	49.5	39.6	27	41	52.9	41.0	26	34	56.0	42.5	26	31	55.2	44.0	32	41
26	31.6	27.9	22	64	52.7	41.2	27	36	56.8	41.2	21	20	42.0	34.0	23	44
27	39.0	34.2	28	63	45.9	38.2	29	50	47.8	38.1	26	41	45.0	35.6	22	38
28	28.4	25.9	22	72	42.7	35.0	25	47	50.8	40.0	27	38	36.8	31.2	23	54
29	37.0	31.8	24	57	43.3	38.0	32	62	46.0	40.4	34	63	40.2	34.7	27	58
30	35.6	33.2	30	80	54.8	44.0	32	42	55.2	42.0	26	31	41.5	37.6	33	71
31	40.0	33.2	24	50	44.5	36.2	25	44	52.5	42.0	30	41	44.6	36.6	26	47
MEAN	41.7	34.8	26	56	55.4	42.4	27	34	60.5	44.5	26	28	48.5	38.6	26	42
Normal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

WIND:—Number of hours this month below 10 mi. 377; 10 mi. and over 367; 15 mi. and over 150; 20 mi. and over 52; 25 mi. and over 18; 30 mi. and over 0; 40 mi. and over 0.

This Month:—Dir.	N	NE	E	SE	S	SW	W	NW	DI	Month
Aver. Hly. Vel.	10.0	8.0	7.1	5.4	4.3	10.5	12.3	14.8	1.0	10.4
Percent of Time	14	8	4	2	4	49	7	12	0	100

Maximum velocity this month since 1939, 50 miles from NW on 24 in 1942.

CEILING AND VISIBILITY FREQUENCIES (Based on hourly record observations) at Municipal Airport

Visibility (miles)	Ceiling (feet)									
	0	100- 200	300- 400	500- 900	1000- 1900	2000- 2900	3000- 4900	5000- 9500	Over 9500	Total
0 to 1/8										0
1/8 to 1/4										0
1/4 to 1/2										0
1 to 2 1/2										0
3 to 6						2				2
7 to 15				1		1		7	1	10
20 to 30							5	28	125	158
35 or more								23	551	574
Total	0	0	0	1	0	3	5	58	677	744

Frequencies for larger classes can be derived by addition, i.e., "Under 500 feet" from sum of 0, 100-200 and 300-400 classes; "7 miles or more" from sum of classes 7 to 35 miles or more inclusive.

FROST DATA:—Average date of last killing frost in spring May 15; first in autumn September 24.
Latest date of last killing frost in spring June 23, 1903; earliest in autumn August 25, 1910.
Average growing season 132 days; longest 168 days in 1937; shortest 66 days in 1903.

GENERAL SUMMARY:— October, 1948 was warm and dry. Total precipitation amounted to only 0.02 inch, making it the driest on record since airport records were begun in 1935. A trace of snow fell on the 15th, but melted as it fell.

The monthly mean temperature of 50.8 is 2.8 degrees above the monthly normal. Temperatures ranged from a maximum of 84 on the 3rd to a minimum of 20 on the 17th.

No excessively strong wind velocities were recorded during the month. A maximum velocity of 34 mph from the northwest was registered on the 15th.

Auroras were noted on the 1, 2, 9, 10, 19 and 27th.

STATION Billings, Montana MONTH October 1948

HOURLY TEMPERATURES FOR Municipal Airport

Readings made 20 minutes past the hour

Date	A. M.												P. M.												Date
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1	43	42	41	40	38	38	39	42	46	51	53	55	57	61	61	61	60	57	54	52	49	49	49	47	1
2	47	42	45	39	38	37	39	43	50	56	60	64	70	71	71	70	68	63	62	62	62	57	55	52	2
3	50	50	46	46	46	48	50	55	63	69	71	78	82	80	80	78	77	75	74	71	72	67	67	66	3
4	64	62	59	65	61	60	60	61	63	70	72	76	74	75	73	71	70	67	66	59	58	59	58	57	4
5	55	53	49	49	48	44	44	45	48	49	50	52	52	51	50	50	50	44	42	39	39	39	36	35	5
6	37	36	37	38	39	38	39	39	41	44	46	47	48	50	50	50	48	44	44	42	40	40	39	37	6
7	34	32	32	31	30	33	37	41	47	53	58	61	63	62	66	61	62	59	58	59	57	58	58	58	7
8	56	58	55	55	55	51	51	52	53	56	58	59	59	61	61	58	57	57	48	46	44	44	42	40	8
9	41	40	39	39	35	33	34	35	42	48	51	58	61	65	68	68	67	64	62	56	53	50	52	50	9
10	45	44	43	40	40	38	38	40	45	51	57	60	64	68	69	69	67	62	57	54	52	50	49	47	10
11	48	47	40	39	39	38	37	40	45	53	58	67	70	73	72	73	71	65	61	57	57	58	58	50	11
12	44	47	50	49	46	39	42	42	47	54	56	63	65	68	71	72	71	66	61	61	61	59	59	58	12
13	56	48	46	48	46	44	48	53	57	62	66	71	75	75	76	75	73	64	61	59	54	53	51	49	13
14	48	48	47	46	41	41	41	43	48	53	58	65	70	72	75	73	70	68	65	64	62	62	61	62	14
15	61	60	58	59	58	52	45	45	44	45	45	42	37	34	35	34	34	32	32	32	32	32	33	32	15
16	32	32	32	31	30	26	27	29	32	34	37	40	40	41	40	40	38	35	33	32	30	28	26	26	16
17	24	21	25	27	30	30	34	36	40	45	49	52	53	56	57	56	54	50	50	49	47	48	47	47	17
18	48	44	41	40	42	38	40	42	48	53	56	62	65	68	68	67	64	59	58	56	50	50	46	41	18
19	38	38	36	38	41	40	37	41	52	58	65	66	70	72	73	71	68	61	58	57	58	53	48	46	19
20	45	44	44	38	39	37	38	41	46	52	57	63	66	66	69	67	64	60	58	53	52	48	45	47	20
21	44	47	46	43	42	45	45	48	55	63	66	71	73	74	74	73	70	67	64	61	57	56	57	52	21
22	52	49	45	46	41	40	39	39	44	48	53	59	65	68	68	68	64	62	59	57	55	52	54	53	22
23	50	55	52	51	47	48	51	48	57	64	68	76	78	78	78	75	73	68	66	64	58	61	63	61	23
24	55	52	56	57	57	52	47	52	60	66	71	75	75	77	76	74	71	67	65	66	65	59	55	54	24
25	54	52	52	50	50	48	47	47	50	51	53	56	57	57	58	58	56	53	51	50	47	45	42	41	25
26	36	33	35	33	32	34	36	35	39	45	53	58	61	60	60	59	57	50	47	46	45	43	45	45	26
27	43	40	40	39	39	38	38	40	43	45	46	48	50	49	50	49	48	44	43	40	39	37	37	36	27
28	37	32	32	31	28	28	26	30	32	40	43	48	51	53	54	53	51	48	48	48	46	41	40	40	28
29	39	36	34	34	37	35	38	41	43	43	43	44	45	46	47	48	46	45	44	44	43	42	42	40	29
30	35	34	35	34	36	35	34	35	44	51	55	58	59	61	60	58	55	53	51	50	47	46	45	45	30
31	43	41	39	37	40	36	37	38	41	43	44	51	52	52	55	54	52	51	50	48	49	48	48	45	31

MEAN TEMPERATURE AND TOTAL PRECIPITATION THIS MONTH IN

Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.	Year	Temp.	Precip.
1851			1876			1901			1926		
1852			1877			1902			1927		
1853			1878			1903			1928		
1854			1879			1904			1929		
1855			1880			1905			1930		
1856			1881			1906			1931		
1857			1882			1907			1932		
1858			1883			1908			1933		
1859			1884			1909			1934		
1860			1885			1910			1935	48	0.59
1861			1886			1911			1936	51	0.41
1862			1887			1912			1937	52	2.45
1863			1888			1913			1938	52	1.74
1864			1889			1914			1939	49	0.92
1865			1890			1915			1940	53	2.47
1866			1891			1916			1941	46	1.24
1867			1892			1917			1942	51	1.20
1868			1893			1918			1943	53	0.29
1869			1894			1919			1944	54	0.03
1870			1895			1920			1945	52	0.30
1871			1896			1921			1946	43	2.14
1872			1897			1922			1947	53	0.52
1873			1898			1923			1948	51	0.02
1874			1899			1924			1949		
1875			1900			1925			1950		

Note:—The warmest, coldest, driest, and wettest months are underscored.

STATION Billings, Montana

MONTH October, 1948

HOURLY PRECIPITATION (Inches) FOR Municipal Airport

Date	A. M.												P. M.												Total	Date	
	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12			
1																									0.00	1	
2																									0	2	
3																									0	3	
4																									T	4	
5	T				T	.02	T																T	T	T	.02	5
6																									0	6	
7																									0	7	
8																									0	8	
9																									0	9	
10																									0	10	
11																									0	11	
12																									0	12	
13																									0	13	
14																									0	14	
15			T		T							T	T	T	T	T	T								T	15	
16																									0	16	
17																									0	17	
18																									0	18	
19																									0	19	
20																									0	20	
21																									0	21	
22																									0	22	
23																									0	23	
24																									0	24	
25				T	T	T																			T	25	
26																									0	26	
27																									0	27	
28																									0	28	
29							T		T	T	T	T	T						T	T					T	29	
30																									0	30	
31																							T	T	T	31	

"T" Indicates a trace, or amount too small to measure.

Monthly Total.....0.02